

Preface

Trustworthy Communication and Energy Efficiency

A worldwide information infrastructure provided by the massive network of wired/wireless communication is changing the lives of humanity. The Internet is becoming ubiquitous with the continuous advance of wireless mobile communication devices and systems. However, modern ubiquitous communication and information systems pose a great challenge to security and energy efficiency. This special issue brings to research society's attention the importance of researches in these areas, and some original research results addressing these issues. We hope that the platform we provide can make contributions toward the next-generation trustworthy and energy-aware computing and communication systems.

With the fast development of various types of communication networks, the demand to secure the data transmission has been increasing. Users intend to protect their data from unauthorized users, and apply some techniques like encryption for trustworthy ubiquitous computing. Wireless security and security validation have become the focus, and trustworthy operations of mobile computing have been investigated.

While internet multimedia applications are becoming very popular, multimedia contents such as digital images, are particularly vulnerable while in storage and during transmission over a network. In seeking the best practices and processes, techniques like secret sharing schemes have been adopted to improve secure visualization. With such schemes, even if the unauthorized users have access to some data, they will not be able to decrypt the whole data of interest. The secret data can only be reconstructed by using a number of shares. Some included research work elaborated the security, reliability and privacy perspectives.

A forum is included here to leverage the research in trustworthy computing for people interacting within ubiquitous environment of computing, communications, information sciences and engineering, improving the accountability, and minimizing the security vulnerabilities.

Energy efficiency, or efficient energy use, sets out the goal to reduce the amount of energy required to provide products and services. Enhancing energy efficiency and productivity makes a difference in the daily lives of Americans, as it is one of the most constructive and cost-effective ways to address the challenges of high energy prices and energy assurance. Research has been conducted to expose the potential and possibility for reducing energy input to deliver the same services, or deliver more services for the same energy input. Towards the end of demand growth is a detailed guide to new energy efficiency technologies and energy-aware design methodologies.

The wearable ECG system is very important to people having heart problem and/or high blood pressure. It can provide real time monitoring of ECG signals and keep patients away from dangerous situations. However, it has limited power supply. For wireless long time communication and monitoring, the energy efficiency is one of the critical factors. Special strategy, like unequal error protection, has been adopted in the listed work by which not just signal interpretation quality is guaranteed but also energy efficiency in wireless body sensor network is achieved.

Sometimes, the role of a device or operation in energy efficiency is complex, and the pros and cons need to be carefully analyzed. For example, in wireless sensor networks, control packets in hybrid MAC protocols is one of the major sources of the energy waste, consuming significant amount of energy while not directly benefiting the data transmission. On the other hand, however, they perform an important role in avoiding collision and overhearing problems which are another two major sources of the energy waste. Therefore, whether to apply control packets is a complex trade-off issue, and various aspects have to be newly examined and quantified as shown in a research paper, before the conclusion can be drawn.

Cognitive radios network has emerged as one of the most promising candidate solutions to improve spectrum utilization in next generation cellular networks. Spectrum sensing encompasses a collection of procedures to determine the occupancy state of a particular frequency band which is of great importance for cognitive radio. Spectrum sensing method is investigated given the one based on standard analog-to-digital converters leading to unaffordable high sampling rate or implementations. A research result shown in the paper revealed a revolutionary wideband spectrum sensing method based on the compressed sensing theory which can greatly decrease the sampling rate of the wideband signals successfully.

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