Foreword and Editorial

International Journal of Smart Home

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

This issue contains 24 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.

The paper "Development and Implementation of Visual Exposure Indicator for Residential Development" aimed to establish a methodology to find out the extent of visual damage and households caused by residential development. The research aims to make a quantitative calculation of visual grading and degree of concealment from residential development. Kumho residential apartment development was selected as a case study. Within the case study, 5 blocks were chosen to simulate which is located between Han River and Dalmaji hill. The degree of visual screening is analyzed into three different visual exposures; Visual Exposure, Distance-weighed Visual Exposure and Area-weighed Visual Exposure. Then the Visual Exposures were compared with visual damage and landscape simulations. In particular, Area-weighed Visual Exposure has a great potential to be implemented into planning process including disputes, grant and assessment since it does reflect human visual perceptions.

Paper "Experimental Exploration of RSSI Model for the Vehicle Intelligent Position System" investigates the experimental performance of translating the power measurements to corresponding distance between eachpair of nodes. The priori knowledge about the environment interference could impact the accuracy of vehicles's position and the reliability of paremeters greatly. Based on the real-world outdoor experiments, they compare different regression analysis of the RSSI model, in order to establish a calibration scheme on RSSI model. Empirical experimentation shows that the average errors of RSSI model is able to decrease throughout therules of environmental factor n and shadowing factor ηrespectively. Moreover, the calculation complexity is reduced, as aninnovative approach. Since variation tendency of environmental factor n, shadowing factor η with distance and signal strength could be simulated respectively, RSSI model fulfills the precision of the vehicle intelligent position system.

The paper "High-Gain and Low-Power Power Amplifier for 24-GHz Automotive Radars" presents a high gain and low power 24-GHz power amplifier (PA) for the short range automotive radar. The proposed circuit is implemented using TSMC 0.13-μm RF CMOS (fT/fmax=120/140 GHz) technology, and it is powered by a 1.5-V supply. To improve power gain of the amplifier, it has a 2-stage cascode scheme. This circuit uses transmission lines to reduce total chip size instead of real bulky inductors for input and output impedance matching. The layout techniques for RF (radio frequency) are used to reduce parasitic capacitances at the band of 24 GHz. The proposed RF amplifier has low cost and low power dissipation since it is realized using all CMOS processes. The proposed circuit showed the smallest chip size of 0.12 mm2, the lowest power dissipation of 44.3 mW and the highest power gain of 24.04 dB as compared to recently reported research results.

The research paper entitled "Prediction on Hourly Cooling Load of Buildings Based on Neural Networks" devoted to the development of a comprehensive modeling of cooling load for a large building with ice-storage systems in Beijing, China. The models describe the dynamics of cooling load, outdoor climate parameters and indoor parameters as one multi-variable nonlinear system in a way that is useful for prediction analysis. The cooling load data collected is from June to September, and then the method of similarity for both longitudinal and transverse waveforms is used to judge whether there is abnormal data. The optimal parameter setting in the proposed model is studied. Principle Component Analysis (PCA) method was applied to select input parameters. A load prediction model has been constructed based on BP neural networks. Taking account of the generalization ability of neural networks, this paper has chosen the bayesian regularization algorithm, which can get better fitting effect than other training algorithms, to train the neural networks. Then, the BP neural network model is used for the summer hourly cooling load prediction of the business building. Evaluation of the prediction accuracy of the proposed models is based on the root mean square error (RMSE).

The paper "Fuzzy Fractional Order Sliding Mode Control for Automatic Clutch of Vehicle AMT" proposed the method of fuzzy fractional order sliding mode control (FFOSMC) for clutch control based on the theory of fractional calculus and traditional sliding mode control,. By selecting the fractional order sliding surface, the laws of control are designed; and self-tuning of the switch gain is realized with the fuzzy controller. Theoretical analysis and numerical simulation revealed that compared with the traditional fuzzy integer order sliding mode controller, FFOSMC achieves better dynamic performance in position control and better robustness against load disturbance and other uncertain factors.

Authors of the paper "A 2D-DCT Image Processing in Matlab and Voice Informatics Based Remote Home Monitoring and Security System" proposes design and construct an image recognition & voice technology based security system by highlighting the advantages of image processing technology and voice synthesis technology which are presence in the electronic market. This paper mainly approaches towards enhanced security by checking the tag image of the operator as well as recognizing voice which are validated previously by this system just using simply a web-camera or closed circuit television (CCTV) camera and a voice recording software system and gives the signal in terms of alarm, Alert Light, message via global system for mobile communication (GSM)/ general packet radio service (GPRS) to the consumer mobile number/the nearest police station's mobile number.

In the paper "Simulation Model of Pedestrian Evacuation in High-Rise Building: Considering Group Behaviors and Real-Time Fire", many fire evacuation models have been proposed in recent years to better simulate such as an emergency situation. However, fire has different characters in high-rise building, and is affected by all kinds of factors. Evacuation of persons in case of fire is very complex, the environment will affected it, the individual psychological quality and physical quality, real time fire and so on. The numerical model based on cellular automata is presented, considering group behavior and real time fire development in the paper, and simulation experiments show the model is on the brink of reality and demonstrate its applicability and validity.

In the thesis "Web Service Definition and Validation, and Performance Analysis and Implementation of Control Tower for CCTV Sites" defined RESTful web service based R4CSM-API (RESTful web service for CCTV Site Management-API) instead of SNMP that had some limitations for the purpose of implementing an integrated management of CCTV sites. In this thesis, the performance analysis was conducted using Emulab

environment of KISTI as to the main functions of CCTV site integrated management. Also, an effective CT4CS (Control Tower for CCTV Sites) was designed and implemented for an integrated management of large-scale CCTV sites by utilizing the performance analysis results. Moreover, it validated the R4CSM-API that would be conducted at CT4CS by utilizing RESTClient that is an experimental tool of RESTful web service.

The paper "Research and Design of the Modular Robot Fuzzy Control Based on ZigBee" design a modular robot teaching device, combine with wireless communication technology, and robot control technology. Introduce ZigBee nodes into the robot's every module, transmit the current motion parameters through the wireless communication, adjust the robot motion state and realize the fuzzy control of the robot motion. This device has good openness, does not involve the establishment of the robot kinematics and dynamics model, and avoid a large number of algorithms in the same time. Its operation is simple, convenient, and more suitable for the teaching.

Authors of the paper "Evaluations of Hardware and Software-Based Context Switching Methods in Cortex-M3 for Embedded Applications" propose an algorithm for analyzing the performance of context switching methods in uC/OS-II the Cortex-M3.

The research paper "Parking Lot Optimal Routing Based on Grey Entropy Relation Grade Multi-Attribute Decision Making" is committed to path optimization of parking lot by grey entropy relation grade multi-attribute decision making. The decision attribute matrix is identified by driving distance which is deduced through Dijkstra algorithm, walking distance deduced through Euclidean distance and parking space environment value deduced through the expectation of triangular fuzzy number.

In the paper "WBS-based Hierarchical Classification and its DB Modeling of All Construction Information for Apartment House", WBS-based hierarchical classification and its DB modeling structure of all construction information for apartment house are proposed. The proposed WBS-based construction information classification system divide all construction information of apartment house into 4 hierarchical levels that are construction zone classification, building classification, work classification, and work item classification. These hierarchical construction information are DB modeled using a relational data model. The computer aided processing of the construction management by this DB modeling of the construction information is possible. The proposed WBS-based hierarchical classification and its DB modeling structure will be applicable to an effective and scientific cost estimation system

The paper "An Enumeration Method Applied in Intelligent Transportation System" tried a new analysis method without feature extraction for these two applications. The approach is based on enumeration. All the possible results of image analysis are tested by the testing function. Then, the extreme value of the testing function is selected and the corresponding result is just the concerning result.

This report "An Analysis of the Economic Effects of NetworkIndustry by Applying Household Endogenous Model", applies an analysis of inter-relationship among industries including an influence process of income and consumption by considering the effects of an increase in consumption, resulting from the growth of household income, on production. It might be worthy to review input-output table with household endogenous model when it investigates the effectiveness of investment on network infrastructure.

Authors of the paper "Research on the Electronic Commerce Market Survey Based on Normalization Kernel Principal Component Analysis" put forward an improved principal component analysis method- normalization principal component analysis method. This method transforms the negative index and the neutral index into the positive index. And it also transforms the positive index that the index value exists negative values into the index value that the positive indexes are all the positive values. Then it can score these indexes.

The paper "Augmented Reality Fashion Apparel Simulation using a Magic Mirror" proposes a system that uses a depth camera to capture the figure of a user standing in front of a large display screen. The display can show fashion concepts and various outfits to the user, coordinated to his or her body. Thus, a "magic mirror" effect is produced. Magic mirror-based fashion apparel simulation can support total fashion coordination for accessories and outfits automatically, and does not require computer or fashion expertise. This system can provide convenience for users by assuming the role of a professional fashion coordinator giving an appearance presentation. It can also be widely used to support a customized method for clothes shopping.

In the paper "Modeling and Simulation of Discharging Characteristics of External Melt Ice-on Coil Storage System", in case of energy storage air conditioning system, due to load fluctuation, the traditional control methods can't obtain good effect, the model predictive control method can realize the optimization control system, and can overcome the influence of load fluctuation. In order to realize the predictive control, need to study model of air conditioning system. Ice storage air-conditioning system, by analyzing the mechanism of ice tank, ice melting system outside the tank model is established. First, analyzed the physical structure of ice bath, determine the parameters of ice bath, put forward the control as well as the output of the ice tank.

The paper "X3D Nodes for Representing and Rendering Real Characters in 3D Virtual Environments" proposes and defines four eXtensible 3-dimensional (X3D) nodes to render real-world characters such as human being and animals in 3D virtual environments, which conform to the X3D standard format for representing and rendering real-world characters in virtual spaces, aiming to make them available as an extension of the X3D core nodes. Several examples are implemented to evaluate the effectiveness of the proposed X3D nodes. Implemented results demonstrate the feasibility of the proposed X3D nodes as an extension of the X3D core components for rendering real characters in 3D virtual spaces.

In the paper "Intelligent Monitoring System for Home Based on FRBF Neural Network", in accordance with the requirements for home security and safe guard, a new type of intelligent monitoring system is researched and developed. The system is established with CAN bus and wireless as the foundation. Multi-sensor technology is used to improve the alarm algorithm of the system, a new fuzzy neural network is put forward as the classifier. There are four layers in the network, and the input signals are temperature and the concentration of CO, smoke and CO_2, the output signal is the fire probability. Radial basis function (RBF) is used as the fuzzy membership function. The principal component analysis (PCA) is used to extract the information of sensors and an observation window is used to extract the necessary information for neural network.

The paper "Analysis and Evaluation of Holistic Energy Saving for Modern Buildings" reviewed and concluded the development of modern building energy saving technology. On this basis, designing ways and methods for energy saving system was proposed from the points of walls, doors and windows, roofs, and grounds. The concept of evaluation

index of energy saving building was put forward, and the objectives and principles of evaluation index of energy saving building were analyzed. Finally, take the modern energy saving residential housing as an example, it discussed in tail how to establish the evaluation index system for energy saving residential housing, and confirmed the weight and standard for evaluating the residential housing, and ensured the gray multi-hierarchy structure comprehensive method.

Paper "Dynamic Allocation of Random Access Opportunity for Machine-Type Communication in LTE-Advanced" proposed a combination of a dynamic resource allocation and a random access check mechanism to solve the overload problems for MTC in LTE-Advanced. An analytical model is presented with the derivation of three metrics, the collision probability, the success probability, and the idle probability to evaluate the method.

In the paper "Simulation Experiment on Acoustic Emission of Pipeline Leakage" experiment conducted on the experiment table with the heater pipeline leakage, inner pipeline leakage of heater was studied through the leakage failure detection system. The frequency distribution and the amplitude of acoustic emission signals of leakage versus internal pressure were analyzed. Variations of signals versus leakage aperture and dissemination distance were summarized. According to the mapping relationship between the leaking spot and acoustic emission signals, and between the leakage flow and acoustic emission signals, reasons of leakage failure were concluded.

The paper "An Intelligent Managing System of Electric Energy Based on ST7538" designed the intelligent managing system in order to meet with the growing needs of the society; it is used in residential area, factories, substations and other areas to manage data of electric energy. The system has many functions such as collecting data automatically, analysis data, and querying data and so on.

Paper "A Vibration Signal Envelope Extract Method Based on Wavelet" proposed a vibration signal envelope extract method based on wavelet. In this proposed, the wavelet used to filter the noise which embedded the vibration signal, and to detect weak signal (fault signal) through obtained the coefficients by wavelet processing. And then, the Hilbert envelope was introduced to do energy envelope spectrum analysis for coefficients obtained by wavelet processing, the results analysis shows, the proposed method used to extract the signal envelope for fault detecting is practical, stability and reliable.

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**Editors of the February Issue on
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