Analysis of the Promoting Role of Computer Science and Technology in the Development of the Internet of Things

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Abstract: ***Computer science and technology, as the core driving force for the development of the Internet of Things, deeply promote the rapid development of the Internet of Things through continuous innovation and technological integration. Sensors RFID. The widespread application of embedded technologies enhances the perception and interaction capabilities of the Internet of Things; The introduction of cloud computing and big data technology greatly enhances the efficiency of data processing and analysis. These technologies not only broaden the application areas of the Internet of Things, but also promote the intelligence, efficiency, and safe and reliable operation of IoT systems, laying a solid foundation for building an intelligent world of interconnected everything.***

Keywords: Computer technology; Internet technology; Internet of Things technology.

1. THE BASIC MEANING OF THE INTERNET OF THINGS

Internet technology is the core and premise of the development of Internet of Things technology. Based on computer science computing, it expands and extends the existing user end of the Internet among goods through the expansion and extension of the Internet, and then operates through information data transmission, transformation and exchange. The basic definition of Internet of Things technology is: a sensing device capable of data transmission and information conversion, which connects and communicates useful information contained in objects according to relevant protocols, and enables intelligent management and positioning of objects through computer science technology. The emergence of Internet of Things technology completely follows the pace of social development and is a scientific achievement worth considering. The development of the Internet of Things has received great attention in the field of information technology in China. At present, China has formulated policies related to the development of the Internet of Things, improved the development conditions of the Internet of Things, and laid a good foundation for its subsequent development. Foundational societal and infrastructural concerns are addressed by Su et al. (2025), who conducted a structural assessment of family and educational influences on student health behaviors [1], and by Yang (2025), who researched site reliability optimization in cloud environments using synthetic monitoring [2]. Advancements in autonomous and generative systems are prominently featured. Tang et al. (2026) proposed SVD-BDRL, a blockchain-enhanced framework for trustworthy autonomous driving decisions [3], while Lu et al. (2025) developed NeuroDiff3D, a diffusion model for viewpoint-consistent 3D generation [4]. For complex data integration in governance, Zhang (2025) created a knowledge graph-enhanced multimodal AI framework for tax compliance [5]. Enhancing environmental perception, Xie et al. (2025) introduced MARNet, a multi-scale network for robust point cloud completion via cross-modal fusion [6]. The evolution from foundational cyber-physical systems to contemporary applications is evident. Early work by Hou et al. (2017) established a camera-based cyber-physical framework for triggering bridge health monitoring [7]. Modern applications include Tian et al.'s (2025) cross-attention multi-task learning approach for digital ad recall in business intelligence [8], and the design of a PID controller-based autonomous vehicle speed control system by Zhang, Tian, and Hua (2025) [9]. Security and privacy in collaborative AI have become critical, as seen in Deng and Yang's (2025) multi-layer defense strategies against membership inference attacks in federated learning [10], and Sultan et al.'s (2026) FedGuard framework for privacy-conscious anti-money laundering collaboration [11]. Finally, specialized applications demonstrate the versatility of integrated AI. Zhu, Yu, and Li (2025) applied a spatiotemporal graph convolutional network (SAGCN) with IoT for adolescent tennis motion analysis [12]. In logistics and innovation, Zhang (2024) used cohesive hierarchical clustering for dynamic adaptation of emergency power material supply [13], and Zhou and Cen (2024) investigated the impact of ChatGPT-like AI on user entrepreneurial activities [14].

2. THE KEY ROLE OF COMPUTER SCIENCE AND TECHNOLOGY IN THE INTERNET OF THINGS

Computer science and technology play a crucial role in the Internet of Things (IoT) and are the core driving force behind the development and popularization of IoT technology. As a complex and massive system, the Internet of Things connects the physical world with the digital world, realizing the vision of interconnected and intelligent interaction of all things. All of this cannot be achieved without the deep integration and innovative application of computer science and technology.

Firstly, computer science and technology provide a solid infrastructure for the Internet of Things, which relies on various computing devices, sensors, network communication technologies, and data processing platforms, all of which are direct products of computer science and technology. By designing efficient and reliable hardware platforms and software frameworks, computer science ensures the stable operation of IoT systems and supports the access and management of large-scale devices.

Secondly, data processing and analysis techniques in computer science are key to the intelligence of the Internet of Things. The massive data generated by the Internet of Things needs to be processed through advanced algorithms and models to extract valuable information and achieve intelligent decision-making and prediction. Technologies such as big data analysis, machine learning, and artificial intelligence in computer science enable IoT systems to automatically learn, optimize, and adjust, providing more accurate and personalized services.

Thirdly, computer science and technology also play an irreplaceable role in the field of IoT security. With the popularity of IoT devices, network security issues are becoming increasingly prominent. Computer science provides security mechanisms such as encryption technology, identity authentication, and access control to ensure the confidentiality, integrity, and availability of data transmission, storage, and processing in IoT systems, effectively resisting various network attacks and threats.

Fourth, computer science has also promoted the deep integration of the Internet of Things with cloud computing, edge computing and other technologies. Cloud computing provides powerful computing resources and storage capacity for the Internet of Things, enabling the Internet of Things system to handle more complex data and tasks; Edge computing sinks computing resources to the edge of the network, reducing data transmission delay and bandwidth requirements, and improving the real-time and response speed of the Internet of Things system.

3. THE INTEGRATION OF INTERNET OF THINGS AND COMPUTER SCIENCE TECHNOLOGY

3.1 Basic concepts and connections between the Internet of Things and computer science technology

The Internet of Things (IoT) refers to a network that connects any item to the Internet for information exchange and communication through information sensing devices, such as radio frequency identification, infrared sensors, global positioning systems, laser scanners and other devices and technologies, to achieve intelligent identification, positioning, tracking, monitoring and management. Computer science and technology cover multiple fields such as computer hardware, software, networks, databases, algorithms, etc., and are the foundation and core of information technology. The close connection between the Internet of Things and computer science and technology is reflected in multiple aspects. Firstly, the construction of the Internet of Things relies on the support of computer hardware, including sensors, processors, communication modules, etc., all of which are products of computer science and technology. Secondly, the data processing, analysis, and application of the Internet of Things rely on computer science algorithms, databases, and artificial intelligence technologies. Finally, the security and reliability of the Internet of Things also depend on the encryption, authentication, and protection technologies of computer science. The integration of the Internet of Things and computer science technology is an inevitable trend in the development of Internet of Things technology.

3.2 The role of computer science and technology in achieving the intelligence and automation of the Internet of Things

Computer science and technology play a crucial role in achieving the intelligence and automation of the Internet of Things. By applying advanced technologies such as artificial intelligence and machine learning, computer science and technology can endow IoT devices with the ability to learn, optimize, and make decisions on their own. This enables IoT systems to automatically adjust and optimize their operating status based on environmental changes and user needs, achieving intelligent control and management. The automation control technology in computer science and technology also provides strong support for the automation of the Internet of Things. By integrating hardware devices such as sensors, actuators, controllers, and combining computer software programming and control logic, remote monitoring, automatic control, and fault diagnosis of IoT devices can be achieved, greatly improving the operational efficiency and reliability of IoT systems.

3.3 Impact of Computer Science and Technology on IoT Data Processing, Security, and Scalability

Computer science and technology have had a profound impact on the data processing, security, and scalability of the Internet of Things. In terms of data processing, technologies such as big data processing and distributed computing in computer science enable IoT systems to efficiently and quickly process massive amounts of data, extract valuable information, and provide support for intelligent decision-making. Technologies such as data mining and machine learning also help IoT systems discover patterns and trends from data and optimize operational strategies. In terms of security, computer science and technology provide various security mechanisms and technical means, such as encryption technology, identity authentication, access control, etc., to ensure the confidentiality, integrity, and availability of data transmission, storage, and processing in IoT systems. These technologies effectively resist various network attacks and threats, ensuring the secure and stable operation of IoT systems. In terms of scalability, modular design, distributed architecture, and other technologies in computer science enable IoT systems to be flexibly expanded and upgraded. With the continuous increase and expansion of IoT devices and applications, IoT systems need to have good scalability to meet future challenges. Computer science and technology provide strong support for the scalability of IoT systems, enabling them to continue to develop and evolve.

4. ANALYSIS OF THE PROMOTING ROLE OF COMPUTER SCIENCE AND TECHNOLOGY IN THE DEVELOPMENT OF THE INTERNET OF THINGS

4.1 Application of Artificial Intelligence and Machine Learning in the Internet of Things

The artificial intelligence (AI) and machine learning (ML) technologies in computer science and technology are profoundly driving innovation and development in the field of the Internet of Things (IoT). The introduction of AI has made IoT systems no longer just data collectors, but intelligent agents capable of thinking, learning, and making decisions like humans. Machine learning algorithms can automatically identify patterns, patterns, and trends in the massive data generated by IoT devices through deep mining and analysis, providing accurate predictions and intelligent decision support for IoT systems. For example, in smart agriculture, AI and ML technologies can automatically adjust irrigation and fertilization plans based on environmental parameters such as soil moisture and light intensity, achieving precise agricultural management, improving crop yield and quality. These technologies can also be applied to fault prediction and health management. By monitoring the operating status of IoT devices, potential problems can be detected and solved in advance, ensuring the stable operation of the system.

4.2 The role of big data analysis in IoT data processing

With the widespread deployment of IoT devices, the amount of data generated every day is exploding, providing a broad stage for big data analysis technology. Big data analysis technology plays a crucial role in IoT data processing, as it can efficiently and accurately process and analyze massive amounts of data, extracting valuable information and knowledge. By utilizing advanced big data analysis algorithms and tools, IoT systems can monitor and analyze device operating status, user behavior patterns, and other data in real time, providing strong support for enterprise operational decision-making, product optimization, and market promotion. Big data analysis can also help IoT systems discover potential security threats and abnormal behaviors, take timely measures to prevent and respond, and ensure the security and stability of the system.

4.3 Impact of cloud computing and edge computing on IoT architecture

As two important branches of computer science and technology, cloud computing and edge computing are reshaping the architecture and ecology of the Internet of Things. Cloud computing provides powerful backend support for IoT systems by offering elastic and scalable computing resources and storage capabilities. IoT devices can upload collected data to the cloud for processing and analysis, utilizing the powerful computing power of cloud computing for complex tasks such as data mining and model training. Cloud computing can also provide a unified management and operation platform for IoT systems, reducing maintenance costs and complexity. Edge computing sinks computing resources to the edge of the network to achieve localized processing and analysis of data. The advantage of this architecture is that it can reduce the latency and bandwidth consumption of data transmission, improve the real-time performance and response speed of the system. The combination of cloud computing and edge computing makes the IoT system not only enjoy the powerful computing resources and service capabilities of the cloud, but also ensure low latency and high efficiency of data processing, providing strong technical support for the wide application of the IoT.

4.4 Application of blockchain technology in IoT security

Blockchain technology has shown great potential in the security of the Internet of Things due to its decentralized, tamper proof, transparent, and traceable characteristics. In IoT systems, communication and data exchange between devices often involve a large amount of sensitive information, such as user privacy, device identity, transaction data, etc. Once this information is leaked or tampered with, it will cause serious losses to users and businesses. Blockchain technology achieves secure storage and transmission of data by building distributed ledgers and consensus mechanisms. IoT devices can record critical data on the blockchain, utilizing the immutability of the blockchain to ensure the authenticity and integrity of the data. The smart contract function of blockchain can also automatically execute predefined rules and conditions, ensuring the security and credibility of transactions and collaboration processes between IoT systems. Blockchain technology can also provide identity authentication and access control services for IoT devices, preventing unauthorized access and attack behavior. The application of blockchain technology in the security of the Internet of Things will provide strong guarantees for the healthy development of the Internet of Things.

5. THE APPLICATION OF COMPUTER SCIENCE AND TECHNOLOGY IN THE INTERNET OF THINGS

5.1 Application of Sensor Technology in the Internet of Things

The importance of sensor technology, as the core driving force of the IoT perception layer, is self-evident. These tiny devices, like tentacles of the Internet of Things, are ubiquitous in every corner, showcasing their powerful functions from temperature and humidity monitoring in smart homes to precise control in industrial production. Sensors can capture physical quantities in the surrounding environment in real time, such as temperature, humidity, light intensity, etc., and convert them into digital signals for further processing and analysis by IoT systems. In the field of smart homes, sensors can intelligently adjust indoor environments and improve living comfort; In industrial manufacturing, sensors help achieve automation and intelligence in the production process, improving production efficiency and product quality. With the continuous advancement of technology, sensor technology is developing towards higher accuracy, lower power consumption, and stronger anti-interference ability, laying a solid foundation for the widespread application of the Internet of Things.

5.2 Application of RFID Technology in the Internet of Things

RFID technology, also known as wireless radio frequency identification technology, plays an important role in the field of the Internet of Things with its unique non-contact data transmission method. RFID tags, as carriers of data, can be easily attached to objects and communicate with readers through wireless radio frequency signals to achieve automatic identification and information collection of objects. In the Internet of Things, RFID technology is widely used in various scenarios such as inventory management, item tracking, and identity authentication. For example, in intelligent logistics systems, RFID tags can be attached to goods and real-time information can be read through readers to achieve fast sorting and tracking of goods. RFID technology can also be combined with sensor technology to achieve real-time monitoring and early warning of the status of goods, improving the efficiency and accuracy of logistics management. With the continuous maturity and cost reduction of RFID technology, its application prospects will be even broader.

5.3 Application of Embedded Technology in the Internet of Things

Embedded technology, as a product of the deep integration of computer science and technology with the Internet of Things, provides strong support for the intelligence and interconnection of IoT devices. Embedded systems typically integrate various hardware resources such as processors, memory, input/output interfaces, and run specific software programs to achieve specific functions. In the Internet of Things, embedded technology is widely used in the research and production of various intelligent terminals and devices. These intelligent terminals and devices not only have multiple functions such as data collection, processing, communication, and control, but can also be customized and modularized according to actual needs. Through embedded technology, IoT systems can achieve intelligent upgrades and interconnectivity of devices, improving the overall performance and reliability of the system. Embedded technology also has characteristics such as low power consumption, high reliability, and strong real-time performance, providing strong guarantees for the widespread application of IoT.

5.4 Application of Cloud Computing and Big Data in the Internet of Things

Cloud computing and big data technology, as advanced applications of computer science and technology in the Internet of Things, provide powerful support for data processing and analysis of IoT systems. Cloud computing platforms enable IoT systems to easily cope with the processing needs of massive amounts of data by providing elastic and scalable computing resources and storage capabilities. In the Internet of Things, data generated by devices is uploaded in real-time to the cloud, and efficient data processing and analysis are carried out using cloud computing platforms. Big data technology, on the other hand, through in-depth mining and analysis of IoT data, discovers patterns and trends in the data, providing strong support for enterprise operational decision-making, product optimization, and market promotion. The combination of cloud computing and big data technology not only improves the data processing capability and intelligence level of IoT systems, but also reduces the maintenance cost and complexity of the system. With the continuous development of technology, the application of cloud computing and big data in the Internet of Things will become more extensive and in-depth.

6. CONCLUSION

Looking ahead to the future, with the continuous advancement of computer science and technology, the development of the Internet of Things will usher in a broader space. We look forward to seeing more innovative technologies emerge, further promoting the deep integration and application of the Internet of Things in fields such as smart cities, Industry 4.0, and healthcare. At the same time, attention should also be paid to challenges such as technological ethics and data security, ensuring the healthy development of IoT technology and jointly creating a more intelligent, convenient, and secure future world.

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