

# 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 35 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 “Research into Key Techniques of the Agricultural Greenhouse Monitoring System Based on Internet of Things”, intelligent greenhouse monitoring technique is an efficient agricultural control technique emerging recently. The threshold value control of the switching value is the most-adopted greenhouse control method. Due to unique characteristics of greenhouse, the existing monitoring style cannot meet the great demand of greenhouse for intensive monitoring. Concerning the monitoring demands of the greenhouse and based on the technique of Internet of Things, this paper introduces the multisensory fusion technique to the intelligent greenhouse monitoring system. The greenhouse environmental monitoring system based on ZigBee is built, and a two-layer fusion method of “sensor+aggregation node” is put forward. The Kalman filtering method and the weighted average method are employed to conduct sensor node fusion and aggregation node fusion, respectively.

The paper “Controlling Home Appliances in IOT Environment” will provide an efficient solution for a reliable, economical and user friendly home automation system. In this system they will be using Raspberry pi to connect to the home network through which they can access the home appliances from across the globe. PHP Script has been used for creation of web portal through which the user can provide the inputs for controlling the appliances. Python program has been used in Raspberry pi which will turn devices on and off. Connection between PHP and Python has been maintained using My SQL Database.

In the article “Research on Innovative Design of Shared Refrigerator”, the conceptual design of shared refrigerator is mainly from the humanization to solve the problem that different smells that made by different foods stored together, and it can effectively avoid the unreasonable use of the refrigerator space. In this refrigerator design, the practical problems encountered in the using process are fully considered and analyzed, and the humanized design concept is widely used. This article, focusing on people's needs in their daily lives, taking full account of the relationship between structure and function of the refrigerator, is mainly about the innovative design and research of shared refrigerator in terms of function, structure, materials, process and man-machine relationship, etc. This article puts forwards a new refrigerator–design–concept to make people feel the beauty, happiness and convenience of life brought by the design.

In the paper “Experimental Study of Factors Affecting the 7075 Aluminum Alloy Thin-walled Parts Milling Force”, taking 7075 aluminum alloy thin-walled part as the research object, with higher cutting parameters than the normal value selected, a four factors and four levels orthogonal experiment was carried out, in which they chose YG carbide cutting tools for the milling, intercepted the milling force stable section, selected ten peak values and took an average, conducted multiple linear regression analysis using Matlab

numerical calculation software and established the milling force empirical formula of 7075 aluminum alloy thin-walled part to study the factors which have influence on its milling force. By range analysis of the experimental results, the cutting force change rule in the manufacturing process of aluminum alloy with the change of cutting parameter was revealed. It is found that the axial cutting depth had the greatest influence on the force perpendicular to the direction of cutting surface, and the radial cutting depth had the minimal impact. By comparative analysis on theoretical value and experimental value of milling forces, they found that the predicted value of the milling force  $F_x$  and  $F_y$  in theory were in good agreement with the experimental results with a relative error less than 8.7%.

Authors of the paper “ALED System to Provide Mobile IoT Assistance for Elderly and Disabled” propose a unified system ALED (Assisted Living for the Elderly and Disabled) using Google Brillo and Weave platform to solve both of these problems. The system provides a solution by collecting data from IoT devices (e.g., smart sensors, wearable devices, tags) and utilizes the Cloud to process the information from database. The system enables the elderly and disabled to live their life independently and at the same time make it more pleasing.

The study “Fuzzy Logic Control Strategy for Parallel Hybrid Excavator” proposed a fuzzy logic based strategy to control the power train of the 20t parallel hybrid excavator to optimize the fuel economy of the engine and maintain the balanced electric quantity of power batteries simultaneously. The torque required by the system and the state of charge (SOC) of the capacitor were regarded as the input parameters, while the power partition coefficient  $K$  was regarded as the output parameter to design the fuzzy logic controller, so as to optimize the power output of the engine and the motor.

The paper “Obstacle Avoidance for AGV with Kinect Sensor” aims the development of autonomous obstacle avoidance algorithm for automated guided vehicle with a Kinect sensor. To do this task, the followings are executed. Firstly, depth data is obtained from the Kinect sensor, and the mean filter approach is developed to filter out noises. Secondly, Otsu and U-V parallax based method is designed to identify background and obstacles. Finally, According to barrier information, corresponding fuzzy control rules is generated for the path planning.

The research study “Grey Correlation Analysis between Industrial Structures and Carbon Emission in Guangxi Beibu Gulf Economic Zone” explores the relationship between industrial structures and carbon emission by analyzing development of industrial structures and low-carbon economy, status of carbon emission and grey correlation between industrial structures and carbon emission in the zone. The conclusion is that there is a close relationship between industrial structures and carbon emission and that secondary industry have the most important influence on carbon emission intensity in the economic zone. On this basis, suggestions are provided to promote development of low-carbon economy.

The paper “Environmental Effect Evaluation of Agricultural Production Activities Based on Analytic Hierarchy Process Model” takes Weifang, where ecological advantage is relatively stronger than other regions in Jiaodong peninsula, as an example and establishes an index system for environmental effect evaluation of agricultural production activities in order to conduct quantitative research on the relationship between agricultural production activities and environment. Firstly, indexes are chosen under PSR framework, then extension analytic hierarchy process (AHP) is used to calculate extension interval judgment matrix on the basis of expert scoring. Calculation result is weight vectors that meet with consistency conditions and single hierarchical arrangement is practiced. The

normalized results of single hierarchical arrangement are weight vectors of indexes of different hierarchies. The index system helps to formulate policies for sustainable development of economy, society and ecology, industrial restructuring and conservation and rehabilitation of ecological environment in Jiaodong peninsula.

In the article “A Smart Building Automation System”, the building energy management systems its control and automation in buildings has significant role. These systems can play an important role in regular energy monitoring and management and therefore to save the possible energy and cost. The key point of the building automation market is focused upon better facilitation to the user in terms of comfort at reduced operation cost. Energy efficiency improvement will also contribute to environmental protection. Therefore there have been regulations and rating systems made that mandates the requirement of energy monitoring and control in a building. For example, the above mentioned building utilities and equipment control and automation plays an integral role in achieving the green building rating points from certifying authorities such as GRIHA and IGBC. The proposed system is to control the active systems such as lighting including artificial lighting (on/off & dimming control), air conditioners and safety features like fire alarm & gas alarm. In future the existing idea can be implemented for the whole building, i.e. various rooms or areas and then all of them can be integrated on a common platform for monitoring and control of different equipment.

In the paper “Intelligent Optimization of Solar Air Heating System in Large Scale Construction of and its Application”, the monomer thermal performance of solar air collector is the bottleneck problem of the design application of practical engineering. By combining the experimental and theoretical researches, this paper uses the heating load and thermal efficiency of the optimization module at different flow rates, and puts forward the efficiency normalization treatment method; analyzes the heat transfer intensity, heating capacity, thermal efficiency and indoor heating effect of the module under different operation modes; with the microprocessor as the core, sets up the intelligent control system of solar air heating with multiple sensor information fusion; adjust the running state of fan and heating units according to the changes of indoor and outdoor environment in real time. The practical application shows that the intelligent control system can ensure a comfortable indoor environment and improve the thermal efficiency of the system.

In the study entitled “Research on Combustion Performance Optimization of Bio-fuel Combustion Machine Control System”, in order to improve bio-fuel burner efficiency and decrease the pollution, after studying its control characteristics, they proposed the new performance control scheme, which use CO and O<sub>2</sub> feedback correction as air volume to adjust bio-fuel combustion burner, based on it, they designed the software and hardware of control system, at the same time, they studied its combustion model and optimization algorithm, came up with the control algorithm of the burner based on LSSVM + GA. Finally, use the proposed control scheme and optimized control algorithm in this paper, to make the model of combustion efficiency and NO<sub>x</sub> emissions of bio-fuel machine, make the optimization experiments of O<sub>2</sub>, CO amount based on GA gas, under the condition that NO<sub>x</sub> emissions is less than 0.52%, the combustion efficiency is less than 0.06%, the algorithm proposed can adjust the wind amount into burner timely and get the best combustion efficiency and nitrogen oxide emissions.

He paper entitled “The Research and Application of Multiple Spindle Dynamic Follow to Improve CNC Thread Milling Products Precision” proposed a new control method. The SIEMENS 828D control system reads a feed axis machining of any one time processing, calculates the axis displacement data and draws the other two related linkage axis

machining data. it through the PLC program of the control system written way R parameter is assigned to the other two related linkage of shaft processing program. Dynamic following effect of forming milling thread machining, reduce the product processing error, improve the product processing precision, technical indicators satisfy the similar foreign products.

Paper “Smart Home Entertainment System with Personalized Recommendation and Speech Emotion Recognition Support” proposed a personalized recommendation and speech emotion recognition based smart home entertainment system, which integrates multiple entertainment resources including online movies/TV serial, TV programs and online music. The system is controlled by the smart phone through finger touch or speech, avoiding searching infrared remote controller. There is no requirement for luxury and expensive acoustic system or smart TV. Furthermore, advertisements are removed when watching online movies by capturing video source files and customizing the web video player. Massive design details are presented and discussed, including: (1) system architecture and functionalities; (2) design of the server and the smart phone APP; (3) details of personalized recommendation and speech emotion recognition; (4) design of database and some implementation issues, including web page source file crawling, regular expression based information extraction, resource searching and absolute progress locating of web video player.

In the paper “The Effect of a Hybrid Method for Indoor Location”, one of the popular methods studied for indoor positioning is based on Wi-Fi signal strength. Variation in signal strength that depends on communication distance is an important parameter. But signal strength shows not only intuitive results but also irregular results. Depending on the experiment, using only wireless signal strength to determine communication distance may have evident positioning errors. Therefore, some additional methods for increasing positioning accuracy are needed. Time of flight (ToF) and additional sensors to support positioning are needed. In this study, a method based on only Wi-Fi signal strength and other hybrid methods which are used additional upon wireless signal method are studied. Compass sensors and laser sensors were proven to be good additional methods for better positioning in a Wi-Fi-based system.

In the paper “A Study of Digit Recognition Algorithm for Meter based on Rough Set and Neural Network”, due to the low recognition accuracy, the remote meter reading technology based on camera direct reading has been developed slowly. Although there is a variety of features data for recognizing digit in image using BP neural network, some of data cannot be used to recognize digit accurately. Moreover, the BP network has a slow rate of convergence, low accuracy and easily fall into local minimum. To solve the above questions, a new digit recognition algorithm of meter based on rough set and neural network which are optimized by genetic algorithm is proposed. The improved genetic rough set algorithm is used for reducing the data, and then the minimum feature attribute sets after reduction are input to genetic neural network for identifying digit.

The paper “Passive Track and Location Method with TDOA for Moving Target”, aiming at the problem of passive tracking of moving target, this paper establishes a mathematical model for the multi station time difference location and passive tracking of the moving radiation source and proposes a passive tracking algorithm based on extended Calman filter (Kalman Filter Extended, EKF). At first, the two order constant velocity motion model is established, the initial value and the initial co-variance of the Cal-man filter are used as the initial value and the initial co-variance of the system.

In the study “Sustainable Smart Home and Home Automation: Big Data Analytics Approach”, popularity of information technology not only changes the façade of data management, but powers smart home and city movement. Despite there are many different types of smart home technologies, lots of them share similar goal of sustainable development. Heaps of these tools improve energy generation or save energy and reduce water wastage. Beyond doubt, some of them achieve the win-win-win co-development in environment, social and economics. In this paper, they firstly discuss three generations of smart home: (1) Bluetooth and Zigbee enables smart technologies, (2) smart home with artificial intelligence and (3) smart home robot which can stroll around home. They then adopt big data analytics method to study the popularity of smart home and home automation searches in Google from 2004 to 2016. Finally, they search for the latest smart home technologies that can achieve the goal of sustainable development. The results show that nations which are keen on smart home and home automation devices do not only restrict on the richest countries in the World. All the top three cities with the largest number of Google searches in home automation over the past decade come from India. They are famous information technology (IT) hubs with many IT personnel. They speculate that interests in smart home / home automation are correlated with residents’ computer literacy rather than economic wealthiness. Besides, the research shows that many of the sustainable home technologies mainly focus on energy saving. Water saving smart home devices only happen once in a blue moon. That may be reflected in the relative high costs in using electricity as compared to water in many cities around the World. In short, the research offers academic, practical and policy contribution.

Authors of the paper “An Efficient Routing in Urban Vehicular Ad Hoc Networks” propose an efficient routing based on static node assistance. The static nodes are fixed in each intersection. Each static node stores information of other static nodes in path. The routing takes static nodes as backbone nodes and vehicles as relay nodes between static nodes. The static nodes are selected dynamically and sequentially, and they are chosen according to the delay that packets are forwarded from the current static node to the candidate one. The vehicular relay selection between two static nodes considers the link stability as the parameter.

In the paper “Identification of Transmission Line Lightning based on HHT”, lightning groundwire or tower without fault, back striking, shielding failure without fault and shielding failure with fault are simulated and analyzed in this paper based on the electromagnetic transient simulation software of ATP-EMTP. The results show that the current waveform of lightning strikes the ground or tower without fault is generated by the coupling of lightning current from lightning groundwire and oscillates around the axis of the steady state. Back striking contains processes of couple and flashover, its current waveform has characteristics of reverse polarity pulse and sudden current drop. The current of shielding failure without fault is the lightning current. The current waveform of shielding failure with fault is characterized by the truncation. On this basis, the Hilbert Huang transform (HHT) was introduced to do further analysis of the simulation results. The solution of end effect is also proposed in this paper. And thus the marginal spectrum was obtained by dealing with the simulated current waveform of lightning stroke. Then, calculating the energy distribution in different frequency bands and normalizing them. Therefore, a method for recognizing 4 types of lightning stroke is proposed which is on the basis of the energy proportion in different frequency bands.

The research paper “Cloud-based Home Energy Management (HEM) and Modeling of Consumer Decisions” provides a detailed summary of the literature review of HEM and proposes (1) a conceptual smart home model with a special integration of solar powered devices with the cloud, (2) a limited consumer survey, and (3) a Multi-Attribute Modeling

(MAM) with an example application for consumer adoption of Home Energy Management System (HEMS) and allied devices. The results of literature research and an online survey point out that the surveyed consumers acknowledge the importance of energy efficiency in their daily lives and lean towards adopting cloud-based smart home devices for their needs. The bottom line for adopting HEMS is the availability of secure, robust and cost-effective solutions coupled with considerable money-saving potential.

In the study “Design and Optimization of Micro Gas Sensor”, the ordinary gas sensor has low material utilization, high power consumption, temperature distribution uneven and poor consistency problems. Based on film processing technology, this paper designs a new structure of micro gas sensor. Triangle type design is first adopted in the structure, with platinum as the electrode material, ceramics substrate. Using ANSYS Workbench to analysis different size electrode and substrate that including the temperature field, stress field and the optimization design for substrate and electrode, the sensor can be uniform temperature distribution, stress of small and the effective control of power consumption, it is beneficial to improve the overall performance of the sensor. In addition, the sensor is tested to verify the accuracy of the finite element simulation.

In the paper “Review of the Research on the Optimization of the Energy Consumption of the Cloud Platform”, Cloud platform is a basic platform to support large data, large-scale and high-frequency access computing. The high-energy consumption of the cloud platform and the schedule of multi-constrained combination in cloud applications is challenging issues faced by the cloud computing. They conducted a systematic review in this paper for the energy consumption of a cloud platform, and pointed out the existing problems, and put forward ideas to solve the above problems by constructing the four-level system. Firstly, by conducting virtualization management to the physical resources in the cloud to form the layer of virtual resource. Then, named as presentation layer, to build a formal model of cloud application multi\_attribute with effective description, measurement, calculation. Based on this proposed scheduling application layer enables cloud applications to meet the multiple objectives with multi-attribute, heuristic, feedback, iterative scheduling and cloud resources, energy optimization.

In the article “A Review on Mobile Based Intelligent Systems for Homecare Monitoring of Diabetic Mellitus Foot Ulcer”, the diabetic foot might display numerous complexities when they are not monitored frequently. Diabetics will lead to foot ulcer which in future leads removal of foot parts. Persistent homecare observing of the diabetic foot is very important where a frameworks coordinated to a Smartphone helped Model for analysis are required by doctors to enhance early finding. This paper presents a review on diverse frameworks related to homecare based diabetic foot monitoring and procedures utilized for diagnosing diabetic's foot.

In the paper “Simulation and Analysis of Orthodontic Archwire Bending Robot”, a 3D mathematical model of orthodontic archwire with rectangular curve is established. Simplified 3D solid model of orthodontic archwire bending robot, which is consistent of bending die, support structure and archwire are established by Creo software, then the simplified model of bending die is put into ANSYS Workbench. Material parameters the contact condition and boundary conditions are set reasonably for the model. Based on the finite element analysis method, the calculation and analysis of the nonlinear contact problem of archwire and bending die, besides the stress distribution of curve bending and bending die is got. This provides the reference for optimal design of bending planning and bending die.

Paper “Carbon Emission Early Warning System Modeling and Simulation Study of Urban Regional Transportation” proposes particle swarm optimization to optimize support vector machine carbon emission early warning system of urban regional transportation (PSO – SVM) and takes the advantage of small sample data modeling of support vector machine to improve the carbon emission evaluation accuracy of urban regional transportation. Furthermore, this paper takes carbon emission evaluation accuracy of urban regional transportation as modeling target, selects reasonable evaluation index, confirms carbon emission evaluation model structure of urban regional transportation and then optimizes support vector machine (SVM) by adopting particle swarm optimization (PSO) to establish evaluation model and conduct system simulation.

The article “A New Quadratic Boost Converter with Voltage Multiplier Cell: an Analysis and Assessment” introduced a new topology of high gain DC-DC quadratic boost converter with voltage multiplier cell (VMC). The proposed VMC technique is derived from the traditional quadratic boost converter, which has an advantage with high voltage gain and stress across the semiconductor devices are lower than the output voltage. To validate efficacy of the proposed method simulation has been performed in Mat lab Simulink software to compare the voltage gain of proposed method with others five modified boost converters. The input voltage of proposed converter and other topologies are same 10VDC but the output voltage of proposed converter is much higher than others converters which are discussed in this paper.

In the article “Research on the Application of BIM in the Construction Industry”, BIM is a major innovation in the past ten years, it has had a broad and far-reaching impact in the construction industry. Based on the research and analysis of the application value and application status of BIM, this paper forecasts the application prospect of BIM, and puts forward the application scope and application mode of BIM in the construction industry. In this paper, the author participate in BIM projects, he details BIM’s Technology of Application in the green building design and analysis process; he explore the using BIM Technology for green building design and simulation analysis, finally ,he summarizes the technical advantages.

Paper “Study on Drug electronic Supervision Based on Flows Monitoring” states that drugs are special goods for preventing, treating and diagnosing disease in order to assure people’s health. The quality of drugs is directly related to people’s health. Drug electronic supervision is a kind of technology model to strengthen the drug circulation regulation, being of great significance to guarantee drug safety. Based on the flows monitoring of drug logistics system, they combine qualitative analyses and quantitative researches, theory researches and simulation analyses together. A network flows real-time monitoring model is established in this paper and the simulation results show that the model can automatically monitor the drug circulation of the entire system in real-time.

Authors of the paper “Reducing Delay with Mobile Sink in Low-Duty-Cycle Sensor Networks” propose Efficient Mobility Scheduling scheme, which decomposes mobility schedule problem into three sub-optimal problems, the delay-bounded hierarchy, path planning for mobile sink and dynamic data forwarding. The main idea behind is to balance the moving time by reducing the number of rendezvous nodes and waiting time by switching the forwarding path dynamically. The proposed scheme is evaluated through extensive simulations and compared with the state of the art, which shows their design is more efficient on delivery delay and energy conservation.

The work carried out in this paper “Daily Activity Monitoring of an Elderly Person for Determining Their Wellness” aims to present a model based on elderlies daily activities to

determine their wellness status. A wellness function is delineated to estimate the health condition of the aged individuals while carrying out their day-to-day routine. The proposed model can also be used to monitor the mobility parameters, such as entry and exit of a room and bed occupancy of an elderly. Simple sensors such as capacitive sensors are equipped into their homes to monitor their behaviour and identify their daily activities via non-contact means. The device will allow extracting daily behavioral patterns of the elderly person.

The article “Application of Computer Multimedia Technology in Landscape Design and Art Analysis of Southwest Ethnic Towns” states that with the development of multimedia technology, the computer simulation drawing is widely used in landscape planning and design. 3DS Max is the most popular three-dimensional production software in the computer graphics industry, it has a powerful function to create the fine landscape model. In this paper, the author research on the application of computer multimedia technology in landscape design and art analysis of southwest ethnic towns. The southwestern ethnic towns have their own unique landscape features, which can embody the historical culture, the traditional style, the social life and the folk customs of the historical period. On the other hand, as a kind of cultural landscape, the national towns also include intangible cultural connotation which Embody the cultural concept and social relationship of the residents in the corresponding cities and towns.

In the article “Design of Urban Landscape Environment based on Computer Multimedia Simulation”, the integration of digital information has become an important strategy to promote the sustainable development of information construction and social economy. In this paper, the author analyzes the design of urban landscape environment based on computer multimedia simulation. By using digital means to deal with the present problems in the process of landscape design, designers can optimize the distribution of resources, and realize the multi-resolution, and the 3d modeling of the environment description. In general, computer aided method can solve the problems in urban landscape design, improve design efficiency and optimize the results, to will achieve the environment needs of landscape design, such as characteristic, diversity and comfort.

Paper “Analysis on the Smart Classroom and Innovation Mode of Physics Teaching based on MOOC E-Learning Platform” states that the development of Internet and multimedia technology has led to a variety of educational forms; more and more people are starting to take online courses. In this paper, the author analyzes the smart classroom and innovation mode of physics teaching based on E-learning platform. The supporting technology of network education is a kind of network education software and hardware platform, which provides users with fast, high quality, interactive learning environment. Physics is a natural science based on experiment and application. According to its teaching content and subject characteristics, the physical network platform should have some special templates.

Authors of the paper “Analysis on College English Reform and Teaching Mode based on Smart Classroom and Multimedia Assisted Instruction” states that multimedia computer assisted instruction has the characteristics as large information capacity, high efficiency, wide application area and so on. In this paper, the author analyzes the college English reform and teaching mode based on smart classroom and computer multimedia education. Nowadays, the network multimedia teaching technology plays a more and more important role in promoting quality education.

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**Editor of the August Issue on  
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