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Monday, June 12, 09:00 - 10:10

Session A1: 3D Modeling and Processing

Room: Lecture Hall

Chairs: Jian-Jiun Ding (National Taiwan University, Taiwan), Li-Wei Kang (National Yunlin University of Science and Technology, Taiwan)

09:00 ***Moving Object Detection Based on Image Bit-Planes and Co-Occurrence Matrix in Video Surveillance 1***

Kahlil Muchtar and Chia-Hung Yeh (National Sun Yat-Sen University, Taiwan); Zhi-Yao Jian (National Chung Cheng University, Taiwan); Chih-Yang Lin (Yuan Ze University, Taiwan); Wei-Yang Lin (National Chung Cheng University, Taiwan); Wan-Jen Huang (National Sun Yat-Sen University, Taiwan)

The development of moving object detection systems has become of great interest in video surveillance field. Although many foreground detection methods have been proposed, but there remained a problem of incomplete object shapes and misclassified shadow region. In this paper, we incorporate image bit-planes representation and gray-level co-occurrence matrix (GLCM) in order to compensate for the loss of spatial-temporal information and discard the shadow, respectively. The experimental results show that the proposed method is valid and suitable for detecting a moving objects in real-time.

09:15 ***High Quality and Efficient Light Field Image Rendering Based on White Image Compensation 3***

Chia-Chun Hsu and Jian-Jiun Ding (National Taiwan University, Taiwan)

Image rendering is an important technique in light filed image processing. It is to reconstruct the entire scene by combining micro images. However, due to the imperfect optical design of the light field camera, micro images suffer from the attenuation effect, which causes server blocking artifacts in the final rendered image. In this work, a high quality and efficient image rendering algorithm based on the linear blending and white image compensation is proposed. First, the compensation model is estimated from the white image. Then, an adaptive modified function is adopted to adjust the compensation rate. Finally, the light field image can be reconstructed by applying the linear blending technique. Simulations show that the proposed light field image rendering algorithm is able to reconstruct a high quality light field image with less artifacts than existing methods.

09:30 ***3D Modeling for Steel Billet Images 5***

Chao-Yung Hsu (China Steel Corporation, Taiwan); Hsin-Yi Lin and Li-Wei Kang (National Yunlin University of Science and Technology, Taiwan); Ming-Fang Weng (Institute for Information Industry, Taiwan); Chih-Ming Chang and Teng-Yi You (National Yunlin University of Science and Technology, Taiwan)

To achieve the goal of Industry 4.0 for steel industry, intelligent automated manufacturing becomes increasingly important. One of the key steps on the automatic production line of steel products is automatic inspection of surface detects. Recent trends in vision-based surface inspections of steel products have shown that the use of 3D information would be more beneficial than only utilizing two dimensional surface data. In this paper, a 3D modeling framework is proposed to capture 3D information of steel billet images. Our major goal is to obtain the depth information for the billet images to be inspected for possibly further applications (e.g., inspection of surface defects). The presented results have shown the feasibility of the proposed framework.

Session A2: High Performance and Dependable Computing Systems

Room: 201

Chair: Masaru Fukushi (Graduate School of Sciences and Technology for Innovation, Yamaguchi University, Japan)

09:00 ***Correlated Insertion/Deletion Error Correction Coding for Bit-Patterned Media 7***

Yusei Suzuki and Haruhiko Kaneko (Tokyo Institute of Technology, Japan)

This paper presents channel model and error correction coding for correlated insertion/deletion errors in high-density magnetic recording media. Simulation results show that the bit error rate can be lowered by the presented coding.

09:15 ***High Performance of Moving-Object Detection by GPGPU based on Pipelining 9***

Satomi Kameyama and Yasuyuki Miura (Shonan Institute of Technology, Japan)

In this research, we tried high efficient processing based on pipeline processing in order to improve the processing speed of CPU and GPU in existing moving-object detection system. In our method, pipeline processing and multithread processing were implemented in an existing program which is a sequential processing. Evaluation of numerical values of processing speed before and after changing, and evaluation of processing speed when plural processes were carried out. As a result, a processing speed of 1 frame was improved.

09:30 ***Buffer Size Evaluation of Mixture Communication of the Wormhole and Single-Flit Routing 11***

Yasuyuki Miura and Junpei Sugioka (Shonan Institute of Technology, Japan)

In this paper, we introduce the mixture communication method of single-flit and wormhole routing. In the method, a buffer memory is shared in each link and virtual channels are assigned. We also evaluated the dynamic communication performance with various amount of buffers. As a result, it was shown that the communication performance could be predicted from the packet length.

09:45 ***A Study on Inter-frame Differencing for Compressed Moving Images 13***

Yasuyuki Miura and Tetsuya Tanaka (Shonan Institute of Technology, Japan)

A Surveillance cameras are installed in facilities and urban areas for the purpose of monitoring intruders, and objects equipped with a moving object detection function also exist. In addition, due to recent improvements in camera technology, prices have declined, individuals can own surveillance cameras and install them at home. In this way, since the surveillance camera is installed in various places for various purposes, there are cases where it is sometimes necessary to deal with a moving image with a large amount of coding distortion. Experiments were carried out with various thresholds and compression ratios by applying the inter-frame differencing method. From the result, it was shown that the decrease in the precision was gradual and the recall decreased greatly when the compression ratio is high.

10:00 ***An NTP-based Detection Module for DDoS Attacks on IoT 15***

Tamotsu Kawamura (Yamaguchi University, Japan)

This paper proposes an event detection module for distributed denial of service (DDoS) attacks on Internet of Things (IoT). Different from existing detection modules using knowledge-based filtering, the proposed module focuses on the system behavior under DDoS attacks and detects it utilizing information obtained from widely used time synchronization service. We conducted demonstration experiments with the developed module generating pseudo DDoS attacks. The result shows that the proposed module achieves high recall and precision values, indicating its usefulness in the real time event detection on IoT.

Session A3: Interactive and Network-Oriented Applications for Consumer Electronics

Room: 202

Chair: Hiroaki Nishino (Oita University, Japan)

09:00 ***12-Bit 250-MHz Digital Transmitter with DAC and Line Driver 17***

Guo-Ming Sung, Te-Chang Lee and Jonathan Hsia (National Taipei University of Technology, Taiwan)

This paper presents a 12-bit 250-MHz CMOS digital transmitter for gigabit Ethernet, which is fabricated in TSMC 0.18μm 1P6M CMOS technology. The 12-bit digital-to-analog converter (DAC) is implemented with switched-current technique and segmented topology, which is composed with a 3-bit binary code and a 9-bit thermometer code. The destination not only enhances the operating speed but also reduces the chip area. A four-quadrant symmetric current source arrangement is used to eliminate the nonlinearity and parabolic gradient error in chip layout. In view of the line driver, the utilization of impedance synthesis is considered in eliminating the matching resistor, which works with extra power consumption. Besides, a current distribution circuit is used to increase the linearity of line driver. The proposed line driver performs with an output voltage of 2.0 VPP at the differential load of 100 Ω, the supply voltage of 1.8V and the operating frequency of 125 MHz.

09:15 ***A Piano Performance Trainer with Tactile Guidance 19***

Hokuto Tsutsumi, Hiroaki Nishino and Tsuneo Kagawa (Oita University, Japan)

Educating musical performance skills is a human-centric activity that an expert transfers his skills to others. While the expert tries to convey his skills through language and

physical contacts, most ICT-based training systems fully depend on visual information presentation. We propose a method enabling beginners to easily learn piano playing skills. The proposed method presents some important clues to improve the playing skill such as keystroke timing through tactile feedback function. It lightens a learner's visual load and allows him to concentrate on playing the piano. We developed a training support system with a mobile feedback function based on the proposed method and evaluated the system.

09:30 ***Estimation of Noise Suppression Parameters for Maximizing Snoring Activity Detection Performance 21***
Keisuke Nishijima, Shingo Uenohara and Ken'ichi Furuya (Oita University, Japan)
In this paper, we analyze the best parameters of noise suppression for snore activity detection, and examine ways to improve detection performance. Snore activity detection is performed by machine learning using a support vector machine (SVM) with a linear kernel. The SVM is trained by acoustic features and grand truth, and the trained SVM models are utilized to detect snore activity. The acoustic features of sound pressure level (SPL) and Mel-frequency cepstrum coefficients (MFCC) are calculated from sleep sound data obtained using a smartphone. To improve the detection performance, noise suppression is performed before feature extraction. We study the relation between the detection performance and the noise suppression parameters, and we investigate the best parameters of noise suppression for snore activity detection.

09:45 ***A Wireless Network Visualizer Based on Signal Strength Observation 23***
Toshiyuki Haramaki, Dai Shimizu and Hiroaki Nishino (Oita University, Japan)
Efficiently managing network infrastructures laid in corporate organizations and universities is a crucial task. Making wireless network segments stably running is particularly an expensive and time consuming task. Providing a system for continuously monitoring the wireless network and simply visualizing up-to-date network conditions should be a big help for administrators and even for end users. In this paper, we propose a wireless network visualizer based on signal strength observation using IoT devices and lightweight communication protocol. We describe a concept and an implementation approach of the wireless network visualization system.

10:00 ***One Card Points System Using Near Field Communication 25***
Kuang-Ting Hsu (Chung Yuan Christian University, Taiwan)
Near Field Communication (NFC) is a special subset within the family of RFID. It is quite popular for a smart phone to support NFC features. In this paper, we use NFC technology to construct a one card points (OCP) system. That is, when users buy something, they can use the NFC of the smart phone to collect points. Traditionally, some stores distribute a paper card to users to collect points, and a user may have have many point cards. By using the proposed OCP, not only we can save the waste of papers, but it also provides great flexibilities and conveniences.

Session A4: ICT-based Heterogeneous Integration Technology for Consumer Electronics

Room: 204
Chairs: Cihun-Siyong Gong (Chang Gung University, Taiwan), Chin Hsia (National Central University, Taiwan)

09:00 ***Battery-Free Sensor Tag for IoT Applications 27***
Jia-Hao Bai, Tzu-Hang Huang and Zen-Dar Hsu (Industrial Technology Research Institute, Taiwan); Li Ren Huang (ITRI ICL, Taiwan); Cihun-Siyong Gong (Chang Gung University, Taiwan); Chin Hsia (National Central University, Taiwan)
Internet of Things (IoT) applications requiring the installation of a large number of sensors face power supply limitations. This paper presents a solution which powers sensing devices without the use of batteries or power lines. The proposed solution is tested using temperature, humidity and gas sensors, using BLE for wireless transmission and MUC for signal processing. Experimental results show that sufficient power is obtained, and point towards future improvements.

09:15 ***An Integrated High-slew-rate Low Power OTA Design for Doppler Ultrasound Transmitters 29***
Kun Chu Lee and Chin Hsia (National Central University, Taiwan)
The paper presents an integrated operational-trans-conductance-amplifier (OTA) design for medical ultrasound transmitters, particularly used for continuous wave Doppler signal transmission. A dual complementary differential input pair in conjunction with a class AB output stage were designed to drive a large capacitive load. The device operates from a 5-V supply, capable of rail-to-rail operation at both the input and output. Simulated results exhibit the capability of the designed OTA can drive 3Vp-p into 2000 pF load with total harmonic distortion (THD) of less than 4.5%, and achieves more than 56V/μs slew-rate at cost of static power consumption of 140 mW.

09:30 ***Synchronization of Multiroom Audio Streams in Wi-Fi Environment 31***
Kai-Wei Ke (National Taipei University of Technology, Taiwan); Yi-Jie Pan (HTC Cooperation, Taiwan); Ho-Ting Wu and Rong-Shue Hsiao (National Taipei University of Technology, Taiwan)
Converting audio signal to packet stream and propagating through wireless local area network (Wi-Fi technology) to loud speakers that may be located at different rooms will be a popular scenario of multimedia applications. Since the packets received by separate speakers varied with the transmission paths and environment to them, this made the playable contents different from one speaker to another and resulted in an unsynchronized play out effect. This paper proposed and designed specific mechanisms such as pre-buffering, time synchronization and retransmission to resolve the issue in order to make the play out behavior of a speaker in conformity with others.

09:45 ***A High-Voltage Integrated Bipolar Pulser for Medical Ultrasound Scanner Applications 33***
Yen-Chung Huang (Industrial Technology Research Institute, Taiwan); Chin Hsia (National Central University, Taiwan); Guo-Zua Wu (ITRI, Taiwan)
In this paper, a high-voltage integrated bipolar pulser for medical ultrasound scanner applications is proposed. The pulser employs high-speed level shifters and a high-voltage push-pull output stage that can produce 100 Vpp (±50V) output pulses with rising and falling times of 10.6 ns and 10.5 ns, respectively, under a 1-KOhm resistance parallel with a 100-pF capacitance load. The transmitted signal shows about -40 dBc second harmonic signal distortion (HD2). The measured results indicate the designed pulser can be used for medical imaging with low second harmonic sideband signals.

Session A5: Recent Advances in Intelligent Signal Processing

Room: 205
Chair: Ching-Min Lee (I-Shou University, Taiwan)

09:00 ***Data Packet Decoder Design for LiDAR System 35***
Li-Juan Zheng (National Taipei University of Technologe, Taiwan); Yu-Cheng Fan (National Taipei University of Technology, Taiwan)
A method for chip and system design of data packet decoding and analyzing for User Datagram Protocol (UDP) on Velodyne LiDAR Puck-16 (VLP-16) is proposed. We decode the 3D LiDAR information, which transmits the UDP format of data packets. The results will get the distance, angle, reflectivity, and time stamp. Above of all results can perform the point cloud of the coordinate system in the 3D environment.

09:15 ***Dynamic Detection Technology for Moving Objects Using 3D LiDAR Information and RGB Camera 37***
Shi-Chiuan Wang and Yu-Cheng Fan (National Taipei University of Technology, Taiwan)
In recently years, automation is more important in the world. Autonomous car is the example in our live around. It use the 3D LiDAR to scan the information of surrounding. Then this paper use 3D LiDAR capture the data of environment to do the object recognition, motion estimation and path planning to let car auto drive on the road.

09:30 ***FPGA-based Fast Rain Removal System using Orientation-Adaptive Non-local Mean Filter 39***
I-An Lin, Trong-Yen Lee, Chih-Ming Chen and Shu-Yu Liu (National Taipei University of Technology, Taiwan)
Advanced driving assistance systems (ADAS) have developed in widespread use for traffic safety, they must include mechanisms functioning in bad weather conditions. However, the rain reduces visibility and degrade the effectiveness of computer vision algorithm when they are vision-based methods. We propose an orientation-adaptive non-local mean (OA-NLM) filter algorithm to further improve rain removal performance, removing rain streaks in images by high-performance denoising algorithm of NLM and improving computational cost using orientation-adaptive and computing module (CPM). The proposed method is implemented on a Xilinx FPGA system to improve the image processing speed. Experimental results show that the proposed method reduces 94.21% on execution time of image processing with hardware-software design.

09:45 ***Super-Resolution of Magnetic Resonance Images using Deep Convolutional Neural Networks 41***
Kathiravan Srinivasan (National Ilan University, Taiwan); Avinash Ankur and Anant Sharma (LNMIIT Jaipur, India)
This research focuses on developing a Super-resolution magnetic resonance (MR) Image restoration method using Convolutional Neural Networks (CNN). The main aim is to train an end to end mapping that takes low-resolution image as input and returns a high-resolution output. Low overhead and a state of the art reconstruction makes the model perform efficiently.

Session A6: Display Circuits and Systems for Consumer Electronics

Room: 302

Chair: Hsueh-Yen Yang (National Taiwan University, Taiwan)

09:00 ***Hardware Implementation and Signal Processing of Holographic System 43***
Po-Tai Wu and Yu-Cheng Fan (National Taipei University of Technology, Taiwan)
The aim of this paper attempts to adjust the rotation speed of the same for 360˚ video of objects. Then create the video of the other three sides and display a holography image through HoloAD. Scale invariant feature transform (SIFT) is used to adjust rotation speed of objects of video, and film cut the 0˚ , 90˚ , 180˚ and 270˚ of objects right. The results of this paper shows effect better on display by the holographic.

09:15 ***A Study of Floating Image System with the Interaction Function 45***
Wen-Kai Lin (National Chiao Tung University, Taiwan); Chien-Chang Chiu (National Changhua University of Education, Taiwan); Bor-Shyh Lin (National Chiao Tung University, Taiwan); Wei-Chia Su and Fu-Li Hsiao (National Changhua University of Education, Taiwan)
In this study, a Fresnel lens, a half-reflecting mirror and a LCD were used to build up a see-through floating image system. A gesture recognition module was employed to achieve the human-computer interaction function. The designed system offers a simple and economic architecture for augmented reality (AR) system.

09:30 ***A Hybrid Display with 2D/3D Image Based on Static Hologram and LCD Panel 47***
Wen-Kai Lin (National Chiao Tung University, Taiwan); Wai-Tin Liu (National Changhua University of Education, Taiwan); Bor-Shyh Lin (National Chiao Tung University, Taiwan); Wei-Chia Su (National Changhua University of Education, Taiwan)
In this paper, a hybrid display which can provide 2D and 3D images was practice based on waveguide hologram. The hologram element recorded different 3D images and display different image without crosstalk.

09:45 ***The Method of RGBX Sub-pixel Architecture for Power Efficient Display 49***
Hsueh-Yen Yang (National Taiwan University, Taiwan)
the Active Matrix Organic Light Emitting Device (AMOLED) currently apply four sub-pixels architecture, which include a red (R), green (G), blue (B) and additional (X) sub-pixel, which has high luminous efficiency to achieve a power efficient display. Therefore, a specified algorithm would be requested to indicate which pair of sub-pixels is lighting up. In this work, we propose an available method to implement the selection for the display of four sub-pixels configuration. Utilizing the property of the CIE-xy coordinate, a threshold value would be derived to perform RGBX sub-pixels selection. The proposed method can simplify the difficulty of conventional algorithm.

Session A7: Emerging Technologies for Smarter Life(I) –Vision-based

Room: 303
Chairs: Kuan Hung Chen (Feng Chia University, Taiwan), Toshihiko Yamasaki (The University of Tokyo, Japan)

09:00 ***Hippocra: Doctor-to-Doctor TeleDermatology Consultation Service towards Future AI-based Diagnosis System in Japan 51***
Hideaki Imaizumi (ExMedio, Inc. & Keio University, Japan); Akio Watanabe, Hiromi Hirano, Masatoshi Takemura, Hideyuki Kashiwagi and Shinichiro Monobe (ExMedio, Inc., Japan)
In order to create AI-based Diagnosis System for Dermatology as a final goal, we started Doctor-to-Doctor TeleDermatology consultation service in Japan as a way to collect a lot of dataset of skin diseases. In this paper, we explain the overview of the service and the data format to be teacher data for machine learning in the future.

09:15 ***Automatic Queue Monitoring in Store Using A Low-Cost IoT Sensing Platform 53***
Supatta Viriyavisuthisakul and Parinya Sanguansat (Panyapiwat Institute of Management (PIM), Thailand); Satoshi Toriumi and Mikihara Hayashi (Future Standard Co., Ltd., Japan); Toshihiko Yamasaki (The University of Tokyo, Japan)
In this paper, the problem of queue in convenient stores is considered. we propose a low cost automatic queue length monitoring by using an Internet-of-Things (IoT) platform. This system can detect the length of queue and the number of people that enqueue and leave the queue. If the length of queue is critical, the system will alert to staff via LINE Notify. Experimental results indicate that our system can perform people counting and notify in real-time processing. And the average accuracy rate is 95\% for people counting and 86\% for notification, respectively.

09:30 ***A Detection and Recognition System for Chinese Highway Traffic Panels 55***
Shu-Jui Hsieh, Kuan Hung Chen, De-Sheng Chen and Yi-Wen Wang (Feng Chia University, Taiwan)
Based on the computer vision and neural network techniques, we propose a driver assistant system for automatic detection and recognition of Chinese traffic panels on highway. In detection stage, search regions are reduced by a simple ROI setting and traffic panels are efficiently identified by proper HSV color thresholding. In recognition stage, individual English characters are first located as maximally stable extremal regions (MSER) and are grouped into lines. Then the word lines are interpreted by a feedforward neural network (FFNN), following a lookup table, to Chinese texts. The experimental results show the proposed system achieves high accuracy for detection and recognition, with a fast processing speed of 22.5 frames/s.

09:45 ***Grey-Scale Skeletonization using Delaunay Triangulation 57***
Vicky Sintunata (Tohoku University, Japan); Terumasa Aoki (Tohoku University & New Industry Creation Hatchery Center (NICHe), Japan)
Conventional skeleton extraction methods require a closed boundary constraint to solve the problem. In natural image closed boundary constraint might not be easily satisfied due to the similarity of the object and its background, occlusion, etc. In this paper a novel approach based on the Delaunay triangulation to solve the skeleton extraction in natural images is proposed. The algorithm shows a promising result in extracting the skeleton in natural images.

10:00 ***A Novel and Blur-Invariant Local Feature Scheme for Image Matching 59***
Qiang Tong (Tohoku University, Japan); Terumasa Aoki (Tohoku University & New Industry Creation Hatchery Center (NICHe), Japan)
The lack of robustness to blur (especially motion blur) is one of the biggest problem in the existing local feature schemes. In this paper, we present a novel Local feature scheme to solve this problem. Our proposed method is good at image matching between (motion and Gaussian) blurred images and non-blurred images. Experimental results show that the proposed method outperforms state of the art methods for blurred image matching.

Session A8: Emerging Technologies for Smarter Life(II) – Wireless and 3D IC

Room: 304
Chairs: Kun-Chih Chen (National Sun Yat-Sen University, Taiwan), Rong-Shue Hsiao (National Taipei University of Technology, Taiwan)

09:00 ***Implementation of a Zigbee-based Wireless Router for Home Automation Systems 61***
Yi-Chiao Wu, Liang-Bi Chen and Wan-Jung Chang (Southern Taiwan University of Science and Technology, Taiwan); Che-Ching Yang (Vision Automobile Electronics Industrial Co., Ltd., Taiwan); Chao-Tang Yu (Southern Taiwan University of Science and Technology, Taiwan)
This paper proposes a wireless router based on Zigbee networks for home automation systems applications, which is capable of smart devices monitoring, controlling, and enabling. When a smart device is joined the domain of the home automation system, the system will automatically require the related basic information of this device. Then this smart device can be monitored and controlled. Moreover, the user can plan automatically inter-enabling devices. As a result, it can increase devices interconnectability and reduce the design complexity of the console UI.

09:15 ***A Hybrid Indoor Positioning for Asset Tracking Using Bluetooth Low Energy and Wi-Fi 63***
Chun-Hao Kao, Rong-Shue Hsiao, Tian-Xiang Chen, Po-Shao Chen and Mei-Jin Pan (National Taipei University of Technology, Taiwan)
In this paper, an asset positioning method is proposed. The proposed method combines Wi-Fi fingerprinting and Bluetooth Low Energy (BLE) trilateration positioning methods. Firstly, the Wi-Fi fingerprinting method estimates rough position of asset in a large building, provided by mobile device user. Then, when user approaches the asset, the exact position of asset is estimated by the BLE trilateration method. The experimental result showed that the BLE trilateration positioning achieved 90% accuracy within 1.21 m. Therefore, the proposed method can effectively assist users to locate and track assets in a large building.

09:30 ***Dynamic Buffer Allocation for Thermal-aware 3D Network-on-Chip Systems 65***
Kun-Chih Chen (National Sun Yat-Sen University, Taiwan); Ciao-Ting Chou (National Sun Yat-sen University, Taiwan); Yen-Po Lin and Kai-Yu Chiang (Feng Chia University, Taiwan)
The thermal problem of 3D NoC system becomes severer than 2D NoC systems due to the different heat dissipation capability between each stacking die, which increases the power density and worsen the thermal issue. Hence, many Dynamic Temperature Managements (DTMs) are proposed to control the system temperature. The DTM is classified into temporal approaches and spatial ones by considering either only temperature or only traffic problem. To combine the advantages of the both aforementioned approaches, we propose a Dynamic Buffer Allocation (DBA) technology to worsen traffic congestion of near-overheated routers, which leads to the reduction of switching frequency and the hotspot problem can be eased. By considering the full temperature information, the DBA can mitigate the performance impact and synchronize the changing rate of temperature and traffic information. The experimental results show that the proposed scheme can reduce the deviation of temperature distribution by 39.4% and help to improve the full

system performance by 24.8% compared with previous work.

Monday, June 12, 10:10 - 10:30

Coffee Break

Room: Break Area

Monday, June 12, 10:30 - 10:50

Opening Remarks, Prof. Yu-Cheng Fan

Room: Lecture Hall

Monday, June 12, 10:50 - 12:00

K1: Keynote Speech I: IEEE Consumer Electronics Society VP of Operations and Planning, Brian Markwalter

Room: Lecture Hall
Chair: Wen-Chung Kao (National Taiwan Normal University, Taiwan)

Monday, June 12, 12:00 - 13:00

Lunch

Room: Lunch Area

Monday, June 12, 13:00 - 14:30

Session B1: IoT and Big Data

Room: Lecture Hall
Chairs: Guo-Shiang Lin (Da-Yeh University, Taiwan), Yi-Jen Su (Shu-Te University, Taiwan)

13:00 ***Platform Design for Social Internet of Things 67***
Bo-Shen Chen (National Dong Hwa University, Taiwan); Varsha Kshirsagar (National Dong Hwa University, India); Shou-Chih Lo (National Dong Hwa University, Taiwan)
Due to the advance of Internet of Things (IoT) and the support of cloud computing and big data technologies, people start enjoying smart services. These services extend from smart homes, smart factories, to smart grids, etc. Taking the smart home as an example, there are some commercial products with integrated hardware and software to make living space more automated and smart. However, these products are diverse and hard to be integrated together. In this paper, we show a platform design that can manage various IoT devices (sensors and actuators) operating with different protocols such as MQTT, CoAP, and HTTP. Moreover, this platform provides data visualization and analysis of sensed data. The social network is also connected to the platform such that users can be informed with any data anomalies from sensed environments.

13:15 ***Software Defined Radio Implementation of LTE R13 NB-IoT Downlink Vector Signal Generator 69***
Cheng-Feng Li (Institute for Information Industry, Taiwan); Jeng-Kuang Hwang (Yuan-Ze University, Taiwan); Chingwo Ma (Institute for Information Industry, Taiwan); Chun-Ju Lin (Yuan Ze University, Taiwan)
In this paper, we present a software defined radio (SDR) implementation for generating the downlink (DL) signal according to the LTE R13 narrowband internet-of-things (NB-IoT) spec. Given the NB-IoT DL parameters, all its six baseband physical (PHY) signals/channels are firstly generated in software. Then we turn the USRP SDR platform into a vector signal generator (VSG) to up convert the NB-IoT OFDMA I/Q waveform patterns to RF transmit signal. Finally, the DL signal is verified by using costly vector signal analyzer (VSA) with a preliminary NB-IoT option.

13:30 ***An Image Spam Detection Method 71***
Chun-Yuan Su (National Yunlin University of Science and Technology, Taiwan); Day-Fann Shen (Electrical Engineering, National Yunlin University of Science and Technology, Taiwan); Guo-Shiang Lin (Da-Yeh University, Taiwan)
In this paper, an image spam detection method was proposed. The proposed method has several parts: key block extraction, feature extraction, multi-level spam classifier. Key block extraction is used to extract the important information from image spams. Since color is one of important visual information to identify produces for humans, it is measured as a feature. To deal with geometric transform, spatial information among key blocks is extracted as a feature. After feature extraction, the number of key blocks is used to find some candidate clusters of image spam as the first-level classification for raising the efficiency of the proposed system. In the second level, the dissimilarity of color and spatial features is measured to determine which cluster of image spam the input image is and whether the input image is spam or not. Experimental results show that the proposed method can determine whether the input image is spam well.

13:45 ***Overlapping Community Detection with Seed Set Expansion by Local Cluster Coefficient 73***
Yi-Jen Su and Che-Chun Lee (Shu-Te University, Taiwan)
Since the inception of Web 2.0, social media services have become ubiquitous. Just as in the real world, multiple relationships exist simultaneously among members of the same virtual community. Therefore, this paper proposes a novel overlapping community detection method by seed set expansion with local clustering coefficients (LCC). The detection result was evaluated by measuring the quality of community cohesion.

Session B2: Advanced Signal Processing Techniques and Multimedia Processing

Room: 201
Chair: Jian-Jiun Ding (National Taiwan University, Taiwan)

13:00 ***A New Method with Saliency Detection for Image Quality Assessment 75***
Ren-Yao Xiao and Min-Hung Yeh (National Ilan University, Taiwan)
In this paper, a new method with visual saliency detection for image quality assessment (IQA) is proposed. Through the experiments in this paper, we have verified the proposed method can be effective than most others.

13:15 ***A Superpixel-based Saliency Model for Robust Autofocus in Low Contrast Images 77***
Nan Mu, Xin Xu and XiaoLong Zhang (Wuhan University of Science and Technology, P.R. China)

Due to low signal to noise ratio, the performance of autofocus will serious decline in low contrast images, making it quite difficult to locate the focus region. To tackle this challenge in computer vision, we perform autofocus by conducting a salient object detection approach. Based on the mechanism of human visual system, we detect the salient object by calculating the global saliencies in superpixel image blocks. This method tackles the low contrast image through a simple contrast measure. First, the global differences of each two superpixels are computed to obtain a saliency map. Then, the resulting map is refined by introducing an inter-superpixel similarity approach. The proposed model perfectly extracts the salient object in low contrast visibility conditions, which has been tested on three public datasets, as well as a nighttime image dataset. Experimental results demonstrate that the proposed method outperforms existing state-of-the-art saliency models and has a superior performance in autofocusing application.

13:30 ***Unsupervised Radio Map Learning for Indoor Localization 79***

Chingchun Huang and Wei-Chi Chang (National Chung Cheng University, Taiwan); Nguyen Hung (HCMC University of Technology and Education, Vietnam)

For radio-based indoor localization, the approaches founded on the radio fingerprint concept are efficient duo to low cost and the ability to handle occlusion effects. However, the approaches require a lot of human labor to label training data for radio map (fingerprint) construction. To address this issue, in this paper, we proposed an unsupervised framework to learn a Wi-Fi radio map in an indoor environment. Unlike conventional approaches that depend on a simulated radio map or a prior radio propagation model to reduce human efforts, our method uses Wi-Fi and IMU signals collecting by crowdsourcing to build a robust radio map automatically. More concretely, four types of constraints are fused by the proposed radio map optimization procedure. They include the alignment of Wi-Fi landmarks, the displacement constraint, the manifold-based smooth constraint, and the inter-trajectory constraints. Our experiment results also show the effectiveness of the unsupervised radio map

13:45 ***A General Structure of Type-III FIR Filters with Derivative Constraints 81***

Bo-You Yu (National Chiao Tung University, Taiwan); Peng-Hua Wang (National Taipei University, Taiwan); Po-Ning Chen (National Chiao Tung University, Taiwan)

In this paper, a general structure of type-III FIR filters with derivative constraints is proposed. It consists of a linear combinations of basic sub-filters, called cardinal filters, with weighting coefficients equal to derivatives of the target frequency response at $\omega = 0$. Closed-form expressions for these cardinal filters are derived and their filter coefficients are shown to have a simple recursive relation. Numerical experiments confirm that the proposed design is much more numerically stable than the solution obtained by solving the derivative constraints.

14:00 ***Action Recognition Using Three Dimension Convolution and Long Short Term Memory 83***

Yu-Cheng Liu, Jian-Jiun Ding and Yao-Jen Chang (National Taiwan University, Taiwan); Chien-Yao Wang and Jia-Ching Wang (National Central University, Taiwan)

The convolutional neural network (CNN) is more and more popular in computer vision and widely used in acoustic signal processing, image classification, and image segmentation. In this work, an architecture which is a combination of the 3-D convolutional neural network and the long short term memory (LSTM) was proposed for action recognition. It stacks the consecutive video frames, extracts spatial and time features, and trains the input dataset to achieve good recognition performance. Moreover, the LSTM model based on the relations among the frames in different time is adopted to consider the information of past frames. Simulations show that the proposed algorithm outperforms other neural network based methods and has even better performance for action recognition.

Session B3: Advanced Signal Processing for Healthy Living

Room: 202

Chair: Yi-Chong Zeng (Institute for Information Industry, Taiwan)

13:00 ***Monitoring Bed Activities via Vibration-Sensing Belt on Bed 85***

Chao-Lin Wu (NTU IoX Center); Yi-Wei Chien and LiChen Fu (National Taiwan University, Taiwan)

The aging issue has become an important issue of the world, mostly because the aging body makes elderly people in high risk. Since falling is a common accident when getting off bed and bed activities can help estimate sleeping quality, it is desirable to monitor bed activities for elderly people sleeping on beds. In addition, the deployment should be simple for the practicability. In this work, a simple vibration-sensing belt is deployed on the bed to collect signals about how users interact with the bed, and corresponding algorithm is developed to analyze signals for monitoring bed activities for users.

13:15 ***A Missing Temperature Data Estimation Method Using Graph Fourier Transform 87***

Chien-Cheng Tseng (National Kaohsiung First University of Science and Technology, Taiwan); Su-Ling Lee (Chang-Jung Christian University, Taiwan); Rui-Heng Su (National Kaohsiung First University of Science and Technology, Taiwan)

In this paper, a missing temperature data estimation method using graph Fourier transform (GFT) is presented. First, the GFT based on graph Laplacian matrix is briefly reviewed. Then, the spectral analysis of the temperature data is provided by using GFT to show that its bandwidth is approximately limited. Based on this band-limited property, a missing temperature data estimation approach is proposed. Finally, the real temperature data measured in ten cities of south Taiwan are employed to demonstrate the usefulness of the proposed graph Fourier transform method.

13:30 ***Development of a smart living platform based on a motion sensing carpet 89***

Chiao-yen Huang (Yuan ze University, Taiwan)

Localization and mobility monitoring are fundamental technologies for constructing a smart living space. This paper presents smart living platform based on motion sensing carpets WhizCarpet. It is developed in the form of 50×50cm 'puzzle floor mat' units, which allows the users to assemble by themselves according to their desired shape and area. From the pressure data collected by WhizCarpet, functions such as location tracking, mobility monitoring and fall detection can be achieved. This platform has been installed in Zhulun Apartment for field trial.

13:45 ***Mobile Platform based Multispectral Imaging of a Wound Simulation Created by Vacuum Cupping 91***

Wei-Min Liu, Po-Fu Wan and Peng-Jiun Tzeng (National Chung Cheng University, Taiwan); Zong-Cheng Li (National Chung-Cheng University, Taiwan); You-Xun Zheng, Wei-Ting Xiao and Yun-Zhong Lu (National Chung Cheng University, Taiwan); Yung-Chang Cheng (National Chung-Cheng University, Taiwan); Ke-Wei Chen and Wei-Che Chien (National Chung Cheng University, Taiwan)

The wound care management of bedsore is important to long-term bedridden patients. The wound size is usually monitored by a consumer-graded camera and then calculated by computer-aided analysis. In this paper, we simulated a subcutaneous and dermal injury using vacuum cupping experiment and performed multispectral imaging with three wavelengths, including active 650 nanometers red light and 940 nanometers near-infrared light illumination and passive 8-12μm thermal imaging. We also proposed to modify the optical design of current smartphones and connect with a miniature thermal imaging module via the Micro-USB port to fulfill our imaging needs. The extra imaging capabilities allow us to investigate more physiological features of a wounded site than a traditional visible light camera does.

14:00 ***Implementation of Post-operative Wound Analytics 93***

Yi-Chong Zeng, Kuan Hao Liao, Chu-Hsuan Wang, Yuling Lin and Wen-Tsung Chang (Institute for Information Industry, Taiwan)

Wound infection care after clinical surgery is mostly done by human observation. This type of work not only adds extra work to clinical physician and/or nurses, but is also subjective in nature. Doctors are relying on off-premise post-surgery monitoring mechanism to track the progress of their patients. This paper introduces our scheme to assist doctor in post-operative wound analytics based on smart mobile device, which combines automatic wound detection and infectious status recognition of wound. We integrate color normalization, robust edge detection, and skin color detection for wound detection. Subsequently, wound image is divided into overlapped blocks for infectious status recognition, which employs feature extraction and machine learning. The experiment results demonstrate the proposed scheme has high accuracies in post-operative wound analytics.

Session B4: Wearable Technology on the Health and Medical Electronics

Room: 204

Chair: Jian-Chiun Liou (National Kaohsiung University of Applied Sciences, Taiwan)

13:00 ***An Asymmetric Shorted Ground Using CPW Fed Antenna for Wearable Device Applications 95***

Wu Chia hao, Li Tsung-Lin, Shieh Han and Jwo Shiun Sun (National Taipei University of Technology, Taiwan)

A design concept for a wearable device is proposed wherein one coplanar waveguide is ground-connected to short the bottom ground. The proposed antenna, fabricated on 0.4-mm-thick 20 mm × 15 mm FR4 substrate, exhibited a bandwidth of 300 MHz (2.33-2.63 GHz), which is sufficient for covering the 2.4-GHz Bluetooth/WiFi band.

13:15 ***Multi-channel module of heart rate and electromyography clinical human-computer interaction system 97***

Jian-Chiun Liou (National Kaohsiung University of Applied Sciences, Taiwan); Wen-Chieh Lin (Kao Yuan University, Taiwan); Yun-Yao Kong (National Kaohsiung University of Applied Sciences (KUAS), Taiwan)

Multi-channel module heart rate and EMG clinical human-computer interaction system was using Wi-Fi mobile network transmission of physiological signals. With Grove-EMG, you can send a general physiological signal to a mobile device. System achieved real-time monitoring function for the monitoring of a number of physiological data to monitor the integrity of the monitoring. Hospital Network We uploads the patient's physiological data to the cloud. This physiologic information is convenient for physicians and nurses to analyze and judge. It can also through the hospital network to store the patient data. This monitoring information is convenient for future long-term care.

13:30 *Investigated blood flow measurement of lights with different wavelengths system 99*
Jian-Chiun Liou (National Kaohsiung University of Applied Sciences, Taiwan); Wen-Chieh Lin (Kao Yuan University, Taiwan); Yun-Yao Kong and Kuan-Wen Fang (National Kaohsiung University of Applied Sciences (KUAS), Taiwan)
Blood flow measurement is based on the blood of hemoglobin to absorb light capacity. The sensors are made up of light sources and detectors placed close to each other, and are placed directly on the skin when measured. The emitted light penetrates into the skin, tissues and blood vessels, and then is absorbed, transmitted and reflected. The intensity of the reflected light recorded by the detector will vary depending on the flow of blood flowing through the arteries. The applicable wavelength for this measurement depends on which part of the body is measured.

13:45 *Panoramic Annular Lens design of Endoscope 101*
Shu-Ming Tseng (National Taipei University of Technology, Taiwan); Ching-Wen Huang (Shin Kong Memorial Wu Ho-Su Hospital, Taiwan); Yueh-Teng Hsu (Aeolus robot, Taiwan); Jian-Cheng Yu (National Taipei University of Technology, Taiwan)
This paper aims at the endoscope based on the panorama image system. We propose parabolic mirrors in the new endoscope, allow to take photos each one of which can be transported into a 360 degree virtual tour without need for any editing. Hence, the 360 degree around the curved mirror is discharge, allowing for the image reflected by the mirror to be uninterrupted. Furthermore, with the advent of cameras of ever increasing definition, systems based on parabolic mirrors have resumed attention much more complex systems. Another excellent advantage of the parabolic mirrors is that they are flexible, at once, to uses that go beyond the mere photography: interactive 360 degree video, 360 degree videos, interactive real time 360 degree cameras, etc.

Session B5: Circuits and Systems for Sensor Network Applications

Room: 205
Chairs: Hou-Ming Chen (National Formosa University, Taiwan), Kuang-Hao Lin (National Formosa University, Taiwan)

13:00 *A Novel Lossless Embedded Compression Algorithm for Video Coding for Wireless Sensor Node Applications 103*
Yue-Zhan Kao, Kuo-Hsiang Huang and Shih-Song Fan Jiang (Yuan Ze University, Taiwan); Yu-Hsuan Lee (Multimedia Circuit and System Lab, Department of Electrical Engineering, Yuan-Ze University, Taiwan)
Recently, wireless sensor in the video surveillance system plays an important role, but the sensor operation is limited by battery capacity. Obviously, the technique to reduce power consumption is necessary. In this paper, a novel lossless embedded compression (EC) algorithm is proposed to save the memory bandwidth in video coding. It comprises two core techniques of Multi-directional Gradient Detection Prediction (MGDP) and Finer-opportune Golomb-Rice Code (FOGC). The experiment results reveal that the memory bandwidth can be reduced up to 41% on average.

13:15 *Low-Power and High-Speed Startup Circuit for Reference Circuit 105*
Hou-Ming Chen, Bo-Yi Lee, Kuang-Hao Lin, Xian-Ji Huang and Yu-Siang Huang (National Formosa University, Taiwan)
This paper presents a novel startup circuit that provides a startup operation for bias circuits and reference circuits. The proposed circuit employs delay buffer and series transistors to automatically turn off the startup circuit after the bias circuit has started. Thus, the proposed startup circuit consumes no power during the normal operation of the reference circuit and is useful for low-power circuits. The proposed circuit has been designed with a standard TSMC 0.18 μm 1P6M CMOS technology. Simulation result shows that a short startup time 7.6 ns can be achieved by controlling the proposed delay buffer.

13:30 *Three-lead ECG Detection System Based on an Analog Front-end Circuit ADS1293 107*
Liang-Hung Wang, Ming-Hui Fan and Ming-Hui Guan (Fuzhou University, P.R. China)
A three-lead electrocardiogram acquisition system is constructed with an analog front-end circuit (ADS1293), a microprocessor (MSP430X), and a personal phone or computer. The acquired three-lead (namely, Lead I, Lead II, and Lead V1) ECG data can not only be displayed on a personal computer by a MATLAB simulator but can also be stored in the cloud.

13:45 *A Modified Least Squares Iteration for Indoor Positioning System 109*
Kuang-Hao Lin, Chi-Chang Lu, Hou-Ming Chen, Hsu-Feng Li and Cheung-Fu Chuang (National Formosa University, Taiwan)
This paper presents the modified least squares iteration (MLSI). It is calculated by the least squares and trilateration to reduce positioning errors. In this study, environment model curves build to estimate the distance by ZigBee received dB value. Then, use trilateration to measure distance of reference and destination nodes. When the position errors appear, it will affect the obtained trilateration destination node location. As used herein, the modified least squares iterated (MLSI) is implemented to reduce errors and optimize the relationship between reference and destination nodes. That makes positioning result closer to the actual location of the node.

14:00 *Hybrid Multi-hop/Single-hop Opportunistic Transmission of WSNs 111*
Chih-min Yu (Chung Hua University, Taiwan); Meng-Lin Ku (National Central University, Taiwan); Chia-Wei Chang (Chung Hua University, Taiwan)
In this paper, two hybrid multi-hop/single-hop opportunistic transmission strategies for lifetime extension of WSNs are proposed. To prolong the network lifetime, a systematic model that contains a network distribution block, a routing algorithm block, a traffic pattern block and an optimal policy block is presented to determine the optimal transmission probability of each node. With the global routing paths, two optimization strategies in the optimal policy block are proposed by minimizing the overall power consumption or minimizing the maximum power consumption of nodes. Computer simulations show that the second strategy can achieve almost triple network lifetime extension, as compared to the first strategy.

Session B6: Smart Novel System Design

Room: 302
Chairs: Xin-Yu Shih (National Sun Yat-sen University, Taiwan), I-Chyn Wey (Chang Gung University, Taiwan)

13:00 *VLSI Design of An Ultra-High-Speed Polar Encoder Architecture Using 16-Parallel Radix-2 Processing Engines for Next-Generation 5G Applications 113*
Xin-Yu Shih and Po-Chun Huang (National Sun Yat-sen University, Taiwan)
This paper presents an ultra-high-speed/area-efficient Polar encoder design with very high system throughput for emerging next-generation 5G applications. In a demonstrated design example, the proposed hardware architecture is mainly based on 16-parallel radix-2 processing engines. An 8192-point Polar encoder is designed and synthesized with TSMC 40-nm CMOS technology, operating at clock frequency of 10.0GHz and delivering total throughput of 160.0Gbps. The synthesized area only occupies 0.045mm2 and consumes 413.8mW.

13:15 *A Flexible K-Best Sphere Decoding Kernel for Configurable Antennas and Constellations 115*
Yan-Zhang Huang, Yu-Horng Hsieh and Cheng-Hung Lin (Yuan Ze University, Taiwan)
In this paper we present a flexible decoding kernel using K-best and iterative K-best algorithms. Using this decoding kernel, system designers can choose the alternative algorithms for their different applications. With one kernel, it supports multiple configurable antennas (2×2,4×4) and variable modulation schemes (QPSK,16-QAM). Using number of kernels supports 8×8 and 64-QAM. Using a 90-nm CMOS technology, the 7.29 mm2 proposed kernel achieves the throughput of 445.3 Mbps at 166.7MHz.

13:30 *Architectural Memory Co-simulation Tool with Floorplan, Power, Timing, and Thermal Information 117*
Shu-Yen Lin and Shao-Cheng Wang (Yuan Ze University, Taiwan)
In this work, we proposed the architectural memory co-simulation tool to generate the floorplan, power, timing, and thermal Information. A STTRAM prototype is applied as a design example to demonstrate the features of the proposed co-simulation tool.

13:45 *2-Dimensional Minimum Fast-Searching Design Approach of LDPC Decoder Architecture for IEEE 802.11n/ac/ax Applications 119*
Xin-Yu Shih and Yu-Chun Chen (National Sun Yat-sen University, Taiwan)
This work proposes a systematic design approach to perform minimum and second minimum fast-searching in 2-dimensional xy-planes. This fast-searching approach can extremely improve the calculating timing in LDPC decoder architecture, especially for high row weights defined in IEEE 802.11n/ac/ax SPEC. In a design example with row weight of 22, our developed approach only requires about 42.9% of critical-path timing under 12.2% hardware overhead with respect to often-used binary-tree approach. This approach also extends to other various high row weights for enhancing critical-path timing performance.

14:00 *Miniaturized UAV Datalink Frequency Source System Design N/A*
Hui Cao (Northwestern Polytechnical Universit, P.R. China); Yu Qu (Northwestern Polytechnical University, P.R. China); I-Chyn Wey (Chang Gung University, Taiwan)
In order to meet the demands of a UAV airborne transmitter local oscillator, a PLL frequency synthesizer based on ADF4350 is designed. The chip integrates a phase detector and a VCO, only a reference circuit, a low-pass filter, and a control circuit should be added to form a complete local oscillator. The result and practical application show that this local

oscillator stable and reliable, compact, and fully meet the UAV data link requirements

Monday, June 12, 14:30 - 15:20

K2: Keynote Speech II: National Cheng Kung University, Prof. Jar-Ferr Yang (Kevin)

Room: Lecture Hall
Chair: Chih-Peng Fan (National Chung Hsing University, Taiwan)

Monday, June 12, 15:20 - 15:40

Coffee Break

Room: Break Area

Monday, June 12, 15:40 - 17:40

Session C1: Three Dimensional Multimedia Systems, Transmission and Cyber Security for IoT

Room: Lecture Hall
Chairs: Fu-Li Hsiao (National Changhua University of Education, Taiwan), Yi-Cheng Liu (National Taipei University of Technology, Taiwan)

15:40 ***Fragmentation Prevention in the Cloud File System for P2P File Sharing using Smart Devices 121***
Chao-Hsien Lee and Shih-Kuei Yu (National Taipei University of Technology, Taiwan)
More and more network services integrate the cloud platform to deliver their services. In order to accelerate the data sharing among users, data are usually divided and encapsulated into small pieces before delivery. However, the cloud file system enlarges the basic block size for maximizing the access throughput. This conflict between network transmission and cloud file system may induce high fragmentation in the cloud file system. In this paper, we propose one minimum block defragmentation mechanism (MBDM) to avoid any fragmentation in the cloud file system even if data are exchanged piece by piece. Based on our experiments, the proposed MBDM save 36% time and 46% energy consumption than the traditional BitTorrent (BT) service.

15:55 ***A Novel Design and Application of High Pixel Density Display Technologies 123***
Yi-Cheng Liu and Yu-Cheng Fan (National Taipei University of Technology, Taiwan)
The global high pixel density display ran into the consumer's life since 2012, almost all TV factory and company recommend 4K TV currently. For these reasons, it is the inexorable that the pixel density will be higher and higher, such as 8K even 16K type high pixel density display will appear. However, it is very serious technologic challenge for panel factory, so 8K or 16K type high pixel density display will not be easy to develop. Therefore, we bring up the novel methods that combine gate signal control design and micro scale IC transfer to solve these problems, let higher pixel density and quality display bring to consumer's life.

16:10 ***LiDAR Information for Objects Classified Technology in Static Environment 125***
Hsin-I Ning (Taipei University of Thechnology, Taiwan); Yu-Cheng Fan (National Taipei University of Technology, Taiwan)
Researching of automatic vehicle is increasing recently. Through the variable driving assistance system, the passenger can avoid and predict the obstacles. Besides, it optimizes the automatic vehicle to do positioning and navigation when classified the static obstacles. The paper proposed the classification using 3D LiDAR to distinguish the objects in static environment.

16:25 ***3D Building Scene Reconstruction Based on 3D LiDAR Point Cloud 127***
Shih-Chi Yang and Yu-Cheng Fan (National Taipei University of Technology, Taiwan)
This paper presents a "3D Building Scene Reconstruction Based on LiDAR Point Cloud." The 3D Light Detection and Ranging (LiDAR) can take the stereo information under the environment. The short distance research is growing recently for 3D LiDAR. We use the point cloud data of interior building to perform 3D model.

16:40 ***Image Quality Improvement of Water Screen 3D Projection System 129***
Chien-Yu Chen (National Taiwan University of Science and Technology, Taiwan)
The study applied water mist as the projecting medium and two projectors with different circular polarization in order to present 3D image. The system in this study is miniaturized for higher practicability, and judged the image quality by PSNR analysis.

16:55 ***Indoor Environmental Data Collection, Localization and Fusion 131***
Chieh-Hsun Huang, Cheng-Hsin Lin, Shih-Yu Shih, Po-Yen Chang, Yuan-Chi Lin and Cheng-Ming Huang (National Taipei University of Technology, Taiwan)
This paper presented an implementation of indoor environmental data collection with the localization module. Since where the environmental data is collected can be known, the distribution of the environmental data in an indoor environment would be presented. The small and light weight sensors are employed here and equipped on a mobile platform such that the mobile platform can freely cruise in the indoor environment to gather data. A monocular webcam is utilized to do the visual simultaneous localization and mapping, however, it may be failed when the visual features are few. The localization by the wireless sensor networks is then fused with the visual localization to improve the localization accuracy. In addition, the embedded system is employed to grab the environmental data from several kinds of sensors and transmit the data to a remote sever.

17:10 ***Secured Remote Sensing by Deploying Clone-Resistant Secret Unknown Ciphers 133***
Wael Adi (Technical University of Braunschweig, Germany); Saleh Mulhem (Technical University Braunschweig, Germany); Ayoub Mars (Technische Universität Braunschweig & Institut für Datentechnik und Kommunikationsnetze, Germany)
Secured remote sensing is becoming a widely required technology to make certified measurements at remote sites via Internet of Things (IoT) without the need for trusted personal efforts. This is essentially required for reading huge number of meters such as consumed energy, gas, electricity or water meters. It is necessary to produce such meters at low-cost deploying standard System-on-Chip (SoC) units. Such units can serve as smart meters to cover all control, management, and IoT communication tasks. A Secret Unknown Cipher (SUC) concept was introduced in [3]. SUC can be created in a post fabrication process making SoC units unique and clone-resistant [4]. The paper in presenting a low-cost two-way protocol for SoC environment using such units to achieve secured machine to machine (M2M) remote measurement with scalable relatively high security against cloning or manipulation attacks. The SoC manufacturer is completely end-user defined and do not involve manufacturer in the security concept.

Session C2: Best Paper Competition

Room: 201
Chair: Yeong-Kang Lai (National Chung Hsing University, Taiwan)

15:40 ***Fast Depth Coding Based on Depth Map Segmentation for 3D Video Coding 135***
Yi-Wen Liao, Jie-Ru Lin, Mei-Juan Chen and Jeng-Wei Chen (National Dong Hwa University, Taiwan)
This paper proposes a fast algorithm based on depth map segmentation for the depth coding of 3D video coding to reduce the coding complexity of the depth map. The proposed algorithm segments the depth map into different regions by modifying automatic thresholding technique. We also propose the search range adjustment according to the classification of the coding tree unit (CTU). The early termination and fast prediction unit mode decisions are also proposed to reduce the coding complexity. The experimental results show that the proposed algorithm can reduce the coding time of depth map and maintain good synthesized view quality.

15:55 ***Distribution of Bit Patterns on Multi-value Sequence over Odd Characteristics Field 137***
Yuta Kodera (Okayama University, Japan); Takeru Miyazaki (The University of Kitakyushu, Japan); Md. Al-Amin Khandaker (Okayama University, Japan); Md. Arshad Ali (Okayama University, Japan & Hajee Mohammad Danesh Science and Technology University, Bangladesh);

Yasuyuki Nogami (Okayama University, Japan); Satoshi Uehara (The University of Kitakyushu, Japan)
The Internet of Things (IoT) provides much convenient life for us, at the same time it has brought threads for our privacy. In this context, secure and efficient cryptosystem is required to which pseudorandom sequence plays an important role. Especially, the distribution of bit patterns in the pseudorandom sequence is one of important security aspects. This paper especially focuses on the bit patterns and the distribution in an NTU sequecne. As a result of a lot of observation, an important assumption about the distribution on an NTU sequence is introduced.

16:10 ***An Embedded Cloud Surveillance System Design 139***
Jen-Kai Hsueh, Yi-Ching Huang, Bing-Ting Dong and Ching-Min Lee (I-Shou University, Taiwan)
In this paper, an embedded cloud surveillance system for particular area security is designed, which consists of monitoring and control parts. The system uses an Arduino Yun board to be the platform, and uses two PIR sensors as well as a Webcam for a purpose of monitoring. Once PIR sensors detect someone close to the system, not only a buzzer will play alarm sounds, the camera will enable to monitor at the same time, but also the system will send the screenshots to a predefined cloud storage system which is set by Dropbox and will warn users via email simultaneously. Users are able to decide to live-stream or to process after receiving the message. In addition, users can remotely control some devices of the system via mobile phone APP to further monitor. According to practical execution results, the cloud surveillance system works well no matter in day or night. The requirement of real time is also guaranteed.

16:25 ***Power-efficient CISPR25 class-3 compliant LED Driver with Dynamic Headroom Control for Automotive Headlights 141***
Anusua Das (Hochschule Darmstadt-University of Applied Sciences & Texas Instruments Germany, Germany); Thomas Schumann (Hochschule Darmstadt-University of Applied Sciences, Germany); Robert Regensburger (Texas Instruments, Germany)
Today automotive headlights are using high current Light Emitting Diodes (LEDs). LED drivers are necessary to provide the appropriate voltage out of the car battery. Recent microcontroller-based solutions are costly and power hungry. This paper presents a power-efficient LED driver. The design is CISPR25 class-3 EMI compliant and supports ISO 7637-2 and ISO 16750-2 standards. In addition, the system includes a special feature of Dynamic Headroom Control (DHC) that aims at maximizing overall system efficiency by adjusting voltage at the boost controller by sensing the LEDs voltages. Experimental results show up to 88% power-efficiency.

16:40 ***Hadoop Cluster with FPGA-based Hardware Accelerators for K-means Clustering Algorithm 143***
Ching-Che Chung and Yu-Hsin Wang (National Chung Cheng University, Taiwan)
In this paper, the implementation of the K-means clustering algorithm on a Hadoop cluster with FPGA-based hardware accelerators is presented. The proposed design follows MapReduce programming model and uses Hadoop distribution file system (HDFS) for storing large dataset. The proposed FPGA-based hardware accelerator for speed up the K-means clustering algorithm is implemented on Xilinx VC707 evaluation boards (EVBs). There are four computers in the proposed Hadoop cluster, one computer is Master Node, and the other three computers are Slave Nodes. The Slave Nodes communicate with VC707 EVBs through Gigabit Ethernet. The experimental results show that for clustering 125 million three-dimensional input dataset, the proposed design can achieve 4x speedup than the Hadoop cluster without FPGA-based hardware accelerators.

16:55 ***GPU-based Training of Autoencoders for Bird Sound Data Processing 145***
Jian Guo (Tokyo Institute of Technology, Japan); Kun Qian (Technical University Munich, Germany); Björn W Schuller (Imperial College London & University of Passau, United Kingdom (Great Britain)); Satoshi Matsuoka (Tokyo Institute of Technology, Japan)
Bird sounds have been studied in recent years due to their significance in helping ornithologists, and ecologists to monitor birds' activities, which reflect climate changes, biodiversity, and reserves' local protection status. Within the increasingly collected large amount of bird sounds data from experts and amateurs, how to handle, and employ the state-of-the-art deep learning methods to mining such large amount of data, is bringing a huge challenge, and opportunity for the research community. In this work, we propose a framework using the GPU to accelerate autoencoders' training for a large amount of bird sounds data. Experimental results show that the GPU can considerably speed up the training process of bird sounds when fed within different scales of data, or feature numbers, compared with CPU-based learning.

Session C3: Biomedical Circuits and Systems for Consumer Electronics

Room: 202
Chairs: Chi-Chun Chen (National Chin-Yi University of Technology, Taiwan), Pao-Cheng Huang (National Cheng Kung University, Taiwan)

15:40 ***Applicability of Copper Nodule for Biomedical Cell Capture Based on 3D Interdigitated Microelectrode 147***
Fu-Yu Chang (National Synchrotron Radiation Research Center, Taiwan); Pao-Cheng Huang (National Cheng Kung University, Taiwan); Min Haw Wang (Chinese Culture University, Taiwan)
This study presents a method to use copper nodules to induce dielectrophoresis force. It can be applied in biomedical cell capture. The capture electrode is a 3D interdigitated microelectrode and also can be used in electrical cell impedance measurement. No additional procedural is needed to form copper nodules. The process is easy, convenient, and the same as a normal 3D electrode manufacture.

15:55 ***Medical Ultrasound system with an Application-specific integrated circuit(ASIC) 149***
Jian-Chiun Liou (National Kaohsiung University of Applied Sciences, Taiwan); Wen-Chieh Lin (Kao Yuan University, Taiwan); Yun-Yao Kong, Kuan-Wen Fang and Yuan-Cheng Song (National Kaohsiung University of Applied Sciences (KUAS), Taiwan)
An Application-specific integrated circuit(ASIC) of special chip circuits are used in ultrasonic probe array systems. The circuit architecture is to calculate the output of the ultrasonic probe signal in two different periods of time. In the odd-even mode, the mode setting module arranges one of odd ones and even probes of the address parameters in numerical order, followed by the other one of the odd probes and the even probes of the address parameters in numerical order to form the activation sequence.

16:10 ***Investigated of DNA microarray chips for disease detection and gene sequencing 151***
Jian-Chiun Liou (National Kaohsiung University of Applied Sciences, Taiwan); Wen-Chieh Lin (Kao Yuan University, Taiwan); Kuan-Wen Fang and Yuan-Cheng Song (National Kaohsiung University of Applied Sciences (KUAS), Taiwan)
This paper describes the DNA microarray chips for disease detection and gene sequencing. It is combining imaging of DNA liquid jetting system. Its droplets are very small. It is only 50 to 60 microns. With the ASIC architecture circuit of the thermal bubble generation system, it can eject 432 DNA droplet points only 85μsec period.

16:25 ***Fast Algorithm for Heart Rate Calculation Based on an Android Application 153***
Liang-Hung Wang, Lei Liu and Qun-Chao Chen (Fuzhou University, P.R. China)
Remote electrocardiograph (ECG) monitoring systems are gaining increasing attention with the progress of time. However, the traditional heart rate calculation formula has numerous limitations. This study presents a simple and rapid algorithm for heart rate calculation. This algorithm can provide an approximate heart rate even when the ECG signal contains noise. When this formula is used in an ECG monitoring application, heart rate can be obtained quickly and accurately. Power consumption will also be significantly reduced.

16:40 ***Delta Sigma Modulator for a Portable ECG Acquisition Device 155***
Liang-Hung Wang (Fuzhou University, P.R. China); Hong-Jie Lai (Fuzhou University, Taiwan); Chen-hui Feng and Qun-Chao Chen (Fuzhou University, P.R. China)
This study presents a single-loop, third-order, low-power, high-precision, switched-capacitor delta sigma modulator (DSM) for a portable electrocardiogram (ECG) acquisition device. Several techniques, including modified feedforward structure, gain-enhanced current mirror operational transconductance amplifier (OTA), and dynamic comparator, are adopted to improve signal-to-noise ratio (SNR) and reduce power consumption. Simulation results indicate that the SNR and the corresponding effective number of bits are 100.8 dB and 16.45 bits, respectively, which fulfill the requirements of an ECG acquisition system. The circuit will be fabricated by the SMIC using a 0.18 μm general purpose process in the near future.

16:55 ***Shielded Capacitive Electrode with High Noise Immunity 157***
Chi-Chun Chen (National Chin-Yi University of Technology, Taiwan); Wen-Ying Chang (Industrial Technology Research Institute, Taiwan); Ting Yi Xie (National Chin-Yi University of Technology, Taiwan)
This study proposed the use of an innovative shielded capacitive sensing electrode in noncontact electrocardiograms (ECG) with high noise immunity. Capacitive ECGs are sensitive to external noise and interference such as mains power and environmental changes. Therefore, a shielded capacitive electrode designed with capacitance feedback was proposed to prevent such interference.

17:10 ***A Microwave Resonator Biosensor for Biological Cell Trapping in Portable Biomedical Application 159***
Chia-Feng Liu and Pao-Cheng Huang (National Cheng Kung University, Taiwan); Riqing Chen (Fujian Agriculture and Forestry University, P.R. China)
This work presents a near-field microwave resonator combining with a micro-channel and cell trappings for detecting biological cells. A hairpin sensor with a high-Q dielectric resonator allows the detection of a small variation of DUT in the micro-channel by measuring the scattering parameters responses at resonance frequencies of around 2.2 GHz. The sensor is a microfluidic device constructed from polydimethylsiloxane (PDMS) and negative photoresist (SU-8) using micro-electro-mechanical-system (MEMS) technology to measure the characterization of biological cells under liquid medium. Measurements and analysis of Dulbecco's modified Eagle's medium (DMEM) and B16F10 melanoma cells (mus musculus skin melanoma) were then performed. These analysis results are helpful for further portable biomedical applications such as cell trapping, measurement, and characteristics.

17:25 *An HBC-Based Biosensor Transmitter for Time Division Multiple Access Network 161*

Nicolas Fahier (National Chiao Tung University, Taiwan)

A wireless medical biosensor using Human Body Communication(HBC)for data transmission is presented in this paper. HBC is included in the IEEE Standard 802.15.6 for Local and Metropolitan Area Network and presents the characteristic of being a new non-radio frequency type of wireless communication as it uses the human body as a transmission medium. The multiple access technique should be Time Division Multiple Access(TDMA) and data are transmitted over HBC capacitive coupling aside from a bio-signal sensing system. The transmitter time characteristics shows the feasibility of implementing a TDMA body sensors star network centralized into a single hub for a single connection to Wide Area Networks. The proposed system is composed by a bio-sensor unit and an HBC transmitter

Session C4: Advanced Signals and Systems

Room: 204

Chairs: Hsia Chih-Hsien (Chinese Culture University, Taiwan), Heri Prasetyo (Universitas Sebelas Maret, Indonesia)

15:40 *Chroma upsampling for YCbCr 420 videos 163*

Yi-Chieh Yu, Jhe-Wei Jhang, Xutao Wei and Hua-Wei Tseng (Chung Yuan Christian University, Taiwan); Yangming Wen (Jimei University, P.R. China); Zhaoyi Liu (Beijing Institute of Technology, P.R. China); Ting-Lan Lin, Shih-Lun Chen and Yih-Shyh Chiou (Chung Yuan Christian University, Taiwan); Ho-Yin Lee (Shenzhen Hiker Technology Co. Limited, Taiwan)

We proposed a novel chroma upsampling scheme for YCbCr 420 videos. In a state-of-the-art work, the upsampling is performed by simply duplicating the stored U and V values in YCbCr 420 for 4 copies and saving to the corresponding locations in YCbCr 444. In the proposed method, instead of directly copying the current values, we consider their neighboring chroma values as the weights to redistribute the total energy. The experimental results show that the proposed chroma upsampling method is better than the state-of the-art method in all the tested videos in terms of CPSNR; the average gain is 0.13 dB.

15:55 *A Compensation Technique for Recycling Folded-Cascode Amplifier 165*

Po-Yu Kuo and Sheng-Da Tsai (National Yunlin University of Science & Technology, Taiwan)

A compensation technique for recycling folded cascade (RFC) operational transconductance amplifier (OTA) is presented in this paper. By applying the compensation technique, the proposed unity-gain frequency enhanced recycling folded cascade (UGFERFC) structure improves slew rate and unity-gain frequency of RFC amplifier. The proposed amplifier has been implemented using TSMC 0.18μm CMOS process and simulated with a 1.8V power supply and a 5.6pF capacitor load. When compared to the RFC amplifier, the proposed amplifier achieves 80MHz increment in unity-gain frequency (134.2 MHz versus 214.3 MHz), 13.4 V/μs increment in slew rate (94.1 V/μs versus 107.5 V/μs), and 19.6dB increment in dc gain (73.2 dB versus 53.6 dB).

16:10 *Image Forensics Using EDBTC Feature 167*

Bambang Harjito (Sebelas Maret University, Indonesia); Heri Prasetyo (Universitas Sebelas Maret, Indonesia)

This paper presents a new method on image forensics application using the Error Diffusion Block Truncation Coding (EDBTC) feature. The image forensics tries to detect the copy-move forgery image regions on the forged image. Firstly, an image is divided into several non-overlapping image blocks. The image feature is further derived for each image block. Herein, two image features, namely Color Feature (CF) and Bit Feature (BF), are composed from the EDBTC compressed data stream. The forged region is detected while the image feature of this region is similar to the image feature of other region separated far away. As documented in the experimental section, the proposed method gives a promising result on the image forensics taks, and, at the same time, outperforms the former existing scheme

16:25 *Halftoning-Based Block Truncation Coding Feature on Scrambled Images 169*

Heri Prasetyo (Universitas Sebelas Maret, Indonesia); Bambang Harjito (Sebelas Maret University, Indonesia)

This paper investigates the usability of Halftoning-based Block Truncation Coding (HBTC) feature for image retrieval. It assumes that all images in database are stored in scrambled/encrypted format. Firstly, an image feature descriptor is derived from the scrambled/encrypted image. This image feature is subsequently converted into the binary representation to achieve fast similarity measurement. The Hamming distance measures the similarity between the query and target images in the bitwise manner. As documented in experimental result, the proposed method gives a promising result on the scrambled/encrypted image retrieval. It demonstrates the superiority of HBTC feature in dealing with scrambled/encrypted image.

16:40 *Feature Selection on Human Activity Recognition Dataset using Minimum Redundancy Maximum Relevance 171*

Afrizal Doewes and Sri Edi Swasono (Universitas Sebelas Maret, Indonesia); Bambang Harjito (Sebelas Maret University, Indonesia)

Human Activity Recognition is a research field that aims to identify the activities that are carried out by a person. Recognition can be done by using information that is retrieved from various sources, for example: using inertial sensors. Lately, many people use smartphone with built-in inertial sensors such as accelerometer and gyroscope which make these smartphone capable of recognizing human activities. But, an optimization must be done to minimize the computational process of the recognition system so that the system could be function properly in smartphone that has limited processing power. In this study optimization was done by reducing the numbers of features used in the dataset. Using an available public human activity recognition dataset, mRMR (Minimum Redundancy Maximum Relevance) feature selection method was applied to the dataset to reduce the numbers of features. Results from this study show that using mRMR method in dataset 7:3, the numbers of features can be reduced from 561 features to 201 features, while still maintaining the accuracy at 95.15% using SVM classifier and 94.23% using MLP classifier. While using mRMR method in dataset 8:2, the numbers of features can be reduced from 561 features to 154 features with the accuracy 95.18% using SVM and the numbers of features can be reduced from 561 to 211 with the accuracy 94.84% using MLP. Both dataset using the same threshold that is 95% for SVM and 94% for MLP. For the running time computation, in dataset 7:3 the running time becomes 42.57% from the initial running time using SVM and 12.63% from the initial running time using MLP. While in dataset 8:2 the running time becomes 60.5% from the initial running time using SVM and 14% from the initial running time using MLP.

16:55 *An Output-Capacitorless Low-Dropout Regulator with -132dB PSRR at 1KHz 173*

Po-Yu Kuo (National Yunlin University of Science & Technology, Taiwan); Che-Hao Chang (National Yunlin University of Science and Technology, Taiwan)

An output-capacitorless low-dropout (LDO) regulator with a Rising-Class-A voltage buffer is presented in this paper. By using the proposed voltage buffer, the non-dominant parasitic poles can be pushed to higher frequencies and leads to good stability in power supply rejection ratio (PSRR). The proposed regulator is implemented using TSMC 1P6M 0.18-μm CMOS technology and simulated with a 1.8V power supply. From the simulation results, the proposed regulator delivers a 100mA maximum load current with a dropout voltage less than 200mV. The simulated PSRR of the proposed output-capacitorless LDO regulator reached -132dB at 1KHz. It only consumes 32μA quiescent current and is able to settle within 0.5μs.

Session C5: Event Detection and Recognition

Room: 205

Chairs: Keng-Hao Liu (National Sun Yat-sen University, Taiwan), Po-Chyi Su (National Central University, Taiwan)

15:40 *Stingray Detection of Aerial Images with Region-based Convolution Neural Network 175*

Chien-Hung Chen and Keng-Hao Liu (National Sun Yat-sen University, Taiwan)

The image processing technologies have become a popular tool for biological related researches. In order to detect the specific animal from aerial videos, this paper attempts to use the region-based convolution neural network to implement stingray detection on aerial images obtained by UAV. The experimental shows that using Faster R-CNN algorithm as the target detector can achieve good detection accuracy with short computing time. It suggests that using deep learning-based methods have considerable potential to aid real-time applications.

15:55 *Cushing response in intracranial hypertension discovered by wavelet signal analysis 177*

Yi-Hsin Tsai (National Taiwan University & Far Eastern Memorial Hospital, New Taipei City, Taiwan); I-Jen Chiang (Institute of Bioengineering, National Taiwan University, Taiwan); Hao-Wei Cheng and Jau-Min Wong (Institute of Biomedical Engineering, National Taiwan University, Taiwan)

Cushing response is the reaction of blood pressure, heart rate and respiratory pattern to increased intracranial pressure. We try to recognize this well-known phenomenon in a patient with head injury, using wavelet transform to abolish noises and preserve the true signals.

16:10 *A Targeted Person Searching Scheme in Digital Videos Based on Face Quality Assessment and Recognition 179*

Jia-Hao Hu, Po-Chyi Su and Po-Wei Hsieh (National Central University, Taiwan)

This research presents a targeted person searching scheme in digital videos. It is assumed that a user is provided with an exemplar video that contains a targeted person and long investigated videos from which the scenes related the targeted person will be extracted. First, the exemplar video is processed to generate multiple representative face images, which are shown on an interface for the user to manually select the images of a targeted person. After choosing the images characterizing the targeted person, the scheme will apply face tracking and face quality assessment for training a model, which can then help to search that person in other long investigated videos. The proposed scheme can facilitate such applications as evidence collection from surveillance videos and retrieval of actors from TV dramas or movies.

16:25 *Fisheye calibration with wide-angle characteristics 181*
Tien-Ying Kuo, Yu-Shuo Wang, Yi-Jun Cheng and Kuan-Hung Wan (National Taipei University of Technology, Taiwan)
In this paper we make improvement to fisheye camera calibration methods. Chessboard corners are used to calculate the relation between 2D image points and 3D world points. In addition, we perform a weighted joint residual refinement. With our fisheye camera calibration method, we can attain better camera parameters and produce a more accurate fisheye undistortion image. Experiment results shows that our method can correct radial distortion and stretched boundary in fisheye images.

16:40 *Automatic Photographic Composition Based on Convolutional Neural Network 183*
Sheng-Fang Chen, Chan-Shuo Hu, Zheng-An Zhu and Chen-Kuo Chiang (National Chung Cheng University, Taiwan)
This paper presents an automatic photographic composition method based on convolutional neural network.Firstly, photographic composition rules are adopted for photographic composition assessment, including the rule of third, horizontal line, leading line, scale and texture information. Then, the scores obtained by the aforementioned rules are used to train the Convolutional Neural Network (CNN). To further improve the photographic composition CNN model, a dual-channel CNN model is proposed. The top channel contains the network of scores of composition rules, whereas the bottom channel is trained by the image scores rated by the crowd. The experimental results show that the CNN model is very effective for automatic photographic composition suggestion.

16:55 *A Multilevel Technique for Automatic Foreground Extraction 185*
Ming-Sui Lee and Yi-Min Yang (National Taiwan University, Taiwan)
Foreground extraction is an important and challenging problem in many applications of computer vision. Most existing algorithms either require user intervention as hard constraints or demand special inputs for extra information. Thus, an automatic foreground extraction algorithm from a single image is proposed in this paper. A Gaussian image pyramid is constructed and the gradient vector flow (GVF) snake is adopted at the coarsest level to generate a rough contour of the object which is then upsampled and serves as the initial input to GVF snake in the next level. This process repeats until the estimated contour is propagated to the finest level. Based on the result in the finest level, a binary mask can be generated accordingly and becomes the initial constraint in the segmentation. The proposed segmentation step includes two novel schemes, which simulate the Latent Dirichlet Allocation (LDA) generative model and a probabilistic stochastic process called Chinese restaurant process. With these mechanisms, the Gaussian Mixture Models adaptively determine the number of components for foreground and background individually. As a result, the proposed method is expected to not only produce a satisfactory result of foreground extraction automatically with more robustness and adaptation but also serve as a good preprocessing to improve the performance and accuracy for tasks in computer vision.

17:10 *Vehicle Detection Based on Wheel Part Detection 187*
Yu-Sheng Ruan (National Dong Hwa University, Taiwan); I-Cheng Chang (National DongHwa University, Taiwan); HungYu Yeh (National Dong Hwa University, Taiwan)
This paper proposed an effective vehicle detection system based on wheel parts detection. The system is composed of two principal modules: feature detector construction and vehicle detection. Feature detector construction is to train a vehicle part model based on Adaboost using HOG and MB-LBP. Vehicle detection is formed by three sub-modules. ROI segmentation segments the searching region where wheels appear frequently, and this region is further divided into three sub-ROIs corresponding to three different aspect ratios. Wheel determination filters the outliers from the detected results in each sub-ROIs, and find the relationship between front wheels, back wheels and tail light parts. Vehicle localization focuses on localizing vehicles using those matched wheels. The experiments show that the proposed approach can offer good detection results under different environments.

Session C6: Internet of Energy for Advanced Electric Power Consuming

Room: 302
Chair: Hisayoshi Sugiyama (Osaka City University, Japan)

15:40 *ID-Based Power Flow Coloring for Power Fluctuation Management: Concept and Classification 189*
Saher Javaid (Kyoto University, Japan); Takekazu Kato (Shizuoka Institute of Science and Technology, Japan)
This paper implements the power flow coloring, by giving a unique ID to each power flow between a specific power source and a specific power load. It enables us to design versatile power flow patterns between distributed power sources and power loads taking into consideration energy cost, availability and gas emissions. This paper first explains the concept of the power flow coloring and then gives classifications of the several implementation methods for the power flow coloring.

15:55 *Real-Time Power Supply and Demand Mediation Algorithm for Energy on Demand System 191*
Saher Javaid (Kyoto University, Japan); Takekazu Kato (Shizuoka Institute of Science and Technology, Japan)
We proposed the concept of Energy on Demand (EoD) system as novel smart demand-side energy management scheme to realize efficient and versatile control of e-power flows among decentralized energy generation, storage devices and appliances in homes, offices, factories, and neighboring communities. This paper proposes a real-time power supply and demand meditation algorithm based on EoD system. The novelty of our proposed method rests in (i) power allocation based on appliance dynamic priority model (ii) power supply from multiple power sources based on their capacity limitations i.e., load factor profile (iii) multi agent real-time mediation algorithm for efficient management of power.

16:10 *Agent-Based Feedback Control for Fluctuating Power Sources and Loads: Watch TV with PV Power 193*
Saher Javaid (Kyoto University, Japan); Takekazu Kato (Shizuoka Institute of Science and Technology, Japan)
The presence of renewable energy sources with large power variations, dynamic power consumption behaviors of appliances, and power usage patterns of storage battery yield in development of sophisticated power control with diverse and versatile components. Our proposed agent-based feedback control method can manage power flow streams with diverse characteristics e.g., the power generated by a photovoltaic is characterized by power fluctuations and available time periods. A power with dynamic fluctuations can directly flow into load without effecting other power flows. Consequently, we are able to use variety of power sources with diverse characteristics.

16:25 *Influence of Packetized Electric Power Transmission on Radio Wave Environment 195*
Hisayoshi Sugiyama (Osaka City University, Japan)
Influence of packetized electric power transmission on radio wave environment is investigated. In contrast to conventional power transmission with continuous electric current of low frequency sine wave, packetized power transmission may affect surrounding field with high frequency radio noises. In this paper, based on the analysis of electric field strength around a power line, the radio noises generated by various packetized power transmissions are evaluated. Pulse trains in synchronized frame structure of pulsed power network is adopted as the power packet signals. As the results, though the total of generated radio power exceeds that of conventional power transmissions, peak strength of electric field rather falls behind the conventional one.

16:40 *FPGA Based Emulator for Half-bridge Inverters Operated in Stand-alone Mode 197*
Triet Nguyen-Van and Eri Maeda (The University of Tokyo, Japan); Rikiya Abe (the University of Tokyo, Japan)
This paper presents a real-time emulator for single-phase half-bridge inverter operated in stand-alone mode. The discrete-time model used to emulate the inverter is derived by discretizing the three characteristic differential equation of the inverter. The emulator is implemented on high-speed FPGA (Field Programmable Gate Array), which enable FPGA based digital controller be evaluated by a real-time simulator system in the early development process. Experiment results show that the proposed emulator yields voltage, and current responses, which match with that of the realistic inverter circuit almost exactly under the same digital controller.

16:55 *Toward Implementing Power Packet Networks 199*
Hiroki Nakano and Yasuo Okabe (Kyoto University, Japan)
"Power Packets" are one of useful ideas of power distribution for a highly-efficient and comfortable society with a low environmental impact and energy efficient systems. It has yet to be shown that it is feasible to generate physical electric power packets and control them with computers. This study aims to organize the past achievements from the point of view of our studies. This study offers a map for the studies of Power Packets and suggests a direction for new studies in this area.

17:10 *Blockchainbased electricity trading with Digitalgrid router 201*
Kenji Tanaka (the University of Tokyo, Japan)
As decentralized renewable energy has been installed into the present grid, millions of consumers and prosumers interacting each other over power grid. The variety of needs for exchanging energy would arise based on each customers' situation. The future electricity grid should be a bi-directional system with interconnected using distributed energy management software. Being able to provide a secure and decentralized control to these autonomous, peer-to-peer exchanges is one of the biggest challenges. We propose to use Blockchain-based electricity trading system with Digitalgrid router as an underlying platform because it could fit these requirements. Digitalgrid router, which consists back-to-back bi-directional digital inverters with

Monday, June 12, 17:40 - 18:20

K3: Keynote Speech III, National Taiwan University of Science and Technology Prof. Jing-Ming Guo

Room: Lecture Hall
Chair: Pei-Jun Lee (National Chi Nan University, Taiwan)

Monday, June 12, 18:30 - 21:00

Welcome Reception (GIS Taipei Tech Convention Center)

Room: Social Event

Tuesday, June 13

Tuesday, June 13, 09:00 - 09:50

K4: Keynote Speech IV: ASE Group Dr. William T. Chen

Room: Lecture Hall
Chair: Jwo Shiun Sun (National Taipei University of Technology, Taiwan)

Tuesday, June 13, 09:50 - 10:10

Coffee Break

Room: Break Area

Tuesday, June 13, 10:10 - 12:00

Session D1: Multimedia Signal Processing and Implementation (I)

Room: 201
Chairs: Chih-Yang Lin (Yuan Ze University, Taiwan), Pei-Yu Lin (Yuan Ze University, Taiwan)

10:10 ***Approximate Functional Testing for Image Applications Based on Error-Tolerance 203***
Tong-Yu Hsieh, Tai-Ang Cheng and Chao-Ru Chen (National Sun Yat-sen University, Taiwan)
Error-tolerance is a notion that focuses on evaluating the acceptability of errors by considering the insensitivity of human beings to minor vibrations in multimedia applications. In this paper we will show that this notion can relax the functional test requirements of a target circuit. Rather than finely grading the quality of the output results as conventional methods do, we only need to decide if the circuit is acceptable or not. We refer to this notion as approximate functional testing in this paper. This notion can lead to great reduction in test time and thereby the test cost. Cost-effective hardware implementation of an on-chip quality monitor circuit can also thus be enabled for evaluating the dependability of the circuit. In this paper a flow will be presented to describe how to carry out approximate testing. A case study on image applications will also be provided to illustrate the flow.

10:25 ***Keyboard recognition from scale-invariant feature transform 205***
Ming-Te Chao and Yung-Sheng Chen (Yuan Ze University, Taiwan)
Based on the scale-invariant feature transform, this paper presents an approach to keyboard recognition. Not only the skewed keyboard can be corrected, but also the keys in the keyboard can be located. Experimental results confirm the feasibility of the proposed method.

10:40 ***An Iterative Superpixel Algorithm based on Color Variances and Cross Seams 207***
Ching-Chi Huang and Liang-Yu Tai (National Taiwan University Of Science And Technology, Taiwan); Chang Hong Lin (National Taiwan University of Science and Technology, Taiwan)
In this paper, we proposed a seam carving based refinement method to refine and produce superpixels. The proposed method can refine existing superpixels by repeating the splitting process. There are two major steps. The first is choosing a superpixel candidate by analyzing color variances; the second is splitting a superpixel into 4 by dynamic programming. The experimental results show that the proposed method can achieve higher accuracy compare to original methods in the same number of superpixels.

10:55 ***Secret Sharing based on Part-Based Factorization for Chinese Characters 209***
TsungYi Huang (National Chung Hsing University, Taiwan); Chih-Yang Lin (Yuan Ze University, Taiwan); Min-Kuan Chang (National Chung Hsing University, Taiwan); Chia-Chen Kuo (National Applied Research Laboratories, Taiwan)
In this paper, we propose a new secret sharing method for Chinese characters based on non-negative matrix factorization (NMF). Chinese characters can be regarded as binary images, but traditional NMF is only suitable for gray-level images. Therefore, this paper proposes a modified version of NMF for dealing with Chinese characters in binary images. The modified NMF decomposes a Chinese character into several parts, making each part unreadable to ensure that secrecy can be preserved. Experimental results show the decomposed results and the feasibility of the proposed method.

11:10 ***Data hiding using visual secret sharing and joint fractional Fourier transform correlator 211***
Hsuan-Ting Chang (National Yunlin University of Science and Technology, Taiwan); Qian Zhen (Yangzhou University, P.R. China); Chien-Yi Lu (National Yunlin University of Science and Technology, Taiwan)
In this paper, we combine the visual secret sharing (VSS) scheme and the fractional Fourier transform (FrFT) to propose a new data hiding method. The cover and hidden images are used together to generate the two sharing data based on the VSS scheme. Then the FrFTs are applied to the sharing data to further encrypt them. To reconstruct the hidden image, both the two sharing data and the correct fractional order are required. The computer simulation results verify the effectiveness of the proposed method.

11:25 ***Blind Image Restoration for Blurred Images Implemented on GPU 213***
Tomio Goto, Shota Otake and Satoshi Hirano (Nagoya Institute of Technology, Japan)
In this paper, we use a restoration method that rapidly restores blurred images using local patches proposed. The computation time is significantly reduced by that method, but it is not yet a practical. Therefore, we propose to accelerate by implementing the image restoration processing on GPU. By measuring the processing time of the image restoration, we show the superiority of the use of GPU than CPU.

11:40 ***Efficient Intra Transform Unit Partitioning for High Efficiency Video Coding 215***
Zong-Yi Chen, Hui-Yu Jiang and Pao-Chi Chang (National Central University, Taiwan)
This paper proposes an efficient method for accelerating Transform Unit (TU) depth decisions based on the rough mode cost (RMC), which is the simplified rate-distortion (RD) cost during the rough mode decision (RMD), in HEVC intra coding. The TU partition of the mode with the minimal RMC is used to determine the TU partitions of remaining intra modes. The proposed TU partitioning method improves RD performance as well as reduces the encoding time; it demonstrates greater performance than the default method in reference software.

Session D2: Communication and Information Technologies for Future Network Systems (I)

Room: 202
Chair: Takuji Tachibana (University of Fukui, Japan)

10:10 ***Robust Secure Beamforming for SWIPT Systems with Full-Duplex Receivers and Energy-Harvesting Eavesdroppers 217***
Zhixiang Deng, Yuan Gao, Wei Li and Cai Chang chun (Hohai University, P.R. China)
In this paper, we consider a simultaneous wireless information and power transfer (SWIPT) system with a full-duplex (FD) receiver and an energy-harvesting (EH) eavesdropper.

The FD receiver decodes the information that should be kept secret from the EH eavesdropper and sends jamming signals to degrade the eavesdropper simultaneously using the energy it harvests from the source. An optimization problem is formulated to maximize the worst-case secrecy rate taking into account the eavesdropper channel uncertainties. A SDR-based method is proposed to solve this problem. Numerical results are given to show the superiority of our proposed scheme.

10:25 ***Multi-Wavelength Laser Based on SOA and Polarization Maintaining Fiber for WDM Systems 219***
Chung-Hong Lai, Wei-Chieh Tang, Mekuanint Agegnehu Bitew, Run-Kai Shiu, Yibeltal Chanie Manie and Peng-Chun Peng (National Taipei University of Technology, Taiwan)
In this paper, we have proposed and demonstrated a multi-wavelength laser source based on a semiconductor optical amplifier (SOA) with fiber laser loop. The fiber laser loop serves as a filter element to determine the output wavelengths. The loop is composed from a polarizer (P), polarization controller (PC), polarization maintaining fiber (PMF) and mirror. Experimental results revealed that a stable multi-wavelength lasing with 0.27 nm wavelength spacing is achieved at room temperature. Moreover, the proposed method is cost effective compared to the previously proposed schemes.

10:40 ***Collaborative in-network caching for multi-path routing 221***
Yuta Miyoshi, Takuya Wada and Kouji Hirata (Kansai University, Japan)
This paper proposes a collaborative in-network caching method for multi-path routing. In-network caching allows routers in networks to store contents in their caches and users can download the contents from the routers in addition to content servers. In such a situation, the proposed method introduces a joint optimization problem of in-network caching and multi-path routing, which is formulated as linear programming. The in-network caching problem decides location of contents and the multi-path routing problem decides multiple routing paths to download the contents. Through numerical experiments, we show that the proposed method efficiently reduces the loads of congested links.

10:55 ***Multi-Wavelength Generation Based on RSOA for Passive Optical Networks 223***
Jack Junior Imbu, Mekuanint Agegnehu Bitew, Chen-Hsien Chang, Wei-Chieh Tang, Yibeltal Chanie Manie and Peng-Chun Peng (National Taipei University of Technology, Taiwan)
This paper presents wavelength-generating scheme using reflective semiconductor optical amplifier (RSOA) and delay interferometer (DI). The proposed method presents simplified multi-wavelength generation by establishing promising laser structure incorporating fiber coupler, an optical circulator, bandwidth variable tunable filter and delay interferometer. The gain medium leapfrogs intrinsic properties of RSOA with the DI and the tunable filter to generate four stable wavelengths at room temperature. Experimental results adequately highlight output stability with the tunable wavelengths and channels spacing within the L-band applicable for passive optical networks (PONs).

11:10 ***High Speed Tunable Filter for Wavelength-Division Multiplexing Communication Systems 225***
Run-Kai Shiu, Wei-Chieh Tang, Mekuanint Agegnehu Bitew, Chung-Hong Lai, Chen-Hsien Chang, Yibeltal Chanie Manie and Peng-Chun Peng (National Taipei University of Technology, Taiwan)
In this paper, a high-speed tunable filter using optical polarization control module is proposed and experimentally demonstrated. The output spectrum of the filter and is obtained and high-speed tuning performance is demonstrated. The proposed filter is cost effective and simple; consisting of polarization controller (PC), polarizer(P) and polarization maintaining fiber (PMF). To testify the high speed tuning effect, the eye diagram and ON/OFF switching performance are measured. Experimental results revealed that the proposed filter is a good candidate to be applied in wavelength-division multiplexing (WDM) communication systems.

11:25 ***Modeling of countermeasure against self-evolving botnets 227***
Koki Hongyo (Kansai University, Japan); Tomotaka Kimura (Tokyo University of Science, Japan); Takanori Kudo (Setsunan University, Japan); Yoshiaki Inoue (Osaka University, Japan); Kouji Hirata (Kansai University, Japan)
Recently, machine learning has been extensively used and achieved significant results in many research areas. On the other hand, machine learning becomes a big threat when malicious attackers make use it for the wrong purpose. As such a threat, self-evolving botnets have been considered in the past. The self-evolving botnets autonomously predict vulnerabilities and evolve by performing machine learning with computing resources of zombie computers, which have high infectivity. In this paper, we consider several models of Markov chains to counter the spreading of the self-evolving botnets. Through simulation experiments, we show the behaviors of these models.

11:40 ***Resource Allocation with Optimization Problems Based on Dual Connectivity and Backhaul Link for Heterogeneous Networks 229***
Gaku Kato and Takuji Tachibana (University of Fukui, Japan)
In this paper, for Heterogeneous networks (HetNet), we propose a resource allocation with optimization problems based on dual connectivity and traffic load on backhaul links. In the proposed method, two optimization problems are constructed; one is for determining the allocation of a base station and frequency slots to each user, and the other is for determining routes for traffic in backhaul. We evaluate the performance of the proposed method for multiple topologies with simulation, and we show the effectiveness of the proposed method.

11:55 ***Optimal Resource Pool Management for Sharable VNFs in Service Chaining 231***
Shuhei Yamamoto and Takuji Tachibana (University of Fukui, Japan)
In this paper, we propose an optimal resource pool management for sharable VNFs in service chaining. In the proposed method, each resource pool is managed to place each VNF in servers for multiple service chains by solving an optimization problem. In the optimization problem, VNFs that are shared by multiple service chains are determined, and an appropriate amount of resources can be used for each VNF. This optimization problem is solved with genetic algorithm. We evaluate the performance of the proposed method with simulation, and investigate the effectiveness of the proposed method by comparing with other methods. Numerical examples show that our proposed method is effective for managing resource pool in service chaining.

Session D3: Communication and Information Systems for Next Generation Internet (I)

Room: 204
Chair: Nobuo Funabiki (Okayama University, Japan)

10:10 ***Adaptive Control of Viscosity in Remote Control System with Force Feedback 233***
Yusuke Komatsu (Nagoya Institute of Technology, Japan); Hitoshi Ohnishi (The Open University of Japan, Japan); Yutaka Ishibashi (Nagoya Institute of Technology, Japan)
In this paper, we propose adaptive viscosity control which dynamically changes the viscosity coefficient according to the network delay for a remote control system in which a user operates a haptic interface device at a remote place by using another haptic interface device while watching video. We first indicate that the optimum viscosity coefficient exists depending on the network delay. Next, we obtain equations which derive the optimum viscosity coefficient from the network delay. Then, we demonstrate the effectiveness of the proposed control by Quality of Experience (QoE) assessment.

10:25 ***Identification of 3D Objects with Haptic, Olfactory, and Auditory Senses in Virtual Environment 235***
Mya Sithu and Yutaka Ishibashi (Nagoya Institute of Technology, Japan)
In this paper, we objectively investigate how much correctly 3D objects can be identified with haptic, olfactory and auditory senses in a virtual environment. We use 16 objects, which are different from each other in shape and softness. Some of the objects have sounds or smells. Assessment results show that how much largely the identification accuracy can be achieved with the help of haptic, olfactory, and auditory senses in the virtual environment.

10:40 ***Hybrid Unicast/Broadcast Transmitter for Next generation Optical Access Networks 237***
Yibeltal Chanie Manie, Mekuanint Agegnehu Bitew, Meng-Hsin Fang, Chung-Hong Lai, Run-Kai Shiu and Peng-Chun Peng (National Taipei University of Technology, Taiwan)
In this paper, a hybrid unicast/broadcast signal transmitter for next generation optical access networks is proposed and experimentally demonstrated. Light waves generated from multiple laser are multiplexing by a multiplexer and fed into a phase modulator (PM). The light waves are modulated by the broadcast signal and a polarization beam splitter (PBS) is employed to separate a carrier from sidebands. Mach-Zehnder Modulator (MZM) modulates the central carrier with a unicast signal. The unicast and broadcast optical signals are combined by polarization beam splitter (PBS) and transmitted through 25 km single mode fiber (SMF). Experimental results revealed that the proposed scheme achieves a very good bit error rate (BER) curve.

10:55 ***Tour Miner: Mining System of Tour Plans from SNS - Smelting Function from Travel Records to Tour Routes - 239***
Shingo Yamaguchi and Takuma Terada (Yamaguchi University, Japan); Bundit Manaskasemsak, Arnon Rungsawang and Pattara Leelaprute (Kasetsart University, Thailand)
We have been developing a system, called Tour Miner, which mines tour plans from SNS. It consists of two functions: mining and smelting. The mining function searches SNS for a given keyword and discovers travel records related to the keyword. The smelting function combines the travel records and extracts tour plans from the combination. In this paper, we elucidated the implementation of the smelting function. It first converts the travel records into a graph by process mining technique, and then gives each path of the graph as a tour route. We also illustrated its usefulness with an application example.

11:10 ***An Offline Answering Function for Code Writing Problem in Java Programming Learning Assistant System 241***
Nobuo Funabiki, Yingxin Wang and Nobuya Ishihara (Okayama University, Japan); Wen-Chung Kao (National Taiwan Normal University, Taiwan)
In order to promote Java programming educations, the Web-based Java Programming Learning Assistant System (JPLAS) has been implemented. JPLAS provides the code writing problem, where students write Java codes that satisfy the given specifications and submit them to the JPLAS server to obtain the marks using test codes instantly. Unfortunately,

JPLAS could be accessed simply when the Internet connections are available. In this study, we perform the offline answering function for the code writing problem for use of JPLAS even in places without the Internet connections. First, the teacher downloads the assignment files from the server and delivers them to the students using USB memories. Next, students solve the assignments on Eclipse including code writing and testing, then submit the results to the teacher. Finally, the teacher uploads the results to the server. To evaluate the proposed function, the questionnaire will be collected after giving five assignments to six students in our group.

Tuesday, June 13, 10:10 - 12:10

Session D4: Advanced Cryptography and Its Applications

Room: 205

Chair: Yasuyuki Nogami (Okayama University, Japan)

10:10 ***A Digital Content Sharing Model Using Proxy Re-Encryption Without Server Access 243***

Tsutomu Yoshida and Masaaki Shirase (Future University Hakodate, Japan)

In this paper, we proposes a digital content sharing scheme using proxy re-encryption, in which we don't need to access any server when sharing content, and a person, who is not owner of a content but shares it from an owner of it, cannot sublet it to other person. We think such property provides an efficient DRM system. Moreover, we provide experimental result of the scheme.

10:25 ***Application of PRBS for Dominant Source Identification Electromagnetic Interference Caused by Digital Integrated Circuits 245***

Chiaki Ishida, Kengo Iokibe and Yoshitaka Toyota (Okayama University, Japan)

Pseudo-random binary sequence (PRBS) was applied to identify the dominant noise source of electromagnetic interference (EMI) radiated from a printed circuit board on which digital ICs were mounted. Amplitude of switching current generated in digital ICs was varied according to PRBS. Correlation coefficient between the temporal variation of EMI strength and PRVS was, then, examined. Results showed that PRBS is applicable to identify a dominant noise source contributing to EMI generation largely.

10:40 ***A Study on a Secure Protocol against Tampering and Replay Attacks Focused on Data Field of CAN 247***

Shunsuke Araki, Akiyoshi Tashiro and Ken'ichi Kakizaki (Kyushu Institute of Technology, Japan); Satoshi Uehara (The University of Kitakyushu, Japan)

In the presented paper, we will show a secure protocol over Controller Area Network(CAN) against tampering and replay attacks. Because a data field in a CAN data frame is at most 64 bits in length, there is a problem that the number of frames increases if security data such as a Message Authentication Code(MAC) is added for data. We will discuss the secure protocol concatenating a part of the MAC value to data where the total length of them is 64 bits.

10:55 ***Multi-value Sequence Generated by Trace Function and Power Residue Symbol Over Proper Sub Extension Field 249***

Md. Arshad Ali (Okayama University, Japan & Hajee Mohammad Danesh Science and Technology University, Bangladesh); Takeru Miyazaki (The University of Kitakyushu, Japan); Yasuyuki Nogami (Okayama University, Japan); Satoshi Uehara (The University of Kitakyushu, Japan); Robert H Morelos-Zaragoza (San Jose State University, USA)

In this paper, the authors have proposed a pseudo random multi-value sequence generated by a primitive polynomial, trace function, k-th power residue symbol, and a certain mapping function over the proper sub extension field. Here, the trace function actually maps an element of the extension field to an element of proper sub extension field, which is actually a vector space. The distribution of numbers within the sequence becomes more balanced by considering the proper sub extension field. In addition, its period and autocorrelation properties also explained with a small example.

11:10 ***Tightly Secure Identity-Based Multisignatures 251***

Naoto Yanai (Osaka University, Japan)

ID-based multisignatures are digital signatures where each signer generates a partial signature with any identity as its own public key and combine them into a single signature as one of a group of signers. In this work, we discuss a tight security reduction of an ID-based multisignature scheme, which is an open problem in this work. Here, a tight reduction means that a reduction cost in a security proof is independent of a capability of an adversary. Our main idea is to utilize one-more DH assumption, which is an interactive assumption with an oracle to return a CDH instance. It can also support combination of signatures required for constructing multisignatures. Thus, our scheme is fairly practical.

11:25 ***Detecting Falsification to MP3 Audio Signals for Conference Record Using Digital Watermarking 253***

Tomoki Yoshida and Takeru Miyazaki (The University of Kitakyushu, Japan); Shunsuke Araki (Kyushu Institute of Technology, Japan); Satoshi Uehara (The University of Kitakyushu, Japan); Yasuyuki Nogami (Okayama University, Japan)

In this paper, we will propose a digital watermarking for voice signals recorded by a digital voice recorder especially in conferences. We will discuss some requirements for detecting falsifications in the voice signal, because the conference record has the probability that a conclusion is changed for only a falsification in a little time interval. Next, we will show a method of locating an altered place in the voice signal and a new idea applying a white Gaussian noise for guarantee of the valid voice signal without falsification. One characteristic of our proposal is an agitation depending on a peak spectrum for making it difficult to illegally change the embedded watermark.

11:40 ***Generic Identification Protocols by Deploying Secret Unknown Ciphers (SUCs) 255***

Wael Adi (Technical University of Braunschweig, Germany); Ayoub Mars (Technische Universität Braunschweig & Institut für Datentechnik und Kommunikationsnetze, Germany); Saleh Mulhem (Technical University Braunschweig, Germany)

Secret Unknown Ciphers (SUCs) were first introduced in [1]. Such ciphers are self-created, basically unknown ciphers within a permanent digital self-reconfiguring unit. Such self-reconfiguring non-volatile structures are expected to be available in the near future. The authors approached quite promising concepts for realizing such ciphers in Microsemi non-volatile self-reconfiguring FPGA units. This work presents two generic protocols for physically identifying units incorporating such SUCs as clone-resistant System-on-Chip (SoC) entities in open networks. A broad spectrum of applications in consumer and vehicular units is expected when deploying such ciphers resulting with low-cost, clone resistant or even possibly unclonable units. The technique allows manufacturer-independent personalization of SoC units having non-volatile technology such that it is possible to achieve commercially-efficient and "pragmatic" clone-resistant units by SUCs to protect intellectual property rights and counteract cloning-attacks. The SoC units are "mutated" irreversibly into unique physical entities, such that cloning them becomes commercially useless as break-one break-all in such technology does not work. Each unit requires to be attacked individually, thus frustrating attackers as paying for a legal device becomes always cheaper than cloning it.

Tuesday, June 13, 10:10 - 12:00

Session D5: Intelligent Video Analytics to Smart Living Applications by Internet of Things

Room: 302

Chair: Bing-Fei Wu (National Chiao Tung University, Taiwan)

10:10 ***Application of Intuitive Mixed Reality Interactive System to Museum Guide Activity 257***

Ko-Fong Lee and Yen-Lin Chen (National Taipei University of Technology, Taiwan); Hsiang-Chin Hsieh (Institute for Information Industry, Taiwan); Kai-Yi Chin (Aletheia University, Taiwan)

The old museum guide modes use phonetic system or traditional artificial guide, failing to combine the virtual information into the real world, and the artificial guide sometimes needs a great deal of manpower. Therefore, this study aims to develop a mixed reality interactive system with gesture recognition technique, and combines smart phone with Cardboard to generate the mixed reality guidance service, so as to provide an intuitive museum guide mode. This new technological application mode is expected to enable people to obtain the required information from the real environment in easier ways, so that the users can perform intuitive interaction with the 3D object and feel their personally on the scene. This system is expected to be integrated and introduced into different application contexts in the future, to be popularized to different research areas and related industries.

10:25 ***A GA-based Resource Management Algorithm for Smart Living Applications Requiring Intensive Computing Power 259***

Yu-Lun Huang and Zong-Xian Li (National Chiao-Tung University, Taiwan)

When running smart living applications requiring intensive computing power in a cloud, a proper resource management algorithm is required to guarantee the performance of the applications. The paper presents a Genetic Algorithm (GA) based resource management algorithm, GASdv2, for allocating cloud-based virtual machines on physical machines. GASdv2 analyzes the utilization of hardware resources (CPU, memory, etc.) and generates an optimized distribution strategy to obtain better performance of the cloud running applications that requires intensive computing power and/or memory capacity.

10:40 ***Front Object Recognition System for Vehicles Based on Sensor Fusion Using Stereo Vision and Laser Range Finder 261***

Kai-Quan Zhong (National Sun Yat-senUnisersity, Taiwan)

This paper proposes a front object recognition system for the safety of driving, which is based on sensor fusion with laser range finder and stereo vision. The study utilizes a stereo vision system for objects detection. Since the calculation time of the stereo vision algorithm is too long, in order to detect objects immediately, a laser range finder is integrated to improve the calculation time and detection accuracy. On the completion of the detection stage, the support vector machine is used to recognize the objects. The experimental results show that the objects detection system yields an accuracy rate of 95%.

10:55 ***Gender Recognition Technology of Whole Body Image 263***
Hsuan Hung Liu (National Taiwan University of Science and Technology, Taiwan)
There are numerous potential applications for the Internet of Things (IOT) at the present stage. In the topic of image processing, the gender recognition usually adopts face information to identify the gender of a person. Therefore, if the input image loses face information, it will result in the wrong identification result. In this paper, we proposed a multiple-attributes (MA) recognition method. Not only facial parts, but also use gender of wearing characteristic for gender identification. The paper also develop an automatic segmentation algorithm to locate the wearing characteristic. The objects features will be effectively extracted, and classified into some object attributes by classifier. Finally, the attributes are given to the corresponding weights to obtain male scores and female scores. According the gender scores to determine the gender of people. This paper has multiple-attributes (MA) to solve the defects of the face attribute recognition.

11:10 ***Scalable Face Image Compression Based on Principal Component Analysis and Arithmetic Coding 265***
You-Ran Liu (University of Taipei & National Taipei University of Technology, Taiwan); Lih-Jen Kau (National Taipei University of Technology, Taiwan)
In this paper we propose a scalable face image compression algorithm based on Principal Component Analysis (PCA) and Entropy Coding. By using PCA and some training face image patterns, we can extract the most representative eigen-image of human faces. To reduce the coding complexity as well as to achieve a higher compression ratio, only the first term of the extracted eigen-images will be used for the encoding of the human face, i.e., only the eigen-image with maximal energy strength will be selected for the encoding process. As we will see in the experiment that a good trade off between the computation complexity, compression ratio, and image quality can be achieved with the proposed algorithm.

11:25 ***Shopping Assistance and Information Providing Integrated in a Robotic Shopping Cart 267***
Hsin-Han Chiang (National Taiwan Normal University, Taiwan); Yen-Lin Chen, Chi-Hong Wu and Lih-Jen Kau (National Taipei University of Technology, Taiwan)
This paper presents a robotic shopping cart for a shopping mall to provide shopping assistance and information. When customers login to the shopping cart system, the information providing is first started to provide directions and recommendations of the shopping mall. In addition, the robotic shopping cart is developed to be autonomous returning to starting position while customers logout from the service screen. Finally, the purchase record of customers can be send to the centralized system of shopping mall for further analysis of various shopping behaviors.

T1: Tutorial: ASE Group

Room: Lecture Hall

Tuesday, June 13, 12:00 - 13:00

Lunch

Room: Lunch Area

Tuesday, June 13, 13:00 - 14:30

PA: Poster Session A

Room: Poster Area
Chairs: Hsia Chih-Hsien (Chinese Culture University, Taiwan), Masahiro Tanaka (Konan University, Japan)

Guiding robot at entrance of university library 269
Masahiro Tanaka, Kodai Okada and Masahiro Wada (Konan University, Japan)
The authors and the students in the group have been developing a unique robot used in the university campus. The base of the robot is Segway RMP 200, which was used for the research of localization. Now it is mainly used at the entrance hall of the library for showing various useful information of the library and to attract the visitors to the robot technology. Although the software is replaced every year, we almost have achieved the automatic operation without human aid. In this paper, the robot is briefly surveyed, and the coming new function in the near future will be mentioned.

Design and Implementation for an Automotive DOA System 271
Ching-Long Su, Zih Ying WU and Bo Chen (National Yunlin University of Science and Technology, Taiwan)
In order to solve the problem of traffic accidents that caused by drivers and passengers open the door abruptly, this paper proposes a door open alarm (DOA) system that uses the camera as the sensor, and applies two analog cameras that set at the both side view mirrors to get the video information. This paper is based on image processing to develop the algorithm and has been implemented on Renesas®R-Car developed platform that built in ARM®Cortex-A15 dual-core and clock rate is 1.5 GHz. The DOA system can detect closing targets in 20 meters of the rear vehicle immediately, and the frame rate is 30 frame per second (FPS). The detection rate in day and night is 98.04% and 96.15%.

Design and Implement of A Multifunctional Image Keying System 273
Yi-Hsin Liu, Jian-Jie Ciou, Siou-Hong Liou and Cheng-Yuan Chang (National United University, Taiwan)
Image matting is one of the most common image processing techniques, because it is often necessary to extract the desired foreground object from the original image and then to composite the extracted foreground with the another background. Over the years, there have been lots of commercial image processing tools or softwares which can support the human beings this function, such as photoshop, photoimpact and so on. However, it seems not very easy to use these tools, especially for most beginners who are not familiar with them. Moreover, these softwares usually require payments from the users. In view of the above issues, a multifunctional image keying system which can provide two main functions: image composite and image matting for free and without complicated operations is proposed in this paper. The proposed system is mainly implemented by utilizing the closed form matting method and the trimap which the users simply and roughly provide, thus it can make the users achieve the purpose of performing the operations of the image matting and composite easily and quickly.

Spatial-Domain Edge-Directed Interpolation Based De-interlacing to Up-scaling Technology for 1080i Full HD to Progressive 8K Ultra HD 275
Yu-Ming Chang and Chih-Peng Fan (National Chung Hsing University, Taiwan)
In this paper, an effective edge-directed low-complex interpolation based method is proposed for 1080i Full HD to Progressive 8K Ultra HD video post-processing. The proposed spatial-domain post-processing technology is composed of two processing stages, where the first stage is the three-scan lines based de-interlacing process for 1080i Full HD to 1080p Full HD conversion, and the second stage is the de-interlacing based upscaling process for 1080p Full HD to 8K UHD conversion. First, the proposed pixel detector classifies the interlaced pixels into five modes, which tend to a smooth pixel, a vertical edge, a horizontal edge, a near horizontal edge, or an uncertain status. Then the corresponding de-interlacing methods are used to interpolate de-interlaced pixels for edge preservation. Second, the same de-interlacing scheme is applied to the upscaling process. Simulation results demonstrate that the proposed edge-directed interpolation scheme provides better subjective results than the previous spatial-domain based methods. Moreover, by paying the cost-effective complexities, the proposed method can also achieve the acceptable visually performance for the real-time de-interlacing and upscaling applications.

Design and Product Implementation for an Automotive BSD System 277
Ching-Long Su, Shu-Hong Li, Zih Ying WU and Bo Chen (National Yunlin University of Science and Technology, Taiwan)
This paper proposes a vehicle blind spot detection (BSD) system to reduce the traffic accident when car was changing lanes on the road. The cameras are installed at the bottom of the left and right side view mirrors. The system reaches 99% vehicle detection rate and is applicable during daytime and nighttime without high-cost radar. Furthermore, the system integrates with functions of auto cycle video recording, side view and so on. The system is set with Sunplus®SPHE6700 and achieves real-time detection at 30 frame per second (FPS) with CORTEX®A9 dual-core @1GHz and accomplishes production and sales with TOYOTA® Altis.

Effective memory management for improving image processing on smartphones 279
Shih-Jie Chou (Instrument Technology Research Center, NARLabs, Taiwan); Rui-Cian Weng and Chun-Li Chang (Instrument Technology Research Center, National Applied Research Laboratories, Taiwan); Tai-Shan Liao and Chi-Hung Hwang (Instrument Technology Research

Session E1: Intelligent Devices, Systems, and Algorithms for Real-life Applications (I)

Room: Lecture Hall

Chairs: Tsung-Che Chiang (National Taiwan Normal University, Taiwan), Shih-Shinh Huang (National Kaohsiung First University of Science and Technology, Taiwan)

13:00 ***Color Image Enhancement Using Histogram Equalization Method without Changing Hue and Saturation 305***

Su-Ling Lee (Chang-Jung Christian University, Taiwan); Chien-Cheng Tseng (National Kaohsiung First University of Science and Technology, Taiwan)

In this paper, a color image enhancement method is presented by using intensity histogram equalization (HE) approach without changing hue and saturation in HSI color space. The proposed method has better visual colorfulness than the conventional HE method because hue and saturation are preserved in the enhancement process. The back-lighting image and night-time image are used to demonstrate the effectiveness of the proposed color image enhancement method.

13:15 ***Removing Blue Screen Background under Non-uniform Illumination 307***

Ching-Hung Teng, Yun-Hsuan Liao, Yi-Chia Chou and Sih-Yu Lin (Yuan Ze University, Taiwan)

In this paper, we develop a system to remove the background of an image captured in a blue screen environment under non-uniform illumination. We first collected some images as the training data and applied a watershed segmentation to extract a number of coherent regions from these images. With these extracted regions, two mixed Gaussian models for the foreground and background are trained using an expectation-maximization (EM) algorithm. With the trained models, for each input image we first segment the image using the watershed segmentation algorithm and then predict the associated foreground/background label for each extracted region. Finally, the regions labeled as background are removed. Some experiments were conducted and the results showed that the proposed system performs better than traditional chroma keying technique.

13:30 ***Environmental/Economic Dispatch using an Adaptive Multiobjective Differential Evolution Algorithm 309***

Zhong-Yi Lin, Chen-Yu Lee and Tsung-Che Chiang (National Taiwan Normal University, Taiwan)

This paper addresses the environmental/economic dispatch (EED) problem, which aims to minimize the fuel cost and emission of pollutants in a power generation system. We propose an adaptive multiobjective differential evolution algorithm to solve the problem by seeking for the set of Pareto optimal solutions. Performance of the proposed algorithm is verified by comparing with recent algorithms using two public test systems. Experimental results show that the proposed algorithm has competitive performance.

13:45 ***An ISM-Band Frequency-Discriminator-Based Vital Sign Radar 311***

Chan-Hung Lee and Kang-Chun Peng (National Kaohsiung First University of Science and Technology, Taiwan)

In this paper, an ISM band single-antenna radar is proposed to detect vital sign, which is useful in numerous medical applications. Our radar system is based on a frequency discriminating transceiver. The transceiver utilizes a circulator with high isolation to isolate the transmitted voltage-controlled oscillator (VCO) signal and received Doppler signal. After mixing both signals, the heartbeat and breathing signals of human can be detected. Our experimental results demonstrate that the system can successfully detect human vital signs.

14:00 ***Parallelization of Hough Transform for High-Speed Straight-Line Detection in XGA-Size Videos 313***

Jungang Guan (HIROSHIMA University, Japan)

This paper reports a hardware architecture for Hough transform (HT) implementation on an FPGA with parallelized voting procedure. A DE4 platform with a Stratix-IV FPGA device has been applied to synthesize a prototype system. Average processing speed of 5.4 ms per XGA-frame at 200 MHz working frequency is achieved for the application of road-lane detection.

Session E2: Multimedia Signal Processing and Implementation (II)

Room: 201

Chairs: Chih-Yang Lin (Yuan Ze University, Taiwan), Pei-Yu Lin (Yuan Ze University, Taiwan)

13:00 ***A DPM based object detector using HOG-LBP features 315***

Tanase Cucliciu (Asia University, Taiwan); Chih-Yang Lin (Yuan Ze University, Taiwan); Kahlil Muchtar (National Sun Yat-Sen University, Taiwan)

In this paper, we combine Histogram of Oriented Gradients (HOG) and Local Binary Pattern (LBP) in order to detect the cranium and its components; namely, the brain, eyes and mouth. Furthermore, Deformable Part Model (DPM) algorithm is paired with the AdaBoost for training and classification. We use a CT/PET database acquired from the National Biomedical Imaging Archive (NBIA) in order to train and test our solution.

13:15 ***A Hue-Based Quad-Tree Method for Color Image Segmentation 317***

Ken-Chung Ho and Chia-Lung Hung (National United University, Taiwan)

Image segmentation is an important technique in image processing. It be used for separating the objects or foreground from the background. This paper focuses on the split step of a split-and-merging approach for color image segmentation. For splitting, we propose a quad-tree method based on hue angles (QTHA). The QTHA introduces a novel metric criterion for measuring hue homogeneity within a block in the quad-tree. The homogeneity is guaranteed by monitoring the within-block parameters, such as angle difference, saturation radius, and light difference. Experimental results show that compared with a conventional method working on the RGB space, the QTHA is more consistent with the human visual perception and provides the segmentation that is more accurate.

13:30 ***Robust OLED displays dimming algorithm based on visual perceptual analysis techniques 319***

Kyle Shih-Huang Lo and Chia-Hung Yeh (National Sun Yat-Sen University, Taiwan); Wen Jung Huang (National Applied Research Laboratories, Taiwan)

Mobile devices have become an indispensable part of our live. Hence, to increase battery life of mobile devices has become a crucial research topic to interdisciplinary fields. In this paper, we propose a subjective-visual-perception-based (SVPB) OLED displays dimming technique to reduce the power consumption when displaying videos on mobile devices. First, we extract the motion vectors (MV) from the video's bitstream and transform it into a saliency map. Then, we formulate a SVPB pixel dimming algorithm to obtain how great of pixel's value can be reduce with respect to its intensity of salience, based on the principle of human visual system (HVS). Finally, a subjective experiment is conducted to determine the parameter in the algorithm to ensure the good visual quality. Experimental results show that our method achieved on average 16% of power-saving.

13:45 ***Enhancing Image Security and Privacy in Cloud System Using Steganography 321***

Wen-Chuan Wu and Shang-Chian Yang (Aletheia University, Taiwan)

Cloud systems are a popular type of Internet-based computing that provides shared digital resources to computers and other devices on demand. Such systems also allow users uploading and offloading data to the cloud by mobile applications. There are some potential security and privacy concerns using mobile devices since cloud systems are usually in a public domain. This paper presents an efficient image protection method to secure the existence of important private images in the cloud by using steganography technique. Experimental results show that the proposed method is able to not only enhance image security but also increase the cloud storage capacity.

14:00 ***Indoor Location Estimation Using BLE Beacon with Multiple Transmission Power Levels 323***

Min-Kun Sie and Chih-Hung Kuo (National Cheng Kung University, Taiwan)

In this paper, we introduce an indoor location estimation method based on the Bluetooth low energy (BLE) beacon. Beacons are advertised at low transmission power level to limit the estimation error. Each beacon point transmits with multiple power levels to increase the utilizing efficiency. We fully take advantage of BLE beacons that are cheap and controllable. Simulation results show that the estimation error of the proposed scheme is less than a meter.

14:15 ***Non-photorealistic Rendering via Modified Convolutional Neural Model 325***

Kathiravan Srinivasan (National Ilan University, Taiwan); Anant Sharma and Avinash Ankur (LNMIIT Jaipur, India)

For eons, the human kind has been motivated by art. Art is a method to express the feelings of its creator and usually is a combination of the subject matter and the design in an image. The convolutional neural network is a powerful tool able to extract the key and meaningful features from images. Here we try to use the neural network to extract the features from an art and merge it with the content of another image.

14:30 ***Rating Realism Assessment for Computer Generated Imagery 327***

Wen Jung Huang (National Applied Research Laboratories, Taiwan); Chia-Hung Yeh (National Sun Yat-Sen University, Taiwan); Chia-Chen Kuo (National Applied Research Laboratories, Taiwan); Yuan-Chen Cheng (National Sun Yat-sen University, Taiwan); Jia-Ying Lin (National Sun Yat-Sen University, Taiwan)

Computer-generated imagery (CGI) is more and more often integral to a movie's story and appeal, which dominates the film's success at the box office. The realism of CGI is now evaluated by post-production supervisors and few objective realism assessments focus on this area. This paper investigates enhanced feature learning and classifier training for CGI assessment by deep learning. A training set selection method is proposed to select proper samples, which is very important to deep learning training. Then, the selected samples are converted into entropy images to strengthen their features. We adopt a convolutional neural network to allow feature learning and classifier training to estimate the realism of CGI. Experimental results show that the developed matric has acceptable accuracy when compared to the grout truth. In addition, the rating result of the proposed

assessment is very close to that of human visual perception.

14:45 ***Real Time Validating the Accuracy of Physiotherapy Exercises 329***
Nghia Vo (University of Science, HoChiMinh city, Taiwan); Tuan Tran (University of Science, HoChiMinh city, Vietnam); Viet-Hang Duong and Jia-Ching Wang (National Central University, Taiwan); Pham The Bao (HCMUS, Vietnam)
Physical therapy involves exercising and manipulating the body as a cost-effective treatment to improve mobility and relieve pain. In this paper, we develop a system to depend on some defined features from sample exercises and compare with the derived features from repeated exercises. The comparison results will reflect the benefit of these exercises and determine plan treatment for a patient. A physical therapy department from a medicine university provides our experimental database. By the Kinect toolkit, our algorithm sends the accuracy of about 90% for each physical therapy exercises.

Session E3: Communication and Information Technologies for Future Network Systems (II)

Room: 202
Chair: Takuji Tachibana (University of Fukui, Japan)

13:00 ***Efficient Content Sharing Using File Segmentation and Relocation in Peer-to-Peer Networks 331***
Yu Fujita and Shinji Sugawara (Chiba Institute of Technology, Japan)
Recently, digital content sharing over peer-to-peer (P2P) network has been attracted. We proposed some methods that divide each content item into small blocks and allocates them on hybrid P2P network, and relocate and replicate the blocks for efficient content retrieval. This paper improves the method by avoiding an excessive content dispersion and removing unattractive content items frequently to reduce network load and content loss. Also, we showed the effectiveness of the proposal by computer simulations.

13:15 ***Node Density Estimation Using Sparsely Deployed Access Points 333***
Akira Noguchi and Tomotaka Kimura (Tokyo University of Science, Japan); Yoshiaki Inoue (Osaka University, Japan); Kouji Hirata (Kansai University, Japan); Masahiro Muraguchi (Tokyo University of Science, Japan)
In this paper, we propose a node density estimation method in intermittently connected mobile ad-hoc networks. We consider situations where mobile nodes do not know location information about their positions. Under the situations, the proposed method estimates the node density using sparsely deployed access points. These access points broadcast inspection packets by mobile nodes relaying. After the access points receive the inspection packets, the node density is estimated based on the received packets. Through simulation experiments, we show that the proposed system provides a good approximation of the node density.

13:30 ***Experimental Evaluation of Mobility Management in ID/Locator Separation Networks and Dynamic Control of Maximum Transmission Rate 335***
Farhanah Ibrahim (University of FUKUI, Malaysia); Hathairat Pinitsuwan (Srinakharinwirot University, Thailand); Yurie Shirosaki and Takuji Tachibana (University of Fukui, Japan)
In this paper, we construct an experimental system to investigate the mobility management with HIMALIS architecture for campus network environments. We also propose a dynamic control of maximum transmission rate for ID/Locator separation networks HIMALIS. In the proposed method, the maximum transmission rate changes dynamically as the utilization time of corresponding communication session increases, and when the corresponding locator changes. From the experimental results, we found that the mobility management is effective even for campus network environments, and transmission rate can be suppressed by using our proposed dynamic control method to encourage user's movement.

13:45 ***Robustness-based Resource Trading with Optimization Problem for Network Slicing 337***
Syouta Fukuhara and Takuji Tachibana (University of Fukui, Japan)
By using network slicing based on network virtualization technology, network slices are constructed by considering quality of each service and the constructed network slices are operated as a dedicated network. By using network resources such as CPU, memory, bandwidth appropriately, several kinds of services can be provided flexibly in physical networks. Here, the network slice usage varies frequently, and hence it is indispensable to change the amount of network resources for each network slice. Therefore, in this paper, we propose a resource trading where network resources can be traded between multiple network slices. In the proposed method, the optimal resource trading are performed based on both costs for trading network resources and quality of services. Especially, we formulate an optimization problem that can minimize the total cost under the constraint condition for quality of services, and the network trading is performed by solving the optimization problem. We evaluate the performance of the proposed method with simulation, and in numerical examples we show the effectiveness of the proposed method.

14:00 ***A Distributed Dual-Ring Tree Algorithm for Bluetooth Networks 339***
Chih-min Yu (Chung Hua University, Taiwan); Meng-Lin Ku (National Central University, Taiwan); En-Li Lin (Chung Hua University, Taiwan)
In this paper, a distributed Dual-Ring Tree scatternet formation is proposed to generate a reliable topology for Bluetooth networks. To mitigate the formation complexity, each root distributively connects with its downstream roots with local topology instead of global nodes information, instructs them to connect together, and generates a desired dual-ring subnet via distributed computation with three predefined parameters c, r1 and r2. Each root then serves as a coordinator to construct its own spanning tree subnet, finally creating a reliable Dual-Ring Tree scatternet. Computer simulation shows that the distributed Dual-Ring Tree method outperforms the conventional BlueHRT in throughput performance for Bluetooth multi-hop networks.

14:15 ***Packet Transmission Scheduling against Long-term Deteriorating Channel Condition for Enhancing TCP Throughput in Wireless LAN 341***
Yosuke Tanigawa, Shiori Yoshioka and Hideki Tode (Osaka Prefecture University, Japan)
In wireless LAN, low channel utilization is a serious problem. We have proposed some packet transmission scheduling methods that improve channel utilization by transmitting packets at as high rate as possible through preferential scheduling of packets in proper wireless condition, compared with an existing approach that uses lower transmission rate according to the channel fading around receiver stations. However, in the scheduling methods, enough TCP throughput is not achieved to stations in long-term deteriorating channel condition. Therefore, this paper proposes a new packet transmission scheduling method that allocates transmission opportunities to stations in long-term deteriorating channel for sufficient compensation for interrupted transmission, and demonstrate its effectiveness.

Session E4: Communication and Information Systems for Next Generation Internet (II)

Room: 204
Chair: Nobuo Funabiki (Okayama University, Japan)

13:00 ***Fault Tolerant Calculation Method of Predicting Road Condition for Network-Connected Wheelchair 343***
Kazuyuki Kojima and Jun'ichi Kaneko (Saitama University, Japan)
This paper handles a fault tolerant calculation method for sensor network. We applied the method to our network-connected wheelchair for the purpose of predicting road conditions. Generally, sensing and communication system has the problem of transient faults in which some nodes suddenly disappear from the network because of network trouble and/or sensor breakage. In the case of the calculation which uses all necessary nodes, this kind of problem makes the calculation failure. In this paper, we propose our Mahalanobis-based method to be able to calculate even when some nodes are disappeared from the network.

13:15 ***An Unsolicited Heat Stroke Alert System for the Elderly 345***
Akihito Yatsuda, Toshiyuki Haramaki and Hiroaki Nishino (Oita University, Japan)
Watching and health care for the elderly are one of promising application fields of IoT. Among them, detecting and preventing indoor heat stroke conditions is a crucial issue. We propose a method for monitoring indoor environment, detecting any risky conditions, and then effectively warning it to the elderly. Since elderly people have different physical weaknesses such as low vision and poor hearing, we designed and developed a system for alerting the elderly through multi-sensory information presentation. It can convey risky situations to the elderly via visual, auditory, and tactile stimuli.

13:30 ***Application of Saliency Map to Restraint Scheme of Attack to Digital Watermark using Seam Carving 347***
Makoto Fujimura (Nagasaki University, Japan); Kousuke Imamura (Kanazawa University, Japan); Hideo Kuroda (FPT University, Japan)
Recent years have witnessed a drastic rise in the number of image content on the Internet. In this context, several digital watermarking techniques have been investigated in order to prevent illegal duplication and distribution of such content. Illegal users in turn attempt to remove digital watermarks from such content, and collusion attacking methods, such as an average value attack, constitute a serious threat to digital watermarks. In previous research, we proposed a restraint scheme of average value attacks, which is one of collusion attacking. By the scheme, a region of interest (ROI) on the image is translated based on seam carving technique. When the image content is done by average value attack, a reconstructed image quality is decreased. But the ROI is located manually on the content. So we applied a saliency map to the scheme for locating ROI automatically. Experiments have been shown good results.

13:45 ***Efficient Content Search Method Using Network Mobile Agents with Sharing Searching Progress 349***
Yumeto Shiraki (Nagoya Institute of Technology, Japan); Shinji Sugawara (Chiba Institute of Technology, Japan)
This paper deals with content searching with multiple mobile agents in the network. Although we previously proposed a scheme, it makes plural agents search the same node

redundantly, and degrades the total search efficiency. In this paper, we propose a novel scheme that a single node supervises the search progress of the agents to avoid duplicative search, and show the effectiveness of the scheme using computer simulations.

Session E5: Intelligent Devices, Systems, and Algorithms for Real-life Applications (II)

Room: 205

Chairs: Chun-Feng Liao (National Chengchi University, Taiwan), Ching-Hu Lu (National Taiwan University of Science and Technology, Taiwan)

13:00 ***On Design Issues and Architectural Styles for Blockchain-driven IoT Services 351***

Chun-Feng Liao, Sheng-Wen Bao, Ching-Ju Cheng and Kung Chen (National Chengchi University, Taiwan)

We can perceive the advent of smart living spaces attributed to the rapid emerging of IoT (Internet of Things) technologies. By combining with the blockchain technology, many innovative business models can be brought into reality. This paper aims to report our recent progress in investigating the architectural issues of realizing blockchain-driven IoT (B-IoT) services. In particular, we first present design issues and then discuss four typical architectural styles for B-IoT services.

13:15 ***An IoT Framework for Intelligent Roadside Assistance System 353***

Soumya Kanti Datta (EURECOM & Co-Founder, Future Tech Lab, France); Christian Bonnet (Institut Eurecom, France)

The connected road infrastructure and roadside assistance services constitute an important consumer market segment in the Intelligent Transportation System (ITS) and Smart Cities. A closer look at available such services reveal the presence of data silos, heterogeneity and lack of interoperability. They affect the overall consumer experience and increase the cost of service development \& maintenance. This paper proposes an IoT framework for next generation, intelligent roadside assistance system. A data centric architecture is presented along with solutions of the mentioned challenges.

13:30 ***Semi-supervised Data Stream Analytics with Balanced Recognition Performance and Processing Speed 355***

Ching-Hu Lu and Chun-Hsien Yu (National Taiwan University of Science and Technology, Taiwan); Bo-Han Chen (Yuan Ze University, Taiwan); I-Shyan Hwang (Yuan-Ze University, Taiwan); Shih-Shinh Huang (National Kaohsiung First University of Science and Technology, Taiwan)

For the upcoming IoT (Internet of things) era, plethora of data from a variety of sensors needs to be processed on a real time basis for improving system responsiveness. Due to the increasing modality of sensors, data streaming analytics to deal with high dimensional data becomes a critical ability. In addition, concept drift also needs to be addressed since an IoT-enabled environment is dynamic in nature. To address the above issues, this study proposed a semi-supervised algorithm of data streaming analytics under concept drift to achieve a tunable balance be-tween the processing speed and the recognition accuracy based on the user needs or application characteristics. In the experiment using a KDD dataset, we found that the proposed method does achieve an expected and promising result.

13:45 ***Fast Music Retrieval with Advanced Acoustic Features 357***

Ja-Hwung Su (Cheng Shiu University, Taiwan); Tzung-Pei Hong and Yu-Tang Chen (National University of Kaohsiung, Taiwan)

Recently, much attention has been paid to music retrieval. Yet, it is not easy to conduct high-performance music retrieval due to the semantic gap. Therefore, this paper presents an effective and efficient method to partially solve this problem. In terms of effectiveness, the acoustic features are improved to increase the precision of retrieval. In terms of efficiency, a depth-first-search strategy is performed to accelerate the retrieval process. The experimental results reveal that the proposed method can achieve higher quality of music retrieval in comparison with the traditional methods.

14:00 ***Development of a Large-Scale Mandarin Radio Speech Corpus 359***

Yung-hsiang Shawn Chang, Yuan-Fu Liao, Sheng-Ming Wang, Jenq-Haur Wang, Sing-Yue Wang, Chen Jhih-Wei and You-Dian Chen (National Taipei University of Technology, Taiwan)

The Taiwan Mandarin Radio Speech Corpus consists of roughly 300 hours (and growing) of audio recordings, selected from Taiwan's National Education Radio (NER) archive. The corpus includes speech from hundreds of speakers and various speech styles (spontaneous conversational and read news). This corpus provides a rich resource for research in speech and automatic speech recognition (ASR). In this paper, we briefly introduce the corpus development approach and report two preliminary experimental results using this corpus.

14:15 ***A Voice-Enabled Android Roll Call System 361***

Ji-Jian Wu and Jia-Yin Wang (Chung Yuan Christian University, Taiwan)

We design a voice-enabled Android roll call system which combines different input methods and voice operation features. Four input methods are provided to make a roll call, 1) name check method, 2) smart Mandarin phonetic method, 3) NFC scan method, and 4) voice input method. The attendances records can be automatically synchronized to the Google spreadsheet. In addition, multiple smart phones can be used to make a roll call simultaneously, which is convenient for outside activities. We combine all these features to make a cheap, flexible and efficient roll call system.

Tuesday, June 13, 14:30 - 18:00

Tour

Room: Social Event

Tuesday, June 13, 18:30 - 21:00

Banquet (La mar'ee, Gongguan)

Room: Social Event

Wednesday, June 14

Wednesday, June 14, 09:00 - 10:40

PB: Poster Session B

Room: Poster Area

Chairs: Wu-Ja Lin (National Formosa University, Taiwan), Chien-Cheng Tseng (National Kaohsiung First University of Science and Technology, Taiwan)

Color Image Sharpening Using DST-Based Matrix Low-Pass Butterworth Filters 363

Chien-Cheng Tseng (National Kaohsiung First University of Science and Technology, Taiwan); Su-Ling Lee (Chang-Jung Christian University, Taiwan)

In this paper, a color image sharpening method is presented by using discrete sine transform (DST) and matrix low-pass Butterworth filters. First, the DST method is used to design matrix Butterworth filters. Then, the un-sharp masking method and the designed matrix low-pass Butterworth filter are employed to develop a color image sharpening algorithm. Finally, Lena digital color image is used to demonstrate the effectiveness of the proposed color image sharpening method.

A Temperature Data Prediction Method Using Graph Filter and Lp-Norm Minimization 365

Chien-Cheng Tseng (National Kaohsiung First University of Science and Technology, Taiwan); Su-Ling Lee (Chang-Jung Christian University, Taiwan); Rui-Heng Su (National Kaohsiung First University of Science and Technology, Taiwan)

In this paper, a temperature data prediction method using graph filter and Lp-norm minimization is presented. First, the graph filter based on graph Laplacian matrix is briefly reviewed. Then, the filter coefficients of the prediction graph filter are estimated from the temperature measurement data by using the Lp-norm minimization approach. Finally,

adopting Delphi study technique. This study invites 15 experts including experienced elementary and high schools teachers, to survey and provide suggestions for this indicator. After three rounds of Delphi study, this study completed 5-level programming competence, including detailed content of indicators, learning and instructional methods, and learning environments. The proposed indicators can be used for formal coding curriculum in schools systematically, and informal education such as self-directed learning or cram schools.

Bidirectional Smart Pill Box Monitored Through Internet And Receiving Reminding Message From Remote Relatives 393

Fuh-Shyang Juang (National Formosa University, Taiwan); Hsiu-Ling Tsai (Chung Hwa University of Medical Technology, Taiwan); Chun Hsiang Tseng and Long-Cian Wang (National Formosa University, Taiwan)

A smart pill box (SPB) for the elderly and nursing homes meets the needs of the market by integrating electronic technology and network functionality. The interactive SPB, which features a particular device that contains embedded sensors in each compartment that not only transmits detected signals to website when users are taking their pills but also receives a remind message back to the LCD screen on SPB by displaying words and/or patterns, or speaking a voice. This study uses the Webduino module installed in SPB to achieve two-way messaging with remote relatives via internet of thing (IoT). The module first reads the sensing signal in the kit and uses WiFi to transmit the signal to WiFi Router, and then sends the medication information to a remote webpage or cell phone for monitoring (on LCD). Remote relatives can input care messages on the webpage or mobile phone to send a signal back to the WiFi Router and then to Webduino module. After receiving the signal, Webduino will send it to Arduino for text display and voice playback in the SPB. Therefore, the elderly staying in their home or nursing home institution can easily manage their medication via this application. The smart interactive pill box will be crucial for medical care management for elder persons of this aging population or in the future.

Development of a Portable Shock Wave Therapy Device Using a PIC Microcontroller 395

Huai-ping Song (National Taipei University of Technology, Taiwan)

This study attempted to develop a lightweight shock wave therapy device. In the platform investigation, the specific characteristics of the shock pulse depend on the common electrical stimulation in physical therapy, the minimum dimensions of the multi-coil accelerator structure, and calculation of the capacitor's discharge energy size for the first single trigger. The combination of the coil firing check protection circuit and the voltage-dividing signal produces a miniaturized continuous toggle-type coil launcher. The ADC and PWM functions in the microcontroller control the value of the main pulse output reference. Analyzing the user-selected frequency can detect the random input offset voltage. Accordingly, a new firmware algorithm is needed to adjust the output energy to fit every kind of launch power. The platform not only can improve safety during processing, but also benefit the commercial products.

Contactless Pulse Rate Measurement Based on Smart TV 397

Shun-Chieh Yu, Yu Chen Lin and Yuan-Hsiang Lin (National Taiwan University of Science and Technology, Taiwan)

Due to the advent of the aging society, homecare is more and more important. In this paper, we design and implement the contactless pulse rate measurement method based on the Android smart TV, which allows the user to measure their pulse rate without requiring of contact sensors. This framework provides a convenient measurement environment for homecare. The results of the experiment show the the presenting error of the worst case is between +3.7 and -1.17 bpm.

Development of an Exercise Management Platform for the Elderly 399

Huai-Kuei Wu (Oriental Institute of Technology, Taiwan); Kuan-Yu Lin (Ling Tung University, Taiwan); Pang-Hsing Liu (Ling-Tung University, Taiwan); Hung Tei Wei and Zhi-Yu Xiao (Oriental Institute of Technology, Taiwan); Jyun-Yuan Chen, Lai Rong-Xiang, Wei-Xiang Wang, Yu-Pei Wang and Zhe-Wei Ye (Ling-Tung University, Taiwan)

Aging is a global issue that affects many countries such as Taiwan. The rapid rise in the elderly population has led to a rise in serious medical problems. Therefore, ways to improve elderly individuals' physical and mental health has become an important topic. This paper suggests an exercise-improvement platform and presents the design of the end-user application software for mobile devices. As elderly individuals exercise in sports centers, data collected during exercise can be uploaded to this platform through the software. In addition, physiological data measured by the individual during exercise at these centers or at home can be uploaded to this platform.

The Development of a Sport Management and Feedback System for the Healthcare of the Elderly 401

Huai-Kuei Wu (Oriental Institute of Technology, Taiwan); Neng-Chun Yu and Chia-Ho Tsai (National Taiwan University of Science and Technology, Taiwan)

Aging and declining birthrate is a common problem faced by modern country, a rapid increase in the proportion of elderly people in society, the lack of the human care and health care system of heavy burden is a serious problem, how to solve these problems is one of the goals of the experts need to work. The natural decline in physical function that is associated with aging leads to an increase in the incidences of a variety of chronic diseases among elderly people. In order to improve the health of elderly people, regular and suitable sport is needed. To enhance the elderly's exercise habits and stable the elderly's condition, this project has multi-faceted through the assistance, try to culture elderly person's exercise habits, including exercise management platform and exercise sharing platform, using a combination of the two aforementioned factors, with the aim of increasing the elderly's participation in sports. By regularly taking part in suitable sports, elderly people may improve their health as well as quality of life.

Analysis on The Difference of Acceptance Between Micro Plastic Surgery and Invasive Plastic Surgery Among Different Groups 403

Shu-Ping Chiu and Li-Wen Chuang (Fuzhou University of International Studies and Trade, Taiwan)

The progress of medical science and technology to extend the average life expectancy of mankind, aging of the times changed the population social structure, health, anti-aging has become a new indicator of future industry. Today's society, everyone emphasizes the importance of self-marketing. According to the research on the plastic surgery of the office worker from 1111 Job Bank indicated that the female has reached as high as 70% approvals to improve her semblance by plastic cosmetic surgery. The rapid development of medical cosmetology has changed the consumers' habit and its market which is mainly based on the salon cosmetology in these years. The medical cosmetology not only influenced the consuming behavior but also compressed the space of salon cosmetology with the help of the medical groups. Recent years the micro plastic surgery has been widely applied to substitute for the traditional plastic cosmetic surgery gradually. The purpose of research investigates the marketability and acceptability of the micro plastic surgery among different demographic variables in Taiwan. The questionnair survey was conducted using a random sampling method, Likert scale was applied and verified that validity KMO is 0.769 and reliability Cronbach' s α Value is 0.8325. All the collected data were statistically analyzed by SPSS for descriptive statistics,an Independent Samples T Test, one-way ANOVA in this study. The results show that only 4.3% of people accept the tradi tional plastic surgery and the micro plastic surgery up to 56.4%. The viewpoints of men and women are similar. Up to 67.5% believe that micro plastic surgery is promising. It is that the market potential for the non-intrusional of Micro Plastic Surgery is good in Taiwan.

Session F1: Smart Sensors and Applications

Room: Lecture Hall

Chair: Chi-Chia Sun (National Formosa University, Taiwan)

09:00 ***An Improved LOMB Algorithm for HRV Analysis on a PPG Sensor for Low-Cost DSP Processor 405***

Chi-Chia Sun, Chun Kai and Nian Jyun Yang (National Formosa University, Taiwan)

In this paper, an improved LOMB algorithm for Heart Rate Variability (HRV) calculation is proposed and implemented on a low-cost DSP processor. HRV analysis can reflect the activities of sympathetic and parasympathetic on a person health condition. We have compared the accuracy using FFT and a modified Lomb for HRV analysis both on an ECG sensor and a PPG sensor. On the other hand, the proposed method also has been implemented on a low-cost DSP processor, which can perform the modified LOM algorithm for HRV calculation in real-time while fit for the time-to-market budge margin. Experimental results show that the proposed method can improve the accuracy of HRV analysis from 50% error to 30% in average PPG based sensor compared to ECG device.

09:16 ***Design of a hydrogen compression system with hazard prediction 407***

Jian-Feng Tsai, Yu-Cian Syu and Li-Pei Lin (National Formosa University, Taiwan); Shih-Hung Yang (Feng Chia University, Taiwan)

The objective of this paper is focused on implementing a hydrogen compression system to achieve hazard prediction. With multiple dedicated temperature and pressure sensors, the system status is well monitored in whole process by expert algorithm. An experimental platform is presented to verify the effectiveness. Experimental results show high reliability and remote monitoring capability.

09:33 ***Non-overlapping Multi-camera Object Tracking Algorithm and System Design 409***

Rui-Yang Chi (National Yunlin University of Science and Technology, Taiwan); Ming-Hwa Sheu (National Yunlin University of Science & Technology, Taiwan); Chi-Chia Sun (National Formosa University, Taiwan)

In this paper, we propose a non-overlapping multi-camera object tracking method, which contains two method: the color correction for multi-camera and the topology of the camera. The color correction for multi-camera, which can reduce the effect of chromatic aberration and different light source between the cameras. The topology of the camera, which can improve the efficiency and accuracy of object identification. The proposed method is evaluated through a wide range of experimental databases. The results show that the proposed method can improve the performance of non-overlapping multi-camera object tracking.

09:50 ***Application of thermal camera in PV plants shelter detection 411***

Yu Ruei Tzeng (National Yunlin University of Science and Technology, Taiwan); Chia che Ho (Ho-Chia int., Taiwan); Ming-Hwa Sheu (National Yunlin University of Science & Technology, Taiwan); Chi-Chia Sun (National Formosa University, Taiwan)

This paper proposed a new method, MDM(Multiple detection method). In the case of variable distance outdoor observation, we can detects the location of the PV Module automatically. Then, we proposed a method ICAD(Inner Closed Area Detection), whitch can detected whether there is a shelter situation on PV Module.After all, we designed a systems of PV Module Shelter Detection. This system is combined with UAV(Unmanned Aircraft System), whitch can expand the search range and provide more efficient detection in solar power plant area.

10:06 ***Long-Distance Sensing Fiber Sensor System Using Broadband Source and Raman Amplifier 413***
Bao-Yi Guo, Wei-Chieh Tang, Yibeltal Chanie Manie, Mekuanint Agegnehu Bitew, Hung-Kai Lu and Peng-Chun Peng (National Taipei University of Technology, Taiwan)
Maximum transmission distance of fiber Bragg grating (FBG) sensor is limited by the signal loss in the fiber link. This paper aims to address the issue long-distance transmission in FBG sensor systems based on Raman amplifier. Intensity and wavelength-division multiplexing (IWDM) technique has been employed to increase the number of FBG sensors in the system. Experimental results showed that the maximum Raman gain is about 14 dB at 25 km remote sensing position. The proposed scheme enables a long-distance sensing system and supports a number of FBG sensors with different Bragg wavelengths.

10:23 ***Performance the Balance of Circular Inverted Pendulum by Using LQR Controlled Theory 415***
Hai Wu Lee (National Taipei University of Technology, Taiwan)
In this study, the LQR control theory was employed to control the upright inverted pendulum to be balanced. The traditional controller was designed by the mathematical model of the physical system, but fuzzy controller collected set theory, membership function and control knowledge. In fact, LQR controllers are able to processes make complex and inexact mathematical models be controlled well. There are many ways to control the way and theory: a mathematical model, fuzzy control theory, Lyapunov function and LQR control theory and so on, the use of dynamic equations of the characteristics of online adjustment of the controller parameters to control the inverted pendulum mechanism, upright positioning of the pendulum, and suspension oscillation elimination control. The results disclosed that the circular inverted pendulum with LQR control algorithm performed more stable than that with the traditional PID control method.

Session F2: Wireless Consumer Circuit and System

Room: 201
Chairs: Hai Wu Lee (National Taipei University of Technology, Taiwan), To-Po Wang (National Taipei University of Technology, Taiwan)

09:00 ***Differential Dickson Voltage Multiplier with Matching Network for Radio Frequency Harvester 417***
Guo-Ming Sung, Leenendra Chowdary Gunnam and Yu-Jen Lai (National Taipei University of Technology, Taiwan)
This paper presents the design and implementation of the differential Dickson voltage multiplier with a matching network which is used in the radio frequency (RF) energy harvester at GSM frequency band. The proposed RF energy harvester consists of a matching network and a Dickson rectifier. Those circuits are designed and simulated with standard TSMC 0.18um 1P6M CMOS process. The matching network is used not only to obtain the maximum power deliver from antenna to the RF-DC rectifier, but also to have the maximum conversion efficiency. In the proposed differential Dickson voltage multiplier, a native MOSFET is considered in implementing the multiplier with low threshold voltage, and a modified Dickson voltage multiplier with differential schematic is used to enhance the performance of the Dickson voltage multiplier. According to the simulated results, the conversion efficiency, input return loss, and output voltage are 28.83%, -47.285 dB, and 1.5 V, respectively, at a load impedance of 239 kΩ, an input power of -10 dBm, and in GSM frequency band.

09:15 ***An extended CPW ground antenna for Bluetooth Headset 419***
Wu Chia hao, Li Tsung-Lin, Lin Jin Wei and Jwo Shiun Sun (National Taipei University of Technology, Taiwan)
A plane antenna suitable for Bluetooth headsets—wherein an asymmetric coplanar waveguide ground plane was used to achieved a bidirectional radiation pattern—is proposed. An impedance bandwidth of 223 MHz (~9%) covering the ISM band (2.4-2.484 GHz) was obtained. The peak gain of the antenna was 3.2 dBi.

09:30 ***Design of Low-Voltage Low-Power 40-GHz CMOS VCO 421***
To-Po Wang, Wei-Bin Lu, Tsai-Sheng Chu and Shu-Hong Lin (National Taipei University of Technology, Taiwan)
This paper presents a low power consumption LC-tank voltage controlled-oscillator (VCO). It is suitable for communication system of Integrated circuit. In this circuit, the operating frequency is generated by LC-tank. The circuit add a forward-bias circuit at the body to decrease the threshold voltage. Therefore, it can reduce the operation voltage and minimize the dc power consumption. This design was simulated by using TSMC 0.18-um CMOS process. According to the simulation results, the power consumption is 4.5 mW with a 0.7-V supply voltage. At the 40-GHz operation frequency, the phase noise is -101 dBc/Hz at 1-MHz offset from the carrier frequency. In addition, the simulated output power is -25.8 dBm, and the FoM is - 186.5 dBc/Hz.

Session F3: User-Oriented Video Delivery and Utilization

Room: 204
Chair: Shih-Hsuan Yang (National Taipei University of Technology, Taiwan)

09:00 ***Robust Detection And Tracking Of Vehicle Taillight Signals Using Frequency Domain Feature Based Adaboost Learning 423***
Cheng-Lung Jen (HTC, Taiwan); Yen-Lin Chen and Hao-Yuan Hsiao (National Taipei University of Technology, Taiwan)
In this paper, we present a robust vision-based autonomous tracking of vehicle taillights and signal detection. In this study, the vehicle candidates are detected by Harr-like based classifier in bright scene and paired rear lights in dark scene, and this provides the taillight ROI for alert signal analysis. Then, the detected ROI regions are tracked with kernelized correlation filter. To recognize the taillight signal, we propose an invariant feature by finding the light scattering area with color and luminance analysis. The frequency response of dynamics and history of the light scattering area size can be trained by Adaboost classifier to detect the turn signal. Moreover, the high mounted stop light is used to detect the brake signal to improve the reliability of brake signal detection. The experimental results verified the accuracy and effectiveness of the proposed system.

09:15 ***A Personalized Learning System with Smart Interaction 425***
Shih-Hsuan Yang, Xiu-Wen Liu and Ying-Chen Lo (National Taipei University of Technology, Taiwan)
Education can benefit much from new technologies. In this study, we report the design methodology and implementations of a new personalized learning system. The devised system seamlessly incorporates speaker identification, speech recognition, gesture control, and voice quizzes for human machine interaction. We emphasize the usability of interfaces for creating humanized user experience. The devised system has been tested and its effectiveness is substantiated.

09:30 ***Set-Top Boxes Providing Adaptive Streaming Services for Multiple Mobile Devices 427***
Shih-Hsuan Yang and Tzu-Hsuan Huang (National Taipei University of Technology, Taiwan); Ching-Ming Tien (MitraStar Technology Corporation, Taiwan)
As videos are more and more frequently played on mobile devices, a new-generation digital set-top box (STB) should provide TV users the streaming services additional to the conventional broadcast channel services. The inclusion of streaming services impose two imperative challenges for STB systems. First, the bandwidth should be efficiently distributed to multiple mobile users. Second, the system should provide protection for the copyrighted video. This paper proposes a safe adaptive video streaming system for a digital STB connected to multiple mobile devices. Videos are transmitted using the MPEG-DASH protocol, where a new bitrate adaptation algorithm is proposed. Based on the duration of stored video segments in the mobile device's buffer, required highest quality level for each mobile device, and estimated bandwidth variation, the proposed bitrate adaptation method provides each user fair and smooth video services. Compared with the conventional MPEG-DASH quality-adaptation algorithm, the proposed method reduces the quality-level transition and simultaneously increases the average bitrate and PSNR.

09:45 ***Fast Fingerprint Feature Extraction Based on Modified Haar-Like Patterns Using Support Vector Machine 429***
Hsu Yi-Pin, Yen-Lin Chen, Chen-Fu Liao, Xiu-Zhi Chen and Chao-Wei Yu (National Taipei University of Technology, Taiwan)
In this paper, Haar-like patterns and a classification machine were employed for fingerprint feature extraction. Although the Gabor filter has high accuracy for feature extraction under a wide angle representation range, the full range of the filter is not required. Moreover, fingerprints have clear direction field representation. Due to these two key factors, this paper uses modified Haar-like patterns to create near-circular patterns for acceptable feature detection. A support vector machine classifier is used to detect features. In a performance comparison that used 15 general Haar-like patterns as a benchmark, the proposed algorithm was able to reduce the average computation required by approximately 50% without sacrificing accuracy. Thus, the proposed method is suitable for real-world applications.

10:00 ***An Interactive Learning System Incorporated Application to Educational Radio Station Website 431***
Sheng-Ming Wang, Ling-Yi Chu, Jenq-Haur Wang, Yung-hsiang Shawn Chang, Yuan-Fu Liao and Hsueh-Ru Hong (National Taipei University of Technology, Taiwan)
This paper presents a new mechanism of reusing and value-added mechanism to the digital archived contents of the National Education Radio, as its interactive nature diffuses it from traditional attempts in the past. Aiming to improve the quality of user experiences, relevance of their content and expand on their target audience, our research team mediates by incorporating the design thinking method of cross-domain integration, along with a service design approach, in creating a new interactive learning platform for the current radio station website. Acting as a new, integrated source of knowledge for both listeners as teachers and learners, it allows for the huge amount of high quality content produced by the station over the years to inculcate by a broader audience in the future, with both more efficiency and value-added.

10:15 ***Improving Sentiment Rating of Movie Review Comments for Recommendation 433***
Jenq-Haur Wang and Ting-Wei Liu (National Taipei University of Technology, Taiwan)
People usually ask for advices before making decisions, for example, watching movies. It's convenient if user opinions can be automatically aggregated and analyzed. To obtain an exact rating of a movie, sentiment rating can be formulated as a regression problem. Since our goal is only an overall suggestion of worthwhile or not, lexicon-based sentiment

classification is used in this paper. To facilitate efficient movie recommendation, we propose to adjust sentiment lexicons for improving the sentiment classification accuracy in movie reviews. Also, we compare several methods of opinion rating aggregation for movie recommendation. In our experiments on Chinese movies, we can obtain high accuracy for the top-rated movies using our proposed approach. Further investigation is needed to evaluate the performance in larger scale.

10:30 ***Exploiting Path Diversity in Content Delivery Network with the Collaboration of SDN 435***
Ta-Wei Yang (National Taiwan University, Taiwan); Yu-Lin Hsieh (National Taiwan University (NTU), Taiwan); Ming-Hung Chen (National Taiwan University, Taiwan); Cheng-Fu Chou (NTU, Taiwan)
Content Delivery Networks (CDNs) are able to improve user-oriented application performance through caching and anycast routing or DNS-based user mapping mechanism. With the fact that BGP is widely used for inter autonomous system (AS) routing for CDNs, there is a middle mile bottleneck problem, which cause by the nature limitation of BGP. To solve this problem, we propose an SDN-based tunnel multi-path system, CDN-Detour, which can detour the bottleneck for CDN to improve user experience.

Wednesday, June 14, 10:40 - 11:00

Coffee Break

Room: Break Area

Wednesday, June 14, 11:00 - 12:00

K5: Keynote Speech V, Ambarella Taiwan Ltd. Prof. Tihao Chiang

Room: Lecture Hall
Chair: Yu-Cheng Fan (National Taipei University of Technology, Taiwan)