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
Kahilik 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 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
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 capable to reconstruct a high quality light field image with less artifacts than existing methods.

09:30 3D Modeling for Steel Billet Images
Chao-Yung Hsu (China Steel Corporation, Taiwan); Hsin-Y 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
Yuseli 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 error rate can be lowered by the presented coding.

09:15 High Performance of Moving-Object Detection by GPGPU based on Pipelining
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 scheme. 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-Fit Routing
Yasuyuki Miura and Junpei Sugioka (Shonan Institute of Technology, Japan)

In this paper, we examine the mixture communication method of single-fit and wormhole routing. In the method, a buffer memory is shared in each link and virtual channels are assigned. We also evaluate 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 Differentiation for Compressed Moving Images
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
Takuma 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
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 0.18um 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 9-bit thermometer code. The design 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 external power consumption. Besides, a current distribution circuit is used to increase the linearly of the 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
Hokuto Tanizumi, Hiroaki Nishino and Tsuneyo 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 Uenoohara 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 by using a smartphone. To improve 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 institutions 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 (Chang 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); Chun-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-transconductance-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 3-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) less than 4.5%, and achieves more than 96%uV/slew-rate at cost of static power consumption of 140 mW.

09:30 Synchronization of Multirloor Audio Streams in Wi-Fi Environment 31
Kai-Wen Ke (National Taiwan University of Technology, Taiwan); Yu-Jie Pan (HTC Cooperation, Taiwan); Ho-Ting Wu and Rong-Shue Hsiao (National Taiwan University of Technology, Taiwan)
Converting audio signal to packet stream and propagating through wireless local area network (Wi-Fi) to loudspeakers 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 in order to make the play out behavior of a speaker in conformity with others.

09:45 A High-Voltage Integrated Bipolar Pulsed 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 pulsed for medical ultrasound scanner applications is proposed. The pulsed 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 pulsed 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 (1-Shou University, Taiwan)

09:00 Data Packet Decoder Design for LIDAR System 35
Li-Juan Zheng (National Taipei University of Technology, 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 data which transmits through 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-Chuan Wang and Yu-Cheng Fan (National Taipei University of Technology, Taiwan)
In recent 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 the 3D LiDAR and RGB camera can detect the object relative position, 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
J-An Lin, Trong-Yen Lee, Chih-Ming Chen and Shu-Yu Liu (National Taipei University of Technology)
Advanced driving assistance systems (ADAS) have developed 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 in widespread (CMP). 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
Karthik Srinivasan (National Ilan University, Taiwan); Avinash Ankur and Aman Sharma (LNMUI) 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
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° 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  
Ken-Lin Lin (National Chiao Tung University, Taiwan); Chien-Chang Chu (National Chianghua University of Education, Taiwan); Bor-Shyh Lin (National Chiayi University, Taiwan); Wei-Chia Su and Fu-Li Hsiao (National Chianghua 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  
Ken-Lin Lin (National Chiao Tung University, Taiwan); Wai-Tin Liu (National Chianghua University of Education, Taiwan); Bor-Shyh Lin (National Chiayi University, Taiwan); Wei-Chia Su (National Chianghua University of Education, Taiwan)  
In this paper, a hybrid display which can provide 2D and 3D images was practiced based on waveguide hologram. The hologram element recorded different 3D images and displayed different image without crosstalk.

09:45 The Method of RGBX Sub-pixel Architecture for Power Efficient Display  49  
Hseuh-Yen Yang (National Taiwan University, Taiwan)  
the color display device (OSM) 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. Utilising the property of the CIE-y coordinate, a threshold value would be derived to perform RGBX sub-pixel 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), Toshikazu Yamasaki (The University of Tokyo, Japan)

09:00 Hippocra: Doctor-to-Doctor TeleDermatology Consultation Service towards Future AI-based Diagnosis System in Japan  51  
Hidenori Kuri (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  
Suputta Viriyavitsithakul and Pannya SanguanWat (Panyapwet Institute of Management (PIM), Thailand); Satoshi Toriumi and Mikihara Hayashi (Future Standard Co., Ltd., Japan); Toshikazu Yamasaki (The University of Tokyo, Japan)  
In this paper, the problem of queue in convenient stores is proposed. we use a low-cost automatic queue length monitoring by using an Internet-of-Things (IoT) platform. This system can detect the length of queue and 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 computer vision and neural network techniques, we propose an 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 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 (NICEh), Japan)  
Conventional skeletonization methods require a closed boundary contour as a source object. In natural image cloning, which is not 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  
Giang Tong (Tohoku University, Japan); Terumasa Aoki (Tohoku University & New Industry Creation Hatchery Center (NICEh), Japan)  
The problem of blurring is a well known for image matching (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 Taipe 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 Automotive Electronics Industrial Co., Ltd., Taiwan); Chih-Bin Yang (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 to 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 Taipe 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 the rough position of asset in a large building, irregular position method via BLE. 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); Tiao-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 consumption and worsen the thermal issues. In this paper, the Multiple Temperature Mapping (MTM) are proposed to control the system temperature. The MTM 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
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 Kehirsagar (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 commerical 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.

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 transformation, 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 Salience 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 at most others.

13:15 A Superpixel-based Salience 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 seriously 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 saliences 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 image 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 autofocus 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 due to low cost and the ability to handle occlusion effects. However, the APs require a lot of human labor to label training data for this type of construction. To address these problems, 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 the computational effort, our method uses Wi-Fi and IMU signal data and automatically builds a radio map. More concretely, four types of constraints are used 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 experimental 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-Yu 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 u = 0. Closed-form expressions for these cardinal filters and their derived filters are shown to have a simple recursive structure. 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-Chung 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 way, 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-Tsen 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-yeun Huang (Yuan Ze University, Taiwan)
Locomotion monitoring are fundamental technologies for constructing a smart living space. This paper presents smart living platform based on motion sensing carpets WhaCarpet. It is developed in the form of 50x50cm ‘s floor mat’ units, which allows the users to assemble by themselves according to their desired shape and area. From the sensory data collected by WhaCarpet, functions such as location tracking, mobility monitoring and fall detection can be achieved. This platform has been installed in Zhulin Apartment for field trials.

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-Chie Chien (National Chung Cheng University, Taiwan)
The management of bedsores 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 wavebands (ultraviolet 20 mm × 15 mm FR4 substrate, exhibited a bandwidth of 900 MHz (2.33-2.33 GHz), which is sufficient for covering the 2.4-GHz Bluetooth/WiFi band.

14:00 Implementation of Post-operative Wound Analytics 93
Yi-Chong Zeng, Kuan Hao Liao, Chu-Hsuan Wang, Yuling Lin and Wen-Tsang Chang (Institute for Information Industry, Taiwan)
Surgical wound care after clinical surgery is mostly done by 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 normalisation (CON) and edge detection, and skin and color detection for wound images divided into overlapping blocks for infectious status recognition, which enables feature extraction and machine learning. The experiment results demonstrated 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-Chiu Liu (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 Shiuin 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 FR4 substrate, exhibited a bandwidth of 0.05-0.24 GHz (f = 1.2 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-Chiu Liu (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 data. Besides, the EMG data was converted to a general physiological signal for the usage 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-Chiu Liu (National Kaohsiung University of Applied Sciences, Taiwan); Wen-Chieh Lin (Kao Yuan University, Taiwan); Yun-Yao Kong and Wen-Wen Kao (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 light which is 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 Institute 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 panoramic annular lens in the new parameter, allow to take photos each one of which can be transported into a 360 degrees virtual tour without need for any editing. Hence, the 360 degrees 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 use that go beyond the mere photography/ interactive 360 degrees video, 360 degrees videos, interactive real time 360 degrees 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 (MDGDP) and Finner-opponet Columb-Rice Code (FCGR). 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 on 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
Li-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 (MS8430X), and a personal phone or computer. The acquired three-lead (namely, Lead I, Lead II, and Lead VI) 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 Iteration 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 trilateralization to reduce positioning errors. In this study, environment model curve builds to estimate the distance by ZigBee received db value. Then, use trilateralization to measure distance of reference and destination nodes. When the position error appears, the obtained trilateration (MLS) 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 160Gbps. 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-Horang 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 designer can choose the alternative algorithms for their different applications. With one kernel, it supports multiple configurable antennas (2x2, 4x4) and variable modulation schemes (QPSK, 16-QAM). Using different kernels of 8x8 and 64-QAM. Using a 90-nm CMOS technology, the 7.29 mm² proposed kernel achieves the throughput of 443.5 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 STRTRAN 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 various other high row weights for enhancing critical-path timing performance.

14:00 Miniaturized UAV Datalink Frequency Source System Design

N/A

Hui Cao (Northwestern Polytechnical University, P.R. China); Yu Qi (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 ADP4350 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
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 Cheng 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**  
Chao-Hsien Lee and Shih-Kuei Yu (National Taipei University of Technology, Taiwan)

The global high pixel density display market is rapidly growing. 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 fragmentation mechanism (MBDM) to address such a situation. MBDM can reduce the 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**  
Yi-Cheng Liu and Yu-Cheng Fan (National Taipei University of Technology, Taiwan)

This paper presents an implementation of an indoor high pixel density display with the local government module. Where the environmental data positions can be known, the distribution of the environmental data in an indoor environment would be presented. The small and lightweight sensors are equipped and connected to a mobile platform for the mobile platform to smoothly 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 server.

16:10 **LiDAR Information for Objects Classified Technology in Static Environment**  
Hsin-I Ning (Taipei University of Technology, 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**  
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 image 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**  
Chien-Yu Chen (National Taiwan University of Science and Technology, Taiwan)

The study applied water mist as the projecting medium and two-dimensionally polarized light for the projection purpose. The proposed method used the Fresnel mirror to control the optical polarization of the projection light. The Fresnel mirror with adjustable aperture was designed to control the spatial light distribution and achieve 3D image.  

16:55 **Indoor Environmental Data Collection, Localization and Fusion**  
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 presents an implementation of an indoor environmental data collection with the localization module. Where the environmental data positions can be known, the distribution of the environmental data in an indoor environment would be presented. The small and lightweight sensors are equipped and connected to a mobile platform for the mobile platform to smoothly 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 server.

17:10 **Secured Remote Sensing by Deploying Clone-Resistant Secret Unknown Ciphers**  
Wael Adi (Technical University of Braunschweig, Germany); Saleh Muhem (Technical University Braunschweig, Germany); Ayoub Mars (Technische Universität Braunschweig & Institut für Datentechnik und Kommunikationsnetze, Germany)

Secure 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. It is essentially required for reading huge amount of data 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 (MDM) 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**  
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**  
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);
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 Yung Christian University, Taiwan); Yangming Wen (Jimel University, P.R. China); Zhaoyi Liu (Beijing Institute of Technology, P.R. China); Ting-Lan Lin, Shih-Lun Chen and Yih-Shyh Chio; (Chung Yuan Christian University, Taiwan); Ho-Yin Lee (Shaw 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 Y'CBCR 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 PSNR; the average gain is 0.13 db.

15:55 A Compensation Technique for Recycling Folded-Cascade Amplifier 165
Po-Yu Kuo and Shen-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 (USERFC) structure improves slow 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 amplifierless improves the unity-gain frequency 134.2 MHz versus 214.3 MHz), 13.4 μs increment in slew rate (94.1 μs versus 107.5 μs), and 16.8dB increment in d.c gain (73.2 dB versus 53.6 dB).

16:10 Image Forensics Using EDBT 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 lossy region 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 takes, and, at the same time, outperforms the former existing scheme.

16:25 Half-toning-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 (HTBC) 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 measurement determines the similarity between the query target and images in the database format. As documented in experimental result, the proposed method gives a promising result on the scrambled/encrypted image retrieval. It demonstrates the superiority of HTBC 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 sensors, for example: using 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 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 & Technology, Taiwan)
An output-capacitorless low-drop (LDO) regulator with a Rising-Current-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 0.18μm 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 33μA 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 growing importance of aerial images has brought a popular tool for biological related researches. In order to detect the specific animal from aerial images, 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 scenes from which the scenes required 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 aim to make improvement to fisheye camera calibration method by calculating the distance between 3D image points and 3D world points. We will 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 show 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 Chang (National Chung Cheng University, Taiwan)
This paper presents an automatic photographic composition method based on convolutional neural networks. The proposed method is 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)
This paper presents a multilevel technique for automatic foreground extraction. The proposed method is effective for various types of image sequences.

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); Hung-Yu Yeh (National Dong Hwa University, Taiwan)
This paper proposes 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 model based on AdaBoost using HOG and MB-IPB. 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 detection 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 4D-Based Power Flow Coloring for Power Fluctuation Management: Concept and Classification 189
Saheer Javaid (Kyoto University, Japan); Takekazu Kato (Shizuoka Institute of Science and Technology, Japan)
We propose the concept of Energy on Demand (EdSys) system as novel smart demand-side energy management scheme to realize efficient and versatile control of power flows among decentralized energy sources, storage devices and appliances in homes, offices, factories, and neighboring communities. The novelty of our proposed method rests in (i) power allocation based on appliance dynamic priority model and (ii) power supply from multiple power sources based on their capacity limits. The experiment results show that the proposed approach can offer good detection results under different environments.

15:55 Real-Time Power Supply and Demand Mediation Algorithm for Energy on Demand System 191
Saheer Javaid (Kyoto University, Japan); Takekazu Kato (Shizuoka Institute of Science and Technology, Japan)
This paper presents an algorithm for real-time power supply and demand mediation algorithm based on EdSys system. The novelty of our proposed method rests in (i) power allocation based on appliance dynamic priority model and (ii) power supply from multiple power sources based on their capacity limits. The experiment results show that the proposed approach can offer good detection results under different environments.

16:10 Agent-Based Feedback Control for Fluctuating Power Sources and Loads: Watch TV with PV Power 193
Saheer Javaid (Kyoto University, Japan); Takekazu Kato (Shizuoka Institute of Science and Technology, Japan)
The power consumption of electric devices in home with power fluctuations is characterized by power fluctuations and available time periods. A power with dynamic fluctuations can directly flow into load without affecting other power flows. Consequently, we are able to use various power sources with diverse characteristics.

16:25 Influence of Packetized Electric Power Transmission on Radio Wave Environment 195
Hisayoshi Sugiyama (Osaka City University, Japan)
Packetized electric power transmission on radio wave environment is investigated. In contrast to conventional power transmission with continuous electric current of low frequency, packets of electric power transmission may affect surrounding field with high frequency radio noise. In this paper, 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 packetized power transmission 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); Rikika Abe (the University of Tokyo, Japan)
The purpose of this paper is to design an FPGA based emulator for half-bridge inverters operated in stand-alone mode. The discrete-time model is used to emulate the inverter 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 to 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 real-time half-bridge circuit almost exactly under the same digital controller.

16:55 Toward Implementing Power Packet Networks 199
Hirotaka 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 packets and control them with physical electric power. 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 Blockchain based 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 each consumer 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)
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 Shun 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 be designed to evaluate 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 propose a superpixel 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
Tsung-Yi 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 unrecognizable to ensure 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: Takaji Tachihana (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.
10:25 Multi-Wavelength Laser Based on SOA and Polarization Maintaining Fiber for WDM Systems 219
Chung-Hong Lai, Wei-Chieh Tang, Mekuainit Agegnehu Bitew, Run-Kai Shiu, Yibetall Chanie Manie and Peng-Chun Peng (National Taipe 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 an element to determine the output wavelengths. The loop is composed from a polarizer (P), polarization maintaining fiber (PMF) and mirror. Experimental results revealed that a stable multi-wavelength laser lasing at 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
Yutsi Miyoshi, Takuya Wada and Kouji Hirata (Kansai University, Japan)
This paper presents 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 multipaths 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, Mekuainit Agegnehu Bitew, Chen-Hsien Chang, Wei-Chieh Tang, Yibetall Chanie Manie and Peng-Chun Peng (National Taipe University of Technology, Taiwan)
This paper presents wavelength-generating scheme using reflective semiconductor optical amplifier (RSOA) and delay interferometer (DI). The proposed method presents simultaneous multi-wavelength generation by establishing promising laser structure incorporating fiber coupler, an optical circulator, bandwidth variable tunable filter and delay interferometer. The gain medium lasers 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, Mekuainit Agegnehu Bitew, Chung-Hong Lai, Chen-Hsien Chang, Yibetall Chanie Manie and Peng-Chun Peng (National Taipe 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 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); Takahiro Kudo (Setsunau University, Japan); Takashi Inoue (Osaka University, Japan); Kouji Hertz (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 for the wrong purpose. As such a threat, self-evolving botnets have been considered in the past. The self-evolving botnets autonomously predict vulnerability scores and self-evolve by performing 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 Takui 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 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 Takui 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 Ohashi (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 accurately 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
Yibetall Chanie Manie, Mekuainit Agegnehu Bitew, Meng-Hsin Fang, Chung-Hong Lai, Run-Kai Shiu and Peng-Chun Peng (National Taipe University of Technology, Taiwan)
In this paper, we propose 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 Manasaekamsak, Arnon Rungsawang and Pattara Leelaprute (King Mahidol 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 explain the implementation of the smelting function. It first extracts 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 Tuning 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 which satisfy the given specifications and submit them to the JPLAS server to obtain the marks using test codes instantly. Unfortunately,
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
Tatsutomu Yoshida and Masaaki Shiraize (Future University Hakodate, Japan)
In this paper, we propose 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 granted access to 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 PRBS 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, Akio 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 a message 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 Tighter Security 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 is a reduction where there is a reduction of search-cost in security, and if a main idea is that it is independent of a capability of signers. Our main idea is to one use one-more DH assumption, which is a 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 the 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 Adl (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) elements in open networks. A broad playing 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. These SUCs are “mutated” irreversibly into unique physical entities, such that cloning 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 An 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); Hsien-Ching Hsieh (Institute for Information Industry, Taiwan); Yi-Chin Lin (Althea University, Taiwan)
We propose a mixed reality system use wearable devices which is intuitive design, and use wearable devices to help museum guide to service, so as to provide an intuitive museum guide mode. This new technological application model 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 personal 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.

Yuchun 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, GASo2v2, for allocating cloud-based virtual machines on physical machines. GASo2v2 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-senUniversity, 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 image processing from input images. 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-images 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 Chang (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 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 sent 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)

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, photomat 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 closest edge 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.

Design and Implementation for an Automotive DOA System 271
Ching-Long Su, Zhi Ying Wu and Bo Chen (National Yang-Ming 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 implemented on Renesas R8C/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 96.19%.

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)

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 technology is composed of two processing stages, where the first stage is the three-scans lines based de-interlacing process for 1080i Full HD to 1080p Full HD conversion, and the second stage is the de-interlacing based up-scaling process for 1080p Full HD to 8K UHD conversion. First, the proposed pixel detector classifies the pixels into five modes, which tend to a smooth pixel, a vertical edge, a horizontal edge, a near 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 up-scaling 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, Zhi Ying Wu and Bo Chen (National Yang-Ming 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® S3P86700 and achieves real-time detection at 30 frame per second (FPS) with CORTEX® A9 dual-core @1GHz and accomplishes production and sales with TOYOTA® Atis.

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 Center, National Applied Research Laboratories, 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%.
Center, Taiwan)

Smartphones have become popular, with people carrying mobile phones at all times and to all places; for example, people use mobile phones to pass time while waiting for a bus. Therefore, if smartphones' features are combined with industrial mobile technology, mobile phones can be used to capture images and the phones' processor can be used to process and store the images by applying image processing and analysis techniques. For example, to identify car numbers on license plates and to detect diseases. This article proposes the use of low-cost mobile devices for image processing. In mobile phones, single-core processors and memory performance constraints propose a method to substantially improve the speed of image processing, and verified this method on the smartphone.

An Intelligent Home Access Control System Using Deep Neural Network 281
Shih-jye Lee (University of National Cheng Kung, Taiwan); Chu-Sing Yang (National Cheng Kung University, Taiwan)

In recent years, artificial intelligence technology has developed rapidly, and deep learning has been widely used in many areas. The performance of deep learning is particularly prominent in image recognition. This paper proposes a method to achieve efficient image recognition based on deep neural network using a small amount of data, which can be applied to home access control systems. The method uses high-dimensional objects including informative features between objects that can be transferred to the embedded system. From the experimental results, we can see that the image recognition has a very good accuracy rate. It is feasible to apply artificial intelligence to consumers products and intelligent home access control systems.

An Early Warning System for Predicting Driver Fatigue 283
Yu-Tao Lin (National Chung Cheng University, Taiwan); Fao-Ann Hsiung (National Chung Cheng University, Taiwan & Amity University, India)

Driving is one of the main causes of traffic accidents. An early warning system for driver fatigue can effectively reduce the incidence of accidents. This study uses continuous physiological data to train a fatigue analyzer such that it learns the physiological change. As a result, the system can predict fatigue beforehand. For the purpose of early warning, the weights in weighted moving average are dynamically adjusted. As a result, prediction accuracy is also improved.

Improving Machining Accuracy by Automatic Compensation Based on the Off-line Measurement 285
Wei-Ping Chen, Jeng-Yu Wang and Ching-Chih Wei (National Taiwan University of Science and Technology, Taiwan)

The inaccuracy of CNC machining may come from several factors, such as machine vibration, dynamic stiffness, and thermal expansion. If a workpiece is machined inaccurately, we may modify the NC program to generate compensation tool paths, and then perform the finishing process. However, the modification of the NC code is time-consuming, and the accuracy may deteriorate. In this paper, we propose a method to improve the machining accuracy by automatically modifying the NC program for compensation based on the data obtained from an off-line measurement. Then the workpiece could be finished along the tool paths to compensate the errors caused by the CNC machine. A case study showed that the machining accuracy of a workpiece could be enhanced by using this compensation method.

Security Analysis of Raspberry Pi Against Side-Channel Attack with RSA Cryptography 287
Akifuro Sanada, Yasuyuki Nogami, Kengo Jokibe and Md. Al-Amin Khandaker (Okayama University, Japan)

In this paper apply two more exponentiation algorithms such as left-to-right binary method and Montgomery powering ladder algorithm on Raspberry Pi and evaluate their security against Side-channel attack.

Parallel Computing Architecture for Eye Tracking Systems 289
Wen-Chung Kao, Jui-Che Tsai and Yi-Chin Chiu (National Taiwan Normal University, Taiwan)

Visible light eye tracking systems (VLTS) have much better user experience than infrared-based ones. But the computational complexity of analyzing eye images becomes much higher due to the fact that the algorithm should accommodate various illumination conditions. In this paper, we propose a parallel computing architecture for realizing a high precision algorithm on multi-core microprocessor. The experimental result shows the proposed architecture can be applied to the design of a high speed VLTS with frame rate of more than 700 frames/s.

Analysis on the development trend of green cosmetics 291
Shu-Ping Chiu and Li-Wen Chuang (Fuzhou University of International Studies and Trade, Taiwan)

Archaeologists have found that thousands of years ago the Egyptians have already begun to use skin care products. After the evolution of the times and the development of science and technology so far, hundreds of thousands of kinds of cosmetic formulations varied. In order to keep the cosmetics in different climates, temperatures and environments, although the chemical formula they add could achieve its preservation effect, it may cause skin and the emotional pollution and the injury. For marketing cosmetics, businesses are racking their brains in its internal and external packaging with sophisticated design. The cosmetic product increased in the visual selling point, but caused the environment negative pollution and burden, that accounting for the majority of pollution sources of business units also take on corporate social responsibility, used green thinking as its starting point, green marketing seems to be formed; the green concept has become the design of the primary conditions. Many cosmetics industry have also responded, green cosmetics that to care for others being, love the earth at the same time, also brought a green consumer business opportunities. Based on the concept of green, this study explores the current situation and future trend of green cosmetics. Through the compilation and analysis of literature and related researches, this paper puts forward the feasibility evaluation scheme of green cosmetics.

A Distance Coefficient-based Algorithm for K-center Selection in Wireless Sensor Networks 293
Tien-Wen Sung (Fujian University of Technology, P.R. China)

This paper proposes a distance coefficient-based scheme to solve the problem of selecting k control centers from the sensors in a wireless sensor network as well as updating the sensors into k groups for the minimization of the distance between each control center and its farthest sensor. The proposed scheme can avoid the drawback of applying the farthest-first or the nearest-first method in the control centers selection.

Automated Machine Learning for Internet of Things 295
Che-Min Chung (MoBagel Inc., USA); Cai-Cing Chen (MoBagel Inc., Taiwan); Wei-Ping Shih (MoBagel Inc., USA); Rui-Jun Yeh and Ting-En Lin (MoBagel Inc., Taiwan); Iru Wang (MoBagel Inc., USA)

IoT is currently the most rapidly growing industry and it only will grow even more exponentially. By 2020, the world will have over 50 billions devices connecting to each other and streaming over 60ZB data. Data science is a necessary part to unlock the potential of these massive data. However, according to McKinsey's report, by 2018, the United States was still facing a shortage of 190,000 data scientists, meaning the necessary tools to exploit IoT. Automated machine learning is a direct solution to the shortage of data scientists. This technology can drastically increase the productivity of data scientists by speeding up work cycles, and ultimately, possibly replace the need for data scientists. Decentralized machine learning evolved in such a system that simultaneously trains more than 50 types of algorithms, and yields a 30% higher accuracy compared to industry benchmarks of Google ML, AWS ML, and other machine learning services. This paper will discuss all in depth real cases of applying Decanter AI's automated machine learning to various IoT applications in smart buildings and explore further potential industries that can benefit from Decanter's robust system.

Design of a Non-Processor OBD Device for Parking System Based on Infrared Communication 297
Hsin-Chuan Chen, Chih-Jye Huang and Kai-Hung Lu (Beijing Institute of Technology, Zhuhai, P.R. China)

Most of the OBD (On Board Unit) devices of vehicles use MCU to control the infrared transmission and reception for the infrared-oriented parking systems. However, the battery power of the OBU device will be dissipated. In this paper, a non-processor OBU device is proposed to reduce its standby power consumption. Besides, when the OBU device receives an infrared signal induced to transmit an infrared identification signal, the data collision also can be avoided by the design of the delay control circuit to further increase the stability of identification.

An Efficient Complexity Reduction Scheme for G.723.1 Speech Coder 299
Rong-San Lin (Southern Taiwan University of Science and Technology, Taiwan)

Because of limited computational capability of personal electronic devices for communication, a coder with low computational necessity is necessary for integrating services from several media sources. This paper presents a scheme that uses a third-order adaptive pitch predictor to reduce the computational complexity of the G.723.1 speech coder. The simulation results indicate that the average perceptual evaluation of speech quality score is degraded slightly, by 0.08, and our proposed method can reduce complexity by about 38.99% compared with the original coder with exceptionally negligible degradation. Objective evaluations verify that our proposed complexity reduction scheme can provide speech quality equivalent to that of the original coder.

Real-Time Vision System for Nighttime Vehicle Detection 301
Hsia Chih-Hsien (Chinese Culture University, Taiwan); Yan Kong (Nanjing University of Information Science & Technology, P.R. China); Ying-Ren Chien (National I-Lan University, Taiwan)

In recent years, there are more and more cars on the road, and this results in that the video-based traffic flow monitoring and counting technology is considered to be important. However, compared with the technology of computer vision-based traffic flow monitoring and counting used in the daytime, that used in nighttime is less developed. In this background, this paper proposed a mixed feature vector of two technologies, which is used to analyze the headlight of cars during nighttime. Firstly, we analyze the light source distribution in each captured image and distinguish the length-width ratio of the head light. If two headlights are both conformed to the standards, comparison between cars will be carried out, in order not to count the same car more than once. Next, the space between and colors of two headlights are used to judge whether these two lights belong to the same car by the analysis algorithm. From experimental evaluations, we know that the proposed technology in this work could be stable used in both the monitoring of traffic flow and the real-time management of cars during nighttime.

Real-time localization of mobile targets using abnormal wireless signals 303
Chengming Luo and Xinnan Fan (Hohai University, P.R. China); Gaifang Xin (Changzhou College of Information Technology, P.R. China); Jianjun Ni (Hohai University, P.R. China); Pengfei Shi and Xuewu Zhang (Hohai University, P.R. China)

Real-time localization of mobile target has been paid more attention in recent years. When attracted much attention of people and system will be more and more. Due to some complex environment such as the complicated wireless sensor networks can be applied to locate and track the mobile targets in this paper. The multi wireless signals are used to weaken the effect of abnormal wireless signals in some areas. To verify the real-time localization performance for mobile targets, experiments and analyses are implemented. The results indicate that the proposed location technology can provide experimental basis for the applications, such as the garage, shopping center, underwater, etc.
**Session E1: Intelligent Devices, Systems, and Algorithms for Real-life Applications (I)**

**Room: Lecture Hall**
- Chairs: Tsung-Chieh Chang (National Taiwan Normal University, Taiwan), Shih-Shinh Huang (National Kaohsiung First University of Science and Technology, Taiwan)

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<tr>
<th>Time</th>
<th>Title</th>
<th>Author(s)</th>
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<tbody>
<tr>
<td>13:00</td>
<td>Color Image Enhancement Using Histogram Equalization Method without Changing Hue and Saturation</td>
<td>Su-Ling Lee (Chang-Jung Christian University, Taiwan); Chien-Cheng Tseng (National Kaohsiung First University of Science and Technology, Taiwan)</td>
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<tr>
<td>13:15</td>
<td>Removing Blue Screen Background under Non-uniform Illumination</td>
<td>Ching-Hung Teng, Yun-Hsuan Liao, Yi-Chia Chou and Sih-Yu Lin (Yuan Ze University, Taiwan)</td>
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<tr>
<td>13:30</td>
<td>Environmental/Economic Dispatch using an Adaptive Multiobjective Differential Evolution Algorithm</td>
<td>Zhong-Yi Lin, Chen-Yu Lee and Tsung-Chieh Chang (National Taiwan Normal University, Taiwan)</td>
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<tr>
<td>13:45</td>
<td>An ISM-Band Frequency-Discriminator-Based Vital Sign Radar</td>
<td>Chan-Hung Lee and Kang-Chun Peng (National Kaohsiung First University of Science and Technology, Taiwan)</td>
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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.

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

- Authors: Junping Wang (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-line detection.

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**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)

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<th>Time</th>
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<tr>
<td>13:00</td>
<td>A DPM based object detector using HOG-LBP features</td>
<td>Tanase Cucliuciu (Asia University, Taiwan); Chih-Yang Lin (Yuan Ze University, Taiwan); Kahil Muchtar (National Sun Yat-Sen University, Taiwan)</td>
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<td>13:15</td>
<td>A Hue-Based Quad-Tree Method for Color Image Segmentation</td>
<td>Ken-Chung Ho and Chia-Lung Hung (National United University, Taiwan)</td>
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<td>13:30</td>
<td>Robust OLED displays dimming algorithm based on visual perceptual analysis techniques</td>
<td>Kyle Shih-Huang Lo and Chia-Hung Yeh (National Sun Yat-Sen University, Taiwan); Wen Jung Huang (National Applied Research Laboratories, Taiwan)</td>
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<td>13:45</td>
<td>Enhancing Image Security and Privacy in Cloud System Using Steganography</td>
<td>Wen-Chuan Wu and Shang-Chiang Yang (Aletheia University, Taiwan)</td>
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<tr>
<td>14:00</td>
<td>Indoor Location Estimation Using BLE Beacon with Multiple Transmission Power Levels</td>
<td>Min-Kun Sie and Chih-Hung Kuo (National Cheng Kung University, Taiwan)</td>
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<tr>
<td>14:15</td>
<td>Non-photorealistic Rendering via Modified Convolutional Neural Model</td>
<td>Kathiravan Srinivasan (National IIT, Kharagpur, India); Anant Sharma and Avinshak Ankur (LMNIT, Jaipur, India)</td>
</tr>
<tr>
<td>14:30</td>
<td>Rating Realism Assessment for Computer Generated Imagery</td>
<td>Yu-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)</td>
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For our project, 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 and art merge with it the content of another image.

---

**14:45 Enhancing Image Security and Privacy in Cloud System Using Steganography**

- Authors: Wen-Chuan Wu and Shang-Chiang 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 to use and access data from the cloud without the need to know how data are stored or transferred. There are some external security and privacy concerns facing 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**

- Authors: 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**

- Authors: Kathiravan Srinivasan (National IIT, Kharagpur, India); Anant Sharma and Avinshak Ankur (LMNIT, Jaipur, India)

For evens, 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 and art merge with it the content of another image.

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

- Authors: Yu-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)

Currently, 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
assessments are very close to that of human visual perception.

14:45 Real Time Validating the Accuracy of Physiotherapy Exercises 329
Ngela 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 Tho 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 sensors and features from sample exercises. We 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: Takju Tachibana (University of Fukui, Japan)

13:00 Efficient Context Sharing Using File Segmentation and Relocation in Peer-to-Peer Networks 331
Yu Fujita and Shinni Sugawara (Chiba Institute of Technology, Japan)
Received, digital data 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); Yoshikazu 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
Farshad Ibrahim (University of FUKUI, Malaysia); Hathairat Pitsuwun (Srirakarninwrit University, Thailand); Yurie Shirokai and Takju 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 utilisation 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 management 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
Yusuke Fukuhara and Takju 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 network. As the network slice usage varies dynamically, and hence it is indispensable to change the amount of network resources for each network slice. 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 is performed based on the resource requests for trading network resources. Specifically, we formulate an optimisation 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
Chin-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 subnetwork distributed computation with three predefined parameters: c, r1 and r2. Each root then serves as a coordinator to construct its own spanning tree subnetwork, 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 Yoshikawa 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 channel, compared with an existing approach that uses lower transmission rates in the channel fadingough 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 demonstrates 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 proposes a fault tolerant calculation method for sensor nodes. 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 fail. In this paper, we propose our network-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
Achiko Yatsuda, Toshiyuki Haramaki and Misao Ishino (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, detects in 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 Salinity Map to Restrained Scheme of Attack to Digital Watermark using Seon 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 interest (ROI). When the image is 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 salinity 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 Shiraiki (Nagoya Institute of Technology, Japan); Shinni 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
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 reveals 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 need 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-Hung Su (Cheng Shiu University, Taiwan); Tsung-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 Taiwan 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 (spoken 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 call roll 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

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,
The real measurement temperature data in the cities of the south Taiwan are used to demonstrate the effectiveness of the proposed graph filter prediction method.

An Optical Link between an AC LED and an IR Receiver Module 367
Tang-Jen Liu (Far East University, Taiwan)
To save time and expense, a preliminary optical link can be constructed with a white-light AC LED and an IR receiver module. It is not easy to develop a matching optical receiver for a visible-light data transmitter with satisfactory signal-to-noise ratios. Before the dedicated receiver being achieved, an off-the-shelf IR receiver module can be a proper substitute. The limitation of the pair is the range and the baud rate smaller than 3Mbits because of the specification of the IR receiver module. In this paper, an approach to connect a white-light AC LED with an IR receiver module wirelessly is proposed. The result illustrates lighting with LEDs not only available for illumination but also remote controls for household appliances.

Asymmetric Loading on the Energy Saving Scheme for EPON Networks 369
Cheng-Ting Liu (National Taipeh University of Technology; Taipei City University of Science and Technology); Ho-Ting Wu and Kai-Wei Ke (National Taipei University of Technology, Taiwan)
We study the impact of asymmetric loading on the power saving performance of EPON networks. It is generally observed that asymmetric loading often leads to reduced network performance as compared to that from symmetric loading. For such network, an adaptive bandwidth assignment scheme according for traffic load can be set to meet the target of delay performance or power saving effect.

Design of Remote Control of Home Appliances via Bluetooth and Android Smart Phones 371
Dennis Sullivan (Wayne State University, USA); Wen Chen (4855 4th St. & Wayne State University, USA); Abihash Panda (Wayne State University, USA)
With everyone being on the move in a fast-paced world, technologies have been increasing rapidly. This work is regarding a student-designed project allowing users to be able to control multiple appliances remotely from a single mobile device. This project involves the use of Bluetooth communication and the Arduino Uno Rev 3 Microcontroller. The whole idea is to design an app on an Android cell phone to control home appliance remotely such as lights and fans using AC power. Although there are commercially available products on the market that implement the control of multiple appliances, this project is a teaching point for students to build their own communication networks, create Android phone apps, and practice electrical operation of circuits.

An Extension of JPEG XT with JPEG2000 373
Hiroyuki Kobayashi (Tokyo Metropolitan College of Industrial Technology, Japan); Hitoshi Kiyu (Tokyo Metropolitan University, Japan)
In this paper, a new two-layer coding scheme based on JPEG 2000 is proposed for HDR images, where coded data contains two layers to reconstruct HDR images: the base-layer for tone mapped LDR version of an HDR image and an enhancement layer. The paper considers a coding scheme as extended versions of the JPEG XT Profile A. JPEG coders used in JPEG XT are replaced with JPEG 2000 ones. Compared to normative JPEG XT coding, the proposed schemes have the following properties, (1) high compression efficiency, (2) flexible bit-rate control, (3) over-eight-bit LDR images, etc. We demonstrate the effectiveness of the proposed scheme by experimental results.

Automatic Recognition of Clothes Pattern and Motifs Empowering Online Fashion Shopping 375
Kai Seren Lokerm (Swansea University of Technology Sarawak, Malaysia)
Automatic recognition of clothes patterns and styles have broad application in consumer online fashion shopping. In this research, we propose a fast and accurate method of recognizing a clothes textile design and pattern. We used a modified 6-channel co-occurrence matrix with a random forest classifier. We tested the accuracy of recognizing clothing of fashion models and obtained results of 93%.

A Study on Promotion of Generational GC in ART 377
Ruyusuke Mori (Kogakuen University, Japan); Shintaro Hamanaka (Kogakuen University Graduate School, Japan); Masato Oguchi (Ochanomizu University, Japan); Saneyasu Yamaguchi (Kogakuen University, Japan)
Android Runtime (ART) has Garbage Collection (GC) function, which automatically releases unused memories. Generational GC is one of the most important GC improving methods and ART also has a Generation GC implementation, which is called Generational Semi-Space GC (GSS). Generational GC clusters object into two groups. One is objects that will probably die soon. The other is objects that will not. An usual generational GC, such as GSS separates object with its ages. Generational GC expects young and old objects will and will not die soon, respectively. An object is promoted from young object to old object when its age exceeds its threshold. In this paper, we focus on the promoting condition. First, we introduce ART GSS and its promoting condition. Second, we propose a new promoting policy for effective collection. Third, we evaluated our method. Our evaluation demonstrates that the method can decrease memory size consumed by an application without application performance.

Exploring the Interface Design of Assisting Children to Find Books in the Library Using Smartwatches 379
Wei-Ching Wang, Chun-Ching Chen and Ko-Chiu Wu (National Taipeh University of Technology, Taiwan)
Exploring new technologies that allow mobile device to enable children to easily find their desired books. However, the cognitive abilities of children might bring about incorrect use of these devices. Therefore, it is imperative that libraries pursue innovative service such as smart book-finding specifically designed for children. In this paper, we conduct an analysis to examine if we can apply new mobile technologies to the children's library and interact with the children in a personalized manner. Thus, this study presents an innovative and an easy-to-use mobile application, which is a mobile interface designed to help children in traversing the library. Children can take advantage of this mobile application to find the books they desire.

Novel Parasitic-SCR Impacts on ESD Robustness in the 60 V power pDMOS Devices 381
Shen-Li Chen, Chih-Hung Yang, Chih-Ying Yen, Kuei-Yyun Chen and Yi-Ch Wu (National United University, Taiwan); Jia-Ming Lin and Chün-Ting Kuo (Peking University, P.R.C.); Yu-Lin Lin, Yi-Hao Chiu and Yi-Hao Chao (National United University, Taiwan); Jen-Hao Lo (Peking University, P.R. China); Hung-Wei Chen (National United University, Taiwan)
The paper describes devices fabricated by a TSMC 0.15 μm 60 V process. This paper presents a novel type of parasitic SCR in the drain end or guard-ring area, respectively. From the TLP testing results, the β values of the drain parasitic SCR npn-type and pnp-type could reach > 7 A, higher than that of the traditional pDMOS device. However, the Vth and Vh values of the pDMOS-SCR npn-type were less than that of the pnp-type. Furthermore, the Vth of the pDMOS-SCR (ring npn-type) was higher than that of the pnp-type. The β values of the pDMOS-SCR (ring npn-type) can reach 3.223 A, than as compared with the traditional pDMOS increased about 251.8%. Therefore, therefore, the pDMOS-SCR (ring npn-type) is a new layout manner for the ESD robustness and anti-latch-up immunity.

A Follow-Me Robot Toy 383
Wu-Ja Lin, Ling-Yu Wu, Hong-Jhe Chen, Tzu-Wei Wang and Chi-Chun Hung (National Formosa University, Taiwan)
In this paper, we present a robot toy designed to interact with the baby based on visual information captured by the camera. The robot toy navigates and keeps itself at a proper position to the baby and the streets are always related to the parents. The presented robot toy not only can interact with the baby in a more natural way, but also help the parents make sure the baby is in a safe environment.

Wireless Cross-Platform Interactive Home Automation System for Long-Term Care Facilities 385
Yuh-Chen Chang (National Taipei University of Technology, Taiwan)
This paper presents a novel cross-platform interactive home automation system for long-term care facilities, based on the commercially available card-size embedded systems Banana Pi M1 and Intel® Edison. The designed system was divided into two parts, the host and distributed terminals, and various kinds of sensors can be bundled with the distributed terminals. The host can query events of the distributed terminal using the known IP address and defined keywords via a TCP chat service. Each distributed terminal might have different numbers and kinds of sensors for various purposes. This feature provides flexibility and extendibility. Users can use any device, with a camera, and query sensor data on the distributed terminals using an Android application. These features are useful when users are not home.

Sleep stage classification by combination of categoric and heart rate signals 387
Yutaka Yoshida (Nagoya City University Graduate School of Medical Sciences, Japan); Emi Yuda (Nagoya City University Graduate School of Medical Sciences, Japan); Yutaka Yoshida (Nagoya City University Graduate School of Medical Sciences, Japan)
This paper presents the performance of sleep stage classification by combination of categoric and heart rate signals. We studied 40,643 epochs (length 3 min) of polysomnographic (PSG) data for 115 subjects. Both categoric and continuous morphological indices derived from heart rate variability were useful for discriminating between non-REM sleep and wake/REM sleep at 76.9% sensitivity and 74.5% specificity and between REM sleep and waking at 77.2% sensitivity and 72.3% specificity.

Developing an Educational Game Authoring System: Educate-Maker 389
Ah-Fur Lai and Hao-De Gu (University of Taipei, Taiwan)
Learning games are a cost-effective way of promoting learning motivation. Educational game design involves programming competence, visual design and educational profession. Nevertheless, most of the teachers do not have the programming skills. At the same time, almost of game development tools are not designed for educational use. As a result, the purpose of this study is to develop an educational game authoring system for helping the teachers to design web-based instructional game for their students. A monogame system designed by this system is presented and verified for assessing the suitability of this authoring tool.

A Study of Constructing K-12 Programming Competence Indicators 391
Ah-Fur Lai (University of Taipei, Taiwan)
Learning how to code can enhance the learners' logic reasoning and computational thinking abilities, so coding education become an important policy in many countries. At the same time, there are many visualized block programming environment developed after MIT Scratch was launched. Nevertheless, how to conduct coding education is still a big problem without appropriate programming competence indicator. As a result, this study is to constructing a series of programming competence indicator for K-12 students by
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 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 Juan (National Formosa University, Taiwan); Hsu-Ling Tsai (Chung Hwa University of Medical Technology, Taiwan); Chun Hsiang Tseng and Long-Cian Wang (National Formosa University, Taiwan)

A bidirectional 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 the intercommunication messaging with remote relatives. By the sensing sign in the kit and uses WIFI to transmit the signal to WIFI Router, and then sends the medication information to a remote device 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 elderly persons of this aging population or in the future.

Development of a Portable Shock Wave Therapy Device Using a PIC Microcontroller 395
Hui-ting Song (National Taiwan 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 electricity 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 shock protection circuit and the voltage-dividing signal produces a miniature continuous buglike coil launcher. The ADC and PWM functions in the microcontroller control the value of the main pulse output reference. Analyzing the user-selected input 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 medical 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 healthcare. A user study shows that 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
Hui-Kuei Wu (National Taiwan University of Technology, Taiwan); Kuan-Yu Lin (Ling Tung University, Taiwan); Pang-Hsing Liu (Ling-Tung University, Taiwan); Hung Tei Wei and Zhi-Yu Xia (National 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 in Taiwan has become a serious issue due to 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 presents 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 the physical 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
Hui-Kuei Wu (National 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 facility. It is a big burden to a serious problem to 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 exercise is a necessity. 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-Chiu Chiu and Li-Wen Chang (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 111 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 salon of cosmetology with the help of the medical groups. Recent years the micro plastic surgery has been widely applied to substitute for the traditional plastic surgery gradually. The purpose of research investigates the marketability and acceptability of the micro plastic surgery among different demographic variables in Taiwan. The questionnaire survey was conducted using a random sampling method, Likert scale was applied and verified that validity KMO 0.769 and reliability Cronbach’s z Value 0.8325. All the evidences were statistically analyzed by SPSS for the statistic analysis, Independent Samples T Test, one-way ANOVA in this study. The results show that only 43.3% of people accept the traditional 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 Juyn 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 on a PPG sensor. On the other hand, we developed a low-cost processor and can perform the modified LOM algorithm for HRV calculation in real-time while fit for the time-to-market budget margin. Experimental results show that the proposed method can improve the accuracy of HRV analysis from 90% 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-Chen 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. 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 Shen (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 can reduce the effect of light source 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 Rwei Tseng (National Yunlin University of Science and Technology, Taiwan); Chia che Ho (Ho-Chia int., Taiwan); Ming-Hwa Shen (National Yunlin University of Science & Technology, Taiwan); Chi-Chia Sun (National Formosa University, Taiwan)

This paper proposed a new method, MAD(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 ICD(Inner Closed Area Detection), which can detected whether there is a shelter situation on PV Module. After all, we designed a system of Pattern of Multiple Shields Detection. This system is combined with UAV(Unmanned Aircraft System), which 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, Yibetall Chanie Manie, Mekuanint Agegnehu Bitew, Hung-Kai Lu and Peng-Chun Peng (National Taiwan 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 (WDWM) 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 Taiwan University of Technology, Taiwan)

In this study, the LQR control theory was employed to control the inverted pendulum to be balanced. The traditional controller was designed by the mathematical model of the system, but fuzzy controller can be very sensitive to the system. In this research, the controller was designed by LQR control theory, which can control complex and inexact mathematical models be controlled well. There are many ways to control the way and theory: a mathematical model, fuzzy control theory, Laguoyov function and LQR controlling theory. The use of dynamic equations of the characteristics of on-line adjust so on, the use of parameters to control to 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. These circuits are designed and simulated with standard TSMC 0.18um LP CMOS process. The matching network is used not only to obtain the maximum power deliver from antenna to the RF-OC 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 switch 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 -13 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 Shih Sun (National Taiwan 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-Fan Wei-Bin Li, Tsi-Sheng Chu and Shiu-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 circuit. 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 0.18um 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 Taiwan 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 haar-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 kernalized correlation filters. To recognize the taillight signal, we propose an invariant feature including the light scattering area size 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 the current system, we report the design methodologies and implementations of a new personalized learning system. The devised system seamlessly incorporates speech recognition, gesture control, and voice quizzes for human machine interaction. We emphasize the usability of interfaces for creating meaningful 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 played on mobile devices, a new-generation digital set-top box (STB) should provide TV users the streaming services additional to the conventional broadcast service channels. 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 device’s previous video viewing habits, the device chooses the device’s buffer, required bitrate and video quality for each mobile device, and estimated bandwidth variation, the proposed bitrate adaptation algorithm 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, Xi-Zhi Chen and Chao-Wei Yu (National Taipei University of Technology, Taiwan)

In this paper, Haar-like patterns and a classification maximum error rate 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, Jeng-Haur Wang, Yung-Ihsaii Shaw 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. Aimed 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 principles of cross-domain integration, along with a service design approach, 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 incuate 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
Jeng-Haur Wang and Ting-Wei Liu (National Taipei University of Technology, Taiwan)

People usually ask for advice 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)