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ROBOTIC TECHNOLOGY TERMINOLOGY

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INTRODUCTION

With the development and expansion of science, the progress of science and technology, especially the field of robotic technology has been significantly improved, whether it is brought by new materials, or artificial intelligence on the robotic system, all have made the field of robotics effective innovation. With new concepts, the combination of different types of scientific, and technological vocabulary forming more terms in the field of robotic technology. The research on terminology in this emerging field is also continuing to open new knowledge and cognition for the field of linguistics, because with the advancement of science and technology lead to the development of human civilization, so that the human language system is also constantly improving and changing. Robotic technology as an important product of human civilization progress, in which the understanding and analysis of various terms is essential for effective communication, knowledge dissemination and further development of the field.

From ancient times people through simple assembly of levers and other mathematical principles to create labor-saving work tools, subsequently reach to the complete liberation of people's minds in the Renaissance, people began to explore the unknown, and after the industrial revolution into the information age, industrial society and Silicon age, industrial robots played an important role in the entire manufacturing system. From 400 to 350 BC, Ancient Greek mathematician Archytas invented the steam-powered robot bird, which laid the foundation for the development of automated machines and the invention of robot. Fast forward to 1893, *"Steam Man"* made by George Moore, a steam-powered walking robot. In 1920, the Czech writer Karel Čapek published a play called *"Rossum's Universal Robots"*, which tells the story of a company named Rossum that brought robots to the market as industrial products produced by humans and let them be used as labor forces to replace human labor. The author created the word "robot" based on the word "Robota" from Czech for "servitude,

hard labor" and the word "Robotnik" form Polish for "worker". After World War II, people began to study robotic arms to imitate human actions to work. It was in 1954 that G.C. Devol made the world's first programmable robot, and in 1958, known as the "father of industrial robots" Joseph F. Engel Breiger founded the world's first robot company and manufactured the first industrial robot, further propelling the field of robotics into an entirely new era. With the rapid development of the field of robotics, people's demand for related professional words is growing. In the field of technical terminology, robotic technology terminology is gradually spreading from complex vocabulary to everyday language. In addition, robotic terms are widely used in areas such as robot programing, hardware fabrication, and robot networking to complement the implementation of new concepts.

The relevance of the research is to enable clearer and effective communication and writing between professionals in the field of robotic technology, in addition, understanding the linguistic aspects of terms to help the creation and emergence of new terms in the field, and finally provides effective information for the future development of the field of robotics by analyzing the logic behind the terminology and analyzing the generation of concepts.

The practical significance of the research is to promote the effective communication of terminology in the field of robotics technology, help the formation of terminology vocabulary in robotics, help beginners, ordinary people understand robotics manuals, and generally improve the standard of robotics terminology, implementation can be used for education and training.

The general scientific methods we use in our research include linguistic field of stylistics feature analysis in register and vocabulary; morphological derivation in derivation, compounding, abbreviation, and conversion; cognitive linguistics in metaphor and mapping.

The novelty of the research lies in the use of stylistic features, morphological derivation, and cognitive linguistic of robotic technology terminology, especially the

definition, analysis, and predication of fresh insights and deeper understanding of robotic terms in today's life.

The object of the research is the linguistic aspects of robotic technology terminology.

The subject is stylistic features, morphological aspects, and cognitive linguistic features of robotic technology terminology.

The aim of the research is to deep dive into robotic technology terminology based on linguistic field to terminology field.

The purpose of the research constitutes accomplishment of the following **objectives:**

- to give a definition to the notion of the robotic technology terminology, the origin of robotic technology terminology and characterize this phenomenon, building on the definitions given by different linguists and dictionaries.
- to examine the characteristics of robotic technology terms.
- to analyze and define the possibility of terms under different theories and situations.
- to delineate the relevant elements of the stylistics, morphological derivation of the robotic technology terms under the influence of cognitive linguistic.
- to identify and analyze the variations of terms in the field of robotics in real life applications, the substitution of meanings.
- check the impact of robotics terminology on communication, distinguishing understanding, and clarity of communication between professionals, researchers, learners and customers.
- to explore the consistency between the concept of robotics terminology and the understanding of human cognition, and the concept mapping to the impact of human life on robotics terminology.
- to promote further research and cross-scientific cooperation, and to promote the effective exchange of science and technology through the study of robotics terminology.

The language data come from the Oxford English Dictionary, Cambridge Dictionary, and research materials on robotic technology vocabulary in English-speaking countries and CNKI.

Structure: the research paper is composed of an introduction, two main chapters, conclusions to chapters, conclusions, references, and appendices.

The first piece of the research paper is divided in to five parts. Firstly, it narrates and introduces the origin and notion of robotic technology terminology, the period from ancient Greece to the Industrial Revolution to how terminology was shaped, and the period when the concept of robotics began to collide, moreover notion of it mainly defines and normative framework the research object of this paper, discusses the theories of other scholars in related fields, and clarifies the scope of terminology discussion in this paper, and explains the sources of robot technology terms. Secondly, subsection 1.2 is an analysis of the theoretical framework of terminology in stylistic analysis, and it is mainly subdivided into register and vocabulary characteristics. Thirdly, subsection 1.3 is based on morphological theory, by sorting out the knowledge summarized by previous scholars, summarizing the terminology status of this paper under the influence of terminology and robotics, through the theoretical analysis of derivation, compounding, abbreviation, conversion, and blending, and giving the applicable theoretical framework for the situation of this paper. Fourthly, subsection 1.4 provides an overview of robotics terminology based on cognitive linguistic theory, focusing mainly on the influence of conceptual metaphors on terminology. Final subsection is a summary of the main points of first chapter.

The second chapter is divided into four parts, and the second chapter is an analysis of the practice of robotic technology terminology based on the theory of the first chapter. The first part is based on the theory of subsection 1.2, and analyzes the characteristics embodied in robot science and technology terms under stylistics, regarding to theoretical summary, examples, and in-depth analysis of register and vocabulary features. The second part builds on the theory in subsection 1.3, splitting the terminology of robotics under morphology, regarding to derivation, compounding,

abbreviation, conversion, and blending, and giving special examples to support the theory and obtain characteristics. The third part is based on the theory of subsection 1.4, based on the perspective of cognitive linguistics, through metaphorical analysis and discussion, in depth to the logical and cognitive level of mapping of robot technology terminology. The last part is a summary of the main points of second chapter.

The conclusions to chapters are to make a summary as mentioned above, and summarize the main content and conclusions outlined in the two main chapters respectively.

The conclusions are to make a final summary, highlight the key points and research results, and put forward final hypotheses and suggestions.

References present the sources used for the comprehension of the topic.

Appendices present the diagrams used for the comprehension of the result.

CHAPTER 1. THEORETICAL FRAMEWORK OF ROBOTIC TECHNOLOGY TERMINOLOGY INVESTIGATION.

1.1 The origin and notion of robotic technology terminology.

Human progress comes from the discovery of new scientific concepts, these concepts are inherited from the historical traces of human beings, the determination and specification of concepts need to be determined through terminology, so the development of a scientific history is also the development process of terminology in this field.

As early as the ancient Roman and Greek periods, terms were already present in the research of various scholars in different fields, philosophy, mathematics, natural sciences, etc. all used specific words to express their concepts. The French scholar Rey [35] regarded Plato's Cratylus as the earliest work on terminology in the West, and many subsequent schools have talked about academic thought and terminology. Since the Industrial Revolution, the development of science and technology and the popularization of informatization have also led to the emergence of new concepts, and specialists use of precise vocabulary to define them as great significance for the dissemination and exploration of concepts. During the World War I, countries began to establish different scientific research institutions, at this time scholars were using terms to define various novel concepts. At the beginning of the 20th century, the Austrian scholar Eugen Wüster defined terminology as a discipline and established the General Theory of Terminology (GGT) [2, p. 111], which began to enter the view of scholars for the study of terminology in the field of science, especially information technology and robotic hardware. In 1937, the International Federation of Standardization Associations established ISA/TC37 to coordinate terminology work. In 1952, the International Organization for Standardization (ISO) took over the committee and established ISO/TC37 to continue to promote the standardization of terminology. Subsequently, United Nations Educational, Scientific, and Cultural Organization (UNESCO) and the International Organization for Standardization

proposed the joint establishment of the International Terminology Bureau. In 1956, the International Federation of Translators (FIT) began to explore the feasibility of establishing an international scientific and technical terminology center. The International Information Centre for Terminology (Infoterm) was officially established in Vienna, Austria, in 1971. This organization came into existence through a collaborative agreement between UNESCO and the Austrian Center for Standardization Research.

With the integration of terminology and technology, the field of robotics witnessed significant advancements. During 1980, approximately 20,000 robots were deployed in various industries worldwide, highlighting the growing presence of robotic technology [9]. In 1981, the National Bureau of Standards Library published *"A Glossary of Terms for Robotics"* [3], marking the birth of a comprehensive dictionary in the field of robotics, which contains robot parts and explanations of various robot concepts, and represents that the terminology of industrial science began to enter the public domain.

As all kinds of scientific and technological terms enter the public's field of vision one by one, scholars from all over the world also have their own unique views and discussions on the definition of terminology. In every language, there is always "terms" first, then there is "terminology", the suffix of terminology "-ology" is derived from the Greek "-logia", its meaning represents the study of a certain object or field, ISO issued *"Terminology work-principles and methods"* [24] expresses that terminology is across science, expressed in professional language concepts, logic , cognition, linguistics and a series of other sciences support, so terminology involves not only linguistics, but indeed a discipline that begins with language as the foundation.

In 1985, Chinese scholars defined terminology as an emerging interdisciplinary science-terminology [48], which shows the understanding analysis of terminology, as well as they paid more attention to historical development and the logic behind the formation of terms, however they ignored the terminology itself as linguistic feature analysis based on linguistics. Controversy over the definition of terminology has long

existed in academia. Some scholars believe that there is no unified and generally accepted term or definition range in English to regulate “terminology” [49], because when analyzing terminology, it can be analyzed within the scope of linguistics, and other techniques such as logic and cognition can be used beyond linguistics. Sager planned the main practice of terminology into linguistics and information science [40], but he did not deny that terminology has its own methods and theories, and Silvia P. of Canada believes that *“terminology is part of applied linguistics.”* [41, p. 18] She even regarded terminology and specialized lexicography as synonymous, and some scholars in China classified terminology in applied linguistics, which they considered to be a blank block of applied linguistics for the exploration of the scientific field [11], because the main object of study of terminology is a specific scientific field, and linguistics has a lack of involvement in this field, and Cabré believed that the theoretical and viewpoint embodiment of terminology exists only in other mature scientific frameworks [6]. Therefore, the terminology in the field of robotics technology in this paper is first derived from the vocabulary of industrial technology, and secondly, the endowment of computer concepts to form the field of robotics, which is a mature discipline, so there is a mature framework for the study of terminology.

However, regarding whether terminology can be established as a separate discipline, Budin proposed that terminology meets the criteria of being established as a discipline, terminology has its own journals and publications, and is independent of academic conferences and institutions of other disciplines [4], these can prove terminology is an independent subject. The research on whether terminology is independent of linguistics is not only based on vocabulary itself, but also on the category of concepts represented by words. Because of the endowment of concepts, words become terms. In Chinese dictionaries, interprets concepts as a form of thinking, gathers the common characteristics of things to a point, and derives a range of concepts to obtain a field of terminology [10]. In the eyes of some scholars, they believe that it is important to distinguish between object and item in the field of science and technology terminology, object is the material of scientific research, and item is related

to the concept of research method [16], which lead to different items may appear on the same object according to the starting point of the research. In addition, Rey points out that definitions play an important role in the study of lexicology in terminology, which is also the retrospective of terminology as a conceptual synonym [36]. Riggs expressed that although terminologists are familiar with and use lexicography, the reverse is not the case [37], so in view of the formation of terms, the difference between terminology and lexicography in the nature of the recipient, the field involved, the working method, the way it is presented to the reader, the nature of the heading, etc., and concluded that it is only when the terminology is introduced into the terminology that it is distinguished from lexicography, and also means that it is only when the vocabulary of a particular scientific field is brought into the concept to the terminology, it will be distinguished from linguistics itself.

Based on the above summary, this paper defines terminology as a discipline based on the language vocabulary itself, extended to conceptual cognition, and based on the specific professional vocabulary of robotic technology as research. The terms and specific definitions studied come from the following books, articles, dictionaries, and professional websites: *"Robots Done Right: Glossary of Robotic Terms"* [38], *"National Robot Safety Standard, Industrial Robotics English"* [34], *"Industrial Robotics English"* [25], *"Robot vocabulary in Chinese and English"* [39], *"Academic press dictionary of science and technology"* [30], and *"Rise of the Robots 50 Robots That Changed the World"* [22]. The vocabulary of robot technology includes robot concepts, artificial intelligence, robot industrial parts, etc., rather than just humanoid intelligent robots that are reference objects to human behavior.

1.2 Stylistics of robotic technology terminology.

The essence of stylistics comes from "style", and the terminology that exists in a specific field is more explicit in the embodiment of "style". As discussed in 1.1, terminology derives from terms, and terms are derived from the vocabulary and language assigned to concepts, then concepts are the embodiment of the style of a

specific scientific field, so the stylistics characteristics of the analysis of robotic technology terminology are also obvious in linguistics.

Thomas S.Kane [26] defined style as a unique pattern of linguistic characteristics. Thus, in the field of robotics, style can be defined as the embodiment of the term concept to objects and addressees. D. Crystal [7] shows that linguistics is a scholar who studies language, and stylistics as a part of linguistics is to express the connection between the creator of the style as an artist and the language, and in the field of robot technology terminology, it can also be expressed as the connection between scientists' terminology creation, concept assignment, and vocabulary citation, so Su Zhanghai [42] defines the analysis of style usually focuses more on the uniqueness of discourse and the characteristics of information transmission. It is also the product of stylistic analysis of concepts (terminology) that can be used in scientific terms, especially in the field of robotics, which are complex and diversified information transfers. Furthermore, H.G. Widdowson [50] argues that stylistics involves linguistic criticism and morphological allusion in the same way as in technical terms. Qin Xiubai [33] also said that stylistics is guided by modern linguistic theory. So, language does not occur independently in a person's behavior, but with events and situations, same in terminology, which occurs on the basis of lexis and is accompanied by the endowment of concepts. The stylistics feature of a discourse contains lexis and semantics levels, and the scenarios in Xin Jiqiu [52] describe these bounded features as stylistic significant features, and they should be the focus on it.

1.2.1 Register.

Halliday define the register is *"the linguistic features which are typically associated with a configuration of situational features——with particular values of the field, mode and tenor"* [17, p. 22, as cited in Leckie-Tarry, 1998, p. 6] When we put the analysis of the subject into the field of robotics, the terminology in this field also shows the value of stylistic characteristics.

M. Ferenčík [12] defines register as conditional, situationally changing linguistic changes for language communication for specific purposes and domains. In the study of terminology, it is mainly aimed at the study of content-dependent, because of social factors, robotics terminology can be summarized in Professional Jargon, some term hints only exist between professional communication, such as “robotic arms”, they simply mean “arm”. The analysis of Register features is derived mainly along the definition of three dimensions, field, tenor, and mode. This paper focuses on field-derived research, the malleability of terms in the prescribed field of robotics. According to scholars Hu Zhuanglin, field is a linguistic reflection of the teleological role of language users in the context of text occurrence [18], based on the term itself, in the interpersonal relationship between creator, writer, and reader.

1.2.2 Vocabulary.

According to Hirsch [19], language can be called a form and style because it is itself as a phenomenon, and a carrier of phenomena that can be obtained when we divide this phenomenon carefully. Through the expression of register, we can conclude that the same vocabulary expresses different concepts for people with different identities in the field of robotics science, and vocabulary is an important tool for analyzing robot terminology. Cowan [8] argues that the core vocabulary in the tech world, semi- or non-technical words are meaningless, because of their high frequency of use, and they are completely isolated words. So, in the analysis section of the second chapter, the analysis of the vocabulary section focuses on robot-based fields, semi-robotic technical terms, non-robotic technical terms, and fully specialized robotic technical terms.

1.3 Morphological derivation of robotic technology terminology.

Lieber defines *“Morphology is the study of words and word formation”* [27, p. 2]. In this paper, it defines as a vocabulary-term that gives concepts to a term formation based on morphological derivation.

Morphology has long been used in the study of biology, the study of the basic components of language, and is also based on the study of the functional unit of morphemes [13]. Compared with the study of the field of robot terminology, it is also very important in morphology, because the robot itself has a compatibility with biology features, and secondly, this can also be seen as the outcome of the ongoing expansion of the morpheme as a basis. Stuart [43] believes that morphology is the study of the semantic meaning and grammatical structure of words, in which semantic or grammatical components constitute morphemes, so morphology is focused on studying the internal structure and rules of word formation through morphemes, which has great research value for emerging terms, allowing people to understand and infer the reasons for the formation of certain terms, and in a certain scientific and technological field, the overall composition logic and characteristics of the term.

1.4.1 Derivation.

The derivation of word formation is very common in the field of robotics, and its analysis is obtained by splitting words through affixation, and it is also a method of creating new words. According to Henry Bradley, *"means the making of a new word out of an old one, usually by the addition of some prefix or suffix which is not itself a word but is significant in combination."* [5, p. 111] It can be seen that the affix method analyzes words based on the splitting of prefixes and suffixes. The essence of terminology is the transformation of concepts brought about by the vocabulary itself, so in the research of affixation, in the field of robot technology with structured concepts, the characteristics of derivation also have the characteristics of structure and clarity. Taft, M. [46] believes that the root is the basis for storing the meaning of the word, and the prefix will allow the root to extend to the basic concept expressed by the root. In the field of robot technology terminology, this phenomenon is also reflected in the combination of robot concepts.

1.3.2 Compounding and abbreviation.

Compounding method is to arrange two or more words in a certain order into a new word, the composition of new words is called compound words, in the field of robot technology terminology, the combination of two words to form a new term is very common, which also greatly increases the amount of terminology in this field, and can also make it easy to understand the concept of terminology through the combination of words. Henry Bradley defines compounding as *"A compound word is a word formed by joining two or more words to express a meaning that could be rendered by a phrase of which the simple words form part."* [5, p. 112], So many concepts related to robot hardware, robot systems, and robot networks, composed by simple two or more words after modern English. In James R. Hurford's (1994) [23] theory of Heads of Compound Words, and the main meaning of compound words is concentrated at the head of the compound word, and in English the head is located at the right end of it. In the field of robotics, the stock of abbreviations is also very large, mainly to avoid some concepts are too complex, so the use of long compound phrases to represent the trouble. Grange, Bob, and D. A. Bloom [14] are mentioned in "*Acronyms, abbreviations, and initialisms"*, and classifies abbreviations as clipping, titular contraction, first letter initialism, syllabic initialism, combined initialism, and acronym.

1.3.3 Conversion.

In the field of robotics terminology, conversion is also a common method used to help understand knowledge and actions in the field of robotics science. According to Quirk *"because the process is like deriving (transferring), a word into another morphological category with a zero-affix creating a semantic dependence of one word upon another."* [32, p. 1558] Conversion can be understood as the process of creating a new word from an existing word without changing the form, and it can be divided into zero derived and non-derived transformations.

1.3.4 Blending.

Blending is to combine parts of two or more words into one word to complete a new vocabulary. It can also be understood as a simplified form of compounding in disguise, but it is indeed more difficult to understand. In the field of robotics technology, due to the increase of a large number of compounding terms, scholars' understanding of concepts has also increased. In order to make the concept of robots simple in terms of word form, the form of blending to create new words is also gradually. Micheal. Q [31] believes that when some independent words have their own meaning as stems, and then combine two groups of words to form new words, such words are not considered blending but compounding, because the stem itself has not changed and can be used independently as a word. Hu Zhuanglin [21] also said that blending is a relatively complicated form of compounding, so the analysis of separating such terms and carefully tracing their source of vocabulary is more complicated than compounding.

1.4 Cognitive linguistics of robotic technology terminology.

Cognitive linguistics is a completely new approach to language research, which originated in the late 70s of the last centuries and is based on human experience, perception, and conceptualization of the world [47]. Cognitive linguistics is indispensable for the study of language and terminology in the field of science and technology, and this paper focuses on the representation of subjects and objects in cognitive language.

Steen defines the cognitive linguistics as a systematic field of analytical measurement, and metaphors can close the loop of cognitive linguistics from initial cognition to final acceptance [44]. Such theories are also well matched in the field of analytical robotic technology, and the entire system of terminology is mature from the initial perception to the concept that everyone receives. Thibault believes that *"Cognitive linguistics and its purposive-rational model of human action lead to... the individual-centered linguistic practice itself"* [45, p. 302]. However, in the field of

robotics, because the main body of research is on robot technology subject, so the concept of human action is transformed into robotics. According to Li.Q, metaphorical thinking enables individuals to broaden their cognitive scope, generate novel ideas, and extend a part of the familiar world into a broader realm [28]. In his analysis, Li.Q argues that cognitive linguistics encompasses conceptual content and notions explored within the realm of cognitive processing, subjective thinking, and objective thinking. He suggests that the prevalence of empty subjects in technical terms results in the use of passive voice. Additionally, Li.Q posits that technical terms employ nominalization to strike a balance between imaginative and abstract thinking. According to Lakoff & Johnson [29], the essence of conceptual metaphor is to understand one type of thing in another, and the goal of conceptual metaphor research is to reveal the underlying thinking patterns, which make words meaningful. Given the theory and analysis of the above scholars, this paper analyzes and discuss concepts in the field of robot scientific and technological terminology in the category of cognitive linguistics, according to ISO704 [24], the conceptualization process of scientific and technological terms can be summarized as: objects become concepts through “conceptualization”; The concept has become a term through “designation”, and the metaphorical characteristics that manifest halfway through are examined in the second chapter of this paper.

Conclusions to the first chapter.

Through the discussion of terminology theory in this chapter, we’ve studied that terminology has research value with the support of the field of science and technology; In the field of robotics, the formation of terms involves the cognition of linguistic vocabulary, the definition of concepts and the study of terminology; The research on robotics terminology in this chapter is based on the articles published by scholars and researchers on robotics science and technology, summarizing robotics terms or professional words; Robot technology terminology can explore the possibility of changing the stylistics of terms in different situations from the perspective of register through stylistic analysis, and explore the variability of vocabulary concepts in

vocabulary. Terminology in the field of morphology through the study of morphemes, through derivation of affixation, compounding, abbreviation, conversion, and bleeding to split terms conceptually and morphologically, which focusing on the logic and framework behind the formation of terms; In the cognitive linguistics section, the impact of metaphor on human cognition is mainly discussed, but also accompanied by the endowment of the concept of robotics, the process of converting words into terms.

CHAPTER 2. ANALYSIS OF ROBOTIC TECHNOLOGY TERMINOLOGY.

The rapid development of science and technology has had a profound impact on the language practice activities of human society. In this process, vocabulary becomes the most reflective tool of the times. Advances in science and technology aimed at making better use of the human mind to open new areas of science have also led to the development of robotics. The constant updating and emergence of terminology represents the continuous progress of human civilization. The following chapter conduct a systematic terminology analysis of terminology in the field of robotics based on the theories described above. At the same time, we explore the stylistic characteristics of robot technology terms, the changes of terminology itself, and the derivation of related concepts from the perspective of linguistics.

2.1 Analysis of stylistics.

2.1.1 Register.

In analyzing the following material, we've investigated Halliday's [20] definition and analysis of register, while also conducting an analysis robot terminology mainly through the three dimensions of field, tenor and mode according to the changing linguistic characteristics of the situation, it considering both coherence and cohesion with concept aspects. Some examples with analysis are given below:

Field: autonomous navigation, SLAM, AI, robotic surgery, Service robotics, ROS, sensor fusion, odometry, UAVs, etc.

Tenor(formal/informal): kinematic model(f), loop closure(f), machine learning(f), ROI(f), mapping accuracy (f), drone(informal), etc.

Mode (spoken/written): drone(spoken), SLAM dataset, Deep learning(spoken), end effector, waypoint navigation, object detection, etc.

From the terms of the above example, we can get that the terms in the three dimensions all have the characteristics of coherence and cohesion, and coherence and cohesion are not limited to only existing in separate dimensions, so a term can be used

as field, tenor, and mode at the same time. In field, Robotic technology terminology should be consistent with the specific domain of the robot, ensuring that the terminology is consistent with relevant concepts, technologies, and applications in that field; In tenor and mode, robotic technology terminology demonstrates internal consistency over language usage, style, and specific communication durations. "*SLAM*" (*Simultaneous Localization And Mapping*) has the characteristics of coherence in the dimension of field. It is consistent with the field of robot mapping and positioning. It refers to the process in which a robot simultaneously creates its environmental map and determines its position in the map. The term is consistent with advances and research in autonomous navigation and exploration. "*SLAM dataset*" is also characterized by coherence in the dimension of mode, and it is widely used to refer to publicly available datasets used to evaluate SLAM algorithms. The term is at coherence was maintained in the discussion patterns, which participants recognized and understood as a common term for sharing and benchmarking SLAM methods. "*Loop closure*" is also characterized by coherence in the dimension of toner, which is used consistently in the context of SLAM, and it is refers to the identification and closure of loops in robot trajectories, which helps to correct accumulated errors and improve the accuracy of the map, and researchers maintain coherence by using the term consistently in the tone of SLAM research. "*Drone*" has a coherence feature in the dimension of toner, it is often used to refer to unmanned aerial vehicles (UAVs), the term remains coherent in informal communication patterns, people recognize and understand it as a colloquial term for drones, at this time "*UAVs*" have coherence and cohesion characteristics in dimension of field, UAVs are usually divided into different types according to their design, capability and intended use, such as reconnaissance UAVs, combat UAVs. Terminology in the field of robotic science and technology, through the derivation of concepts, due to the special terms of coherence and cohesion, the concept is distributed in multiple dimensions to make the terminology system more perfect. The term "*Deep learning*" has coherence characteristics in dimension of toner and mode, which means that robots learn and mine deeper through more objective insights

when assisting a scientific field. Such expressions are usually used in informal conversations or articles, showing that the concept of robots is anthropomorphic, and “deep” as an adjective give learning emotional color and expresses a self-mining concept, this phrase is prescribed in tenor and mode because of its subjective emotional color, but in the field of robotics technology, it can be regulated by different fields under the extension of the concept. Its central concept is a self-learning program in the field of AI, followed by the existence of medicine, biology, etc. As an extension, in-depth learning of different scientific problems, formulation of strategies, and conclusion of conclusions, etc. Therefore, tenor and mode exist in robotics terminology to be regulated by the main field and the secondary field to diffuse. At the same time, dimension of field in the terminology of robot technology, there are references to other scientific fields to form the characteristics of cohesion, the term *“robotic surgery”* means to accurately operate various mechanical instruments through the robot's self-programmed judgment to complete surgery. The word “surgery” comes from the medical field, and is borrowed in robotics, thus becoming a subsidiary field of the concept of robotics, and its extended vocabulary in toner and mode has terms or vocabulary directly derived from the style of normal medical surgery, so in the field of robotics terminology, when expressing the characteristics of cohesion, scientists directly match the terms and concepts in the mature field associated with it to create new robot concept terms.

2.1.2 Vocabulary.

The vocabulary of robotics terminology can be broadly divided into three categories: formal non-technical vocabulary, semi-technical vocabulary, and highly specialized technical vocabulary. These distinct lexical categories serve different purposes in diverse contexts and target readers, necessitating their appropriate use and interpretation. The analysis presented in this chapter primarily focuses on non-technical and semi-technical vocabulary. The examination of highly specialized

technical vocabulary, with its independence and neutrality, will be undertaken in the exploration of conceptual content and word formation in subsequent sections.

Non-technical vocabulary is the basic vocabulary of the robotics terms, and it can be used in a variety of styles. Non-technical terms can be divided into functional words, mainly including prepositions, pronouns, conjunctions, etc. According to Xue Hanrong [51], professionals often translate everyday vocabulary into precise, non-technical terms to improve the accuracy and formality of their expressions. The following examples are given to state the appeal theory.

Robotic technology terms	General English
to insert	*to put into*
to consume	*to use up*
to eliminate	*to get rid of*
to transmit	*to communicate/send*
to halt	*to stop*
to command	*to control*
to initiate	*to start*
to identify	*to detect*
to navigate	*to move*
Robotic technology terms	General English
perform	*execute*
high-performance	*efficient*
robust	*reliable*
accurately	*precisely*
eventuate	*occur*
optimum	*best*
versatile	*flexible*

The main feature of non-technical vocabulary is that it does not convey any feelings and is unemotional, because it has its own conceptual structure, which is to ensure that the scientific and technological concepts in the field of robotics are clearly

conveyed when writing and expressing. The verb *"to navigate"* substitutes *"to move"*, because if the use of *"move"* does not make other concepts under the general structure of the robot concept interlinked, experts use *"to navigate"* to describe the robot's ability to move and navigate its environment, which means the use of sensors, algorithms and planning to ensure efficient and barrier-free movement. The adjective term *"versatile"* replaces *"flexible"* because *"versatile"* describes a robot or system that can adapt and perform a variety of tasks or functions, and it conveys the ability of robotics to handle a variety of applications. The adverbial term "*accurately*" replaces "*precisely*" to describe an action or measurement performed by a robotic system with a high degree of precision and precision, which highlights the robot's ability to perform a task with minimal deviation or error. A deeper analytical verb term "*initiate*" replaces the verb *"start"*, which in general text carries emotional overtones and can evoke excitement, anticipation, or a sense of urgency. It means starting an action or process in a subjective and personal tone. For example: *"I started my journey with great enthusiasm"*. In the field of robotics, the word *"initiate"* describes the action of a robot starting a process or operation, unlike *"start"*, *"initiate"* has a neutral technical tone and no emotional overtones, it highlights the precise and controlled activation of the robotic system. For example: *"The autonomous robot initiates its navigation sequence."* Therefore, in the non-technical vocabulary of robots, the terminology used is characterized by maintaining the neutrality of objective concepts.

Semi-technical words, also known as sub-technical words, refer to words that are partly derived from ancient Greek and Latin roots. In the field of robotics, many terms use ancient scientific vocabulary as a basis, combined with everyday English expressions to give scientific definitions. Such semi-technical terms are often able to be used in everyday life and have a specific meaning in the field of science, although their extended meaning may vary. For example, the word "*sensor*" in robotics terminology can be classified as a semi-technical term. The word is derived from the Latin word "*sentire*", which means "to perceive". In everyday life, we also use similar words to describe human perception abilities, such as "sensing" or "perception".

However, in the field of robotics, *"sensor"* is used to refer to a device or device capable of sensing and measuring environmental features. Ai Peng [1] believes that ordinary words are borrowed by people in the professional field to express objective concepts, because they have similar functions and relationships to express roughly the same objects, thus forming the vocabulary in the scientific field. The following examples are given to state the appeal theory.

Words	Robotic technology field	General English
gripper/ grip	*a mechanical device or end-effector used by a robot to grasp objects.*	*a person or thing that grips*
feedback	*information or signals received by a robot about its performance.*	*comments given to provide guidance or evaluation.*
manipulator	*a mechanical device or robotic arm, which could move objects.*	*a person who handles things manually.*
planning	*the process of determining a keeping action to achieve a task.*	*the act of deciding how to do something.*
haptic	*Relating to the technology used to simulate touch sensations in robots.*	*the sense of touch.*
hierarchy	*a relationship of elements in a structure divide into levels, with those at higher levels having priority or precedence over those at lower levels. (control hierarchy, sensory hierarchy)*	*the people in the upper levels of an organization who control it.*
adaptable	*capable of making self-directed corrections. In a robot this often accomplished with the aid of visual, force or tactile sensors.*	*able or willing to change to suit different conditions.*
monitor	*a machine regularly tests something.*	*someone who supervises*

The meaning of the word *"gripper"* as a term and the action it means in general English are consistent, the only different is that one express a person who initiates the action, and the other is a robot, so semi-technical terminology follows the feature of functional similarity. The word *"monitor"* is used as a term to supervise and test other systems in the robot system itself, and can be understood as supervisor in general English, which reflects the characteristics of correlation and directly borrows the meaning of related objects. In addition, in semi-technical terms, the frequency of use of the term is high, because its audience is not only professional technicians, but also for ordinary people, or learners to understand a starting point in the field of robotics technology, through the semantic range of the polysemy to explain the concept of robotics, so that people can associate the concept and meaning of ordinary words as a term through analogy.

2.2 Analysis of morphological derivation.

2.2.1 Derivation.

In the field of robotics, the formation of terms is not completely independent and single, it is formed by vocabulary as the basis, through the endowment of concepts, derivation and then the corresponding affixes are formed. The affixation is the process of combining a free morpheme with one or more adhesive morphemes (prefixes or suffixes) to form a word. The following examples are given to state the appeal theory.

tele-: meaning "far off". e.g., teleoperation, teleoperator, telecommunication.

auto-: meaning "self". e.g., autonomous, automation, automatic, automat.

bio-: meaning "life". e.g., biometric, bionic.

electro-: meaning "amber" or "worked by electricity". e.g., electronic, electron.

multi-: meaning "many" or "multiple". e.g., multi-functional, multi-task, multi-degree, multiprocessor control.

hapt-: meaning "touch, feel". e.g., haptic.

augment-: meaning "to increase". e.g., augmented reality.

-ist: meaning "a person who is skilled in field". e.g., roboticist.

-ing: which is used to form present participles in English. e.g., sensing, manufacturing systems, non-imaging sensors, programming, Light Emitting Diode (LED).

-or: meaning to a person performs an action. e.g., manipulator, sensor, operator, cursor, annunciator, semiconductor.

-ation: which is used to form nouns indicate an action. e.g., navigation, manipulation, supination, translation, active illumination.

-ics: which is used to form nouns indicate a branch of field. e.g., kinematics, dynamics, robotics.

From the above example, we can see that most prefixes and suffixes in the field of robotics terminology come from Greek and Latin affixes in the field of robotics terminology. The prefix "tele-" derived from the Greek word *"tēle"*, meaning long distance, when combined with the root word "operation", it forms *"remote operation"*, which refers to controlling a robot from a remote location. The prefix "auto-" of the term *"autonomous"* comes from the Greek word "autos" for itself, which, when combined with the root word "nomos" (rule) forms "autonomous", describing the robot's ability to operate independently without external control. The suffix "-or" of the term *"manipulator"* comes from the Latin word, when combined with the root word "manipulate", indicates the concept of a mechanical device used to manipulate a task.

In the derivation of modern English, some words can be combined with other words to play the role of affixes, which breaks the traditional understanding of affixes by linguists. The term *"sensorimotor"* can be split into "sensor" (a device that detects and responds to stimuli) and "motor" (related to high-frequency motion), which together describe the integration of sensory perception and motion control in a robotic system or robot. Because splitting two phrases has its own unique meaning, so to remove to identify which word as an affix is a certain difficulty, from the phrase "sensor" in order to adapt to the formation of the term, turned into "sensori-", at this time we cannot see it as a prefix evolved into modern English phrases, and "-motor" is

called stem, from the sense of the word, in the field of robotics hardware “motor” can be used as hardware to provide energy, and “sensor” is more about providing a concept that represents sensitivity and perception, but also can exist independently as hardware, more diversified than motor, and more widely used. So, we can conclude that in modern English terminology, in the field of robotics, there are characteristics of changing diverse phrases and adapting them into affixes while using more specific and single words as stems to create new words.

2.2.2 Compounding and abbreviation.

Forming compound terms, we can create new vocabulary that more accurately describes concepts, entities, and behaviors in the field of robotics. The flexibility and diversity of this combination of terms allows us to express more specific and precise concepts, enriching our language and expressions. And the composition of compound terms is diverse, in grammatical category has different permutation combinations. The following examples are given to state the appeal theory.

1) noun+noun: control system, sensor array, robot arm, perception unit, machine vision, shaft encoder, access time, background processing, instruction set, etc.

Compound nouns are most compound term components, the main meaning of which is an extension of the concept provided by the central word, while another noun plays a supporting and modifying role, and gives the compound term this character. The relationship between them can be understood as “A+B=B”. Term *“robot arm”* refers to the robot's mechanical limbs or appendages, which emphasize a specific function or component of the robot, which is simply understood as “robot+arm=arm”. Term *“control system”* represents a set of devices, algorithms, and mechanisms that regulate and manage robot operations, which emphasizes the concept of controlling and managing robot actions, which is simply understood as “control+system=system”. The examples provided that both system and arm are terms formed by the concept of the larger framework of robotics, but its essence and function have not changed.

2) noun+gerund: machine learning, batch manufacturing, central processing unit, background processing, robot programming, image processing, data mining, path planning, behavior modeling, etc.

In this type of compound term, the noun in the term usually provides logic to assist Gerund in achieving the concept. The term *"robot programming"* refers to the process of designing, coding, and controlling robot behavior, which highlights that programming is enabling robots to perform specific tasks, and the gerund also provides logic for the robot concept, because the programming of the program creates machines with human action perception and thinking.

3)noun+verb+er/or: robot programmer, machine operator, sensor designer, motion planner, master-slave manipulator, etc.

For terms of this type, nouns are used to define scope, verbs are used to define logic and function, and the final suffix is used to focus concepts and actions on specific objects or people. The term *"sensor designer"* describes the person who designs and develops the sensors used in robotic systems, highlights the specialized concept of creating and optimizing sensors for robotic applications, and the person who does this conceptualization (logic way) focuses and then forms this combined term.

4) adjective+noun: bilateral manipulator, flexible manufacturing systems, adaptive control, mass production, industrial robot, autonomous robot, etc.

In this compound, adjectives usually play the role of modification and auxiliary, but in the field of robotics, most of these combinations, adjectives are given to compound sub-concepts, and play a core role in expressing concepts, because the core of the term is to embody the concept, so A+B=A under the mature concept framework. The term *"industrial robot"* refers to robots designed and used specifically for industrial applications such as assembly, welding, or material handling. It highlights the use of robots in industrial environments, so in the context of the machine field, mainly to highlight the concept of industrial technology, so the actual center of this term combination is in the first adjective.

5) verb+noun: work station, fail safe, load capacity, learning control, open loop control, slew rate, etc.

In this compound, because verbs have different grammars, the characteristics expressed after the combination are different, reflecting the diversity of compound terms, at the same time, such compound can also be used as an adverb to modify the situation. The term *"slew rate"* refers to the maximum rate at which the system can follow command scheduling, this combination word in the field of robotics terminology, although it does not show a specific core, can only understand an abstract term through rate, but the point is that slew is the past tense of slay, here provides a logical subject, which can be understood as the largest, because it exceeds the maximum, so it is slew, and can also be used as an adverb to modify the running state of the entire system.

6) multiple nouns: matrix array camera, CCD camera, read only memory (ROM), complementary metal-oxide semiconductor (CMOS), analog-to-digital converter (A/D), digital-to-analog converter (D/A), robot gripping mechanism, human-robot collaboration, robot arm manipulator, etc.

This type of compound is not limited to two words, but has three or more, and the characteristics they embody are the complexity of logic expressed by multiple words, and the complexity of concepts, most of these words are accompanied by the characteristics of abbreviations, more specialized, ordinary people may need to go through systematic learning to understand the concepts behind this type of term. The term *"analog-to-digital converter"* converts analog signals into digital devices, where "signals" and "digital quantities" also need to be explained, such conceptual logic is very common in mature robotics fields, which also reflects the logical tightness of the term.

7)adverb+verb: intelligently adapt, flexibly adapt, seamlessly integrate, safely collaboratives.

This type of compound terminology is more professional, because there is no noun directly refers to clear concepts and metaphors to understand the concept, but

directly based on the concept of computer technology to form a term, if the previous analysis of the noun compound number language is a term that beginners or laymen can understand, then the removal of the compound of the noun brings that is completely communication between professionals, which can also be understood as the term "code" of the scientific term of robotics, such as term "*Seamlessly integrate*" indicates the ability of a robot to integrate or merge with existing systems or technologies without any disruption or problems.

8) adjective+adjective: advanced autonomous, intelligent adaptive, safe collaborative, precise flexible, etc.

This type of compound terminology is between compound terms without nouns and compound terms with nouns, which can highlight the concept of computer terms, but will appear vague because there is no range of nouns as a foundation. The term *"Advanced Autonomous"* describes a robot with advanced autonomy, capable of making intelligent decisions and performing tasks independently, but it is difficult to understand because it does not provide a term for the concept of robotics or mechanical technology.

Abbreviations in the field of robotic technology terminology, mainly reflected in the initials of the phrase capitalization abbreviation, which reflects the professionalism and communication efficiency of the term, in the analysis of phrases, the main analysis of the priority and importance of the word in the phrase expression concept. The following examples are given to state the appeal theory.

AI (Artificial Intelligence), SDLC (Synchronous Data Link Control), HDLC (High-level Data Link Control), BI-SYNC (Binary Synchronous Communications), ADCCP (Advanced Data Communication), LED (Light Emitting Diode), CRT (Cathode-Ray Tube), MODEM (Modulator-Demodulator), MOS (Metal-Oxide Semiconductor), ROS (Robot Operating System), AGV (Automated Guided Vehicle), DNN (Deep Neural Network), etc.

The standard acronyms are composed of capital letters. In order to express abstract concepts, the phrases are abstracted from the morphology, which is advanced

and simple. Such acronyms do not exist only in the professional field. It is shown as a “signature” in the communication between people. When this concept, or the scope of influence of this field becomes larger and begins to enter the lives of ordinary people, then this “signature” loses its mystery, and is replaced by a simple abbreviation. The extremely high transitivity leads to everyone’s knowledge. The term *“AI”* refers to the simulation of human intelligence in machines that are programmed to think and learn. This term represents an important discipline within the broad framework of the field of robotics, but also precisely into the lives of non-professionals. As we are familiar with automatic driving, smart furniture, etc., this term has a strong transitivity in non-field life. In the above example, we can see that not all abbreviations are capitalized, there are exceptions. The abbreviation *“BI-SYNC”* for the term *“Binary Synchronous Communications”* is an unconventional acronym based on this phenomenon that will give an analysis of possibilities when creating the term. Possibility A: *“SYNC”* is already an existing acronym, and *“BI”* is added to distinguish it, because “sync” can be used as a word and its own meaning is *“make synchronous and adjust in time or manner.”* In this context, *“SYNC”* usually refers to “sync” in the context of data communication. Add *“BI”* to *“BI-SYNC”* to distinguish it from binary data transfer in the robotics domain. This means that the communication method referred to is a synchronous communication system designed to transfer binary data between robotic devices; Possibility B: Abbreviations are created by extracting letters from pronunciation. In this case, *“BI-SYNC”* is a combination of the initials or syllables of the word *“Binary Synchronous Communications”*. It was created by extracting *“BI”* from *“Binary”* and *“SYNC”* from *“Synchronous Communications”*. This method is often used to create abbreviations in technical terms, where key elements or important parts of the original word are combined to form a concise and recognizable abbreviation. Both possibilities A and B provide a plausible explanation for the formation of the abbreviation *“BI-SYNC”* in the field of robotics, emphasizing its association with binary data transmission and synchronous communication in the context of robot systems.

2.2.3 Conversion.

Conversion is a commonly used vocabulary building method in the field of robotics terminology. It can help us understand knowledge and actions in the field of robotics. Transformation can be seen as the process of converting words from one part of speech into another without changing the form of the word. Through Conversion, we can expand our vocabulary and more accurately describe concepts and operations in robotics terms. The following examples are given to state the appeal theory.

The program(noun) aired last week.	*The engineer programmed(verb) the robot.*
He looks her, sensing(verb) danger.	*The robot's sensing(verb) capabilities allow it to detect and respond to change in its environment.*
The robot's vision(noun) system allows it to identify objects.	*The robot is programmed to vision(verb) the scene.*

From the above example, we can see that in the field of robotics, most conversions are converted between verbs and nouns. The term *"program"* was originally used in the broadcast of TV programs, with the output of the subsequent robot concept, it is necessary to use the program to create robot thinking, and the essence of the program is the arrangement of calculation and language, so after the emergence of phrases such as *"making program"*, in order to communicate more briefly and effectively, the concept of "program" as a verb representing its computer language has been applied to robot programming. In addition, the term *"vision"*, whether it is a verb or a noun, exists completely in the field of robot technology, which represents the range of things that the eye can see things, so when the robot is anthropomorphic, "vision" can be regarded as the range and field of view observed by the robot with its own "eyes" (camera, radar), and when it is used for the verb, it directly replaces the action of "see", which is more professional, because when "vision" is used as a verb, In addition to representing the action of see, it also represents a tense that has been completed, which has seen and observed things, and a further professional

extension is that it has control the vision, so when used as a verb, it can be understood as “control”, which reflects a more intuitive expression, and is more objective and professional than “see” lacking emotion.

2.2.4 Blending.

Blending is to connect the beginning of a word and the end of another word to create new vocabulary, in the field of robotics technology because of the continuous emergence of new technologies, how to create new vocabulary that is easy to understand in such a technical framework, blending has played an important role. The following examples are given to state the appeal theory.

robo-advisor=robot+advisor. *robomower=robot+mower*

modem=modulator+demodulator. *robovac=robot+vacuum*

Through the analysis of the above examples, we can understand that there are roughly two forms of blending in the field of robotics, and the term *“modem”* is the more common form. Term *“modulator”* the mix refers to the device or component that modulates the signal, it means the process of converting digital information into a modulated analog signal for transmission, and *“Demodulator”* is the mix refers to the device or component of the demodulated signal, it means the process of extracting the original digital information from the modulated analog signal when received, then the term *“modem”*, which refers to a device that combines the functions of modulating and demodulating the signal, the term makes the fusion of functions through the form of blending, which reflecting the importance of communication capabilities in the field of robotics, the suffix of referential functions “-ulator” is removed in the form of the original word, and then the prefix “mod-” and “demo-” are combined, it is analyzed in derivation that the prefix has the function of giving concepts to the root or stem, and in the field of rapid conceptual innovation such as robot technology, which is inevitable that there will be the integration and upgrading of each concept, so the concepts given to prefixes are directly integrated to form new vocabulary. In addition, another form of blending provides stronger reference. The term *“robo-advisor”* allows readers to

directly and clearly understand from the word itself, which is an advisor for a robot automatic system or artificial intelligence. This form of blending is very common, and this feature can be called “stickiness”, which is manifested in the fact that a new theme concept is centered, and then other existing functions attached and merged to it, then updated to use the change is more efficient. Secondly, simply remove the “t” as a consonant and then add a functional body, which is also to express this concept and give special features for the convenience of pronunciation, it is also usually used in robotic technology products that need to be oriented the purpose of general population to let the them understand the products under the new concept in a more comprehensive way and attract them to consume.

2.3 Cognitive linguistics of robotic technology terminology.

2.3.1 Metaphor.

Metaphor is a characteristic of human thinking and a recent factor in the development of language. The development of language is creative, it is a change in the cognition of new things, and with the exploration of new scientific and technological fields, human language produces new language words and understanding of language through metaphorical characteristics. Metaphor can also be seen as a point where language starts from nothing, and a channel through which people convey concepts by generating new languages and words. Therefore, in the cognitive system, people create new words through metaphors to convey their individual cognition of the world, so metaphors are very important in cognition. In their research on cognitive linguistics, Lakoff & Johson [30] studied that metaphor is an important feature of people expressing abstract ideas, and in the field of robotics discussed in this paper, metaphor is equally important for creating new terms.

The term *“robot”* itself has a metaphorical nature, it is derived from the Czech word “robota” meaning “forced labour”, its meaning has the same concept as machinery, the continuous work of industrial machinery is not selective, is a program

set by people, but if the machine is regarded as a human, then the emotional verb “force” will give it life, object is “labour”, the concept of action is "forced" ,therefore, the word “robota” borrowed from the Czech has become a scientific and technological term “robot”. We can see that the English characteristics of words in the field of robotics are very extensive, not English in the traditional sense of a single language system, but English under the world language system, because the cognition of scientific and technological innovation is explored by the human race, not a separate individual culture. From this stage onwards, robots are endowed with human characteristics, thus metaphorically creating new words from within to give the concept of robot technology a large number of features in the English system. The following examples will state the appeal theory.

Life metaphor terms	*timing belt, mark, digital DNA, DaVincisurgicalrobot, welding gun, virus, explorer, channel, etc.*
Action and perception metaphor terms	*save, run, read, run, execute, recover, escape, edit, sensory, etc.*
Body metaphor terms	*wrist, elbow, shoulder, arm, elbow bock, forearm, upper arm, eye, etc.*
Character metaphor terms	*thinking, intelligence, attention, perception, power, responsibility, etc.*

The above example divides the terminology in the field of robotics into four parts through metaphorical characteristics, life, action, perception, body, and personality are all closely related to human culture. The term *“virus”* can be composed of “information virus”, “virus security” mainly refers to some information and security vulnerabilities in the program system of the robot, “virus” in life mainly comes from medical and biological aspects, refers to the material and life that have invasive properties to the human body, and in the field of robotics, when experts anthropomorphize the robot as a bodily function, then the program that destroys the system , it is same with “virus" used in the same concept of medicine and biology, which lead to the term is also used

in the field of robotics to express metaphorical characteristics. The term *"digital DNA"* in robotics and artificial intelligence refers to the underlying code, algorithms, and data structures that define the behavior and characteristics of robotic systems. This metaphor likens digital components to biological DNA that carries genetic information, highlighting the fundamental role of digital code in shaping the capabilities and functions of robots. The term *"elbow"* makes some industrial robots' part of their own tools to support and flexibly use, and its role is consistent with human elbow. From the visual effect, industrial robots and people do not look similar, they are more of a part of mechanical composition in industrial manufacturing, but the term can be metaphorically from human limbs to machinery, this phenomenon reflects that the starting point of metaphor is not visual, but conceptual. The first is to understand the difference between machinery and robots, machinery has no self-judgment consciousness is completely manipulated by people to replace labor, and the metaphor of the concept of program corresponds to the thinking of the human brain, so even if there is a distinction in appearance, when the concept is given and the function reflected is consistent, then the metaphor will occur.

As the above-mentioned metaphors for objects in the robotic domain reached a mature stage of influence on the vocabulary, metaphors for abstract concepts such as actions and characters emerged. The term "intelligence" in the term *"AI"* (artificial intelligence) is the core of the term and embodies the characteristics of metaphor, intelligence can only appear in intelligent life forms, combined with the previous part of the term "artificial", it can be concluded that this is an object created by humans. Because it has a program system with independent judgment, so it is called the concept of intelligence. When character is given, along with the influence of logic on cognition, the characteristics of metaphor in action and perception are also reflected. The word "run" is used as a verb in life, when we extend this action, we get the result of reaching the end point, so when it is applied to the field of robotics, as the term "run" means to process a program, with pull meaning for a long time. This type of terminology has a vaguer point, *"sweeping robot is cleaning the living room"*, the word "cleaning" is not

a manifestation of the term, in the entire paragraph is to personify the “sweeping robot”, but the action it starts from the word “cleaning” is not given a concept, so it is not a term.

2.3.2 Mapping.

Language is the channel through which people express concepts, and terminology is the signal. In the field of robotics, the cognitive analysis of terms involves examining how humans perceive and understand the concept of robots, leading to the creation of new types of terminology and expressions. It delves into the intersection of language, thought, and logic, as concepts originating from human cognition are translated into linguistic forms within the realm of robotics. This cognitive analysis explores how our understanding of robots shapes the development of specialized terminology and facilitates effective communication in the field. Grady [15] argues that conceptual metaphors have four characteristics, systematicity, directionality, motivation, and mapping. Systematicity is a concrete framework based on the thickness of the reserve of knowledge in the field of robot concepts. For directionality, and motivation in the above analysis of metaphor, we can know that metaphor is unidirectional, such as *“robots think like people”* rather than “people think like robots”, it is reflected in the sequence of conceptual appearance, and the metaphor of robot technology terms is post-attached. This subparagraph will give mapping a distraction. Mapping refers to the copying of a systematic concept into a new field, so that the resulting terminology can be created in batches.

Mapping’s analysis of terms is mainly reflected in objects, concepts, and cognition. For example, in robot technology, when we regard robots as human, the concept of human is mapped to robots at this time, so we get that robots can see, robots can think, and can even have emotions and IQ. The mapping of the concept of human beings to robot technology is the core concept of the object, and under such a core mapping, through the integration of various cultures and logic of human beings, there will also be subordinate related mapping concepts. For example, in the field of medical

robotics, robots can perform surgery, so some terms in the medical field can also be used in the field of robotics through conceptual mapping, such as *"amputation"*, *"tenorrhaphy"*, *"operating knife"*, *"vascular access"*, *etc.* At this time, the object changed, from a human to a robot, so the previous terms were summarized as the field of robotics, which can also be said to be the integration of the field. The term *"robotic technology"* is split to obtain "robotic" and "technology", where robot as the theme, is a central concept, "technology" represents different scientific and technological fields, it can be understood as sub-concepts, and the mapping can be from these word concepts to the central concept mapping, and the accompanying terms can also be incorporated into the field of robotics through metaphors.

Conclusions to the second chapter.

In the field of robotic technology terminology, the difference between the study of terminology and the study of general vocabulary is that the formation of terms is extended and shaped with the concept of robotics.

In the first part of the analysis of stylistic features, the application logic of terminology in the field is analyzed from the perspective of register, and the characteristics of coherence and cohesion are mainly studied. Through the observation of dimensions of field, mode, and toner, it is concluded that in the use of context in the field of robotics technology, through the extension of the main concept of robots, vocabulary from other scientific and technological fields is integrated into the main field, and the main concept and sub-concepts are fused together to reflect the characteristics of cohesion. The embodiment of toner in the general scientific and technological field is linked with the field, so that terms can appear in multiple dimensions at the same time; In the research of vocabulary, the research on non-technical words shows that the characteristics of terms are to maintain objective concepts and neutral characteristics, for avoid the use of emotionally colored vocabulary as a term. The research on semi-technical terms shows that this type of term is used frequently. Due to its wide audience, the term explains the concept of robots

through the semantic range of polysemous words to assist in association. Such terms can emotional overtones exist because anthropomorphic concepts are provided.

In the second part of morphological analysis, the verification is mainly carried out by splitting the terms. Firstly, the words and concepts are split, and then the words themselves are split, and then the concepts are combined for analysis. Through analysis, the affixes of terms are mainly derived from Greek and Latin vocabulary. In the extension of modern English, the stems (main concepts) of terms can often be combined with new affixes (sub-concepts) as a single vocabulary to form a new term; In the research on compounding, it is concluded that the central concept expressed in noun combination terms mainly exists in the words on the right head, and the combination has logical characteristics. In the combination of nouns and other parts of speech, nouns can also serve as the main concept leading the meaning expressed by the term. In the use of the situation, the past participle form of the verb is used to assist in expressing the progress of a concept, thus forming a term with a fixed tense. Combine through metaphors, and at the same time reflect the tight logic of terms; In abbreviation, through the analysis of uncommon examples, speculate on the reasons for the formation of such terms in different situations, reflecting the diversity of terms; In the analysis of conversion, which is concluded that concepts are borrowed to form terms through words that have already appeared, and terms can be expressed by nouns by directly expressing the results of actions, thereby avoiding the emotional color produced by verbs; In blending, by directly giving the prefixes and suffixes of words to concepts, after the way of combining into terms reflects the stickiness of terms. At the same time, by combining other nouns with the main concept term, the concept of the term is simply expressed. This motivation comes from the better exposure of the public to the concept of robotic products.

The last part is based on the terminology logic formed by combining words and concepts through metaphors and mappings from the perspective of cognitive linguistics. This approach helps rapid communication in the field of robotics and creates batches of terminology through central concepts.

CONCLUSIONS TO CHAPTERS

The first chapter reviews the history of the establishment of terminology and its subsequent integration with the field of robotics science, from the conceptual table of natural science and philosophy by scholars in ancient Rome and ancient Greece, to the development of information technology and mechanical technology in the industrial revolution, followed by the establishment of ISO specifications to the status of terminology in academia, then robotics terminology was also recognized in academia and entered the field of public science, these developments promoted the research and standardization of terminology. These events provide a more precise and consistent terminology base for developments in the field of robotics; The possibility of terminology as an independent discipline is discussed, even if the definition and research of terminology are controversial, but terminology as an independent discipline has certain academic support from the field of science and technology. In the field of robotics, the formation of terms designs the cognition of language vocabulary, concepts and defines the research on terminology, in this paper will be based on the linguistic perspective of research and the source of terminology vocabulary.

In stylistics, it is convenient to determine the embodiment of the conceptual object and audience of the term, it focus on the uniqueness of the term and the characteristics of information transfer, which is especially important in the field of complex and diverse information transfer such as the field of robotics. The register is a feature related to scenarios and domains, and vocabulary is an important tool for analyzing robotics terminology, expressing different concepts in different scenarios. Concisely, the style needs to be rational and framework, highlighting theoretical knowledge, while keeping it concise and clear; The morphology of robotics terms, which refers to the study of the formation process of terms in the field of robotics through morphological analysis, understanding the internal structure and laws of term formation through the study of morphemes, mainly through the addition and removal of affixes in derivation to form new terms, and the essence of terms is to bring about

the transformation of concepts through vocabulary, so in the field of robotics, the study of affixes has structured and clear characteristics. Compounding and abbreviation in the field of robotics, many concepts related to hardware, systems, and networks are formed by combining two or more words. In addition, abbreviations are also a common form of morphological derivation, used to simplify the representation of complex concepts. Conversion is mainly through the process of creating a new word from an existing word without changing the form, which can be divided into zero derived transformation and non-derived transformation. The stems of blending mixed words retain their original meaning but form a new word when combined; From the perspective of cognitive linguistics, the conceptual formation process of terminology is analyzed mainly through the characteristics of metaphor, and the logic and framework behind the formation of terminology.

The second chapter is mainly based on the theory of the first chapter, and when analyzing the register characteristics in stylistics, it is obtained that the term has the characteristics of coherence and cohesion in the field of robotics technology, and can exist in multiple dimensions, making the vocabulary become a more compact and mature structure of the term under the influence of the concept of science and technology. In the analysis of vocabulary, mainly for the characteristics of non-technical terms and semi-technical terms are analyzed, in the field of robotics technology, in order to ensure the neutrality and accuracy of concepts and views, non-technical terms do not convey any feelings, no emotional color. Audiences in semi-technical terms tend to be more inclined to the public and learners; In morphological analysis, terms are mainly split, and analysis by derivation it is concluded that in modern English terminology, in the field of robotics, there are characteristics of changing phrases and adapting them into affixes while using more specific and single words as stems to create new words. Through compounding and abbreviation, the core conceptual expression of the term changes with the different arrangement categories of the grammar, not only on the first word, but also changes according to the invention and appearance of the concept of the term itself when combining and abbreviating. In

conversion, it is found that in the field of robotics, most of the verbs and noun referents are converted, and the purpose of the concept is achieved through the extension of actions, reflecting the objectivity and professionalism of the term. In blending, mainly by combining two concepts similar to the term, retaining morphemes with conceptual significance to form new concepts, which is also widely used in professionals, another situation is to combine function with the main concept, which can attach multiple words representing function to the vocabulary expressing the main concept to form new terms, mainly used for the promotion of products in the field of robot technology; In the analysis of cognitive linguistics, mainly through metaphor, the logic of term formation is a batch of terms formed by human cognition of concepts, through mapping to objects, and the mapped concepts can form terms across languages. At the same time, the terms formed by metaphors are emitted by a central foundational core concept, and in the field of robotics, terms are mainly based on the concept of “robot” term for batch creation.

CONCLUSIONS

Human beings' pursuit of knowledge is always endless, and it is precisely because of this stubbornness that today's technological society is created. The field of robotics is still a developing technology field today, and more and more people are beginning to understand and learn about it through products in the field of robotics, so language communication in this kind of software is very important. A field has its own language - terminology, which is why terminology can be supported by many scholars in China, because the involvement of linguists, writers, and robotics experts from the field of science and technology, the formation of robotic technology terminology becomes a diverse discipline and research.

The formation of robotic technology terminology is gradually emerging based on continuous development, with the emergence of new technical concepts prompting the emergence of new terms and the evolution of old terms. This innovation and evolution are closely related to professionals in the field of robotics, as well as beginners and ordinary people who are new to robotics, whose different perceptions of concepts define new terms, lead to language expressions of ease and difficulty. In this process, linguists also promote the scientific development of this field and social communication through the study of the structure and function of terminology, revision and expansion of terminology.

The research materials of this article are provided by Cambridge Dictionary, Oxford Dictionary, Google Scholar, Baidu Library and CNKI. Examples of computer-related words come from dictionaries and Baidu Wenyu website.

Through the theoretical derivation and research of this paper, it is concluded that the terminology of robotic technology is mainly based on people’s cognition of concepts to change the shape and style of vocabulary to form terminology in the professional field. The conclusions are divided into the following points.

1. The terminology in the field of robotics will appear as an informal substitute in different contexts due to the ordinary use of professionals, and this feature will be used by general people.

2. In terms of robot terminology, since the endowment of concepts directly maps to human life, its essence is to replace labor, so most of the terms are formed by the fusion of existing concepts or terms with secondary concepts.

3. In the study of affixes, it is found that the stem of a term comes from the object, and the stem as the basic body can independently form a word, while the concept is expressed through affixes, so the process of giving a concept to a word, which becoming a term is also affixes and stems the process of fusion.

4. In the field of robotics, the creation of terms is cohesive. The terminology of new technological products is formed by taking the concept of robots as the theme and gluing other words together. This situation exists in researchers, learners and between customers.

5. In the field of robotics, the de-emotionalization of verbs is manifested in the extension of the concept expressed by the verb. By extending the concept of the verb to the end point, robot technology is expressed in order to achieve a state of control.

6. There is a systematic batch creation of robotics technology terms. The formation of terms is based on borrowing concepts and then assigning terms in this field to robotics technology concepts to become new terms.

By stating the conclusions of this paper, it is hoped that the inclusiveness and extensibility of machine technology terminology can promote the research of terminology in the field of robotics, also be considered and revised in the future dictionary for the field of robotics. The results of this research can be used for further research in the field of lexical derivation, semantic derivation, robotics, conceptual cognition, and terminology.

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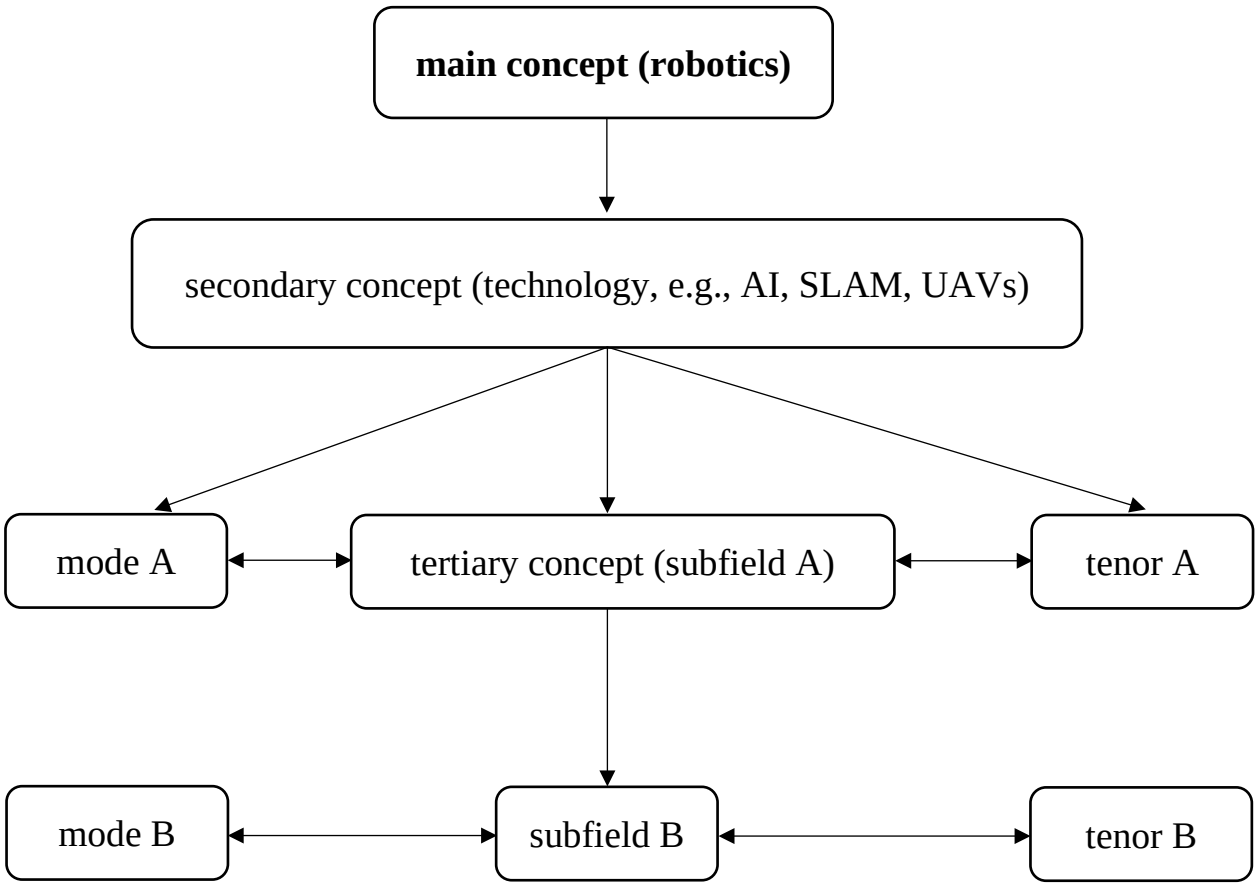
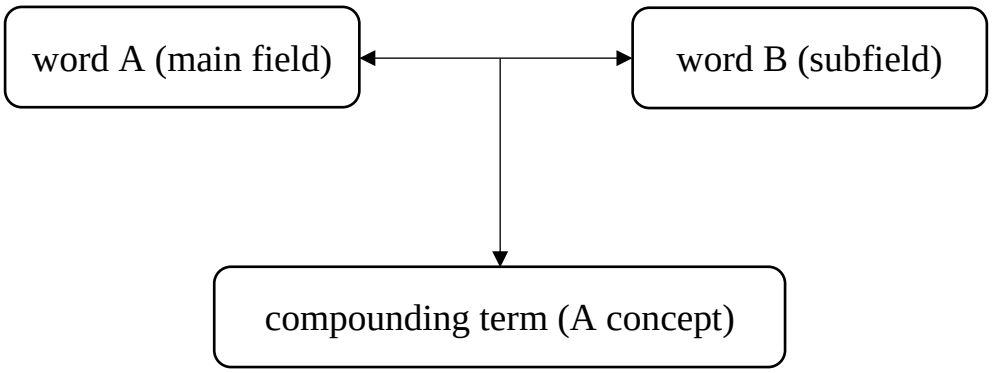
APPENDICES

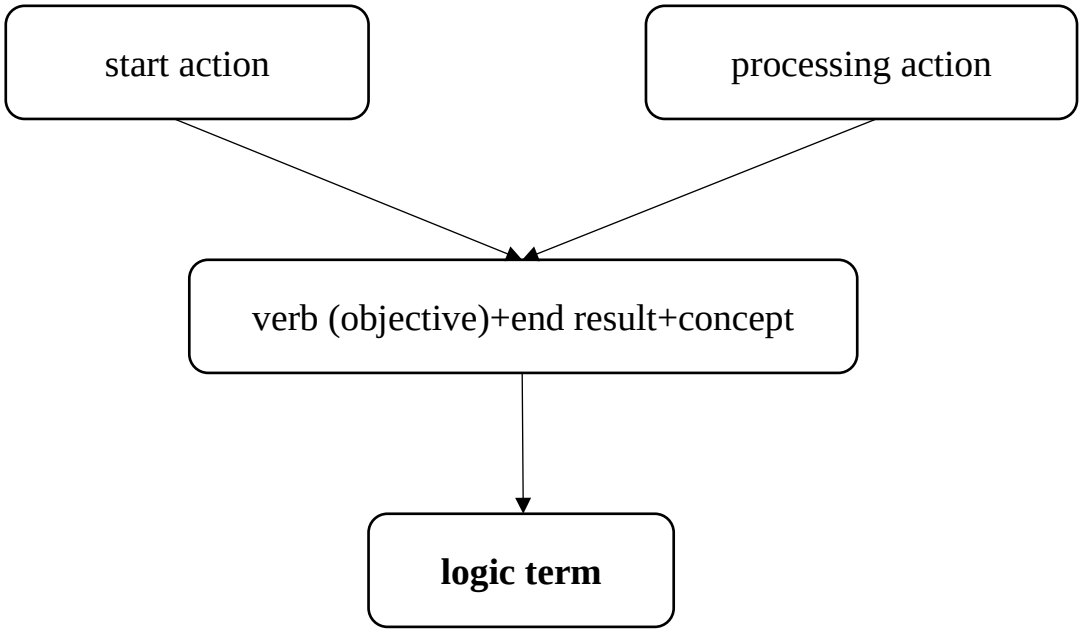
APPENDIX A. Stylistics diffusion.



APPENDIX B. Conceptual combination.



APPENDIX C. Logic form.



APPENDIX D. Cognitive structure.