English for Electronics
and Information Technology

电子信息
专业英语

ESP

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前　言

当今世界，电子信息技术日新月异，作为该专业及相关专业的学生，很有必要提高自己的英语水平尤其是专业英语水平。唯有掌握了一定的语言技能，才能无障碍地阅读和翻译有关英文文献、资料，提高自己的学习、工作及科研水平。为了给同学们提供有针对性的学习材料，我们编写了这本《电子信息专业英语》。

本书内容编排由浅入深，将专业知识和语言学习有机结合，在突出本专业主流技术的基础上兼顾发展热点，充分体现了针对性、专业性以及实用性。希望同学们通过本书的学习，掌握电子信息专业及其相关专业的英文术语，扩大自己的词汇量；熟悉科技文献的英文表达特点，提高阅读理解能力。

全书共分为 9 个单元，每个单元包括两篇课文（附中文译文）、课后练习以及两篇阅读材料。语言难度适中，既照顾到基础相对薄弱的学生，也给那些学有余力的同学留有进步的空间。

在本书的编写过程中，我们得到了相关领导和部分同事的关心和支持，在此，向他们表示衷心的感谢。同时，我们对书中引用文章的作者致以真诚的谢意。

由于编者水平有限，加之时间仓促，书中难免会有一些错误和不足之处，恳请读者批评指正，以便今后改进。

编　者

2015 年 1 月

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Unit 1

The Development of Information Technology

Lesson 1 The History of Personal Computer

1. When was the first computer invented?
2. What is the function of a transistor?

"Who invented the computer?" is not a question with a simple answer. The real answer is that many inventors contributed to the history of computers and that a computer is a complex piece of machinery made up of many parts, each of which can be considered as a separate invention.

The real beginning of computer began with an English mathematics professor, Charles Babbage. Babbage's steam-powered Engine outlined the basic elements of a modern general purpose computer and was a breakthrough concept. The Analytical Engine consisted of over 50,000 components. The basic design included input devices in the form of perforated cards contained operating instructions and a "store" for memory of 1,000 numbers of up to 50 decimal digits long.

Another computer development spurred by the war was the Electronic Numerical Integrator and Computer (ENIAC). It consisted of 18,000 vacuum tubes, 70,000 resistors and 5 million soldered joints. The computer was such a massive piece of machinery that it consumed 160 kilowatts of electrical power.

ENIAC was developed by John Presper Eckert and John W. Mauchl. ENIAC was a general-purpose computer.

The invention of the transistor changed the computer's development greatly in 1948. The transistor which was at work in the computer by 1956 replaced the large, cumbersome vacuum tubes. Throughout the early 1960s, there were a number of commercially successful computers used in business, universities and government from companies, such as Burroughs, Honeywell, IBM, and others. These computers also contained transistors in place of vacuum tubes. They also contained all the components we associate with the modern day computer: printers, disk storage, memory, tape storage, operating systems, and stored programs.

Though transistors were clearly an improvement over the vacuum tube, they still generated a great deal of heat, which damaged the computer's sensitive internal parts. In 1958, the integrated circuit was developed. The IC combined three electronic components into a small silicon chip, which was made from quartz. Later, scientists managed to fit even more components on a single chip which was called a semiconductor.

By the 1980's, huge scale integration squeezed hundreds of thousands of components onto a chip. Ultra-large scale integration increased that number to millions. The ability to fit so much onto an area which is about half the size of a dime helped to diminish the size and price of computers. It also increased their capacity, efficiency and reliability. By the mid-1970s, computer manufacturers sought to bring computers to general consumers. These minicomputers brought complete user-friendly software packages that were offered to even non-technical users to arrange applications. The most popular application are word processing and spreadsheet programs.

In 1981, IBM introduced its personal computer (PC) for using in the home, office and schools. The 1980s saw an expansion in computer use in all three areas as the compatible machine of the IBM PC made the personal computer even more affordable. The number of personal computers more than doubled from 2 million in 1981 to 5.5 million in 1982. Ten years later, 65 million PCs were being used. As computers became more widespread in workplace, new ways to harness their potential were developed. As smaller computers became more and more powerful, they could be linked together, or networked to share memory space, software, information and communicate with each other. Computers continue to grow smaller and more powerful.

Lesson 2 The Subfield of Electronic Engineering

1. What is the electronic engineering?
2. What is the subfield of the electronic engineering?

Electronic engineering is an engineering discipline which utilizes non-linear and active electrical components (such as electron tubes, and semiconductor devices, especially transistors, diodes and integrated circuits) to design electronic circuits, devices and systems. The discipline typically also designs passive electrical components, usually based on printed circuit boards.

Electronic engineering has many subfields. This lesson describes some of the most popular subfields in electronic engineering. Although there are engineers who focus exclusively on one subfield, there are also many who focus on a combination of subfields.

Signal processing deals with the analysis and manipulation of signals. Signals can be either analog and vary continuously according to the information, or digital and vary according to a series of discrete values representing the information.

For analog signals, signal processing may involve the amplification and filtering of audio signals for audio equipment or the modulation and demodulation of signals for telecommunications. For digital signals, signal processing may involve the compression, error checking and error detection of digital signals.

Telecommunications engineering deals with the transmission of information across a channel such as a co-axial cable, optical fiber or free space.

Transmissions across free space require information to be encoded in a carrier wave in order to shift the information to a carrier frequency suitable for transmission, and this is known as modulation. Popular analog modulation techniques include amplitude modulation and frequency modulation. The choice of modulation affects the cost and performance of a system and these two factors must be balanced carefully by the engineer.

Once the transmission characteristics of a system are determined, telecommunication engineers design the transmitters and receivers needed for such systems. These two are sometimes combined to form a two-way communication device known as a transceiver. A key consideration in the design of transmitters is their power consumption as this is closely related to their signal strength. If the signal strength of a transmitter is insufficient, the signal's information will be corrupted by noise.

Control engineering has a wide range of applications from the flight and propulsion systems of commercial airplanes to the cruise control on many modern cars. It also plays an important role in industrial automation.

Control engineers often utilize feedback when designing control systems. For example, in a car with cruise control the vehicle's speed is continuously monitored and fed back to the system which adjusts the engine's power output accordingly. Where there is regular feedback, control theory can be used to determine how the system responds to such feedback.

Instrumentation engineering deals with the design of devices to measure physical quantities such as pressure, flow and temperature. These devices are known as instrumentation.

The design of such instrumentation requires a good understanding of physics that often extends beyond electromagnetic theory. For example, radar guns use the Doppler effect to measure the speed of coming vehicles. Similarly, thermocouples use the Peltier-Seebeck effect to measure the temperature difference between two points.

Often instrumentation is not used by itself, but as the sensors of larger electrical systems. For example, a thermocouple might be used to help ensure a furnace's temperature remains constant. For this reason, instrumentation engineering is often viewed as the counterpart of control engineering.

Computer engineering deals with the design of computers and computer systems. This may involve the design of new computer hardware, the design of PDAs or the use of computers to control an industrial plant. Development of embedded systems made for specific tasks (e.g., mobile phones) is also included in this field. This field includes the micro controller and its applications. Computer engineers may also work on a system's software. However, the design of complex software systems is often the domain of software engineering, which is usually considered a separate discipline.

New Words and Expressions

mathematic [ˌmæθɪ'mætɪk] 数学的，精确的
breakthrough ['breɪkθru:] 突破
concept ['kɒnsept] 观念，概念
perforate ['pɜ:fəreɪt] 穿孔于，在……上打眼
decimal ['desɪml] 十进位的，小数的
joint [dʒɔɪnt] 关节
kilowatt ['kɪləwɒt] [电]千瓦
transistor [træn'zɪstə(r)] 晶体管
cumbersome ['kʌmbəsəm] 笨重的，累赘的
associate [ə'səʊʃieɪt] 联合，结交
manufacture [ˌmænjʊ'fæktʃə(r)] 制造，生产
silicon ['sɪlɪkən] 硅
quartz [kwɔ:ts] 石英
semiconductor [ˌsemikən'dʌktə(r)] 半导体
diminish [dɪ'mɪnɪʃ] 减少，缩小
spreadsheet ['spredʃi:t] 电子制表软件，电子数据表
expansion [ɪk'spænʃn] 扩大，扩张
affordable [ə'fɔ:dəbl] 负担得起的
widespread ['waɪdspred] 广泛的，普遍的
engineer [ˌendʒɪ'nɪə(r)] 工程师

integration [ˌɪntɪ'greɪʃn] 结合，整合

trend [trend] 走向，趋势

proceed [prə'siːd] 进行，前进

category ['kætəgəri] 类型，部门，种类

safeguard ['seɪfgɑːd] 保护，保卫

commerce ['kɒmɜːs] 商业，商务

manipulation [məˌnɪpjʊ'leɪʃn] 操作，操纵

discrete [dɪ'skriːt] 离散的

amplification [ˌæmplɪfɪ'keɪʃn] 放大

modulation [ˌmɒdjʊ'leɪʃn] 调制，调幅度

compression [kəm'preʃn] 压缩，压紧

telecommunication [ˌtelɪkəˌmjuːnɪ'keɪʃn] 电信

optical ['ɒptɪkl] 光学的

corrupt [kə'rʌpt] 堕落，腐化

cruise [kruːz] 巡游，漫游

vehicle ['viːəkl] 车辆

thermocouple ['θɜːmə'kʌpl] 热电偶

embed [ɪm'bed] 嵌入的

vacuum tube 真空管

PC（personal computer）个人计算机

IBM（International Business Machines Corporation）国际商业机器公司

electronic information engineering 电子信息工程

Exercises

1. Please translate the following sentences into Chinese.

(1) Though transistors were clearly an improvement over the vacuum tube, they still generated a great deal of heat, which damaged the computer's sensitive internal parts.

(2) Signal processing deals with the analysis and manipulation of signals. Signals can be either analog and vary continuously according to the information, or digital and vary according to a series of discrete values

representing the information.

2. Please translate the following sentences into English.

(1) 1948年，晶体管的发明极大地改变了计算机的发展。1956年，晶体管被用在电脑上，取代了既大又笨重的真空管。二十世纪六十年代初，一些成功的商业计算机被应用在企业、学校和政府。

(2) 信号处理包括信号分析和处理。信号可以是模拟的，在这种情况下，根据信息而连续变化；或数字的，在这种情况下，根据一系列代表信息的离散值而变化。

Reading Material

1 The History of the Internet

The Internet developed in the 1950s. Firstly, it was point-to-point communication between mainframe computers and terminals. And then, this expanded to point-to-point connections between computers and early research into packet switching. Packet switched networks such as ARPANET, Mark I at NPL in the UK, CYCLADES, Merit Network, Tymnet, and Telenet were developed in the late 1960s and early 1970s using a variety of protocols. The ARPANET in particular led to the development of protocols for inter-networking, where multiple separate networks could be joined together into a network of networks.

In 1982 the Internet Protocol Suite (TCP/IP) was standardized and the concept of a world wide network of fully interconnected TCP/IP networks called the Internet was introduced. Access to the ARPANET was expanded in 1981 when the National Science Foundation (NSF) developed the Computer Science Network (CSNET) and again in 1986 when NSFNET provided access to supercomputer sites in the United States from research and education organizations. Commercial internet service providers (ISPs) began to emerge in the late 1980s and 1990s. The ARPANET was decommissioned in 1990. The Internet was commercialized in 1995 when NSFNET was decommissioned, removing the last restrictions on the use of the Internet to carry commercial traffic.

Since the mid-1990s the Internet has had a drastic impact on culture and commerce, including the rise of near-instant communication by electronic mail, instant messaging, Voice over Internet Protocol (VoIP) "phone calls", two-way interactive video calls, and the World Wide Web with its discussion forums, blogs, social networking, and online shopping sites. The research and education community continue to develop and use advanced networks such as NSF's very high speed Backbone Network Service (vBNS), Internet2, and National LambdaRail. Increasing amounts of data are transmitted at higher and higher speeds over fiber optic networks operating at 1-Gbit/s, 10-Gbit/s, or more. The Internet continues to grow, driven by even greater amounts of online information and knowledge, commerce, entertainment and social networking.

It is estimated that in 1993 the Internet carried only 1% of the information flowing through two-way telecommunication. By 2000, this figure had grown to 51%, and by 2007, more than 97% of all telecommunicated information was carried over the Internet.

2 Wireless Networking

Wireless networking is a significant challenge. The network must be able to locate a given user wherever it is among billions of globally-distributed mobile terminals. It must then route a call to that user as it moves at speed of up to 100 Km/h. The finite resources of the network must be allocated in a fair and efficient manner relative to changing user demands and locations. Moreover, there currently exists a tremendous infrastructure of wired networks: the telephone system, the Internet, and fiber optic cable, which should be used to connect wireless systems together into a global network. However, wireless systems with mobile users will never be able to compete with wired systems in terms of data rates and reliability. Interfacing between wireless and wired networks with vastly different performance capabilities is a difficult problem.

Perhaps the most significant technical challenge in wireless network design is an overhaul of the design process itself. Wired networks are mostly designed according to a layered approach, whereby protocols associated with different layers of the system operation are designed in isolation, with baseline mechanisms to interface between layers. The layers in a wireless systems include the link or physical layer, which handles bit transmissions over the communications medium, the access layer, which handles shared access to the communications medium, the network and transport layers, which routes data across the network and insure end-to-end connectivity and data delivery, and the application layer, which dictates the end-to-end data rates and delay constraints associated with the application. While a layering methodology reduces complexity and facilitates modularity and standardization, it also leads to inefficiency and performance loss due to the lack of a global design optimization. The large capacity and good reliability of wired networks make these inefficiencies relatively benign for many wired network applications, although it does preclude good performance of delay-constrained applications such as voice and video. The situation is very different in a wireless network. Wireless links can exhibit very poor performance, and this performance along with user connectivity and network topology changes over time. In fact, the very notion of a wireless link is somewhat fuzzy due to the nature of radio propagation and broadcasting. The dynamic nature and poor performance of the underlying wireless communication channel indicates that high-performance networks must be optimized for this channel and must be robust and adaptive to its variations, as well as to network dynamics. Thus, these networks require integrated and adaptive protocols at all layers, from the link layer to the application layer. This cross-layer protocol design requires interdiciplinary expertise in communications, signal processing, and network theory and design.

参考译文：

第一课　个人计算机的历史

“谁发明了电脑？”这个问题没有简单的答案。真正的答案是，许多发明家对计算机做出了贡献。计算机是一个复杂的机器，由许多部件组成，每一个部件都可以被视为一个单独的发明。

电脑真正开始于英国的数学教授查尔斯·巴贝奇。巴贝奇的蒸汽分析机是一个突破性的概念，概述了现代通用计算机的基本要素。分析机由 50 000 个部件组成。基本设计包括含有操作指令的穿孔卡片形式的输入装置，以及一个可“存储”1 000 位数即可达 50 位十进制的记忆。

战争促使计算机的另一个发展是电子数字积分计算机（ENIAC）的产生。它由 18 000 个真空管、70 000 个电阻和 5 000 000 个焊点组成。这个电脑如此巨大，以致它能消耗 160 千瓦的电力。ENIAC 是一台通用计算机，是由 John Presper Eckert 和 John W. Mauchl 研发的。

1948 年，晶体管的发明极大地改变了计算机的发展历程。1956 年，晶体管被应用在电脑中，取代了既大又笨重的真空管。二十世纪六十年代初，一些成功的商业计算机应用于企业、学校和政府，它们来自于 IBM、宝来以及其他公司。这些计算机也包含取代了真空管的晶体管。他们还包含了现代计算机的部件，如打印机、硬盘、内存、磁带存储、操作系统和存储的程序。

尽管晶体管明显优于真空管，但它们仍然会产生大量的热，这些热量会损害计算机内部的敏感部件。1958 年，集成电路被发明。它将三个电子元件集成到一个由石英制造的小硅片上。后来，科学家设法将更多的元件集成到一个芯片上，这个芯片称为半导体。

二十世纪八十年代，大规模集成电路将数十万个元件集成在一个芯片上。超大规模集成将这一数字增加到数百万计。能够容纳这么多元件到一角硬币一半大小的面积上减少了计算机的体积和价格，同时也增加了它们的能力、效率和可靠性。二十世纪七十年代中期，电脑制造商致力于把计算机推向一般的消费者。这些小型计算机具有完备的用户友好的软件包，提供非技术用户应用程序的安排，最流行的是文字处理和电子表格程序。