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 20 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 "Control System Design of Anti-rolling Tank Swing Bench Using BP Neural Network PID Based on LabVIEW" deals with the studies of anti-rolling tank swing bench is a typical hydraulic position servo system. Its function is to simulate the ship roll motion and to verify the performance of the anti-rolling tank. Generally, the PID control method can achieve an ideal control effect. But the uncertainties, such as the couplings and the nonlinearty of the swing bench, make it difficult to establish the precise mathematical model of system. During experiments, the different disturbance torques are generated according to the different dimension scales of the anti-rolling tanks. Changes of the natural characteristics of the system are caused by changes of load, and the fixed parameters of PID controller are difficult to continue to ensure a good control effect. In order to reduce the influences caused by the factors mentioned above, a BP neural network PID control system based on virtual instrument LabVIEW is designed.

Authors of the paper "A Comparative Study on the Neighborhood Street Characteristics of Seongnam City" investigate ①Road system (about 6m road) ②District use ③Relation of Neighborhood Facilities' location and distribution ④ Formation time of residential area. It decides to take these factors as main criteria of analysis and draw analytic maps of reciprocal relations for daily Neighborhood Facilities in 4 dongs. Through this comparative study on Neighborhood Streets of residential areas, it is found out that in order to achieve sustainable urban residential area regeneration for the original part of Seoungnam City, it is necessary to keep and support existing communities with its Neighborhood Streets. And it believes that the enhancement of these Neighborhood Streets will improve the true quality of residents' daily lives, which are closely integrated with these. Therefore, it strongly proposes the small scale Regeneration Plan of each residential blocks with improving these Neighborhood Streets for pedestrian residents.

The study "Simulation on the Supporting of Underground Storage Foundation Pit by Anchor and Soil Nail" chose the foundation pit of underground storage in Zheng Zhou City as an example, the simulation model for composite. Zhou City was chose as an example, the simulation model for composite supporting of anchor and soil nail was set by FLAC software, the ideal elastic-plastic constitutive model was selected for soil, the cable unit was selected for the prestressed anchor and soil nailing, based on the interaction between supporting system and soil, the dynamic process for the excavation and support of foundation pit was simulated. The law for the effect of the excavation on disturbance, soil changes in displacement and internal force distribution of soil nail and anchor was obtained in this study, the connection line of the maximum axial force of soil nail and anchor were actually the potential failure surface of soil foundation pit, the position change of maximum axial force reflected the trends of internal displacement of excavated

soil. The related conclusions have certain reference significance for the composite anchor and soil nailing supporting design.

The research paper entitled “Bayesian Optimization RSSI and Indoor location Algorithm of Iterative Least Square” introduced a Bayesian optimization RSSI and an indoor location algorithm for ILS by setting RRS ranging as location framework. Firstly, through analyzing the RSSI-based ranging model, an indoor location model was introduced. Secondly, in view of the influence on RSSI value caused by the indoor environment, the Bayesian probabilistic model was adopted to process the RSSI measured value and to screen out the "big probability" of RSSI value. Thirdly, Obtaining accurate measured data by estimating distance using method of minimum mean square error. Finally, Estimating the node location using least square method, and according to the TelosB node of Telos Series produced by company Crossbow, the ranging experiment can be designed and thus groups of experimental data were obtained and analyzed.

Paper” FPGA Based Energy Efficient Universal Asynchronous Receiver Transmitter Design Using Thermal Scaling” throws light on the behavior of the UART in response to the variations in the junction temperature. Analysis has been done to find the most ideal temperature range for the operation of the UART. After all the calculations, deduction comes to a point that lowering the temperature values increases the efficiency of the UART significantly since the losses due to the leakage power are reduced to a minimum value when the temperature is decreased. Significant reduction in the percentage of leakage power is seen as the temperature is lowered. Implementation has been done on the FPGA generations Virtex-6, Virtex-5, Virtex-4 using XILINX simulator and Verilog Hardware Description Language.

In the paper “Optimization for Remote Monitoring Terrestrial Petroleum Pipeline Cathode Protection System Using Graded Network”, aims to develop a system to monitor the terrestrial pipe cathode protection equipment to wholly track the operation status of buried pipe timely. The monitoring system integrates technology of wireless sensor networks, GPRS network and Internet not only to collect the cathode potential data in time and realize remote data transmission but also to regulate the guard mode of cathode protection on demand. Optimization mechanisms are adopted to effectively lower the energy assumption and to ensure data transmission reliability, from architecture design, selection of power saving hardware components, implementation of reliable network traffic mechanism including hierarchical network topology with least-complexity cluster head shift strategy, TDMA protocol with auto-adaptive resending scheme, work-on-duty with radio-awaken mechanism and so on.

Paper “Energy Efficient Clean and Green IT: Concepts and Approaches” stated different management policies for reduction in energy consumption. Energy Star (ES) programme of the United States promotes energy efficiency in electronics products that provides an exceptional productivity as compared to the old or traditional systems. Energy Star program has been adopted by many countries to make a move towards Clean and Green environment. ES labels can be easily found on electronic appliances at homes, offices, buildings and many other places. Depending upon the devices, using these policies can result between 30%-90% of less power consumption.

Authors of the paper “The Evaluation System of New Digital Home Shopping Service” discusses the evaluation system for the users of the new digital home shopping service based on HD (High Definition) -interactive shopping platform. The suggestion is to change from the channel with playing functions to the column with interactive functions for public goods since HD -interactive digital shopping is a Chinese government policy

for three networks convergence, and it is a new model to provide the home shopping directly and realize economic objectives for telecom operators.

In the paper "The Design and Realization of the Household Intelligent Alarm System", proposes a solution to design and realization the system. The whole system based on microcontroller AT89C51 is divided into hardware system and software system. Hardware system consists of pyroelectric infrared sensor, alarm mainframe, dial circuit, voice circuit, telephone interface circuit, key interface circuit. And software system includes master control modules, alarm processing modules interrupt processing modules, dial modules, voice modules and keyboard input modules. When Infrared sensor detects alarm signal such as fire, housebreaking and emergency pulses of elder, the microcontroller receives interrupt request from prober and controls telephone interface circuit to finish simulating off-hook. Using DTMF (dual-tone multi-frequency) dial circuit to realize auto dial and voice call to play prerecorded voice messages to inform the host of the house to take measures timely. The system without rewiring is particularly applicable in the decoration and inconvenient for the user.

In the paper "FPGA-Based Real-Time System for Demodulating FBG Wavelength", studied the demodulation technology for FBG wavelength. The FPGA-based real-time demodulation system for FBG wavelength was built. The optical unit includes the broadband light source, the fiber coupler, the TFPF, the reference gratings module and sensing grating array. The circuit unit is composed of A/D conversion circuit, D/A conversion circuit and human-computer interaction circuit. The signal processing unit was designed based on FPGA. It realizes many functions, such as data acquisition, FIR filtering, peak clipping, peak searching, TFPF driving and data calculation. And it has the advantages of high reliability, real-time, fast and programmable.

Authors of the paper "Dynamic Interaction System Design of Urban Landscape Information Based on PHP Technology" described the structure and functions of the system, explained design methods of the database and application. The construction and application of the system can integrate landscape information of the transitional period of Urbanization, such as item information, engineering information, education information and artistic information, offer a human-machine interactive communication platform based on P2P mode (point-to-point). It will become innovative power for the development of urban landscape industry.

The thesis "Construction Scheme Study of Smart Agricultural Demonstration Park" detailed discusses the construction scheme of smart infrastructures, smart production modules, file management modules, smart website modules and smart business modules. This framework is composed of integration platform, infrastructures, demonstration modules and application platform.

Paper "A Study on HL7 Standard Message for Healthcare System Based on ISO/IEEE 11073" studied the standard of HL7 message for healthcare system which can support diagnosis for healthcare provider and user. It studied the connection of standard medical devices, i.e., continua health alliance under the Android 4.x Bluetooth HDP (Health Device Profile) environments based on ISO/IEEE 11073 which is standard of information exchange among health device agent and service. And also it studied smart healthcare system using smart phone depending upon current trend. This system was studied on the environment of ISO/IEEE 11073 and HL7 standard.

In the paper "The Research on Smart Home's Wireless Control Mechanism", puts forward the general framework of smart home's wireless control on smart home's

wireless control protocol and specific applications, and designs hardware and network structure for this system. By combining with design and algorithm implementation of repeaters, the paper improves WSN routing protocol, which is based on applications of smart home, and geographical routing protocol, which is appropriate for this scene. Meanwhile, the paper applies double bounce greedy algorithm and routing void mark to improve the problem of routing void. In this way, it avoids from the generation of routing void to the greatest extent. Through the simulation experiment, it can draw a conclusion that comparing with GPSR protocol and GEAR protocol, the improved protocol has a great improvement on node energy consumption and effective avoidance of routing void. It makes network performance improve to a greater degree. Before deploying smart home's network nodes, it should pay more attention to deploy the number of nodes. In appropriate node deployment, better network performance of smart home can be obtained.

In the paper "Application of Travel Management System Based on Route Inquiry", proposes system management design and application based on tourist routes inquiry. Firstly, based on MAP technology, it achieves a cross-check of space and attribute data, then explores the knapsack problem through the genetic algorithm, making the travel route arrangements more reasonable and providing latest shareable maps for tourists, and finally conducts simulation experiment on system model.

In the paper "Dynamic Data Binding Protocol between IoT Medical Device and IoT Medical Service for Mobile Healthcare", the author suggests a binding protocol which enables users to use public medical devices as if they are their own medical devices through IoT Healthcare. Binding protocol provides customized real-time transmission function enabling interwork between mobile phones, medical devices and monitoring services. In particular, the author defines a protocol to support streaming date transmission, and verifies the operating effectiveness of the protocol by measuring the transmission time through simulation.

The paper "Model and Algorithm for Traffic Network Design by the User Equilibrium Allocation", adopts the bi-level programming model to describe the game progress, and sets up the traffic network design model based on the user equilibrium allocation. The upper resource allocation problem is used to describe the traffic planner's decision, and it chooses the minimum system impedance as the objective function; the lower traffic flow problem reflects traveler's response to the decision, and it chooses the UE model to describe the traveler route choice behavior. In the process of modeling it join s comprehensive service level evaluation index constraint on basis of the previous research, makes comparative research on the three cases through different parameter values to verify it can get better traffic network retrofit scheme if the comprehensive service level evaluation index is added as limit condition in the traffic network design model.

Paper "iGreenhouse: A Case Study for Connecting Physical Devices into Mobile Social Networks" propose a case study to explore the effectiveness of connecting devices into mobile social networks for status monitoring and controlling. In the work, it developed iGreenhouse, a greenhouse can post its environment information automatically to the most popular mobile social networks Wechat in China, and Wechat users are able to remotely control the devices in the greenhouse easily.

Paper "Design of Smart Home System Based on WiFi Smart Plug" presents a low-cost and flexible solution to control and monitor home appliances using Smart Plug devices. The Smart Plug is a power switch which can be accessed via WiFi connection. It integrates two temp sensors, a current sensor and an IR-emitter. Users can plug devices into the Smart Plug to remotely switch power on/off, get information of device's power

consumption and ambient temperature, and eventually control the nearby devices using the integrated IR-emitter. There are two ways to access Smart Plug, that is, either connecting it directly in WiFi Ad-Hoc mode or connecting it with a router in WiFi infrastructure mode and accessing online with IP-connectivity. The paper utilizes RESTful based Web services in which the overall system architecture is client/server model and the Web client uses JavaScript and Ajax to transfer data. An Android-based Smartphone application employs standard operations such as Get and Post requests that return responses to communicate between the remote user and the Web server.

The paper "Mobility Pattern Classification for a Bed Activity Monitoring System" primarily based on instrumented assessment method where the pressure sensitive mats along with processing algorithms were used to monitor the motion assessment on the bed. The experimental results show that the movement patterns can be uniquely identified. The classifier module is efficient enough to discriminate the normal person's movement (NP) from patient's movement (GA, BA, BGA). WDM-CEP provides superior results compared to the EDM-AR and EDM-CEP. However due to the similarity in patient's motion data (GA and BA), the current extracted parameters do not produce the same result as in the case of discriminating the normal person's motion.

June 2015

Editors of the June Issue on
International Journal of Smart Home