LITERATURE SURVEY

Smart, Secure, yet Energy-efficient, Internet-of-Things Sensors

NirajJha et al propose a novel way out of this predicament by employing signal compression and machine learning inference on the IoT sensor node. Since on-sensor compression and inference drastically reduce the amount of data that need to be transmitted, we actually end up with a dramatic energy bonus relative to the traditional sense-and-transmit IoT sensor. Use a small part of this energy bonus to carry out cryptographic techniques to ensure data confidentiality and integrity. The experimental results indicate that relative to the traditional sense-and-transmit sensor, IoT sensor energy is reduced by 57.1× for electrocardiogram (ECG) arrhythmia detection, 379.8× for freezing of gait detection, 139.7× for electroencephalogram (EEG) seizure detection, 216.6× for human activity classification, 162.8×for neural prosthesis spike sorting, and 912.6× for chemical gas classification. Our approach not only enables the IoT system to push signal processing and decision-making to the sensor node, but also solves

An Integrated System for Regional Environmental Monitoring and Management Based on Internet of Things

Yunqiang Zhu et al introduces a novel IIS that combines Internet of Things (IoT), Cloud Computing, Geoinformatics [remote sensing (RS), geographical information system (GIS), and global positioning system (GPS)], and e-Science for environmental monitoring and management, with a case study on regional climate change and its ecological effects. Multi-sensors and Web services were used to collect data and other information for the perception layer; both public networks and private networks were used to access and transport mass data and other information in the network layer. The key technologies and tools include real-time

operational database (RODB); extraction-transformation-loading (ETL); on-line analytical processing (OLAP) and relational OLAP (ROLAP); naming, addressing, and profile server (NAPS); application gateway (AG); application software for different platforms and tasks (APPs); IoT application infrastructure (IoT-AI); GIS and e-Science platforms; and representational state transfer/Java database connectivity (RESTful/JDBC). Application Program Interfaces (APIs) were implemented in the middleware layer of the IIS. The application layer provides the functions of storing, organizing, processing, and sharing of data and other information, as well as the functions of applications in environmental monitoring and management. The results from the case study show that there is a visible increasing trend of the air temperature in Xinjiang over the last 50 years (1962-2011) and an apparent increasing trend of the precipitation since the early 1980s. Furthermore, from the correlation between ecological indicators [gross primary production (GPP), net primary production (NPP), and leaf area index (LAI)] and meteorological elements (air temperature and precipitation), water resource availability is the decisive factor with regard to the terrestrial ecosystem in the area.

An IoT Approach for an AAL Wi-Fi-Based Monitoring System

Sensors are connected to a cloud platform, embodying a genuine Internet of Things approach. With respect to conventional approaches, much better scalability, flexibility, and inexpensiveness can be attained. The main expected drawback comes from the higher power consumption, inherently needed to sustain much higher data rates. This paper focuses on such an issue, illustrating design techniques aimed at optimizing power consumption and battery lifetime. Performance results are shown, which definitely fall within a practical range and are fully comparable with more conventional approaches.

A Reconfigurable Smart Sensor Interface for Industrial WSN in IoT Environment

Chuan Zhang et al proposed to design a reconfigurable smart sensor interface for industrial WSN in IoT environment, in which complex programmable logic device (CPLD) is adopted as the core controller. Thus, it can read data in parallel and in real time with high speed on multiple different sensor data. The standard of IEEE1451.2 intelligent sensor interface specification is adopted for this design. It comprehensively stipulates the smart sensor hardware and software design framework and relevant interface protocol to realize the intelligent acquisition for common sensors. A new solution is provided for the traditional sensor data acquisitions. The device is combined with the newest CPLD programmable technology and the standard of IEEE1451.2 intelligent sensor specification. Performance of the proposed system is verified and good effects are achieved in practical application of IoT to water environment monitoring.

Analysis of Three IoT-Based Wireless Sensors for Environmental Monitoring

TeodoraSanislav et al presented systems provide the possibility of recording data at remote locations and of visualizing them from every device with an Internet connection, enabling the monitoring of geographically large areas. The development details of these systems are described, along with the major differences and similarities between them. The feasibility of the three developed systems for implementing monitoring applications, taking into account their energy autonomy, ease of use, solution complexity, and Internet connectivity facility, was analyzed, and revealed that they make good candidates for IoT-based solutions.

Situation-Aware IoT Service Coordination Using the Event-Driven SOA Paradigm

Shuai Zhao et al present a situational event definition language (SEDL), an automaton-based situational event detection algorithm, and a situational event-driven service coordination behavior model, which is based on an extended event-condition-action trigger mechanism. Moreover, Propose a reliable real-time data distribution model to support the effective dispatching sensory data between information providers and consumers, which is based on the grid quorum mechanism to organize those brokers into a grid overlay network to facilitate the asynchronous communication in a large-scale, distributed, and loosely coupled IoT applications environment. We also illustrate the various illustrations for IoTservices coordination and alarming disposal process of coal mine safety monitoring and control automation scenarios, and also report the measurement and analysis of the platform's performance.

Classifying IoT Devices in Smart Environments Using Network Traffic Characteristics

Adam Radford et al address this challenge by developing a framework for IoT device classification using network traffic characteristics. First, we instrument a smart environment with 28 different IoT devices spanning cameras, lights, plugs, motion sensors and health-monitors. Collect and synthesize traffic traces from this infrastructure for a period of 6 months, a subset of which we release as open data for the community to use. Second, we present insights into the underlying network traffic characteristics using statistical attributes such as activity cycles, port numbers, signalling patterns and cipher suites. Third, Develop a multi-stage machine-learning-based classification algorithm and demonstrate its ability to identify specific IoT devices with over 99%. Finally, we discuss the trade-offs

between cost, speed, and performance involved in deploying the classification framework in real-time. Our study paves the way for operators of smart environments to monitor their IoT assets for presence, functionality, and cyber-security without requiring any specialized devices or protocols.

Environmental Measurement Technology: An Approach to the Amazonian Environment

Andre das NevesCarvalho et al presents the development of an environmental measurement technology prototype based on Internet of Things (IoT) for intelligent monitoring of environmental variables called PLACOT2AM. The system performs all the functions of an Environmental Monitoring System and has the task of analyzing behavior in environments by an intelligent agent, which processes the patterns related to environmental variables of temperature and relative humidity. The sensor hardware is composed of a computational embedded unit with wireless communication interfaces with the Internet of Things. The analysis of thermal comfort is made in this study and the results are presented.

Toward QoI and Energy-Efficiency in Internet-of-Things Sensory Environments

Joel W. Branch ; Kin K. Leung et al propose a novel concept of the critical covering set of any given task in selecting the sensors to service a task over time. Third, energy management decision is made dynamically at runtime, to reach the optimum for long-term application arrivals and departures under the constraint of their service delay. We show a case study to utilize sensors to perform environmental monitoring with a complete set of performance analysis.

Introducing IoT and Wearable Technologies into Task-Based Language Learning for Young Children

Luis Orozco-Barbosa et al investigate the benefits of using wearable and Internet-of-Things (IoT) technologies in streamlining the creation of such realistic task-based language learning scenarios. Show that the use of these technologies will prove beneficial by freeing the instructors of having to keep records of the tasks performed by each student during the class session. Instead, instructors can focus their efforts on creating a friendly environment and encouraging students to participate. Our study sets up a basis for showing the great benefits of using wearable and IoT technologies in streamlining 1) the creation of realistic scenarios in which young foreign language learners can feel comfortable engaging in chat and becoming better prepared for social interaction in a foreign language, and 2) the acquisition and processing of performance metrics.

AVIoT: web-based interactive authoring and visualization of indoor internet of things

Dongkun Shin et al presents an interactive framework of visualizing and authoring IoT in indoor environments such as home or small office. Building blocks of the framework are virtual sensors and actuators that abstract physical things and their virtual behaviors on top of their physical networks. Their behaviors are abstracted and programmed through visual authoring tools on the web, which allows a casual consumer to easily monitor and define their behaviors even without knowing the underlying physical connections. The user study performed to assess the usability of the visual authoring showed that the visual authoring is easy to use, understandable, and also preferred to typical text-based script programming.

Learning Activity Predictors from Sensor Data: Algorithms, Evaluation, and Application

Janardhan Rao et al present several metrics to evaluate activity predictors in the context of real-world applications. Third, we evaluate our approach using real sensor data collected from 24 smart home testbeds. Also embed the learned predictor into a mobile-device-based activity prompter and evaluate the app for nine participants living in smart homes. Our results indicate that our activity predictor performs better than the baseline methods, and offers a simple approach for predicting activities from sensor data.

A Mutual Authentication and Key Establishment Scheme for M2M Communication in 6LoWPAN Networks

Maode Maetal proposed scheme enables a 6LoWPAN device to securely authenticate with the remote server with a session key established between them. The security proof by the protocol composition logic can prove the logic correctness of the proposed scheme. The formal verification and the simulation show that the proposed scheme in 6LoWPAN could not only enhance the security functionality with the ability to prevent various malicious attacks, but also incur less computational and transmission overhead.