计算机与通信专业英语

（修订第三版）

徐秀兰／主编

ENGLISH

FOR COMPUTERS AND TELECOMMUNICATIONS

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内容简介

本书主要取材于上世纪90年代以后国外发表的共40余种最新材料。内容广泛，语言现象丰富。所选内容既有基础理论，又尽量跟踪最近两三年内公众关心的热点与新技术。教材内容基本能覆盖计算机、通信这两个专业常用的技术词汇、词组及常见的科技语法。

教材的编写对于所选专题除正文外，还列出了较多的关键字、注释、习题及部分参考译文。对于某些较难的语法现象，除给出相应的参考译文外还对语法现象予以分析。在本书的最后还附有习题解答及生词表，以供读者快速查阅。

本书可作为计算机与通信两个专业学生的英语教材，也可供其他工程专业作为专业英语教材或参考书，还可作为从事计算机、通信、信息等工作的技术人员的自学教材或参考书。

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前　　言

自 1995 年本书的初版问世，到此次的修订第三版与读者见面共换了四个版本，印刷了七次，发行量为两万八千册，该书的修订版已在 2000 年被评为我校的优秀教材，而修订第二版已被推荐为全国优秀教材，现正在审批中。该书受到读者如此之厚爱，使编者深受鼓舞。因此，在编写时总是兢兢业业，力图在内容选材上下功夫，尽量将有关技术的新进展奉献给读者，使读者在提高英语水平的同时，能获得相应的新知识。

由于近两年在计算与通信技术方面的许多新技术都向纵深发展，因此，在本版中，淘汰了一些相对陈旧的内容而代之以该领域的新进展。如向读者介绍了未来的崭新计算模式——普适计算（有些译为普及计算）；又如 ISDN 一章完全以 BISDN 代替，GSM 一章为个人无线通信（包括 CDMA 技术）所取代；原来的 Internet 网一章也完全得到更新，并适当介绍了下一代 Internet 网及其新协议 IPv6；在应用方面，则增加了模式识别一章（因为它是计算机识别技术在各个方面应用的基础理论，应用极广）；在图像处理方面淘汰了部分过时的内容，而增加了计算机图形学的一些基本概念；光通信一章删除了关于光通信发展历史背景的介绍面代之以 DWDM 技术。

由于半导体计算机已经快要完成其历史使命，21 世纪将是光计算机、量子计算机、DNA 计算机的新世纪，尽管这些技术目前还不够成熟，但也应予以关注。因此，在本书的最后一章对这方面的进展也作了一些概略的介绍，藉以扩大读者的视野。

在编写上，则保留了本书的原有风格，即对课文中出现的大量生词及词组作出注解以尽可能帮助读者从不同的角度来理解。对文中出现的各种缩略词也一一作了介绍。在对课文中较难词句的注解上，除给出句子的参考译文外，还尽可能对句子的结构作出必要的分析。此外，在书的末尾给出了生词速查表以利于读者查找。

经过两年来的教学实践，编者对原修订第二版中出现的个别疏漏和不妥之处进行了更正，对所有的习题解答也进行了全面的核对和修改，所附的词汇表也进行了相应的重新加工。

本书由徐秀兰同志担任主编并完成第 1，2，3，4，5，6，7，8，9，10，11，12，13，14，19，20 等 16 个单元的编写，徐劲同志担任第 15，16，17 等 3 个单元的编写，第 18 单元由李程同志完成。全书注解主要由徐秀兰同志编写。在原修订第二版中未更动处则连同注解悉予保留。徐秀兰同志担任了全书的统稿工作。在本书的出版中，杨燕群同志协助了书稿的部分输入。在此，编者向所有为本书作出过贡献的同志表示感谢。

在本书出版过程中，虽经反复核对及修改，但限于编者水平，各种错误仍难以避免。不足之处，恳请读者批评指正。

编　者

2002 年 8 月于北京

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UNIT 1

A New Computing Model—Pervasive (Ubiquitous) Computing

1-1 What is Pervasive Computing?

Pervasive computing has its goal as the enhancing computer use by making many computers available throughout the physical environment, but making them effectively invisible to the user. A number of researchers around the world are now working in the pervasive computing framework. Their work impacts all areas of computer science, including hardware components (e.g. chips), network protocols, interaction substrates (e.g. software for screens and pens), applications, privacy, and computational methods.

Pervasive computing is not virtual reality, it is not a Personal Digital Assistant (PDA) such as Apple's Newton, it is not a personal or intimate computer with agents doing your bidding. Unlike virtual reality, pervasive computing endeavers to integrate information displays into the everyday physical world. It considers the nuances of the real world to be wonderful, and aims only to augment them. Unlike PDA's, pervasive computing envisions a world of fully connected devices, with cheap wireless networks everywhere; unlike PDA's, it postulates that you need not carry anything with you, since information will be accessable everywhere. Unlike the intimate agent computer that responds to one's voice and is a personal friend and assistant, pervasive computing envisions computation primarily in the background where it may not even be noticed. Whereas the intimate computer does your bidding, the pervasive computer leaves you feeling as though you did it yourself.

Pervasive computing is exploring quite different ground from Personal Digital Assistants, or the idea that computers should be autonomous agents that take on our goals?[1] The difference can be characterized as follows. Suppose you want to lift a heavy chject. You can call in your strong assistant to lift it for you, or you can be yourself made effortlessly, unconsciously, stronger and just lift it. There are times when both are good. Much of the past and current effort for better computers has been aimed at the former; pervasive computing aims at the latter.

The approach the researchers took was to attempt the definition and construction of new computing artifacts for use in everyday life. They took their inspiration from the everyday objects found in offices and homes, in particular those objects whose purpose is to capture or convey information. The most pervasive current informational technology embodied in artifacts is the use of written symbols, primarily words, but including also pictographs, clocks, and other sorts of symbolic communication. Rather than attempting to reproduce these objects inside the virtual computer world, leadig to another "desktop model", instead the new kind of computer will also be put out in this world of concrete information conveyers.[2] And because these written artifacts occur in many different sizes and shapes, with many different affordances, so the computer embodiments to be of many sizes and shapes, including tiny inexpensive ones that could bring computing to everyone.

Pervasive computing gives us tools to manage information easily. Information is the new currency of the global economy. We increasingly rely on the electronic creation, storage, and transmittal of personal, financial, and other confidential information, and demand the highest security for all these transactions. We require complete access to time-sensitive data, regardless of physical location. We expect devices—personal digital assistants, mobile phones, office PCs and home entertainment systems—to access that information and work together in one seamless, integrated system. Pervasive computing can help us manage information quickly, efficiently, and effortlessly.

Pervasive computing is about making our lives simpler. Pervasive computing aims to enable people to accomplish an increasing number of personal and professional transactions using a new class of intelligent and portable devices. It gives people convenient access to relevant information stored on powerful networks, allowing them to easily take action anywhere, anytime.

These new intelligent appliances or "smart devices" are embedded with microprocessors that allow users to plug into intelligent networks and gain direct, simple, and secure access to both relevant information and services. These devices are as simple to use as calculators, telephones or kitchen toasters.

Pervasive computing simplifies life by combining open standards-based applications with everyday activities. It removes the complexity of new technologies, enables us to be more efficient in our work and leaves us more leisure time. Computing is no longer a discrete activity bound to a desktop; pervasive computing is fast becoming a part of everyday life.

Key words

affordance	可提供的(设备或物体)
appliance	器具，仪表，设备
artifact	产品，人工制品
augment	放大，增强
bidding	吩咐，命令
confidential	保密的，机密
embody	具体表现(思想感情等)
endeavor	努力，尽力，企图
framework	框架，主机，结构
intimite	宣布，明白表示
nuance	意义，意见，颜色等方面的细微差别
PDA: Personal Digital Assistant	个人数字助理
pervasive	遍布的，弥漫的，渗透的
pictograph	象形文字，统计图

postulate	假定，条件，主张，假设前提
seamless	天衣无缝，圆满的
substrate	衬底，基底，基件
take…from…	离开，移去，使退出
transaction	事务，交易
ubiquitous	无所不在的，普遍存在的

Notes

1. Pervasive computing is exploring quite different ground from Personal Digital Assistants, or idea that computers should be autonomous agents that take on our goals.
   这是一个带有两级定语从句的主从复合句。第一个 that 引导的定语从句修饰 pervasive computing。第二个 that 引导的定语从句修饰 agents。全句意思请见参考译文。
2. Rather than attempting to reproduce these objects inside the virtual computer world, leading to another "desktop model", instead the new kind of computer will also be put out in this world of concrete information conveyers.
   本句的主句是：instead 后面引导的一个句子，即：the new kind of computer will also be put out in this world of concrete information conveyers. 而 Rather than…后面引导的是一个分词短语，起方式状语作用，意为"不是…"。全句意思请见参考译文。

1-2 Challenges to Pervasive Computing

Getting the computer out of the way is not easy. This is not a graphical user interface (GUI) problem, but is a property of the whole context of usage of the machine and the affordances of its physical properties: the keyboard, the weight and desktop position of screens, and so on. The problem is not of "interface". For the same reason of context, this was not a multimedia problem, resulting from any particular deficiency in the ability to display contains kinds of realtime data or integrate them into applications. (Indeed, multimedia tries to grab attention, the opposite of the pervasive computing ideal of invisibility). The challenge is to create a new kind of relationship of people to computers, one in which the computer would have to take the lead in becoming vastly better at getting out of the way so people could just go about their lives.[1]

Work on pervasive computing is still at an early phase. Most work now is concentrating on the mobile infrastructure for wireless networking. Because pervasive computing envisions hundreds of wireless computers in every office, its need for wireless bandwidth is prodigious. For instance, I work in a not-very-large building with 300 other people. If each of us has 100 wireless devices in our offices, each demanding 256 kbits/sec, we are using 7.5 gigabits of aggregate bandwidth in a single building. This is difficult to achieve with currently envisioned wireless technologies.

A second challenge of the mobile infrastructure is handling mobility. Networking developed over the past twenty years with the assumption that a machine's name, and its network address, were unvarying.

However, once a computer can move from network to network this assumption is false. Existing protocols such as TCP/IP and OSI are unprepared for to handle machine mobility without change. A number of committees and researchers are now working on methods of augmenting or replacing existing protocols to handle mobility.

A third challenge of the mobile infrastructure is window systems. Most window systems, such as those for the Macintosh and for DOS, are not able to open remote windows over a network. Even window systems designed for networking, such as X, have built into them assumptions about the mobility of people. The X window system protocol, for instance, makes it very difficult to migrate the window of a running application from one screen to another, although this is just what a person traveling from their office to a meeting might want.[2]

This then is phase I of ubiquitous computing: to construct, deploy, and learn from a computing environment consisting of tabs, pads, and boards. This is only phase I, because it is unlikely to achieve optimal invisibility. (Later phases are yet to be determined). But it is a start down the radical direction, for computer science, away from attention on the machine and back on the person and his or her life in the world of work, play, and home.

Key words

aggregate	汇聚，聚集
deficiency	缺点，缺陷，不足
get out of sth.	逐渐放弃…
go about	四处走动，走来走去
pad	拍子簿，印色盒
prodigious	巨大的，大得惊人的
radically	根本上
tab	标签，垂片，垂圈

Notes

1. The challenge is to create a new kind of relationship of people to computers, one in which the computer would have to take the lead in becoming vastly better at getting out of the way so people could just go about their lives.
本句为一个主从复合句。第一个逗号之前的部分为主句，逗号之后的代词 one 指主句中的 new kind of relationship。in which 引导的是一个定语从句，它对 one 作进一步说明。so 引导的是一个结果状语从句。全句可译为：困难（指普适计算）在于创建一种新型的人与计算机的关系，这种关系使计算机在摈弃并大大优于原有的计算方式中占主导地位，因而人们能够在生活中随意使用。
2. The X window system protocol, for instance, makes it very difficult to migrate the window of a running application from one screen to another, although this is just what a person traveling from their office to a meeting might want.

这是一个主从复合句，although 引导的是一个让步状语从句。全句可译为：举例说 X Window 协议使得将一个运行着的应用程序窗口从一个屏幕移到另一个是非常困难的，然而这恰恰是一个人走出他们的办公室去参加一个会议时所需要的。

1-3 Turning Pervasive Computing into Mediated Spaces

With pervasive computing, we envision a future in which computation becomes part of the environment. The computer forms (workstation, personal computer, personal digital assistant, game player) through which we now relate to computation will occupy only a small niche in this new computational world. Our relationship with pervasive computing will differ radically from our current relationship with computers. When computation becomes part of the environment, most human-computer interaction will be implicit, and it will have to take account of physical space. Physical space rarely matters in current human-computer interaction; but as computational devices become part of furniture, walls, and clothing, physical space becomes a necessary consideration. First, more than one person can occupy a space. Second, individuals within the space are doing things other than interacting with the computer: coming and going, and perhaps most strikingly, interacting with each other—not just with the computer. Finally, physical space provides a sense of place: individuals associate places with events and recurrent activities.

The emerging relationship between people and pervasive computation is sometimes idealized as a "smart space": the seamless integration of people, computation, and physical reality. This paper focuses on a particnlar kind of smart space, the "mediated space," in which the space understands and participates in multiperson interaction. Mediated spaces will expand human capability by providing information management within a context associated with that space. The context will be created by recording interaction within the space and by importing information from the outside. Individuals will interact with the space explicitly in order to retrieve and analyze the information it contains, and implicitly by adding to the context through their speech and gesture. Achieving the vision of mediated spaces will require progress in both behind-the-scenes technology (how devices coordinate their activities) and at-the-interface technology (how the space presents itself to people, and how the space deals with multiperson interaction). This paper explores the research challenges in both of these areas, examining the behind-the-scenes requirements of device or manifestation description and context maintenance, as well as the interface problems of metaphor and understanding natural human-to-human spoken interaction.

The pervasive computing revolution will surely occur: computation will be embodied in things, not computers. We can already put computation almost anywhere. Embedded computation controls braking and acceleration in our cars, defines the capability of medical instruments, and runs virtually all machinery. Hand-held devices (especially cell phones and pagers) are commonplace; serious computational wristwatches and other wearables are becoming practical; computational furniture and rooms are demonstrable. Relentless progress in semiconductor technology, low-power design, and wireless technology will make embedded computation less and less obtrusive.[1] Computation is ready to disappear into the environment.

But what will *it all mean*? The nature of our relationship to computation in its pervasive form will necessarily be different from our relationship to computation in its current form. The first key difference is the explicitness of the computational task. Presently people think in terms of performing explicit tasks "on the computer"—creating documents, sending e-mail, and so on. When computation is part of the environment, this comfortable explicitness will disappear. Individuals will do whatever they normally do: move around, use objects, see and talk to each other. The computation in the environment may be able to facilitate these actions, and individuals may come to expect certain services, but they will usually not be doing things "on the computer".

We see the beginnings of this form of interaction with existing embedded computers. For example, an automatic braking system engages when the driver performs the normal action of pushing the brake pedal. The "automatic" is significant: the computation is implicit—braking simply works better (most of the time) and we do not care how. Currently this form of interaction is extremely limited. We allow it only when our intent is unambiguous and when the computer can clearly do the job better than we can. In order to take advantage of pervasive computing, we must he able to greatly expand this form of interaction. Implicit computation will be available everywhere; we need to figure out how to interact with it.

A second key difference in the pervasive computing world is the importance of physical space. Current computers obviously occupy physical space, but this is usually irrelevant. Apart from dealing with limitations of "screen real estate" and ergonomic considerations of head and hand positioning, most computer interface design has nothing to do with physical space. With very rare exceptions, conventional computer interfaces are unaware of the presence, much less the identity, of human beings.[2]

When computation is part of the environment, it will be part of everyday physical space. This single shift radically changes the relationship between humans and computation—from a fairly static single-user location-independent world to a dynamic multiperson situated environment.[3] First, pervasive computation environments are necessarily dynamic with respect to their human users. Individuals move around in space, changing position and visual focus, coming and going. Second, more than one person can occupy a space. When more than one person is in a space, they tend to interact with each other. Finally, the physical location of the computation—or more precisely the interface to the computation—becomes relevant. Computer users are currently encouraged to disassociate computation from location: information is available from any tap; "the network is the computer." While this is a valuable viewpoint that will certainly continue in the pervasive computing world, it is based on the separation between computers and real things. A computer is an artificial entity; it does not matter very much where it is, especially in a networked world. This is very different from a computational desk or conference room table, where the interface is part nf a specific spatial environment that has other attributes and associations. Individuals associate places with events ("you were sitting right there when I told you that") and recurrent activities (the conference room, my office, my favorite store for children's clothing).

Key words

accelerate	加速
ambiguous	含糊不清的，可能有两种以上的意义
brake pedal	制动踏板，刹车板
cell phone	蜂窝电话
engage	雇佣，允诺，担保
ergonomic	人机工程
estate	地产，不动产，状况
explicit	明白的，明确的
figure out	想出，理解，指望，料想
gesture	手势，姿势
implicit	暗示的，含蓄的，隐含的
manifestation	显示，表明，明白表示的言行
mediated	中间的，居中调停的
metaphor	暗喻，隐喻
niche	壁龛，适当的位置
obtrusive	强入的，闯入的
pager	寻呼机
recurrent	经常发生的，周期性发生的
strikingly	引人注意的，显著的，惊人的
tap	分接头，抽头，三通头

Notes

1. Relentless progress in semiconductor technology, low-power design, and wireless technology will make embedded computation less and less obtrusive.
此处的"less and less obtrusive"意为：强迫性越来越少。全句可译为：在半导体技术，低能耗设计，以及无线技术方面的无情的进步使得嵌入式计算变得越来越自然。

2. With very rare exceptions, conventional computer interfaces are unaware of the presence, much less the identity, of human beings.
此句可译为：除极少数例外，常规计算机的接口不理会它(指物理空间)的存在，而远比人的识别能力差。

3. This single shift radically changes the relationship between humans and computation —from a fairly static single-user location-independent world to a dynamic multiperson situated environment.
这是一个简单句，破折号后面的短语对原句中的 relationship 作进一步的说明。全句可译为：这种简单的变化从根本上改变了人与计算的关系——从一个相当静态的单用户，独立于位置的世界变到一种动态的多人参与的环境。

Reading Matrials: Smart Spaces and Hardware Prototypes

Ⅰ. Smart Spaces

The relationship between people and pervasive computation that ought to come into being is a seamless integration of people, computation, and physical reality: a "smart space". The concept of a smart space has a long history in computer science. In the early 1960s Dong Engelbart at Stanford Research Institute (now SRI International) was exploring the concepts of human-computer systems that could augment human capability, especially humans working in groups. Although this work is most famous for the mouse interface, its primary contribution is probably the "smart space" vision that still informs the research community. The "Media Room" project developed by the MIT (Massachusetts Institute of Technology) Architecture Machine Group in the mid-1970s explored the concept of users interacting with room-sized computational environments. The result was a new human-computer interface based on the combination of speech and gesture input, and text and graphics output.

A decade later, Mark Weiser and his colleagues at Xerox PARC (Palo Alto Research Center) were investigating a different paradigm in which spaces consist of invisibly computational objects, objects that embody computational extensions of their originals (smart Post-it * * notes, badges, pads, etc.). People perform tasks primarily through interaction with these smart devices as they move through their day. Unlike the Media Room concept, explicit interaction with the computer is meant to be minimal to nonexistent. In the "ubiquitous computing" world envisioned by Weiser, people interact with computational entities pretty much the way they interact with physical entities, not tha way they interact with other people.

As the technology of pervasive computing has improved, research in this area has flourished, producing significant interactive environments based on these earlier concepts. For example, Michael Coen's "Intelligent Room" and more recent "Hal" are intellectual descendants of the Media Room; both are conference rooms that track the people in them and understand commands as combinations of speech and gesture input. The goal is to expand the boundaries of human-computer interaction, moving toward human-human or even human-superhuman interaction patterns between people and computers. The MIT Media Lab's "Things That Think" project shares much of the heritage of ubiquitous computing. The "Smart Rooms" of Sandy Pentland and colleagues have a similar point of departure, but additionally create complex three-dimensioual information environments that make use of human spatial reasoning capability. Smart Rooms, and Pentland and Liu's "Smart Car," also focus on inferring human intentions through their actions in order to provide enhanced interaction. The "Tangible Bits" approach nf Hiroshi Ishil et al. pushes still further on the boundaries of human-computer interaction, following the ubiquitous computing patialigm into physical and ambient interfaces.

These smart-space approaches are about humans dealing directly (even if implicitly) with computers to accomplish tasks. They mostly ignore the interpersonal interactions of people in the space, e.g., "in

general, the room ignores spoken utterances from the lapel microphones not specifically directed to it."
This is an important simplifying assumption that makes implementation tractable, but it also defines the smartness of the space in terms of human-computer interaction: the capability of the space to understand what people are trying to tell it.

Ⅱ. Hardware Prototypes

New hardware systems design for pervasive computing has been oriented towards experimental platforms for systems and applications of invisibility. New chips have been less important than combinations of existing components that create experimental opportunities. The first pervasive computing technology to be deployed was the Liveboard [Elrod 92], which is now a Xerox product. Two other important pieces of prototype hardware supporting our research at PARC are the Tab and the Pad.

Tab

The ParcTab is a tiny information doorway. For user interaction it has a pressure sensitive screen on top of the display, three buttons underneath the natural finger positions, and the ability to sense its position within a building. The display and touchpad it uses are standard commercial units.

The key hardware design problems in the pad are size and power consumption. With several dozens of these devices sitting around the office, in briefcases, in pockets, one cannot change their batteries every week. The PARC design uses the 8051 to control detailed interactions, and includes software that keeps power usage down. The major outboard components are a smll analog/digital converter for the pressure sensitive screen, and analog sense circuitry for the IR receiver. Interestingly, although we have been approached by several chip manufacturers about our possible need for custom chips for the Tab, the Tab is not short of places to put chips. The display size leaves plenty of room, and the display thickness dominates total size. Off-the-shelf components are more than adequate for exploring this design space, even with our severe size, weight, and power constraints.

A key part of our design philosophy is to put devices in everyday use, not just demonstrate them. We can only use techniques suitable for quantity 100 replication, which excludes certain things that could make a huge difference, such as the integration of components onto the display surface itself. This technology, being explored at PARC, ISI, and TI, while very promising, is not yet ready for replication.

The Tab architecture is carefully balanced among display size, bandwidth, processing, and memory. For instance, the small display means that even the tiny processor is capable of four frame/sec video to it, and the IR bandwidth is capable of delivering this. The bandwidth is also such that the processor can actually time the pulse widths in software timing loops. Our current design has insufficient storage, and we are increasing the amount of non-volatile RAM in future tabs from 8k to 128k. The tab's goal of postit-note-like casual use puts it into a design space generally unexplored in the commercial or research sector.

Pad

The pad is really a family of notebook-sized devices. Our initial pad, the ScratchPad, plugged into a