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ENGLISH FOR THE DIGITAL AGE

Exploring Technology through Reading, Listening, Speaking & Writing

Textbook

КИЇВСЬКИЙ УНІВЕРСИТЕТ 2025

UDC 37.091.33:004.775]:811.111-043.2(075)=111
S827

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Recommended by the Academic Council of
Educational and Scientific Institute of Philology
(Protocol №10 dated 27 May 2025)

Stepanenko O.

S827 English for the Digital Age: Exploring Technology through Reading, Listening, Speaking & Writing : Textbook. / Olena Stepanenko, Dmytro Kostenko, Kateryna Palamarchuk. – Kyiv: PPC "Kyiv University", 2025. – 177 p.

ISBN 978-966-933-334-6

English for the Digital Age: Exploring Technology through Reading, Listening, Speaking & Writing is a comprehensive textbook designed specifically for students in the field of Information Technology. It features 10 thematic units that explore key topics and trends in contemporary English-speaking discourse, including those relevant to the tech industry. The course materials aim to build students’ confidence and language proficiency through structured, communication-based tasks. Emphasis is placed on the development of advanced reading, listening, writing, and speaking skills in English, with a focus on real-world applications in IT contexts. A textbook can be used by English language teachers of higher education institutions and students who study computer sciences and information technologies.

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PREFACE

Communicating clearly in English is just as important as mastering code. **English for the Digital Age: Exploring Technology through Reading, Listening, Speaking & Writing** helps students expand their language skills while engaging with the latest trends and tools in computing, cybersecurity, and robotics.

Each unit offers authentic texts, technical vocabulary practice, real-world listening examples, and opportunities for speaking and writing – helping learners express ideas with accuracy and confidence in an IT context.

This coursebook covers 10 logically structured topics, introduced in the following units: *Computers in History, Types of Computers, Quantum Computers and the Quantum Internet, Printers, Social Networking and Internet Addiction, Digital Fingerprinting, Cybersecurity Threats. Hackers, Smart Homes, Robots,* and *Professional Gaming*.

It contains up-to-date, professionally written texts to provide challenging reading for B2-level students who already possess IT and computing knowledge in their native language.

Each unit includes:

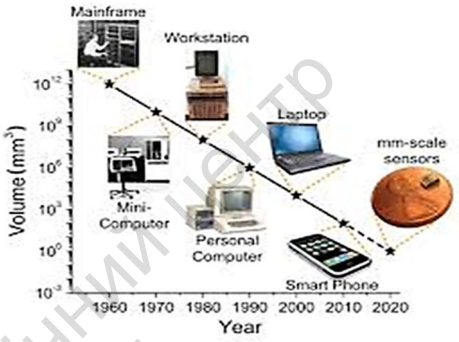
- Inspirational quotes
- A set of pictures
- Vocabulary exercises
- Video-based tasks
- Communicative speaking activities
- Writing and reading comprehension tasks
- Use of English exercises
- Word cloud activities
- Quizzes for review and self-assessment

This coursebook can also be used for self-study, which is why an Appendix and Answer Key are included. It consolidates and extends students' knowledge of English for Specific Purposes (ESP), IT, and Computer Science by applying a skills-based approach to understanding modern computing topics.

UNIT 1
COMPUTERS IN HISTORY

"We are changing the world with technology."
– Bill Gates, CEO, philanthropist

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?



TEXT A

Key Vocabulary: personal computers, individual models, to become affordable, Internet gateways, to take a backseat to larger brands, advertising, special model names, a major selling point, to make a comeback, to be a huge investment, to determine, to be running, to pick favorites, tech-savvy programmers

Task 2. Read the text and answer the questions

10 Most Popular Computers in History

As personal computers became affordable, must-have Internet gateways in the late 1990s, individual models took a backseat to larger brands. Dell didn't bother advertising special model names. It just advertised one major selling point: cheap. When Apple made a comeback with iMacs, and later MacBooks and MacBook Pros, you were either a Mac person or a PC person. Whether that PC was a Dell, or an HP, or an ASUS didn't make much difference.

But when the PC market was younger, smaller and much more expensive, things were different. Your PC was everything. In the late 1970s and 1980s, buying a computer was a huge investment, likely costing thousands of dollars and determining what kind of software you'd be running for the next several years. As a result, computer hobbyists picked favorites. And they stuck by them.

The wars between IBM fans, Tandy owners, Apple devotees and Commodore diehards were fiercer than any Mac versus PC argument. As a result, those early systems had an immense impact on those early home computer users, creating a generation of tech-savvy programmers. Ask any of them about their first (or favorite) computer, and they'll be able to tell you exactly what it was.

A few extremely popular breakout models sold millions of units. These are 10 of the most popular computers ever built. Your favorite may be among them [1].

Questions:

1. How did the PC market change as personal computers became more affordable and widespread in the late 1990s?
2. Why was buying a computer a significant investment for individuals in the late 1970s and 1980s?
3. How did the loyalty and devotion of early computer hobbyists to their preferred brands and models differ from the later Mac versus PC debates?
4. What were some of the most popular and influential computer models that sold millions of units?
5. How did the emergence of larger computer brands like Dell and Apple affect the importance of individual computer models?
6. What impact did the early home computer users have on the development of technology and programming?

Task 3. Match the words and make up 10 sentences

personal	models
Internet	computers
PC	dollars
huge	point
thousands of	a result
as	investment
selling	users
individual	fans
IBM	gateways
computer	person

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key Vocabulary: to release a computer, even by standards, to make an attractive entry point, to aspire hobbyists, to be infamously slow, to contain, to handle all of processing, to refresh external display, to speed up calculations, to improve functions, to increase the computer's capabilities, to bear some similarities, the go-to storage medium

Task 5. Read the text and ask 5 questions

Timex Sinclair 1000 and Tandy TRS-80

In 1981, Sinclair released a computer at a price that is still crazy 30 years later: $99.95. The Timex Sinclair 1000, also known as the ZX81, was small, ran on BASIC, and offered a mere 2KB of RAM to go with its 3.25 MHz processor. Even by 1981's standards, it was slow – but it also cost a mere 100 bucks, making it an attractive entry point for aspiring hobbyists who couldn't spend a thousand dollars on a PC.

Thanks to its price, the Timex Sinclair 1000 sold over 600,000 units in the United States. The Timex Sinclair 1000's performance was infamously slow – because the computer contained a mere four chips, it relied on its CPU to handle all of its processing and refresh whatever external display it was attached to. Switching to "FAST" mode would speed up calculations but cause a terrible screen refresh rate. Thankfully, the computer supported tons of expansions, like floppy drives and RAM add-ons, that greatly improved its functionality.

Radio Shack sold computers under its very own brand. And they were hugely successful. In the 1970s, when cassette tapes, and not floppy disks, were the go-to storage medium for computers, Tandy put out a personal computer called the TRS-80. Thanks to the TRS-80, the Tandy name was as big as IBM or Apple or Commodore in the PC market of the 1980s.

The TRS-80 launched in 1977, before the home computer market had really exploded. Tandy offered its first model with 4K of RAM, a 1.77 MHz processor and a 12-inch monitor for $600. Later models and a $300 Expansion Interface greatly increased the computer's capabilities, adding floppy support, extra ports and more memory.

Tandy's TRS-DOS (disk operating system) was a popular OS predating MS-DOS. Microsoft's early operating system bore some similarities to TRS-DOS – no surprise, since Tandy sold more than 200,000 units and followed the TRS-80's success with more popular systems such as the 1980 Color Computer, or CoCo. [1]

Task 6. Work in pairs and discuss your questions

Task 7. Find in the text English equivalents for the words below

Касетні плівки, інтерфейс, монітор, системи, ПК, процесор, додатки для оперативної пам'яті, стандарти, функціональність, точка входу, дискова операційна система, швидкість оновлення екрана, додаткові порти, мікросхеми, оновлювати.

TEXT C

Key Vocabulary: to be ruled by companies, hardware giants, a unique computer, to stand for, to apply to a number of similar systems, to be created by, to become a global hardware standard, to be spearheaded, a popular range of computers, to be a monstrous success, to be eventually dominated

Task 8. USE OF ENGLISH. Read the text and choose the correct answer

1	A were ruling	B ruled	C were ruled	D ruling
2	A being created	B created	C creating	D having created
3	A expensive	B expensively	C more expensive	D expense
4	A had sold	B sold	C was sold	D has sold
5	A much	B highly	C very	D many
6	A Although	B Since	C While	D However
7	A system	B system's	C systems'	D systems
8	A 1980s	B the 1980s	C decade of 1980s	D 80s
9	A Even though	B Despite	C Although	D Whereas
10	A might	B mighty	C mightily	D mighted

MSX and NEC PC-98

While the United States and European markets 1)_____ by companies like IBM, Commodore, Sinclair and Apple, Japan had its own hardware giants in the '80s. The MSX is a unique computer, because its name, which could stand for Microsoft Extended Basic or Machines with Software Exchangeability, actually applied to a number of similar systems 2)_____ by Japanese companies like Toshiba and Sony.

MSX was designed to be a hardware standard and was spearheaded by Microsoft Japan's Vice President Kazuhiko Nishi. The computers used Microsoft BASIC and weren't as 3)_____ as some other computers of the 1980s. Since the launch of MSX in 1983, the computer family 4)_____ more than 5 million units. MSX never became a global hardware standard, but it was 5)_____ successful in Japan (as some video game fans know, Metal Gear was originally released on the popular MSX before Nintendo's Famicom).

6)_____ the MSX was a popular range of Japanese computers united by a common set of hardware standards, NEC's PC-98 was a monstrous success all by its lonesome. Released in 1982, the PC-98 ran on a 5 MHz Intel 8086 CPU, had two display controllers, and a base 128 KB of RAM. The PC-98 was a powerful computer for its time, and NEC ruled the Japanese market with roughly a 50 percent market share, thanks to the 7)_____ success.

While the computer market was dominated by IBM PCs and IBM knockoffs in 8)_____, Japan was dominated by NEC's unique architecture. The PC-98 line sold over 15 million computers in its more than decade-long existence. 9)_____ NEC released several updates to this computer throughout its life, the original PC-98, released in 1982, did not garner all of these sales by itself.

Even so, NEC was Japan's go-to computer company in the 1980s, making the PC-98 the eastern equivalent of the 10) _____ IBM PC [1].

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 hardware	A put to practical use as opposed to being theoretical
2 applied	B show (data or an image) on a computer, television, or other screen
3 exchangeability	C a personal computer
4 launch	D the conceptual structure and logical organization of a computer or computer-based system
5 video game	E the machines, wiring, and other physical components of a computer or other electronic system
6 display	F equal in value, amount, function, meaning, etc.
7 PC	G the quality of being capable of exchange or interchange
8 architecture	H numerous and often varied
9 multiple	I a game played by electronically manipulating images produced by a computer program on a television screen or display
10 equivalent	J introduce (a new product or publication) to the public for the first time

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

European markets * unique computer * Japanese computers * market share * hardware standard * spearheaded by Microsoft * hardware giants * display controllers * originally release * release updates*

1. Japanese computers played a significant role in shaping early personal computing, especially in the Asian and _____.
2. The creation of a _____ model helped certain companies stand out in the crowded technology landscape.
3. The introduction of a global _____ revolutionized how computers were built and used across different regions.
4. Many influential devices were _____ in niche markets before becoming mainstream around the world.
5. Early _____ allowed computers to process and show graphics, changing the way people interacted with machines.
6. _____ have a historical impact on the global standardization of hardware.
7. Major _____ like IBM and Intel laid the foundation for the powerful systems we rely on today.
8. The expansion of a company's _____ in the 1990s often depended on both innovation and aggressive marketing.
9. Many computing revolutions were _____, especially in the development of user-friendly software.
10. Regular _____ helped improve functionality and fix bugs in both hardware and software systems.

TEXT D

Key Vocabulary: computer, model, iMac, MacBook, laptop, investment, speedy computer, released, virtuality, computing, drive, drab, aesthetic, product, era, Apple

Task 11. Read the text and choose the correct words from the list to complete the text

1. models
2. drive
3. product
4. coprocessors
5. design
6. tremendous
7. virtually
8. computing
9. company
10. computers

iMAC and Commodore Amiga

The iMac is the exception to the rule of modern 1) _____that no single model is unique enough or popular enough to match the fandom of groundbreaking '70s and '80s computers. Of course, that was Apple's point. When they released the iMac in 1998, they advertised its colorful body by criticizing the beige color of drab PCs. Today, Apple's moved away from the candy colored aesthetic for the iMac, but the computer's main draw remains unchanged. It's a simple, all-in-one

2) __________ that incorporates all of the computer's components into the monitor housing. Easy to move, easy to set up.

The iMac was the beginning of a new era for Apple, which would usher in 3) __________ success with "i" products such as the iPod and iPhone. The iMac was never a massively successful 4) __________ line – Apple struck gold a few years later with its MacBook and MacBook Pro laptops – but it was still the first Mac in years to make a dent in the Microsoft-dominated PC market of the 1990s.

The iMac also rebranded Apple as a style-conscious 5) __________ worthy of imitation. In 1999, they sued a pair of computer companies for ripping off the iMac's look, which they'd promoted with a $100 million marketing campaign. Given their success with 6) __________ every product released since the iMac, that campaign was likely a worthy investment.

The Amiga 500, released in 1987, followed in the footsteps of wildly successful 7) __________ like the Commodore 64 and Apple II. It was newer, faster, better: The Amiga 500 made the jump from an 8-bit CPU up to 32 bits and 7 MHz of speed. The computer shipped with 512KB of RAM, support for up to 4096 colors, and an internal 3.5-inch floppy 8) __________. Not bad for a launch price of $700.

The Amiga was a speedy computer, thanks to a design featuring multiple coprocessors that were dedicated to certain duties such as audio or video. The central processing unit didn't have to do everything by itself. Commodore released many Amiga 9) __________ over the course of a decade, but the inexpensive 500 was the most popular. The Amiga was an especially popular software platform for games and creative programs for video and sound work. Thanks to its 10) __________, the Amiga was powerful enough to do graphic and animation work previously impossible on a consumer PC.

Overall, the Amiga family sold approximately 6 million units – an amazing number for any computer launched in the 1980s [1].

Task 12. Search the Web and find 7 definitions of the words in the cloud

Task 13. Make your own story using a word cloud

TEXT E

Key Vocabulary: to release, at a starting price, to exist no longer, on the design, on retaining, to add a case and keyboard, expansion slots, extremely customizable, to be configured, sinclair at starting price.

Task 14. Read the text and choose the best sentence below to fill in the gaps

Apple II and ZX Spectrum

In 1977, the same year Sinclair released the $100 Timex Sinclair 1000, Apple released the Apple II. Apple's second hobbyist computer cost a bit more than the Sinclair at a starting price of about $1300, but there's a reason one company no longer exists and the other is the richest corporation on the planet. 1)_____. It built on the design of the Apple I by retaining a simple 1MHz processor and 4KB of RAM and adding a case and keyboard.

Eight expansion slots on the Apple II board made the computer extremely customizable for hobbyists, and the system could be configured with up to 48 KB of RAM. That was a ton in 1977. But it was software that truly set the Apple II apart. 2)_____. More importantly, spreadsheet software VisiCalc made the computer a powerful tool for corporations, who were perfectly willing to pay more than $1000 per machine.

The Apple II was one of the best selling computers on the market for five years, selling more than 1 million units in the young computer market, spawning offshoot models like the Apple IIe, and placing Apple on the Fortune 500 list. Apple introduced the Macintosh in 1983 and had sold 1 million units by 1987. 3)_____.

While computer company Sinclair found success in the United States with the Timex Sinclair 1000, its greatest contribution to the industry was the ZX Spectrum, launched a few years later in 1982. The design was similar: The Spectrum was a small, affordable (£ 125 in the U.K.) system that incorporated a keyboard into its body. But the Spectrum was a much better computer than its predecessor thanks to 16 KB of RAM and a real hardware keyboard (the Timex, known as the ZX-81 in the U.K., had a poor plastic membrane keyboard).

The ZX Spectrum line was successful worldwide, selling more than 5 million units during its lifetime. 4)_____. It was the first computer many people owned. The Spectrum launched hundreds or thousands of careers, as young hobbyists discovered a passion for computers thanks to the affordable machine. For British IT and video games, it all started with the ZX Spectrum [1].

A) But the Spectrum is also the computer that brought the PC into the home in the U.K.
B) The Apple II was an incredible success.
C) Apple's Steve Wozniak designed an affordable 5 1/4-inch floppy drive add-on, the Disk II, that was relatively inexpensive to produce, thanks to a new software approach to reading and writing.
D) While the Macintosh name has stuck, the Apple II made a tremendous impact on the computer industry.
E) The company was founded to produce and market Wozniak's Apple I personal computer.
F) With Apple Trade In, you can get a great value for your current device and apply it toward a new one.

Task 15. Answer the following questions

1. In what way was the PC market changed as personal computers became affordable in the late 1990s?
2. What model of computer is the exception to the rule of modern computing as far as its uniqueness is concerned?
3. When was it released and what capabilities did this model of computer possess?
4. Name the most worldly-recognized computer-producing companies and explain the reasons for their great success.
5. Define and speak on the most popular computers' brands in world history.

Task 16. Solve the puzzle

https://thewordsearch.com/puzzle/8239374/computers-in-history/

Types of Computers

E	A	K	W	A	R	L	L	L	Y	E	S	E	M
E	A	R	E	E	A	E	S	O	G	S	C	W	A
S	E	E	A	E	O	N	S	R	O	R	B	E	I
K	O	T	R	O	R	T	E	U	L	H	A	L	N
O	R	U	A	S	P	K	P	N	O	U	T	W	F
O	O	P	B	O	R	N	M	L	N	A	E	S	R
B	T	M	L	A	P	T	O	P	H	B	R	E	A
E	A	O	E	K	S	T	R	U	C	V	A	R	M
T	B	C	P	A	H	B	B	T	E	M	V	V	E
O	L	R	P	H	A	B	L	E	T	N	U	E	S
N	E	E	C	E	N	E	T	W	O	R	K	R	E
Y	T	P	M	A	K	O	O	B	T	E	N	E	H
K	C	U	T	E	N	P	A	E	T	H	A	N	V
E	Y	S	M	A	R	T	P	H	O	N	E	N	C

NETBOOK
LAPTOP
USER
PHABLET
SUPERCOMPUTER
WEB
TECHNOLOGY
SERVER
WEARABLE
TABLET
NETWORK
MAINFRAME
SMARTPHONE
NOTEBOOK

TEXT F

Key Vocabulary: personal computer, processor, virtually identical, bit, compatible, configuration, chip, programmable, powerful, memory, equipped, peripherals, software

Task 17. Read the text and find synonyms to the words in the list

IBM PC and Commodore 64

Today's non-Mac personal computer is, essentially, an IBM PC. The Intel-based, Windows-running computers that have dominated the market since the 1990s were born from the IBM PC, which was released in 1981 with a humble 4.77 MHz Intel 8088 processor and 16 KB of RAM. IBM Model 5150 wasn't the company's first effort to move into the personal computer market – they'd released an expensive PC back in 1975 – but it was the one that did everything right. The system wasn't the fastest around, but it was equipped with Intel's 16-bit processor, rather than the older 8-bit processors

most computers at the time were using. Despite being a new chip, the 8088 used an 8-bit bus, making it compatible with existing peripherals and memory expansions.

The IBM PC cost about $1600 in a base configuration, which was affordable for a powerful computer at the time. The system was popular, and software was coded specifically to take advantage of IBM's design and maximize the Intel 8088's performance. So, other companies cloned IBM's BIOS and put out IBM PC clones.

Within a few years, all x86 computers – those using Intel's processors – were compatible with the IBM PC and virtually identical to IBM's design. They all ran MS-DOS, and the x86 PC field went on to become the de facto standard. There's only one reason the IBM PC isn't the most popular computer ever made – too many other companies made their own versions!

The Commodore 64 is the single most popular computer system ever sold. Released in 1982, the Commodore 64 had a 1MHz CPU and two big draws: a powerful, programmable sound chip and powerful graphics for a 1982 computer. Even better, the Commodore 64 cost a reasonable $595 and had 64KB of RAM (hence the name). And the Commodore 64 could be plugged into a TV, making it a hybrid computer/video game console.

When it was released in 1982, the Commodore 64's graphical capabilities beat the pants off other popular computers like the Apple II. Thanks to its price, the Commodore 64 sold well. And it kept selling. As the computer became cheaper to produce, Commodore cut the price, keeping it popular throughout the 1980s. It continued to be produced until 1994.

Affordable modems made the Commodore 64 a great computer to get online with, and like most systems of the day it used the BASIC programming language. It was a popular software platform. By the end of its life, the Commodore 64 had sold more units than any computer before or since. Estimates vary from as few as 12 million to as many as 30 million. The Commodore 64 likely sold an incredible 17 million by the end of its life [1].

vitally-	benefit-
controlled-	one-cause-
attempt-	modest-
agreeable with-	costly-
extension-	reasonable-

Task 18. In pairs, finish the following sentences and translate them into Ukrainian

1. The system wasn't the fastest around, but…
2. Despite being a new chip…
3. The IBM PC cost about…
4. Intel's processors were compatible with…
5. Only one reason the IBM PC isn't the most popular computer …
6. When it was released in 1982, the Commodore…
7. Commodore cut the price…
8. It was a popular software platform…

TEXT G

Key Vocabulary: computing, sensors, monitor, wired machines, network computing, ubiquitous computing, manipulate computers, reliable connection, access, computer mouse, massive transformations, biometric devices.

Task 19. Read the text and and decide if the sentences are True or False

Ubiquitous Computing

A popular theme in science fiction stories set in the future is ubiquitous computing. In this future, computers have become so small and pervasive that they are in practically everything. You might have computer sensors in your floor that can monitor your physical health. Computers in your car that can assist you when you drive to work. And computers are practically everywhere, tracking your every move.

It's a vision of the future that is both exhilarating and frightening. On the one hand, computer networks would become so robust that we'd always have a fast, reliable connection to the Internet. You could communicate with anyone you choose no matter where you were with no worries about interruption in service. But on the other hand, it would also become possible for corporations, governments or other organizations to gather information about you and keep tabs on you wherever you go.

We've seen steps toward ubiquitous computing over the last decade. Municipal Wi-Fi projects and 4G technologies like LTE and WiMAX have extended network computing far beyond the world of wired machines. You can purchase a smartphone and access petabytes of information on the World Wide Web in a matter of seconds. Sensors in traffic stoplights and biometric devices can detect our presence. It may not be long before nearly everything we come into contact with has a computer or sensor inside it.

We may also see massive transformations in user interface technology. Currently, most computers rely on physical input interfaces like a computer mouse, keyboard, tracking pad or other surface upon which we input commands. There are also computer programs that can recognize your voice or track your eye movements to execute commands. Computer scientists and neurologists are working on various brain-computer interfaces that will allow people to manipulate computers using only their thoughts. Who knows? The computers of the future may react seamlessly with our desires.

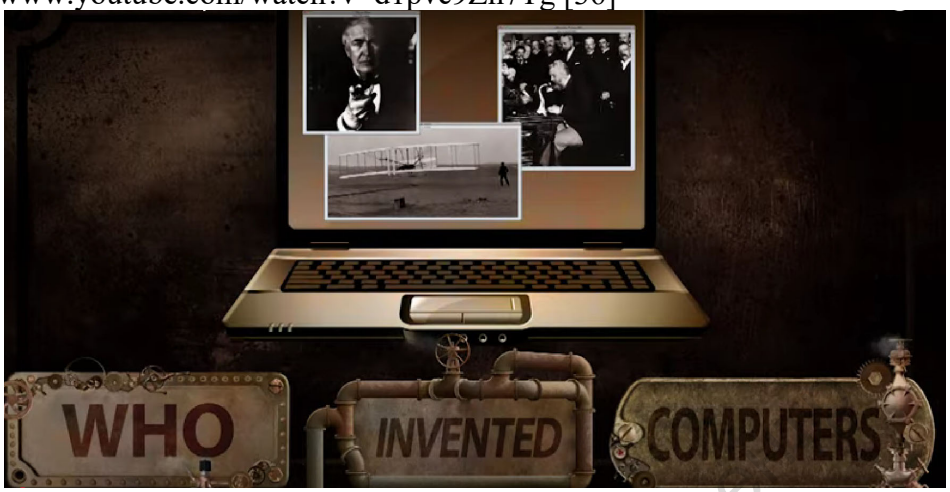
To extrapolate out to 100 years is difficult. Technological progress isn't necessarily linear or logarithmic. We may experience decades of progress followed by a period in which we make very little headway as we bump up against unforeseen barriers. On the other hand, according to some futurists, there may be no meaningful difference between computers and humans within 100 years. In that world, we'll be transformed into a new species that can improve upon itself at a pace unimaginable to us in our current forms. Whatever the future may hold, it's a safe bet to assume the machines we rely upon will be very different from today's computers [21].

1. In the future, computers may be embedded in floors to monitor people's health. T/F
2. Ubiquitous computing means computers will only be used in homes and offices. T/F
3. One concern about ubiquitous computing is the potential for constant surveillance. T/F
4. LTE and WiMAX are examples of technologies that support ubiquitous computing. T/F
5. Traffic lights and biometric devices are already using sensors to detect human presence. T/F
6. Currently, all computers rely solely on physical input devices like a mouse or keyboard. T/F
7. Scientists are developing brain-computer interfaces that respond to human thoughts. T/F
8. Technological progress always follows a smooth and predictable path. T/F
9. Some futurists believe humans and computers may become indistinguishable in the future. T/F
10. The text predicts that computers in the future will be exactly like those we use today. T/F

VIDEO

"Who Invented the Computer?"

https://www.youtube.com/watch?v=d1pvc9Zh7Tg [36]



Key Vocabulary:

analytical engine – a mechanical device designed by Babbage, considered a blueprint for computers

general-purpose computer – a machine capable of performing various tasks by changing its program

programme-controlled – operated based on a set of coded instructions

declassified – made public or no longer secret (especially information from wartime)

stored-program computer – a computer that keeps its instructions in memory for execution

patent – legal right granted to inventors to protect their creations

royalties – payments made to use someone's invention or intellectual property

legal battle – a lawsuit or prolonged court dispute

derived from – developed based on or influenced by something else

incremental steps – small improvements or changes that build over time

Task 20. In pairs, look at a list of the following names and inventions, and match each inventor to their contribution. Then watch a video and check your answers

https://www.youtube.com/watch?v=d1pvc9Zh7Tg

Charles Babbage	a) Z3 – earliest programmable, functioning computer
Alan Turing	b) ENIAC – first all-electronic, programmable computer
Konrad Zuse (Sousa)	c) Analytical Engine – a machine with memory and logic
John Mauchly & Presper Eckert	d) The concept of the universal machine (Turing machine)
John Vincent Atanasoff	e) Early computing machine shown to Mauchly in 1940

Task 21. In small groups, reconstruct the timeline of key events and inventions mentioned in the video. Put the events in chronological order. Add dates and inventors' names to each event

- Mauchly visits Atanasoff and sees his computing machine
- The Manchester Baby runs its first program
- Charles Babbage conceives the Analytical Engine
- Court rules that ENIAC idea was derived from earlier work
- Alan Turing proposes the concept of the Universal Machine
- Patent awarded to ENIAC inventors
- Konrad Zuse builds the Z3
- Recognition that computer invention was a collective process
- ENIAC is built by Mauchly and Eckert

Task 22. Discuss the following questions

1. Why is it difficult to credit a single person with the invention of the computer?
2. What role did World War II play in the development of computing technology?
3. How did legal and patent issues influence the recognition of inventors?
4. Do you think incremental innovation is more important than one big idea? Why or why not?
5. Which inventor or machine mentioned in the video impressed you the most? Explain.

PROJECT WORK

Task 23. Using the information from Unit 1 write an essay on one of the topics

From ENIAC to AI: The Evolution of Computers Through History
How Early Computers Changed the World: A Historical Perspective
The Rise of Personal Computing: Key Milestones in Computer History
The Role of Hardware Giants in Shaping Computer Development
Japanese and European Contributions to the Global Computer Industry

UNIT 2
TYPES OF COMPUTERS

"Computers are good at following instructions, but not at reading your mind"
– *Donald Knuth, an American computer scientist, mathematician*

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?

TEXT A

Key Vocabulary: personal computers, to design for specific tasks, to apply, to envision a device, featherweight touchscreen tablets, interconnected, various web technologies, text-based systems, to deliver everything from live news streams, common computer applications, essentially, wearable computers

Task 2. Read the text and answer the questions

10 Types of Computers, From Wearables to Supercomputers

It's impossible to imagine life without a computer nowadays. From work to entertainment, these machines have become an integral part of our daily lives. But did you know there are various types of computers, each designed for specific tasks and purposes?

While the term "computer" can apply to virtually any device that has a microprocessor, most people envision a device that receives input through a mouse or keyboard, processes it and displays the result

on a screen. The hardware and software within computers have evolved at a circuit-snapping pace in the past few decades – the bulky, desk-crushing machines from the early 80s look nothing like the featherweight touchscreen tablets or laptop computers of today.

Modern computers are not just faster; they're more interconnected, thanks to the internet and various web technologies. The days of dial-up modems and text-based systems are long gone. Today, computers use WiFi and broadband connections to deliver everything from live news streams to high-definition movies and intricate video games.

There are a lot of terms used to describe different types of computers. Most of these words imply the size, expected use or capability of the computer. Let's get started with the most obvious one.

The latest trend in computing is wearable computers. Essentially, common computer applications (e-mail, database, multimedia, calendar/scheduler) are integrated into watches, cell phones, visors and even clothing. Many other wearables target outdoors enthusiasts and fitness fanatics, allowing them to track their location, altitude, calories burned, steps, speed, and much, much more.

The Apple iWatch, now in its eighth incarnation, is one of the best reviewed wearables to date. This small watch has many of the functionalities of a full-blown smartphone. It lets you perform normal texting and email duties. And it has a built-in cell phone, unlike some other smart watches that must be paired with a phone to make calls. It even has a built-in electrical heart sensor that you can use to take an electrocardiogram and share it instantly with your doctor.

But watches are just the beginning. Sewn-in accessories for clothing are growing, as are smart eyeglasses, smart belts, sleep monitors, heart rate trackers and intelligent ear buds. A company called MC10 is even touting skin patches that will track various biological processes happening in your body.

Wearables are indeed a new horizon in personal computing. Their flexibility and mind-warping potential speak to the idea that the computer revolution isn't over. If anything, the PC era might just be getting underway [30].

Questions:

1. Why have computers become an integral part of our life?
2. What are the main parts of a personal computer?
3. In what way have the hardware and software within computers evolved in the past few decades?
4. Why are modern computers more interconnected?
5. What type of computers can be considered the latest trend?
6. Name the peculiarities of wearable computers and their application.

Task 3. Match the words and make up 10 sentences

integral	software
web	part
full-blown	eyeglasses
hardware and	cell phone
sleep	processes
the PC	era
high-speed	server
biological	smartphone
smart	monitors
built-in	technologies

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

VIDEO

“Tracking your health data through wearable devices”
https://www.youtube.com/watch?v=RyV7a60p52o [29]

Key Vocabulary:

health tracker – a device or app that monitors health-related data like heart rate, sleep, and activity levels
smartwatch – a wearable digital watch that can run apps and track health data
sensor – a device that detects and responds to changes in an environment (e.g., motion, temperature, heart rate)
electrocardiogram (ECG) – a test that records the electrical activity of the heart
cardio fitness – a measure of how efficiently your heart and lungs work during exercise
baseline – a starting point used for comparison over time
gait – the manner of walking or moving on foot
atrial fibrillation – an irregular, often rapid heart rate that can lead to serious health problems
metabolic changes – alterations in the body’s chemical processes, often indicating changes in health
self-tracking – monitoring one’s own behaviors, activities, or health data using technology
encrypted – converted into code to prevent unauthorized access
privacy concerns – worries about how personal information is collected, stored, and used

Task 5. In small groups, discuss the following questions

1. Have you ever used a health tracking app or smartwatch? If yes, what features did it have?
2. What kinds of health information do you think a smartwatch can detect?
3. Why might some people be concerned about smartwatches collecting health data?
4. Do you think smartwatches can help detect serious health problems before symptoms appear? Why or why not?

Task 6. Watch a video and answer the questions

1. What is the main function of modern smartwatches?

A) To replace smartphones
B) To track health data
C) To play music
D) To help with online shopping

2. According to the text, how do smartwatches show health data?

A) On a small built-in screen
B) Using voice messages
C) By sending an email
D) Through an app on your smartphone

3. What kind of medical warning can an Apple Watch give?

A) When the battery is low
B) When you forget your medication
C) When sound levels are too high
D) When you miss a doctor's appointment

4. What does the electrocardiogram (ECG) feature do?

A) Measures blood pressure
B) Shows your heart rhythm
C) Tracks your sleep time
D) Sends messages to the hospital

5. What early signs can smartwatches detect?

A) Changes in sleep and heart rate
B) Allergies and flu
C) Dehydration and hunger
D) Vision and hearing loss

6. Why is atrial fibrillation dangerous?

A) It causes a slow heart rate
B) It can lead to a stroke
C) It makes people very sleepy
D) It increases blood sugar levels

7. Why are smartwatches better than doctor visits for detecting some problems?

A) They are more comfortable
B) They have better internet access
C) They are cheaper than medicine
D) They are always with the person

8. What health condition did Professor Snyder's app help identify?

A) Flu
B) COVID-19
C) Heart disease
D) Diabetes

9. What is one concern Professor Gina Neff has about smartwatches?

A) They are too expensive for most people
B) Medical data could be misused
C) They don't work in cold weather
D) They are difficult to understand

10. What is the future goal for smartwatch health tracking?

A) To replace all hospitals
B) To stop people from using phones
C) To detect diseases like cancer and diabetes
D) To measure fitness for professional athletes only

TEXT B

Key Vocabulary: personal computers, to design specifically, to run on the Windows operating system, a compact version, computer systems, to equip with a graphical user interface, on-screen icons, hardware components, computing power, to include touchscreens, build-in connecting options, the desktop format, versatility, to put in reach

Task 7. Read the text and ask 5 questions about the information you have read

The All-Powerful Personal Computer and Desktop

The term "personal computer" (PC) describes a computer designed specifically for individual use. While Apple's iMac falls under the category of a PC, most associate the term with computers that run on the Windows operating system. These PCs, initially dubbed as microcomputers, were a compact version of the massive computer systems that businesses employed.

In 1981, iconic tech maker IBM unveiled its first PC, which relied on Microsoft's now-legendary operating system – MS-DOS (Microsoft Disk Operating System). Not to be left behind, Apple, in 1983, introduced the Lisa, marking one of the first instances of a PC equipped with a graphical user interface (GUI). This meant that for the first time, users could interact with on-screen icons rather than a bland text interface.

Over the years, advancements in hardware components like the central processing unit (CPU) and random access memory (RAM) have skyrocketed. These leaps in technology allowed for an exponential increase in computing power. For instance, in 1986, Compaq introduced a 32-bit CPU in its 386 machines, and in 1993, Intel unveiled its first Pentium processor.

Modern personal computers have evolved to include touchscreens, a myriad of built-in connectivity options like Bluetooth and WiFi, and ever-evolving operating systems. The physical form of these machines, from desktop computers to portable laptops, has also seen significant transformations. Today, PCs are more than just tools for data processing or playing games; they're integral to countless aspects of daily life, from scientific research to weather forecasting.

Until the middle of the 1980s, consumers had one choice for a PC – and it was the desktop format. These knee-knocking boxes (called "towers") were big enough to gouge your shins. Equipped with large CRT (cathode ray tube) monitors, they crowded your home workspace or the office. The expectation with desktop systems were that you would set the computer up in a permanent location.

Most desktops initially offered more power, storage and versatility for less cost than their portable brethren, which was what made them the go-to computer in the 1990s, when laptops were still thousands of dollars.

These days, desktops are much, much cheaper than they were 20 years, and you can have one for just a few hundred dollars. That's a far cry from the thousands of dollars they cost in the '80s. In fact, one of Hewlett-Packard's first business PCs, the 300, cost $95,000 in 1972.

As smartphones and laptops continue their domination of the world, and their prices have put them in reach of most consumers, desktops are going the way of the dinosaur. In 2017, worldwide desktop sales dropped below 100 million, far fewer than the 161.6 million laptops that flew off shelves that same year.

But don't cry for the desktop. This PC format is giving way to products that are just as powerful, with the tremendous added benefit of portability. And hardcore gamers still value desktops [30].

Task 8. Work in pairs and discuss your questions

Task 9. Find in the text English equivalents for the words below

Графічний інтерфейс користувача, обробка даних, операційна система, технологія, робочий простір, споживачі, універсальність, динозавр, експоненціальне збільшення, домінування, настільні системи, сенсорні екрани, міріади, обчислювальна потужність, смартфони, ноутбуки.

TEXT C

Key Vocabulary: high-speed servers, to optimize, to provide services, to process orders, to track shipping data, to store servers on racks, typical computer components, to configure and control multiple servers, to anticipate search inquiries, to crunch complex databases, to secure countless transactions, a spike in mainframe sales.

Task 10. USE OF ENGLISH. Read the text and choose the correct answer

Server and Mainframe

A computer that has been optimized to provide 1) ________________ to other computers over a network, servers usually have powerful processors, lots of memory and large hard drives.

Unlike a desktop or laptop PC, you don't sit down at a server and type. Instead, a server provides computer power through a local area network (LAN) or over the internet. Companies small and large 2) ______________ on servers to provide information, process orders, track shipping data, crunch scientific formulas and a whole lot more. Servers are often stored on racks in a 3) ____________ server room, which in some companies may resemble warehouses.

Like regular PCs, servers have a typical computer 4) ___________. They have motherboards, RAM, video cards, power supplies and ample network connections for any need. They don't typically have dedicated displays, though. Instead, IT workers use a single monitor to 5) ____________ and control multiple servers, combining their computing power for ever greater speed.

Ever wonder how a service like Google can anticipate your search 6) __________ in real time ... and then kick back answers to your deepest questions in just a moment? It's all because of servers. By some estimates, the company maintains and 7) _____________ roughly 2.5 million servers in huge data centers scattered all around Earth.

In the early days of computing, mainframes were huge computers that could fill an entire room or even a whole floor! As the size of computers has diminished while their power has increased, the term "mainframe" has fallen out of use in favor of enterprise servers. You'll still hear the term mentioned, though, particularly in large companies to describe the huge machines processing millions of transactions every day, while simultaneously working to fulfill the needs of hundreds, if not thousands of individual users.

Although mainframes traditionally meant a 8) ___________ computer linked to less powerful devices like workstations, this definition is blurring as smaller machines gain more power and mainframe computers get more flexible.

Mainframes first came to life in the post-World War II era, as the U.S. Department of Defense ramped up its energies to fight the Cold War. Even as servers become more numerous, mainframes are still used to crunch some of the biggest and most complex databases in the world. They help to secure 9)____________ sensitive transactions, from mobile payments to top-secret corporation information.

Indeed, IBM, one of the world's most enduring makers of mainframes for more than half a century, saw a 10) ____________ in mainframe sales in 2018, for the first time in five years. That's in part because mainframes can pack so much calculating muscle into an area that's smaller than a rack of modern, high-speed servers [30].

1	A solutions	B services	C choices	D items
2	A lean	B jump	C carry	D lead
3	A divided	B decorated	C dedicated	D democratic
4	A accessories	B components	C connections	D services
5	A configure	B confuse	C compile	D consider
6	A entries	B items	C inquiries	D questions
7	A operates	B opens	C optimizes	D outlines
8	A certified	B centralized	C consistent	D calculated
9	A countless	B considered	C collective	D compact
10	A scale	B spark	C spike	D split

Task 11. Match the following words to their definitions and translate them into Ukrainian

1 processor	A a number of interconnected computers, machines, or operations
2 network	B a printed circuit board containing the principal components of a computer or other device, with connectors for other circuit boards to be slotted into
3 desktop	C a computer suitable for use at an ordinary desk
4 laptop	D a computer that is portable and suitable for use while travelling
5 formula	E a desktop computer terminal, typically networked and more powerful than a personal computer
6 motherboard	F a machine that processes something
7 mainframe	G the strength and vitality required for sustained physical or mental activity
8 workstation	H a computer or computer program which manages access to a centralized resource or service in a network
9 energy	I a large high-speed computer, especially one supporting numerous workstations or peripherals
10 server	J a mathematical relationship or rule expressed in symbols

Task 12. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations.

high-speed servers *multiple servers* computer power * real time * to provide information* complex databases * dedicated server * server room * centralized computer* network connections

1. How do _____ influence the way different types of computers communicate and share data?
2. In your opinion, what kind of tasks truly require high_____, and which ones could be done on simpler machines?
3. What are the pros and cons of using a _____system in a large company?

4. Why do you think some companies invest in a _____ room, while others use cloud-based solutions?
5. How can _____ improve customer experience in online shopping or streaming services?
6. In what ways does having access to _____ data change the way businesses or emergency services operate?
7. Why is it important to store _____ on specialized computers rather than on personal devices?
8. Do you think that having _____ is always necessary for large organizations? Why or why not?
9. If you were designing a modern office, would you include a _____, or would you rely on external data centers?
10. How do modern computers _____ more efficiently than traditional systems from 10–20 years ago?

TEXT D

Key Vocabulary: to use a desktop, to condense sophisticated systems, portable computers, to make a push to popularize, to be a far cry from the svelter device, a battery operated package, to give eyes a workout, to smash barriers, by cramming real computing efficiency, a race to ultra-portability.

Task 13. Read the text and choose the correct words from the list to complete the text

1. light
2. fortunately
3. integrate
4. component
5. laptop
6. desktop
7. sophisticated
8. weighed
9. memory
10. trackball

Laptop

Once upon a time, if you wanted to use a PC, you had to use a 1) _____. Engineers simply couldn't condense the 2) _____ systems in a PC into a portable box. In the mid-1980s, though, many big computer manufacturers made a push to popularize 3) _____ computers.

Laptops are portable computers that 4) _____ the display, keyboard, a pointing device or 5) _____, processor, memory and hard drive all in a battery-operated package slightly larger than an average hardcover book.

The first true commercial laptop, though, was a far cry from the svelte devices crowding retail shops today. The Osborne 1, released in 1981, sold for around $1,800, had 64 kb of 6) _____ – and weighed about 24 pounds (10 kilograms). As it toned your biceps, the Osborne 1 also gave your eyes a workout, as the screen was just 5 inches (12 centimeters)

7) _____, manufacturers quickly improved upon the look and feel of laptops. Just two years later, Radio Shack's TRS-80 Model 100 packed its 8) _____ into a 4-pound (8 kilogram) frame, but it lacked power.

By the end of the decade, NEC's UltraLite smashed barriers by cramming real computing efficiency into the first true notebook (i.e. very 9) _____ laptop) style, which 10) _____ just 5 pounds (2.2 kilograms). The race to ultra-portability was officially on. However, laptops didn't overtake PCs in sales until 2005 [30].

Task 14. Search the Web and find 7 definitions of the words in the cloud

Task 15. Make your own story using a word cloud

TEXT E

Key Vocabulary: ultra-portable computers, netbooks, traditional, a brand- new laptop, extreme cost-effectiveness, internal components, primarily, as a means for accessing the internet, web-based applications, little storage capacity, skimp on, skip data ports, to wield, relatively sluggish processors, to do heavy lifting, graphics applications, hardcore games, to be popularized by, tablets.

Task 16. Read the text and choose the best sentence below to fill in the gaps

Netbooks and Tablets

Netbooks are ultra-portable computers that are even smaller than traditional laptops. The extreme cost-effectiveness of netbooks (roughly $200) means they're cheaper than almost any brand-new laptop you'll find at retail outlets. However, netbooks' internal components are less powerful than those in regular laptops.

Netbooks first appeared in 2007, primarily as a means for accessing the internet and web-based applications, from email, to music and movie streaming, to web surfing. 1) _____. They have small displays (as small as 6-7 inches or 15-18 centimeters), little storage capacity (perhaps maxing out at 64GB), and sometimes skimp on or altogether skip data ports (like USB or HDMI) that traditional laptops wield. A lot of netbooks come from small manufacturers, as the big guns can't be bothered with the low profit margins of these cheaper machines.

Because they have relatively sluggish processors and little memory, netbooks can't do the heavy lifting for graphics applications or hardcore games. Instead, they're best for the task that gives them their name: web surfing.

2) _____. Tablets are thin, flat devices that look like larger versions of smartphones. They were first manufactured in 2000 by Lenovo, but popularized by Apple in 2010 with the release of its iPad.

Tablets can do pretty much all the functions that laptops do, but don't have the internal fans that PCs have. So they have to rely on lower-performing processors that won't use as much heat or battery power. 3) _____. Older tablets used the same operating systems as mobile phones but the newer tablets use a full operating system such as Microsoft Windows 10.

4) _____. For those who like the keyboard functionality of a laptop, some tablets come with a keyboard (attached or detachable), allowing you to combine the best of both worlds [30].

A) They also have less storage capacity than traditional PCs.
B) They're incredibly compact, but as a result, their specifications list often resembles a very stripped-down laptop.
C) From the moment your hands land on the keyboard you'll notice a sense of relaxation.
D) Tablets have largely replaced the niche netbooks occupied.
E) Netbooks aren't designed for mobility and energy efficiency.
F) Tablets are more portable than PCs, have a longer battery life yet can also do smartphone-like activities such as taking photos, playing games and drawing with a stylus.

Task 17. Answer the questions

1. What technical characteristics has a computer that has been optimized to provide services to other computers over the network?
2. Explain the role of servers in small and large companies' work.
3. Speak on typical components of regular PCs and their functions.
4. What's the traditional meaning of mainframes and in what way have they been changed since the early days of computing?
5. What are netbooks' and tablets' main functions and web-based applications?

Task 18. Solve the puzzle

https://thewordsearch.com/puzzle/8239184/types-of-computers/

Types of Computers

E	A	K	W	A	R	L	L	L	Y	E	S	E	M
E	A	R	E	E	A	E	S	O	G	S	C	W	A
S	E	E	A	E	O	N	S	R	O	R	B	E	I
K	O	T	R	O	R	T	E	U	L	H	A	L	N
O	R	U	A	S	P	K	P	N	O	U	T	W	F
O	O	P	B	O	R	N	M	L	N	A	E	S	R
B	T	M	L	A	P	T	O	P	H	B	R	E	A
E	A	O	E	K	S	T	R	U	C	V	A	R	M
T	B	C	P	A	H	B	B	T	E	M	V	V	E
O	L	R	P	H	A	B	L	E	T	N	U	E	S
N	E	E	C	E	N	E	T	W	O	R	K	R	E
Y	T	P	M	A	K	O	O	B	T	E	N	E	H
K	C	U	T	E	N	P	A	E	T	H	A	N	V
E	Y	S	M	A	R	T	P	H	O	N	E	N	C

NETBOOK
LAPTOP
USER
PHABLET
SUPERCOMPUTER
WEB
TECHNOLOGY
SERVER
WEARABLE
TABLET
NETWORK
MAINFRAME
SMARTPHONE
NOTEBOOK

TEXT F

Key Vocabulary: handheld computers, digital assistant, hard drive, user, input, PDA, smartphone, touchscreen, battery life, full-blown computer, keyboard, memory, dual-lens cameras, device, Bluetooth, WiFi, 3G.

Task 19. Read the text and find synonyms to the words in the list

Handheld Computers

Early computers of the 20th century famously required entire rooms. These days, you can carry much more processing power right in your pants pocket. Handheld computers like smartphones and PDAs are one of our era's iconic devices.

Debuting in the 1990s, personal digital assistants (PDAs) were tightly integrated computers that often used flash memory instead of a hard drive for storage. These computers usually didn't have keyboards but relied on touchscreen technology for user input. PDAs were typically smaller than a paperback novel, very lightweight with a reasonable battery life. For a time, they were the go-to devices for calendars, email and simple messaging functions. Remember the Palm Pilot and the BlackBerry?

But as the smartphone revolution began, PDAs lost their luster. Smartphones like the iPhone and Samsung Galaxy blend calling features and PDA functionality along with full-blown computer capabilities that get more jaw-dropping by the day. They feature touch-screen interfaces, high-speed processors, many gigabytes of memory, complete connectivity options (including Bluetooth, WiFi and more), dual-lens cameras, high-quality audio systems, and other features that would startle electronics engineers from half a century ago.

Although smartphones have existed in some fashion since 2000, it was the heavily hyped debut of the iPhone 3G in 2007 that brought the device to the masses. The look, feel and functionality of that iPhone set the template for all the other smartphones ones that have followed [30].

flawlessly-	plain-
epoch's-	possibilities-
counted on-	first-rate-
commonly-	demanded-
sensible-	appearing-

Task 20. In groups, finish the following sentences and translate them into Ukrainian

1. Early computers of the 20th century famously required…
2. Personal digital assistants (PDAs) usually didn't have keyboards but…
3. Although smartphones have existed in some fashion since 2000,...
4. Unlike a desktop or laptop PC, you…
5. Like regular PCs, servers have typical…
6. In the early days of computing, mainframes…
7. Laptop are portable computers that…
8. Tablets used the same operating systems as…

TEXT G

Key Vocabulary: processor, desktop, workhorse PC, workstation, power, CPU, computer system, word processing, machine, data safety, individual user, mainframe, supercomputer, large-capacity solid-state drives

Task 21. Read the text and decide if the sentences are True or False

Workstation and Supercomputer

A workstation is simply a desktop computer that has a more powerful processor, additional memory, high-end graphics adapters and enhanced capabilities for performing a special group of tasks, such as 3D graphics or game development.

Workstations, like regular desktop computers, are intended for individual users. But they differ from desktops in that they are much, much speedier. Typically, it's businesses like engineering firms or multimedia companies that buy these workhorse PCs for their employees.

The power of a workstation doesn't come cheap. Whereas small businesses can easily find normal desktops for just a few hundred dollars, workstations might cost three times as much. Basic workstations easily go for $1,500 and double in price in a hurry.

But while cheap desktops are built with equally cheap (read: sometimes unreliable) components, workstations are quality machines meant for serious business. They may be left overnight to crunch numbers or render animations. Therefore, these computers sport redundant hard drives for data safety, as well as faster CPUs and large-capacity solid-state drives.

All of those factors point to a machine that's made more for profit instead of basic word processing or random games of Minesweeper.

This type of computer usually costs hundreds of thousands or even millions of dollars. Although some supercomputers are single computer systems, most are composed of multiple high performance computers working in parallel as a single system. The best known supercomputers are built by Cray Supercomputers.

Supercomputers are different from mainframes. Both types of computers wield incredible computing power for Earth's most intense industrial and scientific calculations. Mainframes are generally tweaked to provide the ultimate in data reliability.

Supercomputers, on the other hand, are the Formula 1 race cars of the computer world, built for breakneck processing speed, so that companies can hurtle through calculations that might take other systems days, weeks, or even months to complete.

They're often found at places like atomic research centers, spy agencies, scientific institutes or weather forecasting stations, where speed is of vital concern. For example, the United States' National Oceanic and Atmospheric Administration, which has some of the world's most advanced weather forecasting capabilities, uses some of the world's fastest computers – capable of more than 8 quadrillion calculations per second.

That kind of heart-stopping computer power comes at an equally heart-stopping price. The U.S. Department of Energy's Oak Ridge National Laboratory's Summit supercomputer, for example, cost $200 million. It is the first supercomputer built to handle AI applications [30].

1. A workstation is a type of desktop computer that has more power and is used for special tasks like 3D graphics. T/F
2. Workstations are generally slower than regular desktop computers but are cheaper. T/F
3. Engineering and multimedia companies often use workstations for their employees. T/F
4. Workstations are usually built with low-quality, unreliable components to reduce costs. T/F
5. Workstations can cost three times more than a regular desktop computer. T/F
6. Supercomputers and mainframes are the same because they are both built mainly for speed. T/F
7. Supercomputers are designed for high-speed processing and are often used in places like weather stations or research labs. T/F
8. The Summit supercomputer cost around $200 million and was made to handle AI tasks. T/F
9. Supercomputers are commonly used for basic office tasks like word processing and email. T/F
10. Supercomputers are often built using multiple high-performance computers working together. T/F

Task 22. In small groups, agree or disagree with the following statements.

I agree because….
I disagree because…

1. We don't need a dedicated server room anymore – cloud computing has replaced it.
2. Centralized computers are no longer useful in the modern world.
3. Real-time data processing is essential for the success of most businesses.
5. The more computer power an organization has, the better its overall performance.
6. The main purpose of most computers is to provide information quickly and clearly.
7. High-speed servers are unnecessary for small businesses with limited data needs.
8. When building an IT system, network connections should be the top priority.

PROJECT WORK

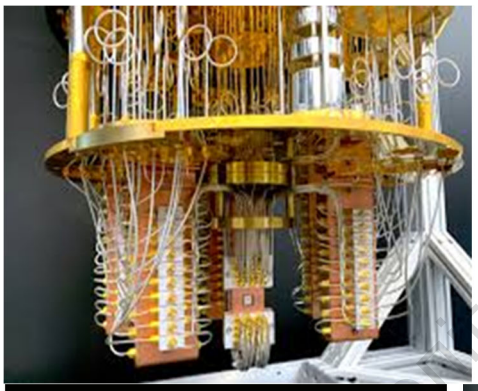
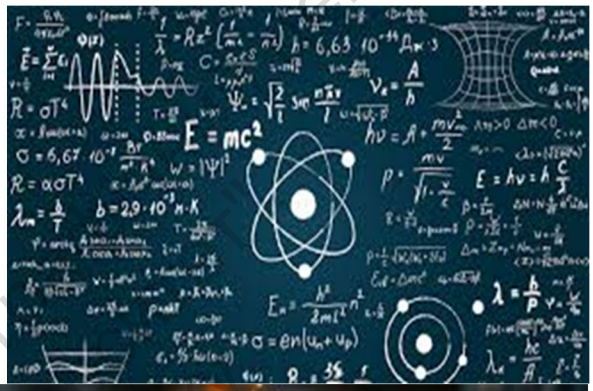
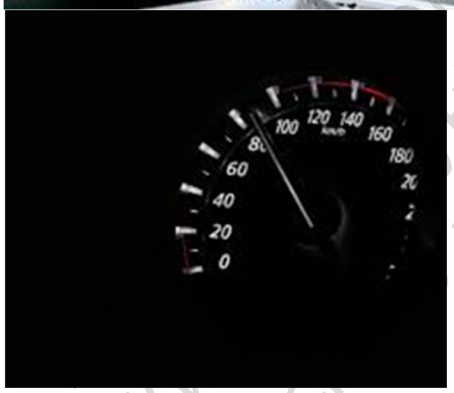
Task 23. Using the information from Unit 2 write an essay on one of the topics

From Desktops to Supercomputers: A Journey Through Computer Types
Understanding the Differences Between PCs, Workstations, and Servers
Types of Computers in the Modern World
How Different Computers Serve Different Purposes

UNIT 3
QUANTUM COMPUTERS AND THE QUANTUM INTERNET

"On the one hand, our minds try to probe the ephemeral reality of the quantum world; on the other, we talk, think, and act in a language adapted for discussing trees, rocks, and automobiles – as well as poetry and emotions."
– F. David Peat, British holistic physicist

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?


TEXT A

Key Vocabulary: amount of processing power, the origins of quantum computing, basic quantum computers, to quench thirst for computing, computing power, the proliferation of personal computer, to fuel need for more computing, to double every month, to measure automatic scale, to harness the power of atoms and molecules, to perform memory and processing tasks, to credit with applying quantum theory.

Task 2. Read the text and answer the following questions.

How Quantum Computers work

The massive amount of processing power generated by computer manufacturers has not yet been able to quench our thirst for speed and computing capacity. In 1947, American computer engineer Howard

Aiken said that just six electronic digital computers would satisfy the computing needs of the United States. Others have made similar errant predictions about the amount of computing power that would support our growing technological needs. Of course, Aiken didn't count on the large amounts of data generated by scientific research, the proliferation of personal computers or the emergence of the Internet, which have only fueled our need for more, more and more computing power.

Will we ever have the amount of computing power we need or want? If, as Moore's Law states, the number of transistors on a microprocessor continues to double every 18 months, the year 2020 or 2030 will find the circuits on a microprocessor measured on an atomic scale. And the logical next step will be to create quantum computers, which will harness the power of atoms and molecules to perform memory and processing tasks. Quantum computers have the potential to perform certain calculations significantly faster than any silicon-based computer.

Scientists have already built basic quantum computers that can perform certain calculations; but a practical quantum computer is still years away. In this unit, you'll learn what a quantum computer is and just what it'll be used for in the next era of computing.

You don't have to go back too far to find the origins of quantum computing. While computers have been around for the majority of the 20th century, quantum computing was first theorized less than 30 years ago, by a physicist at the Argonne National Laboratory. Paul Benioff is credited with first applying quantum theory to computers in 1981. Benioff theorized about creating a quantum Turing machine. Most digital computers, like the one you are using to read this article, are based on the Turing Theory [15].

Questions:

1. What do you know about Howard Aiken and his ideas concerning computing?
2. What similar errant predictions have been made by the other scientists?
3. Was the proliferation of personal computers or has the emergence of the Internet also taken into account?
4. What was Moore's law concerned with?
5. Which computers -quantum or silicon-based can perform certain calculations significantly faster?
6. When and whom was quantum computing theorized by?

Task 3. Match the words and make up 10 sentences

computer	scale
scientific	engineer
atomic	computer
atoms and	needs
Turing	data
amounts of	machine
quantum	research
computing	moleculas
perform	computing
era of	calculations

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key vocabulary: quantum Turing machine, theoretical device, to hold a symbol, a read-write device, to give instructions, to perform calculations at once, to work by manipulating bits, to exist in superposition, superposition of qubits, entanglement.

Task 5. Read the text and ask 5 questions

Defining the Quantum Computer

The Turing machine, developed by Alan Turing in the 1930s, is a theoretical device that consists of tape of unlimited length that is divided into little squares. Each square can either hold a symbol (1 or 0) or be left blank. A read-write device reads these symbols and blanks, which gives the machine its instructions to perform a certain program. Does this sound familiar? Well, in a quantum Turing machine, the difference is that the tape exists in a quantum state, as does the read-write head. This means that the symbols on the tape can be either 0 or 1 or a superposition of 0 and 1; in other words, the symbols are both 0 and 1 (and all points in between) at the same time. While a normal Turing machine can only perform one calculation at a time, a quantum Turing machine can perform many calculations at once.

Today's computers, like a Turing machine, work by manipulating bits that exist in one of two states: a 0 or a 1. Quantum computers aren't limited to two states; they encode information as quantum bits, or qubits, which can exist in superposition. Qubits represent atoms, ions, photons or electrons and their respective control devices that are working together to act as computer memory and a processor. Because a quantum computer can contain these multiple states simultaneously, it has the potential to be millions of times more powerful than today's most powerful supercomputers.

This superposition of qubits is what gives quantum computers their inherent parallelism. According to physicist David Deutsch, this parallelism allows a quantum computer to work on a million computations at once, while your desktop PC works on one. A 30-qubit quantum computer would equal the processing power of a conventional computer that could run at 10 teraflops (trillions of floating-point operations per second). Today's typical desktop computers run at speeds measured in gigaflops (billions of floating-point operations per second).

Quantum computers also utilize another aspect of quantum mechanics known as entanglement. One problem with the idea of quantum computers is that if you try to look at the subatomic particles, you could bump them, and thereby change their value. If you look at a qubit in superposition to determine its value, the qubit will assume the value of either 0 or 1, but not both (effectively turning your spiffy quantum computer into a mundane digital computer). To make a practical quantum computer, scientists have to devise ways of making measurements indirectly to preserve the system's integrity. Entanglement provides a potential answer. In quantum physics, if you apply an outside force to two atoms, it can cause them to become entangled, and the second atom can take on the properties of the first atom. So if left alone, an atom will spin in all directions. The instant it is disturbed it chooses one spin, or one value; and at the same time, the second entangled atom will choose an opposite spin, or value. This allows scientists to know the value of the qubits without actually looking at them [15].

Task 6. Find in the text English equivalents for the words.

Кубіт, обчислення, вимірювання, головка зчитування, закодовувати інформацію, квантова фізика, операції над числами з рухомою комою, атоми, значення, субатомні частинки, терафлопи, швидкості, гігафлопи, заплутаність, застосовувати силу

Task 7. Work in pairs, discuss your questions about the information you have read

TEXT C

Key Vocabulary: to develop a quantum computer, to replace, to perform calculations, incredibly time-consuming, key advancements, to analyze quantum information, to design quantum computers, repeated cycles, computer scientists, to solve real-world problems.

Task 8. USE OF ENGLISH. Read the text and choose the correct answer

Today's Quantum Computers

Quantum computers could one day replace silicon chips, just like the transistor once replaced the vacuum tube. But for now, the technology required 1) _______________ such a quantum computer is beyond our reach. Most research in quantum computing is still very theoretical.

2) ______________________ quantum computers have not gone beyond manipulating more than 16 qubits, meaning that they are a far cry from practical application. However, the potential remains that quantum computers one day could perform calculations that are incredibly time-consuming on conventional computers. Several key advancements 3) ________________ in quantum computing in the last few years. Let's look at 4) _________________ of the quantum computers that have been developed.

In 1998, Los Alamos and MIT researchers managed to spread a single qubit across three nuclear spins in each molecule of a liquid solution of alanine (an amino acid used to analyze quantum state decay) or trichloroethylene (a chlorinated hydrocarbon used for quantum error correction) molecules. Spreading out the qubit made it 5) ___________________ to corrupt, allowing researchers to use entanglement to study interactions between states as an indirect method for analyzing the quantum information. In 2000, Scientists at Los Alamos National Laboratory 6) _______________ the development of a 7-qubit quantum computer within a single drop of liquid. The quantum computer uses nuclear magnetic resonance (NMR) to manipulate particles in the atomic nuclei of molecules of trans-crotonic acid, a simple fluid consisting of molecules 7) ______________ of six hydrogen and four carbon atoms. The NMR is used to apply electromagnetic pulses, which force the particles to line up. These particles in positions parallel or counter to the magnetic field let the quantum computer 8) ____________ the information- encoding of bits in digital computers.

In 2005, the Institute of Quantum Optics and Quantum Information at the University of Innsbruck announced that scientists had created the first qubyte, or series of 8 qubits, using ion traps. In 2006, scientists in Waterloo and Massachusetts devised methods for quantum control on a 12-qubit system. Quantum control becomes more complex as systems employ more qubits. In 2008, Canadian startup company D-Wave demonstrated a 16-qubit quantum computer. The computer solved a sudoku puzzle and other pattern matching problems.The company claims it 9)_______________ practical systems by 2008. Skeptics believe practical quantum computers are still decades away, that the system D-Wave has created isn't scalable, and that many of the claims on D-Wave' Web site are simply impossible given our understanding of quantum mechanics.

Quantum computers could also 10) _____________ to search large databases in a fraction of the time that it would take a conventional computer. Other applications could include using quantum computers to study quantum mechanics, or even to design other quantum computers.

But quantum computing is still in its early stages of development, and many computer scientists believe the technology needed to create a practical quantum computer is years away. Quantum computers must have at least several dozen qubits to be able to solve real-world problems, and thus serve as a viable computing method [15].

1	A develop	B to develop	C developing	D developed
2	A Most advanced	B More advanced	C The most advanced	D Advancing
3	A are made	B were made	C have been made	D had been made
4	A a little	B a few	C some few	D little
5	A hard	B more hard	C hardly	D harder
6	A announce	B announcing	C had announced	D announced
7	A made up	B made out	C made of	D made into
8	A to mimic	B mimic	C mimicking	D mimicked
9	A has produced	B will have produced	C had produced	D is producing
10	A be used	B been used	C using	D to use

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 quantum	A the quality in a sound of being deep, full, and reverberating
2 chip	B a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer
3 resonance	C a small or tiny part, amount, or proportion of something
4 calculation	D the process of protecting information or data by using mathematical models to scramble it in such a way that only the parties who have the key to unscramble it can access it
5 algorithm	E a discrete quantity of energy proportional in magnitude to the frequency of the radiation it represents
6 fraction	F a mathematical determination of the amount or number of something
7 information	G data as processed, stored, or transmitted by a computer
8 encryption	H a set of electronic circuits on a small flat piece of silicon
9 time-consuming	I relating to the interrelation of electric currents or fields and magnetic fields
10 electromagnetic	J taking or needing a lot of time

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

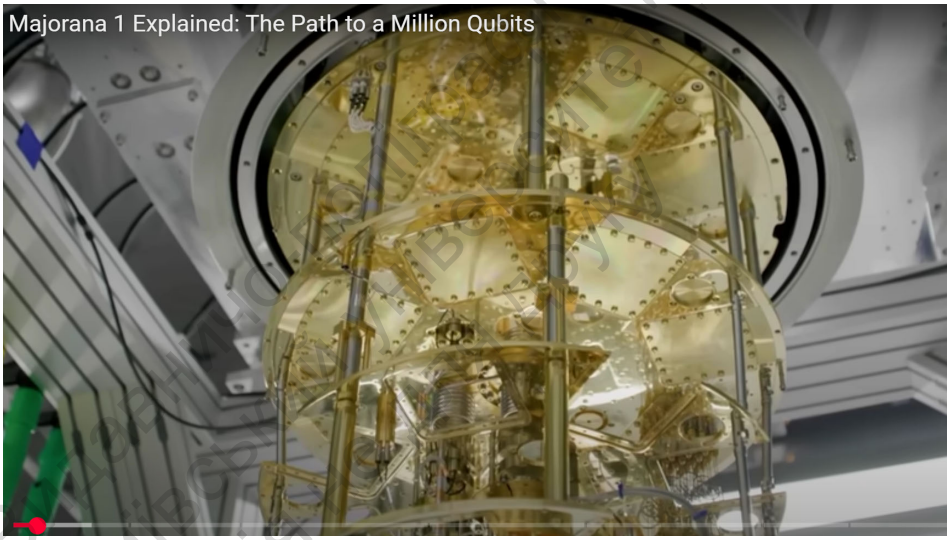
indirect method * startup companies * factoring large numbers * complicated method *magnetic field * real-world problems * quantum computers * decoding and encoding secret information * conventional computers* practical applications *

1. _____ have the potential to revolutionize industries by solving problems that would take conventional computers centuries to compute.
2. While still in their early stages, the _____ of quantum computing could include breakthroughs in medicine, artificial intelligence, and climate modeling.

3. Unlike traditional computing, where data is processed in bits, quantum computing relies on an _____ using quantum states to perform complex calculations.
4. Scientists manipulate particles using a _____ to maintain quantum coherence, but stabilizing these delicate systems remains a significant challenge.
5. Many _____ are racing to develop quantum technologies that can solve problems, from drug discovery to financial modeling.
6. One of the most famous uses of quantum computers is _____, a task that could break modern encryption methods in seconds.
7. Governments and tech companies are investing heavily in quantum cryptography to improve_____ securely.
8. Unlike classical computers, which rely on step-by-step calculations, quantum computers often use a _____ called quantum superposition to process multiple possibilities at once.
9. Quantum computers can outperform classical computers in solving _____.
10. Although quantum computing is still developing, its ability to solve problems that are impossible for _____ could change the way we understand the universe.

VIDEO

"Majorana 1 Explained: The Path to Million Qubits"
https://www.youtube.com/watch?v=wSHmygPQukQ&list=PLjs0SZcoXWQZTUPE890_kZ4v8s32NlmVz&index=211 [22]



Key Vocabulary:

quantum computing – a type of computing that uses quantum bits (qubits) to process information much faster than traditional computers.
qubit – the basic unit of quantum information, similar to a bit in classical computing but with special quantum properties.
majorana particle – a theoretical particle that is its own antiparticle, important for building stable qubits.
topological qubit – a type of qubit designed to be less affected by noise and errors.
superconductor – a material that conducts electricity with zero resistance.
semiconductor – a material used in chips and circuits that partially conducts electricity.
scalability – the ability to increase the size or capacity of a system efficiently.
error correction – techniques used to fix or prevent mistakes in computing.
wet lab – a laboratory where scientists conduct physical experiments.
form factor – the physical size and shape of a device or component.
simulation – a model or imitation of a real-world process used for testing or study.
antiparticle – a particle with the opposite charge or quantum state of a normal particle.

Task 11. In small groups, discuss the following statements. Agree or disagree. Watch a video and check your answers

1. Quantum computers already exist and are used by the general public.
2. Computers today can simulate any scientific problem, given enough time.
3. Tiny particles can be used as computing units.
4. Noise and temperature don't affect computers.
5. New materials are the key to scientific breakthroughs.
6. Artificial intelligence will be the most powerful technology of the future.

Task 12. Watch a video again and answer the questions

1. What is the primary promise of quantum computing?

A) Faster internet speeds
B) Accurately modeling the laws of nature
C) Improving classical computing methods
D) Enhancing video game graphics

2. Why has quantum computing been slow to progress?

A) Lack of interest from researchers
B) Limited applications in the real world
C) Difficulty in making qubits stable and resistant to noise
D) High cost of classical computing alternatives

3. What is a qubit in quantum computing?

A) A digital bit used in regular computers
B) A quantum bit that stores and processes information
C) A type of electrical signal used in processors
D) A high-speed transistor used in quantum chips

4. How does the Majorana 1 processor differ from conventional quantum computers?

A) It uses electrons instead of qubits
B) It relies on vacuum tubes for computation
C) It uses Majorana particles for computing
D) It eliminates the need for quantum mechanics

5. Why is the topological qubit considered a breakthrough?

A) It eliminates the need for classical computers
B) It is stable, small, and resistant to noise
C) It replaces all other forms of computing
D) It is based on silicon transistors

6. How many qubits can the new chip design store?

A) Tens of qubits
B) Hundreds of qubits
C) Thousands of qubits
D) Over a million qubits

7. What does a quantum accelerator do?

A) Increases the speed of a classical computer
B) Functions independently from classical computing
C) Works with classical computers to solve problems
D) Eliminates the need for mathematical calculations

8. Why is quantum computing particularly valuable for chemistry and materials science?

A) It allows for highly accurate simulations
B) It replaces the need for physical laboratories

C) It speeds up traditional chemistry experiments
D) It creates new elements

9. What role do Majorana particles play in quantum computing?

A) They allow for topological qubits, which are more reliable
B) They replace silicon in classical processors
C) They create new types of superconductors
D) They eliminate the need for classical computing

10. What is the long-term impact of quantum computing on scientific research?

A) It will make classical computing obsolete
B) It will redefine material science and AI research
C) It will slow down AI development
D) It will have no significant impact

TEXT D

Key Vocabulary: quantum, particles, network, value, quantum internet, platform, ecosystem, run massive applications, entanglement, utilize, scientist, quantum-loop, exchange information, ordinary computer.

Task 13. Read the text and choose the correct words from the list to complete the text

1. development
2. bandwidth
3. scientist
4. internet
5. mechanics
6. super-powerful
7. communication
8. project
9. quantum-loop
10. information

We're getting closer to the Quantum Internet, but what is it?

Back in February 2020, scientists from the U.S. Department of Energy's Argonne National Laboratory and the University of Chicago revealed that they had achieved a quantum entanglement – in which the behavior of a pair two tiny particles becomes linked, so that their states are identical – over a 52-mile (83.7 kilometer) 1) _____ network in the Chicago suburbs.

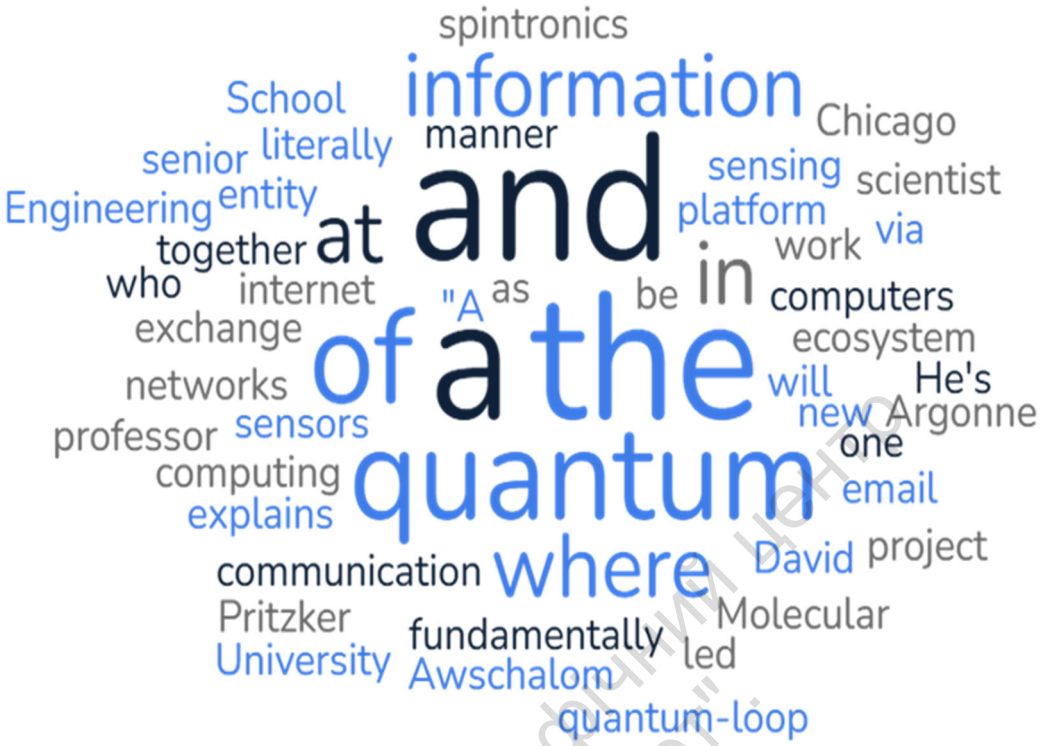
You may be wondering what all the fuss is about, if you're not a 2)_____ familiar with quantum 3) _____ – that is, the behavior of matter and energy at the smallest scale of reality, which is peculiarly different from the world we can see around us.

But the researchers' feat could be an important step in the 4) _____ of a new, vastly more powerful version of the 5) _____ in the next few decades. Instead of the bits that today's network uses, which can only express a value of either 0 or 1, the future quantum internet would utilize qubits of quantum 6) _____ which can take on an infinite number of values. (A qubit is the unit of information for a quantum computer; it's like a bit in an ordinary computer).

That would give the quantum internet way more 7) _____ which would make it possible to connect 8) _____ quantum computers and other devices and run massive applications that simply aren't possible with the internet we have now.

"A quantum internet will be the platform of a quantum ecosystem, where computers, networks, and sensors exchange information in a fundamentally new manner where sensing, 9) _____, and computing literally work together as one entity," explains David Awschalom via email. He's a spintronics and quantum information professor in the Pritzker School of Molecular Engineering at the University of Chicago and a senior scientist at Argonne, who led the quantum-loop 10) _____ [32].

Task 14. Search the Web and find 7 definitions of the words in the cloud



Task 15. Make your own story using a word cloud

TEXT E

Key Vocabulary: quantum networks, particles of light photons, a quantum message, intercept a message, quantum physics, entangled photons, far-flung clocks, complex simulations.

Task 16. Read the text and choose the best sentence below to fill in the gaps

Explaining the Quantum Internet

So why do we need this and what does it do? For starters, the quantum internet is not a replacement of the regular internet we now have. Rather it would be a complement to it or a branch of it. It would be able to take care of some of the problems that plague the current internet. 1) _____.

Right now, if Alice in New York sends a message to Bob in California over the internet, that message travels in more or less a straight line from one coast to the other. Along the way, the signals that transmit the message degrade; repeaters read the signals, amplify and correct the errors. But this process allows hackers to “break in” and intercept the message.

However, a quantum message wouldn’t have that problem. Quantum networks use particles of light photons to send messages which are not vulnerable to cyberattacks. Instead of encrypting a message using mathematical complexity, says Ray Newell, a researcher at Los Alamos National Laboratory, we would rely upon the peculiar rules of quantum physics. With quantum information, “you can’t copy it or cut it in half, and you can’t even look at it without changing it.” In fact, just trying to intercept a message destroys the message, as Wired magazine noted. That would enable encryption that would be vastly more secure than anything available today.

“The easiest way to understand the concept of the quantum internet is through the concept of quantum teleportation,” Sumeet Khatri, a researcher at Louisiana State University in Baton Rouge, says in an email. He and colleagues have written a paper about the feasibility of a space-based quantum internet, in which satellites would continually broadcast entangled photons down to Earth’s surface, as this Technology Review article describes.

“Quantum teleportation is unlike what a non-scientist’s mind might conjure up in terms of what they see in sci-fi movies,” Khatri says. “2) _____. Then, through a sequence of operations, the sender can send any quantum information to the receiver (although it can’t be done faster than light speed, a common misconception). This collection of shared entanglement between pairs of people all over the world essentially constitutes the quantum internet. The central research question is how best to distribute these entangled pairs to people distributed all over the world.”:

Once it’s possible to do that on a large scale, the quantum internet would be so astonishingly fast that far-flung clocks could be synchronized about a thousand times more precisely than the best atomic clocks available today, as Cosmos magazine details. That would make GPS navigation vastly more precise than it is today, and map Earth’s gravitational field in such detail that scientists could spot the ripple of gravitational waves. 3) _____.

“You could potentially see planets around other stars,” says Nicholas Peters, group leader of the Quantum Information Science Group at Oak Ridge National Laboratory.

It also would be possible for networks of super-powerful quantum computers across the globe to work together and create incredibly complex simulations. That might enable researchers to better understand the behavior of molecules and proteins, for example, and to develop and test new medications.

4) _____. “We don’t have a complete picture of how the universe works,” says Newell. “We have a very good understanding of how quantum mechanics works, but not a very clear picture of the implications. The picture is blurry where quantum mechanics intersects with our lived experience [32].”

A) The quantum Internet aims to use the principles of quantum mechanics to enable ultra-secure communication by transmitting information through entangled particles.
B) For instance, a quantum internet would offer much greater protection from hackers and cybercriminals.
C) In quantum teleportation, two people who want to communicate share a pair of quantum particles that are entangled.
D) It also could make it possible to teleport photons from distant visible-light telescopes all over Earth and link them into a giant virtual observatory
E) It also might help physicists to solve some of the longstanding mysteries of reality.
F) Unlike traditional networks, the quantum Internet could allow instant and tamper-proof data exchange, revolutionizing cybersecurity and global communications.

Task 17. Read the text again and answer the questions

1. Name the origins of quantum computers.
2. What are the most digital computers based on?
3. Explain why most research in quantum computing is still very theoretical?
4. Speak on several key advancements which have been made in quantum computing in the last few years.
5. What is Quantum Internet?

Task 18. Solve the puzzle

https://thewordsearch.com/puzzle/8237951/quantum-computing/

Quantum Computing

G	Y	P	T	E	T	A	E	R	C	T	Y	I	S
R	S	Q	M	P	R	P	E	Y	Y	E	R	H	K
A	E	Y	U	E	E	A	L	O	D	L	E	N	R
V	L	E	E	A	S	C	T	E	R	E	N	V	O
I	C	N	T	P	N	S	N	N	E	P	A	S	W
T	I	C	V	D	R	T	A	O	A	O	S	P	T
A	T	R	E	T	W	O	U	G	C	R	C	E	E
T	R	Y	I	A	T	A	A	M	E	T	I	E	N
I	A	P	Y	P	O	C	A	E	A	A	S	D	N
O	P	T	R	P	B	G	O	N	C	T	Y	S	M
N	N	I	P	B	R	D	G	T	T	I	H	T	E
A	E	N	O	W	R	T	L	E	E	O	P	E	A
L	G	G	I	C	I	N	T	E	R	N	E	T	H
C	Y	B	E	R	A	T	T	A	C	K	S	P	U

SPEED
QUANTUM
CREATE
CYBERATTACKS
COPY
PHYSICS
TELEPORTATION
CONCEPT
GRAVITATIONAL
NETWORKS
PARTICLES
ENCRYPTING
MESSAGE
INTERNET

TEXT F

Key Vocabulary: quantum internet, quantum information, vacuum, function, sorts of hardware, developed, scientist, researcher, amount of energy, quantum systems.

Task 19. Read the text and find synonyms to the words in the list

Challenges of building the Quantum Internet

But before any of that can happen, researchers have to figure out how to build a quantum internet, and given the weirdness of quantum mechanics, that's not going to be easy. "In the classical world you can encode information and save it and it doesn't decay," Peters says. "In the quantum world, you encode information and it starts to decay almost immediately."

Another problem is that because the amount of energy that corresponds to quantum information is really low, it's difficult to keep it from interacting with the outside world. Today, "in many cases, quantum systems only work at very low temperatures," Newell says. "Another alternative is to work in a vacuum and pump all the air out."

In order to make a quantum internet function, Newell says, we'll need all sorts of hardware that hasn't been developed yet. So it's hard to say at this point exactly when a quantum internet would be up and running, though one Chinese scientist has envisioned that it could happen as soon as 2030 [32].

to make out-	precisely-
the ridiculousness-	ongoing-
reserve-	to restrain from-
is compatible with-	option-
the external world-	researchers-

Task 20. In groups, finish the following sentences and translate them into Ukrainian

1. Quantum computers could one day...
2. Today's computers, like a Turing machine, work...
3. As Moore's Law states, the number of transistors on a microprocessor...
4. Quantum computers have the potential to perform ...
5. The Turing machine, developed by Alan Turing, is...
6. Researchers have to figure out..
7. "In the quantum world, you can encode information and save it…"
8. Challenges of building the Quantum Internet are...

TEXT G

Key Vocabulary: supercomputer, computing power, processor, electronic clock, calculations per second, electrical pulses, data, memory, perform calculations, computer performance, prime numbers, future computers.

Task 21. Read the text and decide if the sentences are True or False

What is computing power?

What makes a supercomputer so super? Can it leap tall buildings in a single bound or protect the rights of the innocent? The truth is a bit more mundane. Supercomputers can process complex calculations very quickly.

As it turns out, that's the secret behind computing power. It all comes down to how fast a machine can perform an operation. Everything a computer does breaks down into math. Your computer's processor interprets any command you execute as a series of math problems. Faster processors can handle more calculations per second than slower ones, and they're also better at handling really tough calculations.

Within your computer's CPU is an electronic clock. The clock's job is to create a series of electrical pulses at regular intervals. This allows the computer to synchronize all its components and it determines the speed at which the computer can pull data from its memory and perform calculations.

When you talk about how many gigahertz your processor has, you're really talking about clock speed. The number refers to how many electrical pulses your CPU sends out each second. A 3.2 gigahertz processor sends out around 3.2 billion pulses each second. While it's possible to push some processors to speeds faster than their advertised limits – a process called overclocking – eventually a clock will hit its limit and will go no faster.

As of March 2010, the record for processing power goes to a Cray XT5 computer called Jaguar. The Jaguar supercomputer can process up to 2.3 quadrillion calculations per second.

Computer performance can also be measured in floating-point operations per second, or flops. Current desktop computers have processors that can handle billions of floating-point operations per second, or gigaflops. Computers with multiple processors have an advantage over single-processor machines, because each processor core can handle a certain number of calculations per second. Multiple-core processors increase computing power while using less electricity.

Even fast computers can take years to complete certain tasks. Finding two prime factors of a very large number is a difficult task for most computers. First, the computer must determine the factors of the large number. Then, the computer must determine if the factors are prime numbers. For incredibly large numbers, this is a laborious task. The calculations can take a computer many years to complete.

Future computers may find such a task relatively simple. A working quantum computer of sufficient power could calculate factors in parallel and then provide the most likely answer in just a few

moments. However, quantum computers have their own challenges and wouldn't be suitable for all computing tasks, but they could reshape the way we think of computing power [35].

1. Supercomputers are designed to process complex calculations much faster than regular computers. T/F
2. A computer's processor does not rely on mathematical calculations to execute commands. T/F
3. The speed of a computer's CPU is determined by an electronic clock that generates electrical pulses. T/F
4. A processor with a clock speed of 3.2 gigahertz sends out 3.2 million pulses per second. T/F
5. Overclocking allows a processor to operate at speeds higher than its advertised limits. T/F
6. The Cray XT5 supercomputer, known as Jaguar, held a record for processing 2.3 quadrillion calculations per second as of 2010. T/F
7. Floating-point operations per second (flops) is not a common measurement of computer performance. T/F
8. Multiple-core processors can perform more calculations per second while consuming less electricity than single-core processors. T/F
9. Traditional computers can easily factor very large numbers into their prime components in just a few seconds. T/F
10. Quantum computers have the potential to solve complex problems like factoring large numbers much faster than traditional computers. T/F

Task 22. In groups, discuss the following questions

1. How do you think quantum computers will change the way we solve complex problems compared to conventional computers?
2. In what ways could the practical applications of quantum computing impact fields like medicine, artificial intelligence, or climate science?
3. Quantum computing relies on an indirect method of processing information – how do you think this makes it more powerful than traditional computing?
4. Since quantum systems are highly sensitive to their environment, what role does the magnetic field play in stabilizing quantum bits (qubits)?
5. Many startup companies are developing quantum technologies–do you think smaller companies can compete with tech giants in this field? Why or why not?
6. One of the biggest concerns about quantum computing is its ability to factor large numbers quickly, which could break modern encryption. Should governments be worried about this?
7. How can quantum computing improve decoding and encoding secret information, and do you think it will make online security better or worse?
8. Some people believe that the complicated methods used in quantum computing make it difficult to develop. Do you think these challenges will slow down its adoption?
9. If quantum computers can outperform classical computers in solving real-world problems, what industries do you think will benefit the most?
10. Given the rapid advancements in quantum technology, do you believe conventional computers will eventually become obsolete, or will they still have a role in the future?

PROJECT WORK

Task 23. Revise the information from Unit 3 and write an essay on one of the topics

Quantum Computers vs. Classical Computers: A New Era of Computing Power
Challenges and Opportunities in Developing a Global Quantum Internet
The Future of Computing: Will Quantum Technology Replace Classical Systems?

UNIT 4
PRINTERS

"The printer in the corner of the office starts choking and then spits up pages."
– *Jowita Bydlowska*, *Polish-Canadian writer and a journalist*

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?

TEXT A

Key Vocabulary: printer, device, infrared signal, standards, transmit, information, operate, gadget, produce, spectrum, human eye, kilobytes, megabytes, per second,built-in infrared transceivers, night vision goggles, infrared radiation.

Task 2. Read the text and answer the questions

IrDA Printers

Early wireless printers used technology standardized by the Infrared Data Association (IrDA). The IrDA is a nonprofit organization in charge of creating standards for devices that use infrared signals to transmit and receive information. Without these standards, different companies might produce devices that used the same signals to operate. That could result in signal interference and the affected devices might not work correctly.

IrDA devices, whether they are printers or other gadgets, communicate by transmitting and detecting pulses of light from the infrared spectrum. To the human eye, light in the infrared spectrum is invisible. We can only see infrared light by using gadgets like night vision goggles. But we can sense infrared radiation – rather than see it, we feel it as heat.

The IrDA has standards for several data rates – the amount of data a device can send or receive per second – ranging from 115.2 kilobytes per second (kbps) to 16 megabytes per second (Mbps). Communication between IrDA devices relies on transceivers – a combination of a transmitter and a receiver. That means IrDA devices are capable of sending and receiving data using infrared signals. Microprocessors in the devices translate electronic commands – such as a print job – into pulses of infrared light. The receiving device detects and decodes these pulses, changing them back into the original electronic command.

In order to use IrDA technology to print, you need the following elements:
- An infrared transceiver connected to your computer (or other device);
- An infrared transceiver connected to your printer.

Some printers have built-in infrared transceivers. Printers without native infrared transceivers need infrared adapters. Typically, an adapter plugs into either a serial port or a USB port on the printer. Many infrared adapters have short cords that connect the infrared transceiver to the adapter's plug. This makes it possible for the user to position the transceiver so that it's pointing toward the transmitter.

That's one of the downsides to IrDA technology: It relies on a line-of-sight configuration. Because IrDA devices use light to transmit information, they need an unobstructed path between the transmitter and receiver to work. This limitation means that you can't print to an IrDA printer if you're too far away from it or if there are walls or doors between your computer and the printer.

On the other hand, as long as the two transceivers aren't blocked, IrDA devices can be reliable and secure. They aren't prone to suffering interference problems, and they aren't as susceptible to hackers as other wireless solutions. But many manufacturers have abandoned IrDA technology in favor of another popular alternative: Bluetooth technology [33].

Questions:

1. What role does the Infrared Data Association (IrDA) play in wireless printing technology?
2. Why is it important for devices using infrared signals to follow standardized protocols?
3. How do IrDA devices transmit and receive information, and what makes the infrared light used in this process invisible to the human eye?
4. What are the essential components required to use IrDA technology for wireless printing?
5. Why is the line-of-sight configuration a disadvantage of IrDA technology, and how does it affect device placement?
6. Despite its reliability and security, why have many manufacturers chosen Bluetooth over IrDA technology for modern wireless printing?

Task 3. Match the words and make up 10 sentences

wireless	vision
infrared	information
night	port
electronic	spectrum
susceptible to	technology
Bluetooth	printers
human	organization
USB	hackers
receive	port
nonprofit	commands

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key Vocabulary: technology, electronics, personal-area networks,transmit signals, detect, Bluetooth networks, to send print jobs, multiple device, range, detect, Bluetooth technology, Bluetooth devices.

Task 5. Read the text and ask the questions

Bluetooth Printers

Over the last few years, Bluetooth technology has become more popular in the world of electronics. Bluetooth devices transmit data using low-powered radio signals in the 2.4 gigahertz range (GHz). There are two different classes of Bluetooth devices. The weaker class can transmit signals over a 10-meter (33-foot) range. The other class can send signals as far as 100 meters (328 feet) away. Bluetooth technologies allow users to create personal-area networks (PANs). Devices can detect and Unlike IrDA, Bluetooth signals aren't dependent upon line of sight. Bluetooth networks can extend beyond walls, doors and even different levels of a building. As long as the devices are within range, they can interact. Bluetooth devices can transmit data at a rate of up to 3 Mbps to other Bluetooth devices in range.

Some printers and computers come with Bluetooth transceivers already installed. Others require an adapter in order to use Bluetooth signals. In many ways, the process of sending and receiving a Bluetooth signal is similar to IrDA devices. Instead of converting computer data into pulses of light, a Bluetooth device converts the information into radio signals and transmits them. Other Bluetooth devices receive the signals and convert them back into data.

With a Bluetooth network, it's possible to send print jobs from multiple devices to the same printer [33].

Task 6. Work in pairs and discuss your questions

Task 7. Find in the text English equivalents for the words below

Передавати, сигнали, мережа, взаємодіяти, діапазон, електроніка, адаптер, світло, радіо, імпульси, перетворюватись, користувач, виходити за стіни, потребувати, принтер, гігагерц.

TEXT C

Key Vocabulary: wireless, standards, type, WiFi, WiFi transceivers, connected to the system, WiFi frequencies, compatible devices, using radio signals, network, dedicated printer, black hat hackers, locate the printer.

Task 8. USE OF ENGLISH. Read the text. Use the word in brackets to form a word that fits best in the sentence

WiFi Printers

Wireless networks are becoming 1) _____(to increase) popular in businesses and in the home. The majority of these networks use WiFi, also known as the 802.11 set of standards. Like Bluetooth, WiFi

sends data using radio signals. The WiFi 2) _____ (frequent) are 2.4 GHz and 5 GHz. WiFi data rates range from 11 Mbps to 140 Mbps, depending on the type of 802.11 network.

There are several printers on the market that have WiFi transceivers built into them. Network 3) _____(to administer) must first install the printer to the network so that other devices connected to the system can locate the printer. Once connected, compatible devices can send print jobs to the printer. This comes in handy for offices or households with lots of computers – there's no need to buy a dedicated printer for each machine if everyone can access the same one.

Whenever you are working within a 4) _____ (to wire) network, it's important to consider security. An unsecured wireless network is an attractive target for black hat hackers and Internet thieves. There are several devices on the market that can detect wireless signals – there's even a T-shirt that can do it. Some people use such devices to seek out 5) _____ (to protect) wireless networks in order to get free Internet access. If you use an 6) _____ (to secure) network and have a bandwidth limit with your ISP, you could be in danger of receiving a very large bill for Internet 7) _____ (to use). And if the moochers used your network to perform illegal activities, you might end up being the one accused of a crime.

An unsecured network could give hackers the opportunity to access your machines remotely. A skilled hacker might be able to get all sorts of private information from your computers. Identity theft can be very difficult to resolve.

For these reasons, it's always a good idea to make sure your network is secure. That includes using firewalls to protect your network from outside 8) _____ (to interfere). You should use password protection on your network. Using a good encryption standard such as WiFi Protected Access (WPA) is also important.

Some WiFi printers have a button that activates WPA encryption, allowing secure 9) _____ (to connect) with other devices. By pushing the button on the printer and activating a similar feature on each computer on the network, you can create a secured network between each computer and the printer. That might seem 10) _____ (to excess), but considering the risks of unsecured data transmission, it's a good idea.

If you're tired of tripping over cables or being chained to one location, you might want to look into wireless printing. Think about your needs – they'll determine which method will work best for you [33].

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 wireless	A (of a computer, piece of software, etc.) able to be used with a specified piece of equipment or software without special adaptation or modification
2 encryption	B a programme or signal that is broadcast or sent out
3 printer	C your home and everything that is connected with looking after it.
4 compatible	D the quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media
5 household	E a machine for printing text or pictures, especially one linked to a computer
6 password	F a string of characters that allows access to a computer, interface, or system

7 transmission	G the act of putting information into a special code that hides the information's true meaning
8 data	H a mark or point at which one fires or aims, especially a round or rectangular board marked with concentric circles used in archery or shooting
9 target	I using radio, microwaves, etc. (as opposed to wires or cables) to transmit signals
10 access	J obtain or retrieve (computer data or a file)

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

password protection * wireless networks * Internet usage * opportunity to access * WiFi printers * compatible devices * activates WPA encryption * data transmission * wireless signals * secure connections

1. _____ allow users to print documents from any location within range of wireless networks.
2. Many modern printers are designed to work with _____ such as smartphones, tablets, and laptops.
3. Printing through _____ helps reduce cable clutter and increases flexibility in office spaces.
4. _____ has expanded the functionality of printers, allowing cloud printing and remote access.
5. Users now have the printers without _____ needing to be physically near them.
6. WiFi printers often come with built-in features that establish _____ for safer printing.
7. A quality printer _____ to ensure that only authorized users can send print jobs.
8. _____ over wireless printers is protected using modern security protocols.
9. Interference from other _____ is minimized with dual-band network support in some printers.
10. Setting up _____ on your printer helps restrict access and maintain document privacy.

TEXT D

Key Vocabulary: devices, volatile, color and quality of ink, printer ink, sustainable, petroleum-based, gadget designs, cartridge's ink, printer's warning messages, recyclable components, giant.

Task 11. Read the text and choose the correct words from the list to complete the text

1. cartridge
2. devices
3. recycle
4. giant
5. ink
6. petroleum-based
7. health
8. volatile
9. coffee
10. eco-friendly

How Coffee Printers Will Work

The coffee printer concept utilizes spent coffee grounds as a source for printer 1) _____.

This idea faces practical challenges, such as the limited color and quality of ink produced, the potentially cumbersome ink-loading process and the reliance on personal coffee or tea consumption for ink supply.

Environmentally friendly inks like soy ink offer a more established and sustainable alternative to traditional petroleum-based inks.

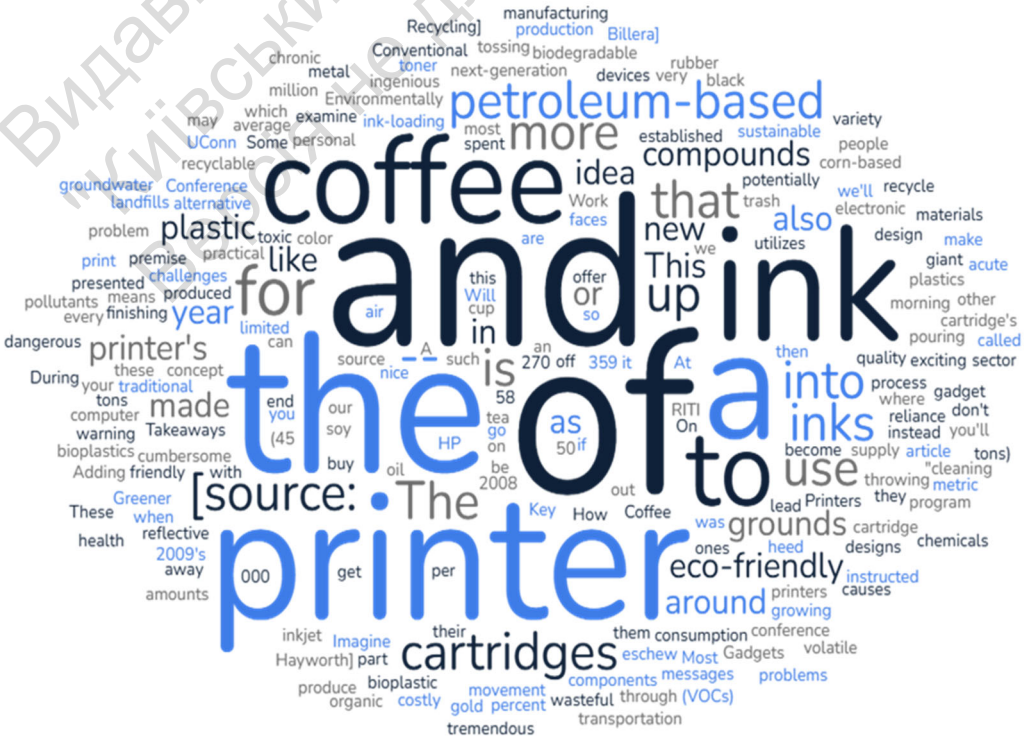
Imagine finishing off a nice cup of morning 2) _____ and then, instead of throwing the grounds into the trash, pouring them into a 3) _____ where they become printer ink. This ingenious idea is the premise of an exciting new design for a next-generation 4) _____printer, the RITI coffee printer, that we'll examine in this article.

The coffee printer is reflective of a growing movement for more eco-friendly electronics 5) _____, ones that eschew toxic compounds and use more recyclable components. Some of these gadget designs use bioplastics, biodegradable plastics. At the 2008 Greener Gadgets Conference, computer 6) _____HP presented a printer made out of a corn-based bioplastic. The coffee printer was part of 2009's conference.

Conventional inkjet printers are very wasteful. On average, if you heed your printer's warning messages and buy new cartridges when instructed, you'll be tossing away up to 58 percent of the cartridge's ink. A printer's "cleaning" program also causes it to go through costly ink. Adding to the problem, most people don't 7) _____ their cartridges, and so every year, around 270 million print cartridges, made up of plastic, metal, rubber and other materials, end up in landfills.

Most printer ink is 8) _____, which means that like with our transportation sector and plastic production, we use tremendous amounts of oil to make printer ink and toner – around 50,000 tons (45,359 metric tons) of black gold per year. During manufacturing, petroleum-based inks also produce dangerous chemicals called 9) _____ organic compounds (VOCs). These pollutants can get into the air and groundwater and may lead to a variety of acute or chronic 10) _____ problems [9]

Task 12. Search the Web and find 7 definitions to the words in the cloud



Task 13. Make your own story using a word cloud.

TEXT E

Key Vocabulary: coffee printer, presumably, LED indicator, standard power cable, wasteful ink cartridge, require, basic household product, heat, dripping coffee- or tea-colored water onto the paper.

Task 14. Read the text and choose the best sentence below to fill in the gaps

Advantages of Coffee Printers

The coffee printer is envisioned as being as environmentally friendly as possible. Consequently, the current design appears to use little electricity, though presumably it would have to use some, at the very least for the LED indicator lights on the outside of the device and to push the paper through the printer. Printers also require heat to bond the image to the paper. 1) _____. However, most inkjet printers (and this design appears to resemble one) require a standard power cable.

Perhaps the most exciting aspect of this printer design is that it uses a basic household product that traditionally goes to waste. 2) _____. And besides coffee grounds, the printer can use tea dregs. The grounds or dregs and water are loaded into a reusable "ink case" rather than a wasteful ink cartridge.

So, how do you turn coffee or tea dregs and water into print on a page? This alluring idea is still in the concept stage, so there aren't any patents for us to pursue. But, the general idea can be seen in the instructions from the original sketches, which basically call for moving the ink case back and forth, thereby dripping coffee- or tea-colored water onto the paper and forming text or images.

3) _____. After you're done, you can still find a sustainable manner in which to dispose of your coffee grounds – many people compost them – but before that, you can, quite literally, squeeze out every last drop of useful material.

Some ink cartridges are quite expensive (particularly for high-volume color or photo printing), so the coffee printer, by using materials that you'd normally throw away, may be a cheaper alternative. 4) _____. Instead of misleading warning messages on your computer – which may pop up long before your ink is actually going to run out – you can clearly see when your ink supply is low [9].

A) Plus there are no trips to the office-supply store, no trying to find the correct kind of cartridge, and no worrying about recycling old cartridges.
B) Some users may appreciate this little bit of manual labor, as it means they will be more involved in the printing process, turning it into something like a craft.
C) Load in some coffee grounds and water, and you have homemade ink.
D) But the coffee printer could use a standard USB connection to siphon off energy from the computer and, of course, to transmit printing instructions from the computer to the printer.
E) Coffee production, cultivation of coffee plants, usually done in large commercial operations.
F) The RITI coffee printer doesn't use coffee grounds as ink.

Task 15. Answer the questions about the information in Text E

1. Why is the coffee printer considered environmentally friendly?
2. What materials does the coffee printer use instead of traditional ink?
3. How does the coffee printer form text or images on the paper?
4. What is one financial advantage of using a coffee printer compared to a traditional printer?
5. How does the coffee printer help users know when it's time to refill the ink?

Task 16. Solve the puzzle.

https://thewordsearch.com/puzzle/8248727/printers/

Printers

E	U	I	O	E	T	R	S	A	O	I	R	D	D
D	I	E	G	D	I	R	T	R	A	C	O	F	C
W	N	T	I	I	O	C	R	A	F	T	N	G	O
D	G	E	N	P	D	C	S	S	A	E	T	R	F
R	I	A	S	P	U	F	R	E	T	A	W	O	F
F	S	D	T	G	R	P	R	I	N	T	L	U	E
A	E	P	R	O	C	E	S	S	W	K	U	N	E
R	D	I	U	C	D	C	U	C	T	B	F	D	W
N	R	O	C	N	O	F	F	I	C	E	E	S	S
O	F	N	T	F	I	A	N	F	E	P	T	R	N
C	K	S	I	F	U	S	B	A	S	S	S	K	U
K	N	I	O	C	D	S	E	E	F	W	A	C	A
I	A	C	N	D	S	U	I	D	C	E	W	C	R
S	U	I	S	A	D	S	I	I	R	C	W	E	T

INK
INSTRUCTIC
GROUNDS
CARTRIDGI
WASTEFUL
CRAFT
COFFEE
OFFICE
DESIGN
PROCESS
USB
IDEA
PRINT
WATER

TEXT F

Key Vocabulary: bioprinter, temperature, organ, encounter, basic parts, metal plate, horizontal track, organ tissue samples, stem cells, production process, reservoir, sensor, life-sustaining compounds.

Task 17. Read the text and find synonyms to the words in the list

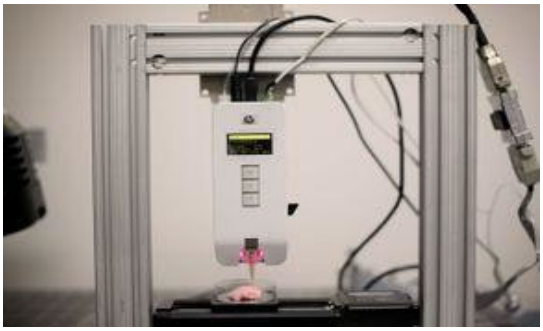
Bioprinter Components

This bioprinter, located at the Shiley Center for Orthopedic Research & Education at Scripps Clinic in La Jolla, Calif., is displaying the temperature, pressure and drops/nozzle settings just above the three buttons. Could a future organ of yours be created on a bioprinter someday?

If you were to pull apart a bioprinter, as we'd love to do, you'd encounter these basic parts:

Print head mount – On a bioprinter, the print heads are attached to a metal plate running along a horizontal track. The x-axis motor propels the metal plate (and the print heads) from side to side, allowing material to be deposited in either horizontal direction.

Elevator – A metal track running vertically at the back of the machine, the elevator, driven by the z-axis motor, moves the print heads up and down. This makes it possible to stack successive layers of material, one on top of the next.



Platform – A shelf at the bottom of the machine provides a platform for the organ to rest on during the production process. The platform may support a scaffold, a petri dish or a well plate, which could contain up to 24 small depressions to hold organ tissue samples for pharmaceutical testing. A third motor moves the platform front to back along the y-axis.

Reservoirs – The reservoirs attach to the print heads and hold the biomaterial to be deposited during the printing process. These are equivalent to the cartridges in your inkjet printer.

Print heads/syringes – A pump forces material from the reservoirs down through a small nozzle or syringe, which is positioned just above the platform. As the material is extruded, it forms a layer on the platform.

Triangulation sensor – A small sensor tracks the tip of each print head as it moves along the x-, y- and z-axes. Software communicates with the machine so the precise location of the print heads is known throughout the process.

Microgel – Unlike the ink you load into your printer at home, bioink is alive, so it needs food, water and oxygen to survive. This nurturing environment is provided by a microgel – think gelatin enriched with vitamins, proteins and other life-sustaining compounds. Researchers either mix cells with the gel before printing or extrude the cells from one print head, microgel from the other. Either way, the gel helps the cells stay suspended and prevents them from settling and clumping.

Bioink – Organs are made of tissues, and tissues are made of cells. To print an organ, a scientist must be able to deposit cells specific to the organ she hopes to build. For example, to create a liver, she would start with hepatocytes – the essential cells of a liver – as well as other supporting cells. These cells form a special material known as bioink, which is placed in the reservoir of the printer and then extruded through the print head. As the cells accumulate on the platform and become embedded in the microgel, they assume a three-dimensional shape that resembles a human organ.

Alternatively, the scientist could start with a bioink consisting of stem cells, which, after the printing process, have the potential to differentiate into the desired target cells. Either way, bioink is simply a medium, and a bioprinter is an output device. Up next, we'll review the steps required to print an organ designed specifically for a single patient [7].

found-	output-
produced-	probable-
run into-	position-
connected-	alternative-
parallel to the ground-	remain alive-

Task 18. In groups, finish the following sentences and translate them into Ukrainian

1. Researchers mix cells with the gel before …
2. If you were to pull apart a bioprinter…
3. A metal track running vertically…

4. A shelf at the bottom of the machine provides …
5. The reservoirs attach to the print heads…
6. As the cells accumulate on the platform and
7. To create a liver, she would start with…
8. After the printing process…

VIDEO

Scientists 3D Print Human Heart!

https://www.youtube.com/watch?v=rgxDixvWbLE&list=PLjs0SZcoXWQZTUPE890_kZ4v8s32NlmVz&index=200 [26]

Key Vocabulary

organ transplant – a surgical operation to replace a damaged or missing organ with a healthy one
3D printing – a process of making three-dimensional objects from a digital model by laying down layers of material
bio-ink – a substance made from living cells used in 3D printing to create tissues or organs
hydrogel – a gel made mostly of water used to support living cells in 3D bioprinting.
stem cells – cells that can develop into different types of cells in the body
embryonic stem cells – stem cells derived from early-stage embryos that can become any cell type
immune system rejection – when the body attacks a transplanted organ because it doesn't recognize it as its own.
ventricles and chambers – parts of the heart that help circulate blood
tailor-made medication – medicine designed specifically for an individual's body or illness
antigens – molecules that trigger an immune response in the body
biotech – technology that uses living organisms or cells to develop products and applications

Task 19. In pairs answer the questions and share your ideas

1. What do you know about organ donation and transplants?
2. Have you ever heard about using 3D printing in medicine?
3. What do you think are some benefits and risks of creating organs in a lab?

Task 20. Read the statements and discuss whether you agree or disagree. Explain your opinion

1. 3D printing will eliminate the need for human organ donors.
2. Technology should not be used to extend human life unnaturally.
3. Every person should have equal access to medical technology.
4. Artificial organs will work better than natural ones in the future.

Task 21. Watch a video and answer the questions.

1. Why is 3D printing a heart from human cells considered a breakthrough?
- A) It is the first time a heart has been created using plastic.
- B) It uses real human cells to make a working heart.
- C) The heart is already being used in hospitals.
- D) It replaces the need for heart medication.

2. What problem does 3D printing human organs aim to solve?
- A) The shortage of doctors in hospitals.
- B) The time it takes to print organs.
- C) The cost of traditional surgeries.
- D) The difficulty in finding organ donors.

3. Where did the scientists who printed the 3D heart work?
- A) Zurich University
- B) McMaster University
- C) Tel Aviv University
- D) ColdFusion Lab

4. What is a current limitation of the 3D printed heart?
- A) It cannot be printed with human cells.
- B) It breaks after 3,000 beats.
- C) It cannot pump blood yet.
- D) It is too large for a human body.

5. What advantage does using the patient's own cells for printing organs provide?
- A) It reduces the risk of rejection.
- B) It makes the organ grow faster.
- C) It costs less than donor organs.
- D) It increases the size of the heart.

6. What material was used in the 2017 Zurich artificial heart?
- A) Hard metal
- B) Human fat tissue
- C) Magnetic plastic
- D) Soft, flexible silicon

7. What new method is McMaster University using for cancer research?
- A) Printing 3D tumors to test treatments
- B) Using AI to diagnose cancer
- C) Removing all cancer cells with magnets
- D) Injecting medication into real tumors

8. What can the Zurich 3D printed heart do?
- A) Pump real blood in a human body
- B) Beat for several days
- C) Replace the human heart in surgery
- D) Pump water for about 30 minutes

9. What possible future use of 3D printing is mentioned in the video?

A) Creating robotic limbs for pets
B) Printing smartphones
C) Designing heart-attack-proof hearts
D) Building homes with living tissue

10. What concern is raised about 3D printed organs?

A) They may stop working suddenly.
B) They might only be available to the wealthy at first.
C) They are too small for use.
D) They require animal testing.

Task 22. In groups, discuss the following questions

- Should scientists be allowed to print body parts to extend life? What are the risks?
- What are the possible consequences of this technology being available only to the rich?
- Do you believe biotechnology is more important than AI in terms of impact on human life?

TEXT G

Key Vocabulary: researchers, tackle, 3-D printer, size, shape, data, organ, build, scan, artificial, dimension, biodegradable, genetically, masses, body/

Task 23. Read the text and decide if the sentences are True or False

When researchers built 3-D printers capable of depositing bioink and forming living masses of cells, they celebrated a major achievement. Then they immediately began to tackle the next big problem: How can bioprinting produce an organ for a specific person? To accomplish this, a medical team needs to collect data about the organ in question – its size, shape and placement in the patient's body. Then team members need to concoct a bioink using cells taken from the patient. This ensures that the printed organ will be compatible genetically and won't be rejected once it's transplanted in the patient's body.

For simple organs, such as bladders, researchers don't print the living tissue directly. Instead, they print a 3-D scaffold made of biodegradable polymers or collagen. To determine the exact shape of the scaffold, they first build a 3-D model using computer-aided design (CAD) software. They usually define the exact x-, y- and z-coordinates of the model by taking scans of the patient using computerized tomography (CT) or magnetic resonance imaging (MRI) technology.

Next, researchers get the cells they need by taking a biopsy of the patient's bladder. They then place the cell samples in a culture, where they multiply into a population sufficiently large enough to cover the scaffold, which provides a temporary substrate for the cells to cling to as they organize and strengthen. Seeding the scaffold requires time-consuming and painstaking handwork with a pipette. It generally takes about eight weeks before such artificial bladders are ready for implantation. When doctors finally place the organ in the patient, the scaffold has either disappeared or disappears soon after the surgery.

The procedure above works because bladder tissue only contains two types of cells. Organs like kidneys and livers have a far more complex structure with a greater diversity of cell types. While it would be easy enough to print a scaffold, it would be almost impossible to recreate the three-dimensional structure of the tissue manually. A bioprinter, however, is ideally suited to complete such a time-consuming, detail-oriented task [7].

1. Researchers can now use 3-D bioprinters to produce living masses of cells. T/F
2. To avoid rejection, the printed organ must be made using cells from a different donor. T/F
3. For simple organs like bladders, scientists print the living tissue directly. T/F
4. Computer-aided design (CAD) software helps define the exact coordinates of the scaffold. T/F
5. Cell samples are taken from the patient's organ and immediately used to cover the scaffold. T/F
6. Seeding a scaffold with cells is a fast and automated process. T/F
7. Artificial bladders are ready for implantation in about eight weeks. T/F
8. The scaffold remains permanently in the patient's body after implantation. T/F
9. Bladder tissue is easier to replicate because it only has two types of cells. T/F
10. A bioprinter is especially useful for creating complex organ structures like kidneys and livers. T/F

Task 24. In groups, discuss the following questions.

1. Would you accept a 3D-printed organ if you needed a transplant? Why or why not?
2. Do you think 3D-printed organs will completely replace donor organs in the future?
3. What are the possible risks of using 3D-printed organs in real patients?
4. Should governments invest more money in developing 3D organ printing?
5. Do you believe that only rich people will benefit from this technology at first? Is that fair?
6. How could 3D printing change the future of medicine and surgery?
7. Would you support printing body parts for non-medical reasons, like cosmetic changes?
8. How can doctors make sure 3D-printed organs are safe to use in humans?
9. Do you think creating artificial organs brings us closer to "playing God"? Why or why not?
10. In your opinion, what is the most exciting or the most worrying part of this technology?

PROJECT WORK

Task 25. Using the information from Unit 4 write an essay on one of the topics

How Bioprinting Is Changing the Future of Medicine
3D Printers: From Plastic Toys to Human Organs
The Pros and Cons of Bioprinting in Modern Healthcare
Will Bioprinting Replace Traditional Organ Transplants?
The Role of Printers in the Medical Revolution: A Look at Bioprinting

UNIT 5
COMPUTER, SOCIAL NETWORKING AND INTERNET ADDICTIONS

"Addiction is when you can't get enough of what you don't want anymore."
– *Deepak Chopra, Indian-American author, new age guru*

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?

TEXT A

Key Vocabulary: computer addiction, obsessively, neglecting personal health and hygiene, to surface, agreed-upon definition of addiction, to create a single definition, to stem from relationship problems, childhood abuse, to be complicated by the fact, a useful tool, legitimate reasons, to work on a model train set**,** to remain a matter of debate, despite negative consequences.

Task 2. Read the text and answer the questions

How Computer Addiction Works

Obsessively checking e-mail. Playing online games for 12 hours or more at a time. Placing more value on chat-room friends than real friends. Neglecting family, work and even personal health and hygiene. These are all symptoms of a new form of addiction that has surfaced only in recent years: computer addiction. In this article, we'll learn about computer addiction, why it's a problem – and why some doctors disagree about whether it exists at all.

Creating a single definition for computer addiction is difficult because the term actually covers a wide spectrum of addictions. Few people are literally addicted to a computer as a physical object. They become addicted to activities performed on a computer, like instant messaging, viewing Internet pornography, playing video games, checking e-mail and reading news articles. These activities are collectively referred to as Computer Mediated Communication (CMC). Computer addiction focused on Internet use is often called Internet Addiction Disorder (IAD).

The various types of computer addicts have different reasons for their habits. Obsessive chat room use or e-mailing might fill a void of loneliness, while excessive viewing of reels might stem from relationship problems or childhood abuse. The matter is further complicated by the fact that a computer is a useful tool. It's not like heroin, for example – there are many legitimate reasons why someone might spend hours using a computer.

-Even if someone uses a computer extensively for purely recreational purposes, that doesn't necessarily represent a real addiction any more than someone who spends hours working on a model train set, making quilts or gardening is "addicted" to those activities. Even the agreed-upon definition of addiction itself has evolved over the decades and remains a matter of debate in the medical community. In fact, the American Medical Association and the American Psychiatric Association do not currently consider computer addiction a valid diagnosis, a controversy we'll discuss later.

As a result of all these complications, any single definition of computer addiction is necessarily broad and a little vague. If the computer use is so pervasive that it interferes with other life activities, and if the user seems unable to stop using the computer to excess despite negative consequences, the problem might be a computer addiction [10].

Questions:

1. What are symptoms of a new form of computer addiction that has surfaced only in recent years?
2. Is it possible to create a single definition for computer addiction?
3. What activities are collectively referred to as Computer Mediated Communication (CMC)?
4. How is computer addiction focused on the Internet called?
5. What are legitimate reasons why someone might spend many hours using a computer?
6. What worldly-recognized organisations don't currently consider computer addiction a valid diagnosis and a controversy?

Task 3. Match the words and make up 10 sentences

chart-room	addiction
computer	tool
physical	community
Internet	object
medical	diagnosis
negative	activities
life	games
online	friends
valid	consequences
useful	use

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key Vocabulary: to recognize, research on computer addictions, to identify danger signs, to mean a real problem, to notice the passage of time, to make conscious efforts, to cut back on computer time, frequently, to hide the extent of computer use, to fail at non-computer-related tasks, to miss out on family activities, despite incurring negative consequences.

Task 5. Read the text and ask 5 questions

Recognizing Computer Addiction

Much of our understanding of computer addiction comes from decades of research on other addictions, like alcoholism or gambling addiction. Psychologists have identified several danger signs for computer addiction. Any of these signs would be a red flag, and multiple signs could mean there's a real problem.

Staying on the computer for much longer than intended, or not noticing the passage of time while using the computer

Making conscious efforts to cut back on computer time and repeatedly failing

Thinking frequently about the computer when not using it or constantly looking forward to the next opportunity to use it

Hiding the extent of computer use from family and friends

Using the computer as an escape when feeling depressed or stressed

Missing events or opportunities or failing at non-computer-related tasks because of time spent on the computer. This could include poor job performance or missing out on family activities.

Continued excessive computer use despite incurring negative consequences, such as marital problems or getting in trouble at work due to computer use [10].

Task 6. Work in pairs and discuss your questions

Task 7. Find in the text English equivalents for the words below

Залежність, можливість, завдання, виконання, наслідки, потрапляти, зусилля, втеча, розуміння, ознаки, залежність від азартних ігор, свідомий,десятиліття, надмірний, чекати з нетерпінням, дослідження.

TEXT C

Key Vocabulary: addiction, computer, excessive computer use, emotional value, Internet, interpersonal communication, screen names, at computer desks, late-night use, long-term sleep deprivation, performance, face-to-face, physical condition, meaningful.

Task 8. USE OF ENGLISH. Read the text. Use the word in brackets to form a word that fits best in the sentence

Negative Effects of Computer Addiction

While computer can have a 1) _____(to vary) of negative effects on a person. The most immediate are social. The user withdraws from friends and family as he spends more and more time

on the computer. Relationships begin to wither as the user stops attending social 2) _____ (to gather), skips meetings with friends and avoids family members to get more computer time. Even when they do interact with their friends, users may become 3) _____ (to irritate) when away from the computer, causing further social harm.

Eventually, 4) _____ (to exceed) computer use can take an emotional toll. The user gradually withdraws into an artificial world. Constant computer gaming can cause someone to place more emotional value on events within the game than things happening in their real lives. Excessive viewing of Internet pornography can warp a person's ideas about sexuality. Someone whose primary friends are screen names in a chat room may have difficulty with face-to-face 5) _____ (a person) communication.

Over the long term, computer addiction can cause physical damage. Using a mouse and keyboard for many hours every day can lead to 6) _____ (to repeat) stress injuries. Back problems are common among people who spent a lot of time sitting at computer desks. Late-night computer sessions cut into much-needed sleep time. Long-term sleep 7) _____ (to deprive) causes drowsiness, difficulty concentrating, and depression of the immune system. Someone who spends hours at a computer is obviously not getting any 8) _____ (to mean) exercise, so computer addiction can indirectly lead to poor overall physical condition and even obesity.

Eventually, the consequences of computer addiction will ripple through the user's life. Late-night use or use at work will affect job 9) _____ (to perform), which could lead to job loss. As the addiction takes its toll on family members, it can even lead to failed marriages [10].

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 social	having or showing a tendency to be easily annoyed
2 irritable	a state of mental or emotional strain or tension resulting from adverse or demanding circumstances
3 interact	the feeling of grief after losing someone or something of value
4 chart room	a feeling of being sleepy and lethargic; sleepiness
5 immune	in the end, especially after a long delay, dispute, or series of problems
6 eventually	resistant to a particular infection or toxin owing to the presence of specific antibodies or sensitized white blood cells
7 stress	serious, important, or worthwhile
8 loss	relating to society or its organization
9 drowsiness	an area on the Internet or other computer network where users can communicate, typically one dedicated to a particular topic
10 meaningful	communicate or be involved directly

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

sleep deprivation * social harm * interpersonal communication * physical condition * physical damage * negative effects * computer time * computer addiction * late-night sessions

1. _____ has become a serious issue affecting both young people and adults in today's digital world.
2. The _____ of spending too much time online often go unnoticed until they start interfering with daily life.
3. Many people underestimate how easily _____ can spiral into unhealthy routines and compulsive behavior.
4. Long hours in front of a screen can lead to _____ such as eye strain, back pain, and poor posture.
5. _____ caused by staying up late to use the computer affects concentration, memory, and overall health.
6. _____ often suffers when someone becomes too reliant on digital interaction instead of face-to-face conversations.
7. _____ of content like gaming or social media can blur the line between entertainment and addiction.
8. Students frequently sacrifice their health during _____ on the computer, often believing it's necessary for success.
9. Regular screen use without breaks can negatively impact your_____, reducing energy levels and motivation to exercise.
10. Computer addiction can cause serious _____ by isolating individuals from friends, family, and real-life social networks.

TEXT D

Key Vocabulary: computer addiction controversy, the validity of computer addiction, to chart online for their own good, to use completely, to consume lives, a compulsive behavior, to be classified as an addiction, to suffer from, to control impulses, to have Internet Addiction Disorder, a complex social reinforcement process, to include video-game addiction.

Task 11. Read the text and choose the correct words from the list to complete the text

1. addiction
2. psychologists
3. parents
4. Association
5. kids
6. suffer
7. disorder
8. Internet
9. community
10. chart

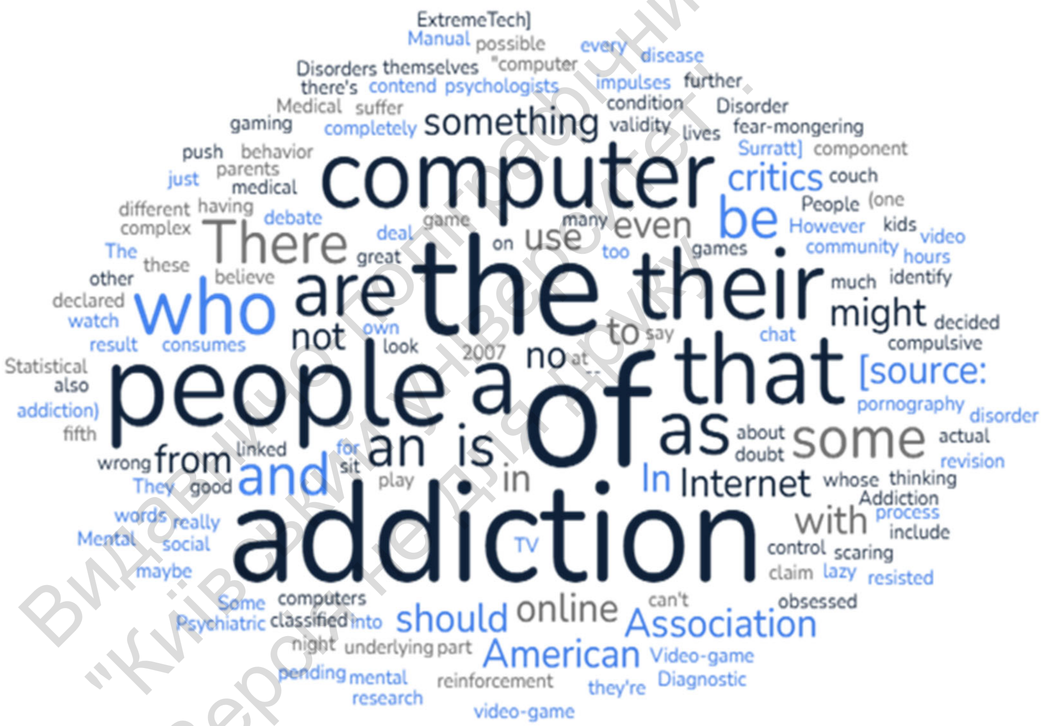
Computer Addiction Controversy

There is a great deal of debate in the medical 1) _____ about the validity of computer 2) _____. There is no doubt that some people use their computers, look at Internet pornography,

play computer games and 3) ______________ online too much for their own good. There are even some people whose computer use completely consumes their lives. However, many 4) __________ believe computer addiction is a compulsive behavior linked to an underlying condition, not something that should be classified as an addiction. People who 5) __________ from "computer addiction" are really people who can't control their impulses, these critics say. They claim that some people might identify themselves as having 6) __________ Addiction Disorder as part of a complex social reinforcement process. Video-game addiction might be the result of fear-mongering – scaring 7) __________ into thinking there's something wrong with their 8) __________. Some critics even contend that people who are obsessed with online gaming are no different from people who sit on the couch and watch hours of TV every night. In other words, maybe they're just lazy.

In 2007, the American Medical 9) _____________ decided that video-game addiction (one possible component of computer addiction) should not be declared an actual disease, pending further research. The American Psychiatric Association also resisted a push to include video game addiction as a mental 10) ______________ in the fifth revision of the Diagnostic and Statistical Manual of Mental Disorders [10].

Task 12. Search the Web and find 7 definitions of the words in the cloud



Task 13. Make your own story using a word cloud

TEXT E

Key Vocabulary: to get help for computer addiction, local mental health services, to find an appropriate support group, to curb computer use, helpful tips, to extend into the night, to make specific time limits, to deal with the problem, to restrict access to Web sites, to be prone to become addicts, to be especially effective.

Task 14. Read the text and choose the best sentence below to fill in the gaps

Getting Help for Computer Addiction

Whatever the classification, excessive computer use remains a problem for some people. 1) _____. Your doctor, local mental health services or your local AA chapter could help you find an appropriate support group. There are online support groups, but results can be mixed – some compare these to holding Alcoholics Anonymous meetings in a bar.

If you're looking to curb your computer use, here are some helpful tips:

2) _____. Set an alarm to go off in one hour and end computer time when it rings.

Set aside "computer-free" parts of the day. If your computer use starts after dinner and extends into the night, get all your computer work done in the morning and don't touch it after dinner.

3) _____. Find a friend you can trust to keep the passwords for the software so you can't circumvent it.

Make a list of things you could be accomplishing instead of wasting time on the computer, and post it prominently near your monitor.

Enlist family members to help encourage you to limit your use. It might be difficult to stop on your own.

Put the computer in a high-traffic area of the house. With others looking over your shoulder all the time, you'll be less likely to overuse the computer. 4) _____ [10].

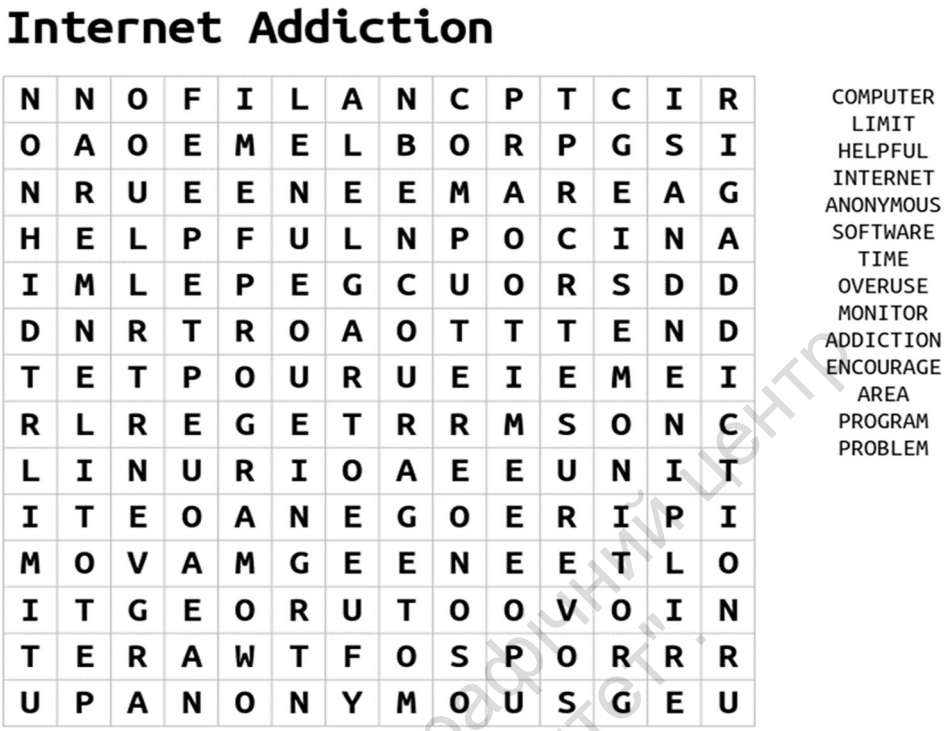
A) Damage to the functions of the organs involved can persist throughout a lifetime and cause death if untreated.
B) If you view computer addiction as a "real" addiction similar to alcoholism, the best way to deal with the problem might be a 12-step program following the precepts of Alcoholics Anonymous.
C) Make specific time limits.
D) Install software to restrict your access to Web sites that you visit compulsively.
E) It has been suggested that people of younger ages are more prone to become addicted to video games.
F) This is especially effective for parents who fear excessive computer use in their children.

Task 15. Comprehension questions

1. What are legitimate reasons for computer and video-game addictions?
2. Explain in what way computers' last-night use and use at work affect job performance.
3. Why is any single definition of computer addiction vague and controversial?
4. Define some danger signs of computer and online gaming addictions and speak on t consequences and problems' solving.
5. Do you support the idea that the result of video-game addiction might be fear-mongering-scaring parents into thinking there's something wrong with their kids?

Task 16. Solve the puzzle

https://thewordsearch.com/puzzle/8243359/internet-addiction/



TEXT F

Key Vocabulary: social networking, profile, updating, subnetworks, structure, online friends, addicted, addictive, concept, social network, Internet, harness, existing networks, Facebook, community, sites, relationships.

Task 17. Read the text and find synonyms to the words in the list

Are Social networking sites addictive

In April 2009, Oprah Winfrey logged on to Twitter and sent her first “tweet,” taking online social networking out of the hands of the computer-savvy and into the living rooms of every American. These days it seems like everyone and their grandma has a Facebook page, Twitter account or LinkedIn profile. People are logging on every day, obsessively updating their profiles and checking the status updates of their online friends. It’s a fun way to pass the time and stay in touch, but can these sites be dangerous? Can you become addicted to social networking?

Social networking is not a new concept. In fact, it’s been around as long as we have. A social network is simply the structure of relationships among individuals. Everyone on the planet is part of one big social network, but we also belong to smaller, more distinct subnetworks. We define these subnetworks by criteria like our families, friends, jobs, schools, hobbies and more. You have a social network at work. You have a social network at the dog park by your house. You have a social network with your college friends. You have a social network with your Tuesday night book club. The list goes on and on, and many people in your network may overlap. Additionally, your contacts multiply all the time, as you meet new people through the people in your existing networks.

Social networking Web sites evolved from these face-to-face networks. The online sites, though, are powerful because they harness the strength of the Internet to manage and map out your relationships.

You can physically see your network – your friends, your friends' friends, and so on – and how you connect with all of them.

Social networking sites allow people to manage their relationships as well as find new ones. Some communities, such as LinkedIn, target professionals. Some, such as the crochet/knitting community Ravelry, target people with specific hobbies. And some, such as Facebook or MySpace, are general interest community sites that allow users to form smaller communities within.

Once you join a social networking site, you may find yourself spending a lot of time there. Is it all in good fun, or can online social networks be addictive [2]?

permit-	particular-
to create-	real-
constantly-	effective-
to determine-	to be obsessed-
to deal with-	socializing-

Task 18. In groups, finish the following sentences and translate them into Ukrainian

1. People are logging on every day, obsessively …
2. It's a fun way to pass the time and…
3. Social networking is…
4. Everyone on the planet is part of one big social network, but …
5. You have a social network…
6. Social networking Web sites …
7. Social networking sites allow people to…
8. Once you join a social networking site, you …

TEXT G

Key Vocabulary: digital, screen, online, computers, get hooked on the Internet, Internet addiction, socializing, activity, contact, researches, Web site, log on, playing online, community, services, computer screen, interaction, human.

Task 19. Read the text and and decide if the sentences are True or False

Internet Addiction

Today's kids spend a lot of time in front of digital screens. A 2007 study from the University of Southern California's Annenberg School Center for the Digital Future showed that almost half of all parents surveyed believed their kids spent too much time watching television, and 20.7 percent felt their kids spent too much time online.

A 20 percent concern about online engagement is relatively low. But that doesn't mean there aren't problems. For example, in 2005, a young South Korean man actually collapsed and died after playing online for 50 hours with few breaks. Concerned authorities even founded "Internet Rescue Schools" to get children away from their computers and into fresh air, physical activity and socializing with other kids.

Children aren't the only ones who can get hooked on the Internet. In 2008, the American Journal of Psychiatry published an editorial in support of naming "Internet addiction" as a bona fide mental

condition. The majority of the medical community disagreed, though, and currently Internet addiction is not a formal disorder. However, excessive use of the Internet can certainly cause problems.

Even though it's not formally classified, many treatment and rehab centers worldwide now offer services for Internet addiction. This includes treatment for cyberporn, online gambling, online affairs and eBay addiction. Of course, these are all behaviors with serious consequences. The hallmark of an addiction is determining whether your actions are affecting yourself or others in a negative way.

So, is hanging out on Facebook any different from talking on the phone for hours, or gabbing with your friends over coffee? Not if you're spending normal amounts of time there. The average American Internet user spends about 15 hours online per month. If you're reading this article, then more than likely, you're one of those people. Congratulations! You're average!

However, if you're spending abnormally large amounts of time online, you could be damaging your relationships and even your health. Experts claim that a lack of face-to-face contact can affect you both socially and physically. Depending upon a computer screen for human interaction might undermine the ability to follow social cues or understand body language. In addition, some researchers believe that we're genetically predisposed to physically benefit from being face-to-face with another human. There's even an online test you can take to see if the time you spend online might be a problem (unless you're addicted to online tests, of course).

If you're one of the many who belong to a social network, you've had a taste of how addicting these Websites can be. What is it that compels us to keep logging on [2]?

1. A 2007 study showed that almost half of the parents thought their kids watched too much television. T/F
2. Only 20.7% of parents felt their kids spent too much time online. T/F
3. A South Korean man died after playing online for 50 hours with few breaks. T/F
4. Internet addiction is officially recognized as a mental disorder. T/F
5. Some authorities in South Korea created "Internet Rescue Schools" to address excessive computer use. T/F
6. Some rehab centers treat behaviors such as cyberporn and eBay addiction. T/F
7. The average American Internet user spends over 15 hours online per week. T/F
8. Spending excessive time online can negatively affect relationships and health. T/F
9. Lack of face-to-face contact has no physical or social consequences. T/F
10. Social networking sites can be addicting for many users. T/F

VIDEO

"DeepSeek, TikTok, Temu: How China is taking the lead in tech"
https://www.youtube.com/watch?v=z7do1hhb6fE [6]

Task 20. Study the vocabulary list and answer the questions

1. What do you know about China's involvement in technology and innovation?
2. Can you name any Chinese tech brands or products?

Key Vocabulary

AI chatbot – a software application that uses artificial intelligence to simulate conversation
tech dominance – leading position in technology development and production
electric car makers – companies that manufacture vehicles powered by electricity
supply chain – the system of producing and delivering a product from raw materials to end consumers
renewable energy – energy from natural sources that are constantly replenished, such as solar or wind
quantum computing – a type of computing that uses quantum mechanics to perform calculations much faster than classical computers
patent – a legal right granted for an invention, giving exclusive rights to the inventor
state-backed capitalism – an economic system where the government heavily supports and funds private or public companies
intellectual property – creations of the mind, like inventions and designs, protected by law
sanctions – penalties or restrictions imposed by one country on another, often for political reasons
pivot (v.) – to change direction or strategy in response to challenges
self-sufficiency strategy – a plan to rely on one's own resources rather than external help
infrastructure – the physical and organizational structures needed for the operation of a society or industry

Task 21. In pairs, agree or disagree with the following statements

1. China is currently leading the world in drone production.
2. TikTok is the only successful Chinese app on the global market.
3. China produces most of the world's solar panels.
4. Chinese tech innovation is mostly independent and not connected to government support.

Task 22. Watch a video and decide if the statements are True or False

1. DeepSeek is the first Chinese AI chatbot to gain international attention. T/F
2. China has become dominant only in smartphone technology. T/F
3. BYD is a Chinese company known for producing electric vehicles. T/F
4. China is responsible for less than half of the global solar panel supply chain. T/F
5. Chinese scientists publish more quantum computing research papers annually than the United States. T/F
6. The 'Made in China 2025' initiative aimed to make China the world's largest exporter of cheap goods. T/F
7. Huawei lost market share due to U.S. sanctions but later became a major player in microchip production. T/F
8. The United States has ignored the technological rise of China and made no significant investments in AI. T/F

Task 23. Write a short paragraph answering the question:

What is the most surprising or important thing you learned about China's role in global tech? Support your answer with one example from the video.

PROJECT WORK

Task 24. Using the information from Unit 5 write an essay on one of the topics

Scrolling into Dependency: The Rise of Internet and Social Media Addiction
From Connection to Compulsion: The Dark Side of Social Networking
Virtual Lives, Real Consequences: Understanding Internet Addiction in the Digital Age
Social Media vs. Mental Health: A Growing Digital Dilemma
Wired for Interaction: The Psychology Behind Social Network Addiction

UNIT 6
DIGITAL FINGERPRINTING

"Don't say anything online that you wouldn't plastered on a billboard with your face on it."
– Erin Bury, co-founder of online will platform Willful

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?



TEXT A

Key Vocabulary: to pop into one's head, to hop online, to share your find, to post a link, digital content, on the Web, digital fingerprinting, computer-driven analysis, fingerprint analogy, database, copyrighted material, smart software, watermarking, unique identifier.

Task 2. Read the text and answer the questions

How Digital Fingerprinting Works

Picture this: The classic David Bowie and Queen collaboration "Under Pressure" pops into your head. You haven't heard it in years, and suddenly you can think of nothing but the lyrics. But you can't remember them all, so you instinctively hop online and look up the song and give it a listen. Where do you go first? You could go to iTunes, where you might find the song available as a 99 cent MP3. But instead, you go to YouTube. And then you want to share your find with your friends, so you post a link on Twitter. Within minutes a dozen people are listening to that same song without paying a dime.

This is the kind of situation digital content creators aren't too wild about. Someone owns the rights to most of the content available on the Web, and all too often it's distributed without permission. How can companies monetize something that's so easily (and frequently) duplicated and shared for free?

One answer is a process called digital fingerprinting. Digital fingerprinting technology relies on complex computer-driven analysis to identify a piece of media like a song or video clip. Here's where the fingerprint analogy is born: Just like every person has a unique fingerprint, every piece of media has identifying features that can be spotted by smart software. But what good does this kind of identification really do? Sites like YouTube can scan files and match their fingerprints against a database of copyrighted material and stop users from uploading copyrighted files. Sounds simple, right? Surprisingly, people often confuse digital fingerprinting with watermarking or don't have a clear picture of what the technology entails.

Part of the problem is that the term "digital fingerprinting" can actually refer to two entirely different things. The first meaning we've already covered, but the second works from a more traditional fingerprint analogy, equating your personal computer to an online fingerprint that can be used to track your online activity. Both concepts refer to a unique identifier, but with completely different functionalities – this second meaning has nothing to do with spotting copyrighted songs or videos. Neither one involves scanning real fingerprints, but they're pretty cool technologies anyway [11].

Questions:

1. Why can you think of nothing but the lyrics?
2. In what way is it possible to share the found song in iTunes with friends?
3. Do you know any kind of situation when digital content creators don't care about?
4. What does digital fingerprinting technology rely on?
5. What meaning, the first or the second of the term "digital fingerprinting" can be used to track someone's online activity?
6. People don't so often confuse digital fingerprinting with watermarking, do they?

Task 3. Match the words and make up 10 sentences

digital	activity
video	for free
fingerprint	fingerprinting
online	software
personal	analysis
shared	features
identifying	analogy
online	fingerprint
smart	computer
computer-driven	clip

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

VIDEO

“What is a Digital Footprint?”

https://www.youtube.com/watch?v=dmQGq_FNBpE [31]

Key Vocabulary:

personal brand – the image or impression you create for yourself online or in public, based on what you share or how you act

privacy settings – controls on websites or apps that let you decide who can see your information or posts

cookies – small pieces of data saved by websites on your computer or device to remember your preferences or actions

online reputation – the general opinion or image that other people have of you based on your online activity

judgments – opinions or decisions people make about someone or something, often based on what they see or know

modify – to change or adjust something

public – open and visible to everyone, not private

limit – To control or reduce the amount or level of something

Task 5. In pairs, discuss the questions

1. How much time do you spend online every day?
2. What kinds of things do you usually post, share, or comment on?
3. Have you ever Googled your own name? What did you find?

Task 6. Before watching the video look at the statements ang guess whether they are True or False. After the video check your answers

1. A digital footprint disappears when you delete something online.
2. Employers can use your digital footprint to learn about you.
3. Cookies are pieces of software that help track your online activity.
4. You can control who sees your posts by adjusting privacy settings.
5. Sharing personal information online is always safe.

Task 7. Watch a video and answer the questions

1. What is a digital footprint?

A) A type of digital currency
B) A history of online activities and shared information
C) A program that deletes online history
D) A device that tracks physical steps

2. Why is a digital footprint permanent?

A) Because online posts can never be deleted
B) Because websites automatically save all user activities
C) Because it is linked to government records
D) Because it updates every time a user goes online

3. How can a digital footprint be beneficial?

A) It allows people to remain anonymous online
B) It helps users delete their online history easily
C) It can create a positive online reputation and personal brand
D) It prevents companies from collecting user data

4. What can apps do with your digital footprint?

A) Improve user experience based on habits and preferences
B) Automatically erase personal data after a certain period
C) Completely hide your activities from search engines
D) Prevent you from visiting certain websites

5. Why is it important to check your digital footprint?

A) To see what information others can find about you online
B) To remove all traces of online activity instantly
C) To avoid using social media completely
D) To increase the number of cookies stored in your browser

6. How can you control who sees your online information?

A) By blocking websites
B) By using Bing search engine regularly
C) By modifying privacy settings on social media and apps
D) By using as many social media accounts as possible

7. What are cookies in the context of digital footprints?

A) Small files that help websites track user activity
B) Security programs that erase browsing history
C) Pop-up ads that appear on search engines
D) Online passwords stored in browsers

8. Why should you think before sharing content online?

A) Because shared content can become part of your permanent digital footprint
B) Because social media websites charge users for removing posts
C) Because online posts disappear after a few hours
D) Because sharing content slows down internet speed

Task 8. Watch the video again and complete "4 Tips to be safe online"

Keep the following tips in mind when you go online to manage your digital footprint. Tip 1. Know what your footprint says about you. Other people use your digital footprint to make 1) _____ about you online. This can include employers when you apply for a job or recruiters when you apply for academic programs. It's important to know what your digital footprint says about you and how your information is being used.

Tip 2. Manage your 2) _____ settings. You can modify the privacy settings of most of the social media sites and online applications that you use. This can help you 3) _____ who sees what you share and what information shows up when someone searches for you online.

Tip 3. Manage your 4) _____. They are notes given to your web browser as you browse the web. These cookies help apps 5) _____ that they need while you're using the app. This can help the app work better for you, but this data also contributes to your digital footprint. You can use the 6) _____ in your browser to limit or block the use of cookies on certain websites.

Tip 4. Think before you 7) _____. Once you share something online, you can't take it back. Make sure you're okay with something being a part of your 8) _____ digital footprint before you share it. Your digital footprint can live forever. Keep these tips in mind to make sure you're happy with your digital footprint and how it is used [6].

TEXT B

Key Vocabulary: digital watermark, identifying markings, digital file, content, smart technology, visible, to filter out, smart technology, visible, digital fingerprint.

Task 9. Read the text. Identify and write down the differences between watermarking and fingerprinting

Watermarking vs Fingerprinting

It's easy to mix up a digital fingerprint and a digital watermark, but these are two very different technologies with somewhat similar goals. When fingerprints are most commonly mentioned in popular culture, they're referenced in spy movies or mysteries as visible identifying markings people leave behind. Well, that's not how a digital fingerprint works – you'll never see any visible evidence that a digital fingerprint exists. The term watermark, on the other hand, typically refers to a completely visible marking on a digital file. Watermarks serve to curb the unlawful dissemination of content by annoyance more than smart technology.

A watermark is a logo or other identifying marking placed on an image or video that is visible at all times. The watermark aims to discourage Internet users from taking a photograph or a video from one Web site and using it for their own purposes without acknowledging the source. It's pretty hard to pretend a photo belongs to you when it has someone else's logo plastered all over it! Unfortunately, there's nothing that really guarantees a watermark will be effective. Pirates can still share watermarked videos, and some photos with smaller watermarks can easily be cropped to hide the identity of their rightful owner. A second form of watermarking adds an imperceptible bit of data to a file that can be used for tracking purposes. While this may sound even less useful than a visible watermark, it actually allows content owners to track the origin of a file by its unique watermark.

Digital fingerprinting offers an even more promising way to restrict the spread of copyrighted material. The very makeup of a file, which you could call its DNA, can be analyzed and recognized by a computer program designed to filter out licensed material. That fingerprint represents the digital equivalent of a red flag – when a computer system knows how to interpret its message, it acts as a warning that says "I'm copyrighted!" Of course, it's not quite that simple [11].

Task 10. Find the English equivalents for the words and word combinations

Відбиток, цифровий, докази, водяний знак, незаконне розповсюдження контенту, утримувати користувачів від копіювання, файл, ідентифікаційний знак, маркування, непомітний біт даних, обмежити розповсюдження файлів, логотип, авторське право, повідомлення.

Task 11. Work in pairs, ask and discuss the questions about the information you have read

TEXT C

Key Vocabulary: to modify a file, external database, pixel, to identify, multiple criteria, content provider, perceptual characteristics, identification, to track one's identity online.

Task 12. USE OF ENGLISH. Read the text and choose the correct answer

Digital Fingerprinting Technology

Unlike watermarking, digital fingerprinting never involves 1) _____ a file. The most promising use of digital fingerprinting is preventive rather than tracking-based. For fingerprinting to work, software has to 2) _____ to accurately identify a piece of media and relate that file to an external database. To achieve this, fingerprinting software samples an audio or video file to 3) _____ tiny portions of the file that are unique to that piece of media. Those samples could involve a handful of red pixels that make up a character's hat at the 57-minute mark of a movie or the exact pitch of a singer's voice 30 seconds into a song. Those are extremely simplistic examples – fingerprinting 4)_____ sampling multiple criteria to form an accurate representation of the media in question.

Audible Magic, one major digital fingerprinting company, works for huge 5) _____ providers including NBC Universal, Sony Music and 20th Century Fox. Audible Magic boasts that its CopySense technology can 6) _____ the source of a video clip within five seconds of playback and can identify an audio file within 10 seconds. And supposedly, that's under any 7) _____. Not only is Audible Magic's software designed to identify a pristine copy of a movie, the company claims its software can recognize a piece of media that was, say, recorded off a movie theater screen with a 8) _____ camera [11].

Identification is based on what Audible Magic calls "the perceptual characteristics of audio and video." The system is smart 9) _____ to see past transformative changes to audio and video files so that transcoding between file formats, equalizing audio, cropping an image or even blurring a picture can't fool CopySense.

Does that mean Audible Magic can identify every piece of content on the Internet? Nope – fingerprinting only works with media that has been analyzed and has a reference file 10) _____ to a database. That file contains all the perceptual characteristics Audible Magic uses to identify a song of video. Audible Magic's Global Rights Registry Database covers millions of files from its clients [11].

1	A creating	B modifying	C duplicating	D encrypting
2	A able	B allow	C be allowed	D be able
3	A cut out	B pick up	C pick out	D cut down
4	A avoids	B entails	C completes	D limits
5	A digital	B content	C entertainment	D media
6	A locate	B decode	C name	D identify
7	A situations	B terms	C conditions	D influences
8	A huge	B small	C handheld	D flexible
9	A enough	B so	C very	D quite
10	A posted	B downloaded	C uploaded	D printed

Task 13. Match the following words to their definitions and translate them into Ukrainian

1 fingerprint	A relating to, using, or storing data or information in the form of digital signals
2 digital	B a structured set of data held in a computer, especially one that is accessible in various ways
3 file	C original, belonging to the earliest period or state
4 database	D to remove the upper or outer parts of
5 pixel	E by means of the Internet or other computer network
6 online	F the association or linking of one thing with another
7 format	G a distinctive identifying characteristic
8 identification	H a collection of data, programs, etc. stored in a computer's memory or on a storage device under a single identifying name
9 crop	I a defined structure for the processing, storage, or display of data
10 pristine	J any of the small discrete elements that together constitute an image

Task 14. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

identify a piece of media * online identity * cropping an image* transcoding* multiple criteria *digital fingerprinting* a pristine copy* sample audio or video* external database * perceptual characteristics*

1. _____ helps track the original creator of an image or video, but it also raises privacy concerns.
2. When people store their personal information in _____, they do not always check how securely it is protected.

3. With advanced technology, social media platforms can easily _____ and remove copyrighted content, although this is not always fair.
4. Even if a song is slightly altered, algorithms can still recognize it based on its _____, which makes it useful for detecting plagiarism.
5. Universities often select students based on _____, such as grades, extracurricular activities, and essays, which many consider the best way to evaluate applicants.
6. A person's _____ may not reflect their true personality, which can affect the way others perceive them.
7. In digital forensics, experts try to find _____of a document to verify its authenticity, which is especially important in journalism.
8. _____ between file formats can help make videos compatible with different devices, but it does not always maintain the same quality.
9. When _____, important details might be lost, which can change the meaning of a photo in the news.
10. Before making a final decision, a filmmaker might _____ from different sources, as this can improve the creative process.

TEXT D

Key Vocabulary: technology, digital fingerprinting, identity tracking, digital world, IP address, Web site, search, Internet, figure out, Web.

Task 15. Read the text and choose the correct words from the list to complete the text

1. technology
2. accounts
3. installed
4. site
5. computer
6. Windows
7. aware
8. service
9. privacy
10. tracking

Digital Fingerprinting and Your Identity

The last page delved into the 1) _____ powering digital fingerprinting as we typically think of it, but the term sometimes refers to an altogether different form of data tracking. This can be pretty confusing. We all know what fingerprinting normally means (we only have one set of fingerprints!), but entering the digital world opens up room for ambiguity. In recent years, digital fingerprinting has been used to describe a method of identity 2) _____ – essentially, every computer has a unique fingerprint that makes it trackable across the Internet.

You've probably heard of IP addresses, the unique numbers attached to every 3) _____ on the Internet. An IP address isn't an exact identity card for a computer. Real fingerprints never change, but Internet 4) _____ providers (ISPs) can change users' IP addresses. Digital fingerprinting 5) _____ for other details to pin down the identity of your computer. And here's where things get a little scary: It's shockingly easy for Web sites to read various bits of data about your computer and figure out who you are. The IP address is just the first step – this shows who your ISP is and what country you live in. The login identity you choose on a Web 6) _____ can be another clue. If you use the same login on multiple sites, that name may be easy to track down with a simple Google search. The operating system 7) _____ on your computer, be it 8) _____ or Mac OS X or Linux, tightens the focus. Even the web browser

you use (and the specific version you're running, like Google Chrome 11.0.696.60 or Firefox 3.6.17) adds detail to your digital fingerprint.

As you can see, the technology exists to track your activities on the Internet. But is this really a bad thing? Well, that depends on how much you value your 9) _____. One use of this technology lies in targeted advertising, which would take your data into account to provide ads more likely to appeal to your interests. If you've ever noticed Google Ads grabbing keywords off a page you're viewing to provide more topical ads or been surprised when Web sites mysteriously identify the city you live in, you've seen a basic version of this technology at work. As this kind of tracking becomes more common, advertising and tracking companies will supposedly offer opt-out Web sites (much like telemarketer "do not call" lists) that will protect your anonymity. Still, you should always be 10) _____ of how easily your identity can be traced [11].

Task 16. Search the Web and find 7 definitions of the words in the cloud

Task 17. Make your own story using a word cloud

TEXT E

Key Vocabulary: computerized, copyright infringement, software, copyrighted material, restrictive technology, to track PC, tracking technology, device, fingerprinting.

Task 18. Read the text and choose the best sentence below to fill in the gaps

Reasons for Digital Fingerprinting

The last two pages established that the term "digital fingerprinting" applies to two entirely different technologies. The thing they have in common, of course, is a computerized form of

identification. Now that we've established how each technology works, let's examine how each is used. YouTube presents an easy starting point. Copyright infringement constantly threatens the video site, and in 2007 Viacom sued Google for $1 billion over clips available on YouTube. 1) _____. Policing a site as large as YouTube is a huge challenge – how can Google keep unlicensed content out?

With digital fingerprinting. Google uses software it calls YouTube Video Identification to sort through uploaded videos and recognize copyrighted content. It also gives copyright owners the control to deny uploads or even monetize their content. This form of digital fingerprinting actually serves two purposes. 2) _____. Ideally, this means both the companies that own the copyright and the companies who host that content online are protected by fingerprinting. The content isn't spread illegally, and sites like YouTube avoid nasty lawsuits.

3) _____. Another excellent example of fingerprinting at work is Shazam, the music identification app that can match a song's audio sample to a musical database. On smartphones, Shazam uses a microphone to pick up audio from a song, analyzes it, and uses that data to find a match. Shazam then pulls up a page of information on the song and artist and provides quick access to a music store where an MP3 of the song can be purchased.

We've described how digital fingerprinting can be used to track PCs across the Internet based on various characteristics that make up a digital fingerprint. That same tracking technology can be used for security, as well. 4) _____. And because identification doesn't rely on an IP address alone, pirates who access the Internet from different places on the same device can still be pinned down.

Obviously, tracking criminals is a noble use of digital fingerprinting – but if this is starting to sound like an invasion of privacy to you, you might be onto something [11].

A) Pirates and Internet users who upload and download illicit material can be identified, tracked and even arrested using the power of digital fingerprinting.
B) Of course, digital fingerprinting doesn't have to be a restrictive technology.
C) Companies and websites use digital fingerprinting to enhance security, verify user identities, and prevent fraud.
D) It protects Google from harmful lawsuits and limits the unlicensed spread of copyrighted material.
E) Digital fingerprinting is used to protect copyrighted content by identifying and tracking unauthorized copies across the internet. F) Google didn't upload the clips itself, but it didn't stop users from uploading the clips, either.

Task 19. Answer the questions

1. Name different technologies of the term "digital fingerprinting".
2. Explain in what way each technology is used.
3. Do you agree that policing a site as large as YouTube is a huge challenge?
4. What form of digital fingerprinting serves two purposes?
5. Explain why tracking criminals is a noble use of fingerprinting.

Task 20. Solve the puzzle

https://thewordsearch.com/puzzle/8234293/digital-fingeprinting/

Digital Fingeprinting

O	D	P	T	Z	D	A	E	R	P	S	N	G	C
C	E	L	O	T	O	A	G	H	E	D	Z	D	O
D	T	P	L	N	L	D	O	O	N	G	T	P	P
N	C	I	R	M	T	A	P	S	I	L	Y	N	Y
R	E	C	O	N	T	E	N	T	L	N	E	C	R
O	T	E	A	O	G	E	G	A	N	G	A	R	I
A	O	N	C	P	E	I	I	N	O	O	O	E	G
D	R	O	A	H	L	R	C	O	L	O	P	C	H
A	P	R	T	R	E	O	E	L	T	G	A	O	T
T	S	E	C	T	L	O	A	S	O	L	I	G	M
A	C	Y	A	S	G	S	D	D	A	E	D	N	G
D	G	M	N	L	A	T	I	G	I	D	N	I	W
W	P	E	D	O	W	N	L	O	A	D	T	Z	G
Z	S	Y	G	O	L	O	N	H	C	E	T	E	E

APLOAD
DATA
MATERIAL
HOST
CONTENT
COPYRIGHT
RECOGNIZE
DIGITAL
PROTECTED
DOWNLOAD
TECHNOLOGY
GOOGLE
ONLINE
SPREAD

TEXT F

Key Vocabulary: fingerprinting, privacy, fingerprinting, Internet, identification, information, technology, laws, digital, global network, develop, identity, fraudulent.

Task 21. Read the text and find synonyms to the words in the list

Legality

As you've probably figured out by this point, digital fingerprinting can be a powerful – perhaps even invasive technology. Do you like the thought of your every online move being tracked, even if it's only for the purpose of targeted advertising? Here's a better question: Is it even legal?

Identity tracking fingerprinting treads on shaky ethical ground that may be deemed overly invasive and unlawful in the future. But because it's a developing technology, those legal issues are still being sorted out. And with the Internet being a global network, laws regarding digital fingerprinting may develop completely differently from one country to another.

According to Canada's guidelines, a digital fingerprint likely constitutes personal information, so usage of that information could be in violation of Canadian privacy laws. Canadian organizations are required to exhaust every possible noninvasive method of personal identification before resorting to methods like fingerprinting. Because fingerprinting "may collect more information than is necessary to identify fraudulent and duplicate respondents in online research," Canadian organizations could get in trouble for tracking people unless they've received permission or exhausted all other opportunities [11].

The first form of digital fingerprinting we covered – matching identifying characteristics of copyrighted media to a database – doesn't suffer from the same ethical challenges as identity tracking.

License holders have the right to protect their content, and nothing about this form of fingerprinting invades the user's privacy. Ideally, fingerprinting will actually decrease the number of copyright infringement lawsuits by stopping the illegal dissemination of licensed media. Viacom's $1 billion lawsuit against YouTube was thrown out of court in 2010 because Google was found to be in compliance with the Digital Millennium Copyright Act (DMCA). Because the site took down illegal videos when notified, it was protected under the DMactually; CA and wasn't held liable for the actions of its users. With better fingerprinting technology, the lawsuit may never have arisen at all. That statement puts a lot of faith into fingerprinting technology, bringing us to our last topic: How well does it really work [11]?

influential-	conviction-
tracing-	truly existing-
moral justification-	disagreements-
private-	copy-
needful-	deceitful-

Task 22. In groups, finish the following sentences and translate them into Ukrainian

1. Digital fingerprinting technology relies on...
2. Digital fingerprinting is a large automated system...
3. Digital fingerprinting must be able to identify...
4. Video elements can vary...
5. In 2007, one of the fingerprinting technologies was...
6. Soapbox was a Microsoft project that allowed users...
7. Thinking the clip would then be indexed and protected...
8. The technology that identifies media will be…

TEXT G

Key Vocabulary: automated system, digital fingerprinting, content, screen, technology, upload, online video, project, software, databases, apps, copyrighted.

Task 23. Read the text and decide whether the sentences are True or False

Effectiveness of Digital Fingerprinting

Digital fingerprinting sounds like the perfect technology to combat Internet piracy. It prevents users from spreading copyrighted content and potentially bypasses the hassle and expense of lawsuits. Once implemented by an organization, digital fingerprinting is a largely automated system, which means less work for content providers and media sites alike. Of course, all that convenience assumes one critical thing: that digital fingerprinting actually works.

Digital fingerprinting must be able to identify thousands or millions of pieces of content – content that can be disseminated in many media formats, cropped or edited in unexpected ways, or even recorded off a movie theater screen. Video elements like color, bitrate and even resolution can vary from video to video. With all those variables, can digital fingerprinting really work?

In 2007, Audible Magic's Copysense fingerprinting technology was put to the test in an online video site called Soapbox. Soapbox was a Microsoft project that allowed users to upload videos a la YouTube. Even with Audible Magic's fingerprinting technology at work, tech site Gigaom was easily able to upload a copyrighted video from Comedy Central's "The Daily Show". It took days for the clip to be taken down from Soapbox – even after Gigaom contacted Microsoft and Audible Magic for

comment. Thinking the clip would then be indexed and protected against illicit sharing, Gigaom tried to upload it again. It worked. They had similar success on Myspace, which also employs Audible Magic's fingerprinting.

Audible Magic protects against 11 million songs, movies and television shows. But with decades of media at our fingertips in digital form, the software obviously can't safeguard against all illegal uploads. Digital fingerprinting also can't stop most peer-to-peer file sharing, which distributes material directly between users. The effectiveness of digital fingerprinting in the future is entirely up in the air. If companies like Audible Magic continue to improve their recognition systems and expand their fingerprint databases, sites with user-generated content will be easier to maintain and the technology that identifies media will be more powerful than ever. Who knows? In 20 years, apps like Shazam may be able to differentiate between two live concert versions of "Free Bird" based on the length of a guitar solo. Now that would be accuracy[11]!

1. Digital fingerprinting eliminates the need for lawsuits by completely preventing users from sharing copyrighted content. T/F
2. Once implemented, digital fingerprinting requires constant manual work by content providers. T/F
3. Digital fingerprinting must recognize content even when it is cropped, edited, or recorded in different formats.T/F
4. The color, bitrate, and resolution of a video do not affect digital fingerprinting's ability to identify it. T/F
5. Audible Magic's Copysense technology was completely successful in preventing the upload of copyrighted content on Soapbox. T/F
6. Gigaom was able to upload a copyrighted video multiple times despite the use of digital fingerprinting technology. T/F
7. Myspace did not use Audible Magic's fingerprinting technology to detect copyrighted videos. T/F
8. Audible Magic's technology protects against all illegal uploads across all digital media. T/F
9. Digital fingerprinting is currently ineffective at stopping most peer-to-peer file sharing. T/F
10. The future of digital fingerprinting depends on the improvement of recognition systems and the expansion of fingerprint databases. T/F

PROJECT WORK

Task 24. Using the information from Unit 6 write an essay on one of the topics

Digital Fingerprinting: A Game-Changer in Copyright Protection?
The Pros and Cons of Digital Fingerprinting in the Digital Age
The Role of Digital Fingerprinting in Online Identity Verification

UNIT 7
CYBERSECURITY THREATS. HACKERS

"It's less about technology for me, and more about religion [on hacking]."
– Adrian Lomo, an American threat analyst and hacker

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?

TEXT A

Key Vocabulary: hacker, information, destroy, computer system, hacker community, infiltrating, creating programs, use computers, unify, small applications, operating systems, explore a network, challenge, malicious intent, computer world, malicious hackers, computer viruses.

Task 2. Read the text and answer the questions

How Hackers Work

Thanks to the media, the word "hacker" has gotten a bad reputation. The word summons up thoughts of malicious computer users finding new ways to harass people, defraud corporations, steal information and maybe even destroy the economy or start a war by infiltrating military computer systems. While there's no denying that there are hackers out there with bad intentions, they make up only a small percentage of the hacker community.

The term computer hacker first showed up in the mid-1960s. A hacker was a programmer – someone who hacked out computer code. Hackers were visionaries who could see new ways to use computers, creating programs that no one else could conceive. They were the pioneers of the computer industry, building everything from small applications to operating systems. In this sense, people like Bill Gates,

Steve Jobs and Steve Wozniak were all hackers – they saw the potential of what computers could do and created ways to achieve that potential.

A unifying trait among these hackers was a strong sense of curiosity, sometimes bordering on obsession. These hackers prided themselves on not only their ability to create new programs, but also to learn how other programs and systems worked. When a program had a bug – a section of bad code that prevented the program from working properly – hackers would often create and distribute small sections of code called patches to fix the problem. Some managed to land a job that leveraged their skills, getting paid for what they'd happily do for free.

As computers evolved, computer engineers began to network individual machines together into a system. Soon, the term hacker had a new meaning – a person using computers to explore a network to which he or she didn't belong. Usually hackers didn't have any malicious intent. They just wanted to know how computer networks worked and saw any barrier between them and that knowledge as a challenge.

– In fact, that's still the case today. While there are plenty of stories about malicious hackers sabotaging computer systems, infiltrating networks and spreading computer viruses, most hackers are just curious – they want to know all the intricacies of the computer world. Some use their knowledge to help corporations and governments construct better security measures. Others might use their skills for more unethical endeavors [12].

Questions:

1. What thoughts does the word "hacker" summon up?
2. When did the term computer hacker first show up and what meaning did it have?
3. What were new ways visionaries could see in using computers?
4. What was a unifying trait among hackers and what did they pride themselves on?
5. How were patches used by hackers?
6. What intent did hackers have and why did they perceive knowledge of how computer networks worked as a challenge?

Task 3. Match the words and make up 10 sentences

malicious	information
steal	computer
hacker	hacker
computer	properly
operating	measures
infiltrating	intentions
security	systems
bad	for free
do	networks
working	community

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key Vocabulary: computer addiction, hacker toolbox , the main resource, to rely upon, apart from ingenuity, computer code, a relatively small number, to program code, to seek out and download code, to explore computer and networks, to design programs, skilled, malicious, to log and review keystrokes, to record, to infiltrate a system, to hack passwords, to generate possible combinations.

Task 5. Read the text and ask 5 questions

The Hacker Toolbox

The main resource hackers rely upon, apart from their own ingenuity, is computer code. While there is a large community of hackers on the Internet, only a relatively small number of hackers actually program code. Many hackers seek out and download code written by other people. There are thousands of different programs hackers use to explore computers and networks. These programs give hackers a lot of power over innocent users and organizations – once a skilled hacker knows how a system works, he can design programs that exploit it.

Malicious hackers use programs to:

Log keystrokes: Some programs allow hackers to review every keystroke a computer user makes. Once installed on a victim's computer, the programs record each keystroke, giving the hacker everything he needs to infiltrate a system or even steal someone's identity.

Hack passwords: There are many ways to hack someone's password, from educated guesses to simple algorithms that generate combinations of letters, numbers and symbols. The trial and error method of hacking passwords is called a brute force attack, meaning the hacker tries to generate every possible combination to gain access. Another way to hack passwords is to use a dictionary attack, a program that inserts common words into password fields.

Infect a computer or system with a virus: Computer viruses are programs designed to duplicate themselves and cause problems ranging from crashing a computer to wiping out everything on a system's hard drive. A hacker might install a virus by infiltrating a system, but it's much more common for hackers to create simple viruses and send them out to potential victims via email, instant messages, Web sites with downloadable content or peer-to-peer networks.

Gain backdoor access: Similar to hacking passwords, some hackers create programs that search for unprotected pathways into network systems and computers. In the early days of the Internet, many computer systems had limited security, making it possible for a hacker to find a pathway into the system without a username or password. Another way a hacker might gain backdoor access is to infect a computer or system with a Trojan horse.

Create zombie computers: A zombie computer, or bot, is a computer that a hacker can use to send spam or commit Distributed Denial of Service (DDoS) attacks. After a victim executes seemingly innocent code, a connection opens between his computer and the hacker's system. The hacker can secretly control the victim's computer, using it to commit crimes or spread spam.

Spy on e-mail: Hackers have created code that lets them intercept and read e-mail messages – the Internet's equivalent to wiretapping. Today, most e-mail programs use encryption formulas so complex that even if a hacker intercepts the message, he won't be able to read it [12].

Task 6. Work in pairs and discuss your questions

Task 7. Find in the text English equivalents for the words below

Атака, хакер, пароль, мережі, повідомлення, сила, розроблений, жертва, віруси, зомбі, зловмисний, зламувати паролі, жорсткий диск, скоювати злочини, поля паролів, дублювати, шпигувати.

TEXT C

Key Vocabulary: to be antisocial, to become a communication barrier, to work on a computer program, computer networks, to associate with other people, to become accessible, to host a bulletin board system, to let dial into the system, to prove claims.

Task 8. USE OF ENGLISH. Read the text and choose the correct answer

Hacker Culture

Individually, many hackers are antisocial. Their intense interest in computers and programming can become a communication barrier. Left to his or her own devices, a hacker can spend hours 1) _________ on a computer program while neglecting everything else.

Computer networks gave hackers a way to associate with other people with their same interests. Before the Internet became easily accessible, hackers would 2) ___________ and visit bulletin board systems – BBS. A hacker could host a bulletin board system on his or her computer and let people 3) ______________ into the system to send messages, share information, play games and download programs. As hackers found one another, information exchanges increased dramatically.

Some hackers posted their accomplishments on a BBS, boasting about infiltrating secure systems. Often they 4) __________ a document from their 5) ___________ databases to prove their claims. By the early 1990s, law enforcement officials considered hackers an enormous security threat. There seemed to be hundreds of people who could hack into the world's most secure systems at will.

There are many websites dedicated to hacking. The hacker journal "2600: The Hacker Quarterly" has its own site, complete with a live broadcast section dedicated to hacker topics. The print version is still available on newsstands. Websites like Hacker.org promote learning and include puzzles and competitions for hackers to test their skills.

When caught – either by law enforcement or corporations – some hackers admit that they 6) ____________ massive problems. 7) ____________ hackers don't want to cause trouble; instead, they hack into systems just because they want to know how the systems work. To a hacker, a secure system is like Mt. Everest – he or she infiltrates it for the sheer challenge. In the United States, a hacker can get into trouble 8) ___________ a system. The Computer Fraud and Abuse Act outlaws unauthorized access to computer systems.

– Not all hackers try to explore forbidden computer systems. Some use their talents and knowledge to create better software and security measures. In fact, many hackers who once used their skills to break into systems now put that knowledge and ingenuity to use by creating more comprehensive security measures. In a way, the Internet is a battleground between different kinds of hackers – the bad guys, or black hats, who try to infiltrate systems or spread viruses, and the good guys, or white hats, 9) ___________ bolster security systems and develop powerful virus protection software.

Hackers on both sides overwhelmingly support open source software, programs 10) ________________ the source code is available for anyone to study, copy, distribute and modify. With open source software, hackers can learn from other hackers' experiences and help make programs work better than they did before. Programs might range from simple applications to complex operating systems like Linux [12].

1	A to work	B worked	C working	D work
2	A to set up	B set up	C set off	D setting off
3	A to dial	B dialing	C dialed	D dial
4	A would have uploaded	B uploading	C upload	D would upload
5	A victim	B victim's	C victims'	D victims

6	A could cause	B could have caused	C can have caused	D may have cause
7	A The most	B Most	C Much	D Most of
8	A to enter	B in entering	C for entering	D by enter
9	A which	B who	C whose	D whom
10	A which	B in what	C for which	D in which

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 hacker	A protect against threats; make safe
2 download	B someone who tries to break into computer systems, especially in order to get secret information.
3 modify	C using, requiring, or involved in high technology
4 secure	D allow the use or operation of (a program, language, or device)
5 massive	E the way in which a machine or natural phenomenon works or functions
6 high-tech	F make partial or minor changes to (something)
7 measure	G a plan or course of action taken to achieve a particular purpose
8 support	H exceptionally large
9 code	I program instructions
10 behavior	J copy (data) from one computer system to another or to a disk

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

panel discussions * hack into systems *. unauthorized access * comprehensive security measures * infiltrating secure systems * computer networks * security threat * cause trouble * communication barriers * dedicated to hacking

1. _____ between departments often delay quick responses to cybersecurity incidents.
2. Modern _____ are increasingly vulnerable to attacks due to their complexity and interconnectivity.
3. Every organization faces a potential _____, regardless of size or industry.
4. Some online communities are entirely _____ and exchanging illicit tools and information.
5. Even a single hacker can _____ for a major corporation by leaking sensitive data.
6. Skilled cybercriminals can _____ that were once believed to be impenetrable.
7. Companies must invest in _____ to protect their digital assets.
8. _____ to confidential data can damage a company's reputation beyond repair.
9. _____ has become a lucrative business for international cybercrime groups.
10. _____ on cybersecurity now frequently include ethical dilemmas related to surveillance and privacy.

TEXT D

Key Vocabulary: laws, damage, information, hacking, device, trial, classified information, stealing, advanced security system, unauthorized access, accused hacker, punishment, use of codes, victims, prosecuting a hacker, specify, legislation.

Task 11. Read the text and choose the correct words from the list to complete the text

1. government
2. laws
3. damage
4. hacking
5. information
6. legislation
7. commit
8. device
9. trial
10. spy

Hackers and Law

In general, most governments aren't too crazy about hackers. Hackers' ability to slip in and out of computers undetected, stealing classified information when it amuses them, is enough to give a government official a nightmare. Secret 1) _____, or intelligence, is incredibly important. Many government agents won't take the time to differentiate between a curious hacker who wants to test his skills on an advanced security system and a 2) _____.

Laws reflect this attitude. In the United States, there are several laws forbidding the practice of 3) _____. Some, like 18 U.S.C. § 1029, concentrate on the creation, distribution and use of codes and devices that give hackers unauthorized access to computer systems. The language of the law only specifies using or creating such a 4) _____ with the intent to defraud, so an accused hacker could argue he just used the devices to learn how security systems worked.

Another important law is 18 U.S.C. § 1030, part of which forbids unauthorized access to 5) _____ computers. Even if a hacker just wants to get into the system, he or she could be breaking the law and be punished for accessing a nonpublic government computer.

Punishments range from hefty fines to jail time. Minor offenses may earn a hacker as little as six months' probation, while other offenses can result in a maximum sentence of 20 years in jail. One formula on the Department of Justice's Web page factors in the financial 6) _____ a hacker causes, added to the number of his victims to determine an appropriate punishment.

– Other countries have similar 7) _____, some much more vague than legislation in the U.S. A recent German law forbids possession of "hacker tools." Critics say that the law is too broad and that many legitimate applications fall under its vague definition of hacker tools. Some point out that under this 8) _____, companies would be breaking the law if they hired hackers to look for flaws in their security systems.

Hackers can 9) _____ crimes in one country while sitting comfortably in front of their computers on the other side of the world. Therefore, prosecuting a hacker is a complicated process. Law enforcement officials have to petition countries to extradite suspects in order to hold a 10) _____, and this process can take years. One famous case is the United States' indictment of hacker Gary McKinnon. Since 2002, McKinnon fought extradition charges to the U.S. for hacking into the Department of Defense and NASA computer systems. McKinnon, who hacked from the United Kingdom, defended himself by claiming that he merely pointed out flaws in important security systems. In April 2007, his battle against extradition came to an end when the British courts denied his appeal [12].

Task 12. Search the Web and find 7 definitions of the words in the cloud

Task 13. Make your own story using a word cloud

TEXT E

Key Vocabulary: malicious behavior, hardware and software, free operating system, free software and computer access, to get sent to prison, server, sentenced, house arrest, specialized in hacking, phone systems, radio station, various radio contests, hacked into computer systems, Internet cafes.

Task 14. Read the text and choose the best sentence below to fill in the gaps

Famous Hackers

Steve Jobs and Steve Wozniak, founders of Apple Computers, were both hackers. Some of their early exploits even resembled the questionable activities of some malicious hackers. However, both Jobs and Wozniak outgrew their malicious behavior and began concentrating on creating computer hardware and software. Their efforts helped usher in the age of the personal computer – before Apple, computer systems remained the property of large corporations, too expensive and cumbersome for average consumers.

Linus Torvalds, creator of Linux, is another famous honest hacker. 1) _____. He has helped promote the concept of open source software, showing that when you open information up to everyone, you can reap amazing benefits.

Richard Stallman, also known as “rms,” founded the GNU Project, a free operating system. He promotes the concept of free software and computer access. He works with organizations like the Free Software Foundation and opposes policies like Digital Rights Management.

On the other end of the spectrum are the black hats of the hacking world. At the age of 16, Jonathan James became the first juvenile hacker to get sent to prison. He committed computer intrusions on some very high-profile victims, including NASA and a Defense Threat Reduction Agency server. Online, Jonathan used the nickname (called a handle) "c0mrade."Originally sentenced to house arrest, James was sent to prison when he violated parole.

Kevin Mitnick gained notoriety in the 1980s as a hacker who allegedly broke into the North American Aerospace Defense Command (NORAD) when he was 17 years old. Mitnick's reputation seemed to grow with every retelling of his exploits, eventually leading to the rumor that Mitnick had made the FBI's Most Wanted list. 2) _____.

Kevin Poulsen, or Dark Dante, specialized in hacking phone systems. He's famous for hacking the phones of a radio station called KIIS-FM. Poulsen's hack allowed only calls originating from his house to make it through to the station, allowing him to win in various radio contests. Since then, he has turned over a new leaf, and now he's famous for being a senior editor at Wired magazine.

Adrian Lamo hacked into computer systems using computers at libraries and Internet cafes. He would explore high-profile systems for security flaws, exploit the flaws to hack into the system, and then send a message to the corresponding company, letting them know about the security flaw. Unfortunately for Lamo, he was doing this on his own time rather than as a paid consultant.

Steve Jobs and Steve Wozniak, founders of Apple Computers, were both hackers. Some of their early exploits his activities were illegal. 3) _____. He was caught after breaking into the computer system belonging to the New York Times.

It's likely that there are thousands of hackers active online today, but an accurate count is impossible. 4) _____. Others know what they're doing so well that they can slip in and out of systems without anyone ever knowing [12].

A) In reality, Mitnick was arrested several times for hacking into secure systems, usually to gain access to powerful computer software.
B) Many hackers don't really know what they are doing – they're just using dangerous tools they don't completely understand.
C) His open source operating system is very popular with other hackers
D) He also snooped around a lot, reading sensitive information and giving himself access to confidential material.
E) Computer hacking is the act of identifying and exploiting system and network vulnerabilities in order to obtain unauthorized access to those systems.
F) A seminal figure in American hacking, Kevin Mitnick got his career start as a teen. In 1981, he was charged with stealing computer manuals from Pacific Bell.

Task 15. Answer the questions

1. Why were founders of Apple Computers considered to be hackers?
2. What ideas concerning hackery are reflected in different countries' laws?
3. How does punishment for hackery range?
4. Name some Websites and journals dedicated to hacking and explain what information they try to promote?
5. Why is the Internet a battleground between different kinds of hackers?

Task 16. Solve the puzzle

https://thewordsearch.com/puzzle/8244188/hackers/

Hackers

M	A	L	I	C	I	O	U	S	A	E	O	A	C
D	A	N	G	E	R	O	U	S	S	E	T	T	O
R	N	I	E	V	A	I	R	Y	M	I	R	I	C
E	V	O	I	N	S	E	S	N	D	R	S	T	H
R	I	I	I	O	S	T	E	T	U	Y	E	N	R
A	C	C	E	I	E	M	U	R	T	C	E	P	S
L	T	T	M	M	N	S	I	R	N	O	A	R	P
I	I	A	M	L	S	I	H	A	C	K	E	R	R
T	M	E	S	S	I	L	A	G	E	L	L	I	I
Y	S	E	G	P	T	T	A	E	R	H	T	O	S
S	E	C	U	R	I	T	Y	I	S	C	I	S	O
R	R	C	S	C	V	A	E	L	T	I	O	R	N
M	G	S	G	S	E	H	L	A	T	I	G	I	D
S	R	E	P	U	T	A	T	I	O	N	T	R	T

SPECTRUM
DANGEROUS
SYSTEM
SENSITIVE
PRISON
REPUTATION
MALICIOUS
HACKER
VICTIMS
THREAT
SECURITY
RERALITY
DIGITAL
ILLEGAL

TEXT F

Key Vocabulary: national cybersecurity adviser, cybersecurity, protecting computer networks, issues surrounding cybersecurity, improvement, vulnerability of computer networks, national security, personal information, establish, denial-of-service attacks (DoS), Department of Defense, high-tech, hacking capabilities, programs.

Task 17. Read the text and find synonyms to the words in the list

Could a single hacker crash a country's network?

You know you're living in the new millennium when one of the Obama administration's newest positions is nicknamed the "cyberczar." In May 2009, President Obama formally announced his plans to appoint a national cybersecurity adviser, charged with protecting computer networks in the United States – which Obama referred to as "strategic national assets" – from hacking and spying.

Cybersecurity isn't a new topic making the rounds in Washington. In 2007, the Commission on Cybersecurity for the 44th President, within the Center for Strategic and International Studies, was tasked with examining public policy and issues surrounding cybersecurity and developing recommendations for its improvement. According to the commission's executive summary, the vulnerability of computer networks has become a national security problem.

Computer hacking has evolved from a casual tech sport into a full-blown nefarious industry. With vast amounts of personal information floating around on the Internet, people are constantly at risk for identity theft and the ripple effect of stolen money. For instance, in 2008, the FBI reported $264.6 million lost due to Internet fraud. The federal government has even more at stake than bank account numbers and birth dates, though. In addition to the appointment of the cyberczar, the Department of

Defense plans to establish a U.S. Cyber Command Center to combat the tide of online threats against its networks and classified government data.

The recent series of cyber-attacks on July 4, 2009, highlighted why we need online safeguards. That weekend, government and public Web sites in the United States and South Korea were assaulted with denial-of-service attacks (DoS), which are essentially virus programs that flood sites with traffic and temporarily disable them. North Korea, which isn't even known for having high-tech hacking capabilities, was suspected as the perpetrator. While the North Korea allegation hasn't been confirmed, the hackers targeted at least nine U.S. sites, including the White House, Treasury Department and National Security Agency (which is, incidentally, where the future U.S. Cyber Command Center is slated to be stationed). In South Korea, the DoS attacks clogged more than 20 sites.

Harassing a handful of Web sites is one thing, but does one hacker have the technological wherewithal to bring down an entire country's network? In a word: yes [14].

collapse-	accentuated-
advance-	to initiate-
swindle-	were attacked-
substantiated-	informed-
incidentally-	manipulating-

Task 18. In groups, finish the following sentences and translate them into Ukrainian

1. Cybersecurity isn't a new topic …
2. A national cybersecurity adviser…
3. The Center for Strategic and International Studies…
4. The vulnerability of computer networks …
5. The federal government has…
6. People are constantly at risk…
7. The recent series of cyber-attacks …
8. North Korea was suspected…

TEXT G

Key Vocabulary: force, security, cyber attack, terrorist, Internet-based attacks, criminal gangs, to improve security, military, damage, connected to the Internet, hacker, weapons, redundancy systems, power supplies, well-trained human staff, worms, Trojan horse programs.

Task 19. Read the text and decide if the sentences are True or False

Cyber Attacks in the United States

Clearly, the United States faces a lot of security holes in its Internet infrastructure, despite the government's efforts to shore up security. But do these security lapses translate into "Die Hard"-style mayhem and destruction? Not quite. No one died in the cyber attacks on Estonia, nor is there a record of anyone ever having been killed because of a cyber attack or a computer being hacked. Some terrorist groups have expressed a desire to launch Internet-based attacks, but the main concerns actually revolve around criminal gangs that extort companies for money and angry hackers trying to make a statement (as with Estonia).

Improving security, redundancy systems, monitoring software and human oversight make it virtually impossible for cyber attacks to inflict large-scale physical casualties, or even any at all. Military

systems in particular are considered quite secure, so ICBMs aren't going to be launched by an 11-year old in Beijing. Nuclear weapons, as with many other critical or classified systems, aren't even connected to the Internet.

Estonia showed us that the possibility of economic damage is real, especially if hackers could shut off power supplies or infiltrate a major bank or the stock market. But in many cases, it's much easier for a hacker to gain entry into a system or network than to do any actual damage while inside. Also, the presence of well-trained human staff and proprietary systems at utilities and other vital systems means that any problems can be quickly dealt with. In the meantime, the main dangers to cyber security remain in the form of worms, Trojan horse programs and the exploitation of security flaws, all of which continue to cause billions of dollars in losses to private industry every year [4].

1. The United States still has security vulnerabilities in its Internet infrastructure. T/F
2. Cyber attacks have already caused large-scale destruction and deaths. T/F
3. Some terrorist groups have shown interest in launching cyber attacks. T/F
4. Criminal gangs and angry hackers are currently a bigger concern than terrorist cyber attacks. T/F
5. Cyber attacks are highly unlikely to cause large-scale physical casualties. T/F
6. Military systems, including nuclear weapons, are not connected to the Internet. T/F
7. Estonia experienced economic damage due to cyber attacks. T/F
8. Once hackers gain access to a system, it's easy to cause massive damage. T/F
9. Skilled human operators and proprietary systems help manage cyber threats effectively. T/F
10. Worms, Trojan horses, and security flaws continue to cost private industry billions of dollars each year. T/F

VIDEO

"`Hacking the hackers! World's biggest cybercrime gang stopped!"
https://www.youtube.com/watch?v=KppbV37Ldwg [5]

Key Vocabulary:
takedown – the removal or defeat of something or someone (e.g., from the internet or in a fight)
prolific – producing a large amount or number of something
infamous – famous for something negative or bad
ransomware – a type of malicious software that locks files until money is paid
dark web – a hidden part of the internet where illegal activities can take place
ally / allies – a person or group that supports and helps another

Task 20. Look at the title and answer the questions

1. What do you think the story is about?
2. Who do you think stopped the hackers?
3. What might be the consequences for the gang?
4. What words might you hear in a story about catching cybercriminals?

Task 21. Watch a video and choose the correct answer

1. The word "takedown" in this video mainly refers to:
A) Uploading a video to a website
B) Removing or defeating something
C) Praising a hacker
D) Writing a report
2. If someone is prolific, it means they:
A) Are lazy and do very little
B) Cause a lot of trouble without being noticed
C) Are famous for doing good things
D) Create or produce a lot of something
3. The term infamous means:
A) Extremely famous in a good way
B) Not famous at all
C) Known for negative or criminal actions
D) Unproductive and lazy
4. What is ransomware used for?
A) To improve computer speed
B) To protect computer systems
C) To hack faster internet
D) To block access and demand money for release
5. Which agency helped lead the takedown of Lockbit?
A) National Crime Agency (UK) and FBI
B) BBC
C) NASA
D) Google Security Team

Task 22. Answer the questions about the information you have watched in the video

1. What did the hacker group Lockbit do to its victims?
2. What happened to Lockbit's own website?
3. Why is the takedown described as "significant"?
4. What does the use of "infamous" tell us about Lockbit's reputation?

Task 23. In groups, discuss the following questions

1. Do you think hacking can ever be used for good? Why or why not?
2. What should governments do to stop cybercrime?
3. Why is it important to learn about cyber threats today?

PROJECT WORK

Task 24. Using the information from Unit 7 write an essay on one of the topics

Hackers: Criminals, Activists, or Innovators?
The Evolution of Hacking: From Curiosity to Cybercrime
White Hat vs. Black Hat Hackers: Ethics in the Digital Age
Cybersecurity in the Age of Hackers: Are We Really Safe?
Hacktivism and Political Protest: When Hacking Becomes a Voice

UNIT 8
SMART HOMES

"Smart homes enable you to not have to worry about the little things, so you can just concentrate on the things that really do matter to you."
– *Gene LaNois*, *Director of Professional & Enterprise Industry Partnerships at Google*

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?




TEXT A

Key Vocabulary: security, smart home, coffee maker, alarm, devices and appliances, smartphone, tablet, smart device, smart lights, smart speakers, smart locks, smart thermostats, smart home systems, technology, Internet of Things, ultra-portable computers, futuristic, interconnected, identifiable, digital networks.

Task 2. Read the text and answer questions

How Smart Homes Work

Smart homes sure alleviate a lot of anxiety. Those without them endure an endless barrage of nagging little doubts. Did I turn the coffee maker off? Did I set the security alarm? Are the kids doing their homework or watching television?

With a smart home, you could quiet all of these worries with a quick glance at your smartphone or tablet. You could connect the devices and appliances in your home so they can communicate with each other and with you.

Any smart device in your home that uses electricity can be added to your home network and at your command. Whether you give that command by voice, remote control, tablet or smartphone, the home reacts. Applications include smart lights, smart speakers, smart locks, and smart thermostats.

The idea of a smart home might make you think of George Jetson and his futuristic abode or maybe Bill Gates, who spent more than $60 million building smart home systems. Once a draw for the tech-savvy or the wealthy, smart technology is incredibly common.

What used to be a quirky industry that churned out hard-to-use and frilly products has matured into a full-blown consumer trend. Instead of start-up companies, more established tech organizations are launching new smart home products.

Much of this is due to the jaw-dropping success of smartphones and tablet computers. These ultra-portable computers are everywhere, and their constant Internet connections means they can be configured to control smart home devices. It's all about the Internet of Things.

The Internet of Things is a phrase that refers to the objects and products that are interconnected and identifiable through digital networks. This web-like sprawl of products is getting bigger and better every day. All of the electronics in your home are fair game for this tech revolution, from your fridge to your furnace [17].

Questions:

1. How do smart homes help reduce everyday worries for their owners?
2. What types of commands can be used to control devices in a smart home, and how do they work together?
3. What are some common examples of smart devices mentioned in the text, and how do they enhance home living?
4. How has the perception and availability of smart home technology changed over time?
5. What role have smartphones and tablets played in the rise of smart home systems?
6. What does the term "Internet of Things" mean, and how does it relate to smart homes and connected devices?

Task 3. Match the words and make up 10 sentences

security	control
smart	alarm
start-up	organizations
remote	device
jaw-dropped	networks
portable	success
coffee	computers
Internet	connections
tech	maker
digital	companies

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key Vocabulary: technology, smart home, developed, products, controlling systems, software, transmitter, genesis, receiver, command, identifying unit number, designed, controls or keypads, numerical code, actual command, communicate.

Task 5. Read the text and ask the questions

Smart Home Software and Technology

Home automation has a long and fitful history. For many years, tech trends have come and gone, but one of the first companies to find success is still around.

The genesis of many smart home products was 1975, when a company in Scotland developed X10. X10 allows compatible products to talk to each other over the already existing electrical wires of a home. All the appliances and devices are receivers, and the means of controlling the system, such as remote controls or keypads, are transmitters. If you want to turn off a lamp in another room, the transmitter will issue a message in numerical code that includes the following: an alert to the system that it's issuing a command, an identifying unit number for the device that should receive the command and a code that contains the actual command, such as "turn off."

All of this is designed to happen in less than a second, but X10 does have some limitations. Communicating over electrical lines is not always reliable because the lines get "noisy" from powering other devices. An X10 device could interpret electronic interference as a command and react, or it might not receive the command at all.

While X10 devices are still around, other technologies have emerged to compete for your home networking dollar. Instead of going through the power lines, many new systems use radio waves to communicate. That's how BlueTooth, WiFi and cell phone signals operate [17].

Task 6. Work in pairs and discuss your questions

Task 7. Find in the text English equivalents for the words below

Автоматизація, сумісний, прилади, пристрої, обмеження, електронний, код, технології, сигнали, компанія, мережевий, числовий, команда, радіохвилі, генезис, мобільний телефон.

TEXT C

Key Vocabulary: smart, alert, provide, resident, notification, safety, unlock doors, path to safety, dial the fire department, program, approach, device, energy, platform.

Task 8. USE OF ENGLISH. Read the text and choose the correct answer

Smart Home Benefits

Smart homes may make life easier and more 1) _____. Who wouldn't love being able to 2) _____ lighting, entertainment and temperature from their couch? Whether you're at work or on vacation, the smart home will alert you to what's going on, and 3 _____ systems can be built to provide an immense 4)_____ of help in an emergency. For example, not

only would a resident be woken with notification of a fire alarm, the smart home would also unlock doors, dial the fire department and light the path to safety.

Here are a few more examples of cool smart home tricks:

Light a path for nighttime bathroom trips.

5) _____unlock your door as you approach.

Feed your pets on a schedule with a preset amount of food.

Instantly 6) _____ mood lighting for any occasion.

Program your television so that your children can watch only at certain times.

Warm the bedroom before you get out of bed so that it's nice and toasty when you get up.

7)_____ the coffee maker from bed.

Smart homes also provide some energy 8) _____ savings. Electric bills go down when lights are automatically turned off in empty rooms, and rooms can be heated or cooled based on who's there at any given moment. One homeowner boasted that her heating bill was about one-third less than a same-sized normal home. Some devices can track how much energy each 9) _____ is using and command power hogs to use less.

Smart home technology promises tremendous benefits for elderly people living alone. A smart home could 10) _____ the resident when it's time to take medicine, alert the hospital if the resident falls and track how much the resident is eating. If an elderly person is a little forgetful, the smart home could perform tasks such as shutting off the water before a tub overflow or turning off the oven if the cook had wandered away [17].

1	A comfortable	B luxurious	C convenient	D optional
2	A arrange	B control	C design	D adapt
3	A emergency	B safety	C alarm	D security
4	A sum	B quantity	C amount	D volume
5	A push	B unlock	C break	D knock
6	A make	B produce	C create	D turn
7	A turn up	B turn on	C turn out	D turn in
8	A conservation	B economy	C efficiency	D reduction
9	A tool	B appliance	C device	D machine
10	A remind	B inform	C notify	D instruct

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 smart	A a warning sound or device
2 resident	B a person who lives somewhere permanently or on a long-term basis
3 overflow	C be so full that the contents go over the sides
4 system	D the quality of being able to do a task successfully, without wasting time or energy
5 alarm	E the place where one lives permanently, especially as a member of a family or household

6 efficiency	F the application of scientific knowledge for practical purposes, especially in industry
7 provide	G the condition of being protected from or unlikely to cause danger, risk, or injury
8 safety	H (of a device) programmed so as to be capable of some independent action
9 technology	I make available for use; supply
10 home	J a set of things working together as parts of a mechanism or an interconnecting network; a complex whole

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

tremendous benefits *immense amount * home technology * security systems * smart home * mood lightning * fire alarm * to make life easier *energy efficiency * normal home

1. The integration of _____ devices represents a new type of computer system embedded in our daily environments.
2. _____ controlled by smart systems can influence people's emotional states and productivity levels.
3. A_____ lacks the intelligent features and automation found in smart homes, which can significantly improve daily living.
4. _____ is transforming how we live by automating routine tasks and offering advanced control over our environment.
5. Modern _____ systems now use smart computing to detect danger more accurately and respond more efficiently.
6. Technology continues _____, but it also raises concerns about overdependence and loss of traditional skills.
7. Embedded computing in everyday devices offers _____, making appliances more efficient and user-friendly.
8. Smart homes are being designed with _____ in mind, reducing power consumption through intelligent automation.
9. AI-powered _____ are becoming essential tools for protecting homes and providing peace of mind.
10. With the rise of smart devices, homes now generate and process an _____ of data similar to that of businesses and institutions.

TEXT D

Key Vocabulary: integrated, monitor, smart, tech, novices, household, numerous, schedule, remind, install, comfort, account, phone, change, tablet.

Task 11. Read the text and choose the correct words from the list to complete the text

1. energy
2. bridge
3. integrated
4. functions
5. lights
6. bulbs
7. efficiency
8. brightness
9. smart
10. monitor

Intelligent Products Galore

These days, the fast proliferations of smartphones and tablets provide an easy way for even tech novices to communicate with household 1) _____ devices. And those gadgets are more numerous by the day.

The Nest thermostat comes with 2) _____ WiFi so that you can control, schedule and 3) _____ your home's temperatures, from the porch or from a taxi. Nest learns your behaviors and automatically adjusts its settings for maximum 4) _____ and comfort. It will tell you how much 5) _____ you're using, remind you to change your filters, and even alter its 6) _____ to account for the differences between, say, a heat pump or radiant heaters.

Philips' Hue 7) _____ offer some concert lighting effects right in your own home. Screw these LED 8) _____ into your regular fixtures, install the app to your phone or tablet, and then you can turn the lights on or off, brighten or dim them, or perhaps best of all, change the color. Then you can even program the lights to perform just about any combination of color and 9) _____, and control up to 50 lights on one bridge (which links the lights to your phone). The more lights you have the more fun it will be. But it will cost you – a starter pack with three bulbs and a 10) _____ goes for around $200 [17].

Task 12. Search the Web and find 7 definitions of the words in the cloud

Task 13. Make your own story using a word cloud

TEXT E

Key Vocabulary: detector, smartphone, switch into, device, app, remotely, process, free Internet, number, endless, light, automatically, keyword, home automation.

Task 14. Read the text and choose the best sentence below to fill in the gaps

Efficiency and Fun

Belkin markets its WeMo home automation switches specifically to smartphone users. For about $100, you'll receive a smart WeMo switch and a motion detector. Plug the switch into an electrical outlet, and then plug a device, such as a lamp, heater or coffee pot into the switch. Pair the switch with your smartphone using Belkin's app, and then you can control the switch remotely, letting you, for example, turn a light on or off from 1,000 miles away (or just from your cozy bed).

Home automation isn't always about pricey products. 1) _____.

The WeMo is one of many products compatible with IFTTT (IF Then, Then That), which is a free Internet service that lets you automate an endless number of processes. For example, with IFTTT (which rhymes with gift), you could create a so-called "recipe" that automatically posts Twitter tweets to Facebook if they contain a specific hashtag or keyword in them. Or you could schedule a text message to yourself as a reminder to call your grandma.

IFTTT is basically just a simple way to create triggers that result in specific actions, and it works with WeMo. For instance, you could set up a WeMo motion detector in your bedroom, and when it sees that you're up for the morning, it will trigger the coffee pot in the kitchen.

The potential for these kinds of "if x, then y" type of actions is limited only by your imagination. Of course, it takes some time to set up all of these fun actions. 2) _____.

Many smart home products use their own proprietary apps. In short, you could install dozens of home automation gadgets and their associated apps, and then slowly drown in frustration as you try to control all of them.

The Revolv is a $299 WiFi hub that connects to all of your other wireless home automation products. Revolv attempts to unify all of your home automation gear under one app, and also helps you build pre-programmed capabilities, all in the name of realizing a truly automated home [17].

3) _____. Revolv currently works best with Z-Wave, Insteon and WiFi products, and it's available only for iPhone users. 4) _____.

A) Once connected, you control all of your gadgets from the central Revolv app.
B) However, the company plans to expand to hundreds of other products and to add Android compatibility, too.
C) Some of the most useful smart home tools are actually free.
D) And that brings up one of the biggest challenges of home automation products.
E) Robotics and automation are revolutionizing industries by enhancing efficiency, precision, and scalability in manufacturing and healthcare processes.
F) Wireless technologies play a pivotal role in modern automation systems, from enabling the coordination of autonomous mobile robots in a warehouse to facilitating remote control of robotic arms in hazardous areas.

Task 15. Answer the questions

1. How does the Belkin WeMo switch work, and what devices can it control remotely?
2. What is IFTTT, and how does it enhance the functionality of WeMo home automation devices?
3. Give an example of a custom automation "recipe" that could be created using IFTTT and WeMo.
4. What is one potential drawback of using multiple smart home products that require separate apps?
5. How does the Revolv hub attempt to simplify home automation, and what are its key features?
6. What are the current limitations of the Revolv hub in terms of compatibility and accessibility?

Task 16. Solve the puzzle

https://thewordsearch.com/puzzle/8247577/smart-homes/

Smart Homes

H	D	C	A	P	A	B	I	L	I	T	I	E	S
S	N	P	O	U	E	O	T	R	N	O	E	U	A
D	M	O	A	N	E	A	C	E	W	S	S	O	L
M	Y	A	M	D	T	R	U	B	R	T	L	L	O
R	N	G	R	T	O	R	D	R	P	A	I	E	W
L	S	R	N	T	M	O	O	C	O	A	G	M	I
I	R	L	A	E	P	U	R	L	U	H	H	A	R
Y	E	A	P	O	T	H	P	G	C	A	T	U	E
G	M	T	C	L	W	R	O	T	S	O	T	T	L
E	O	O	E	A	P	T	I	N	P	P	R	O	E
A	T	T	A	L	N	W	S	I	E	O	E	M	S
R	E	I	A	B	S	S	E	L	D	N	E	A	S
I	L	U	A	U	S	E	T	A	E	R	C	T	O
A	Y	L	M	O	T	I	O	N	L	C	S	E	O

SWITCH
CREATE
OUTLET
WIRELESS
REMOTELY
AUTOMATE
PRODUCT
LIGHT
CAPABILITIES
ENDLESS
SMARTPHONE
GEAR
MOTION
CONTROL

TEXT F

Key Vocabulary: life, remote control, change, complexity, comfortable, smart home, installing, system. component, device, use, failure, require, significant, investment, alarm systems, rapidly, electronics.

Task 17. Read the text and find synonyms to the words in the list

Smart Home Challenges

A smart home probably sounds like a nightmare to those people not comfortable with computers. Those who routinely fumble around with a remote control just trying to change the TV channel might have stopped reading by now.

One of the primary mental blocks of installing a smart home system is balancing the complexity of the system against the usability of the system. If it’s downright exasperating, then it’s actually making your life harder instead of easier. When planning the system, it’s important to consider a few factors:

What kinds of components are part of home automation systems? Are they basic, such a light dimmer, or more imposing, like an alarm system or a video camera?

How intuitive will the system be to a non-user?

Is the device actually fulfilling a need or is it just a fancy and potentially frustrating toy?

How many people will be required to use the system?

Who will know how to operate the system? Who will know how to maintain the system and address failures?

How easy is it to make changes to the interface? For example, if your house is programmed to wake you up at 7 a.m., how will you let it know that you're away overnight on business or sleeping in on a Saturday?

For these reasons, it may be easier to start with a very basic home network and expand as enhancements are needed or desired. Like many new technologies, smart homes require a significant investment in both cash and time to keep up, so if you're short on either, you may want to stick with your "dumb" old house.

Before you buy, check product reviews and avoid those that draw the ire of users. There are plenty of products making sky-high promises that fall flat in the real world. And if you're a smartphone user, strongly consider products that come with an equally well-reviewed smartphone app. Some apps are so unwieldy or convoluted that they cause more headaches than they relieve.

Smart homes also come with some security concerns. Hackers who find a way to access the network may have the ability to turn off alarm systems and lights, leaving the home vulnerable to a break-in. That's because, in spite of so many technological advances, there's still no standard system for automating all of these gadgets. Without such a standard, many consumers are left wondering if they're spending hundreds or thousands of dollars on products that will wind up obsolete or unusable in a short time.

Of course, there's also the question of whether an individual needs all this technology. Is our society really so lazy that we can't flip a light switch? The good news is that with all the time we save from home automation, we'll have time to work on other pursuits. Like developing robot maid [17].

distant-	causes-
the value-	sufficient-
to regard-	worries-
fundamental-	quickly-
conducting-	despite-

Task 18. In groups, finish the following sentences and translate them into Ukrainian

1. It's actually making your life harder …
2. How easy is it to make changes to …
3. It may be easier to start with…
4. There are plenty of products…
5. Smart homes also come with…
6. Thanks to smartphones and tablets…
7. There's still no standard system for automating…
8. Some apps are so unwieldy or convoluted…

TEXT G

Key Vocabulary: consumption, energy, natural gas, oil, electricity, supply, low-power-consuming technologies, Microsoft's operating system, approximately, lighting costs, button.

Task 19. Read the text and decide if the statements are True or False

How Smart Windows Work

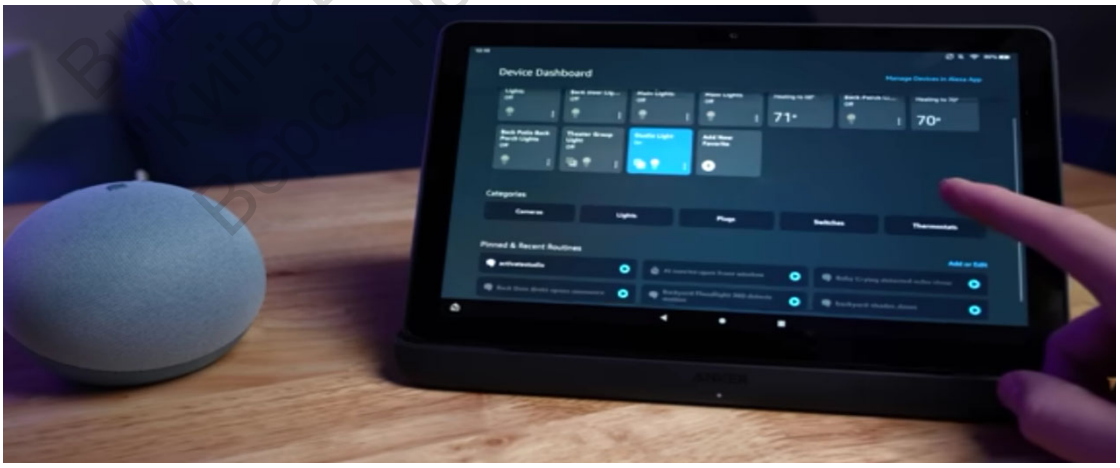
If you live in the United States, you've probably heard recently about the impending energy crunch that is facing Americans. In the next 20 years, U.S. energy consumption will increase 45 percent for electricity, 62 percent for natural gas and 33 percent for oil, according to the Department of Energy (DOE). The DOE also says that energy supplies will be unable to meet demand for the next two decades. For consumers, this means paying higher prices for electricity, natural gas and oil.

While much of the country is concentrating on ways to increase its energy supply, some researchers have been working on new low-power-consuming technologies. Among these new technologies are smart windows, and we aren't talking about Microsoft's operating system. This exciting, cutting-edge window technology allows consumers to block either all light or just some by simply turning a knob or pressing a button. This type of light control could potentially save billions of dollars on heating, cooling and lighting costs (research indicates that approximately 2 percent of all the energy used in the United States is "consumed "by residential windows)[18].

1. In the next 20 years, energy use in the U.S. is expected to decrease. T/F
2. The Department of Energy predicts that energy supplies will not meet demand in the coming decades. T/F
3. Consumers in the U.S. will likely pay more for electricity, gas, and oil in the future. T/F
4. All researchers are only focused on increasing energy production. T/F
5. Some researchers are developing technologies that use less power. T/F
6. Smart windows are a new kind of Microsoft software. T/F
7. Smart windows allow people to control how much light enters a room. T/F
8. You can control smart windows by pressing a button or turning a knob. T/F
9. Residential windows are responsible for about 2% of all U.S. energy usage. T/F
10. Smart windows can help reduce costs related to heating, cooling, and lighting. T/F

VIDEO

"Smart Home Tour"
https://www.youtube.com/watch?v=gPspAA6H9ng [27]



Key Vocabulary:

automation – a process or system that runs by itself without manual input
motion sensor – a device that detects movement in an area
smart plug – a power outlet that can be controlled remotely or automatically

scene – a preset combination of lighting, devices, or sounds triggered at once
key light – a bright light used to illuminate a subject (often for video)
WLED lighting – LED lights controlled through Wi-Fi for custom effects
share house – a house where unrelated people live and split costs
blinds – window coverings that can open or close to control light
retrofitting – adding new technology to old equipment or structures
intercom – a system for communicating inside a building
integrated – connected and working as part of a larger system
dimmer – a device that adjusts the brightness of lights
work in progress – something that is not finished yet

Task 20. In pairs, discuss the questions

1. What does the term smart home mean to you?
2. Which of these devices do you already know about or use? (circle or discuss)
motion sensors / smart plugs / app-controlled lights / voice assistants / security cameras / smart thermostats
3. How do you think a smart home could make life easier?
4. Can you think of any disadvantages of having many automated devices in your home?

Task 21. Complete the sentences with the words from the box

smart plug * share house * retrofitted * motion sensor * scene

1. I installed a _____ in my hallway, so the lights turn on when I walk by.
2. My new _____ can be controlled with my smartphone or voice assistant.
3. The living room lighting is set to a cozy _____ for movie nights.
4. The old house was _____ with smart heating controls.
5. My friend lives in a _____, and they share rent with two others.

Task 22. Watch a video and answer the questions

1. Why does the speaker love his big monitors?
A) They are great for gaming
B) They help him feel comfortable and productive while working
C) They were a gift from his dad
D) They are touchscreen
2. What happens when the speaker enters his office during the day?
A) The air conditioning starts
B) Music plays automatically
C) His chair adjusts itself
D) The blinds open, lights turn on, and monitors power up
3. How does the speaker control different light settings for activities like filming or video calls?
A) With a remote or a tablet
B) Using voice commands only
C) With a smartphone app only
D) Using hand gestures

4. What does the desk do after four hours of no movement?

A) Turns off the lights
B) Locks automatically
C) Plays a video tutorial
D) Sends a notification to stand up

5. What is the purpose of the blinds automation in the hallway?

A) To help people sleep better
B) To adjust lighting for filming
C) To manage room temperature based on weather
D) To save electricity at night

6. Why were the stairs lights one reason the speaker bought the house?

A) They are very energy efficient
B) They prevent accidents and look cool
C) They include sound sensors
D) They are solar powered

7. What happens when the speaker gets out of bed at night?

A) A camera starts recording
B) Music starts playing softly
C) The air conditioning changes
D) Lights under the bed turn on

8. What can the speaker control from the touch panel near his bed?

A) Only the lights
B) Everything in the room
C) Only the blinds
D) Only the TV

9. What problem does the speaker have with the intercom system in the kitchen?

A) It uses too much power
B) It plays loud music
C) It doesn't work most of the time
D) It is too modern

10. What happens when the speaker pauses the TV in the living room?

A) The room becomes brighter
B) The lights turn off
C) Music starts playing
D) The curtains close

Task 23. In groups, discuss the following questions

1. What part of the speaker's smart home setup do you find the most useful? Why?
2. Would you like to have automated lights, blinds, and sensors in your home? Why or why not?
3. The speaker talks about saving energy – do you think smart homes are good for the environment?

PROJECT WORK

Task 24. Using the information from Unit 8 write an essay on one of the topics

The Rise of Smart Homes: Convenience, Security, and Innovation
How Smart Homes Are Shaping the Future of Urban Living
Smart Home Technology: Balancing Comfort and Privacy
From Manual to Automated: The Evolution of Home Automation Systems
The Environmental Impact of Smart Homes: Energy Efficiency in the Digital Age

UNIT 9
ROBOTS

"The danger of the past was that men became slaves. The danger of the future is that men may become robots".
– Erich Fromm, A German-American social psychologist, humanistic philosopher, psychoanalyst

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?

TEXT A

Key Vocabulary: movable segments, motorized wheels, spin, pivot, swivel, actuator, solenoids, a hydraulic system, a pneumatic system, compressed gases, a compressed-air tank, electrical circuits, electrical valves, photoelectric cells.

Task 2. Read the text and answer the questions

Robot Basics

Most robots have movable bodies. Some only have motorized wheels, and others have dozens of movable segments, typically made of metal or plastic. Like the bones in your body, the individual segments are connected together with joints.

Robots spin wheels and pivot jointed segments with some sort of actuator. Some robots use electric motors and solenoids as actuators; some use a hydraulic system; and some use a pneumatic system (a system driven by compressed gases). Robots may use a combination of all these actuator types.

A robot needs a power source to drive these actuators. Most robots either have batteries or plug into the wall. Some may use solar power or fuel cells. Hydraulic robots also need a pump to pressurize the hydraulic fluid, and pneumatic robots need an air compressor or compressed-air tanks.

The actuators are all wired to electrical circuits. The circuits power electrical motors and solenoids directly and activate hydraulic systems by manipulating electrical valves. The valves determine the pressurized fluid's path through the machine. To move a hydraulic leg, for example, the robot's controller would open the valve leading from the fluid pump to a piston cylinder attached to that leg. The pressurized fluid would extend the piston, swiveling the leg forward. Typically, in order to move their segments in two directions, robots use pistons that can push both ways.

The robot's computer controls everything attached to the circuits. To move the robot, the computer switches on all the necessary motors and valves. Many robots are reprogrammable – to change the robot's behavior, you update or change the software that gives the robot its instructions.

Not all robots have sensory systems, and few can see, hear, smell or taste. The most common robotic sense is the sense of movement – the robot's ability to monitor its own motion. One way to do this is to use a laser on the bottom of the robot to illuminate the floor while a camera measures the distance and speed traveled. This is the same basic system used in computer mice. Robot vacuums use infrared light to detect objects in their path and photoelectric cells measure changes in light.

These are the basic nuts and bolts of robotics. Roboticists can combine these elements in an infinite number of ways to create robots of unlimited complexity [16].

Questions:

1. What are some common materials used to make the movable segments of a robot's body, and how are these segments connected?
2. What types of actuators can robots use to move, and how do they differ from one another?
3. Why do hydraulic and pneumatic robots require additional components like pumps and compressors?
4. How does the robot's electrical circuitry interact with its actuators to enable movement?
5. What role does the robot's computer play in controlling the various components of the machine?
6. How do robots monitor their own movement, and what technology is commonly used for this function?

Task 3. Match the words and make up 10 sentences

movable	wheels
electric	power
solar	segments
hydraulic	system
sensory	light
photoelectric	motors
infrared	systems
jointed	bodies
basic	cells
motorized	robots

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key Vocabulary: robot, designed, handle tasks, motor, precisely, move, industrial, equivalent, movable body, pivot, human arm, rotating, freedom, motion sensors, industrial robots.

Task 5. Read the text and ask 5 questions

The Robotic Arm

The term robot comes from the Czech word ‘robota’, generally translated as “forced labor.” This describes the majority of robots fairly well. Most robots in the world are designed for heavy, repetitive manufacturing work. They handle tasks that are difficult, dangerous or boring to human beings.

For example, the robotic arm is frequently used in manufacturing roles. A typical robotic arm is made up of seven metal segments, joined by six joints. The computer controls the robot by rotating individual stepper motors connected to each joint (some larger arms use hydraulics or pneumatics). Unlike ordinary motors, step motors move in exact increments. This allows the computer to move the arm very precisely, performing the same movement over and over. The robot uses motion sensors to make sure it moves just the right amount.

An industrial robot with six joints closely resembles a human arm – it has the equivalent of a shoulder, an elbow and a wrist. Typically, the shoulder is mounted to a stationary base structure rather than to a movable body. This type of robot has six degrees of freedom, meaning it can pivot in six different ways. A human arm, by comparison, has seven degrees of freedom.

Your arm’s job is to move your hand from place to place. Similarly, the robotic arm's job is to move an end effector from place to place. You can outfit robotic arms with all sorts of end effectors, which are suited to a particular application. One common end effector is a simplified version of the hand, which can grasp and carry different objects. Robotic hands often have built-in pressure sensors that tell the computer how hard the robot is gripping a particular object. This keeps the robot from dropping or breaking whatever it’s carrying. Other end effectors include blowtorches, drills and spray painters.

Industrial robots are designed to do the same thing. For example, a robot might twist the caps onto peanut butter jars coming down an assembly line. To teach a robot how to do its job, the programmer guides the arm through the motions using a handheld controller. The robot stores the exact sequence of movements in its memory and does it again every time a new unit comes down the assembly line.

Most industrial robots work in auto assembly lines, putting cars together. Robots can do a lot of this work more efficiently than human beings because they are so precise. They always drill in the same place, and they always tighten bolts with the same amount of force, no matter how many hours they’ve been working. Manufacturing robots are also very important in the computer industry. It takes an incredibly precise hand to put together a tiny microchip.

You may find robots working alongside construction workers, plastering walls accurately and faster than a human can do the job. Robots assist in underwater exploration. Surgeons use robots to handle delicate surgeries. They even handle flipping burgers in the kitchen. These robots all have a form of robotic arm.

Robotic arms are important in space exploration. NASA uses an arm with seven degrees of freedom – like our own arms – to capture equipment for servicing or to grab asteroids. The 7-foot (2-meter) robotic arm on the Perseverance rover has several special tools it uses as it explores the surface of Mars. A camera helps scientists see what's going on to guide the arm. There’s also an abrading tool

used to grind rock samples and a coring drill can collect samples to store in metal tubes that it drops on the surface for return to Earth on future missions. An X-ray device called PIXL (short for Planetary Instrument for X-ray Lithochemistry) has a hexapod with six little mechanical legs that it uses to adjust the X-ray for the best angle.

The Scanning Habitable Environments with Raman and Luminescence for Organics & Chemicals (aka SHERLOC) identifies minerals by the way light scatters from them. The Wide Angle Topographic Sensor for Operations and eNgineering (aka – you guessed it – WATSON) then takes close-up photos for the Earth-bound scientists. They use the two devices to create a mineral map of the red planet's surface [16].

Task 6. Work in pairs and discuss your questions

Task 7. Find in the text English equivalents for the words below

Повторюваний, з'єднаний, точно, промисловий, рухомий, обертатися, застосування, ручний, людські істоти, всесвіт, кут, топографічний, комп'ютерна промисловість, пам'ять, астероїди, Земля, робот.

TEXT C

Key Vocabulary: robotic, operate, adaptable, combination, working locomotion system, hydraulic or pneumatic, segments, wide variety, designer, developed techniques, robot's computer.

Task 8. USE OF ENGLISH. Read the text and choose the correct answer

Mobile Robots

Robotic arms are relatively easy to build and program because they only 1) _____ within a confined area. Things get a bit trickier when you send a robot out into the world.

First, the robot needs a working locomotion system. If the robot only needs to move over smooth ground, wheels are often the best option. Wheels and tracks can also work on 2) _____ terrain. But robot designers often look to legs instead, because they are 3) _____. Building legged robots also helps researchers understand natural locomotion – it's a useful exercise in biological research.

Typically, hydraulic or pneumatic pistons move robot legs. The pistons 4) _____ to different leg segments just like muscles attach to different bones. It's a real trick getting all these pistons to work together 5) _____. A robot designer has to figure out the right combination of piston movements involved in walking and program this information into the robot's computer. Many mobile robots have a built-in balance system (a collection of gyroscopes, for example) that tells the computer when it needs to correct its movements.

Designers commonly look to the animal world for robotic locomotion ideas. Six-legged insects have exceptionally good balance, and they adapt well to a wide variety of terrain. Four-legged robots such as Boston Dynamics' Spot look like dogs, and the similarity breeds comparisons as they take on dangerous jobs such as construction inspection.

Aerial robots are also inspired by real-world examples. 6) _____ many use wings like we see on airplanes, researchers have also developed techniques using fly-wing-like soft actuators. 7) _____ people now are familiar with the propeller-powered drones that provide amazing camera shots for entertainment, sporting events and surveillance.

Underwater, robots may walk across the sea floor. One example is Silver 2, a crab-like robot designed to find and clean up plastic waste. Snake robots, which of course take their name from the animals 8) _____ locomotion they copy, can operate underwater and on land. They even work well in the human body, where they can perform surgical repairs.

Some mobile robots are controlled by a remote human who tells them what to do and when to do it. The remote control might communicate with the robot through an attached wire, or using radio or infrared signals. Remote robots are useful for exploring dangerous or 9) _____ environments, such as the deep sea or inside a volcano [16].

1	A function	B operate	C manage	D apply
2	A roughest	B more rough	C rougher	D rough
3	A adapting	B adapt	C adaptability	D more adaptable
4	A attach	B are attaching	C attaching	D to attach
5	A proper	B properly	C properness	D propered
6	A Since	B However	C Although	D Despite
7	A Most	B The most	C Mostly	D More
8	A which	B that	C whose	D witch
9	A accessibility	B access	C accessing	D inaccessible

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 terrain	A a machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer
2 robot	B situated, occurring, or done beneath the surface of the water
3 segment	C use or expend carelessly, extravagantly, or to no purpose
4 balance	D able to move or be moved freely or easily
5 parkour	E a stretch of land, especially with regard to its physical features
6 aerial	F a remote-controlled pilotless aircraft or missile
7 waste	G existing, happening, or operating in the air
8 underwater	H the activity or sport of running through an area, typically in an urban environment, using acrobatic techniques to negotiate obstacles
9 mobile	I each of the parts into which something is or may be divided
10 drone	J a situation in which different elements are equal or in the correct proportions

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

construction inspection * be networked together * camera shots * developed techniques * good balance * remote control * locomotion system * robot designer * mobile robots * underwater and on land

1._____are becoming essential tools in areas where human presence is dangerous or impossible.
2. Scientists have _____that allow robots to adapt to rough terrain in real time.
3. The use of a _____in robotics limits their potential for true autonomy.
4. A successful _____ needs to combine creativity with a deep understanding of engineering and AI.
5. Robots used for _____can detect structural problems before they become dangerous.
6. Some of the most advanced robots are capable of operating both_____, pushing the limits of modern technology.
7. A_____ between speed and stability is crucial for robots used in emergency situations.
8. Robots equipped with high-definition lenses can take impressive _____ in extreme environments.
9. The type of _____a robot uses determines its efficiency and ability to overcome obstacles.
10. In the future, robots may_____, allowing them to collaborate on complex tasks without direct human input.

TEXT D

Key Vocabulary: robots, autonomous, GPS, act, obstacle, back up, magnetic tape, various, signal's reflection, constrained environment, depth perception, sophisticated, infrared radiometric cameras, manufacturer.

Task 11. Read the text and choose the correct words from the list to complete the text

1. bumper
2. obstacle
3. retailer
4. sophisticated
5. vacuums
6. GPS
7. maneuver
8. pan-tilt-zoom
9. autonomous
10. localization

Autonomous Robots

1) _____ robots act on their own.

Humans program the robot to respond to outside stimuli. The very simple bump-and-go robot is a good illustration of how this works.

This sort of robot has a 2) _____sensor to detect obstacles. When you turn the robot on, it zips along in a straight line. When it finally hits an obstacle, the impact triggers its bumper sensor. The robot's programming tells it to back up, turn to the right and move forward again, in response to every bump. In this way, the robot changes direction any time it encounters an 3) _____.

Some autonomous robots can only work in a familiar, constrained environment. Lawn-mowing robots, for example, depend on buried border markers to define the limits of their yard. An office-cleaning robot might need a map of the building in order to 4) _____ from point to point. Amazon's warehouse robots use colored magnetic tape on the warehouse floor to help them navigate. Among other jobs, the online 5) _____ uses bots to deliver items to humans, keeping their employees focused on packaging orders rather than searching warehouse shelves.

Mobile robots often use infrared or ultrasound sensors to see obstacles. These sensors work the same way as animal echolocation: The robot sends out a sound signal or a beam of infrared light and detects the signal's reflection. The robot locates the distance to obstacles based on how long it takes the signal to bounce back. More 6) _____ robots may be equipped with Light Detection and Ranging (lidar) equipment, which uses light rather than sound to help the robot determine its position within its environment.

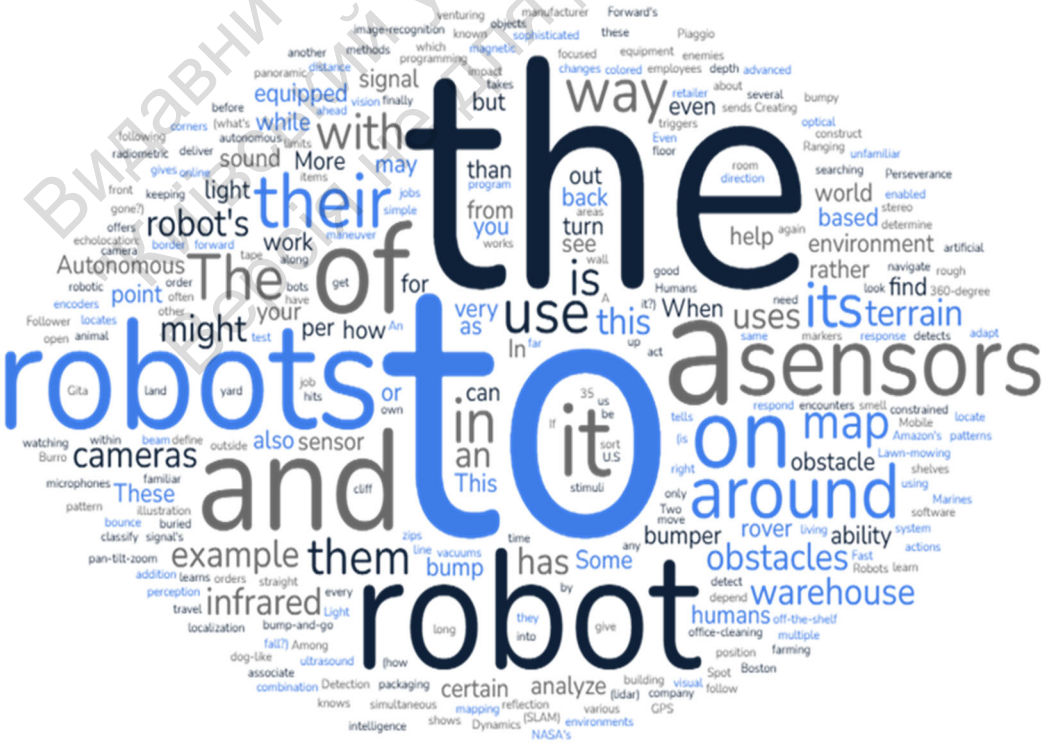
Even off-the-shelf robotic 7) _____ use several methods to find their way around your living room. In addition to bump sensors, they have cliff sensors (is it about to fall?), wall sensors (what's ahead of it?) and optical encoders (how far has it gone?). Creating a map using multiple sensors this way is known as simultaneous 8) _____ and mapping (SLAM).

Some robots use stereo vision to see the world around them. Two cameras give these robots depth perception, and image-recognition software gives them the ability to locate and classify various objects. Robots might also use microphones and smell sensors to analyze the world around them. Boston Dynamics' Spot dog-like robot is equipped with a 360-degree panoramic camera, but the company also offers 9) _____ and infrared radiometric cameras. This enabled the U.S. Marines to test the robot's ability to look around corners to find enemies before venturing out into the open.

More advanced robots analyze and adapt to unfamiliar environments, even to areas with rough terrain. These robots may associate certain terrain patterns with certain actions. A rover robot, for example, might construct a map of the land in front of it based on its visual sensors. If the map shows a very bumpy terrain pattern, the robot knows to travel another way. NASA's Perseverance rover is an example.

Follower robots learn from watching us. Autonomous farming robot manufacturer Burro uses a combination of cameras and 10) _____ to get around, but the robot's artificial intelligence system learns its job by following humans around. Piaggio Fast Forward's Gita robots follow their human leaders while carrying their stuff. The device can even tail you while you're on your bike. It has a maximum speed of 35 miles per hour (56 kilometers per hour) [16].

Task 12. Search the Web and find 7 definitions of the words in the cloud



Task 13. Make your own story using a word cloud

TEXT E

Key Vocabulary: robotics, research robotics, major advancements in robotics, garages and basements, powerful enough, homebrew robotics, remote control, makerspaces, hackerspaces, wide range of applications, amateur roboticists, competitive robots.

Task 14. Read the text and choose the best sentence below to fill in the gaps

Homemade Robots

In the last couple of sections, we looked at the most prominent fields in the world of robots – industry robotics and research robotics. Professionals in these fields have made most of the major advancements in robotics over the years, but they aren't the only ones making robots. For decades, a small but passionate band of hobbyists has been creating robots in garages and basements all over the world.

Homebrew robotics is a rapidly expanding subculture with a sizable web presence. 1)_____. Inexpensive single-board computers are powerful enough for more elaborate projects. Sites like Instructables and Thingiverse let makers share plans with one another. There are makerspaces, hackerspaces and fablabs inside schools, universities, libraries and even in communities for people to borrow tools and learn from one another as they put together their own creations. 2) _____.

Homemade robots are as varied as professional robots. Some weekend roboticists tinker with elaborate walking machines, some design their own service bots and others create competitive robots. The most familiar competitive robots are remote control fighters like you might see on "BattleBots." Some may not consider BattleBots to be "true robots" because they don't have reprogrammable computer brains. They're basically souped-up remote control cars.

More advanced competitive robots are controlled by computers. 3) _____. A standard soccer bot team includes several individual robots that communicate with a central computer. The computer "sees" the entire soccer field with a video camera and identifies its own team members, its opponent's members, the ball and the goal based on their color. 4) _____ [16].

A) The computer uses this information to decide how to direct its team.
B) Many have 3-D printers available to print robot parts to your custom specifications.
C) Soccer robots for example, play soccer with no human input at all.
D) The word robot was first used in the early 1900s, and since then, robots have come a long way.
E) Early attempts significantly underestimated the challenges associated; nevertheless, new theory and technologies have now come to fruition in realizing humanoid robots beside the classic Automata and Karakuri robots.
F) Amateur roboticists may cobble together their creations using whatever is on hand, such as old toys, VCRs and other random leftover gadgets, but the maker movement has made it easy to find components, share ideas and educate others about DIY electronics.

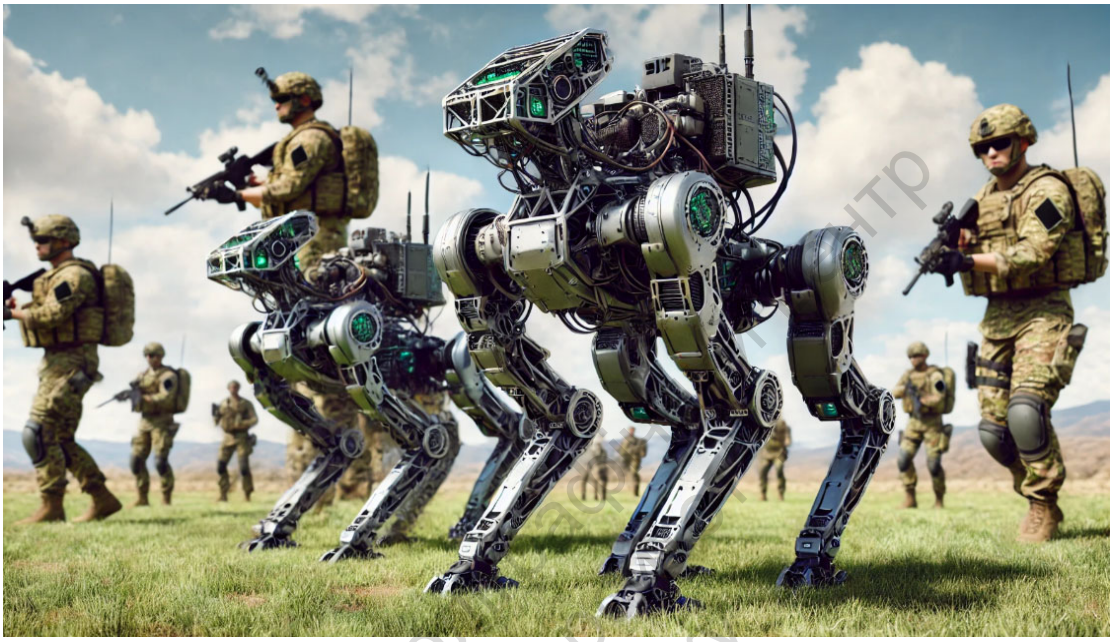
Task 15. Comprehension questions

1. How has the field of home-made robots evolved over time?
2. What are some of the resources and tools available to hobbyist roboticists?

3. What are some examples of the types of home-made robots that people create?
4. How do competitive robots differ from remote control fighters in terms of their level of sophistication?
5. How do advanced competitive robots use computer technology to coordinate their team's actions?

VIDEO

"US Army Testing Creepy Dogs for Extreme Combat Operations"
https://m.youtube.com/watch?v=75-l7kfM64k [31]



Task 16. Look at the vocabulary list. Which of these technologies do you already know or have seen in real life (e.g., games, movies, or news)? Based on the vocabulary and your discussion, what kinds of robots do you think you will see in the video? What roles will they play?

Key Vocabulary:

Autonomous / Semi-autonomous – capable of operating independently / with limited human input
surveillance – continuous observation of a place/person/activity
Quadruped robotics – four-legged robotic platforms
Reconnaissance – a military survey of enemy territory
Subterranean investigation – exploration or investigation underground
Modular platform – a system made up of interchangeable parts
Payload capacity – the amount of weight a robot can carry
Counter-UAS – defense against Unmanned Aerial Systems (drones)
Remote-actuated weapons (RAW) - weapons controlled remotely, not manually operated
ATAC system – Advanced Target Acquisition and Control system
Waypoint navigation – travel based on pre-set GPS points
LiDAR – a technology using laser light to measure distances
Digital twin – a digital replica of a physical object or environment
Combat scenario – a situation that simulates real combat conditions
Combat robotics – use of robots in battlefield operations
Manned-unmanned teaming – collaboration between human soldiers and robotic systems

Task 17. Watch the video. Complete the use of robots in the US army with the words from the box

ammunition * response to unanticipated barriers * providing continuous observation * reconnaissance * reduce soldier risk * hazardous environment operations

A Negotiate tough terrain for 5-mile perimeter patrols _____ in tough wetland conditions.

B Perimeter security and _____ with self-balancing capabilities in ice coordination.

C Serve various functions, including _____ and surveillance.

D Robotic combat vehicles provide a renewed approach to warfare to _____ in combat settings.

E Carry gear and _____ for troops

F Autonomous _____, maintaining mission continuity

Task 18. Watch the video (00:00 - 7:18) and decide if statements 1-10 are true (T) or false (F)

1. Big Dog was introduced by Boston Dynamics in 2005 and was followed by improved generations. T/F
2. Military robot dogs cannot patrol wet or muddy terrain effectively. T/F
3. Spot, one of Big Dog's descendants, is equipped with advanced AI and has commercial applications. T/F
4. Vision 60 robots cannot stay upright on icy terrain. T/F
5. Deep Robotics' Lynx is capable of climbing and navigating dense foliage due to its advanced locomotion system. T/F
6. Robot dogs have been tested in combat scenarios for surveillance and autonomous patrol missions. T/F
7. Robots used by the 325th Security Forces Squadron do not conduct real perimeter patrols. T/F
8. Robots can continue functioning despite physical interference, such as during door-opening tasks. T/F
9. Robot dogs are currently unable to detect and track threats autonomously. T/F
10. Robots can be used to carry gear and ammunition for soldiers. T/F

Task 19. Watch the video (7:18 - 10:30) and complete the summary of the extract with the word combinations in the box

sustain squad operations, support systems, observe,
robotic pack mule, direct control, load, casualty evacuation,
overworked troops, navigate, autonomous

The Leg Squad Support System, LS3, was created to support 1) _____ who often carry around 100 pounds of gear during missions. This 2) _____ was designed to 3) _____ rugged terrain, including mountains, rivers, and forests. It can follow a soldier by tracking stripes on their backpack or be operated with 4) _____ via a joystick. Additionally, the LS3 features 5) _____ waypoint navigation, allowing it to move independently to programmed destinations. Its main mission capability is to reduce the 6) _____ carried by soldiers, transporting items like ammunition? mortar baseplates, and equipment. It also has the potential to assist in 7) _____, possibly reducing the number of Marines needed to carry a wounded soldier. The system was shown to 8) _____ over long distances in harsh environments. Developers aimed to improve the robot's ability to 9)_____ its surroundings and interact better with troops. These innovations marked a big step forward in military robotics 10) _____. However, despite its capabilities, the LS3 was eventually discontinued due to concerns about its loud operating noise.

Task 20. Watch the video (10:31 - 15:04) and choose the correct answer

1. What is one role of robot dogs equipped with LiDAR in crash investigations?

A) Directing air traffic
B) Piloting drones
C) Creating detailed 3D digital models
D) Replacing human rescue teams entirely

2. What does LiDAR technology primarily use to map debris fields?

A) Radio waves and thermal imaging
B) Pulsed lasers and GPS
C) Magnetic fields and radar
D) Sound waves and cameras

3. Which of the following is NOT mentioned as a capability of robots integrated with unmanned aerial systems?

A) Detecting unexploded munitions
B) Performing emergency surgeries
C) Assessing repair needs
D) Mapping risky areas

4. What is the main goal of developing Robotic Combat Vehicles (RCVs)?

A) To replace aircraft pilots
B) To entertain troops
C) To reduce soldier risk in combat
D) To transport civilians

5. Which vehicle is designed to work with RCVs for manned-unmanned teaming?

A) Vision 60
B) Spirit 40
C) METD vehicle
D) Lynx

6. Why is the Army's ground combat robotics exercise considered groundbreaking?

A) It is fully virtual
B) It involves only AI decision-making
C) It introduces new human-robot combat capabilities
D) It replaces all human soldiers with robots

7. What unique challenge does robotic warfare introduce according to the text?

A) Robots lack physical strength
B) There are no existing playbooks or doctrines
C) Soldiers don’t want to use new technology
D) Robots cannot operate in difficult terrain

8. How do soldiers describe their experience controlling robotic combat vehicles?

A) Boring and repetitive
B) Similar to flying commercial drones
C) Like operating gaming interfaces
D) Frustrating due to high failure rates

9. What is a major goal of the ongoing tests involving robotic combat vehicles?

A) To train robots in coding
B) To improve battery life
C) To collect military feedback and performance data
D) To replace tanks with robotic dogs

10. What does the text suggest about the future of military operations?

A) It will phase out all robotic use
B) It may resemble science fiction scenarios
C) It will rely on traditional tactics
D) It will avoid AI for safety reasons

Task 21. In pairs, discuss the questions

1. What are some advantages of using robots in military settings?
2. What risks or challenges might come with deploying robots in combat?
3. Can you think of any specific situations where military robots would be helpful?

Task 22. Solve the puzzle

https://thewordsearch.com/puzzle/8253522/robots/

Robots

M	C	A	S	T	O	M	B	D	N	T	S	M	D
S	P	E	C	I	F	I	C	A	T	I	O	N	H
B	R	P	R	O	F	E	S	S	I	O	N	A	L
A	N	I	T	N	E	N	I	M	O	R	P	R	I
A	V	A	I	L	A	B	L	E	E	M	I	R	Y
E	L	B	B	O	C	I	A	O	T	E	A	R	O
S	W	H	S	E	C	T	I	O	N	U	T	C	O
O	E	T	T	A	O	E	O	C	M	S	V	E	O
I	R	E	N	R	P	O	S	I	U	T	O	O	L
E	B	T	I	B	O	O	S	D	T	H	N	B	I
S	E	N	Y	H	S	B	N	N	H	U	M	A	N
N	M	C	M	E	H	I	O	H	E	E	N	S	E
A	O	N	N	B	E	Y	N	T	A	E	C	O	O
V	H	R	D	E	S	I	G	N	D	G	O	S	I

SECTION
ROBOT
INDUSTRY
DESIGN
PROMINENT
AVAILABLE
COBBLE
CASTOM
TOOL
PROFESSIONAL
HOMEBREW
HUMAN
SPECIFICATION

TEXT F

Key Vocabulary: AI, intelligent, human-made machine, formulate, to store data, replicate, specific elements, attempts, solve problems, desired result, limited capacity, mobility assistance, physical robotic design, industrial.

Task 23. Read the text and find synonyms to the words in the list

Robots and Artificial Intelligence

Artificial intelligence (AI) is arguably the most exciting field in robotics. It's certainly the most controversial: Everybody agrees that a robot can work in an assembly line, but there's no consensus on whether a robot can ever be intelligent.

Like the term "robot" itself, artificial intelligence is hard to define. Ultimate AI would be a recreation of the human thought process – a human-made machine with our intellectual abilities. This would include the ability to learn just about anything, the ability to reason, the ability to use language and the ability to formulate original ideas. Roboticists are nowhere near achieving this level of artificial intelligence, but they have made a lot of progress with more limited AI. Today's AI machines can replicate some specific elements of intellectual ability.

Computers can already solve problems in limited realms. The basic idea of AI problem-solving is simple, though its execution is complicated. First, the AI robot or computer gathers facts about a situation through sensors or human input. The computer compares this information to stored data and decides what the information signifies. The computer runs through various possible actions and predicts which action will be most successful based on the collected information. For the most part, the computer can only solve problems it's programmed to solve – it doesn't have any generalized analytical ability. Chess computers are one example of this sort of machine.

Some modern robots also can learn in a limited capacity. Learning robots recognize if a certain action (moving its legs in a certain way, for instance) achieves a desired result (navigating an

obstacle). The robot stores this information and attempts the successful action the next time it encounters the same situation. Robotic vacuums learn the layout of a room, but they're built for vacuuming and nothing else.

Some robots can interact socially. Kismet, a robot created in 1998 at M.I.T.'s Computer Science & Artificial Intelligence Lab (CSAIL), recognized human body language and voice inflection and responded appropriately. Since then, interactive robots have become available commercially, and some are being used as companions for senior citizens. Although the robots are helpful for cleaning and mobility assistance, adding interactivity helps reduce seniors' social isolation.

The real challenge of AI is to understand how natural intelligence works. Developing AI isn't like building an artificial heart – scientists don't have a simple, concrete model to work from. We do know that the brain contains billions and billions of neurons, and that we think and learn by establishing electrical connections between different neurons. But we don't know exactly how all of these connections add up to higher reasoning, or even low-level operations. The complex circuitry seems incomprehensible.

Because of this, AI research is largely theoretical. Scientists hypothesize on how and why we learn and think, and they experiment with their ideas using robots. M.I.T. CSAIL researchers focus on humanoid robots because they feel that being able to experience the world like a human is essential to developing human-like intelligence. It also makes it easier for people to interact with the robots, which potentially makes it easier for the robot to learn.

Just as physical robotic design is a handy tool for understanding animal and human anatomy, AI research is useful for understanding how natural intelligence works. For some roboticists, this insight is the ultimate goal of designing robots. Others envision a world where we live side by side with intelligent machines and use a variety of lesser robots for manual labor, health care and communication. Some robotics experts predict that robotic evolution will ultimately turn us into cyborgs – humans integrated with machines. Conceivably, people in the future could load their minds into a sturdy robot and live for thousands of years!

In any case, robots will certainly play a larger role in our daily lives in the future. In the coming decades, robots will gradually move out of the industrial and scientific worlds and into daily life, in the same way that computers spread to the home in the 1980s [16].

questionable-	rational-
cognitive-	promising-
advancement-	residents-
incorporated-	practice-
grounded-	practical-

Task 24. In groups, finish the following sentences and translate them into Ukrainian

1. Artificial intelligence (AI) is…
2. AI would be a recreation of human thought…
3. Computers can already solve problems …
4. Some modern robots also can learn …
5. Robots can interact socially…
6. The real challenge of AI is…
7. AI research is useful for understanding…
8. Because of this, AI research …

TEXT G

Key Vocabulary: military, deactivating unexploded bombs, dangerous tasks, armed conflict, human beings, military robots, human input, unmanned ground vehicles (UGVs), military-specific robots, autonomous systems, man-portable robot, sophisticated.

Task 25. Read the text and decide if the sentences are True or False

How Military Robots Work

Everyone knows that being a soldier is a dangerous job, but some of the tasks that soldiers are required to do are more dangerous than others. Walking through minefields, deactivating unexploded bombs or clearing out hostile buildings, for example, are some of the most dangerous tasks a person can be asked to perform in the line of duty.

What if we could send robots into armed conflict instead of humans? Then, if something went wrong, we'd only lose the money it cost to build the robotic technology instead of losing human beings. And we could always build more robots.

The U.S. military has been developing robotic systems for all sorts of jobs for years now, and some of them were even on the front lines in Iraq. In this article, we'll meet some of the military's latest robot soldiers, find out what sorts of jobs they can do, and get a glimpse of what the future holds for military robots. (However, if you're interested in some background on the subject of robots in general – before you learn about military-specific robots – check out How Robots Work.) Now, let's get started.

Today's military robots don't do a whole lot on their own; they still require human input. Instead of independent AI, most military robots are remote-controlled by human operators. The military doesn't usually use the term "robot" – it calls them unmanned ground vehicles (UGVs) or unmanned aerial vehicles (UAVs).

Thanks to artificial intelligence (AI) and machine learning, their computer brains are growing more sophisticated. AI is a form of computer program that allows the robot to process information and make some decisions on its own. Increasingly, the military is introducing autonomous systems that prepare attack plans on their own, but require human consent before they proceed. These robots are called Lethal Autonomous Weapons Systems (LAWS).

One other important thing to remember about military robots: Robots designed to help human soldiers have to be carried onto the battlefield by those soldiers. For that reason, robot builders try to design "man-portable" designs. A man-portable robot can be carried by a single soldier, usually in a special backpack [13].

1. Being a soldier always involves the same level of danger. T/F
2. Robots could potentially reduce human casualties in armed conflicts. T/F
3. Robots were used on the front lines in Iraq. T/F
4. Military robots currently operate completely on their own without human input. T/F
5. The military prefers to call robots "unmanned ground vehicles" or "unmanned aerial vehicles". T/F
6. Artificial intelligence allows military robots to operate with full autonomy in combat. T/F
7. Lethal Autonomous Weapons Systems (LAWS) are fully independent and can attack without human permission. T/F
8. Military robots are often designed to be portable by a single soldier. T/F
9. A man-portable robot can usually be transported in a backpack. T/F
10. The article mainly discusses household and industrial robots. T/F

PROJECT WORK

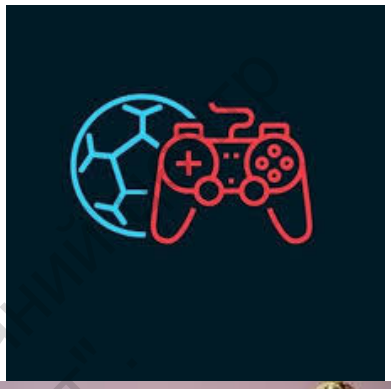
Task 26. Using the information from Unit 9 write an essay on one of the topics

The Rise of Robots: How Automation is Reshaping the Workforce
From Science Fiction to Reality: The Role of Robots in Modern Society
Robots in Warfare: Ethics, Efficiency, and the Future of Combat
Human-Robot Collaboration: Enhancing Daily Life and Industry
Can Robots Replace Humans? Exploring the Limits of Artificial Intelligence

UNIT 10
PROFESSIONAL GAMING

"Life is more fun if you play games."
– Roald Dahl, a British author, poet, screenwriter, wartime fighter ace

Task 1. In small groups, comment on the photos. How do these photos relate to the topic of the unit?

TEXT A

Key Vocabulary: successors, to take video games, global video games industry, film industry, eSports, watchable, attempts, merchandise, level of access, freelance operation, share of false starts and detours, prize pools.

Task 2. Read the text and answer the questions

How Professional Gaming Works

They say that if you love what you do, you'll never work a day in your life. They also say that, if a thing exists, humans will find a way to compete over it – or make money from it. So it was only a matter of time before the spiritual successors of pinball wizards and pool hall warriors found a way to take video games from the couch to the colosseum.

That's right. It is now possible to make a living playing video games. And why not? The global video games industry now posts profits that outstrip the music industry and show signs of creeping up on the film industry. Someone was bound to clamp a vampire clip onto that money stream eventually. That's not to say that the journey hasn't seen its share of false starts and detours: Video game tourneys date back to the early 1970s, and attempts to turn them into watchable theater began as far back as the early 1980s.

These attempts share about as much in common with modern professional gaming, aka eSports, as NBA hoops do with basketball inventor James Naismith's peach baskets. Today, pro-gaming tournament circuits ring the globe, and prize pools funded by tournament hosts, game companies and sales of special passes and merchandise reach millions. Major events fill stadiums like San Jose's SAP Center, and online viewership can reach into six figures.

Solid estimates on details such as the lifestyle, money involved and the number of players making a living at eSports remain elusive. It's a young sport and strictly a freelance operation. Winners pay for rent, rigs, and Red Bull with prize money and social media revenue, sponsorships and appearances. Wannabes often rely on parental support while they struggle to break into the top-tier leaderboards, where teams and tournaments might take notice.

But they're still part of a larger community, one that helps to account for eSports' rising success. When it comes to the level of access that fans have to pros and superstars alike, eSports is in a class by itself. Through social video services like Twitch, fans can experience the equivalent of listening to Tom Brady narrate his thoughts as he calls an audible, or follow Kobe Bryant on a fast break as he reads the defense. Pay for the right access level, and a pro might even answer your question, or drop into a pickup game that a few lucky fans can join [14].

Questions:

1. What two common sayings are mentioned at the beginning of the text, and how do they relate to the rise of professional video gaming?
2. How is the modern eSports industry compared to the early days of video game tournaments?
3. What sources of income support professional eSports players today?
4. Why is it difficult to find reliable statistics about eSports players' lifestyles and income?
5. What makes fan access to eSports professionals unique compared to traditional sports?
6. How do platforms like Twitch contribute to the popularity and growth of eSports?

Task 3. Match the words and make up 10 sentences

spiritual	a living
to make	hosts
video games	successors
professional	sport
freelance	tournaments
teams and	video games
playing	game
pickup	gaming
young	operation
tournament	industry

Task 4. Explain the meaning of the underlined expressions in the text and make up your own sentences

TEXT B

Key Vocabulary: gaming, effectively, server, spread, devices, product awareness and access, viewer, widespread adoption, informative, accessibility, real-time strategy (RTS) games, compete, eSports teams.

Task 5. Read the text and ask the questions

The Road to Recognition

Colosseum crowds and the sponsors and cash that flow from them remained elusive in the pro gaming's early days. At first, technical problems, including a lack of network code or infrastructure needed to link games fairly and effectively, posed the greatest single hurdle. But as the dance of client and server fell into step, and as the internet spread across an ever-growing galaxy of devices, the major barrier shifted from a practical question to a matter of product awareness and access.

Players facing off against one another wasn't enough to make a sport. For a pastime to achieve that kind of status, people must play it, understand it and absorb its very essence into their twitchy finger bones. To make for good viewing, older video games needed to achieve such widespread adoption and familiarity as to pose no barrier to entry. Viewers needed to grasp the fast-paced action almost intuitively, and the "casters" who provided play-by-play and color commentary needed something interesting and informative to say.

Respected fighting franchises like "Street Fighter," or the granddaddy of all competition real-time strategy (RTS) games, Blizzard's "StarCraft" franchise, sported the right combo of cred and history, earned over years of play and replay, sequels and modifications (aka "mods"). Against such a track record, newer games needed to compete by offering cleaner play, better visuals, novelty and something even more important: accessibility. In short, they needed the video game equivalent of stickball.

While some games still charge up-front purchase prices, many of these younger tournament games glommed onto the free-to-play (FTP) model as a means of expanding their reach. Instead of a $40 to $70 price tag up front, these games make money via heaps of small transactions, chump change that pays for perks like power-ups, alternative visuals or expanded content. With the advent of FTP games designed specifically to pit teams of players against one another, and with built-in ladder and leaderboard standings, games like "Dota 2" ("Defense of the Ancients") were tailor-made for eSports.

As pro gaming has expanded into a global phenomenon, it has encountered another major hurdle: how to recruit teammates from foreign countries. Other sports already enjoy a special immigration status that allows foreign players to join U.S. teams. The U.S. government now recognizes eSports players as athletes, so maybe the rest of us can cut them a little slack. [14].

Task 6. Work in pairs and discuss your questions

Task 7. Find in the text English equivalents for the words below

Мережевий код, інфраструктура, галактика, займатися спортом, гравець, інформативний, модель вільної гри, доступність, спеціальний імміграційний статус, готівка, головний бар'єр, обізнаність та доступ, перегляд, переконаний, феномен, еквівалент.

TEXT C

Key Vocabulary: sport, trampoline, devotion and standout talent, specific skillset, to set up a teammate, victory and defeat, provide, high-risk, contests, initiative, injury, know-how.

Task 8. USE OF ENGLISH. Read the text and choose the correct answer

What Makes E-sport a Sport?

In recent years, e-sport 1) _____ in popularity, bringing millions of fans and players together in a thriving competitive gaming scene. With tournaments filling stadiums and prize pools 2) _____ millions of dollars, many people are asking, "Is e-sports a sport?"

But if we take a broader view, e-sports 3) _____ many of the same requirements as traditional sports. Players need special skills, practice, dedication, and talent. These games demand fast thinking, strong teamwork, and the courage to 4) _____ quick, risky decisions. Like athletes, e-sports players must know their teammates' and opponents' styles and act at just the right moment.

Games like "Dota 2" show this clearly. Just like in basketball, where players switch strategies during a match, e-sports teams shift tactics in real time. Success can 5) _____ to a single second or one small move on the screen. That makes games exciting and unpredictable.

Like traditional sports, e-sports have their own highlights and momentum shifts. These can be 6) _____ than a power play in hockey or a big comeback in basketball. One mistake can 7) _____ a big win for the other team. e-sports also have all the signs of a real sport: technical language, big sponsors, 8) _____ fans, and even pressure on young players. Many gamers peak in their early 20s, with careers often ending before age 30.

As the e-sports industry grows, more colleges now offer 9) _____, and coverage is moving to major sports networks like ESPN. Whether you like them or not, eSports are here to stay – and they 10) _____ the definition of a sport [14].

1	A is exploding	B has exploded	C was exploding	D had exploded
2	A getting	B arriving	C reaching	D coming
3	A meets	B are meeting	C has met	D meet
4	A take	B make	C do	D perform
5	A end	B result	C come down	D happen
6	A much intense	B intensively	C the most intense	D more intense
7	A turn into	B change	C make	D grow
8	A hopeful	B loyal	C active	D amazing
9	A bonuses	B prizes	C certificates	D scholarships
10	A suits	B adapt	C fit	D match

Task 9. Match the following words to their definitions and translate them into Ukrainian

1 Olympic Games	A a multiplayer video game played competitively for spectators, typically by professional gamers
2 e-sport	B the ability to assess and initiate things independently
3 player	C the action of defending from or resisting attack.
4 initiative	D (especially in sport) a state of such concentration that one is able to perform at the peak of one's physical or mental capabilities
5 coolheaded	E an ancient Greek festival with athletic, literary, and musical competitions held at Olympia every four years, traditionally from 776 BC until abolished by the Roman emperor Theodosius I in AD 393
6 defense	F a group of players forming one side in a competitive game or sport
7 zone	G a grant or payment made to support a student's education, awarded on the basis of academic or other achievement
8 tournament	H not easily worried or excited.

9 team	I (in a sport or game) a series of contests between a number of competitors, competing for an overall prize
10 scholarship	J a person taking part in a sport or game

Task 10. In pairs, complete the sentences with words from the box and then discuss them. Do you agree or disagree? Make up your own sentences with the given word combinations

favorite team * a specific skill se * business side * make a sport * positioning and timing * side's mistakes * video games * victory and defeat * teammates and opponents * a big play

1. Do you think it's fair _____ out of playing video games, and should it be recognized like traditional athletics?
2. In e-sports, _____ can completely shift momentum. Do you think this makes watching it as exciting as physical sports?
3. How do you personally handle _____ in competitive gaming? Do you learn more from winning or losing?
4. What role do _____ play in shaping a player's performance in high-stakes tournaments?
5. Just like in traditional sports, fans often cheer for their_____. What makes a team truly stand out in e-sports?
6. Do you think the _____ of e-sports is helping or hurting the spirit of gaming?
7. In games, that require strategy, _____ are often more important than fast reflexes. Do you agree?
8. How important is it for e-sports players to develop _____, and how does this compare to athletes in physical sports?
9. Have you ever watched a match where one _____ cost them the game, even though they were technically better?
10. As e-sports grows in popularity, what responsibilities do players and organizers have when trying to make a sport out of_____?

TEXT D

Key Vocabulary: team-based, competitions, virtual, battle, major, represented, tournament, martial arts, team, game, accomplish strategic goals, Multiplayer online battle arenas (MOBAs), exhaustive, preference.

Task 11. Read the text and choose the correct words from the list to complete the text

1. game
2. strategy
3. e-sports
4. team
5. team-based
6. battle
7. virtual
8. weapons
9. competitions
10. kung-fu

The Games People Play

Tournaments large and small exist for all kinds of games, and we'll discuss the major 1) _____ in the next section. First, let's take a quick look at the categories of games that dominate 2) _____ and some of the standout examples of each.

Fighting games such as “Street Fighter," Nintendo’s “Super Smash Bros.” series and “Marvel” vs. “Capcom” pit two players or tag-teams against each other, mano-a-mano, in the 3) _____ squared circle. The games play like mixed martial arts, emphasis on the “mixed”: mixed with superpowers, with magic and with Saturday-morning 4) _____ powers. Players use a combination of positioning, fundamentals, timing and special moves to take down their opponents, flowing from finicky ripostes to devastating combos. Fighting games have been a staple of arcade 5) _____ and couch-based contests from the beginning.

First-person shooters (FPS) focus on using 6) _____ and tactics to accomplish strategic goals, which can range from base defense to killing as many people as possible. They can range from 7) _____combat, as in the “Battlefield,” “Counter-Strike” or “Call of Duty” series, to individual arena-style battle royale competitions, as represented by games like “Quake,” “Unreal Tournament,” “Halo” and “Overwatch.”

Real-time strategy (RTS) games – most famously Blizzard's “StarCraft: Brood War,” “StarCraft II” and “Warcraft III,” combine rapid tactical decision-making with strategic planning. They require players to manage resources, build and upgrade structures, gain intel, mount defenses and launch attacks, all while micromanaging the hard-fought skirmishes that decide the 8) _____.

Multiplayer online battle arenas (MOBAs) combine the individual achievement of FPSs with the 9) _____ and tactics of RTSs. More importantly, by shifting the RTS action to a smaller number of more powerful units – generically called Heroes, each played by a single player – they turn that struggle into a chance for 10) _____ play. The RTS link traces back to the birth of the “Dota” franchise, which grew out of a 2003 fan mod of “Warcraft III: Reign of Chaos” called “Defense of the Ancients” (DotA, later just called Dota). Valve released its own version, “Dota 2,” in 2013, four years after Riot Games put out its Dota-inspired “League of Legends,” the other big name in the MOBA game.

These four categories cover the waterfront, but the list is far from exhaustive. If enough people like a game, someone is bound to build a tournament around it, whether your preference runs to popular sports franchises like “FIFA”, computer-based card games like “Hearthstone” and “Pokémon”, or even dance games [14].

Task 12. Search the Web and find 7 definitions of the words in the cloud

Task 13. Make your own story using a word cloud

TEXT E

Key Vocabulary: gamer, cash, unusual games, running tournament, appropriate, championship, professional, seasonal, entertainment, traditional, Guinness World Record

Task 14. Read the text and choose the best sentence below to fill in the gaps

The Major Tournaments

OK, so you've got your rig, your headset, your fancy gamer chair and a lot of fast-twitch muscle memory. Where do you go to earn your stack of cash? Well, a surprising number of places, as it turns out. 1)_____:

Begun in 2003 and rooted in early Paris LAN parties, Electronic Sports World Cup (ESWC) is still kicking, and it offers some of the more unusual games on the e-sports scene. ESWC is also known for offering custom levels to its competitors in such games as the racing series "Trackmania".

As the maker of some of the longest-running tournament games in e-sports, including "World of Warcraft" and "StarCraft," it's perhaps only appropriate that Blizzard hosts one of the major e-sports events, BlizzCon, each year as a venue for both casual and professional gamers. Blizzard has e-sports circuits for several of its major games, including the seasonal Heroes of the Storm Global Championship Circuit, kicked off in 2016 with a $4 million total purse; the massive Hearthstone Championship Tour, culminating in a $1 million championship; the StarCraft II World Championship Series, bumped up to a $2 million Blizzard-sponsored prize pool in 2016; and the $500,000 BlizzCon WCS Global Championship. That's all according to David Gordon, PR manager for Blizzard Entertainment, who announced in August 2016 that the company will also host the Overwatch World Cup, an international exhibition for nominees, pros and locals.

2)_____. Its 2015 (Season 9) tournament focused on "StarCraft 2" and "League of Legends." IEM brings top regional players and fan favorites from around the world to compete in its championship, which in 2016 offered a $100,000 prize pool.

Run by "Dota 2" maker Valve, The International has seen steady growth since its inception in 2011, and now serves entertainment to thousands in meatspace (aka the real world) and hundreds of thousands on the interwebs. Its total prize pools reach into the tens of millions of dollars, funded in part by player purchases.

If fighting games are more your speed, you won't want to miss EVO (the Evolution Championship Series), a three-day event held annually in Las Vegas. EVO opens its double-elimination brackets to anyone, not just pros. Its 2016 roster included "Street Fighter V," "Ultimate Marvel vs. Capcom 3," "Mortal Kombat X," "Guilty Gear Xrd: Revelator," "Pokken Tournament," "Killer Instinct," "Super Smash Bros. Melee," "Super Smash Bros. for WiiU" and "Tekken 7: Fated Retribution".

3)_____. Think of Dreamhack as essentially a LAN party writ large (it holds the Guinness World Record for the world's largest), combined with an e-sports event and computer festival. Dreamhack runs the gamut from casual to hardcore gamers, from traditional tournament games to sports and music games, and from hosted tournaments to BYOC (controller) get-togethers.

4)_____. Drill down far enough, and you'll find something for everyone. The more esoteric the game, the wilder the competition might be. Just check out the World Pump Festival, which celebrates the "Pump It Up" dancing game, and see if we're wrong [14].

A) And the list goes on.
B) Nintendo opted to focus on innovative gameplay.
C) For about a decade, the Intel Extreme Masters tournament has held competitions around the world in various games.
D) A blurry line separates many tournament events from the expos and conventions with which they exist in a kind of symbiotic relationship.
E) Gaming has been around for decades and has changed with evolving technology.
F) We've listed here a few of the 800-pound gorillas in the eSports jungle.

Task 15. Answer the questions

1. What unique features distinguish the Electronic Sports World Cup (ESWC) from other e-sports events?
2. How does Blizzard Entertainment support the e-sports ecosystem through events like BlizzCon and its various championship circuits?
3. What role does the Intel Extreme Masters (IEM) play in the international e-sports scene?
4. How has the prize pool for The International evolved over time?
5. What makes the Evolution Championship Series (EVO) appealing to both professional and amateur fighting game players?
6. How does Dreamhack differ from traditional e-sports tournaments?

Task 16. Solve the puzzle

https://thewordsearch.com/puzzle/8265120/professional-gaming/

Professional Gaming

C	S	P	D	K	I	C	K	E	D	S	P	S	M
H	L	A	N	O	I	S	S	E	F	O	R	P	C
A	R	E	L	S	E	A	S	O	N	A	L	E	O
M	A	M	A	D	S	C	S	R	U	A	L	E	M
P	C	K	R	A	C	P	E	C	M	A	E	D	P
I	I	E	G	V	E	C	E	T	T	T	P	O	E
O	N	P	L	S	N	O	O	O	P	D	E	A	T
M	G	N	C	E	E	A	T	P	C	T	S	E	I
S	M	I	P	V	B	T	G	A	M	E	R	M	T
H	I	H	A	E	E	R	N	U	M	B	E	R	O
I	C	H	S	N	F	T	A	T	I	A	B	T	R
P	A	P	C	U	O	T	G	T	S	E	T	S	S
P	S	H	P	E	D	M	A	C	E	H	P	O	E
U	H	P	P	H	H	N	R	S	E	A	E	I	C

GAMER
PROFESSIONAL
NUMBER
TOTAL
VENUE
SEASONAL
CHAMPIOMSHIP
SCENE
KICKED
COMPETITORS
RACING
CASH
CELEBRATE
SPEED

TEXT F

Key Vocabulary: cartridge, systems,DVDs, Blu-ray, a quick Internet search, disc-based games, game cleaning, instruction manuals, console, manufacture,cause further damage, toothpaste, scratched game with toothpaste, manufacturer's guidelines, soft cloth.

Task 17. Read the text and find synonyms to the words in the list

How to Clean a Video Game Disc

Gone are the days of blowing into a cartridge to clean your games. Depending on what systems you own, you'll be caring for and cleaning games that are burned onto DVDs or Blu-rays (and if you like vintage gaming, perhaps even some old-school CDs). Luckily, the cleaning process is the same for all disc-based games. However, there's some disagreement about the best technique to clean your discs. A quick Internet search will give you countless methods and variations for game cleaning, but not all of them are going to work. In fact, some Internet solutions (such as the banana-cleaning method) usually make the situation worse and will turn a game that skips occasionally into an unplayable piece of plastic trash. Therefore, if the only boss you can't get past is dirt on your discs, try following the manufacturer's guidelines to get back into the game.

Most instruction manuals and console manufactures will tell you to clean your games with a clean, lint-free, soft, dry or slightly damp cloth and wipe in straight lines from the disc's center to its outer edge. Don't wipe in circles: That's how the discs are read, and doing so could cause further damage. Also, be sure to hold onto the outer edges of the video game disc as you clean – grasping it any other way will just add fingerprint smudges to your already smeared or scratched-up disc.

This cleaning method will buff out smudges and some small scratches, but if your game is badly damaged, you're going to have to break out the big guns. In this case, that's toothpaste.

Yes, you heard that right – we said toothpaste. Cleaning your scratched game with toothpaste is a long-standing Internet rumor that actually works … if you do it right! First, squeeze a moderate amount of toothpaste (a little more than you'd place onto your toothbrush) and evenly rub it onto the disc in straight lines from the center to the edge. (Remember what we said about forgoing circular wiping motions?). Leave on the paste for about five minutes or so, then off wash the disc with warm water until all the solution has been removed. Dry off your game with a clean, soft cloth, and you should be back in front of the TV, controller in hand, in no time. Of course, this technique isn't foolproof, and extremely deep scratches may be unbeatable and force you to restart with another copy of the game.

You can also always pick up a specialized disc-cleaning tool or machine. There are numerous products out there on the market, but the truth is that if damp cloths and toothpaste didn't work for you, these products probably won't, either [19].

fortunately-	tidying-
rapid-	constantly-
gentle-	humid-
fabric-	instrument-
approach-	multiple-

Task 18. In groups, finish the following sentences and translate them into Ukrainian

1. A quick Internet search will give you…
2. In fact, some Internet solutions…
3. Depending on what systems you own…
4. Most instruction manuals and console manufactures will …
5. Cleaning your scratched game with toothpaste …
6. Wash the disc with warm water until..
7. Of course, this technique…
8. You can also always pick up a specialized disc-cleaning tool or machine…

TEXT G

Key Vocabulary: high-tech, game system, machine, performance, console, free of dirt, dry cloth, plastic discs, to worry about, oral hygiene products, delicate, work on any machine, to remove the dirt, particles, manufacturer.

Task 19. Read the text and decide if the sentences are True or False

The Need for Video Game Testers

Bringing a new video game to market costs millions of dollars and takes many months. From concept to final testing and marketing, creating a new video game requires the time, energy and talent of multiple people with many different skills. Writers create characters and premises and illustrators bring them to life. Animators take over from there while code writers work behind the scenes creating the virtual world in which the characters live and the rules they live by. Hardware specialists ensure the game controllers for the given system provide an accurate interface between the video game's virtual world and the gamer.

The video game tester is involved early and often in this process, ferreting out problems that arise along the way. The game tester must be part of the development team, as some bugs that arise can stop the process in its tracks until they're solved. The game tester helps find such fatal bugs early, so that others can fix the problems before they compound.

Video game testers often work on "alpha" or early versions of the game. Testing this version is aimed at finding and fixing major, fatal flaws early. Missing a major flaw can be very costly to the video game creator. The earlier, or deeper the flaw, the more additional code will be built upon it and the harder it'll be to fix it later in the process. For this reason, video game testers who are skilled at approaching the game from various angles are a vital part of the development team.

Video game creators take testing seriously, as a bugged game can cost them. A game with bugs that a company must recall is a costly venture, and not just in dollars.

For example, Madden NFL 2008, a hugely popular game series had fans complaining about numerous bugs and even labeling it "unplayable". Hardware problems, such as the alleged crashing problem cited in a now settled lawsuit against Microsoft's Xbox 360, can also take a bite out of company profits. Fan feedback on the Internet can do irreparable damage to a company's brand. For these reasons, competent video game testing is crucial to game creators [20].

1. Bringing a new video game to market requires a large investment of time, money, and skilled labor. T/F
2. Writers, illustrators, animators, and code writers all play essential roles in the development of a video game. T/F
3. Hardware specialists do not contribute to game development. T/F
4. Game testers are involved early in the development process to identify critical bugs. T/F
5. Missing a major bug in the early stages of development can result in more complex and expensive problems later. T/F
6. Game testers usually work only on the final version of the game. T/F
7. A bugged game that needs to be recalled can be extremely costly for a company. T/F
8. Fan complaints about Madden NFL 2008 included calling the game "unplayable". T/F
9. Hardware issues, like the Xbox 360 crashing problem, have had legal and financial consequences for companies. T/F
10. Negative fan feedback online can damage a company's reputation permanently. T/F

VIDEO

“How AI is Changing Gaming Tech in 2025”

https://www.youtube.com/watch?v=lWY2q90lbWg [8]

Key Vocabulary:

Game Developers Conference (GDC) – an annual event where professionals in the gaming industry meet to share ideas and new tech
AI solution – a tool or system that uses artificial intelligence to solve problems or improve tasks
text prompt – a written instruction given to AI to generate a response or create content
in-game character – a virtual person or creature that interacts with players in a video game
first-person shooter (FPS) – a game genre where players experience the action through the eyes of the character
Natural Language – everyday human speech used in communication, not programming code
indie developer – a small, independent company or individual creating games without large publishers
sensor – a device that detects physical changes (like motion, emotion, or temperature).
galvanic skin response – a method of measuring emotional arousal through skin conductivity
Generative AI – AI systems that can create new content, such as images, sounds, or game elements

Task 20. In groups, before watching a video, answer the questions

1. How do you think AI is used in video games today? Can you give any examples?
2. Imagine you’re designing your own video game. What would you want AI to do in your game? Help the player? Make the enemies smarter? Create new levels?

Task 21. Watch the video and decide whether the following sentences are True or False

1. GDC is an event where developers mostly show new finished games.
2. AI can help game developers create game elements faster using text prompts.
3. Tencent’s “Fackle” is an AI assistant that can follow complex voice instructions.
4. Sensors in a wristband can measure a player’s emotions and change the game experience.
5. AI has completely replaced humans in the game development process.

Task 22. Watch the video again and answer the questions

1. What is the main focus of the Game Developers Conference (GDC)?
A) Showing off new video games
B) Launching new gaming consoles
C) Sharing ideas and trends in game development
D) Selling game accessories

2. How are developers using AI at GDC, according to the video?
A) Only for testing new games
B) To replace all human workers
C) To design gaming consoles
D) To create game content and improve game experiences

3. What can the AI assistant "Fackle" do in the game Arena Breakout?
A) Predict the end of the game
B) Follow complex spoken instructions from the player
C) Change the game's graphics in real time
D) Control other human players

4. What does the emotion-sensing wristband measure to adapt the game experience?
A) Eye color and player's speed
B) The player's age and reaction time
C) Galvanic skin response, heart rate, and skin temperature
D) The player's voice commands

5. What is one of the concerns game developers have about AI?
A) AI might make games too easy
B) AI could take over developers' jobs
C) AI cannot create new characters
D) AI makes games load slower

6. What type of games might use AI companions that understand natural language in the future?
A) Open-world RPGs
B) Puzzle games
C) Racing games
D) Board games

7. What is the main purpose of the emotion-based gameplay shown in the horror game demo?
A) To replace traditional game controllers
B) To make the game shorter
C) To teach players how to stay calm in real life
D) To adjust the game based on the player's emotional state

8. According to the video, what drives the gaming industry, even in the age of AI?
A) Fast internet connections
B) Human creativity and ideas
C) Cheaper game prices
D) AI-only production pipelines

Task 23. In pairs, answer the questions. Share your answers with the group

1. Do you think AI can make video games more fun and personal? Why or why not?
2. Would you feel comfortable if a game could read your emotions and change the game in real time? Why?
3. What other ways (besides games) could emotion-detecting technology be used in everyday life?
4. How do you think AI will change the future of entertainment?

PROJECT WORK

Task 24. Using the information from Unit 10 write an essay on one of the topics

The Rise of E-sports: How Video Games Became a Global Phenomenon
From Hobby to Career: The Making of a Professional Gamer
E-sports and Traditional Sports: A New Era of Competition
Gaming for Glory: Challenges and Realities in the World of Competitive E-sports

PROGRESS TESTS

UNIT 1
Computers in History

Multiple Choice Cloze (1–15)
Choose the correct word to complete the sentence.

1. The first mechanical computer was designed in the _____ century.
   a) 17th
   b) 19th
   c) 21st
   d) 20th
2. Charles Babbage is often called the father of the _____.
   a) calculator
   b) internet
   c) computer
   d) email
3. Early computers were created primarily for military and _____ purposes.
   a) scientific
   b) social
   c) personal
   d) marketing
4. The invention of the transistor made computers smaller and more _____.
   a) expensive
   b) advanced
   c) portable
   d) stable
5. The ENIAC was one of the world's first fully electronic _____.
   a) smartphones
   b) computers
   c) databases
   d) calculators
6. Computers evolved from mechanical machines to digital systems based on _____.
   a) electricity
   b) steam
   c) oil
   d) water
7. Early computers used punched _____ to store information.
   a) drives
   b) disks
   c) cards
   d) batteries
8. The development of the microprocessor allowed computers to become _____ in size and price.
   a) larger
   b) smaller
   c) more complex
   d) more expensive

9. One of the biggest advances in computer history was the invention of the _____.
    a) smartphone
    b) monitor
    c) microchip
    d) mouse
10. Computers were first introduced into homes during the late _____ century.
    a) 19th
    b) 20th
    c) 18th
    d) 21st
11. Alan Turing is famous for his work in computer science and _____ theory.
    a) game
    b) code
    c) algorithm
    d) computation
12. In the early days, computers were much _____ and took up entire rooms.
    a) smaller
    b) faster
    c) larger
    d) cheaper
13. The first computers had limited memory and slow _____ power.
    a) calculation
    b) processing
    c) programming
    d) storage
14. Modern computers are more reliable and _____ than early machines.
    a) slower
    b) affordable
    c) fragile
    d) user-friendly
15. Historical computers were designed mainly for mathematical _____.
    a) operations
    b) entertainment
    c) decoration
    d) error

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. The _____ of computers has transformed almost every industry. (INVENT)
17. Modern computers are much more _____ than early machines. (POWER)
18. Babbage's design of the Analytical Engine was extremely _____ for its time. (INNOVATE)
19. The transition from mechanical devices to digital computers was a major _____ in technology. (ACHIEVE)
20. Computers play a key role in modern _____ systems. (COMMUNICATE)
21. Programming languages are essential for software _____. (DEVELOP)
22. The storage capacity of computers has grown _____ in recent decades. (SIGNIFICANT)
23. Early computer designs lacked the _____ to solve complex problems. (CAPABLE)
24. The modern digital world depends on secure data _____. (TRANSFERENCE)
25. The history of computers shows the rapid speed of technological _____. (PROGRESS)

UNIT 2
Types of Computers

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. A supercomputer is designed to perform calculations at extremely high _____.
    a) prices
    b) speeds
    c) errors
    d) levels
2. Embedded computers are often found inside household appliances and _____ devices.
    a) mechanical
    b) portable
    я) industrial
    d) entertainment
3. Mainframes are used by large organizations to process _____ amounts of data.
    a) limited
    b) secure
    c) vast
    d) physical
4. Unlike desktops, laptops are designed to be _____ and convenient for travel.
    a) expensive
    b) portable
    c) fragile
    d) powerful
5. Smartphones are a type of _____ computer used for communication, entertainment, and productivity.
    a) wearable
    b) mobile
    c) server
    d) embedded
6. Desktop computers require an external _____ to display visual output.
    a) battery
    b) keyboard
    c) monitor
    d) router
7. Supercomputers are used for tasks such as climate modeling, simulations, and _____ predictions.
    a) design
    b) marketing
    c) weather
    d) social
8. Embedded computers perform specific tasks and are usually part of a larger _____.
    a) system
    b) folder
    c) desk
    d) app
9. Laptops offer both computing power and _____ in one compact device.
    a) storage
    b) mobility
    c) color
    d) electricity

10. A mainframe computer is known for its ability to handle large-scale _____ processing.
    a) data
    b) voice
    c) image
    d) color
11. Modern wearable devices such as smartwatches contain tiny _____ computers.
    a) quantum
    b) embedded
    c) personal
    d) mobile
12. Servers are computers designed to store and manage _____ across networks.
    a) tasks
    b) data
    c) wires
    d) passwords
13. A desktop computer is normally placed on a desk and connected to external _____.
    a) components
    b) browsers
    c) routers
    d) downloads
14. Tablets are thinner and lighter than laptops but often have limited _____ compared to desktops.
    a) graphics
    b) memory
    c) performance
    d) printing
15. The primary difference between supercomputers and personal computers is their __ ___ power.
    a) social
    b) financial
    c) processing
    d) wireless

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Supercomputers are used for extremely complex _____ simulations. (SCIENCE)
17. Modern laptops are designed for maximum _____ without sacrificing performance. (MOBILE)
18. Embedded systems are becoming more _____ as technology advances. (POWER)
19. The _____ of cloud computing has changed how businesses store data. (INTRODUCE)
20. The company invested in new servers to improve the _____ of its data storage. (SECURE)
21. Computers have made huge contributions to the _____ of modern society. (DEVELOP)
22. Wearable devices have become increasingly popular among health-conscious _____. (CONSUME)
23. The use of embedded computers has become a standard in modern _____ systems. (CONTROL)
24. A _____ designed supercomputer can perform millions of calculations per second. (SPECIAL)
25. Data _____ is one of the main functions of mainframe computers. (PROCESS)

UNIT 3
Quantum Computers

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. Quantum computers use _____ instead of traditional bits to process information.
    a) codes
    b) qubits
    c) chips
    d) fonts
2. A qubit can exist in multiple states at once, thanks to the quantum principle of _____.
    a) substitution
    b) superposition
    c) encryption
    d) translation
3. Quantum computing could solve problems much faster than _____ computers.
    a) mechanical
    b) traditional
    c) wireless
    d) portable
4. Quantum entanglement allows particles to remain _____ even when separated.
    a) connected
    b) visible
    c) identical
    d) distant
5. The development of quantum computers is still in the early _____ of research.
    a) stages
    b) screens
    c) updates
    d) models
6. Unlike classical systems, quantum computers can explore multiple solutions _____.
    a) randomly
    b) sequentially
    c) simultaneously
    d) manually
7. Quantum computers are expected to revolutionize _____ in fields like cryptography.
    a) productivity
    b) performance
    c) security
    d) complexity
8. IBM and Google are competing to build reliable _____ quantum processors.
    a) advanced
    b) domestic
    c) secure
    d) artificial
9. Quantum computers face significant challenges in error _____ and stability.
    a) prevention
    b) connection
    c) correction
    d) detection

10. The power of quantum computers lies in their ability to handle extremely _____ problems.
    a) easy
    b) small
    c) complex
    d) fast
11. Quantum computing uses the principles of _____ mechanics.
    a) classical
    b) quantum
    c) mechanical
    d) digital
12. Scientists are researching new _____ to stabilize qubits.
    a) techniques
    b) devices
    c) models
    d) routers
13. Quantum computers can process massive amounts of data more _____ than classical systems.
    a) efficiently
    b) slowly
    c) manually
    d) occasionally
14. Entangled qubits remain linked regardless of the _____ between them.
    a) size
    b) distance
    c) memory
    d) color
15. Quantum computers are expected to transform fields such as machine learning and _____ analysis.
    a) data
    b) price
    c) game
    d) email

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Quantum computing represents a major technological _____. (BREAK)
17. Scientists face great _____ in making qubits stable. (DIFFICULT)
18. Quantum systems are capable of _____ calculations at unprecedented speed. (COMPLETE)
19. The potential of quantum computing is truly _____ for the future of IT security. (IMPRESS)
20. Quantum computers could help solve problems that were once considered _____. (POSSIBLE)
21. Quantum _____ describes the connection between particles across distance. (ENTANGLE)
22. The early development of quantum computing requires international _____ between scientists. (COOPERATE)
23. Quantum computers are expected to perform calculations more _____ than classical ones. (ACCURATE)
24. The quantum computing industry is experiencing rapid _____. (GROW)
25. Understanding quantum mechanics is essential for future _____ in this field. (INNOVATE)

UNIT 4
Printers

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. A _____ printer uses liquid ink to create high-quality text and images on paper.
    a) laser
    b) 3D
    c) inkjet
    d) dot-matrix
2. 3D printers build physical objects _____ layer by layer based on a digital model.
    a) randomly
    b) manually
    c) automatically
    d) occasionally
3. Bioprinters use _____ materials like living cells to produce tissue-like structures.
    a) artificial
    b) organic
    c) metallic
    d) electronic
4. A laser printer is faster and more _____ than an inkjet when printing large documents.
    a) expensive
    b) efficient
    c) colorful
    d) random
5. 3D printing is a form of _____ manufacturing, where material is added rather than removed.
    a) additive
    b) subtractive
    c) reflective
    d) predictive
6. Bioprinting could one day help create organs for _____ surgery.
    a) replacement
    b) network
    c) entertainment
    d) retail
7. A typical home printer connects to a computer via USB or a _____ network.
    a) social
    b) wireless
    c) digital
    d) mechanical
8. The quality of printed images depends on the printer's _____ resolution.
    a) screen
    b) graphic
    c) image
    d) print
9. 3D printing is now widely used in product _____ and engineering.
    a) design
    b) transport
    c) calculation
    d) broadcasting

10. Bioprinters are mainly used in medical _____ and research laboratories.
    a) construction
    b) imaging
    c) production
    d) testing
11. Traditional printers are limited to 2D output, while 3D printers can create _____ objects.
    a) digital
    b) physical
    c) virtual
    d) networked
12. 3D printing reduces material _____ compared to traditional manufacturing methods.
    a) cost
    b) waste
    c) movement
    d) style
13. Ink cartridges in inkjet printers need regular _____ when the ink level is low.
    a) design
    b) recycling
    c) replacement
    d) recharging
14. Laser printers rely on static _____ to attract toner particles onto the paper.
    a) electricity
    b) ink
    c) voltage
    d) battery
15. 3D printers allow rapid _____ of prototypes during the design process.
    a) calculation
    b) development
    c) prototyping
    d) transport

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Bioprinters are used to produce complex _____ structures for research. (BIOLOGY)
17. The invention of 3D printing has made _____ manufacturing more accessible. (CUSTOM)
18. Printers must be cleaned regularly to maintain _____ output. (QUALIFY)
19. Engineers are constantly working on the _____ of printing technology. (IMPROVE)
20. The use of bioprinters in medicine shows great _____ for future treatments. (PROMISE)
21. Additive manufacturing helps reduce waste and increases material _____. (EFFICIENT)
22. The 3D model must be _____ before sending it to the printer. (PREPARE)
23. Laser printers offer a highly _____ alternative for large-volume printing. (ECONOMY)
24. Bioprinting is a cutting-edge _____ in tissue engineering. (TECHNICAL)
25. 3D printing allows for fast and cost-effective _____ of product prototypes. (CREATE)

UNIT 5
Computers, Social Networking and Internet Addiction

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. Social media platforms allow users to _____ photos, videos, and messages instantly.
   a) protect
   b) share
   c) translate
   d) develop
2. Many companies use social media for digital marketing and brand _____.
   a) promotion
   b) deletion
   c) removal
   d) distribution
3. The number of active users on social media platforms has grown _____ over the last decade.
   a) slightly
   b) slowly
   c) rapidly
   d) locally
4. Influencers often receive paid _____ from companies to advertise products.
   a) sponsorships
   b) reflections
   c) memberships
   d) instructions
5. Many platforms use _____ to show users personalized content based on their interests.
   a) processors
   b) algorithms
   c) monitors
   d) applications
6. Social media can help people stay connected and _____ relationships across long distances.
   a) explore
   b) maintain
   c) expand
   d) simplify
7. Online posts can go _____ and reach millions of users in just a few hours.
   a) vital
   b) viral
   c) virtual
   d) visual
8. Excessive use of social media can lead to digital _____.
   a) memory
   b) addiction
   c) infection
   d) completion
9. Social media platforms have become essential tools for _____ communication.
   a) real-time
   b) historical
   c) fictional
   d) manual

10. Privacy settings are used to ________ the audience for personal posts.
    a) limit
    b) confuse
    c) delete
    d) develop
11. Companies monitor social media to improve their public ________.
    a) reaction
    b) reputation
    c) limitation
    d) correction
12. Social media encourages content ________ through likes, shares, and comments.
    a) consumption
    b) registration
    c) installation
    d) translation
13. Personal data shared on social media can sometimes be used without the user's ________.
    a) command
    b) consent
    c) connection
    d) construction
14. Platforms often update their privacy policies to follow new data ________ laws.
    a) perception
    b) protection
    c) translation
    d) formation
15. Using social media responsibly is important for online ________ and security.
    a) safety
    b) speed
    c) reality
    d) ownership

Word Formation (16–25)

Complete the sentence by forming the correct word from the word in brackets.

16. Many social platforms focus on ________ interaction between users. (SOCIAL)
17. Social media plays a major role in modern digital ________. (MARKET)
18. Influencers gain ________ by producing engaging content. (POPULAR)
19. Active users often check their feeds for new ________. (UPDATE)
20. Companies rely on social media for global ________ of their products. (PROMOTE)
21. Some users become so ________ on social media that it affects their daily life. (DEPEND)
22. Many businesses improve their ________ through targeted ads. (VISIBLE)
23. Social media can shape the ________ of public opinion during events. (FORM)
24. Some platforms use AI to analyze ________ behavior. (CONSUME)
25. Companies take special care to ensure customer data ________. (SECURE)

UNIT 6
Digital Fingerprinting

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. Digital fingerprinting is a method used to _____ individual devices online.
   a) ignore
   b) identify
   c) delete
   d) connect
2. Unlike cookies, digital fingerprinting collects data about the user's _____ settings and device characteristics.
   a) physical
   b) browser
   c) manual
   d) social
3. Digital fingerprinting helps websites recognize returning _____.
   a) customers
   b) hackers
   c) users
   d) servers
4. Privacy concerns arise when fingerprinting is done without user _____.
   a) connection
   b) consent
   c) creation
   d) deletion
5. Device fingerprinting can include information like screen resolution and _____ type.
   a) font
   b) file
   c) password
   d) camera
6. Digital fingerprints are difficult to _____, even when cookies are cleared.
   a) create
   b) erase
   c) predict
   d) duplicate
7. Websites collect fingerprinting data to improve user _____ and detect fraud.
   a) performance
   b) experience
   c) memory
   d) selection
8. Many businesses use fingerprinting to improve their _____ protection strategies.
   a) network
   b) security
   c) entertainment
   d) marketing
9. A digital fingerprint is more difficult to avoid than _____-based tracking.
   a) cookie
   b) folder
   c) mail
   d) password

10. Fingerprinting allows companies to track users across multiple _____.
    a) devices
    b) rooms
    c) servers
    d) keyboards
11. Digital fingerprinting is one of the most advanced tracking _____.
    a) systems
    b) printers
    c) wires
    d) shapes
12. Many privacy tools are designed to block or reduce _____ fingerprinting.
    a) manual
    b) browser
    c) keyboard
    d) system
13. Digital fingerprints are automatically generated when you visit a _____.
    a) folder
    b) website
    c) printer
    d) virus
14. Fingerprinting helps detect suspicious login _____.
    a) addresses
    b) activities
    c) layers
    d) batteries
15. Websites often track both new and returning _____ for analytics.
    a) devices
    b) hosts
    c) visitors
    d) connections

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Fingerprinting makes online _____ more accurate. (TRACK)
17. Websites store user data for future _____. (IDENTIFY)
18. Developers design tools to enhance online _____. (SECURE)
19. Digital fingerprinting is a highly _____ technology for user recognition. (EFFECT)
20. The _____ of personal data raises ethical questions. (COLLECT)
21. Every user device has a unique _____ fingerprint. (DIGIT)
22. Many companies have adopted stricter _____ policies. (PRIVACY)
23. Websites use fingerprinting for fraud _____. (DETECT)
24. Fingerprinting systems can function _____ without user knowledge. (AUTOMATIC)
25. The debate over fingerprinting is often linked to online _____ rights. (FREE)

UNIT 7
Cybersecurity Threats. Hackers

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. Hackers often search for system _____ to gain unauthorized access.
   a) weaknesses
   b) updates
   c) designs
   d) passwords
2. Ethical hackers help companies find and fix _____ before attackers do.
   a) errors
   b) bugs
   c) vulnerabilities
   d) updates
3. Cybersecurity measures are designed to prevent _____ from stealing data.
   a) developers
   b) hackers
   c) designers
   d) users
4. Phishing emails are used to trick victims into revealing _____ information.
   a) financial
   b) random
   c) social
   d) graphical
5. Passwords should be strong and regularly _____ to prevent security breaches.
   a) recycled
   b) updated
   c) erased
   d) compressed
6. Hackers sometimes install _____ software to control systems remotely.
   a) gaming
   b) malware
   c) compression
   d) editing
7. Ethical hackers follow legal and professional _____ while testing systems.
   a) commands
   b) guidelines
   c) wires
   d) copies
8. Companies often hire cybersecurity experts to monitor and _____ suspicious activity.
   a) ignore
   b) delete
   c) detect
   d) compress
9. A firewall helps prevent unauthorized _____ to a network.
   a) entry
   b) exit
   c) printing
   d) sharing

10. Malware can be used to _____ sensitive data or damage systems.
    a) protect
    b) transfer
    c) steal
    d) display
11. Hackers often attempt to break _____ methods to access confidential data.
    a) encryption
    b) design
    c) printing
    d) conversion
12. Phishing is a common cybercrime technique that uses fake _____.
    a) devices
    b) websites
    c) screens
    d) keyboards
13. Ethical hackers are also known as _____ hat hackers.
    a) black
    b) white
    c) grey
    d) blue
14. Cybercriminals can cause financial and reputational _____ to businesses.
    a) support
    b) harm
    c) creation
    d) promotion
15. 15. Cybersecurity specialists are trained to handle _____ threats.
    a) physical
    b) digital
    c) emotional
    d) social

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Hackers are constantly developing new _____ to bypass security. (TECHNICAL)
17. Companies invest heavily in data _____ to protect user information. (SECURE)
18. A strong password improves system _____. (PROTECT)
19. Ethical hackers help increase _____ in digital systems. (SAFE)
20. Cybersecurity is essential for the _____ of sensitive data. (PRESERVE)
21. The company suffered a serious data _____ after the attack. (LEAK)
22. Good cybersecurity _____ can reduce the risk of human error. (TRAIN)
23. Firewalls and antivirus software offer basic _____ against hackers. (DEFEND)
24. Password managers help users create _____ passwords. (STRONG)
25. Cybercrime is a growing global _____. (THREATEN)

UNIT 8
Smart Homes

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. Smart home systems allow users to control devices _____ via smartphone apps.
   a) manually
   b) remotely
   c) occasionally
   d) randomly
2. Smart thermostats help regulate _____ for energy efficiency and comfort.
   a) temperature
   b) size
   c) brightness
   d) volume
3. Smart home devices are often connected through a _____ network.
   a) wireless
   b) postal
   c) mechanical
   d) manual
4. Motion detectors and cameras improve _____ in smart homes.
   a) decoration
   b) security
   c) storage
   d) lighting
5. Smart lighting can be programmed to turn on _____ at specific times.
   a) automatically
   b) accidentally
   c) manually
   d) unusually
6. Voice-activated _____ allow users to control smart home devices hands-free.
   a) servers
   b) assistants
   c) routers
   d) thermostats
7. Many smart devices are equipped with _____ to detect human presence.
   a) sensors
   b) drivers
   c) applications
   d) folders
8. Automated smart home systems can help reduce _____ bills.
   a) history
   b) energy
   c) laundry
   d) shopping
9. Home automation is designed to improve both comfort and _____.
   a) entertainment
   b) safety
   c) color
   d) design

10. Smart locks allow homeowners to control access to their property _____.
    a) remotely
    b) locally
    c) manually
    d) visually
11. The ability to monitor devices through apps adds extra _____ to modern homes.
    a) confusion
    b) convenience
    c) competition
    d) construction
12. Smart homes rely on stable internet _____ for smooth device communication.
    a) connection
    b) reaction
    c) correction
    d) creation
13. Smart security cameras provide real-time _____ of indoor and outdoor areas.
    a) prevention
    b) surveillance
    c) entertainment
    d) application
14. Many smart home systems allow homeowners to receive alerts _____ suspicious activity.
    a) involving
    b) predicting
    c) detecting
    d) securing
15. Home automation systems are designed to improve _____ of household tasks.
    a) efficiency
    b) currency
    c) loyalty
    d) relaxation

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Smart homes are designed to increase _____ and convenience. (SAFE)
17. The use of voice _____ allows users to control smart devices without touching them. (RECOGNIZE)
18. Home automation systems are becoming more _____ and affordable. (ACCESS)
19. Sensors and alarms help provide advanced _____ for modern homes. (PROTECT)
20. Smart homes allow the _____ management of energy use. (EFFICIENT)
21. Automated devices can be easily _____ to user preferences. (PROGRAM)
22. The development of smart homes has improved energy _____ worldwide. (CONSUME)
23. Automated systems improve comfort and reduce manual _____. (OPERATE)
24. Homeowners are becoming more aware of the _____ risks in digital home systems. (SECURE)
25. Manufacturers are working to improve the _____ of smart home ecosystems. (COMPATIBLE)

UNIT 9
Robots

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. Robots are often used in factories to perform _____ tasks efficiently.
    a) repetitive
    b) creative
    c) occasional
    d) invisible
2. Autonomous robots can make decisions without human _____.
    a) interference
    b) interest
    c) presence
    d) battery
3. Many modern robots rely on _____ to sense their environment.
    a) sensors
    b) wires
    c) keyboards
    d) colors
4. Robots in healthcare assist doctors during _____ surgeries.
    a) casual
    b) precise
    c) random
    d) emotional
5. Artificial _____ enables robots to learn from data and improve performance.
    a) intelligence
    b) reality
    c) lighting
    d) installation
6. Collaborative robots, also called _____, work side by side with humans.
    a) colleagues
    b) cobots
    c) co-drivers
    d) plugins
7. Industrial robots can operate _____, 24 hours a day, without breaks.
    a) continuously
    b) manually
    c) occasionally
    d) temporarily
8. Service robots are designed to help humans in everyday _____.
    a) games
    b) tasks
    c) diets
    d) emotions
9. A robot's ability to complete complex missions depends on its _____ and programming.
    a) battery
    b) sensors
    c) design
    d) price

10. Robots can replace humans in _____ or unsafe environments.
    a) friendly
    b) hazardous
    c) common
    d) academic
11. Military robots are often used for surveillance and _____.
    a) entertainment
    b) exploration
    c) design
    d) writing
12. The robot's _____ was programmed to detect and avoid obstacles.
    a) strategy
    b) algorithm
    c) table
    d) function
13. Humanoid robots are designed to look and move _____ like humans.
    a) slightly
    b) exactly
    c) similarly
    d) remotely
14. Robots are widely used in the automotive industry for _____ assembly.
    a) car
    b) random
    c) manual
    d) efficient
15. Advances in robotics are leading to increased _____ in factories.
    a) productivity
    b) decoration
    c) movement
    d) limitation

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Modern robots can perform tasks with great _____. (ACCURATE)
17. Engineers are working to improve the _____ of autonomous robots. (RELIABLE)
18. Robots help to reduce human _____ in dangerous jobs. (INVOLVE)
19. Artificial intelligence makes robots more _____ in decision-making. (FLEXIBILITY)
20. Industrial robots have brought huge _____ to the manufacturing process. (EFFICIENT)
21. Human-robot _____ is becoming more common in service industries. (INTERACT)
22. Robots are widely used for the _____ of tasks that require precision. (PERFORM)
23. The robotics industry is growing at an _____ rate worldwide. (IMPRESS)
24. Robot software updates are essential for system _____. (SECURE)
25. Engineers are testing the latest robot _____ in extreme conditions. (DESIGN)

UNIT 10
Professional Gaming

Multiple Choice Cloze (1–15)
Choose the correct word to complete each sentence.

1. Professional gamers compete in international _____ for prize money and recognition.
    a) experiments
    b) tournaments
    c) meetings
    d) applications
2. Skilled players practice for hours to improve their reaction time and _____.
    a) speed
    b) strategy
    c) resolution
    d) size
3. Professional gaming is also known as _____.
    a) e-sports
    b) cloud computing
    c) simulation
    d) encryption
4. Competitive gaming requires teamwork, communication, and _____ decision-making.
    a) random
    b) strategic
    c) optional
    d) relaxed
5. Many e-sports players earn income through sponsorship and _____.
    a) streaming
    b) deletion
    c) expansion
    d) duplication
6. Fast internet connections reduce _____ during competitive matches.
    a) login
    b) lag
    c) file size
    d) exposure
7. E-sports have gained global popularity through online _____ platforms.
    a) streaming
    b) storage
    c) encryption
    d) mailing
8. Players often join professional _____ to compete as a group.
    a) games
    b) teams
    c) levels
    d) passwords
9. Coaches and analysts help players improve their individual and _____ performance.
    a) network
    b) team
    c) application
    d) hardware

10. Successful e-sports players train both physically and _____ to stay competitive.
    a) mentally
    b) practically
    c) randomly
    d) mechanically
11. E-sports events are often held in large _____ filled with spectators.
    a) routers
    b) arenas
    c) folders
    d) systems
12. Game developers frequently release _____ to fix bugs and balance gameplay.
    a) updates
    b) passwords
    c) batteries
    d) installations
13. Many professional gamers use dual _____ to improve multitasking during games.
    a) keyboards
    b) monitors
    c) printers
    d) routers
14. Streaming platforms allow players to earn _____ from subscriptions and donations.
    a) income
    b) profiles
    c) profiles
    d) tournaments
15. Professional gaming demands excellent _____ coordination and focus.
    a) mechanical
    b) hand-eye
    c) server
    d) audience

Word Formation (16–25)
Complete the sentence by forming the correct word from the word in brackets.

16. Professional gaming requires constant skill _____. (IMPROVE)
17. Sponsors often provide financial _____ to e-sports teams. (SUPPORT)
18. The number of professional gamers has grown _____ in recent years. (SIGNIFICANT)
19. Competitive matches require quick and accurate _____. (REACT)
20. Mental and physical health are both important for _____ in professional gaming. (PERFORM)
21. Streaming has become a popular _____ for professional players. (OCCUPY)
22. Professional gaming is a highly _____ industry with millions of followers. (COMPETE)
23. New players must demonstrate both skill and _____ to enter the professional scene. (DETERMINE)
24. Gaming tournaments are often broadcast _____ around the world. (LIVE)
25. E-sports organizations focus on the _____ of player talent. (DEVELOP)

KEYS

UNIT 1

Task 3. personal computers; Internet gateways; PC person; huge investment; thousands of dollars; as a result; selling point; individual models; IBM fans; computer users.

Task 7. 1. cassette tapes; 2. interface; 3. display; 4. systems; 5. PC; .processor ; 7. RAM add-ons; 8. standards; 9.functionality ; 10.entry point ;11. disk operating system; 12. screen refresh rate; 13. expansion; 14. extra ports; 15. chips;16.refresh.

Task 8. 1 C; 2B; 3 A; 4 D; 5 C; 6 C; 7 B; 8 B; 9 C; 10 B.

Task 9. 1. E; 2. A; 3. G; 4. J; 5. I; 6. B; 7. C; 8. D; 9. H; 10. F.

Task 10. 1. European markets; 2. unique computer; 3. hardware standard; 4. originally released; 5. display controllers; 6. Japanese computers; 7. hardware giants; 8. market share; 9. spearheaded by Microsoft; 10. release updates.

Task 11. 1. computing; 2. design; 3. tremendous; 4. product; 5. company; 6. virtually; 7. computers; 8. drive; 9. models; 10. coprocessors.

Task 14. 1. A; 2. B; 3. C; 4. D.

Task 17. 1.essentially; 2. dominated; 3. effort; 4. compatible with; 5. expansion; 6. advantage; 7. one reason; 8. humble; 9. expensively; 10. affordable.

Task 19. 1.True; 2. False; 3. True; 4. True; 5. True; 6. False; 7. True; 8. False; 9. True; 10. False.

Task 20. Charles Babbage C; Alan Turing D; Konrad Zuse (Sousa) A; John Mauchly& Presper Eckert B; John Vincent Atanasoff E.

Task 21. 1. Charles Babbage conceives the Analytical Engine; 2. Alan Turing proposes the concept of the Universal Machine; 3. Konrad Zuse builds the Z3; 4. Mauchly visits Atanasoff and sees his computing machine; 5. ENIAC is built by Mauchly and Eckert; 6. The Manchester Baby runs its first program; 7. Patent awarded to ENIAC inventors; 8. Court rules that ENIAC idea was derived from earlier work; 9. Recognition that computer invention was a collective process.

UNIT 2

Task 3. integral part; web technologies; full-blown smartphone; hardware and software; sleep monitors; the PC era; high-speed server; biological processes; smart eyeglasses; built-in cell phone.

Task 6. 1.B; 2.D; 3.C; 4.B; 5.A; 6.B; 7.D; 8.B; 9.B; 10.C.

Task 9. 1. graphical user interface; 2. data processing; 3. operating system; 4. technology; 5. workspace; 6. consumers; 7. versatility; 8. dinosaur; 9. exponential increase; 10. domination; 11. desktop systems; 12. touchscreens; 13. myriad; 14. computing power; 15. smartphones; 16. laptops.

Task 10. 1. B; 2. A; 3. C; 4. B; 5. A; 6. C; 7. A; 8. B; 9. A; 10. C.

Task 11. 1. F; 2. A; 3. C; 4. D; 5. J; 6. B; 7. I; 8. E; 9. G; 10. H.

Task 12. 1. network connections; 2. computer power; 3. centralized computer; 4. dedicated server; 5. high-speed servers; 6. real-time; 7. complex databases; 8. multiple servers; 9. server room; 10. provide information.

Task 13. 1. desktop; 2. sophisticated; 3. laptop; 4. integrate; 5. trackball; 6. memory; 7. fortunately; 8. component; 9. light; 10. weighed.

Task 16. 1. B; 2. D; 3. A; 4. F.

Task 19. 1. famously; 2. era's; 3. relied on; 4. typically; 5. reasonable; 6. simple; 7. capabilities; 8. high-quality; 9. required; 10. debuting.

Task 21. 1. True; 2. False; 3. True; 4. False; 5. True; 6. False; 7. True; 8. True; 9. False; 10. True.

UNIT 3

Task 3. computer engineer; scientific research; atomic scale; atoms and molecules; Turing machine; amounts of data; quantum computer; computing needs; perform calculations; era of computing.

Task 6. 1. qubit; 2. calculation; 3. measurements; 4. read-write head; 5. encode information; 6. quantum physics; 7. floating-point operations; 8. atoms; 9. value; 10. subatomic particles; 11. teraflops; 12. speeds; 13. gigaflops; 14. entanglement; 15. process power.

Task 8. 1. B; 2. C; 3. C; 4. B; 5. D; 6. D; 7.A; 8. B; 9. B; 10. A.

Task 9. Answers: 1. E; 2. H; 3. A; 4. F; 5. B; 6. C; 7. G; 8. D; 9. J; 10. I.

Task 10. 1. quantum computers; 2. practical applications; 3. indirect method; 4. magnetic field; 5. startup companies; 6. factoring large numbers; 7. decoding and encoding secret information; 8. complicated method; 9. real-world problems; 10. conventional computers.

Task 12. 1. B; 2. C; 3. B; 4. C; 5. B; 6. D; 7. C; 8. A; 9. A; 10 B.

Task 13. 1. quantum-loop; 2. scientist; 3. mechanics; 4. development; 5. internet; 6. information; 7. bandwidth; 8. super-powerful; 9. communication; 10. project.

Task 16. 1. B; 2. C; 3. D. 4. E.

Task 19. 1. to figure out; 2. the weirdness; 3. save; 4. corresponds to; 5. the outside world; 6. exactly; 7. running; 8. to keep from; 9.alternative; 10. scientists.

Task 21. 1.True; 2. False; 3. True; 4. False (It sends out 3.2 billion pulses per second.); 5. True; 6. True; 7. False (Flops is a widely used measurement of computing performance.); 8. True; 9. False (Factoring very large numbers can take traditional computers years to complete.); 10. True.

UNIT 4

Task 3. wireless printers; infrared spectrum; night vision; electronic commands; susceptible to hackers; Bluetooth technology; human eye; USB port; receive information; nonprofit organization.

Task 7. 1. transmit; 2. signals; 3. network; 4. interact; 5. range; 6. electronics; 7. adapter; 8. light; 9. radio; 10. pulses; 11. convert; 12. user; 13. extend beyond walls; 14. require; 15. printer; 16. gigahertz.

Task 8. 1. increasingly; 2. frequencies; 3. administrators; 4. wireless; 5. unprotected; 6. unsecured; 7 usage; 8. interference; 9. connections; 10. excessive.

Task 9. 1. I; 2. G; 3. E; 4. A; 5. C; 6. F; 7. B; 8. D; 9. H; 10. J.

Task 10. 1. WiFi printers; 2. compatible devices; 3. wireless networks; 4. Internet usage; 5. opportunity to access; 6. secure connections; 7. activates WPA encryption; 8. data transmission; 9. wireless signals; 10. password protection.

Task 11. 1. ink; 2. coffee; 3. cartridge; 4. eco-friendly; 5. device; 6. giant; 7. recycle; 8. petroleum-based; 9. volatile; 10. health.

Task 14. 1. D; 2. C; 3. B; 4. A.

Task 15. 1. Because it uses little electricity; avoids wasteful ink cartridges; and uses household waste like coffee grounds; 2. It uses coffee grounds or tea dregs mixed with water; 3. By moving a reusable ink case back and forth; dripping colored liquid onto the paper; 4. It may be cheaper because it uses waste materials instead of expensive ink cartridges; 5. Users can visually check the ink level instead of relying on misleading digital warnings.

Task 17. 1. located; 2. created; 3. encounter; 4. attached; 5. horizontal; 6. production; 7. Possible; 8. Location; 9.equivalent; 10 survive.

Task 21. 1. B; 2. D; 3. C; 4. C; 5. A; 6. D; 7. A; 8. D; 9. C; 10. B.

Task 23. 1. True; 2. False (The organ must be made using the patient's own cells to ensure compatibility); 3. False (They print a 3-D scaffold which is later seeded with living cells); 4. True; 5. False (The cells must be cultured until there's a large enough population to cover the scaffold); 6. False (It is described as time-consuming and painstaking); 7. True; 8. False (The scaffold disappears or is absorbed soon after surgery); 9. True; 10. True.

UNIT 5

Task 3. chart-room friends; computer addiction; physical object; Internet use; medical community; negative consequences; life activities; online games; valid diagnosis; useful tool.

Task 7. 1. addiction; 2. opportunity; 3. tasks; 4. performance; 5. consequences; 6. get in; 7. efforts; 8. escape; 9. understanding; 10. signs;11. gambling addiction; 12. conscious; 13. decades; 14. excessive; 15. research;16. looking forward.

Task 8. 1. variety; 2. gatherings; 3. irritable; 4. excessive; 5. interpersonal; 6. repetitive; 7. deprivation; 8. meaningful; 9. performance.

Task 9. 1. H; 2. A; 3. J; 4. I; 5. F; 6. E; 7. B; 8. C; 9. D; 10. G.

Task 10. 1. computer addiction; 2. negative effects; 3. computer time; 4. physical damage; 5. sleep deprivation; 6. interpersonal communication; 7. excessive viewing; 8. late-night sessions; 9. physical condition; 10. social harm.

Task 11. 1. community; 2. addiction; 3. chart; 4. psychologists; 5. suffer; 6. Internet; 7. parents; 8. kids; 9. Association; 10. disorder.

Task 14. 1. B; 2. C; 3. D; 4. F.

Task 17. 1. allow; 2. to form; 3. to define; 4. specific; 5. existing; 6. powerful; 7. all the time; 8. to manage; 9. to be addictive; 10. networking.

Task 19. 1. True; 2. True; 3. True; 4. False (Internet addiction is not formally classified as a mental disorder.); 5. True; 6. True; 7. False (The average user spends about 15 hours online per month.) 8. True; 9. False (Experts say lack of face-to-face contact can affect people both socially and physically.); 10. True.

Task 22. 1. True; 2. False – China is dominant in various tech areas including cars; drones; solar panels; and more; 3. True; 4. False – It's responsible for an estimated 80–95%.; 5. True; 6. False – It aimed to move *away* from that and become a global tech leader; 7. True; 8. False – The U.S. has made large investments; including a $500 billion commitment.

UNIT 6

Task 3. digital fingerprint; video clip; fingerprint analogy; online activity; personal computer; shared for free; identifying features; online fingerprint; smart software; computer-driven analysis.

Task 7. 1b; 2a; 3c ;4a;5a;6c; 7a; 8 a.

Task 8. 1. judgments; 2. privacy; 3. control; 4. cookies; 5. track information; 6. settings; 7. share; 8. public.

Task 12. 1. D; 2. D; 3. C; 4. B; 5. B; 6. A; 7. C; 8. C; 9. A; 10. C.

Task 13. 1. G; 2. A; 3. H; 4. B; 5. J; 6. E; 7. I; 8. F; 9. D; 10. C.

Task 14. 1. digital fingerprinting; 2 an external database; 3. identify a piece of media; 4. perceptual characteristics; 5. multiple criteria; 6. online identity; 7. a pristine copy; 8. Transcoding; 9. cropping an image; 10. sample audio or video.

Task 15. 1. technology; 2. tracking; 3. computer; 4. service; 5. accounts; 6. site; 7. installed; 8. Windows; 9. privacy; 10. aware.

Task 18. 1. F; 2. D; 3. B; 4. A.

Task 21. 1. powerful; 2. tracking; 3. ethical; 4. personal; 5. required; 6. statement; 7. actually; 8. challenges; 9. duplicate; 10. fraudulent.

Task 23. 1. False; 2. False; 3. True; 4. False; 5. False; 6. True; 7. False; 8. False; 9. True; 10. True.

UNIT 7

Task 3. malicious computer; steal information; hacker community; computer hacker; operating systems; infiltration networks; security measures; bad intentions; to do for free; working properly.

Task 7. 1. attack; 2. hacker; 3. networks; 4. message; 5. force; 6. designed; 7. victim; 8. viruses; 9. zombie; 10. malicious; 11. hack passwords; 12. hard drive; 13. to commit crimes; 14. password fields; 15. duplicate; 16. to spy.

Task 8. 1. C working;2. B set up; 3. D dial; 4. D would upload; 5. C victims'; 6. B could have caused; 7. B Most; 8. C for entering; 9. B who; 10. D in which.

Task 9. 1. B; 2. J; 3. F; 4. A; 5. H; 6. C; 7. G; 8. D; 9. I; 10. E.

Task 10. 1. communication barriers 2. computer networks 3. security threat 4. dedicated to hacking 5. cause trouble 6. hack into systems 7. comprehensive security measures 8. unauthorized access 9. infiltrating secure systems 10. panel discussions.

Task 11. 1. information; 2. spy; 3. hacking; 4. device; 5. government; 6. damage; 7. laws; 8. legislation; 9. commit; 10. trial.

Task 14. 1. C; 2. A; 3. D; 4. B.

Task 17. 1. crash; 2. development; 3. fraud; 4. confirmed; 5. by chance; 6. highlighted; 7. to establish; 8. were assaulted; 9. reported; 10. hacking.

Task 19. 1. True; 2. False (No one has ever been killed due to a cyber attack or hacking incident.); 3. True; 4. True; 5. True; 6. True; 7. True; 8. False (It is often easier to gain access than to cause actual damage.); 9. True 10. True.

Task 21. 1B; 2 D; 3 C; 4 D; 5 A.

UNIT 8

Task 3. security alarm; smart device; start-up companies; remote control; jaw-dropped success; portable computers; coffee maker; Internet connections; tech organizations; digital networks.

Task 7. 1. automation; 2. compatible; 3. appliances; 4. devices; 5. limitations; 6. electronic; 7. code; 8. technologies; 9. signals; 10. company;11. networking; 12. numerical; 13. command; 14. radio waves; 15. genesis;16. cell phone.

Task 8. 1. C (convenient); 2. B (control); 3. D (security); 4. C (amount); 5. B (unlock); 6. C (create); 7. B (Turn on); 8. C (efficiency); 9. B (appliance); 10. C (notify).

Task 9. 1. H; 2. B; 3. C; 4. J; 5. A; 6. D; 7. I; 8. G; 9. F; 10. E.

Task 10. 1. smart home; 2. mood lighting; 3. A normal home; 4. home technology; 5. fire alarm; 6. to make life easier; 7. tremendous benefits; 8. energy efficiency; 9. security systems; 10. immense amount.

Task 11. 1. smart; 2. integrated; 3. monitor; 4. efficiency; 5. energy; 6. functions; 7. lights; 8. bulbs; 9. brightness; 10. bridge.

Task 14. 1. C; 2. D; 3. A; 4. B.

Task 17. 1. remote; 2. the usability; 3. to consider; 4. basic; 5. fulfilling; 6. reasons; 7. plenty of; 8. concerns; 9. rapidly; 10. in spite of.

Task 19. 1. False (In the next 20 years; energy use in the U.S. is expected to increase); 2. True; 3. True; 4. False (Some researchers are working on developing low-power-consuming technologies; not just increasing energy production); 5. True; 6. False (Smart windows are a new technology that controls how much light enters through the glass; not a Microsoft product); 7. True; 8. True; 9. True; 10. True.

Task 21. 1. motion sensor; 2. smart plug; 3. scene; 4. retrofitted; 5. share house.

Task 22. 1. B; 2. D; 3. A; 4. D; 5. C; 6. B; 7. D; 8. B; 9. C; 10. A.

UNIT 9

Task 3. movable bodies; electric motors; solar power; hydraulic robots; sensory systems; photoelectric cells; infrared light; jointed segments; basic system; motorized wheels.

Task 7. 1. repetitive; 2. connected; 3. industrial; 4. movable; 5. pivot; 6. application; 7. handheld; 8. human beings; 9. space; 10. angle; 11. Topographic; 12. computer industry; 13. memory; 14. asteroids; 15. Earth; 16. robot.

Task 8. 1. B – operate; 2. C – rougher; 3. D – more adaptable; 4. A – attach; 5. B – properly; 6. C – Although; 7. A – Most; 8. C - whose; 9. D – inaccessible.

Task 9. 1. E; 2. A; 3. I; 4. J; 5. H; 6. G; 7. C; 8. B; 9. D; 10. F.

Task 10. 1. mobile robots; 2. developed techniques; 3. remote control; 4. robot designer; 5. construction inspection; 6. underwater and on land; 7. good balance; 8. camera shots; 9. locomotion system; 10. be networked together.

Task 11. 1. autonomous; 2. bumper; 3. obstacle; 4. maneuver; 5. retailer; 6. sophisticated; 7. vacuums; 8. localization; 9. pan-tilt-zoom; 10. GPS.

Task 14. 1. F; 2. B; 3. C; 4. A.

Task 17. A. providing continuous observation; B. hazardous environment operations; C. reconnaissance; D. reduce soldier risk; E. ammunition; F. response to unanticipated barriers.

Task 18. 1. True; 2. (False Military robot dogs can patrol muddy terrain effectively; as demonstrated at Tyndall Air Force Base.); 3. True; 4. False (Vision 60 robots can elf-balance and remain stable on icy terrain using advanced control algorithms.); 5. True; 6. True; 7. False (Robots used by the 325th do conduct real perimeter patrols and help identify threats before humans are exposed); 8. True; 9. False (Robot dogs can detect and track possible threats autonomously using advanced sensors and ATAC systems.); 10. True.

Task 19. 1) overworked troops; 2) robotic pack mule; 3) navigate; 4) direct control; 5) autonomous; 6) load; 7) casualty evacuation; 8) sustain squad operations;9) observe its surroundings; 10) support systems.

Task 20. 1. C; 2. B; 3. B; 4. C; 5. C; 6. C; 7. B; 8. C; 9. C; 10. B.

Task 23. 1. controversial; 2. intellectual; 3. progress; 4. integrated; 5. based; 6. analytical; 7. successful; 8. citizens; 9. experiment; 10. useful.

Task 25. 1. False (Some military tasks; like deactivating bombs or clearing hostile buildings; are more dangerous than others.); 2. True; 3. True; 4. False (Most military robots are remote-controlled and still require human operators); 5. True; 6. False (AI allows some decision-making; but human consent is still required before proceeding with attacks); 7. False (LAWS prepare attack plans autonomously; but require human approval before acting); 8. True; 9. True; 10. False (The article focuses specifically on military robots and their uses in combat).

UNIT 10

Task 3. to make a living; video games industry; professional gaming; freelance operation; teams and tournaments; playing video games; pickup game; young sport; tournament hosts.

Task 7. 1. network code; 2. infrastructure; 3. To make sport; 4. status; 5. player; 6. informative; 7. free-to-play model; 8. accessibility; 9. special immigration status; 10. cash;11. major barrier; 12. awareness and access; 13. visuals; 14. convinced; 15. phenomenon; 16. equivalent.

Task 8. 1. B; 2. C; 3. D; 4. B; 5. C; 6. D; 7. A; 8. B; 9. D; 10. C.

Task 9. 1. E; 2. A; 3. J; 4. B; 5. H; 6. C; 7. D; 8. I; 9. F; 10. G.

Task 10. 1. make a sport; 2. a big play; 3. victory and defeat; 4. teammates and opponents; 5. favorite team; 6. business side; 7. positioning and timing; 8. a specific skill set; 9. side's mistakes; 10. video games.

Task 11. 1. competitions; 2. eSports; 3. virtual; 4. kung-fu; 5. battles; 6. weapons; 7. team-based; 8. game; 9. strategy; 10. team.

Task 14. 1. F; 2. C; 3. D. 4. A.

Task 17. 1.luckily; 2. quick; 3. soft; 4. cloth; 5. method; 6. cleaning; 7. always; 8. damp; 9. tool; 10. numerous.

Task 19. 1. True; 2. True; 3. False; 4. True; 5. True; 6. False; 7. True; 8. True; 9. True; 10. True.

Task 21. 1. F; 2. T; 3. T; 4. T; 5. F.

Task 22. 1. C); 2. D); 3. B); 4. C); 5. B); 6. A); 7. D); 8. B).

PROGRESS TESTS ANSWERS

UNIT 1

Q.1: b) 19th; Q.2: c) computer; Q.3: a) scientific; Q.4: c) portable; Q.5: b) computers; Q.6: a) electricity; Q.7: c) cards; Q.8: b) smaller; Q.9: c) microchip; Q.10: b) 20th; Q.11: d) computation; Q.12: c) larger; Q. 13: b) processing; Q.14: d) user-friendly; Q.15: a) operations; Q.16: invention; Q.17: powerful; Q. 18: innovative; Q.19: achievement; Q.20: communication; Q.21: development; Q.22: significantly; Q.23: capability; Q.24: transfer; Q.25: progress.

UNIT 2

Q.1: b) speeds; Q 2: c) industrial; Q.3: c) vast; Q.4: b) portable; Q.5: b) mobile; Q.6: c) monitor; Q. 7: c) weather; Q.8: a) system; Q.9: b) mobility; Q.10: a) data; Q.11: b) embedded; Q.12: b) data; Q.13: a) components; Q.14: c) performance; Q.15: c) processing; Q.16: scientific; Q.17: mobility; Q.18: powerful; Q.19: introduction; Q.20: security; Q.21: development; Q.22: consumers; Q.23: control; Q.24: specially; Q. 25: processing.

UNIT 3

Q.1.: b) qubits; Q.2: b) superposition; Q.3: b) traditional; Q.4: a) connected; Q.5: a) stages; Q.6: c) simultaneously; Q.7: c) security; Q.8: a) advanced; Q.9: c) correction; Q.10: c) complex; Q.11: b) quantum; Q.12: a) techniques; Q.13: a) efficiently; Q.14: b) distance; Q.15: a) data; Q. 16: breakthrough; Q.17: difficulty; Q.18: completing; Q.19: impressive; Q.20: impossible; Q.21: entanglement; Q.22: cooperation; Q.23: accurately; Q.24: growth; Q.25: innovation.

UNIT 4

Q.1: c) inkjet; Q.2: c) automatically; Q.3: b) organic; Q.4: b) efficient; Q.5: a) additive; Q.6: a) replacement; Q.7: b) wireless; Q.8: d) print; Q.9: a) design; Q.10: d) testing; Q.11: b) physical; Q.12: b) waste; Q.13: c) replacement; Q.14: a) electricity; Q.15: c) prototyping; Q.16: biological; Q. 17: customized; Q. 18: quality; Q. 19: improvement; Q.20: promise; Q.21: efficiency; Q. 22: prepared; Q. 23: economical; Q.24: technology; Q. 25: creation.

UNIT 5

Q.1 : b) share; Q.2: a) promotion; Q.3: c) rapidly; Q.4: a) sponsorships; Q.5: b) algorithms; Q.6: b) maintain; Q.7: b) viral; Q.8: b) addiction; Q.9: a) real-time; Q.10: a) limit; Q.11: b) reputation; Q.12: a) consumption; Q.13: b) consent; Q.14: b) protection; Q.15: a) safety; Q.16: social; Q.17: marketing; Q.18: popularity; Q.19: updates; Q.20: promotion; Q.21: dependent; Q.22: visibility; Q.23: formation; Q.24: consumer; Q.25: security.

UNIT 6

Q.1: b) identify; Q.2: b) browser; Q. 3: c) users; Q.4: b) consent; Q.5: a) font; Q.6: b) erase; Q.7: b) experience; Q.8: b) security; Q.9: a) cookie; Q.10: a) devices; Q.11: a) systems; Q.12: b) browser; Q.13: b) website; Q.14: b) activities; Q.15: c) visitors; Q.16: tracking; Q.17: identification; Q.18: security; Q.19: effective; Q.20: collection; Q.21: digital; Q.22: privacy; Q.23: detection; Q.24: automatically; Q.25: freedom.

UNIT 7

Q.1: a) weaknesses; Q.2 : c) vulnerabilities; Q.3: b) hackers; Q.4: a) financial; Q.5: b) updated; Q.6: b) malware; Q.7: b) guidelines; Q.8: c) detect; Q.9: a) entry; Q.10: c) steal; Q.11: a) encryption;

Q.12: b) websites; Q.13: b) white; Q.14: b) harm; Q.15: b) digital; Q.16: techniques; Q.17: security; Q.18: protection; Q.19: safety; Q.20: preservation; Q.21: leakage; Q.22: training; Q.23: defense; Q.24: strong; Q.25: threat.

UNIT 8

Q.1: b) remotely; Q.2: a) temperature; Q.3: a) wireless; Q.4: b) security; Q.5: a) automatically; Q.6: b) assistants; Q.7: a) sensors; Q.8: b) energy; Q.9: b) safety; Q.10: a) remotely; Q.11: b) convenience; Q.12: a) connection; Q.13: b) surveillance; Q.14: c) detecting; Q.15: a) efficiency; Q.16: safety; Q.17: recognition; Q.18: accessible; Q.19: protection; Q.20: efficient; Q.21: programmed; Q.22: consumption; Q.23: operation; Q.24: security; Q.25: compatibility.

UNIT 9

Q.1: a) repetitive; Q.2: a) interference; Q.3: a) sensors; Q.4: b) precise; Q.5: a) intelligence; Q.6: b) cobots; Q.7: a) continuously; Q.8: b) tasks; Q.9: c) design; Q.10: b) hazardous; Q.11: b) exploration; Q.12: b) algorithm; Q.13: c) similarly; Q.14: d) efficient; Q.15: a) productivity; Q.16: accuracy; Q.17: reliability; Q.18: involvement; Q.19: flexible; Q.20: efficiency; Q.21: interaction; Q.22: performance; Q.23: impressive; Q.24: security; Q.25: designs.

UNIT 10

Q.1: b) tournaments; Q.2: b) strategy; Q.3: a) e-sports; Q.4: b) strategic; Q.5: a) streaming; Q.6: b) lag; Q.7: a) streaming; Q.8: b) teams; Q.9: b) team; Q.10: a) mentally; Q.11: b) arenas; Q.12: a) updates; Q.13: b) monitors; Q.14: a) income; Q.15: b) hand-eye; Q.16: improvement; Q.17: support; Q.18: significantly; Q.19: reactions; Q.20: performance; Q.21: occupation; Q.22: competitive; Q.23: determination; Q.24: live; Q. 25: development.

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APPENDIX

TAPESCRIPTS

UNIT 1

Who Invented the Computer?

(0:05 - 0:59) Legendary names, legendary inventions, but who invented one of the most significant inventions of all time? The computer. Many embarked on the quest to invent such a machine, but who was first? And what machine qualifies as the first real computer? In 1834, British mathematician Charles Babbage conceived of the analytical engine, a machine with a memory and calculating unit which could be programmed. The analytical engine was never built, but would it have worked? In 1991, a different engine based on a simpler Babbage design was built.

(1:00 - 1:29) It operates exactly as Babbage predicted, 150 years earlier. Can mathematical statements be proved true or false? This question became the foundation of theoretical computer science. Alan Turing, a British mathematician and cryptanalyst, imagined a machine that could compute any problem that was presented in a set of instructions.

(1:30 - 1:51) In essence, a general purpose computer. The universal Turing machine was a conceptual blueprint for automatic computation. Meanwhile, German engineer Konrad Sousa built a series of machines for his calculations.

(1:53 - 2:11) Sousa's Z3 was the earliest fully functioning, programme-controlled machine. But war isolated Sousa and his work wasn't widely known. Technology advances in World War II catapulted computer science.

(2:11 - 2:33) Computing into a new, modern era. American physicist John Mauchly and engineer Presper Eckert built the ENIAC, the first all-electronic computer controlled by a programme. It was much faster than previous machines, but had no memory to store programmes, and needed to be tediously rewired for each problem.

(2:34 - 2:49) After the war, ENIAC was declassified and unveiled to members of the scientific community. Now they saw the importance of storing the programme in memory. They rushed to build their own computers.

(2:51 - 3:10) The Manchester Baby was a prototype of just such a stored programme computer. Built by Manchester University, it ran a programme from memory on June 21st, 1948. A patent for the computer has never been awarded.

(3:12 - 3:28) Konrad Sousa tried in the 1940s, but his first patent application was denied for being vague. And his second was delayed for decades. In 1964, a patent on the ENIAC was awarded to its inventors, Eckert and Mauchly.

(3:29 - 3:41) The Eckert-Mauchly Computer Corporation had been acquired in 1950. by the company that became Sperry Rand. Sperry Rand now demanded royalties from anyone building a computer.

(3:42 - 4:02) When competitor Honeywell refused, a fierce legal battle ensued. But Honeywell's lawyers uncovered a little-known fact. In 1940, John Vincent Antanasoff, an assistant professor at Iowa State, had shown his computing machine to a visitor, John Mauchly.

(4:03 - 4:21) Because of that visit, the court's opinion was that Mauchly and Eckert derived their idea from a prior work. The general concept of the computer was not patentable. So, who invented computers? Not one person, but many.

(4:22 - 4:38) Influenced and inspired by each other. Not a single breakthrough, but a series of incremental steps that continues even today as new generations pursue new realms of computing and its vast possibilities [26].

UNIT 2

Tracking your health data through wearable devices

(0:00 - 1:07) When you were growing up, the closest you ever got to a personal medical data collection device was probably this. Or possibly that. But these days, health trackers have gotten a lot more sophisticated and a lot more wearable.

These smartwatches from companies like Fitbit and Apple are teeming with tiny sensors that display their findings on your smartphone. So this looks like a can detect. Low heart rate, high heart rate, irregular heart.

Blood oxygen, walking steadiness, headphone notifications, noise notifications, and even hand washing, which we can detect. And of course, your pulse rate.

That's high, isn't it? It's on the higher side. So either you haven't drank enough water or you might be really stressed. I might be on national television, for example.

And that could be a reason. Dr. Sumbul Desai is a physician and vice president of health at Apple. At the company's California headquarters, she demonstrated how an Apple watch can warn you about dangerous sound levels.

(1:07 - 1:13) This is flight 37 now leaving for San Francisco. There you go. There it is.

(1:13 - 1:46) Measure your cardio fitness. Yours is 28.6 and it is a little below average. Clearly, I've been very lazy, busy, busy.

And even perform an electrocardiogram. You're going to put your finger on that digital crown. That's real right now? That is real of what your heart rhythm is doing.

And if you want to choose to share this with your doctor, you can hit export to PDF. But the most life-changing talent of the latest smartwatches is brand new. They can give you early warning of medical problems.

(1:46 - 2:12) For example, if you're sleeping more or sleeping less than you used to, if your heart rate is at a different baseline heart rate than it was, those are early signs of things that may be going on. Without my having to check anything, will it actually tell me if it discovers something alarming? It will. Another one is walking steadiness, which is if we notice changes in your gait, we can actually give you an early notification where you can do something about it.

(2:13 - 2:21) Then there's atrial fibrillation. It's a heart condition where your heart quivers instead of beating. As many as six million Americans have it, and it often leads to stroke.

(2:21 - 2:35) The problem is these episodes are intermittent, so your doctor's checkup might miss it. But your watch... You know, the watch is with you all the time. Our watch can detect if your heart is beating out of rhythm and will surface up a notification.

(2:35 - 3:03) Has this feature saved any lives? Almost every day. Their physicians are actually telling them, I'm so glad you showed up when you did because this really could have ended much differently. You don't drive your car around without a dashboard.

Here we are as people. We're more important than cars, but we're running around without any sensors, most people. And we shouldn't be wearing these things, in my opinion, because they can alert you to early things.

(3:03 - 3:27) Stanford School of Medicine professor Michael Snyder is conducting several studies to see how far wearables can go in detecting disease. What's the complete list of conditions that a smartwatch might be able to one day detect? Infectious disease, anemia, even type 2 diabetes. And then in the future, I'm pretty confident there's other things, for sure heart conditions.

(3:27 - 3:38) We're working to see if we can detect cancer right now. Snyder got a taste of his own smartwatch medicine last month. On the day of a cross-country flight, he felt congested.

(3:38 - 3:55) His own research app alerted him of sudden changes in his breathing and heart rates. So I did a COVID test and it turns out I was negative. So I went ahead and got on the plane.

Big mistake. He did have COVID. I listened to my COVID test and I should have listened to my smartwatch.

(3:55 - 4:19) And sure enough, in a Fitbit study involving 100,000 people, those metabolic changes predicted COVID three days before any symptoms appeared. Now at the moment, Snyder's app can't tell what is causing your vital signs to go screwy. Right now, as they say, we can't tell the difference between certain kinds of stresses like workplace stress and mental stress versus a COVID.

(4:19 - 4:29) But in the future, we will. I am here to say that these data are great. People who self-track are more likely to be connected to other people.

(4:30 - 4:45) And when they're connected to other people, they're more likely to be happier. University of Cambridge professor Gina Neff is the co-author of a book about self-tracking. Overall, she's a fan, but she does worry about who gets to see our medical data.

(4:45 - 5:05) Imagine devices that are being used in warehouses to determine if someone is moving fast enough. Imagine devices that you sign up for to help train you to be a safer driver, but it's instead used to raise your insurance premiums. These are scenarios that are used in companies today.

(5:06 - 5:19) At least Apple and Fitbit say that they can't see your data. I want to be completely clear that Apple does not have access to any health information for a user. It is on device, encrypted, and in the user's control.

(5:19 - 5:42) You don't have some engineer that could look up David Pogue's blood oxygen level? Absolutely not. For Stanford's Michael Snyder, the promise of disease detection on your wrist is a goal well worth pursuing. 3.8 billion people on the planet have a smartphone, but if you compare that with a $50 smartwatch, you'd have a health monitoring system for 3.8 billion people [29].

UNIT 3

Majorana 1 Explained The Path to a Million Qubits

What would the world look like with a computer that could accurately model the laws of nature? That's the promise of quantum computing, but there have always been limitations. Now, as one of our longest running research projects, our team at Microsoft has been able to take a subatomic particle that has only been theorized until now and not only observe it, but control it, creating an entirely new material and a new architecture for quantum computing. One that can scale to millions of cubits on a single chip.

This is not a work of science, it's a book of science and art. I gotta be honest, some of these ideas are a little science fiction sounding. It will solve problems unsolvable by the combined power of all the world's computers today and promises to revolutionize fields such as medicine, material science, and our understanding of the natural world.

Our first quantum processor based on this architecture is the Majorana 1. Yeah, I've always been fascinated with puzzles and challenges and a mixture of mathematics and computers, and so when I learned that there's this type of computer that didn't exist yet but could solve problems that we couldn't solve with our digital, you know, all of the computers we had, I was just fascinated. I wanted to learn, well, how can I help that computer be built? Over the years, I ran into problems that you could not solve on the most powerful computers, but then over time, I realized, hey, I could solve that if I had a quantum computer. A laptop can solve a problem of 10 electrons.

A supercomputer can solve a problem of 20 electrons. But no classical computer in the world can exactly solve the behavior of 30 or 40 or 50 electrons. The number 30, 40, 50 electrons, those numbers are seemingly small but require up to lifetime in the universe time scales to solve with all of the world's computers operating together.

That's until you have a scaled quantum computer that can solve these problems efficiently. These calculations are so complicated that then if the classical computer was as big as this entire planet, it would still not be able to compute it, just to give you a constructive scale. And a quantum computer can do it and can do it very, very well.

At the core of a quantum computer are these qubits. Qubits are like our classical bits, right? These are essentially zeros and ones in a transistor. And we need the analog of that in quantum computing.

The analog is a qubit, a quantum bit that serves as that core information unit. It's where we store the information and then we process on those qubits to create computation and ultimately get solutions back out. Now, there's many different ways to create a qubit.

The reason quantum computing has been so slow to progress is that the industry has been struggling with problems making qubits reliable and resistant to noise. Progress has been incremental. The challenge is qubits are actually pretty delicate in general.

So you need underlying qubits that are really stable, but you don't want that to come at a cost because you don't want your underlying qubits to be really big. That's one way to make it more stable is having really big. If they're really big and you're still going to need many of them, then, you know, how are you going to fit them all into your system? You don't want to deal with something the size of a warehouse.

Then the second thing is you don't want the qubits to end up being slow, right? Because if the price you pay for getting something stable is you have to go really slowly, then a computation that might take you a month ends up taking you a decade, and then it's not useful. People in the early days of computation used vacuum tubes and then that technology, actually, you could build very good computers with it. And then the transistor was invented.

And, you know, the earliest transistors weren't necessarily that great, but it became clearer over time as the transistor developed and the integrated circuit developed that this was going to be the technology of the future. In that spirit, the first generation of qubits may not be what gets us to the next stage where we can really solve the kind of problems I was mentioning that are really important. And so we might need to invent a material and therefore a quantum processing unit that has the right properties.

So for us, we want something that has some built-in level of error protection. And a lot of those ideas actually were explored in the context of software of quantum error correcting codes, but you can actually build a lot of those ideas into hardware. So the way you design that qubit matters. We see the states of matter every day. Solids keep their shape. Liquids vary, but keep their volume.

Gases expand to fill the space they're in. All defined ultimately by how their atoms behave. But what if there were more? What if, under the right conditions, you could engineer more? States that have only ever been theorized.

That would change how subatomic particles actually behave. A hundred years ago, mathematicians predicted one such new state of matter. The topological state.

And since then, researchers have been looking for a very specific, very useful quasi-particle within it. The Majorana particle. Last year, we were able to observe it for the first time.

And this year, we're able to control it and use its unique properties to build a photoconductor. A new type of semiconductor that operates also as a superconductor. With this material, we can build a whole new foundational architecture for our quantum computers.

A topological core. Allowing us to scale to not tens or hundreds of qubits on a chip, but millions. All in the palm of your hand.

Majorana's theory showed that mathematically it's possible to have a particle that is its own antiparticle. That means you can take two of these particles and you bring them together and they could annihilate and there's nothing left. Or you could take two particles and you bring them together and you just have two particles.

Sometimes it's nothing, the zero state, and sometimes it's the electron, the one state. So it really has taken quite some thinking, right? Some time to design a device, design a chip that can enable measurement of this literally elusive particle. We've designed a chip that is able to measure the presence of Majorana.

Majorana allows us to create a topological qubit. A topological qubit is reliable, small, and controllable. This solves the noise problem that creates errors in qubits.

Now that we have these topological qubits, we're able to build an entirely new quantum architecture, the topological core, which can scale to a million topological qubits on a tiny chip. Every single atom in this chip is placed purposefully. It is constructed from ground up.

It is entirely a new state of matter. Think of us as building the picture by painting it atom by atom. In a regular chip, the computation is done using electrons.

We don't use electrons for compute. We use Majoranas for computing. It's an entirely new particle.

It's half electron. When we look at the design of this chip, first of all, you can fit so much on just a small form factor. This chip can store over a million qubits.

Over a million can fit on just this small form factor. In addition, we don't want to wait centuries or millennia for a solution. So this chip also offers the right speed to get solutions from the chip in a reasonable, efficient amount of time.

That's the beauty in this qubit design, the topological qubit. It has the right size, the right speed, and the right type of controllability. And all of that together means that it has an ability to scale like no other.

The way the system that we are constructing works is you have the quantum accelerator. You have a classical machine that works with it and controls it. And then you have the application that essentially goes between classical and quantum, depending on which problem it's trying to solve.

Once the computations are done, the results are re-synthesized on the classical side and produced back to the user as one complete answer. Where the quantum machine shines, it is able to do simulations, particularly in chemistry and materials, that are extremely accurate, as accurate as an actual wet lab experiment. Imagine a world where a scientist computes the material that they want and they compute it to the accuracy that it's first time right.

So when you walk into a lab, you don’t need to experiment anymore. Imagine a battery that you charge it once and you never have to worry about discharging. What can you do with a million qubits? In the last few years, there's been an explosion of artificial intelligence, right, co-pilots.

And what's so inspiring about a quantum computer is that with a quantum computer augmenting the AI capability, it can help more, you know, drive even more discovery. What makes me excited about quantum computing is that it will give us the tool to try tackle many of these challenges at the fundamental level by creating new chemicals, new drugs, new enzymes for food production. Honestly, it's kind of mind-blowing right now because this is something we've thought about for a while, years or more.

We call the ages of mankind by materials. We've talked about the Stone Age. We've talked about the Bronze Age and the Iron Age.

The Steel Age, the Silicon Age, materials define our culture, define our mankind, define our progress. Thus, what could be more powerful than having a machine that can let you radically change the way we work with materials? Our leadership has been working on this program for the last 17 years. It is the longest running research program in the company.

And after 17 years, when we are showcasing our results, we are showcasing results that are not just incredible, they're real. They are real because they will fundamentally redefine how the next stage of the quantum journey takes place. We're at the cusp of a quantum age and Majorana 1 is just the beginning [22]

UNIT 4

Scientists 3D Print Human Heart!

Hi, welcome to another ColdFusion video. Maybe you've known someone who is in need of an organ transplant. Finding a donor isn't easy, nor is it quick.

In a situation where time is of the essence, the wait can be painful, that is, if you're even lucky to get an organ donated at all. While soon, this may become a thing of the past. Researchers have just made a breakthrough by 3D printing a heart from real human cells.

This is one step closer to a future where 3D organs can be printed on demand. In this video, we'll take a look. You are watching ColdFusion TV.

Since the 1800s, scientists have developed vaccines and medicines by growing cells in glass petri dishes. It was instrumental in advancing biological science for the past few centuries. In recent years, with the advent of 3D printing, the 2D petri dish has now been upgraded to another dimension.

A revolution has started to develop lab-grown organs for transplants. Researchers at Israel's Tel Aviv University have just successfully 3D printed a heart made from real human cells. Previously, this was only achieved with non-organic materials such as silicon.

Beyond incredible, potential breakthrough in making organs in a lab. Israeli researchers have printed a 3D heart complete with muscle and blood vessels. Explain that the cells that made the heart came from a donor's fat tissue, which were then transformed into embryonic stem cells, and then differentiated into the various cell types in the heart.

The heart is small, only about the size of a rabbit's heart. However, researchers were able to create chambers and veins which nobody had previously achieved before. The researchers envision creating 3D printed hearts suitable for human transplants and also patches which can regenerate defective tissue.

Professor Tal Dever, who led the project, stated, quote, this was the first time anyone anywhere has successfully engineered and printed an entire heart replete with cells, blood vessels, ventricles, and chambers, end quote. With that being said, some obstacles still stand in the way. While the cells can contract, they do not possess the ability to pump, which is the researchers' next objective.

But there are still many advantages in comparison to traditional organ transplants to be optimistic about. Normally, in organ transplants, the body may reject an incoming organ. This is due to the immune system sensing antigens in the cells of the organ, which do not match the rest of the body's cells.

For kidneys, about 25% of transplant patients experience an episode of severe rejection in the first year of the transplant. And for heart transplants, that number rises to 40%. But this 3D printed heart uses human tissue as the bio-ink.

Here's how it works. A sample of cells can be taken from the patient, and a 3D organ can be printed with a personal hydrogel made from their own cells. This potentially resolves rejection issues.

This isn't the first time researchers have printed a heart. In 2017, scientists in Zurich, Switzerland, 3D printed an artificial heart. But instead of using human tissue, they were only able to achieve the feat using soft, flexible silicon material.

The heart was able to push and pull water through intricate chambers at a rate of 80 beats per minute. However, it was only able to pump for 3,000 beats in a row, or approximately half an hour. The Zurich heart was able to achieve a pump flow of 2.2 liters per minute.

This is about two to three times less than the human heart. Still far from what's required to keep a human alive, but not bad for a replica. Apart from the application of building replacement organs, 3D printing is being used to develop new medicines.

For example, what if rather than being given a one-size-fits-all medication, doctors and scientists can model your illness and apply the right exact procedure or medicine for your case? By building tumors in labs using 3D printing, researchers are attempting to do just that. A team at McMaster University in Canada have developed a rapid magnetic 3D bioprinting system, which can build a replica of a cancerous tumor in as little as six hours. The idea is then to test different drugs and treatments, changing the dosage and frequency to see which one works best.

Then after the lab testing, the patient would be given a tailor-made medication program. This could decrease side effects and more importantly, increase the chances of survival for the patient. So this recent breakthrough of 3D printing a heart with real human cells foreshadows a future where on-demand organs are available without waiting lists.

According to some estimates, this reality could be less than a decade away. Though all of this raises some interesting questions for human life. How much longer could we extend our lives if we easily could replace

body parts? Would most people want to do that? And what about the price of a new heart? Will everyone be able to afford it? At first, predictably, such technology might only be available to the rich.

But in the future, prices may come down far enough so that the technology could be cheap and routine. And after this, what comes next? High-capacity lungs that can provide oxygen more efficiently? Or heart attack-proof hearts that are resistant to failure? The future of biotech is an interesting one. As we move from making the best cars, phones, and computers, perhaps the next big revolution will be the upgrading of our bodies.

So what's your opinion on such a future? Do you think that it will prevent early deaths and suffering? Or does this kind of thing bother you and should we let nature take its course? Let me know in the comment section below. I'm interested to know your thoughts. These 3D printing developments are all very interesting for me.

I did my university thesis on 3D printing just before it exploded into the commercial space. So for me to see the progress and diversity of its applications in such a short amount of time has been mind-blowing. Anyway, that just about wraps it up for this video.

Thanks for watching. Just a bit of housekeeping quickly. Late last week I was supposed to release a huge video, probably the biggest video I've done in about 7 years, but I'm still waiting on a licensing agreement from TED Talks.

The video is going to be a documentary format like the Theranos video, so hopefully I'll be able to release that soon, but this video was just something in the meantime while you wait. And lastly, don't forget to follow me on Instagram because I've been posting there a bit more regularly lately. And that's it.

Thanks for watching. This has been Dagogo, you've been watching ColdFusion. Feel free to subscribe if you just stumbled across this channel and I'll catch you again soon for the next video [26].

UNIT 5

DeepSeek, TikTok, Temu: How China is taking the lead in tech - BBC World Service

(0:01 - 0:12) The rise of Chinese AI chatbot DeepSeek has taken the world by storm. But it's part of a wider trend. Chinese apps are rising up the charts around the world.

(0:13 - 0:24) TikTok, CapCut, Xi'an, Timu, to name a few. And it's not just on our phones. China is becoming dominant in many other areas of tech.

(0:25 - 0:39) Look at cars. It's overtaken the previous epicentres of motoring, selling more than any other country thanks to hit electric car makers like BYD. A lot of this success comes from China being the world's biggest battery maker now too.

(0:40 - 0:54) And solar panels. China's responsible for an estimated 80 to 95% of the global supply chain. By 2028, it's predicted that 60% of the world's renewable energy will be generated in China.

(0:55 - 1:09) In drones too, China rules the skies. Next time you hear that buzzing above your head, there's a 70% chance it's a DJI drone made in the city of Shenzhen. Three of the world's top 10 drone makers are Chinese.

(1:09 - 1:27) In the futuristic world of quantum computers, Chinese scientists publish more quantum-related research papers annually than any other country. And they're even ahead of the general leaders, the US, in some areas of quantum computing development. And it's the same picture in AI.

(1:27 - 1:44) Chinese AI firms now issue more patents than any other country. And the rise of DeepSeek shows it's capable of challenging the dominant US giants with products too. So how has China done all this? Well, i's all part of a long-term plan.

(1:47 - 2:06) In 2015, the Chinese government set out an ambitious project called Made in China 2025. It wanted to move away from being the world's factory for low-cost goods to a global tech leader responsible for its own supply chain of cutting-edge tech. Made in China 2025, in my opinion, was largely successful.

(2:07 - 2:25) So in many industries, China is catching up with the leading edge. And in some industries, China is even leading, even in cars and 5Gs, batteries, solar energies. Now even in the AIGAI, China has become one of the players.

(2:26 - 2:44) Across 10 target technologies, the plan set out more than 250 mini-goals. And according to analysis from South China Morning Post, 86% of them have been ticked off. Some targets, like electric vehicles and renewable energy production, have far exceeded the targets.

(2:44 - 3:23) South China Morning Post is sometimes accused of being pro-China. But Made in China 2025 has been hailed a success by many other analysts too. So how has China done it? What China has been moderately successful at least, and some would say incredibly successful at doing, is using its sort of state-backed capitalism system, whereby the government really sets a research agenda, sets a funding agenda, bringing foreign researchers and enticing them to stay in China, or at least to give their innovations and ideas over to Chinese companies, requiring businesses from outside of China oftentimes to set up joint ventures with Chinese ventures.

(3:23 - 3:48) These are all sort of tools that China has used to help achieve these ambitions. According to U.S. Congress research, the Chinese government planned to raise or spend $1.5 trillion on grants for research, development or buying foreign companies. According to the report, more than $627 billion had been spent by 2020.

(3:49 - 4:02) Research centres sprung up in city hubs, centred around various technologies. Also, the U.S. and its allies have accused China of short-cutting investment. They have accused China of short-cutting some of its tech innovation by stealing intellectual property through hacking.

(4:03 - 4:16) For example, U.S. aircraft makers. China has always denied this. Made in China 2025 got so successful that after just a few years, the government stopped using the term as it was antagonising rivals.

(4:16 - 4:38) But it was too late. Over the years, the West has imposed restrictions and sanctions on China regarding sensitive technologies. But this huge external threat has weakened up the Chinese and kind of forced them to pursue a self-sufficiency strategy in this advanced technology.

(4:39 - 4:49) There's an old saying in China, life always finds its own way out. Huawei is a great example of this. In around 2019, it was top of the world in 5G equipment.

(4:50 - 5:04) It had a huge market share in mobile phones too. All of that took a major hit though when the U.S. led widespread sanctions against the company, citing national security concerns around spying. Huawei's market share shrank and it couldn't get the microchips it needed to keep innovating.

(5:06 - 5:23) But it pivoted into microchip manufacturing and is now a major player in that too. In 2023, it released a phone with a microchip far beyond what the rest of the world thought was possible for the company or the country. A similar situation happened with the viral new chatbot DeepSeek.

(5:23 - 5:38) The firm says it couldn't get the most powerful chips to train its models, so it says it made do with older ones and innovated new techniques. They built the impressive bot for far less money with far less kit. For the U.S., it came as a shock.

(5:38 - 5:54) DeepSeek AI from a Chinese company should be a wake-up call for our industries that we need to be laser-focused on competing to win. TikTok, too, has taken the West by surprise. It's the first non-U.S. social network to succeed in the last 10 years.

(5:55 - 6:15) Its enormous success is under the spotlight though and under threat from potential intervention by the U.S. on national security grounds. But Xi'an and Timu are proving worthy challenges in e-commerce now too, thanks to combining China's cheap goods with innovative app technology. But China hasn't succeeded in all its 2025 goals.

(6:15 - 6:35) It's still years behind other countries in chip-making, with progress set to get even worse thanks to more sanctions and controls. Plus, the U.S. government and private firms are throwing hundreds of billions of dollars into staying ahead in chip tech. This increased research and development funding is going to ensure the United States leads the world in the industries of the future.

(6:36 - 6:53) And in January, the U.S. celebrated a commitment from tech giants to invest a potential $500 billion into infrastructure for AI. And it's all taking place right here in America. Other industrialised countries like Germany and Japan have also launched counterplans too.

(6:54 - 7:00) But there’s no doubt that a new high-tech leader has emerged with big ambitions, deep pockets and plenty of patience [6].

UNIT 6

What is a Digital Footprint?

(0:00 - 0:20) If you use the internet, you should be aware of your digital footprint. Just like physical footprints that show someone's steps on a dirt path, your digital footprint is a history of all the activity you do online. Any social media posts you make, any websites you visit, and any information you share online contributes to your digital footprint.

(0:21 - 0:35) Once you post something online, it can't be erased, so your digital footprint can last forever. This can be a good thing if your digital footprint includes things that give you a positive reputation online. This can help you build your personal brand.

(0:35 - 1:02) Your online history can also help the apps you use know more about you. They can use this information to serve you better by adjusting to the things you like and your daily habits. But they can also use this information in the wrong way and share it with others.

Keep the following tips in mind when you go online to manage your digital footprint. Tip number 1. Know what your footprint says about you. Other people use your digital footprint to make judgments about you online.

(1:02 - 1:17) This can include employers when you apply for a job or recruiters when you apply for academic programs. It's important to know what your digital footprint says about you and how your information is being used. To see what your personal brand is online, you can search for yourself.

(1:18 - 1:32) Search for your name in the Bing search engine and see what results are displayed. If these results don't show what you want, think about what you share online and what information you allow other people to see. Tip number 2. Manage your privacy settings.

(1:33 - 1:48) You can modify the privacy settings of most of the social media sites and online applications that you use. This can help you control who sees what you share and what information shows up when someone searches for you online. Tip number 3. Manage your cookies.

(1:49 - 2:30) Cookies are notes given to your web browser as you browse the web. These cookies help apps track information that they need while you're using the app. This can help the app work better for you, but this data also contributes to your digital footprint.

You can use the settings in your browser to limit or block the use of cookies on certain websites. Tip number 4. Think before you share. Once you share something online, you can't take it back.

Make sure you're okay with something being a part of your public digital footprint before you share it. Your digital footprint can live forever. Keep these tips in mind to make sure you're happy with your digital footprint and how it is used [34].

UNIT 7

Cyber hackers hacked: BBC News Review

(0:00 - 0:24) Hacking the hackers! World's biggest cybercrime gang stopped! This is a News Review from BBC Learning English, where we help you understand news headlines in English. I'm Neil. And I'm Georgie.

Make sure you watch to the end to learn the vocabulary you need to talk about this story. Don't forget to subscribe to our channel so you can learn more English from news headlines. Now, the story.

(0:26 - 0:45) One of the most significant disruptions of the cybercriminal world. That's what an operation to take control of Lockbit has been described as. The criminal organisation, thought to be based in Russia, hacked into companies' computers and locked users out until they paid them money.

(0:47 - 1:04) Now, Lockbit has been locked out of its own website after a UK-led operation. You've been looking at the headlines, Georgie. What's the vocabulary people need to understand this story in English? We have takedown, prolific and infamous.

(1:05 - 1:20) This is News Review from BBC Learning English. Let's have a look at our first headline. This one's from Reuters.

(1:21 - 1:41) Lockbit's cybercrime gang faces global takedown with indictments and arrests. So, Lockbit is the name of the cybercrime gang that has had its operations stopped by the British National Crime Agency. We are looking at the word takedown, which seems very straightforward, Georgie.

(1:42 - 2:27) When you take something down from the internet as a verb, then you remove it. And so the noun is a takedown. Is it that simple? Well, yes, Neil, you're right.

We put things up on the internet. You are watching News Review now because we put it up online. The opposite is take something down.

The noun is a takedown. But takedown also has other meanings which make this headline interesting. Yes.

So we can describe a heavy defeat as a takedown. It comes from sport, wrestling. If you throw someone to the ground, then that is a takedown.

You defeat them. And so that's important in this headline as well, because for this cybercrime gang, this is a heavy defeat. It's a takedown.

(2:27 - 3:02) Yes. Another meaning of takedown is strong criticism. So, Neil, remember when you told me that you're brilliant at juggling and then you dropped all the balls within a second? Yeah.

You said that even your dog is a better juggler than me, which is a real takedown. Watch. Maybe your takedown was right.

Let's look at that again. Let's have our next headline. This one's from CNN.

(3:03 - 3:17) FBI and allies seize dark web site of world's most prolific ransomware gang. So, here we are hearing about the FBI and their allies. Allies are people who fight with you on the same side.

(3:18 - 4:32) They've taken control of this dark web site lockbit. We are interested though in the word prolific. It's a very useful adjective, isn't it? Yes.

So, we use prolific to describe something or someone that creates a lot of something. In this case, lockbit is described as prolific. It has committed a lot of crimes.

Obviously, committing a crime is seen as a bad thing, but prolific isn't always used for negative situations, is it, Neil? No. We can also use prolific to talk about good things. So, for example, the footballer Lionel Messi is a prolific goalscorer.

It means he scores a lot of goals frequently. Or let's think about the writer Stephen King. He's a prolific author.

He's written about 65 novels. Now, Georgie, what is the opposite of prolific? Well, unfortunately, we can't use unprolific. We could use unproductive.

Neil, you've told me many times that you're a singer-songwriter, but you've never actually written a song, have you? You are unproductive. I am, it's true. Very unproductive.

But you wait. My album is definitely coming next year. Let's look at that again.

(4:40 - 4:51) Let's have our next headline. This one's from The Mirror. Infamous cybercrime gang Lockbit taken down in huge operation led by UK and the FBI.

(4:51 - 5:32) OK, so there's take down as a verb this time that we saw in our first headline. But we are looking at infamous. And in the word infamous, I can recognise the word famous.

We all know what famous means. And then there's that prefix in, which usually means that it's the opposite in meaning. But that's not the case here, is it? No, and this is a slightly confusing bit of English because, yes, you're right.

When we see the prefix in or in, it usually means the word becomes the opposite. So impossible means not possible. Sometimes, though, that isn't the case, like here with infamous.

(5:32 - 5:44) Yes, so infamous doesn't mean not famous. It means famous, but for bad reasons. So, for example, famous criminals are infamous or dictators, people like that.

(5:45 - 6:18) Another similar word with a similar meaning is notorious. Yes, and another good example of when the in-prefix in a word doesn't mean not is inflammable. So, flammable means that something can catch fire.

So, you would think that inflammable means that it can't catch fire. But actually, inflammable means that it's very likely to catch fire, which is confusing. And a note on pronunciation of infamous.

The stress is on the first syllable, infamous. We don't say infamous. OK, let's look at that again.

(6:24 - 6:35) We've had takedown, the removal of something from the internet, or a defeat. Prolific, producing a lot of something. And infamous, famous but for negative reasons.

(6:35 - 6:44) Now, if you're interested in technology, click here for more. And click here to subscribe to our channel so you never miss another video. Thanks for joining us and goodbye [5].

UNIT 8

Smart home tour

(0:11 - 0:24) So this is my office, where I work during the day and make YouTube videos at night. I spent a lot of money in this room. I love my big monitors that I've got here, because I work from home, so it's really important that I feel comfortable and productive.

(0:24 - 0:47) In terms of automations, the first time I walk in here during the day, this motion sensor here will detect me, it will open up the blinds for the first time, and turn the lights on. It actually powers up the desk as well, one of the things I try to do with my smart home is to save power by turning things off when I'm not using them. So there's a smart plug back there that turns on the monitors so they're not wasting standby power at night, powers everything up.

(0:47 - 1:19) And then I've got different scenes that I set from either a remote control here or from my tablet, so that I can press video conference, so it turns my key light on and sets the lights behind me so I look really cool on video calls. I have a YouTube mode which sets the lights in a certain way for when I'm doing my filming. I've also got my desk actually hooked in as well, and if I haven't moved it to the standing up position for four hours or so, it actually sends me a notification saying you've been sitting down too long, you fat bastard, stand up and move yourself around a bit.

(1:19 - 1:45) A bit of LED lighting behind here which has different effects and such, I've got some lights in my plants here as well. This is something I've been doing a lot lately, it lights them up from underneath, I just think it looks really cool. That was the office. All of the hallways and stairwells have pretty much the similar automations, the blinds here go up and down automatically in the morning and in the evening, if it's going to be hot that day based on the forecast temperature, they stay quite low so that the heat doesn't come in, and if it's going to be cool, they go all the way up to the top.

(1:46 - 2:18) I've got lights down along the top of the stairs here on all the levels, it's actually one of the reasons I bought the house, they just look so cool, they come on at night when motion detected on the stairwell, stop you falling down the stairs and breaking your neck. So, got the bedroom here, most of the automations here are designed for comfort during the night time because that's when we spend time here. I've lived in a lot of share houses, I've hated having to turn the lights on at night to go to the bathroom, so what I tried to do here was make it so that when I got up in the middle of the night I was able to see what I'm doing without blinding myself.

(2:18 - 2:40) I've got motion sensors underneath the bedside tables here which turn on as soon as the feet touch the ground, the lights come on under the bed so I can walk into the bathroom, not step on any Lego or anything like that. My favourite thing in this room is these touch panels here, it makes me feel like I'm living in an expensive hotel. We had some gross switches here before so I just reused that area to place these in.

(2:40 - 3:34) I can control everything in the room from here, I can turn the lights on and off, I can adjust the volume of the music, I can change the air conditioning, adjust the blinds, it's just really awesome, I can do everything from the side of the bed. I cop a lot of flack on my comments on YouTube, why don't you just use your phone, I don't have to unlock my phone in the middle of the night, open up an app, press a button, it's really inconvenient, what I can do is just press a button here, all the lights will turn off, roll over and go to sleep. I've also got sensors underneath the bed to detect if I'm in the bed or not, so when we've been in bed for 20 minutes, we're both in bed, it shuts down everything in the house, turns off all of the power for things that aren't needed, sets the alarm so that it goes on to night mode, anything that necessarily needs to happen at night time will happen automatically and when we get up in the morning, it detects we're out of bed, if we've been out of the room for 20 minutes, the blinds come on and all the lights turn off.

(3:35 - 4:22) Here we are in the kitchen, my dad and I put all these smart lights in here, they're all individually addressable LEDs, there's actually some speakers here in the ceiling that came with the house, one of the reasons that I bought the house, because it had all this tech already in there. I put in an access point here so that it was great WiFi coverage, because we spend a lot of time in here and everything in this room can be controlled here, all of the lighting is controlled by scenes, you can turn up and down the volume of the audio and we also can see the front door camera here. This kitchen we actually got installed when we moved in, so I had a lot of opportunity to add new technology or retrofit things, but some of the things are already existing here, we have an old school intercom system that came with the house, it's janky, I don't like it, it doesn't even work most of the time, I'm going to replace that soon, I haven't figured out what to do with that yet.

(4:22 - 5:00) The heating system was also here, it was able to be integrated into my smart home, which was really handy, a viewer actually told me that it was possible. And then we have our light switches, it's really important that you have really obvious light switches that guests can use, these are smart switches, but you can just use them as normal, turn the light up and down, press them to turn them off. Shall we head down to the living room? Here we've got the living room, a lot of the same tech came with the house that we've got in the other rooms, and I've got two different types of switches here, I've got the press button on and the dimmers that we've got before.

(5:01 - 5:40) Over here I've got my 3D printer. I thought it was a good idea to buy it, but I don't actually know how to use it. I'm hoping to learn that. I've got my TV here, this whole room is a work in progress, it's my living room, we haven't renovated it yet, but I've got a few basic automations here, they turn on when we trigger the motion sensor here, the lights all come on in this room, and they dim when we start watching TV, and when we pause the TV to get up and get a drink, the room brightens up again, that's kind of the basic automation I've got in here. This whole room is a work in progress, I don't know what we should do with it, the cinema room, if you've got any ideas about what works well in a room like this, please let me know in the comments, I love hearing from other people, but yeah, a lot of opportunities.

(5:41 - 5:50) I regularly release videos about home automation and smart homes in general. By joining along on this journey you can learn what I'm learning, and then together we can make your home smarter [27].

UNIT 9

US Army Testing Creepy Robot Dogs for Extreme Combat Operations

Hello everyone and welcome back to the Fluctus channel. It was a matter of time before autonomous and semi-autonomous robots would play a more important role in the military. Recent developments have increased the rate at which this is happening.

These types of systems are expected on the battlefield before the next decade. Big Dog, a pioneering quadruped robotics platform, was introduced by Boston Dynamics in 2005. Three generations followed, each with increased mobility and payload capacity.

The robot could negotiate tough terrain, carry big items, and stay balanced. Spot, one of the most recent descendants, has advanced AI and commercial uses. Military robot dogs already serve various functions, including reconnaissance, surveillance, and subterranean investigation.

Units like the Spirit 40 operate in swarms to gather intelligence, while larger models convey supplies. Their modular platforms offer a wide range of military applications, including perimeter security and hazardous environment operations. Ghost Robotics' Vision 60 has impressive self-balancing capabilities in ice conditions.

Advanced control algorithms enable rapid adaption to slippery circumstances while retaining stability with dynamic leg movements. Even in tough conditions, the robot constantly adjusts its position to avoid falls. Military robot dogs can even effectively patrol swampy terrain, as proven at Tyndall Air Force Base.

These self-contained units can negotiate muddy terrain for 5-mile perimeter patrols. After recharging, they restart 24-hour security duties, providing continuous observation in tough wetland conditions. Their off-road capabilities are unmatched.

Deep Robotics' Lynx has remarkable off-road capabilities, navigating steep slopes, rough terrain, and dense foliage. Advanced locomotion systems enable climbing, jumping, and crossing difficult terrain. The robot maintains stability while navigating difficult terrain that would stop conventional vehicles.

Combat testing has also begun. The 10th Mountain Division and DEVCOM-AC are testing robot dogs in combat scenarios at Fort Drum, with a focus on counter-UAS capabilities. These experiments evaluate robot dogs' capabilities in combat support roles such as surveillance, threat detection, and autonomous patrol missions in difficult terrain.

Applying weapons to robots is the next logical step. Onyx Industries created remote-actuated weapons, RAW systems, for robotic dogs, including the RAW-12 shotgun platform. Air Force security crews demonstrated Vision 60 QUGV's robot dogs at several locations, including Tyndall and Kingsley Field.

These self-driving devices improve base defense by conducting perimeter patrols and threat identification before humans are exposed to danger. The 325th Security Forces Squadron employs these robots to supplement human defenders, utilizing onboard computers and sensors for surveillance activities. Security forces train with robotic QUGV's in simulated expeditionary conditions.

Teams work on merging autonomous patrol capabilities with standard reaction techniques. The robots utilize advanced sensors and ATAC systems to detect and track possible threats and share real-time data with human controllers. Defenders then assess the platform's efficacy in perimeter security and surveillance activities.

These robots would have no meaning if they were easily defeated. Austin Dynamics'testing indicates robot dogs' capacity to function despite physical interference. During door-opening exercises, the platforms automatically respond to interruptions while maintaining balance and performing tasks.

Advanced software allows autonomous response to unanticipated barriers, maintaining mission continuity. The systems are remarkably resilient in maintaining program functionality in the face of external perturbations. Robots can even be used to carry gear and ammunition for troops.

The Leg Squad Support System, LS3, originated as a novel solution for overworked troops that typically carry around 100 pounds of survival and protection equipment. This autonomous robotic pack mule was designed to navigate the same difficult terrain as dismounted soldiers, demonstrating its ability to cross mountains, streams, and dense woodlands. The system's adaptability is proven by its several operating modes.

It can follow a leader by detecting stripes on a soldier's backpack, allowing the operator to concentrate on other tasks while the robot maintains formation. In tight conditions, operators can assume direct control with a joystick, or a completely autonomous waypoint navigation system allows for independent travel to predetermined map points. The LS3's primary mission capability is load reduction, and it carries important equipment such as ammunition, mortar baseplates, barrels, tripods, and numerous types of cargo.

This load-bearing capability increases troop mobility and lowers injury rates during extended patrols. Perhaps more importantly, the technique shows promise in casualty evacuation, potentially decreasing the number of Marines necessary to carry wounded soldiers from six to one. Extensive testing at 29 Palms and Fort Devens proved the platform's all-terrain capability and ability to sustain squad operations.

The program gained high-level backing from Marine Corps leadership, including Commandment General James Amos, who approved a 24-month plan to expand the system's sensors and Marine interface capabilities. This development period was focused on improving the LS3's ability to observe its surroundings and interact more effectively with troops in the field, representing a significant advancement in military robotics support systems. Unfortunately, in the end, the Marines complained about how loud the system was, and this specific variant was discontinued.

Technology such as LiDAR also comes in handy. Robot dogs armed with LiDAR, light detection, and ranging technology play critical roles in aircraft crash investigation and recovery. These platforms can examine dangerous crash sites and create detailed 3D digital models without endangering human lives.

The technologies use pulsed lasers and GPS to measure distances and map debris fields. When integrated with unmanned aerial systems, these robots can quickly examine potentially risky conditions and detect hazardous items or unexploded munitions. The system aids in determining repair requirements and material volumes required for recovery operations, as well as building detailed digital twins of crash sites for in-depth investigation.

Future wars may be fought by robot vehicles. The United States Army's Ground Vehicle System Center, GVSC, is developing robotic combat vehicles, RCVs, in three sizes, light, medium, and surrogate. These platforms provide a renewed approach to warfare, combining diesel-engine electric hybrid drive systems with superior autonomy technologies to reduce soldier risk in combat settings.

The RCVs work with the Mission Enabling Technology Demonstrator, METD vehicle, to enable manned unmanned teaming capabilities. Testing these systems in a live military exercise was of cardinal importance. The Army's largest ground combat robotics exercise is a groundbreaking endeavor in military robotics integration.

Unlike regular equipment upgrades, this testing adds whole new capabilities, with a focus on human-robot collaboration in combat scenarios. The project serves as a watershed moment in military robotics, providing the groundwork for future combat operations. Soldiers, many of whom see parallels with gaming interfaces, are developing new tactics specific to robotic warfare.

Key goals include acquiring extensive military feedback and operational data to guide future development. The tests assess both machine performance and human operator endurance, recognizing that robotic combat vehicles fundamentally alter battlefield dynamics. This experimental phase serves as a catalyst, reshaping the Army's vision for combat robotics.

Without current playbooks for robotic warfare, the lessons acquired here will inform doctrine formulation and future combat robotics adoption, ushering in a new age in military operations. Robotics and artificial intelligence will, and already play, important roles in warfare. With everything from robotic dogs to robotic vehicles, the future battlefield promises to be much closer to Terminator movies.

Exactly how these experiments will unfold is anyone's guess. That's the end of this video. I hope you enjoyed it.

Make sure to subscribe to this channel so you don't miss any of our new content. See you next time! [31]

UNIT 10

How AI is changing gaming tech in 2025 | BBC News

(0:05 - 0:18) San Francisco, home to the annual Games Developers Conference. GDC, as it's known, isn't like other game shows. It's not really about showing off new games.

(0:18 - 1:07) I think every type of developers here, you know, whether you're a writer, whether you're working in narrative design, game design, level design, and this is the one chance that everyone can get together. Trends come and go in video games, and the big one this year is... Everywhere you look on the Expo floor, there's an AI solution to this or an AI solution to that, but the big question is, what difference will all of this AI make to the games that we actually play? AI's presence is being felt in a number of different ways, from tools that allow developers to create elements of video game worlds just by using text prompts... Forgotten your own company, have you? No, no, I'm with Fazbear Financial. Interesting, because I could swear you told me Emberstone Enterprises before.

(1:08 - 1:24) …to in-game characters that react in a more realistic way with the player. Bloom says you're the one to help us tweak the plan. And AI in gaming particularly relates to how AI could improve gamers' experience by helping them play the games, or how it could enable developers to make games faster and cheaper.

(1:24 - 1:54) There's definitely a tension, and firstly it's around jobs, where AI could take developers' jobs, and secondly around training data. Where is the AI getting all the stuff that it uses to be able to generate, say, a new skin or a new character outfit? And if you imagine the traditional game developer in the middle, they're squeezed by AI on one side, the robots making stuff, and user-generated content on the other, the people making stuff. So this traditional game development is going through a very challenging time.

(1:56 - 2:03) Bravo 2, lead the way. Copy. One company embracing AI is Chinese tech behemoth Tencent.

(2:03 - 2:14) It's introduced an in-game assistant called Fackle, or First FPS AI Companion, who understands human language. That trips off the tongue. In position.

(2:15 - 2:29) The AI Companion will be introduced into first-person shooter Arena Breakout. Its developers say unlike regular in-game teammates, this one can understand complex spoken instructions. Run to those sandbags up front for cover.

(2:29 - 2:37) Then to the car ahead. Copy that. In the future, we can put this tech in maybe open-world RPGs.

(2:38 - 2:46) So imagine you can walk around the city and talk to everybody by using natural language. Search for a green box. Copy that.

(2:46 - 3:02) We'll find out if this AI makes a good teammate when the feature launches later this year. Found it. The GDC show floor is packed with indie developers with out-of-the-ordinary ideas for games and ways of controlling them.

(3:02 - 3:09) Stand up, stand up, stand up. Including patting a giant kitty. Umbrellas as controllers.

(3:10 - 3:17) As well as seesaws. And they're not alone. Keyboard and mouse, gamepad.

(3:17 - 3:32) These are the things that we use to control video games. Anybody that's played a game will be familiar with them. But what about if there was a different method of interacting with the action on the screen? That's what this band on my wrist is doing.

(3:32 - 3:45) It's fitted with a variety of different sensors which are measuring my emotions. It actually has more sensors in it than you would find in a smartwatch. The on-screen action will alter depending on how I feel.

(3:45 - 4:04) Now, this is a horror game demo. What happens if I get frightened? Called Ovomide, it can be used to create a relaxing experience or, as we see here, something designed to do the opposite. And I can see the emotions that I'm feeling on this screen here.

(4:05 - 4:09) Spooky doors. Oh. Mannequin.

(4:11 - 4:25) OK, he's not doing anything. An even creepier factory space. Whoa! If you want to survive, stay calm.

(4:25 - 4:34) If I don't want this mannequin to get me, I've got to try and calm down. And there's another one here. OK, I'm going to make a run for it.

(4:34 - 4:54) Let's go for the door. Open, open, open! On top of heart rate and skin temperature, the band measures galvanic skin response, which, its developers say, allows it to assess the emotional state of the player. Combining this with generative AI, changing gameplay elements based on how the player is feeling, could lead to new types of player experience.

(4:54 - 5:27) Because the idea is to be able, in the near future, to have a really ultra-personalised game that only measures your emotions and adapts itself depending on what the game design is, if they want to stress you more or the designer wants to relax or maintain a certain level of spectrum of emotions. The band is currently being pitched at developers. The breadth of creativity on show at GDC 2025 demonstrates that even in the age of AI, the industry is still driven by ideas and human invention [8].

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СТЕПАНЕНКО Олена
КОСТЕНКО Дмитро
ПАЛАМАРЧУК Катерина

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Навчальний посібник

(англійською мовою)

Друкується за авторською редакцією

Оригінал-макет виготовлено ВПЦ "Київський університет"

Формат 60x84$^{1/16}$. Обл.-вид. арк. 13,4. Ум. друк. арк. 12,4. Наклад 100. Зам. № 225-11375.
Гарнітура Times New Roman. Папір офсетний. Друк офсетний.
Підписано до друку 27.05.25

Видавець і виготовлювач
ВПЦ "Київський університет"
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Свідоцтво суб'єкта видавничої справи ДК № 1103 від 31.10.02