

Foreword and Editorial

International Journal of Multimedia and Ubiquitous Engineering

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

This issue contains 12 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.

Authors of the paper “The Research into Structure-dependent Gas-Solid Two-phase Flow within Vertical Screw Conveyor” propose a type of multi-scale structure of gas-solid DEM model by analyzing the gas–solid two-phase flow model in a vertical screw conveyor. The model considers the non-uniform flow structure feature in the vertical screw conveyor, which decomposes the flow structure into two homogeneous phases: dilute phase and dense phase. The movement rule of gas is described with a two-phase coupled Navier–Stokes equation, of which the particle movement rule is described with Newton's second law. The drag force of the gas–solid two-phase flow is based on the EMMS model. This paper examines the influence of particle size, screw speed, and filling rate on vertical speed and concentration distribution of the particle, which is combined with FLUENT software and EDEM software for simulation analysis of this model. The result shows that as maller particle size corresponds to higher screw speed; as maller filling rate corresponds to a more conducive formation of gas–solid two-phase flow in vertical screw conveyor and vertical conveyance of particles.

In the article entitled “Development of an Application Providing Information on Speech Rehabilitation Service based on Android Mobile Platform”, speech therapy service is an area with high level of demand from rehabilitation service users. Speech therapy applications so far developed in Korea have been mostly for rehabilitation purpose but no application has been yet developed that provides information on the operation of public speech therapy clinics including ones operated by universities. This study developed an Android-based application which enables users of speech rehabilitation service to easily find out information on the location, facility and operation hours of speech therapy centers affiliated to universities. The application was developed by using m-BizMaker. The application developed by this study was confirmed to be a convenient application which provides exact information on speech therapy centers affiliated to universities and was highly evaluated for necessity of application, usability of interface and applicability in usability assessment..

In the paper “Design of Multi-tasking Cooperative Path Planning Simulation System with Multi-algorithms Fusion”, for rescue after natural disasters and public calamity, an intelligent multi-tasking cooperative path and patrol planning and obstacle avoidance simulation system should be established for the complex environment. With the simulation system, the effectiveness and feasibility of the intelligent algorithms can be verified in software, meanwhile the risk of putting the software into use and the development cost of post-hardware are all can be reduced. And the multi-thread technology is used for the VS and Vega Prime simulation engine to control the data acquisition and model driving, then the stable 3D-scene simulation system with multi-barrier and multi-channel in the complex scenes is designed and developed. Five kinds of

intelligent and efficient pathfinding and obstacle avoidance algorithms, including the A* algorithm, the ant colony algorithm, the artificial potential field algorithm, the eight-direction recursive algorithm and the particle swarm optimization (PSO) algorithm, are all integrated into the system, then the individuals in each algorithm are divided into subgroups for each task, thus formed the hierarchical multi-tasking intelligent algorithm, which are suitable for the multi-task collaborative planning in complex scenes, and the algorithms can switch quickly each other, when one pathfinding algorithm fails, the another algorithm can be switched. Finally, the system is proved reliable and practical from the simulation results.

In the research paper “Automatic and Invariant Recognition of Traffic Sign with Color-HMAX and Deep ELM Based Classifier”, one of the several challenges in the development of an automatic traffic sign recognition system is the invariant recognition of various traffic signs irrespective of the occlusion and changes in position, size, orientation, illumination and viewpoint. An automatic traffic sign recognition system usually consists of two constituent parts, namely features extractor and features classifier. Most popular Traffic Sign Recognition (TSR) systems usually comprises of a CNN (Convolutional Neural Network) based features extractor and classifier, which achieve significant results but at the cost of a very complex and huge network. Furthermore, since classical NN (Neural Network) based classifiers are trained by Gradient Descent for weights tuning, therefore their generalization capability is limited. To improve the performance further, in this paper they make use of the hierarchical feed-forward model HMAX for the feature extraction and deep extreme learning machine based classifier for the classification of the traffic signs. HMAX model generalizes well and facilitates the features extraction invariant to position, size, orientation, viewpoint and luminance. This robust feature representation is then fed to the deep ELM based feature classifier for the classification of the traffic signs to the respective class category. The recognition and classification accuracy of the developed algorithm was experimentally tested on German Traffic Sign Recognition Benchmark (GTSRB). Achievement of excellent recognition performance is demonstrated with improved generalized, invariant and robust feature representation.

The dissertation “Video Tracking Algorithm Based on Kalman Filter and Online Random Forest”, Kalman filter algorithm can use target information of the previous moment to predict target information of the next moment in video tracking, but the predicted value is bound to have error. When the target movement is too fast or the target is blocked, the algorithm will converge to a region in the background that is more similar to the target color. This will cause the failure of tracking, and the tracking algorithm is difficult to accurately track the target again after tracking failure. In view of the problem of Kalman filter algorithm, this paper introduces the random forest learning algorithm in the process of Kalman filter tracking. Kalman filter output of the current frame, that is, the estimated target state, is passed into random forest detection module. This module adopts reliable sample updating strategy and rapidly detects multiple adjacent areas of the estimated target by the decision tree. For the case of transient target loss, the two methods cooperate with each other to accurately locate the tracking target. The experimental results show that the algorithm can accurately track the target, and ensure the robustness of tracking, effectively avoid the drift problem.

In the paper “Relevance Mining of Multi-Keyword Search to Originate Initial Cluster Centers for K-Means Algorithm”, multi-keyword search take the words as the input query to find the information resources where these keywords occur and look for ways to connect these words using information on referential integrity constraints. Text clustering is an effective way to analyze textual document in retrieval system. K-means algorithm is

most popular and simple tool widely used in data clustering analysis. In this paper, a novel method is proposed to address the initial cluster centers problem in k-means algorithm based on relevance mining of multi-keyword search. In proposed work, the initial cluster centers have obtained using frequent pattern for each keyword and after that k-means algorithm is applied to gain optimal cluster centers in database. The performance of the proposed algorithm is tested on the 20-Newsgroups collection. The experiment results show the proposed method is better way to represent the clusters.

In the study “Assembly of an S-band FMCW Doppler Radar System for improved Pedestrians Detection”, a Frequency Modulated Continuous Wave (FMCW) Doppler radar was assembled to detect passing-by pedestrians. Its operating frequency is at 2.4GHz with transmit power of 10.41dBm. Range resolution of the radar is 2.8meters at 53.2MHz signal bandwidth and chirp waveform of 40ms. The radar exploits Doppler principle to acquire the range and velocity information of targets whilst a Moving Target Indicator (MTI) pulse canceller is utilized to filter incoming noise signal. With the use of Chirp period-bandwidth product of Frequency Modulated (FM) waveform and deramping process, the radars’ Signal to Noise Ratio (SNR) was improved up to 42dB. The attained maximum range is about 200meters for target with Radar Cross Section (RCS) of 1m². The constructed radar is capable to measure speed of moving target at 0.645m/s and above with great accuracy. The radar can detect and determine position of pedestrians with 0.18% percentage error.

Authors of paper “Efficient ID-based Rabin Signature without Pairings” states that ID-based signatures can greatly simplify the key management procedures of certificate-based public key infrastructures. In this paper, based on Rabin’s cryptosystem, an efficient ID-based signature scheme without pairings is proposed. In our scheme, the hash value of the user’s identity is used as his/her public key, while its square root is used as the user’s secret key. During either the signing phase or the verification phase of the proposed scheme, only one exponential operation under modular is used. Then, compared with the similar schemes of this kind, our scheme is more efficient. On the other hand, our scheme can be proved to be secure against existential forgery under adaptively chosen identity and message attacks in the random oracle model.

In the research paper “Handover Analysis for Multicast Enabled Network Mobility Management Using Network Simulator”, Network mobility management has become a popular topic in networking research due to its ability to mitigate mobile IPv6 problems. However the standard network mobility management does not support multicast traffic. Hence in this paper, they introduce context transfer and multicast fast reroute, to enable multicast in the standard network mobility management. This implementation enables multicast in network mobility management with high handover performance support. This paper evaluates handover performance for multicast enabled network mobility management using network simulator called NS3. NS3 is a network simulator that implements virtual network prototype. By using the virtual network entities provided by the NS3, the proposed network mobility management architecture is simulated and its activity is analyzed. The parameters used are referred to real network implementation.

In the study entitled “Data-oriented Media Service of Intelligent Car-to-x Communication in the Context of "Internet Plus"”, the rapid development of Internet technology triggers a new-round revolution of automotive technology, while intelligent inter-connection will usher a new development trend of automotive technology. This paper analyses the current development of intelligent Car-to-x communication in the context of Internet Plus and the media effect of big data, and proposes that In-vehicle information system, as the fourth

screen, may force auto electronics to transform from function type to information-service interacted type and eventually to evolve into an intelligent terminal with four wheels.

Paper about “A Method for Audio and Video Call on Smart Phones Based on Android and VoIP” states that today, more and more WIFI (Wireless Fidelity) networks are built, and their cover area becomes larger and larger. With the rapid development of the technologies of VoIP (Voice over Internet Protocol), smart phone and mobile Internet, more and more demand for audio and video call on smart phones are required. Android is an operating system which is widely used in smart phone. A method for audio and video call on smart phones based on Android and VoIP is presented in this paper, it realizes audio and video call on smart phones using AVCS (Audio and Video Call Service) provided by the third party cloud service platform. This paper introduces the system architecture, describes the working process in detail, takes experiments and analyzes its running effect. The method is simple and efficient. It shortens the development cycle and reduces the difficulty and cost of development.

This paper “Network Architecture of Wireless Underground Sensor Networks for Oil and Gas Pipeline Monitoring” firstly analyzes the underground wireless channel characteristics of the electromagnetic wave (EM), energy consumption dissipation of sensor nodes with EM, changing rule of the path loss factors of EM in soil and points out the energy efficiency and energy balance problem of WUSN for underground oil and gas pipeline monitoring. Secondly, the typical three-layers network architecture of WUSN for oil and gas pipelines monitoring is introduced, and give a practical data collection operation step. Thirdly, some effective improvement strategies for the three-layers network architecture to improve energy performance are proposed, which include (1) magnetic induction waveguide technique, (2) data collection strategies through aboveground and underground mobile nodes, (3) the energy replenishment strategies of sensor nodes, (4) line non-uniform and uniform sensor nodes deployment and scheduling strategies.

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**Editors of the March Issue on
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