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 and Engineering Research Support soCiety.

This issue contains 31 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.

Results of the paper "Research on Forecasting Electricity Demand of the 13th Five-year in Hebei Province" show that the total electricity consumption will grow at an annual rate of 3.46%-3.87% during 13^{th} Five-Year-Plan period, which would be more than 0.4234×1012 kWh in 2020. The electricity consumption growth of tertiary industry and resident sectors would raise fast, which will grow at an annual rate of 8.72%-9.15% and 6.24%-6.72% during 13th Five-Year-Plan period. Moreover, comparing with the demand structure in 13th Five-Year-Plan period, the proportion for industrial electricity demand will decline by 5%, the proportions for tertiary industry and resident sector will increase by 3% and 2%. The electricity consumption structure in Hebei province would change in the future.

In the paper "A Study on The Influence of Use of Web 2.0 Collaboration Tool Reflecting Agile Practice on the Evaluation of OS Project", for the agile development methodology that repeats the frequent releases and the short development periods, there are some value practices that they have to keep. Among them, three typical practices were selected: use of Web 2.0 collaboration tool, adoption of the test driven development (TDD) and refactoring. The agile practice that forces the communication between team members was defined with the use of Web 2.0 collaboration tool. When this is applied to the development method of open-source projects which are dispersed geographically, temporally and culturally, it is expected to raise the satisfaction of OS project users and to contribute the maturity of community. It was applied to the study models that were drawn out from the precedent studies.

In the study "Stress Analysis and Failure Prediction of Adhesively Bonded Single-lap Laminates Joints Subjected to the Tensile Loading", on the basis of the existing experimental results and considering five kinds of failure modes, failure prediction of adhesively bonded single-lap laminates joints with adherend thickness 3mm, adherend thickness 2mm and defect in the adhesive layer under uniaxial tensile loading is performed by progressive failure analysis method. The numerical analysis of composites adhesive joints is implemented in ANSYS Parametric Design Language (APDL) with commercial finite element codes ANSYS. The error of computaional and experimental failure loads is 3.0%. Evolution of adhesive progressive damage is simulated effectively and the initial position and reason of damage is discovered. Furthermore, a finite element simulation is carried out to analyze the stress distributions in the mid-surface of the adhesive layer and the bonding interface. It is found that stress concentration is all emerged near by 1.25mm on the overlap zone ends, that is the initial point of damage, and it is the main factor that the joint strength is affected by peel/shear stress concentrations at overlap zone ends. The computational results are in good agreement with the experimental values.

The paper “The Analysis on Time-dependent Reliability of Steel Structural Components under Fire Conditions” presents a straightforward and possible time-variant model of the steel beams to be resistant against fire, and also a reliability index analysis method. According to the ISO834 standard heating curve, the steel beam’s reliability is evaluated.

The purpose of the paper “A Study on the Space Hierarchy According to the Plan Composition in Outpatient Department of Geriatrics Hospitals” is to establish preliminary data for the design of geriatric hospitals through the quantitative hierarchical analysis of plane structure according to the floor plan composition of outpatient departments in geriatric hospitals. In this study, J-graph and space syntax were utilized for quantitative analysis of outpatient departments in geriatric hospitals, and the analysis target was limited to hospitals for the elderly located in Korea, where there was a rapid increase in aging population recently.

Paper “Research on Innovative Design of Mobile Cooking Table” mainly on the basis of the principle of ergonomics and the concept of humanized design, conduct the design on the overall size and construction of the cooking table from the aspect of function, material and institution to develop a cooking table with strong practicality in order to meet demands of different consumers.

Authors of the paper “Machine Learning Based Adaptive Context-Aware System for Smart Home Environment” present machine learning based context-aware system which can provide service according to the trained model. Two effective learning algorithms: Back propagation Neural Network, and Temporal Differential (TD) class of reinforcement learning are used for prediction and adaptation respectively. This approach indicates better adaptation for context-aware service due to the low error rate.

The Study “The Research of Ad hoc Network Routing Protocol Based on Energy” introduces the basic concepts and key technologies of Ad hoc, and summarized the traditional Ad hoc network routing protocol , commonly used for energy saving existing routing protocol control strategy focuses on . Introduced and compared four typical Ad hoc network routing protocols AODV, DSDV, TORA and DSR performance in energy control. After in-depth study of Ad hoc networks in the energy physical layer, MAC layer, network layer control problems , proposed an Ad hoc network routing protocols based on improved energy control - control of distributed energy source dynamic routing protocols. Finally, the proposed protocol simulation, reflecting its advantages in energy control.

In the paper “Studies of Large-scale Antenna Beamforming Technology”, the large-scale antenna has the advantage of application is strong, it can greatly improve the average throughput of the system, but also can save transmission power , becoming one of the key technologies of the fifth generation mobile communications . However, in FDD system, the sender configure a large number of antennas, the access of channel state information has become a problem to achieve ; for this problem , they propose a bit allocation scheme , this scheme is based on jointly zero forcing beamforming , using random vector quantization method , and getting a better performance , the success of the application of traditional finite feedback technology to large-scale antenna system, the simulation results show the effectiveness and correctness of the proposed algorithm.

Authors of the paper “A Study on Cooperative System between Devices to Construct Internet of Things” design An XML schema on devices for collaboration between devices and implement the device manager, which defines the relationships to enable collaboration between devices. When the device’s relationship is redefined by the manager, they used the compact embedded system in Arduino and OpenWRT while

designed and implemented the prototype system that enables collaboration between devices through an XML schema.

The paper "Design of Light Source System and Optical System for a Static Star Simulator" introduced a scheme of using cold cathode planar backlight, and presented the power supply circuit for light source. According to the analysis, parameters of static star simulator were determined, and then a large field, small distortion and small field curvature collimating objective lens was designed by using transmission optical system. The imaging analysis results show that the design can satisfy the request.

In the study "Research on Traffic Journey Intensity of Residents Based on Gravity Model", in order to accurately predict the traffic journey intensity of residents along the highway, according to the mechanisms of production of the traveling, analyze the influences of traffic journey intensity of residents from the three angles including residents' willingness to travel, destination's attraction, traffic resistance, and predict the traveling intensity combined with the unconstrained gravity model. Then introduce the sensitivity of travel cost and analyze the impact of sensitivity of traveling cost on the traffic journey intensity. Finally, with an instance of the radiation areas of Zhaoma highway in Yunnan, calculate the calibration parameters in the unconstrained gravity model combined with the increase method and analyze the sensitivity of traveling cost within the scope of radiation areas. The results show that there is significant exponential relationship between the traffic journey intensity and the sensitivity, and it can provide some theoretical basis for the trip distribution; the gravity model is reliable and viable in some degree, and has a certain guiding significance for planning the road infrastructures.

Authors of the paper "Novel Gateways and Sensor Nodes Applying an Object Identifier to Monitor Gas Facilities" propose two kinds of novel gateways and sensor nodes that apply an object identifier (OID) to monitor gas facilities. The proposed gateways and sensor nodes collect gas and environment data with various sensors and communicate with a monitoring server. If an exceptional event happens at the inspection site where our devices are installed, sensor nodes can take action by issuing control commands from the monitoring server. Moreover, they have also designed an OID that provides resources and devices in a gas monitoring system with a unique identification. By applying an OID to each message for transmission among sensor nodes, gateways, and monitoring servers, gas facilities and related devices can be accurately and safely managed. To evaluate the proposed devices, they properly installed our gateways and sensor nodes near operating gas facilities and verified their operation.

The study "Research on Traffic Flow Mathematical Model in Urban Traffic" take the urban road network as the object, a further study on the method of traffic signal self organization under the condition of traffic state identification and local congestion. In the urban road traffic state identification study, according to the need of traffic signal control, respectively from qualitative and quantitative point of view, the urban road traffic state is defined. In order to be able to obtain real-time traffic data as the foundation, design urban road traffic state evaluation index system. Based on the current mainstream micro traffic simulation software VB and VISSIM as the tool to build the experimental platform, and set up the UTC-CI (Urban Traffic Control for Congested Intersections) experimental environment, the above method is verified by simulation. The results show that the traffic state identification method and the related signal control method have the expected effect in reducing congestion duration.

In the study "Design and Realization of Personal IoT Architecture Based on Mobile Gateway", in IoT, connectivity for local and/or wide area is fundamental to collect sensed

data from IoT field devices or to send control information to the devices. Up to now, most of IoT devices equip still personal area level wireless radio interfaces due to cost of radio modules, energy consumption, and subscription requirement of wireless cellular networks such as 3G, WiMAX and LTE. In order to collect data from such devices possibly moving in the Internet, a gateway or relay node that can transfers the data using wide area communication techniques is necessary. A smartphone which provide a tethering function can play a role of the gateway for personal IoT environment and it does not require additional subscription for personal IoT devices and provides location independent connectivity. In this paper, they design personal IoT architecture based on mobile gateway and realize it with two case studies, remote control of car navigation system and home automation examples.

In the paper “The Research on Hotel Customization Capability Influence Mechanism Based on Biological Double Helix Gene”, in today’s hotel industry, how to effectively balance the benefit of the customer demand and the supply resources has received widespread attention. This article put forward the connotation of hotel customization capability and “double helix gene” structure model which integrates customer demand, the hotel product characteristics with standardization production factors for customers, and discusses the relationship of different customization performance and enterprise capability; accordingly summarize the influence mechanism of customization capability.

Authors of the paper “A Study on Construction Elements of New Rural Sports Culture in China and Related Influence: an Empirical Analysis Based on Online Survey” test the development status of new rural sports culture in China by using online survey. Factor analysis results show that, KMO = 0.883, Bach Wright test value X2=116.128, P=0.000<0.01, there are 4 common factors, including "material sports culture factor", "spirit sports culture factor", " system style education factor" and "behavior sports culture factor". Contribution rate as 35.272%, 19.376%, 10.495%, 9.809%, the cumulative contribution rate is 74.952%, and there is a high degree of correlation between them.

The paper “Performance Analysis of a Tour Scheduler Focusing on Time-Dependent Gains for Electric Vehicles” conducts an extensive analysis of its performance through a prototype implementation. Main concerns are put on the acquired gain, waiting time, and tour length according to the schedule depth and the number of destinations. Basically, the scheduling service provides an interface for the tour spot manager to upload the time-dependent coupons as well as runs the tour scheduler each time a new request arrives from an electric vehicle. According to the experiment made to run on the real-life geographic tour spot distribution of Jeju City, the proposed scheme takes about 4.8 to 4.9 times as much economic gain as the legacy traveling salesman problem solver. The waiting time approaches the permissible bound specified by the explicit constraint, especially when the schedule acquires more coupons. In addition, the tour length is affected by up to 14.4 %. Here, when many coupons are available, the depth 1 vehicle can monopolize gains, but the next vehicle also takes enough economic gains.

In the paper “Simulation Model for the Decision-Making Behavior in Pedestrian Evacuation with Floor Field Cellular Automata Approach”, in order to simulate pedestrian evacuation from a room with multiple exits, an extended floor field cellular automata (CA) model is proposed to describe the decision-making behavior of pedestrians in a realistic way. The problem of the potential distortion and reciprocating route of pedestrians is solved. Meanwhile, the visual factor and the visual field are introduced to reveal the effect of visual sense on intelligent decision-making behavior of evacuees. To make the simulation more reasonable, human psychological behaviors are considered in the model, such as panic psychology, self-protection awareness, competition awareness,

etc. Moreover, the width and the layout of exits are also taken into account and the critical value is obtained by simulation. The results show that the proposed CA model is efficient and realistic in the assessment of both human evacuation and building design.

The study "Food Security Sensor Management Based on RIHA" takes the security management food security sensor management of food industry the industrial area as the researching object, discussing the architecture of ASAAC standard food security sensor management, by means of a RSSI-based Information Hiding Algorithm (RIHA) analysis method, it puts forward ideas of assessment on the food security sensor management safety. And uses RSSI (Received Signal Strength Indication) as hidden information carrier and designs. It does not affect original data or bring additional communication cost. The simulation results show that RIHA has high hidden information transmission accuracy without bringing additional communication energy consumption.

The article "Development of a Simple and Innovative Wave Energy Harvester Suitable for Ocean Sensor Network Application" represents a new idea about an innovative, simple and cost effective marine energy harvester for powering offshore sensor nodes working as part of Ubiquitous Sensor Network (USN). Betterment of these aqua farms by including these into wireless sensor network so that they could be remote controlled from far land, is needed to make this offshore farming more popular. For this step to be done one major concern is the powering process of the sensor nodes used as the key part of sensing or monitoring purpose of the offshore projects. So our study focuses on the design and numerical study of a wave energy harvesting device for supplying uninterrupted electric power to offshore sensor nodes serving as part of ocean environment monitoring network or any marine aquaculture farm. Analysis of the environmental and device sizing factors that makes the efficiency to deviate, have been discussed here. It is a novel, floating type, double chambered wave energy converter that uses the Oscillating Water Column technology for conversion of wave power into electrical power.

In the paper "Discussion and Design of Dynamic Liquid Level Intelligent Monitoring System", the problem of how to calculate the height of the liquid level under tilting status is considered. A custom algorithm for obtaining the real height of liquid level according to the difference of distance measured by ultrasonic sensors is proposed. A set of intelligent monitoring system is designed as well. The system, which takes S3C6410 processor as the control core of the front-end system, measures distance by multiple HC-SR04 ultrasonic sensors, compensates temperature via external temperature sensor ds1820, collects data via inserting driver modules, and then gets the liquid level angle by means of the difference between distance, to calculate the liquid level height, both of which will be sent via Bluetooth chip CC2541 and wireless network. The data, received by PC, will be used for graphical interface display and speech broadcasting depending on Processing software programming. The smart phone can also read data and control devices from the front-end. The results of simulation experiment of this system are considered.

In the study "Light Fades and Life Prediction of LED Light Source", the life is the most representative parameter in the parameters of LED reliability. But the impact factor of the LED lifetime are numerous and complicated, each factor of the influence degree of each are not identical. If according to the traditional light source life test method, then the cycle is too long to not led update speed. And the majority of the LED accelerated life test by means of increasing the should force experiments to estimate the life of the LED light source, this kind of test is usually elevated led where the ambient temperature or increasing the current through the LED itself. Finally, through the acquisition of data and analysis to predict the service life of LED light source, but did not direct theoretical

foundation to justify force and the service life of LED light source specific equivalent relation. Therefore, the accuracy of accelerated stress measured the service life of LED light source is yet to be verified. Through the analysis of the change of the life of LED is a gradient of chemical reaction, with the Arrhenius model, led the life of the weakening is through changes in the flux to the lumen, and for that they can under the normal working condition analysis of LED light attenuation mechanism and rules, the prediction from but realize life led to predict led by degradation of cause and the change of life.

The research “Paseduluran: A Local Wisdom in Dealing with the Earthquake Disaster in Javanese Society” presents a theory which is very likely related to local wisdom during the post-disaster emergency period. The concept of control of space of post-earthquake market is the realization of the community’s vigilance arising due to the earthquake and was influenced by the culture of the society who has been there and continues to grow to the present. Deep exploration will reveal the rationale of the society's strategy in arising vigilance in emergency period. The concepts which were found then were further explored with transcendental depth and managed to find the paseduluran as the basis of the control of the post-quake market space. The value of paseduluran underlying the consensus of control of space of post-earthquake market includes consensus on spatial distance, space boundary, order of space, and space control. In other words, the overall consensus is based on the value of Paseduluran. These values come from the local culture of the community in Bantul Regency which is proved to accelerate the recovery of the community to normal life.

The paper “Design and Construction of the Virtual Cloud Platform for the Laboratory” construct a virtual cloud platform laboratory, based on the cloud technology. Introduce the design, construction and architecture of the cloud platform in detail. Analyze the advantage and security of the cloud platform. It has low cost of hardware and software, small late maintenance, and centralized data management, the security of data is greatly improved, compared with the traditional computer (PC) laboratory. Meanwhile the virtual platform also has the all characteristics of the real computer. The virtual cloud platform of the laboratory is the trend and direction of the development of the computer lab in the future.

In the paper “Study and Analysis of Semiconductors for the Development of Two-layer Solar Cells”, in the field of renewable energies, researchers have always looked for the improvement of the conversion method in solar cells, due to the fact that only 14% of the electrical potential is being used. That is why in order to increase efficiency, different designs and materials have been studied. One of the most viable ways is the technology of multilayer solar cells, which the recent investigations focused due to the fact this technique allows the possibility of achieving efficiencies above 30%. Despite the above, the problem of this technique is the cost of manufacturing, which compared to the commercial cells, is inferior in benefit - cost relationship. For this reason, this paper shows a study of different semiconductors to design a two-layer solar cell, with the aim of selecting the best combination of semiconductors according to their own characteristics and results according to the described method.

In the paper “Generic Information System for Chain Stores based on Borland C++ Builder”, with the rapid growth of global economy, chain stores are springing up all over the world and have dominated more and more service markets, e.g., retail and dining. Accordingly, chain businesses have been one of the fastest growing industries since the beginning of this century. However, there are many bottlenecks for further producing competitive advantages of chain businesses, such as relatively small scales of chain stores, rather weak information awareness of managers, incompetent staffs and diversified

business processes of chain stores, by using the traditional manual management. The introduction of chain store information systems, which integrate usually comprehensive information technologies, could provide managers of chain stores with a decision making yet overall management platform. In this paper, they develop a generic yet efficient information system for chain stores using MIDAS based three-tier client-server architecture. Besides, they also illustrate the system from three most principal stages in software engineering, which are system analysis, system design and system implementation.

In the study "The Smart Eye Frame Based On Internet of Things", protecting the eyesight has become one of the most current concerns in China, especially for the adolescent group. This design is a tool of protecting the eyesight for preventing the myopia. It is based on the ultrasonic sensor, photosensitive resistance, Bluetooth, the voice module and the smart telephone. It discusses the hardware design and software control for the eye sight protection. It uses CC2530 MCU as the core chip. Its circuit is to achieve the low-cost, high-precision, minimized eye sight protection. It is simple to operate. It includes the strong anti-jamming capability. Now the smart eye frame is heavy because of the battery. But it can supply power by the charger in order to reduce the weight. The initial survey shows more than 50% of students and parents lack the basic science knowledge for caring the vision. Therefore the design of a vision protector to protect eyesight is particularly important. The design of the hardware includes the circuit of the transmitter and the receiver in the ultrasonic, the alarm circuit, the circuit of detecting the light intensity, and Bluetooth communication circuit. The market has no similar products.

In the paper "Design & implementation of an Air Quality Monitoring System for Indoor Environment based on Microcontroller" Indoor air quality is a very important parameter for living environments, which is closely related to people's daily work and health. However, nowadays, the environmental pollution, haze weather and other issues have become increasingly prominent. In this context, it is necessary to design an automatic detection device for monitoring the air quality in buildings. In this paper, an indoor air quality monitoring system was designed and implemented based on LPC2148 micro-processor by means of the sensor technology, embedded technology and communication technology. The system could simultaneously monitor a variety of harmful gases and monitoring gas and setting alarm values according to the requirements of the indoor environment, such as indoor temperature, humidity, formaldehyde and methane, as well as PM2.5. All of the measured data is transmitted to the remote server to process through Ethernet. The experimental results show that, the system works stably and has high accuracy, which has broad market prospect.

In the study "Research on an improved differential evolution algorithm based on three strategies for solving complex function", for the shortcomings of differential evolution algorithm(DE), such as the low convergence rate in the late evolution, easy to trap into the local optimal solution, and weak situation of the global search ability and the stability of optimization, an improved differential evolution algorithm based on multi-population and dynamic local search(MPDLSDE) is proposed in this paper. In the MPDLSDE algorithm, different populations select different mutation operation model in order to obtain superiority reciprocity between different models in the process of evolution. And the random selected method and small probability perturbation are used to increase the diversity of population and balance the exploitation ability and exploration ability of the algorithm. Then dynamic local search method is used to solve the current optimal solution in order to speed up the convergence rate. Several well-known benchmark functions are selected to validate the efficiency of the MPDLSDE algorithm. The simulation experiment and comparative analysis results show that the MPDLSDE algorithm can

enhance the global convergence ability and get the high accuracy solution in high dimensional complex optimization problems.

The paper "Internet of Things (IoT) Framework for u-healthcare System" studies the u-healthcare system with respect to the Internet of Things (IoT) perspective. Mainly, the mover of IoT for u-healthcare is the integration of different technologies and computing system. These include sensor devices to gather patient's physiological data, u-healthcare cloud server and wireless technologies. To address the interoperability limitations of different devices the mobile gateway architecture for u-healthcare and the tiers of u-healthcare system IoT was presented.

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