

# Foreword and Editorial

## International Journal of Smart Home

We are very happy to publish this issue of an International Journal of Smart Home by Science & Engineering Research Support soCiety.

This issue contains 19 articles. Achieving such a high quality of papers would have been impossible without the huge work that was undertaken by the Editorial Board members and External Reviewers. We take this opportunity to thank them for their great support and cooperation.

In the paper “Seasonal Agricultural Products Distribution and Traceability System Based on the RFID Internet of Things”, based on the big data and complexity in the identification process of IOT radio frequency, this article puts forward an optimal algorithm for Adaptive Gaussian Traversal Harmony Search IOT radio frequency identification, which aim at solving the problems of high computational complexity and low identification accuracy of traditional algorithm. At first, the network optimization design is carried out based on Harmony Search (HS) algorithm, and in order to solve the problems of standard HS in optimization accuracy, computational complexity and other aspects, control parameters are introduced into the algorithm improvisation process on the basis of traverse characteristics of Gaussian function, so that the pertinence of preliminary and later searches are improved, and meanwhile, theoretical analysis on parameters selection is described; Secondly, the optimization model of IOT radio frequency identification is studied and improved adaptive optimization objectives are put forward to achieve equilibrium optimization of performance indicators; at last, test results are compared to prove the suggested algorithm having high computational accuracy and faster computational speed.

Authors of the papers “Improvement of Fire Alarm Systems: With a Focus on Apartment” this research proposed new fire alarm systems to solve the drawbacks: false alarms about current fire alarm systems in apartments, increased prices on manufacturing and installation of the alarm systems which developed recently. Although the new alarm systems are more expensive than the current ones which consists of 4 steps, their strengths are that they cost less than the one recently developed for manufacturing and installation, and also reduce false alarms efficiently. The new fire alarm systems consist of 5 steps. If fire detector detects a fire, a receiver receives it and warns to safety center, send a fire signal. In the case of a false alarm, you can stop the alarm and recover the signal by handling the smartphone application or pressing the switch on the receiver. Otherwise, it is regarded actual and the system sends an alarm to fire automatically to let con-cerned people know about it. Another feature of the alarm systems is that the monitoring is possible all the time. Even if the fire safety supervisor is absent for a while, he or she can monitor the fire-related information frequently with the smartphone application.

The paper “Optimal Scheduling Algorithm for Residential Energy Consumption Considering the Wind - Photovoltaic Power and the Electricity Price of Purchase/Selling Electricity” according to extensive development of renewable resources, such as wind power and photovoltaic power, and on the basis of wind-photovoltaic-energy storage hybrid power system, an optimal scheduling algorithm for residential energy consumption scheduling considering the wind -photovoltaic power and the electricity price of purchase/selling electricity is proposed. Firstly, in order to reduce the electricity cost of

user and the burden of power supply, the appliances is arranged in the time-slot with purchase price more than selling price and higher wind -photovoltaic power based on the wind -photovoltaic power and the electricity price of purchase/selling electricity; Then, with the constraint conditions that purchase/selling electricity, the coordination strategy of wind-photovoltaic-energy storage grid is proposed.

Paper “Trust Based Service Selection in Cloud Computing Environment” in order to meet cloud user demand for managed service, we propose a scheme based on trust for cloud service selection. The scheme includes the service chosen and services delivered two parts, which can choose the cloud service through its trust value, to meet the safety requirements premise, and make trust decisions to achieve service controllability. First it make choice of the service in accordance with service attributes weight using AHP, then complete user data delivery rely on trust, which allowing users to combine with their own situation and trust in cloud services dynamically adjusting the cloud user data release granularity to reach the controllability of the service.

The study “Performance Evaluation Depending on Separation Distance Between Skylight and Light Shelf: Focusing on Variation of Distance of Indoor Space” the light shelf, which is a natural light system, has been intensively studied as its efficiency is recognized. However, previous studies on the light shelf have not considered various depths of space, and the performance of light shelf design has not been sufficiently studied with respect to the separation distance between a skylight and a reflection board. Therefore, the purpose of the present study is to establish the fundamental data for light shelf design by deriving an appropriate separation distance between a skylight and a reflection board, considering various depths of space. In the present study, a simulation software program, Radiance, was employed, and the performance evaluation was limited to the environment on the summer solstice when the energy consumption in buildings is the highest. The depth of space was established from 3 m to 8 m at intervals of 1 m for the performance evaluation. The separation distance between a light shelf and a skylight was set to be 50 mm, 100 mm, 150 mm, 200 mm, and 250 mm. The performance evaluation was conducted by deriving the depth of space and uniformity that satisfied the standard of 400 lx.

The purpose of the paper “Design of High Concentration Environmental Sensor Based on MEMS Chip” there are increasingly urgent needs for low power, high performance, and low cost environmental sensor in environmental concentrator industry. A new type of MEMS environmental sensor based on MEMS thin film resistor and heat transduction is designed. Using clean room technology processing micron-size chip, help reduce post-production costs. Preliminary experiment results demonstrate that the output voltage signal is proportional to the environmental concentration in normal working range, and the detection accuracy can reach less than 1%.

The study “A Resource-Efficient System Architecture for Processing Various Sensor Data in Smart home Environment” the Internet of Things (IoT) technology is gaining vast popularity and it is expected to become ubiquitous in the near future. It envisions the idea of a fully connected network of smart objects, enabling cooperative and intelligent distributed functionalities. Especially, smart homes provide innovative, automated and interactive services for residential customers through distributed and collaborative operations. In this paper the challenge of processing large amounts of sensor data at network gateways with limited memory and computing power is described. A resource-efficient system to process various heterogeneous data is introduced.

The paper “Price Learning Based Load Distribution Strategies for Demand Response Management in Smart Grid” in this paper, a Price learning based Load Distribution Strategy (PLDS) is proposed at first. In PLDS model, Smart Power Service, Utility Company and History Load Curves are included, and by considering both the average electricity consumption cost and the average electricity consumption habit, we proposed a convex optimization model to solve the model. In order to accelerate the convergence of PLDS, a price learning mechanism is proposed, which learns a price curve according to the history price data, and predicts price as a learned price for the next iteration. The optimization cycle of PLDS is one day or 24 hours, and in order to further improve the peak shaving performance, an extended version of PLDS named PLRS (Price learning based Load Redistribution Strategy) is proposed, whose optimization cycle length is 1 hour. The optimization models of PLDS and PLRS are the same, and the differences between them are the optimization cycle and the constraint conditions. In the simulation, we compared the convergence performance, peaking shaving performance and total cost among PLDS, PLRS and other strategy ODC in reference [11], and we found that the convergence performances of PLDS and PLRS are both better than that of ODC. The peak shaving performance of PLRS is better than that of ODC in the long term, and the total cost of PLRS is very close to that of ODC.

The paper “Uncertainty Sampling Based Posterior Probability Extreme Learning Machine for Human Activity Recognition” human activity recognition is a main research area of context-aware computing, and is widely used in many applications, such as smart home and elderly care. Smartphone-based human activity recognition is very popular by making use of the embedded inertial sensors. However, there exists the problems of misclassification activities, and how to effectively apply the model trained by known users to new users. To solve these two problems, in this paper, we proposed a novel approach, Uncertainty Sampling based posterior Probability Extreme Learning Machine (USP-ELM), by introducing two strategies: first, we transfer the actual outputs of ELM to posterior probabilities for each instances, and then use uncertainty sampling strategy for confidence level assignment to adapt the training model and improve the classification accuracy.

The paper entitled “The Fire Prevention System Using Thermal Imaging Camera in Connection with CCTV” thermal imaging camera to measure the temperature measurement is possible by moving objects in real-time and non-contact measurement can be used for a variety of tasks, such as industries, process are as, the electricity sector. In addition, environmental changes through the application S/W features for IT/ICT and Information Storage storage and processing of things Internet of CCTV enclosure internal temperature, humidity or higher status monitoring and supervisory control, information processing through the state monitoring areas it is required for ensuring data.

Paper “Smart Home Education and Teaching Effect of Multimedia Network Teaching Platform in Piano Music Education” smart home contains all the living functions of the traditional home, and provides a more safe, comfortable and high-tech home space. With the development and popularization of multimedia technology, computer technology has been applied to music classroom, laboratory, music hall, almost all aspects of music teaching and research. In this paper, the author analyzes smart home education and multimedia network teaching platform in piano music education. Multimedia combined with different teaching characteristics, through the modern media as the carrier of the communication channels, then process the formation of vivid images or sounds of music. Along with the digital process of music classroom, computer music workstations, multimedia, distance learning, portable music systems, online interactive music creation, and other technologies are being popularized.

In the study “Research of Short-Term Load Forecasting Using DWT and LSSVM Optimized by QDE”, to evaluate short-term power load properly and efficiently, this paper proposes a modified DWT-QDE-LSSVM (Discrete wavelet transform (DWT) and least squares support vector machine (LSSVM) optimized by quantum differential evolution (QDE)) model combined with input selected. The load data series of the previous days are first decomposed into an approximation component and a detail component. Then LSSVM is built to model the approximation component and QDE algorithm is applied to overcome the problems faced by LSSVM in selecting parameters. In order to raise forecasting accuracy, this paper proposes the refinement of related factors.

The study “Concentration Building System for Children with Attention Deficit Hyperactivity Disorder” Children with Attention deficit hyperactivity disorder (ADHD) experience lack of concentration. In learning process, the concentration power of the students with ADHD should be increased first. Concentration building systems for them are not available in market. This paper proposes a concentration building system for children with ADHD. It consists of three modules-Bird chirping module, Fish tank module and Alphabet learning module. At first the child is encouraged to press switch corresponding to bird chirping module; it soothes his hyperactive mind. This creates interest in pressing the switch related to next module, that is, fish tank module. The movement of different types of fishes makes the child to stare deeply into the screen and can learn counting them. This activity based learning further improves his concentration power. The third one, Alphabet learning module can be further used to enhance his alphabet learning skills. Individual modules are developed using the microcontrollers MSP430G2553 and PIC16F877A. The proposed system improves the concentration power of the child which in turn improves his cognitive skills.

The paper entitled “Design of Remote Fire Automatic Alarm System Based on Zigbee Technology and TC35i Module” in order to realizing double function of monitoring home interior fire danger and automatic SMS alarm by using Zigbee networking technology, we propose the remote fire automatic alarm system based on Zigbee chip CC2530F256 and GSM wireless communication module TC35i. And on this basis, we give a detailed description of components selection, hardware design and software design of the system. The system testing results demonstrate that this system has good stability and response precision, anti-interference ability, which easy to be extended and applied.

In the paper “Research on Influence of Multimedia Network Teaching Platform and Effective Interaction on Physical Education Curriculum Based on Smart Classroom”, with the development of computer information technology and multimedia Internet technology, human beings have entered a new era of knowledge and network. Education information construction is an important way for the modernization of education, in this paper, the author research on influence of multimedia network teaching platform and effective interaction on physical education curriculum. For the necessity of multimedia and network assisted instruction, 68.57% teachers think that multimedia teaching is very important, and it is necessary means of physical education teaching. Multimedia network teaching platform can also integrate the latest sports information resources, students can watch all kinds of large-scale sports events by online video.

The paper “Design SPARTAN FPGA-Based PD Controller for FOD Systems” it goes without saying that, there is quite a diverse mixture of the linear controller. Nevertheless, I assume the most famous would probably be Proportional Integral (PI) controller. The things with PI controller are that most of PI controllers are reduction the error. As well as PI controllers, another kind of linear controller worth mentioning could be Proportional

Derivative (PD) controller and the unique characteristic of PD controller is that PD controllers are high speed and independent of system's dynamic modeling. In addition, there are the usual things like PID controllers and PI2D controllers. The main objective of this paper designs a minimum delay proportional-derivative (PD) controller to the control of first order delay (FOD) system. First order delay system has delay time about 4 seconds in certain and about 19 seconds in limited uncertain condition. To improve the flexibility, design high-speed and low-cost controller, the micro-electronic device (FPGA-Based) controller is used in this research. The proposed design is 30-bits FPGA-based controller for inputs and 35-bits for output. In this research, the maximum frequency is 63.629 MHz and the minimum period is 15.716 ns, the minimum input arrival time before the clock is 4.362 ns and the maximum output required time after clock is 19.727 ns. In this algorithm, the delay time for the derivative algorithm is 15.526 ns which 87.8% is a logic delay and 12.2% is route delay

The study "Pedestrian Detection Method Based on Convolution Nerve Network" one new pedestrian detection method integrating static high-level features and movement features based on convolution nerve network is proposed in this paper. During the phase of unsupervised deep learning of pedestrian features, the hierarchical static features of pedestrians are extracted from the low to the high with convolution nerve network; the pedestrian movement features are obtained through mean value approach of rectangular block pixel difference. During the logic regression recognition phase, static features and movement features are integrated.

Authors of the paper "Design of the Smart City Planning System based on the Internet of Things" when the building boom of smart city set off all over the world, in order to seize the commanding heights of the construction of smart city, many of the cities in our country have introduced a variety of measures to build smart city planning. Presently, the construction of the smart city in China has stepped into the fast lane and is becoming a nationwide boom. Meanwhile, with the continuous progress of urbanization in China, the number of car ownership has been rapidly increasing and traffic congestion has become a frequent occurrence. In consideration of the nonlinear and time-varying characteristics of traffic, it is difficult for traditional traffic congestion evacuation strategies to cope with the complex changes of the traffic flow due to their poor adaptability. In addition, traditional evacuation assignment strategies are seldom made from the perspective of traffic flow relevance, which results in low efficiency on traffic congestion evacuation. However, during the construction of smart city, the wide application of technologies related to Internet of Things in various fields of smart city, which makes it possible to realize the instantaneity of information perception and technique collection, and helps to improve the sensory ability of the system. Based on this, and under the background of smart city, this paper puts forward a multi-agent-based concept of "model prediction, dynamic calculations, online feedback, beforehand evacuation" and researches on the evacuation strategies of urban traffic congestion.

In the study "The Research of Multiple Regression Analysis in Rural-Urban Income Disparity", the multiple linear regression model contains more than one predictor variable and it shows the relationship among multiple variables. In the existing research field of rural-urban income disparity, the method of multiple regression analysis is mainly employed. But the linear relationship among variables is estimated mainly depending on principal component analysis. Principal component analysis is used to convert a set of observations of possibly correlated variables into a set of values of linearly uncorrelated variables called principal components. The principal component analysis is widely used for feature extraction to reveal the most main factors from the multiple aspects. A multiply linear regression model integrating principal components analysis is proposed to

address on the income gap between the city and country. The influential factors are given and the analysis results are discussed in this paper.

November 2016

*Carlos Ramos, Instituto Politécnico do Porto, Portugal*

**Editor of the November Issue on  
International Journal of Smart Home**