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An introduction to integrated circuit for non-expert

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Abstract. Integrated circuit (IC) has transformed the field of electronics and technology. In this work, we provide a straightforward introduction to IC for non-experts, covering the beginning and growth of IC from its initial conception in the late 1950s through its ongoing evolution in the modern era. We explore the significant impact of IC on various aspects of daily life, including healthcare, transportation, entertainment, etc. We will talk about how to understand IC, types of IC, its development, and applications. Learning about IC is so important for everyone in this era because it almost has a strong connection with our daily lives, so our modern world can not go on without IC. You could not imagine how the world would work if we did not have IC technology. So, this article aims to let non-experts know about the essential role of IC in our interconnected world and illustrate how the IC has shaped our daily lives and inspired technological advancements.

Keywords: Integrated circuit (IC), introduction, daily lives, impact.

1. Introduction

With the continuous development and progress of human society, a variety of high and new technologies came into being; the IC was born as a new technology in the 60s, has benefited humanity so far, and has been well developed. IC has become an indispensable part of our daily lives, playing a significant role in various applications. In our interconnected world, the role of IC technology is necessary. IC technology has become essential to our lives, from smartphones to complex systems in industries. Many technological advancements lie in the innovation of IC. These tiny components have transformed the world of electronics. IC is the foundation of modern electronic applications. IC technology is everywhere in our daily lives, impacting industries ranging from healthcare and automotive to aerospace and entertainment. IC is essential in medical imaging devices, pacemakers, and wearable health monitors in healthcare. The automotive sector relies on IC to control engines, safety, and navigation systems—even the entertainment benefits from IC, such as VR and AR.

In conclusion, the necessity of IC technology cannot be overstated. It promotes innovation and development of the society, enriching our daily lives. As technology advances, IC will still be a leader

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in progress, driving the growth of more intelligent devices, more efficient systems, and groundbreaking solutions. So, understanding the importance of IC technology is critical to appreciating its role in shaping the present and future of our interconnected world. However, many people realize that the world of IC might seem complex and know little about it. This article is an easy-to-understand explanation so that more ordinary people can learn and understand IC technology. In the following sections of this report, we will explore the evolution and usage of IC. The main content of this article covers the basic understanding of IC technology, the categories of IC, the development of IC, and the application of IC in life, aiming to let people intuitively feel the IC technology.

2. Understanding IC

2.1. Through available analogy

IC stands for Integrated Circuit. It has a significant relation with our daily life. ICs are widely used in various electronic devices, including computers, smartphones, televisions, and automotive systems. They have revolutionized the electronics industry by making devices smaller, more efficient, and more reliable. However, since it is a minor feature and complexly organized, it is impossible to imagine what IC is. Thus, the aim is to use an analogy to help to have a tagged IC image in mind. It is a small electronic device that contains multiple electronic components, such as transistors, resistors, and capacitors, integrated into a single semiconductor chip. These components perform specific functions, such as amplification, switching, or signal processing. After knowing the details of IC, we could start with an analogy. ICs are like tiny cities on a chip, and the chip is like the ground holding the whole IC system. A city has different functional buildings and different roads with specific tasks. The first part introduces the primary components, functions, and layout of IC. Firstly, a transistor in an IC is a variable current switch with many functions, such as detection, rectification, amplification, switching, voltage regulation, and signal modulation. Thus, in a city, a transistor is like traffic police who are responsible for controlling and adjusting the cars to run on the road well-organized. Moreover, the vehicles running on the road are like the electric current. Secondly, for resistors, limit the amount of current it passes through. The resistor is like a traffic light in a city, which is used to turn into different colors to restrict or permit through cars. I compared a resistor with a transistor, although both have the function of limiting the current. However, the transistor is a complex component. It is like a traffic police who could use the specific power to control more dangerous and complicated roads, which a simple traffic light could not achieve. The transistor could adjust a transportation system that is about to collapse into a well-organized one. Thirdly, for capacitors, which is to store and release electrical charges. The capacitor is like a parking lot, an area used to park the cars. The number of charges to hold or release depends on the capacity of the capacitor. Capacitors have many applications, including filtering, energy storage, and power supply stabilization. These are primary components in IC. They work together like the different buildings in a city, performing specific tasks to make electronic devices function. The second part introduces its wiring. All IC components on the chip need to be well-organized and connected depending on the wiring. For an analogy, all kinds of roads lead to different buildings in a city, and areas are like wiring.

2.2. Features of IC lead to its advantages

Electronic components can be found almost everywhere in our daily lives. With the development of science and technology of the features of IC, the types of electronic components are also becoming more and more simultaneously. It also begins to send in the direction of high-frequency and miniaturization exhibitions.

2.2.1. highly integrated & small size & light weight. A chip is an integrated electrical junction consisting of many transistors. The chip has different integration scales, up to several hundred million, low to dozens, and several hundred transistors. Since its highly integrated feature, some specific technology has the potential trend to be promoted in the IC industry. For instance, in recent years, for excellent development needs and fast-growing areas in data communication (WLAN), there is one single chip 5-

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6 GHZ Front-end IC based on SiGe BiCMOS that enhances 802.11ac WLAN radio Front-end designs [1]. It means that through developing the highly integrated feature with SiGe material, the signal of WLAN could be significantly enhanced, which means in our daily life, especially in a massive scale of mall, the area of the single signal of WLAN would be better coverage. In that case, allowing more people to visit the internet simultaneously and have a better experience with a strong signal just by a small device is possible. Moreover, since their small size and lightweight, every generation of electronic devices such as smartphones and laptops make people convenient to carry.

2.2.2. highly reliable. Since the IC integrates many electronic components and circuits on a single chip, its reliability is higher than that of traditional electronic components. IC has a high degree of integration and complexity, which reduces the number of members in electronic equipment, reduces equipment failure rate, and improves equipment stability. To some extent, reliability is the life of IC products. Reliability is a measure of product endurance. It answers how long the life cycle of the product is. In short, it is a question of how long it could be used. Thus, it is an expected trend to develop highly reliable features of the excellent reliability of IC. The life cycle of products could be longer and longer after promotion. For instance, in our daily lives, to improve the hot carrier reactance of PDP driver immunity, heterogeneous runaway sources (URS) were studied. Conventional runaway sources (CRS) P-LDMOSFETs electrical properties before and after direct current stress [2]. Thus, it would make a difference if we could develop IC features.

3. Types of IC

3.1. Digital Integrated Circuit

Talking about the digital IC, we can first imagine we are working with a room of lights. The lights in this room can be either turned on or turned off. The different patterns of the on and off can indicate different meanings. Digital IC consists of the "lights" that can function on and off. Instead of controlling the lights, digital ICs are handling instructions from devices like computers [3]. The very basics of digital integrated circuits are about logic gates. A logic gate. It can carry out a Boolean function, a logical operation on one or more binary inputs that results in a single binary output. Here are some basic Logic Gates that you input 1s and 0s in particular conditions, and then the logic gates will generate a specific value of 1 or 0. (see Figure 1).

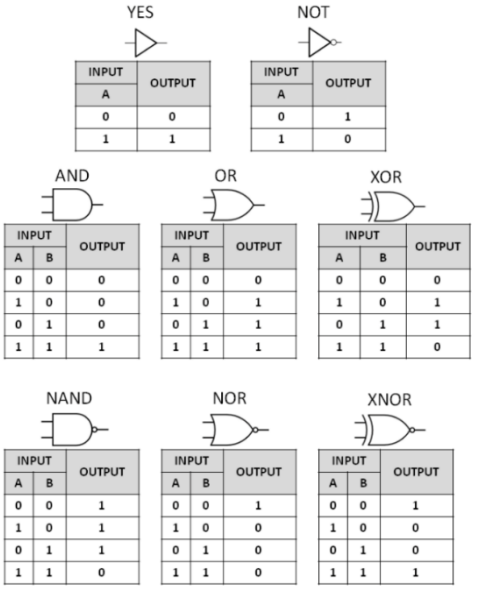

Figure 1. Logic Gates [4].

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3.2. Analog Integrated Circuit

Electronic components known as analog integrated circuits (ICs) process continuous signals instead of the discrete signals (0s and 1s) that digital ICs process. Analog ICs are crucial in various applications, such as signal conditioning, amplification, and filtering. They are essential to modern electronics because they make it possible to process real-world signals like audio, radio waves, and sensor outputs.

3.2.1. Amplification. An analog integrated circuit's fundamental building element is an amplifier. They boost a signal's amplitude (voltage or current). Operational amplifiers (op-amps), one form of amplifier, are frequently employed in various applications, including audio amplification, instrumentation, and feedback control systems. A signal's amplitude, or strength, is increased through amplification, which doesn't appreciably change the signal's other properties. Amplification in electronics mainly refers to raising an electrical signal's voltage or current. Amplifiers are tools or circuits made to accomplish this, and they are essential to several systems, from audio systems to communication networks.

3.2.2. Filtering. Filters of all shapes and sizes, including low-pass, high-pass, band-pass, and notch filters, can be implemented using analog ICs. These filters attenuate some signal frequency ranges while allowing others to pass through. Filters are employed in sensor signal conditioning, communication systems, and audio processing.

3.2.3. Sensor interface. The circuitry and parts needed to connect to and interact with sensors are called sensor interfaces in electronics. Sensors are tools that transform physical parameters into electrical signals, such as temperature, pressure, light, or humidity. Depending on the type of sensor, these electrical signals may be voltage, current, resistance, or digital data.

3.3. Mixed Signal Integrated Circuit

An electronic circuit known as a mixed-signal integrated circuit (IC) combines analog and digital circuitry on a single chip. These ICs process and interface between discrete digital signals and continuous analog signals. Due to their ability to facilitate smooth communication between the analog and digital worlds, mixed-signal ICs are crucial parts of many contemporary electronic products. ADC and DAC are analog to digital conversion and vice versa: Electronics procedures known as analog-to-digital conversion (ADC) and digital-to-analog conversion (DAC) are crucial for converting between continuous analog signals and discrete digital data. ADCs do the inverse, transforming digital data into analog signals such as voltage or current, whereas DACs perform the transformation. Applications ranging from audio processing to communication systems and measurement tools depend on these conversions. To be straightforward, imagine mixed-signal ICs as bridges between two different cities. On one side, you have the smooth, flowing river of continuous signals representing the analog world. Conversely, you have a city with digital signals representing the world of 0s and 1s. Mixed-signal ICs stand in the middle of the bridge, seamlessly translating between the two worlds.

4. Development of IC

4.1. Evolution process

The story of IC development has changed the world of electronic technology. It started around the late 1950s. Throughout numerous changes, chips have transformed into the small yet powerful tools we use currently.

The starting point is from the 1950s to the 1960s. These two visionaries, Jack Kilby and Robert Noyce, laid the groundwork for IC, which has since revolutionized electronic technology. By the 1950s, Kilby had successfully produced the first operational IC employing unique materials. At the same time, Noyce developed an IC using silicon, which provides a more practical approach.

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People made chips in the 1960s and 1970s with just a few tiny parts. They were called the Small-Scale Integration (SSI) and Medium-Scale Integration (MSI). These early ICs found applications in aerospace and military systems.

In the 1970s and 1980s, chips became even more valuable and powerful. The invention of Large-Scale Integration (LSI) and Very Large-Scale Integration (VLSI) marked a turning point in this development story. They could have thousands of parts on one chip. This led to the development of microprocessors and memory chips. As it developed, more powerful computers were created.

Later, the Ultra-Large-Scale Integration (ULSI) emerged in the 1990s, with chips containing millions of tiny parts like transistors. They kept getting smaller and better. Then, the System-on-Chip (SoC) design integrated various functions on a single chip, making chips start doing many things simultaneously. These led to the rise of smartphones, IoT devices, etc. As solid driving forces for the future IC industry, the ICs for Artificial Intelligence and the Internet of Things (AI/IoT) need massive capabilities and rapid development/manufacturing [5].

During this time, IC technology has transformed how we interact with the world. With each new day, they became smaller yet better in quality. It has turned people's imagination into reality. Now, almost all aspects of our lives have a deep connection with integrated circuit technology, which has become an essential milestone in our human civilization.

The development of IC was driven by many factors, including the need for increased efficiency, cost-effectiveness, and improved performance. Integrating multiple components on a single chip led to compact devices with enhanced capabilities. Additionally, the growing demand for portable electronics and the rapid evolution of industries contributed to the push for IC development.

The IC allows multiple transistors to operate simultaneously, resulting in faster data processing speeds. For example, the size gap is vast when comparing an early computer to a modern smartphone. Still, the processing speed of a modern smartphone may be faster, partly because of advances in IC technology. Previously, many electronic devices required many circuit boards and cables to connect the individual components. By using IC, all these components can be integrated on a tiny chip, saving space and reducing the size and weight of the device. For example, multiple functional modules within a computer, such as the processor, memory, and graphics processor, can now be integrated into a single chip, enabling a more compact design. Highly integrated ICs allow finer control, which reduces energy consumption. Transistors can be switched on and off more efficiently on an IC, allowing the device to consume less energy while performing a task. Modern smartphones, for example, can run longer with relatively small battery capacities, partly because of improved energy efficiency in IC technology.

In summary, IC technology improves devices' data processing speed, computing power, space utilization efficiency, and energy consumption efficiency through high integration and small size. These advantages make modern electronic devices more efficient. They pave the way for creating more powerful and intelligent technological devices.

4.2. Impact of IC

IC significantly impacts many fields, such as automation and how we communicate. In addition, IC has revolutionized medical equipment, transportation systems, and the entertainment industry. It promotes innovation and progress in various fields. Compared to the past, the precision and output of manufacturing are now improved. From automotive to electronics, the industry has adopted robots and devices with IC technology to control the quality of the products. This automation speeds up production, ensures consistent quality, and reduces errors and waste.

Nowadays, the popularity of smartphones, tablets, and wearables is connected with IC. The impact of wireless communications on our daily lives has been significant since they empower us to communicate voice, data, image, and video anywhere at any time. Today, wireless communications have evolved from traditional radio and TV broadcasting to a broad spectrum of exciting applications for bi-directional and interactive communications. These wireless communication applications include cellular systems and phones (GSM/GPRS/EDGE/CDMA/3G), wireless cable and wireless local area networks (Bluetooth. UWB - ultra wideband Wi-Fi), broadband wireless access (WiMAX), global

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position system (GPS), RFII), smart handheld devices, broadband satellite communication solutions, phased array RF system etc, Analog/mixed-signal (AMS)· and radio frequency (RF) integrated circuits (IC) are the critical and enabling elements for these wireless communications [6]. Regardless of distance or place, people may now always share ideas and complete commercial activities via these technologies. Therefore, A key engine propelling the semiconductor market growth in wireless communications is the continued advancement of analog/mixed-signal (AMS) and radio frequency (RF) integrated circuits (IC) [6]. Also, these technologies help create rapid data networks, allowing for real-time interaction, social media sharing, and digital amusement. For example, the advancement of IC technology has also brought about the rise of wearable devices, such as smart watches, health bracelets, and so on. These devices integrate sensors and IC chips that monitor our health, activity levels, and sleep quality. Through these devices, we can better understand our physical condition, set health goals, and monitor it in real time. This is important for maintaining a healthy lifestyle and preventing disease.

IC technology has also produced significant advances in the medical industry. Medical devices have become more sophisticated and accurate, improving diagnosis, treatment, and patient care. IC is critical to MRI devices, pacemakers, and blood sugar monitors. These devices provide precise measurements, real-time monitoring, and personalized treatment options. Sensors with IC technology can continuously monitor a patient's vital signs and transmit data to medical professionals for early intervention and active medical management. For example, the breakthroughs in ultrasound imaging in the 1950s were very impressive; it faced many poor performance issues like slow image acquisition, poor image quality, bulky equipment, and operator dependence. Therefore, in the subsequent decades, research efforts were directed toward three interdependent tracks of developing smaller and better-performing ultrasound transducers, ultrasound imaging integrated circuits (ICs) to improve portability and performance, and advanced signal processing algorithms to increase the visual clarity of ultrasound images. For the sake of brevity, some important pioneering works in tracks i) and ii) that are of particular interest to the microelectronics design community are highlighted. Firstly, the work pioneered the development of medical ultrasound imaging ICs to process real-time images from multiple phased arrays. The development of ultrasound ICs is a crucial step toward the miniaturization and integration of ultrasound systems and leverages the exponential progress in the CMOS industry (Moore's law). Secondly, outstanding contributions to developing a new class of ultrasound transducers – the capacitive micromachined ultrasound transducers (CMUTs)- can be seen. CMUT technology is a game changer and presents many advantages over traditional piezoelectric transducers, including greater bandwidth, ease of fabrication of large arrays, and better integration with CMOS circuits [7].

What's more, IC technology has also revolutionized transportation systems. For example, armed with multiple sensors, including cameras and GPS tech, autonomous cars gather critical information about their surroundings. Through cogent conclusions drawn via data analysis, such vehicles safeguard secure navigation. These innovations could transform metropolitan travel, lowering the risk of traffic accidents like car collisions. Besides, IC is essential for navigating aircraft and contributes significantly to increasing flight safety and accurate navigation.

In addition, IC technology has pushed the entertainment industry to new heights. Video games, virtual reality experiences, and immersive entertainment rely heavily on high-performance IC. Advanced Graphics Processing Unit (GPU) enables realistic visual effects and interactive experiences that appeal to a broad audience. Moreover, IC-powered streaming services would allow people to access and enjoy various content, from movies to music, anytime, anywhere on multiple devices. Social media platforms such as Facebook, Instagram, and WeChat allow us to share photos, messages, and life updates and stay socially connected. Besides, IC technology also has a positive impact on the field of education. Students can access rich learning resources through electronic devices and online learning platforms and participate in interactive learning and distance education. Electronic books, educational apps, and online courses have made learning more flexible and personalized, making knowledge more accessible. In short, the impact of IC on various industries is far-reaching and extensive. Later, we will also detail these applications in our daily lives.

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5. Applications of IC in daily life

5.1. Information technology field

5.1.1. Computers. Information is one of the most important strategic resources of human society. Human beings are inseparable from developing, processing, and utilizing information resources in all meaningful activities of understanding and transforming the world. Information technology is a general term for the various technologies used mainly to manage and process information. Ah especially applies computer science and communication technologies to design, develop, install, and implement information systems and application software. In today's rapidly developing information age, information technology, as a variety of technologies for managing and processing information, is one of the essential technical means for mankind to continue to develop. Of course, computers supported by information technology hardware are essential, Of course, computers supported by information technology hardware are essential. Still, the most critical technology in computers is integrated circuit technology, so integrated circuit technology has become a key technology in information technology. Since it is the most fundamental technical support in the entire field of information technology, it directly determines the development of the field of information technology. Suppose integrated circuit technology can provide an excellent central processing unit integrated circuit for the computer. In that case, the computer's processing speed will be considerable, so the management and processing speed of information will be significantly improved. When the computer's management and processing efficiency of information is improved, the development of information technology will be less limited by hardware problems, and it will also be better anti-war and better in the future. It can be seen that the application of integrated circuit technology in the field of information is the most critical technology in the field of information technology, so the further development and research of integrated circuit technology not only makes the technology innovative but also makes the development of the field of information technology better promoted.

5.1.2. Navigation and radar. Integrated circuits are widely used in communications, such as communication satellites, mobile phones, radars, etc.; China's self-developed "Beidou" navigation system is one of the typical examples. The "Beidou" navigation system is a satellite positioning system with independent intellectual property rights in China, known as the world's four major satellite navigation systems, together with the United States G P S, Russia's Gronas, and the EU's Galileo system. Its research success has broken the situation that the satellite positioning navigation application market is monopolized by foreign GPS. Not long ago, China successfully launched the second-generation Beidou navigation test satellite, which will form a network composed of 5 geostationary satellites and 30 non-geostationary orbit satellites in the future.

"Navigator-1", which will replace domestic and foreign chips in the "Beidou" navigation system, can also be widely used in sea, land, and air transportation, wired and wireless communications, geological exploration, resource investigation, forest fire prevention, medical emergency, maritime search and rescue, precision measurement, target monitoring, and other fields.

In recent years, with the rapid development of high and new technology, radar technology has ample space for development, and the relative balance between radar and anti-radar has been constantly broken. Active phased array is a new radar technology that has been rapidly developed in recent years, and it will become a pivotal technology to improve radar against fast, maneuvering, and stealth targets in harsh electromagnetic environments. Active phased array radar is a high-tech product integrating modern phased array theory, ultra-large-scale integrated circuits, high-speed computers, advanced solid-state devices, and optoelectronic technology.

In contrast, millimeter-wave radar has the characteristics of high guidance accuracy, strong anti-jamming ability, high Doppler resolution, and strong plasma penetration ability. Therefore, it is widely used in the final guidance, fuses, industry, medical and other aspects. Whether military or civilian, there

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is a vast demand for millimeter wave radar technology; long-range millimeter wave radar has a broad application prospect in the development of the aerospace industry and is a key means to solve the fine observation and accurate guidance of long-range, multi-batch, high-speed flight space targets. The millimeter-wave radar for various tactical and strategic applications can be expected to increase gradually.

5.2. Medical field

5.2.1. Portable medical devices. With the development of society and the continuous progress of science and technology, people have put forward higher and higher requirements for medical health, quality of life, disease care, and other aspects. At the same time, relying on the high-tech field of electronic technology for various treatment and monitoring means is becoming more and more advanced, but also makes medical products break through the constraints and restrictions of previous concepts; in the informatization, miniaturization, practical aspects have been extensively developed. Many experts started from the demand analysis of the medical and health field. They made a general analysis and discussion of the key technologies (status quo and prospects) used in the medical and health field from the perspective of integrated circuit technology.

As integrated circuits penetrate more and more into modern medicine, modern medicine has made significant progress. In terms of medical management, the IC card medical instrument management system is a typical representative. IC card medical instrument management system integrates I C card, monitoring, computer network management in one, card check, electronic automatic timing, and counting, and can realize recharge printing and report functions. Stable system performance and reliable operation; Control the critical parts of the medical outside, do not connect with the internal wiring of the medical instrument, do not affect the performance of the medical instrument, and do not produce any interference; The management machine and the intelligent bed are organically combined to analyze and count the times; The imaging system automatically recognizes and effectively solves the problem of patient review; Easily realize network management, you can check the file records at any time, and count the number of medical patients at any time.

Regarding health applications, temporary pacemakers have been widely used in clinical work and mature technology to treat transient bradyarrhythmias caused by various etiologies and transitional treatment before implanting permanent pacemakers. In non-cardiac surgical patients with bradycardia and conduction block, due to the influence of anesthesia, drugs, and surgery, bradycardia and conduction block can be aggravated during the perioperative period, increasing the risk of surgery and limiting the development of surgical operations and implantation of temporary pacemakers can effectively solve the above problems and improve the perioperative safety of such patients. At the same time, the aging of the world population also puts forward higher requirements for medical care products, and the current situation of the vast aging group and chronic patients makes the disease industry and the healthcare industry need to develop new technologies and products. Among them, medical electronic products based on integrated circuits have grown rapidly because they are often portable medical products. Due to the miniaturization, integration, networking, digitalization, and intelligence of integrated circuit devices, people are very convenient to carry and use. They are also suitable for personal or family use and can be popularized by the masses. For example, portable devices such as electronic hearing aids, electronic blood pressure monitors, and portable blood glucose meters have become common.

5.2.2. Primary medical equipment (MRI; X-ray machine). MRI machines, computed tomography scanners, ultrasound diagnostic machines, and X-ray machines are all essential medical equipment for various primary medical institutions. Magnetic resonance imaging is a new type of medical device that has a unique effect on treating many diseases. Magnetic resonance imaging (MRI) uses the principle of magnetic resonance imaging to place the human body in a strong and uniform static magnetic field through specific radio wave pulses to change the regional magnetic field, thereby stimulating the hydrogen nuclei in the human tissue to produce resonance phenomenon, and the magnetic moment

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change signal occurs. Because there are different tissues and components in the body, and the properties are also different, signals of different sizes are generated and then computerized and converted into images to present the cross-sectional tissue structure and lesions of the human body as tomographic images of various sections.

MRI can be performed on almost any part of the body, and the images are evident and delicate, especially the development of soft tissues, which is not comparable to any other medical imaging system. At present, commonly used MRI images are based on the nuclear magnetic resonance signals of various tissues; hydrogen is the most important component of human tissues, so MRI images can diagnose multiple diseases, including brain cancer, edema, blood infarction, unsheathing of nerves with abnormal distribution of fat, iron deposition diseases, bleeding, and abnormal contraction of myocardium.

The advantages of MRI, besides not needing to invade the human body, are that you can obtain any cross-sectional profile of various structural tissues of the human body and many other physical parameter information. MRI examination has not found any side effects on the human body for more than ten years at home and abroad. Integrated circuit technology is widely used in medical electronics, roughly divided into four categories: medical imaging, medical instruments, consumer medical equipment and diagnostics, patient monitoring and treatment equipment. The first category includes ultrasound, computerized X-ray tomography (i.e., CT), magnetic resonance imaging (i.e., MRI), X-rays, etc.; The second category mainly includes laboratory-supporting electronic equipment, dialysis instruments, analytical instruments, surgical equipment, dental equipment, etc.; The third category focuses on terminal devices patients use, including digital thermometers, blood glucose meters, blood pressure monitors, etc.; The fourth category is the corresponding equipment to assist doctors in judgment, including electrocardiograms, electroencephalograms, oximeters, blood pressure monitors, thermometers, defibrillators, etc. Of course, these four types are medical electronic equipment with integrated circuit technology as the core, which covers various applications in the field of medical electronics, of which the latter two types of applications need to achieve the goals of miniaturization, intelligence, low power consumption and high resolution of medical electronic equipment through advanced integrated circuit technology.

5.3. Other fields

Integrated circuit technology has a wide range of applications in other fields of daily life. For example, the application of automotive integrated circuit devices such as microcontrollers, power semiconductor devices, power management devices, LED drivers, and CCFL drivers enables automobiles to work optimally. For example, in thermal power engineering, the simplest is the temperature controller; of course, the information management system in the thermal power plant is inseparable from integrated circuit technology. We must mention that our daily lives and products related to integrated circuits can be found everywhere. Mobile phones, televisions, digital cameras, camcorders, etc., are getting closer and closer to our lives. With the advancement of technology and the development of society, mobile phones, with their unique communication functions, have increasingly become an essential tool for people to obtain information, learn knowledge, exchange ideas, and become an important platform for cultural communication. There are more than 500 million mobile phone users in China, forming a new culture such as websites, newspapers, and publications with mobile phones as the carrier. Mobile phone functions and styles are also constantly updated to adapt to the requirements of modern people's lives. Various mobile phones have come out one after another, from PHS to high-tech phones with camera functions; the mobile phone industry is shocking people's thinking and vision. In the process of social development with the simultaneous transformation of science, technology, and information, the dominating influence of television transmission on society is very obvious. Since television is a varied practice, technique, and technology, the home becomes a complex web of home technology. Just as electricity re-establishes new connections with the outside world through television, computers, and telecommunications technology, television reorganizes the family's time, space, leisure, and roles. As a result, television transmission has gradually integrated into public life, bringing about profound changes in people's lifestyles and values. With the acceleration of the pace of modern society, the increase in

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external entertainment costs, and the popularity of television transmission, people have provided sufficient reasons and conditions for staying at home, and they can feel the interpersonal communication brought by social conversation without leaving home.

6. Conclusion

In conclusion, developing the integrated circuit (IC) has been a journey of profound significance, reshaping the landscape of electronics and our daily lives. Throughout its history, IC has undergone a remarkable evolution. Humans use miniaturization and integration capabilities to achieve technological breakthroughs continuously. IC technology development has profoundly changed how individuals live, play, and work. It makes us more easily connected to the world and provides more choices and opportunities for individuals. As IC technology continues to evolve, we can expect more innovations to improve the life experience of individuals further. The journey of IC development is far from over. As we continue to embrace the challenges and opportunities presented by IC technology, we can look forward to a future connected and empowered by the remarkable capabilities of integrated circuits.

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