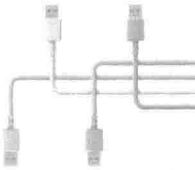

2015 物联网及其应用

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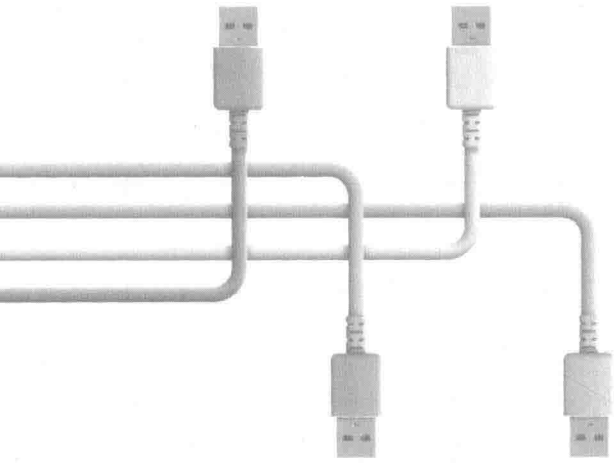
2015物联网及其应用国际论坛会议文集编委　**主编**



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Preface

The 2015 International Forum of the IoT and Applications (IFIoT&A) aims to bring together academics, scientists, engineers and postgraduate students to exchange and share their knowledge and research results on all aspects of Internet of Things (IoT) and to discuss practical challenges and solutions.

The forum addresses key developments and issues in IoT and applications. The topics include the followings:

(1) IoT Developments and Prospects;

(2) IoT Standards and Information Security;

(3) Sensors and Sensor Technologies;

(4) RFID and Traceability;

(5) Computer and Network Technologies;

(6) Communication Platforms and Interfaces;

(7) M2M Communications;

(8) IoT System Integration;

(9) Wireless Power Supply Technologies;

(10) Data Management and Processing Techniques;

(11) Antennas and Propagation in IoT;

(12) Measurement and Control in IoT;

(13) IoT Applications in Transportation, Logistics, Industry, Health and Utilities;

(14) Smart Homes, Buildings, Grids and Cities;

(15) Human Centered IoT.

The conference is organized by Wuhan University of Technology and there are over 15 invited talks at the forum from world leading researchers and scientists worldwide including USA, Europe and China. A total of 60 contributions have been received, and 45 of them have been accepted for publication.

We would like to thank all members of the Program and Organizing Committees for their efforts. We would also like to thank the authors for their contributions and the hard work of the Publishing House of Wuhan University, together making this publication possible.

Editors

July, 2016

Contents

Intelligent Systems and Internet of Things

Duc Truong Pham
University of Birmingham, UK

Abstract

There are many definitions of intelligent systems. In this presentation, we shall examine some of the more common ideas of what might make a system intelligent and the constituents of typical intelligent systems. We shall review different categories of intelligent systems, including intelligent hardware and intelligent computer programs. We shall look at how intelligent systems techniques have been employed to enhance the Internet of Things. We shall conclude the presentation with a forward glimpse at possible future developments.

PicknPack and RFID-enabled Traceability System

John Gray, Zhipeng Wu, Zhaozong Meng, Lizong Zhang
University of Manchester, UK

Abstract

Product quality and information traceability are key parameters in food manufacturing industry, which are closely regulated by the relevant departments of government. Emerging Information and Communication Technologies (ICT) are introduced to enhance the automation of traceability system and its efficiency. This talk will discuss the RFID-enabled traceability system developed for the European PicknPack project focusing on the data collection, data management, traceability, and data sharing for future smart industry application scenarios.

After the overview of RFID technologies, an RFID-enabled traceability system and data handling method will be presented. This will include the modeling of a food production line process, the requirements for traceability, information to be traced, database modeling and system's architecture. The design of the RFID-enabled traceability system will be illustrated. The implementation of the user interface and event handling will be described. Interfaces for data sharing and techniques for interactions with other modules in the production line will also be presented, as an example of IoT applications in food manufacturing.

Challenges in IoT Design and Applications

Shuanghua Yang

Loughborough University, UK

Abstract

The concept of Internet of Things (IoT) is to make every single "network enabled" object in the world network connected, and represents a vision in which the Internet extends into the real world embracing everyday objects. The concept of "things" in the network infrastructure refers to any real or virtual participating actors such as real world objects, human beings, virtual data and intelligent software agents. The purpose of IoT is to create an environment in which the basic information from any one of the networked autonomous actors can be efficiently shared with others in realtime.

Since the concept of IoT was introduced in 2005, we have seen the deployment of smart "network enabled" objects with communication, sensory and action capabilities for numerous applications such as in the areas of healthcare, smart buildings, social networks, environment monitoring, transportation and logistics, etc. All applications of IoT rely on the data collected from distributed smart "network enabled" objects, i. e. WSNs and IoT information infrastructure for data transmission. Scientific and technical challenges in the IoT design require different competencies.

(1) Technology level—challenges linked to the integration of smart "network enabled" objects under strong energy and environment constraints;

(2) Communication and networking level—challenges linked to massive secure, dynamic and flexible networking and the ubiquitous service provision;

(3) Intelligence level—challenges linked to the data fusion and service discovery where data collected by individual smart "network enabled" objects such as RFID and wireless sensors are queried by distributed users.

This invited talk presents the features of IoT, design challenges, and possible architectures. Three applications of IoT funded by both European Commission and Innovate UK have been included in the talk to show the design of IoT, including indoor localization, global water consumption management, and commercial building energy auditing.

Big Data in IoT

Yuchu Tian

Queensland University of Technology, Australia

Abstract

Big data processing has become an emerging area of research and development with typical applications in almost all domains such as special information processing, bioinformatics computation, information retrieval, natural resources monitoring and management, GNSS, and many others. Many of such big data computing tasks have been considered to be implemented in distributed computing and/or cloud computing, another emerging area in information technology. The rapid development of IoT systems further pushes the boundaries of big data theory and methods. This paper identifies challenges in big data from IoT with regard to data generation, management, and processing. Then, a general framework is proposed for hierarchical big data management and distributed/corporative big data processing in IoT. To solve big data problems with multiple objectives, the concept of game balance is adopted to derive a balanced solution. After that, for actual big data computing in distributed environments, a scalable and efficient approach is presented for data distribution and computing task scheduling. Finally, case studies are discussed for demonstration.

Intelligent Transport of Perishables Using IoT

Gabriel Lodewijks

Delft University of Technology, the Netherlands

Abstract

This presentation introduces the application of Internet of Things in the transport of perishables. In particular it focuses on the production process of potato starch and the logistics of transporting the potatoes to the starch mill. A new mathematical model is proposed for predictive scheduling of perishable material transports with the aim of reducing losses of perishables. The starch content of individual potatoes at specific farms is measured through sensors in the potatoes that communicate through the IoT. The mathematical model is particularly designed for allocation of potatoes from several farms to a nearby starch mill, which produces starch from limited amount of potatoes each day. It is known that the quality of potatoes decreases and as a result they produce less starch. A model predictive control approach is proposed to maximize the production of starch. An IoT infrastructure is presented that allows proper data communication and cloud data storage enabling the logistic control of the potato supply process to the starch mill. Simulation experiments indicate that predictive scheduling and real-time information on potato quality can yield a higher starch production compared to non-predictive optimization.

IoT and Big Data with Smart Applications

Weiming Shen

National Research Council, Canada

Abstract

Internet of Things refers to uniquely identifiable objects as well as their virtual representations in an Internet-like structure. It is related to a number of disciplines and technologies that enable the Internet to reach out into the real world of physical objects and their environments. It has been hailed as the most potentially disruptive technological revolution of our lifetime after the web and mobile accessibility. It becomes even more promising with smart applications like smart cities, smart Grid, smart factories, smart buildings, smart homes, and smart cars. On the other hand, Big Data is a broad term for data sets so large or complex that traditional data processing technologies are inadequate. It has recently been considered as a technology and become a very active research area primarily involving topics related to machine learning, database, and distributed computing. It has been claimed that "the success or failure of the Internet of Things hinges on Big Data". Based on many years of first-hand experience, this talk will provide an overview of IoT and Big Data, including stat-of-the-art and future trends, with a focus on how IoT and Big Data are linked with and applied in various industrial domains and societies.

Smart Cities and Internet of Information

Masoud Ghandehari
New York University, USA

Abstract

The emergence of cities, where more than half of the world population now lives, coupled with advances in sensor and data processing, has created a useful platform for better understanding of the complex interaction of physical spaces, environments, and people; examples include mobility, energy consumption and quality of the environment. The recent emergence of urban science centers and industry smart city initiatives point to how cities are being shifted from the problem space to the solution space. This presentation gives examples of the above by highlighting how sensors, observational data, and administrative and operational records are used in New York City. With more than 2000 datasets, New York City offers the largest and most comprehensive open datasets of any U. S. city. These datasets contain spatiotemporal components, requiring flexible exploration and visualizations, and queries that span multiple geographical regions over multiple times. An overview of the above data network will be given along with examples of novel multiscale sensing systems.