



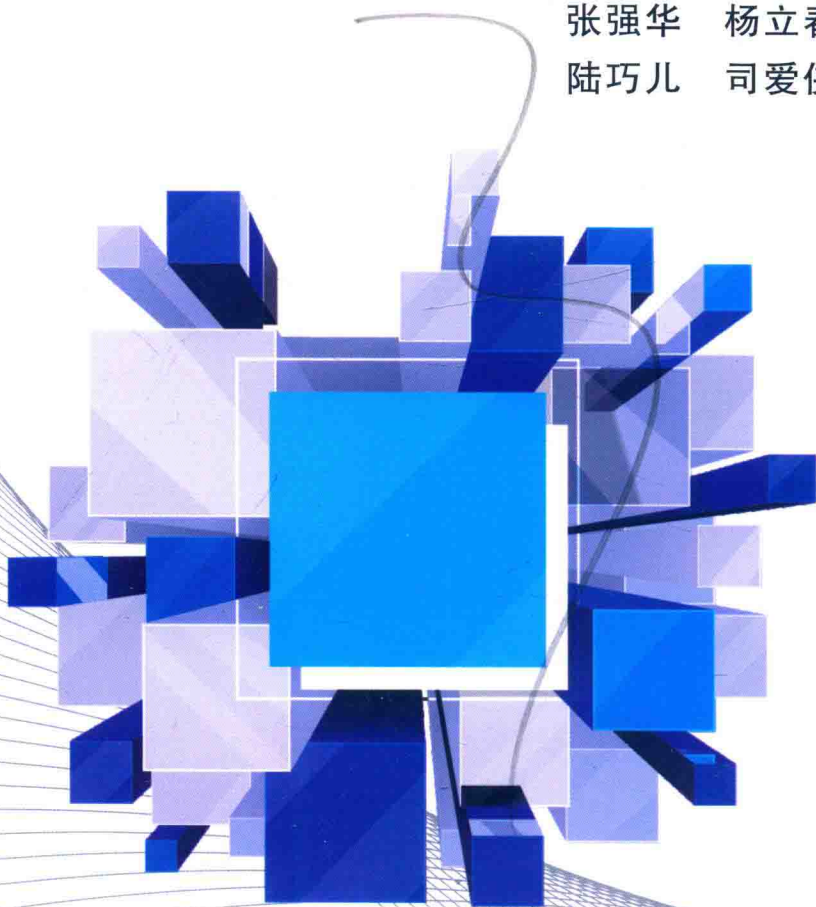
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普通高等教育物联网工程专业“十三五”规划教材
新形态立体化教材（有电子课件与音频资源）

物联网专业英语教程

（第二版）

Internet of Things English

张强华 杨立春 编著
陆巧儿 司爱侠



西安电子科技大学出版社
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内 容 简 介

本书是物联网专业英语教材,选材广泛,覆盖通信技术、网络技术、软件与硬件等各个方面,同时兼顾了相关的发展热点。本书内容包括物联网基础、体系与技术、标准与协议,因特网及其设备,泛在网与虚拟专用网络,条形码技术,RFID,WiFi与蓝牙,无线传感网络及应用,Network,云计算,智慧城市,大数据等。

本书力求体例创新,适合教学。每一单元包含以下部分:课文——包括选材广泛、风格多样、切合实际的两篇专业文章;单词——给出课文中出现的新词,读者由此可以积累物联网专业的基本词汇;词组——给出课文中的常用词组;缩略语——给出课文中出现的、业内人士必须掌握的缩略语;习题——既有针对课文的练习,也有一些开放性的练习;短文翻译——培养读者的翻译能力;参考译文——让读者对照理解和提高翻译能力;难点脚注——即时讲解,注释宽广,具有开放性。附录I的“自测题”可以检查学习效果;附录II的“物联网英语词汇的构成与翻译”揭示新词的构成方法,提供翻译技巧,对读者“破译”新词大有裨益;附录III的“词汇汇总表”既可用于复习和背诵,也可作为小词典供长期查阅。

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本书既可作为高等院校物联网相关专业的专业英语教材,也可供从业人员自学,还可作为培训班教材使用。

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***** 前 言 *****

物联网是继互联网之后的又一次技术革命，它把网络延伸到物的层面。物联网比互联网更有增长潜力，有可能成为信息产业中继计算机、互联网之后的第三次浪潮。我国物联网已经进入高速发展期，许多高校开设了物联网专业，培养急需的专业人员。由于物联网有极高的发展速度，从业人员必须掌握许多新技术、新方法，因此对专业英语要求较高。具备相关职业技能并精通外语的人员往往会赢得竞争优势，成为职场中不可或缺的核心人才与领军人物。

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2017 年 2 月

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2012 年 10 月

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Unit 1 Internet of Things



Text

Internet of Things



The Internet of Things (IoT) refers to uniquely identifiable objects (things) and their virtual representations in an Internet-like structure. The term Internet of Things was first used by Kevin Ashton^① in 1999. The concept of the Internet of Things first became popular through the Auto-ID Center^② and related market analysts publications. Radio-Frequency Identification (RFID) is often seen as a prerequisite for the Internet of Things. If all objects of daily life were equipped with radio tags, they could be identified and inventoried by computers. However, unique identification of things may be achieved through other means such as barcodes or 2D-codes as well.

With all objects in the world equipped with minuscule identifying devices, daily life on Earth would undergo a transformation. Companies would not run out of stock or waste products, as all involved parties would know exactly which products are required and consumed. Misplaced and stolen items would be easily tracked and located.

1. Alternative definitions

Different definitions for the Internet of Things have appeared and the term is evolving as the technology and implementation of the ideas move forward. Here are several partially overlapping definitions.

1.1 CASAGRAS

A global network infrastructure, linking physical and virtual objects through the exploitation of data capture and communication capabilities. This infrastructure includes existing and

① Kevin Ashton (born in 1968 in Birmingham, England) is a British technology pioneer ([ˌpaɪəˈniə]n. 先驱, 倡导者) who cofounded the Auto-ID Center at the Massachusetts Institute of Technology, which created a global standard system for RFID and other sensors.

② Auto-ID Center to design the architecture for the Internet of Things together with EPCglobal.

evolving Internet and network developments. It will offer specific object-identification, sensor and connection capability as the basis for the development of independent cooperative services and applications. These will be characterized by a high degree of autonomous data capture, event transfer, network connectivity and interoperability.

1.2 SAP^①

A world where physical objects are seamlessly integrated into the information network, and where the physical objects can become active participants in business processes. Services are available to interact with these “smart objects” over the Internet, query and change their state and any information associated with them, taking into account security and privacy issues.

1.3 EPoSS

The network formed by things/objects having identities, virtual personalities operating in smart spaces using intelligent interfaces to connect and communicate with the users, social and environmental contexts.

1.4 CERP-IoT

Internet of Things is an integrated part of Future Internet. It could be defined as a dynamic global network infrastructure with self configuring capabilities based on standard and interoperable communication protocols. In the IoT, physical and virtual “things” have identities, physical attributes, and virtual personalities and use intelligent interfaces, and are seamlessly integrated into the information network. In the IoT, “things” are expected to become active participants in business, information and social processes. They are enabled to interact and communicate among themselves and with the environment by exchanging data and information “sensed” about the environment, while reacting autonomously to the “real/physical world” events and influencing it by running processes that trigger actions and create services with or without direct human intervention. Interfaces in the form of services facilitate interactions with these “smart things” over the Internet, query and change their state and any information associated with them, taking into account security and privacy issues.

1.5 Other

The future Internet of Things links uniquely identifiable things to their virtual representations in the Internet containing or linking to additional information on their identity, status, location or any other business, social or privately relevant information at a financial or non-financial pay-off. It exceeds the efforts of information provisioning and offers information access to non-predefined participants. The provided accurate and appropriate information may be accessed in the right quantity and condition, at the right time and place at the right price. The Internet of Things is not synonymous with ubiquitous/pervasive computing, the Internet Protocol (IP), communication technology, embedded devices, its applications, the Internet of People or the Intranet/Extranet of Things, yet it relies on all of these approaches. The

① SAP is a German software corporation that makes enterprise software to manage business operations and customer relations.

association of intelligent virtual representations (e.g. called avatars and embedded, hosted in the Cloud or centralized) and physical objects are sometimes called “cyberobjects”. Cyberobjects are then considered as autonomous actors of the value chains they are involved in: able to perceive, analyze and react in various contexts; although acting under the guidance of human beings as programmed. Cyberobjects can then be assistants, advisors, decision makers, etc; and can be considered as true agent (economics)^①, helping to change existing economic or organization models. In such a scenario, the conception of avatars refers to Artificial Intelligence^② and complex system.

2. Unique addressability of things

The original idea of the Auto-ID Center is based on RFID-tags and unique identification through the Electronic Product Code^③.

An alternative view, from the world of the Semantic Web^④, focuses instead on making all things (not just those electronic, smart, or RFID-enabled) addressable by the existing naming protocols, such as URI^⑤. The objects themselves do not converse, but they may now be referred to by other agents, such as powerful centralized servers acting for their human owners.

The next generation of Internet applications using Internet Protocol version 6 (IPv6)^⑥ would be able to communicate with devices attached to virtually all human-made objects because of the extremely large address space of IPv6. This system would therefore be able to identify any kind of object.

A combination of these ideas can be found in the current GS1/EPCglobal^⑦ EPC Information Services specifications. This system is being used to identify objects in industries ranging from Aerospace to Fast Moving Consumer Products and Transportation Logistics.

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- ① In economics, an agent is an actor and decision maker in a model. Typically, every agent makes decisions by solving a well or ill defined optimization/choice problem.
- ② Artificial Intelligence (AI) is the intelligence of machines and the branch of computer science that aims to create it. AI textbooks define the field as “the study and design of intelligent agents” where an intelligent agent is a system that perceives its environment and takes actions that maximize ([ˈmæksmaɪz]vt.取……最大值, 最佳化) its chances of success.
- ③ The Electronic Product Code (EPC, 电子产品编码) is designed as a universal identifier that provides a unique identity for every physical object anywhere in the world, for all time.
- ④ The Semantic Web is a collaborative movement led by the World Wide Web(WWW, 万维网) Consortium (W3C) that promotes common formats for data on the World Wide Web. By encouraging the inclusion of semantic content in web pages, the Semantic Web aims at converting the current web of unstructured documents into a “web of data”.
- ⑤ In computing, a Uniform Resource Identifier (URI) is a string of characters used to identify a name or a resource on the Internet.
- ⑥ Internet Protocol version 6 (IPv6) is a version of the Internet Protocol (IP). It is designed to succeed ([sək'si:d]v.继……之后) the Internet Protocol version 4 (IPv4). The Internet operates by transferring data between hosts in small packets that are independently routed across networks as specified by an international communications protocol known as the Internet Protocol.
- ⑦ EPCglobal is a joint venture between GS1 (formerly known as EAN International) and GS1 US (formerly the Uniform Code Council, Inc.). It is an organization set up (建立) to achieve worldwide adoption and standardization of EPC technology.

3. Trends and characteristics

3.1 Intelligence

Ambient Intelligence^① and Autonomous Control are not part of the original concept of the Internet of Things. Ambient Intelligence and Autonomous Control do not necessarily require Internet structures, either. However, there is a shift in research to integrate the concepts of the Internet of Things and Autonomous Control. In the future the Internet of Things may be a nondeterministic and open network in which auto-organized or intelligent entities (Web services^②, SOA^③ components), virtual objects will be interoperable and able to act independently (pursuing their own objectives or shared ones) depending on the context, circumstances or environments.

Embedded intelligence presents an “AI-oriented” perspective of IoT, which can be more clearly defined as: leveraging the capacity to collect and analyze the digital traces left by people when interacting with widely deployed smart things to discover the knowledge about human life, environment interaction, as well as social connection/behavior.

3.2 Architecture

The system will likely be an example of Event-Driven Architecture^④, bottom-up made (based on the context of processes and operations, in real-time) and will consider any subsidiary level. Therefore, model driven and functional approaches will coexist with new ones able to treat exceptions and unusual evolution of processes.

3.3 Complex system

In semi-open or closed loops, it will therefore be considered and studied as a Complex system due to the huge number of different links and interactions between autonomous actors, and its capacity to integrate new actors. At the overall stage (full open loop) it will likely be seen as a chaotic^⑤ environment.

① In computing, Ambient Intelligence (AmI, 环境智能) refers to electronic environments that are sensitive and responsive to the presence of people. In an Ambient Intelligence world, devices work in concert to support people in carrying out their everyday life activities, tasks and rituals in easy, natural way using information and intelligence that is hidden in the network connecting these devices.

② A Web service is a method of communication between two electronic devices over the web. The W3C defines a “Web service” as “a software system designed to support interoperable machine-to-machine (机器对机器) interaction over a network”.

③ In software engineering, a Service-Oriented Architecture (SOA) is a set of principles and methodologies ([məθə'dɒlədʒi]n. 方法学, 方法论) for designing and developing software in the form of interoperable services. These services are well-defined business functionalities that are built as software components (discrete pieces of code (代码段) and/or data structures (数据结构)) that can be reused for different purposes. SOA design principles are used during the phases of systems development and integration.

④ Event-Driven Architecture (EDA) is a software architecture pattern promoting the production, detection, consumption of, and reaction to events.

⑤ Chaos theory (混沌论) is a field of study in mathematics, with applications in several disciplines including physics, economics, biology, and philosophy. Chaos theory studies the behavior of dynamical systems that are highly sensitive to initial conditions, an effect which is popularly referred to as the butterfly effect (蝴蝶效应).