2013 IEEE 2nd Global Conference on Consumer Electronics

(GCCE 2013)

Tokyo, Japan
1 – 4 October 2013

IEEE Catalog Number: CFP13GCB-POD
ISBN: 978-1-4799-0891-2

Abstract of Presentations on October 1

[14:00–, R103] Student Award Candidates

☐ Spatiotemporal analysis of EMG signals for muscle rehabilitation monitoring system

(pp. 1 - 2)

Sungyoon Lee (Handong University, Korea); Kyung Hyun Koo (Handong Global University, Korea); Yong Lee (Handong Global University, Korea); Jonghoon Lee (Handong Global University, Korea); Jaehyo Kim (Handong Global University, Korea)

This study proposes spatiotemporal EMG signal analysis for muscle rehabilitation monitoring system. Through this monitoring system, users - both patient and therapist - can check one's status: muscle intensity, muscle fatigue, exercise posture, speed and number of movement. We performed three remedial exercises - SLR, SLR(P), and LE - to analyze the EMG signal. In addition, exercises with inappropriate postures and various joint angles also carried out. As a result, clearly different EMG features were extracted for every condition.

☐ Pose-Based 3D Human Motion Analysis Using Extreme Learning Machine

(pp. 3 - 7)

Arif Budiman (University of Indonesia, Indonesia); Ivan Fanany (Fakultas Ilmu Komputer, Universitas Indonesia, Indonesia)

In 3D human motion pose-based analysis, the main problem is how to classify multi-class label activities based on primitive action (pose) inputs efficiently for both accuracy and processing time. Because, pose is not unique and the same pose can be anywhere on different activity classes. In this paper, we evaluate the effectiveness of Extreme Learning Machine (ELM) in 3D human motion analysis based on pose cluster. ELM has reputation as eager classifier with fast training and testing time but the classification result originally has still low testing accuracy even by increasing the hidden nodes number and adding more training data. To achieve better accuracy, we pursue a feature selection method to reduce the dimension of pose cluster training data in time sequence. We propose to use frequency of pose occurrence. This method is similar like bag of words which is a sparse vector of occurrence counts of poses in histogram as features for training data (bag of poses). By using bag of poses as the optimum feature selection, the ELM performance can be improved without adding network complexity (Hidden nodes number and training data).

☐ Minimization of Image Quality Degradation in Multi-projection Mapping

(pp. 8 - 9)

Akifumi Tanaka (Graduate School of Engineering Science Osaka University, Japan); Daisuke Iwai (Osaka University, Japan); Kosuke Sato (Osaka University, Japan)

A major problem on projection-based mixed reality, or projection mapping, is that high spatial frequency components of a projection image are lost by defocus and resampling. This paper proposes a novel method to minimize the image quality degradation of the projected image in multi-projector environment. In the proposed method, we estimate the projected results from the geometric relationship of the projectors and the projection surface, and select the optimal projector for each point of the projection surface.

☐ Potential Flow for Unit Positioning During Combat in StarCraft

(pp. 10 - 11)

Tung Nguyen (Ritsumeikan University, Japan); Kien Nguyen (Ritsumeikan University, Japan); Ruck Thawonmas (Ritsumeikan University, Japan)

This paper presents a method for improving the quality of unit micro management by applying potential flow to unit positioning in the popular RTS game StarCraft. We believe that it is the first time an application of potential flow has been seen in this domain. Experimental results are provided at the end of this paper, which show a promising potential of integrating the method into a StarCraft AI bot and playing it in actual games.

☐ Development of dynamic transaural reproduction system using non-contact head tracking (pp. 12 - 16)

Hiroaki Kurabayashi (Shinshu University, Japan); Makoto Otani (Shinshu University, Japan); Kazunori Itoh (Shinshu University, Japan); Masami Hashimoto (Shinshu University, Japan); Mizue Kayama (Shinshu University, Japan)

A virtual auditory space can be presented to a listener by synthesizing binaural signals with head-related transfer functions and reproducing the signals at listener's ears. Especially, a transaural system is able to realize the binaural signal reproduction with two or more loudspeakers by utilizing a crosstalk canceller. In the transaural system, however, a listener is forced to be still while listening because the crosstalk canceller is highly sensitive to listener's head movements. This paper proposes a dynamic transaural system that responds to a listener's head rotation using non-contact head tracking. A localization experiment was performed with the developed system. The experimental results show that source directions are perceived accurately when the listeners are allowed to rotate their heads with the system, thereby indicating that the system works correctly with a listener's head rotation.

☐ A Study of Blind Image Restoration by Fast Image Deconvolution Utilizing Hyper-Laplacian Prior (pp. 17 - 18)

Masanao Sawada (Nagoya Institute of Technology, Japan); Kyosuke Ohkoshi (Nagoya Institute of Technology, Japan); Tomio Goto (Nagoya Institute of Technology, Japan); Satoshi Hirano (Nagoya Institute of Technology, Japan); Masaru Sakurai (Nagoya Insitute of Technology, Japan)

In this paper, we propose a novel blind deconvolution method in which PSF (Point Spread Function) estimations and regularized deconvolution are calculated alternately. Our proposed method utilizes the hyper-Laplacian prior for deconvolution processes. Experimental results show that our proposed method improves picture quality, especially dark portions, and reduces the computation time by almost 1/3rd that of the conventional method.

☐ A vibration signaling system for support of the hearing-impaired (pp. 19 - 20)

Daisuke Iwase (Hirochima City University, Japan); Shunsuke Ishimitsu (Hiroshima City University, Japan)

The other side of the speech information is very useful for hearing-impaired. The presentation of speech information using the tactile sense was proposed in this study. At first, the vibration perception thresholds are measured to determine the position (fingertips, proximal phalanges, wrist) and frequency for present stimulus on this system. As the result, it is suggested that all three places could be candidate as vibration presentation positions. In addition, we also showed that the frequency band of 125 Hz was suit for vibration stimulus.

[16:00–, R103] Award Candidates

☐ G-MIB: Green-oriented Management Information Base and Its Standardization in IETF

(pp. 21 - 22)

Satoru Izumi (Tohoku University, Japan); Naoki Nakamura (Tohoku University, Japan); Hiroshi Tsunoda (Tohoku Institue of Technology, Japan); Masahiro Matsuda (Tohoku Institute of Technology, Japan); Kohei Ohta (Cyber Solutions, Inc., Japan); Takuo Suganuma (Tohoku University, Japan); Glenn M. Keeni (Cyber Solutions Inc., Japan); Norio Shiratori (Tohoku University, Japan)

In this paper, we propose a 6 type items model of Green-oriented Management Information Base (G-MIB) to monitor the network device status and aim it for standardization in IETF. The G-MIB has versatility and is easy to implement. Thus, the G-MIB has attracted attention in IETF meeting held at Orland in March 2013. Based on the G-MIB, we have been investigating a Green-oriented Network Management Framework to realize an energy-saving network system even without using power consumption monitoring device such as a smart tap (a power strip with a function to measure power consumptions). It monitors connection status of network device based on network management technology and detects power consumption of each device based on network connectivity in real time.

☐ Injecting Speculation on Ideal Trajectories into a Trip-based Integer Programming Model for Elevator Operations

(pp. 23 - 27)

Tsutomu Inamoto (Ehime University, Japan); Yoshinobu Higami (Ehime University, Japan); Shin-ya Kobayashi (Ehime University, Japan)

In this paper, we propose a technique for a trip-based integer programming model for elevator operations to decrease computational times in solving problems for multiple elevators. The technique is inspired by the speculation on ideal trajectories of elevators, where the interval of arriving floors is equal to each elevator. Such trajectories are regarded as oscillating waves. It is expected that limiting movements of elevators to resemble such waves may decrease computational times without degradation on the objective value. This expectation is numerically examined by obtaining optimal trajectories of some problem instances.

☐ Decoupling Dynamic Resource Management Functions from RTOS for Heterogeneous Multi-Core Systems

(pp. 28 - 29)

Shuichi Oikawa (University of Tsukuba, Japan)

The complexity of consumer electronics devices have them employ more powerful processors as their processing load becomes higher; thus, their higher power consumption becomes a critical problem. In order to balance processing power and electrical power consumption, heterogeneous multi-core processors are becoming popular. This paper proposes an extensible RTOS (real-time operating system) architecture for such heterogeneous multi-core processors, which consist of processors with different processing power and functionalities. The architecture splits the RTOS kernel into the two components, the proxy kernel (PK) and user-level kernel (UK), and decouples dynamic resource management functions from the PK. Such architecture enables the PK to run on a less powerful core while RTOS can utilize dynamic resource management functions provided by the UK. The experiment results running micro benchmark programs show the feasibility of the proposed architecture.

☐ A Study on OSGi Based Home Gateway Employing Application-aware QoS Control

Daisuke Takahashi (Mitsubishi Electric Corporation, Japan); Eiichi Horiuchi (Mitsubishi Electric Corporation, Japan)

Toward improvement for time-sensitive application response with low communication line speed, a mechanism which adjusts bandwidth usage between applications on a OSGi based home gateway (HGW) is proposed. The proposal is to equip a service bundle on HGW which enables QoS control by analyzing and scheduling packets of each application. We also perform a comparable calculation for an example of application-aware scheme. As the result, the waiting time of a time-sensitive event driven packet was improved by about 140 ms in here considered case.

☐ Direct Relayed Power Packet Network with Decentralized Control for Reliable and Low Loss Electrical Power Distribution

Hisayoshi Sugiyama (Osaka City University, Japan)

Direct relayed power packet network is proposed for reliable and low loss electrical power distribution to consumers. Differing from the power packet networks so far proposed, in this scheme, power packets are not stored at routers but a direct path is established to the destination at each packet transmission. Each path is reserved before the packet transmission following the reservation protocol based on the synchronized QoS routing in data packet networking. Therefore, power losses do no occur by packet processing at routers nor by packet discards caused by packet collisions or overflows at routers. In addition, because of the pure decentralized scheme of the network operation, system reliability of the electrical power distribution is obtained against a partial failure of the network. This reliability is especially desirable from the view point of disaster prevention in urban areas. In this paper, besides the description of the proposed power packet network, its performances are evaluated by computer simulations including the network capacity, and its reliability against a partial network failure.

Abstract of Presentations on October 2

[13:00–, Lobby] Poster (1)

☐ A Novel Smart Card Development Platform for Evaluating Physical Attacks and PUFs

(pp. 37 - 39)

Toshihiro Katashita (National Institute of Advanced Industrial Science and Technology, Japan); Akihiko Sasaki (National Institute of Advanced Industrial Science and Technology, Japan); Yohei Hori (AIST, Japan)

Smart cards are widely used in our life, and they handle sensitive information. The cryptographic modules on smart cards must be updated to support new algorithms and countermeasures against new threats. In this study, we designed a smart card board with an FPGA in order to develop and evaluate embedded circuits for smart cards. A smart card reader board for side-channel attack experimentation was developed in our previous study. By combining these boards and software, we constructed a platform to develop embedded hardware, software, and applications with smart cards for countermeasures against physical attacks and physical unclonable functions. The details of the platform are described in this paper, and side-channel attack experiments demonstrate that a cryptographic key was extracted from electromagnetic radiation on the smart card board, while a countermeasure with regulators and capacitors prevented attacks that exploit power consumption.

☐ A Remote Controller with Embedded Browser as a Platform

(pp. 40 - 42)

Hiroki Sawada (Ryukoku University, Japan); Tomohiro Hase (Ryukoku University, Japan)

In this paper, a method of operating household electric appliances using a remote controller that incorporates a browser as a platform is proposed. A prototype was prepared in order to evaluate the effectiveness of the proposed method.

☐ An Information Preserving Data Compression for X-ray CT Images using MMSE Denoising

(pp. 43 - 47)

Yamane Nobumoto (Okayama University, Japan); Motohiro Tabuchi (Hospital of Konko, Japan); Ogo Kazuki (Okayama University, Japan)

In recent technical advance on diagnostic imaging systems, such as a PACS system for X-ray CT imaging, is increasing data storage size and communication information rate. Owing to preserve image information required for diagnostic imaging, PACS systems compress image data using lossless compression techniques. In such lossless image compression, it is known that noise in the observed image takes large amount of information rate. Thus an information preserving denoising method may improve not only efficiency of diagnostics but also performance of the lossless image compression. In this paper, a denoising method for X-ray CT images previously proposed using UNI-GMM-AWF is applied to lossless compression. A simulation result shows that the UNI-GMM-AWF is effective to improve data compression rate.

☐ Background Subtraction Based Object Extraction for Time-of-Flight Sensor

Shung Han Cho (Samsung Electronics, Korea); Kwanghyuk Bae (Samsung Electronics Co., Ltd., Korea); Kyu-Min Kyung (Samsung Electronics Co., Ltd., Korea); Seongyeong Jeong (Samsung Electronics, Korea); Tae-Chan Kim (Samsung Electronic Co. Ltd., Korea)

This paper presents a moving object extraction method using background subtraction techniques for Time-of-Flight sensor. Time-of-Flight sensor obtains two different types of data at the same time. One is depth data representing the distance to objects and another is intensity data representing the confidence level of depth data. After each reference background model is constructed for depth and intensity data, each foreground object map is obtained for depth and intensity data by comparing to its reference background model. Final foreground objects are extracted by combining two foreground object maps to remove noise data. The simulation results with MESA SR4000 show that the proposed method extracts moving objects accurately.

☐ Correlation Analysis of Time-Varying Signals Using Wavelets

Kodai Murakoshi (Hiroshima City University, Japan); Shunsuke Ishimitsu (Hiroshima City University, Japan); Kensuke Fujinoki (Oshima National College of Maritime Technology, Japan)

In this study, we proposed a new method to extract components of objective signals from sound produced by a motorcycle and noise from the interior of a ship using an instantaneous correlation function based on wavelets. We also introduced the concept of limiting the bandwidth of the observed signal using filters to improve the accuracy of our method. Thus, we were able to observe the running condition of the engine based on the sounds it produced within the noisy environment. This method can be useful in designing engine sounds, separating sound sources, and active noise control.

☐ Cover song identification with direct chroma feature extraction from AAC files

Tai-Ming Chang (National Central University, Taiwan); En-Ting Chen (National Central University, Taiwan); Chia-Bin Hsieh (National Central University, Taiwan); Pao-Chi Chang (National Central University, Taiwan)

This paper proposes a low-complexity and effective feature extraction method derived directly from AAC files. Unlike traditional methods that must decode audio files and then compute fast Fourier transform coefficients, the proposed system directly maps the modified discrete cosine transform coefficients into a 12-dimenional chroma feature without fully decoding it. To accelerate the matching time, segmentation is applied to reduce the time dimension in the feature space. In addition, the dynamic programming technique is used to match songs to various tempos. The experimental results show that the proposed system achieves a 62% accuracy rate, which is an improvement over the traditional FFT-based system, and reduces the computational complexity by approximately 35%.

☐ Design of AV Remote Controller GUI by Using Neural Network in Consideration of Human Error

Mio Ogawa (Ryukoku University, Japan); Tatsuya Okugawa (Ryukoku University, Japan); Hiroki Sawada (Ryukoku University, Japan); Tomohiro Hase (Ryukoku University, Japan)

This study proposes a design method for a remote controller GUI that meets various users'

attributes and is easy to use. Further proposed is a method to prevent the recurrence of human errors in operation.

☐ Effects of Electromagnetic Interferences on Implantable Cardiac Pacemakers

Takahiro Okumura (Saitama Medical University, Japan); Kazuyuki Kojima (Saitama University, Japan)

In this paper, we investigate the effects of electromagnetic interferences on implantable cardiac pacemakers. For the purpose, we measure the strength of electromagnetic fields arise from an electric article surveillance system (EAS), and conduct experiments to diagnose the functionality of pacemaker in the electromagnetic fields by using Irnich-model.

☐ Electromagnetic Characteristics of Body Area Communication Using Electromagnetic Resonance Coupling

Fukuro Koshiji (Kokushikan University, Japan); Nanako Yuyama (Kokushikan University, Japan); Kohji Koshiji (Tokyo University of Science, Japan)

In this study, we employed a realistic human arm model based on the MRI data, provided by NICT, for the investigation of the transmission characteristics S21 and electromagnetic field distributions and Specific absorption Rate (SAR) in body area communication using electromagnetic resonance coupling. As a result, it is found that the transmission characteristics obtained from the models employing the realistic arm and the simplified cylindrical arm agreed well with each other. Furthermore, it is also found that the SAR of the body was less than a three-hundredth compared with the safety limit of 2 W/kg.

☐ Energy Management of Hybrid Vehicles using Artificial Intelligence

Kim Fung Tsang (City University of Hong Kong, Hong Kong)

High depletion of diesel and petroleum gas in vehicles has wreaked havoc on environment and human beings. In the light of better fuel economy and lower pollution, more people will adopt hybrid electric vehicles. To improve the energy efficiency of fuel-cell based hybrid electric vehicles and thus improving the performance of fuel reduction, a feasibility study of optimization of energy efficiency has been discussed using genetic algorithm controller and fuzzy logic controller respectively. On the other hand, energy has precedence to be generated by battery over fuel as battery produces less pollutants and carbon dioxide. Based on various percentage battery capacity and fuel tank capacity, thirty two (9) scenarios have been investigated. The average reduction of fuel consumption by genetic algorithm is 17.7% and thus 390 tons of carbon dioxide emission and 2.8 million Hong Kong dollars will be reduced when either one optimization scheme is adopted for every one million of vehicles per 28 kilometers. The performance can be further enhanced to improved energy efficiency by 21.1% with 464 tons carbon dioxide reduction and 3.3 million Hong Kong dollar saving provided the same constraint. This can relieve the greenhouse effect and increase the popularity of people from replacing conventional vehicles with hybrid electric vehicles. To conclude, fuzzy logic is an optimal solution which achieves the highest energy efficiency in fuel-cell based hybrid electric vehicles.

Recently, we are living in an era filled with unprecedentedly growing senior population. Nowadays, smart technologies for healthcare have been increasingly interested by general consumers due to their numerous advantages such as affordability, user-friendliness, point-of-care usability and social-ability. In this paper, we have developed a smart shoe system with ability to observe human gait patterns and foot odor. The motion pattern and foot odor measurement systems were installed inside the shoes using force sensitive resistors (FRSs), bending sensors and chemical gas sensors. Thereby the FRSs and bending-sensor were installed beneath the foot while chemical gas sensor array was installed inside the tongue of the shoes. In addition, zigbee technology was used as data communication between all sensors with a receiver USB-connected to a computer. This system was developed to be consumer-friendly having a compact size and using low-cost technologies. It was demonstrated that this wearable device could classify different types of human gait patterns and foot odors during the duration of wearing time.

☐ High-frame-rate LED Display with Pulse-width Modulation by Use of Nonlinear Clock

(pp. 83 - 84)

Toyotaro Tokimoto (The University of Tokushima, Japan); Kengo Sato (University of Tokushima, Japan); Shiro Suyama (University of Tokushima, Japan); Hirotsugu Yamamoto (University of Tokushima, Japan)

We have developed two types of high-frame-rate LED displays, both of which employ pulse-width modulation by use of nonlinear clock. One of the LED display shows a static image at 4,320 frames per second so that the displayed image is perfectly photographed by a high-speed camera. The second type of the LED display shows a dynamic movie at 960 frames per second. Furthermore, the developed high-frame-rate LED display was utilized for hand-waving steganography.

☐ Implementation of Normally-off Function for TOPPERS/ASP Kernel (pp. 85 - 89)

Yuma Arakawa (Future University Hakodate, Japan); Takeshi Nagasaki (Future University Hakodate, Japan); Masashi Toda (Kumamoto University, Japan); Keiji Hirata (Future University Hakodate, Japan); Hitoshi Matsubara (Future University Hakodate, Japan)

This paper proposes a normally-off embedded system. The idea behind this system is it turns the power off when the system is idle. Volatile devices, however, cannot maintain their own internal information when they are powered off. So, we use non-volatile RAM (NVRAM) to save the internal information. We developed an operating system (OS) function that saves the internal information to and loads it from this NVRAM. We then implemented it into the TOPPERS/ASP kernel as a power saving framework. We conducted two experiments. The first was a simulation for evaluating the break-even point (BEP). The second evaluated the power consumption behavior.

☐ Improvements in Stereophonic Sound Images of Lossy Compression Audio

(pp. 90 - 91)

Masaru Kimura (Mitsubishi Electric Corporation, Japan); Atsushi Hotta (Mitsubishi Electric Corporation, Japan)

We propose a method that gives improvements to stereophonic sound images of lossy compression audio signals. In our proposed method, AR prediction is used for estimating the difference between the signals of the left and right channel. We confirmed that the proposed

method could restore a stereophonic sound image by a subjective evaluation.

☐ Improving Accuracy of Facial Recognition Systems For Distant Targets (pp. 92 - 93)

Jun-Horng Chen (Oriental Institute of Technology, Taiwan); Chin-Lun Lai (Oriental Institute of Technology, Taiwan); Chih-Hong Chu (Wistron Corporation, Taiwan); Jing-Ying Hsu (Wistron Corp., Taiwan)

This work experimentally compared the accuracy in various scenarios for distant targets of the PCA-based face recognition system. The results showed some interesting phenomena which is worthy of further research. Besides, this work also indicated the accuracy can not be always raised by increasing the projection dimensionality which provide a useful recommendation in design of a practical facial recognition system.

☐ InfoScope: Smart Telescope System using Robust Feature Points Matching under Various Sunshine Conditions (pp. 94 - 95)

Tetsushi Watanabe (YRP Ubiquitous Networking Laboratory, Japan); Shinsuke Kobayashi (YRP Ubiquitous Networking Laboratory, Japan); Noboru Koshizuka (The University of Tokyo, Japan); Ken Sakamura (The University of Tokyo, Japan)

In this paper, we propose a smart telescope system, which we call “InfoScope”. The system exploits feature points matching between a pre-registered photo and a live camera screenshot, in order to overlay the POI(Point of Interest) information onto the live camera view. Feature points matching is robust against rotation and scale changes. However, this method is prone to sunshine condition, which significantly affects ambient luminance, to be specific a photo taken in the morning does not match one taken in the evening. To solve this problem, we developed a feature point description database called OmniReference. To absorb these effects, feature point descriptors from a photo and a photo taken in the evening are merged and stored in OmniReference. By utilizing OmniReference, POI can be successfully displayed on the live camera view accurately even under variable sunshine conditions. We have analyzed photos taken periodically during the daytime from three observation points. This method significantly improves the matching accuracy throughout the day.

☐ In-line fiber glucose sensor (pp. 96 - 97)

Cheng-Chih Hsu (Yuan Ze University, Taiwan); Cheng-Ling Lee (National United University, Taiwan)

We proposed an In-line fiber glucose sensor which immobilized the GOx on the surface of no-core fiber by analyzing the MMI signal. Based on the measurement results, the sensitivity of proposed method can be reached 50 mg/dl with the OSA of 0.1 nm wavelength resolution. In addition, different tip of the MMI signal has different sensitivity of the wavelength shifting. In this study, the higher sensitivity of wavelength shifting is around of wavelength of 1450 nm. The smallest wavelength shifting is about 0.1 nm which resulted from the glucose concentration variation of 50 mg/dl.

☐ Point, Shoot, and Paste: Direct Photo Pasting from a Digital Still Camera (pp. 98 - 99)

Tomomi Takashina (Nikon Corporation, Japan); Hideki Sasaki (Nikon Corporation, Japan); Yuji Kokumai (Nikon Corporation, Japan); Yutaka Iwasaki (Nikon Corporation, Japan)

We propose a novel interaction method “point-shoot-and-paste” for transferring a photo into

the specified position of a PC document directly and intuitively from a DSC; a user aims a DSC at the pasting position in the screen of the PC, presses the shutter button, and then the photo is transferred and pasted in the position. This method is advantageous because it is intuitive and doesn't need any special sensors to specify the location of pasting. Our middleware will also enable generic applications to utilize "point-shoot-and-paste".

☐ Practical Depth Map Generation in Zooming-up/ Zooming-down from Asymmetric Stereo Cameras (pp. 100 - 101)

Yoshihiro Morioka (Panasonic AVC Japan, Japan)

A novel technique in order to generate practical dense depth map from asymmetric configuration of stereo cameras is presented. We developed a prototype which is composed of, unlike in the case of conventional apparatus, first imaging system with zoom lens (L-ch) and second imaging system with short focus lens (R-ch). Although we tried to get high-quality dense depth map by the stereo matching, when zoom factor is varying, we found considerable noises were contained in calculated depth maps from R-ch and L-ch . To solve this problem, we examined the origin of the noises, and devised a new system configuration, which suppresses dynamic distribution changes of lens distortion in zooming-in or zooming-out. We confirmed that practical dense depth map can be generated with this technique. Consequently, this technique makes it possible to build compact-size stereoscopic camcorders with ranging function.

☐ Real-time Color Correction for a Photo-based Augmented Reality System

(pp. 102 - 103)

Masaya Ohta (Osaka Prefecture University, Japan); Tsukasa Sato (Osaka Prefecture University, Japan); Masataka Motokurumada (Osaka Prefecture University, Japan); Katsumi Yamashita (Osaka Prefecture University, Japan)

This report proposes methods for correcting the color tone of photographic images in a photo-based augmented reality (AR) system in real time to suit the user's environment. Photo-based AR systems achieve AR by selecting a specific photographic image, which was shot in advance, to suit user's camera position and "pasting" it onto the camera view. Unlike conventional systems, this system does not require a 3D model, so no model rendering, which reduces the rendering load, is necessary. The approach should be effective in terminals with small battery capacities such as smartphones. However, this system becomes problematic if the photograph of the object selected does not fit well with the background lighting conditions when the photograph was shot, because the AR may vary. Thus, the proposed method facilitates more natural AR by correcting the color tone of the photographic image.

☐ Relationship between Physical Conditions and Lip Motion Change Arising due to Amusement Feeling (pp. 104 - 105)

Yoichi Kageyama (Akita University, Japan); Tsuyoshi Takahashi (Akita University, Japan); Atsushi Momose (Akita University, Japan); Masaki Ishii (Akita Prefectural University, Japan); Makoto Nishida (Akita University, Japan)

In our previous study, we have developed a novel algorithm for lip motion analysis arising due to amusement feeling after watching TV-comedy programs as emotion-eliciting stimuli. This algorithm can detect the occurrence of amusement feeling. However, relationship between physical conditions of subjects and the variance of lip motion features extracted from pronouncing some sentences have not yet been analyzed. This paper analyzes this relationship

and the results of the conducted experiment show that the variance of lip motion features varies due to physical conditions of subjects.

☐ Software Modem for Near Field Acoustic Communication with Antenna Diversity Technique (pp. 106 - 108)

Naoki Shinmen (University of Tsukuba, Japan); Takuya Aoki (University of Tsukuba, Japan); Tadashi Ebihara (University of Tsukuba, Japan); Naoto Wakatsuki (University of Tsukuba, Japan); Koichi Mizutani (University of Tsukuba, Japan)

Acoustic communication has broad utility for near field, device-to-device communication, since it utilizes the standard equipment; speaker and microphone. In this paper, a simple acoustic modem that enables communication using orthogonal frequency division multiplexing (OFDM) is focused on. In near-field acoustic communication, the effect of the environmental noise cannot be negligible. To achieve reliable communication, the modem is designed to use antenna diversity which utilizes multiple microphones. To confirm that the antenna diversity technique is effective even in acoustic communication, bit error rate (BER) was estimated with real communication channels. As a result, it was confirmed that the modem with the antenna diversity technique could achieve lower BER than that without antenna diversity.

☐ The First Next Generation Wireless Form Factors standardized in the PCI SIG for Ultrabook and Tablet (pp. 109 - 111)

Hideto Horikoshi (Lenovo, Japan)

This paper reviews the predecessor form factors and the first samples of the Next Generation Wireless Form Factors (NGWFF) standardized in the PCI SIG. The NGWFF was officially re-named as M.2 form factor by the PCI SIG. Lenovo proposed several requirements and recommendations [1] for standardizing the M.2 form factor in the PCI SIG in 2012 based on the Lenovo's custom SFF(Small Form Factor) and TFF(Thin Form Factor) which were integrated into ThinkPad X1 Carbon Ultrabook, ThinkPad Tablet 2 and ThinkPad Helix Ultrabook Convertible. The first wireless module samples of the M.2 form factor were integrated into ThinkPad X230s and T431s ultrabooks. The M.2 form factor will replace the existing PCI Express minicard form factor for ultrabook and tablet.

☐ Trial Implementation of Acoustic Distance Measurement Method for Very-close-range Measurement Based on Standing Waves Using Power and Phase Spectra of Single-channel Observations (pp. 112 - 115)

Noboru Nakasako (Kinki University, Japan); Yuji Koizumi (Kinki University, Japan); Toshihiro Shinohara (Kinki University, Japan); Masato Nakayama (Ritsumeikan University, Japan); Tetsuji Uebo (WADECO CO., LTD., Japan)

Since the distance to target is very important information, we proposed an acoustic distance measurement (ADM) method based on interference between transmitted and reflected waves. However, in order to measure short distances, a transmitted wave with a wide bandwidth is required. Recently, we have theoretically developed the very-close-range ADM method by introducing an analytic signal instead of the power spectrum. The present paper newly describes a realization of compact system for very-close-range measurement and examines experimentally the effectiveness of the proposed system.

[14:00–, R102] SS-6: Entertainment Computing (1)

☐ An Automatic Motion Generation System for Humanoid-like Robot Based on Interactive GA

(pp. 116 - 117)

Soichiro Oki (Keio University, Japan); Masafumi Hagiwara (Keio University, Japan)

In this paper, we propose an automatic motion generation system for a humanoid-like robot based on Interactive Genetic Algorithm(IGA). The proposed system can generate various movements for ten kinds of emotions, i.e., joy, anger, sadness, fear, shame, like, dislike, irritate, easy and surprise. Because of employment of IGA, users' burden is low. Laban features are also used for effective learning. We performed two kinds of evaluation experiments. One is evaluation of generated movements, second one concerns effectiveness of usage of Laban features. In addition, clustering analysis is carried out to find various findings for movements.

☐ A Study of Thermal Sensation with Visuo-Thermal Projection Interfaces

(pp. 118 - 119)

Yuki Yoshikawa (Osaka University, Japan); Daisuke Iwai (Osaka University, Japan); Kosuke Sato (Osaka University, Japan)

In this study, we propose a visuo-thermal projection interface to provide a visible image and a thermal sensation with a distant user for tele-communication. Most previous systems providing a thermal sensation to a user require him/her to touch special devices. On the other hand, our proposed system consists of a visible light projector and a far-infrared light projector, which can simultaneously provide both visual and thermal information on a user's body without requiring him/her to touch such devices. We built a prototype system, and investigated how the thermal sensation of a user was affected by an overlapped visible image through psychophysical experiments.

☐ Camera Based Hand Recognition for the Graphically Extended Hand

(pp. 120 - 121)

Kohei Okahara (Osaka University, Japan); Shuhei Ogawa (Canon Inc, Japan); Daisuke Iwai (Osaka University, Japan); Kosuke Sato (Osaka University, Japan)

In this paper, we propose a manipulation method for 10 foot-UI system called 'Extended Hand' which is a graphical extension of a user's hand. In Extended Hand system, a combination of the forces applied to each finger control the position and the posture of Extended Hand. While the system detects both the pressing of each finger and its direction in video processing, it recognizes the translational direction and identify gripping motion and translation by using each finger displacement. In experiments, the system can recognize the user's translational direction at the directional error within 1.2 deg. and the dispersion within 7.5 degree, also identify translation and gripping with 96% identification rate.

☐ Mobile Visual Search for 3-D Objects: Matching User-Captured Video to Single Reference Image

(pp. 122 - 123)

Hiroko Yabushita (NTT Media Intelligence Laboratories, Japan); Tatsuya Osawa (NTT Corporation, Japan); Shimamura Jun (NTT Media Intelligence Laboratories, NTT Corporation, Japan); Yukinobu Taniguchi (Nippon Telegraph and Telephone Corporation, Japan)

We propose a three dimensional (3D) object recognition technique: it enable realization of "mobile visual search for 3D objects" to get the information about the real-world object that he/she is interested in. Users have only to capture a short video of the target object to realize

matching to a reference image. The image-based object recognition technique recognizes an object by comparing the user-captured image(s) (hereinafter referred to as the "query") to the stored reference image(s). Unfortunately, the appearance of 3D objects changes dynamically with the viewpoint. To cover the variation in appearance anticipated, we must be able to extract from the query and reference image(s) features sufficient to permit matching. We deem the traditional approach, many reference images for each object taken from different viewpoints, to be impractical. Our approach assumes that the reference image of an object is a single photo, while the query data is a video sequence from which features are extracted for matching against the reference image. We proposed the above framework in a prior paper, and showed that it offered high accuracy when challenged with ideal data. To extend the framework such that it can handle real-world data, we propose an advanced technique that obtains the object's features from the captured video, and then matches the features to reference image. An experiment verifies that the proposed technique can recognize real-world objects from captured videos. Its results show that the technique offers high accuracy.

☐ Poppable Display: A display that enables popping, breaking, and tearing interactions with people (pp. 124 - 128)

Yoichi Ochiai (the University of Tokyo, Japan); Takayuki Hoshi (Nagoya Institute of Technology, Japan); Alexis Oyama (JiseCHI Interactive Lab, USA); Jun Rekimoto (University of Tokyo + Sony CSL, Japan)

We previously developed a display using a soap film as a screen. This screen can display various appearances of the projected images by changing its reflectance property by controlling ultrasound waves. Further, the soap film has other advantages of being very thin and disposable. This research aims to make use of these advantages to realize new interactions with a display. The soap screen pops out and breaks. Users can insert their fingers into the screen. After this screen is broken, it can be replaced easily. This display is expected to contribute to entertainment computing communities by acting as a deformable and physically interactive display. In this paper, the details of the proposed display, the related experimental results, discussion and future work are presented.

☐ Exploiting Collective Intelligence for Asynchronous Collaborative Search (pp. 129 - 130)

Ying-Chieh Peng (National Cheng Kung University, Taiwan); Chia-Cheng Chang (National Cheng Kung University, Taiwan); Wei-Guang Teng (Natonal Cheng Kung University, Taiwan); Chen-Ming Wu (Institute for Information Industry, Taiwan)

As information and telecommunication technologies advance at a rapid pace recently, network services have already become an inseparable part of one's daily life for many people. Web search is then undoubtedly a major entry of the Internet for most users when acquiring information, especially for mobile users. However, the recent research direction of this field is too much focused on the improvement of personalized search. We thus propose in this work an idea of collaborative search to reflect the collective intelligence of colleagues working on the same work, students taking the same course, friends planning an upcoming trip and so on. With a proper cooperation, users may work together during their search process in an efficient way even if they are not familiar with their search target. Also, it is noted that users may conduct their search activities in different time and places. We emphasize such an asynchronous style of collaborative search and especially address the features of integration and planning in this work. Moreover, several usage scenarios are developed to verify the feasibility of the proposed technique in accomplishing collaborative search.

[14:00–, R103] SS-8: Recent Audio Engineering & Technology (1)

☐ An optimal Design Method of Delta-Sigma Modulator using GA for Digital Audio Amplifier

(pp. 131 - 132)

Takayuki Iwase (Nagoya Institute of Technology, Japan); Satoshi Hirano (Nagoya Institute of Technology, Japan); Tomio Goto (Nagoya Institute of Technology, Japan); Masaru Sakurai (Nagoya Insitute of Technology, Japan)

Low-power digital audio (Class-D) amplifiers are widely used in portable digital devices, such as MP3 players and smart phones. ΔΣ modulators are suitable for Class-D amplifiers, because high-order ones provide better performance and low cost. However, for higher-order ΔΣ modulator design, it is imperative to determine the optimal design parameters for realizing the maximum signal-to-noise ratio (SNR) while maintaining system stability. This process requires the expertise of an experienced designer. To avoid this requirement, we propose an automatic optimal design method that uses genetic algorithm (GA) and that does not require the expertise of an experienced designer. This method generates an optimal design of ΔΣ modulators, so that the design provides higher system stability and maintains high SNR.

☐ Delta-sigma modulator with μ-synthesis and switching loop filter based on the linear gain

(pp. 133 - 134)

Kita Kenji (Kyushu University, Japan); Toshiya Samejima (Kyushu University, Japan)

A delta-sigma modulator is one of systems used for an analog-to-digital converter. It is known that high signal-to-noise ratio will be obtained by making a high-order loop filter of the delta-sigma modulator. However, when input amplitude becomes large, a problem that the system becomes unstable occurs. This paper proposes a delta-sigma modulator combining the method of switching the loop filter by the change of the linear gain with the loop filters designed through a μ-synthesis. A stable range will spread out for large input amplitude by using the method of switching the loop filter. The effectiveness of the proposed method is confirmed by computer simulations.

☐ Hardware-Accelerator Design for Energy-Efficient Acoustic Feature Extraction

(pp. 135 - 139)

Ingo Schmädecke (Leibniz Universität Hannover, Germany); Holger Blume (Leibniz Universitaet Hannover, Germany)

Music Information Retrieval (MIR) applications are highly attractive for consumer products as they allow a comfortable management of huge music databases. Such methods are almost based on acoustic features extracted from raw audio-content. Unfortunately, this processing step is extremely time intensive. Thus, the energy consumption of the underlying hardware architecture becomes critical especially for mobile devices. This paper presents a hardware accelerator that efficiently extracts features from audio data. The architecture is designed for Field Programmable Gate Arrays (FPGA) and Application-Specific Integrated Circuits (ASIC). Quantitative results confirm a speed up of up to factor 5 compared to an Intel Core i7 2640M CPU with a concurrent reduced power consumption of at least factor 7 regarding the FPGA implementation. Furthermore, the ASIC implementation is up to 70000 times more energy efficient than a CPU and is therefore suitable even for mobile devices.

☐ Rendering an immersive sound field using a virtual height loudspeaker: Effect of height-related room impulse responses (pp. 140 - 141)

Sungyoung Kim (Rochester Institute of Technology (RIT), USA); Doyuen Ko (McGill University, Canada); Wieslaw Woszczyk (McGill, Canada); Hiraku Okumura (Yamaha Corporation, Japan)

In order to provide consumers more enhanced and immersive experience in sound, most of the new multi-channel reproduction formats highlight the significance of height-related information. In this paper, we investigated the influence of height-related room impulse responses when reproduced via various "height-loudspeakers," including a virtual loudspeaker. Test participants then listened to the corresponding sound fields and rated their perceived quality in terms of spaciousness and integrity. The results showed that perceived spatial quality was affected by height loudspeaker positions and signal-rendering methods. When virtually reproduced height information was favored, it was a specific room impulse response coupled with a virtual loudspeaker rendering process, which provided listeners with enhanced spatial impressions.

☐ Assessment of Sound Source Localization and Subjective Quality for VoIP Phone Service with Binaural 3D Audio (pp. 142 - 146)

Ryo Murakami (Nagoya Institute of Technology, Japan); Yoshihiro Ito (Nagoya Institute of Technology, Japan)

This paper studies the feasibility of a VoIP phone service with binaural 3D audio. For this purpose, the paper evaluates it with the objective and subjective evaluation that are for the legacy IP phone services by experiment. Moreover, it assesses the sound source localization, which is inherent in evaluation of 3D audio, for the service. By experiment, the authors show that ITU-T G.711 is better than Speex for the encoding of the service; consequently, they indicate the service is feasible over the Internet.

[14:00–, R104] SS-9: Advanced Embedded Systems Development & Electronics Design (1)

☐ Semi-automatic 3D Stereoscopic Camera Rig System for Home User (pp. 147 - 148)

Julian Ilham (Pukyong National University, Korea); Wan Young Chung (Pukyong National University, Korea)

Because of recent increasing demand for 3D video, 3D production is rapidly growing as well. However common way in stereoscopic 3D system for 3D productions is still using manual technique. This manual operation requires the operator's high level skill and time consuming process. In this paper, our semi-automatic camera rig system equipped with interaxial distance and convergence angle controlled by PLC is proposed for the convenience operation of 3D camera rig. Based on experiment, we can minimize camera rig operator intervention as well as reduce time consuming during video shooting process

☐ Reconfigurable VLSI Digital Filters for Tolerating Multiple Timing Errors (pp. 149 - 150)

Hsin-Chou Chi (National Dong Hwa University, Taiwan); Hsi-Che Tseng (National Dong Hwa University, Taiwan); Chia-Wei Jeng (National Dong Hwa University, Taiwan)

One of the major problems with advanced semiconductor technology is timing errors caused by process variation and device aging. With such problems, conventional worst-case designs

suffer poor system performance. This paper proposes an aggressive design technique for VLSI digital filters for tolerating timing errors. When a timing error occurs, the system reconfigures the buffer cell of the problematic stage with little performance degradation. We have applied the technique to several digital filters. The design of an IIR filter with tolerance of timing errors is described and demonstrated. The results show that our proposed design achieves tolerance of multiple timing errors with small cost of chip area and power consumption.

☐ User-Aware Power Management for Mobile Devices (pp. 151 - 152)

Geunsik Lim (Sungkyunkwan University, Korea); Changwoo Min (Sungkyunkwan University, Korea); Dong Hyun Kang (Sungkyunkwan University, Korea); Young Ik Eom (Sungkyunkwan University, Korea)

The power management techniques to extend battery lifespan is becoming increasingly important due to longer user applications' running time in mobile devices. Even when users do not use any applications, battery lifespan decreases continually. It occurs because of service daemons of mobile platform and network-based data synchronization operations. In this paper, we propose a new power management system that recognizes the idle time of the device to reduce the battery consumption of mobile devices.

☐ Efficient Reverse Converters Designs for RNS based Digital Signal Processing Systems (pp. 153 - 154)

Nicholas C H Vun (Nanyang Technological University, Singapore); Kalyanaraman Karthik (NTU, Singapore)

Residue Number System based signal processing is an efficient alternative to the conventional methods due to its small data size and parallel arithmetic operations. This paper presents the designs of the RNS to binary reverse converter, which is a critical component in a RNS based system. Different RNS modulo adders required to implement the reverse converter for the {2k-1, 2k, 2k+1} moduli set are evaluated. Their performances are then compared against each other. FPGA synthesis results are also presented to demonstrate the performance efficiency of the different designs.

☐ Implementation of Trigonometric Custom Functions Hardware on Embedded Processor (pp. 155 - 157)

Kuan Jen Lin (Fu Jen Catholic University, Taiwan); Chien Chih Hou (Fu Jen Catholic University, The Netherlands)

The CORDIC algorithm is commonly used to calculate the trigonometric functions, which are widely used in real time digital signal processing. In this paper, we explore various hardware structures in combination with software to realize the trigonometric custom instructions on Altera Nios II SOPC platform. With Nios II custom instructions, you can take full advantage of the flexibility of FPGAs to meet system performance requirements. Experimental results shows the proposed custom instructions are typically 1000 times faster than software functions in C language on the platform.

[14:00–, R105] Smart Grid & CE (1)

☐ AC/AC Converter towards Power Routing Systems in Smart-Grids: Advantage on Operation by Nonlinear Dynamics (pp. 158 - 159)

Alexandros Kordonis (Kyoto University, Japan); Ryo Takahashi (Kyoto University, Japan); Takashi Hikihara (Kyoto University, Japan)

The introduction of distributed power sources are making the classic power grid out-of-date. One possibility of smart-grid is replacing the conventional one by introducing power routers. It inserts the information tag along with the power transmission. An important factor of the system, the classic transformers, are also not suitable for the above application since they lack of active control. Therefore, AC conversion systems are proposed to replace them. This paper focuses on the exploitation of nonlinear dynamics aiming to a faster and more agile AC/AC conversion.

☐ Circuit Switching by Power Routers in Power Distribution Network (pp. 160 - 161)

Yutaro Kitamori (Kyoto University, Japan); Ryo Takahashi (Kyoto University, Japan); Takashi Hikihara (Kyoto University, Japan)

A recently proposed power router has a function to realize circuit switching of power distribution network. In this paper, a feasibility of circuit switching with multiple power routers is investigated. In particular, the switching operation is discussed in parallel and serial configuration connections of the power routers. These are enough to confirm the feasibility in distribution network.

☐ A Rule-Based Home Energy Management System Using the Rete Algorithm (pp. 162 - 163)

Tomoya Kawakami (Kobe University, Japan); Tomoki Yoshihisa (Osaka University, Japan); Naotaka Fujita (Kobe University, Japan); Masahiko Tsukamoto (Kobe University, Japan)

In this paper, we propose a rule-based Home Energy Management System (HEMS) using the Rete algorithm. In the proposed system, rules for managing energy are processed by smart taps in network, and the loads for processing rules and collecting data are distributed to smart taps. In addition, the number of processes and collecting data are reduced by processing rules based on the Rete algorithm.

☐ Phase Synchronization of Inverter Linking Power System Network with Distributed Generation under Voltage Sag (pp. 164 - 165)

Masataka Minami (Kobe City College of Technology, Japan); Takashi Hikihara (Kyoto University, Japan)

This paper investigates a phase synchronization of an inverter between distributed generation and power system network. The phase synchronization is focused based on equivalent inertia of the inverter to synchronous generator. It is experimentally clarified that the phase synchronization of the inverter maintains stable linkage with the power system network at an abrupt voltage sag.

☐ Proposal of Alarm and Control Methods for Demand Response of Energy Management System (pp. 166 - 169)

Shingo Fujimori (Marketing Division, Japan)

This paper proposes an alarm and control method for Demand response of Energy Management System. In this paper, alarm method by using AC(Auxiliary Channel) of TV signals is proposed without changing existing technical standard. Consequently, the proposal method allows demand response of energy management system more effective.

[16:00–, R102] SS-6: Entertainment Computing (2)

☐ Touch-Shake: Design and Implementation of a Physical Contact Support Device for Face-to-Face Communication (pp. 170 - 174)

Yohei Yamaguchi (Future University of Hakodate, Japan); Hidekatsu Yanagi (Future University Hakodate, Japan); Yoshinari Takegawa (Future University Hakodate, Japan)

In this study we developed the Touch-Shake, which supports physical contact for face-to-face communication. The Touch-Shake has a LED and a speaker, and is shaped like a baton. When each user holds a Touch-Shake and one user touches the body of the other, the LEDs of the Touch-Shakes turn on and the Touch-Shakes output sounds. Additionally, the output sounds and lighting pattern of LEDs vary based on how the user touches the other body, the users' body condition, and the users' physical attributes, which are measured using a capacitive sensor built into the Touch-Shake. The results of an evaluative experiment revealed that the subjects enjoyed physical contact with the Touch-Shake, and they were able to experience rich face-to-face communication.

☐ OpenPool: Community-based Prototyping of Digitally-augmented Billiard Table (pp. 175 - 176)

Jun Kato (The University of Tokyo, Japan); Takashi Nakashima (OpenPool Project (Lab Production Inc.), Japan); Hideki Takeoka (OpenPool Project (Lab Production Inc.), Japan); Kazunori Ogasawara (Lab Production Inc., Japan); Kazuma Murao (Lab Production Inc., Japan); Toshinari Shimokawa (OpenPool Project (Lab Production Inc.), Japan); Masaaki Sugimoto (Keio University, Japan)

This paper describes our experience of prototyping OpenPool (http://openpool.cc/), a system that digitally augments a billiard table with audio and visual effects. Our observation on its growth as an open-source project revealed that entertainment system can be a good platform for open collaboration among people with diverse backgrounds. In this paper, we explain the brief overview of OpenPool, investigate how it has engaged many people to achieve successful collaboration, and characterize its development process named "community-based prototyping."

☐ A Heart Rate Presentation System for Keeping Music Tempo in Live Performance (pp. 177 - 181)

Daigo Suzuki (Kobe University's Graduate School, Japan); Yoshinari Takegawa (Future University Hakodate, Japan); Tsutomu Terada (Kobe University, Japan); Masahiko Tsukamoto (Kobe University, Japan)

It is important for musicians to show their true ability in a live performance. However many musicians make mistakes, such as a keystroke error or a fingering error, because their music

tempo in live performance is different from that in daily practice. It is difficult to calm the mind and overcome feelings such as nervousness and excitement in live performance. Our preliminary evaluation showed that music tempo is related to the heart rate of a musician. If the musician notices his/her own mental condition, he/she tries to change their performance. For example, he/she tries to play in slower tempo in live performance than in daily practice, when he/she knows that his/her tempo in slower tempo in live performance is higher than in daily practice. Therefore, the goal of our study is to design and implement a heart rate presentation system for keeping music tempo in live performance. The proposed system shows a musician his/her heart rate from daily practice and his/her current heart rate before his/her performance. We have developed a prototype system, and evaluated its effectiveness through actual use of the prototype system. We found that it had advantages compared to the method that presents nothing to keep tempo in live performance.

☐ WearReport: Avoiding Clothe Conflict against Friends Based on Shared Wearing History (pp. 182 - 184)

Itaru Kuramoto (Kyoto Institute of Technology, Japan); Daisuke Matsuura (Kyoto Institute of Technology, Japan); Keiko Yamamoto (Kyoto Institute of Technology, Japan); Yoshihiro Tsujino (Kyoto Institute of Technology, Japan)

Our clothes affect other's impression of us. When a person stands by one of his/her friends who wears a similar clothe to his/hers, he/she is unwillingly conspicuous or his/her characteristics of clothe is diminished. To avoid such a problematic situation, we proposed a wearing history sharing system named WearReport. It enables users to take their clothe photos easily and to share their wearing histories for avoiding wearing similar clothes each other. With WearReport, users can see the history of their and their friends' clothes at a glance. The history visualization is based on the photos which are semi-automatically taken at the entrance of their home every morning. It enables for users to estimate which clothes their friends may wear today. As the result of empirical evaluation, participants can estimate the color of other participants' clothes, but there are no cases for avoiding clothe conflict.

☐ Frame Layout Determination with IGE for an Automatic Comic Generation System (pp. 185 - 186)

Ryohei Baba (Ritsumeikan University, Japan); Akira Fukumoto (Ritsumeikan University, Japan); Ruck Thawonmas (Ritsumeikan University, Japan)

We propose a frame layout determination method for an automatic comic generation system. Most previous work applied simple frame layouts or did not consider user preferences. In this work, we divide frame-layout types into four patterns and introduce interactive grammatical evolution (IGE) for coping with user preferences. We also verify if the proposed method can generate a comic with a high IGA fitness value from a user experience at a museum in Second Life, one of the most popular metaverses.

[16:00–, R103] SS-8: Recent Audio Engineering & Technology (2)

☐ Experimental Audio-based Device Discovery between PC and Smartphone (pp. 187 - 191)

Hiroshi Itoh (Lenovo Japan Ltd., Japan)

A new method of audio-based device discovery between PC and Smartphone is proposed in

this paper. The encoded IP address is sent from Smartphone's speaker to PC's microphone. The decoding of DTMF tones is fully achieved by software-based DSP and this paper will also discuss how to improve the decode success rate by using low pass filters and a moving window of the signal sampling.

☐ A Zoom Drive Noise Reduction Technique for Digital Cameras (pp. 192 - 194)

Tomoki Oku (Xacti Corporation, Japan)

Sound recorded in compact digital cameras includes a zoom drive noise caused by motor driving, gear driving, and so on. The spectral subtraction (SS) method is suitable for removing these noises because it does not require any extra hardware, but the original signal is quite distorted. Therefore we have developed an advanced SS (A-SS) method suppressing the distortion of the original signal. It first subtracts the assumed noise spectrum from an input signal, and then processes the spectrum so as to keep the power constant. In addition, digital cameras have a unique problem that the ratio of noise against a recorded signal varies frequently, which is caused by the lens variability and recording environment difference. To counter this issue, we have developed the two algorithms: the statistically optimized algorithm to pre-compute the noise spectrum beforehand, and the feedback algorithm to automatically control the quantity of subtraction according to the noise ratio. We implement the A-SS method applying the proposed algorithms into a prototype camera and verified the effectiveness on the noise reduction.

☐ A Study on Effect of Audio Insulators on Induced Noise by Vibration on Audio Equipments (pp. 195 - 199)

Kiminobu Nishimura (Kinki University, Japan); Ryuhkei Ina (KRYNA Co. Ltd., Japan)

Many kinds of audio insulators are used to better the sound quality of stereophonic equipments, but their effects seem not always better in improvement of sound quality. In this study, to clarify how the insulator affects on stereophonic equipments, first we consider how works the insulator to the loaded equipment from view point of mechanical vibration induced on stereophonic equipments related with a AC power transformer, CD drive mechanism and radiated sound from loudspeakers etc. Next, we evaluate experimentally its effects on noise suppression of stereophonic equipments and finally we carried out a listening test of represented sound. Consequently, the insulator is effective to reduce inevitable vibration and electrical noise on stereophonic equipments and to improve the sound quality and summing localization under standard stereophonic representation.

☐ New direct-radiator loudspeaker driven by piezoelectric ultrasonic motors (pp. 200 - 203)

Hiroya Saito (Tokyo University of Technology, Japan); Kunio Oishi (Tokyo University of Technology, Japan); Juro Ohga (Shibaura Institute of Technology, Japan); Hirokazu Negishi (MIX Acoustical Lab., Japan); Ikuo Oohira (Associates Inc., Japan); Kazuaki Maeda (TOA Corp., Japan)

Completely new direct-radiator loudspeaker constructions as alternative of the conventional electrodynamic loudspeakers by using piezoelectric ultrasonic motors are introduced. The authors examined two sorts of constructions. One is actuated by continuous revolution of piezoelectric ultrasonic motors. The other is driven by linear ultrasonic actuators. They are useful for radiation of rather low frequency signal because it shows almost flat phase frequency characteristics in low frequency region.

☐ Newly-Developed Loudspeaker Diaphragm which includes Carbon Nanotube

(pp. 204 - 206)

Satoshi Umemoto (Mitsubishi Electric Corporation Sanda Works, Japan)

An innovative loudspeaker diaphragm named NCV has been developed. NCV stands for Nano Carbonized high Velocity and is compounded from various polymers with carbon nanotube. NCV is characterized by high propagation velocity, which exceeds titanium, and moderate internal loss like paper. The diaphragm of various sizes can be molded by injection molding according to each frequency range. Loudspeaker systems using NCV diaphragm can reproduce the original sound precisely over a wide frequency range with same timbre.

[16:00–, R104] SS-9: Advanced Embedded Systems Development & Electronics Design (2)

☐ Enhance OS Security by restricting privileges of vulnerable application (pp. 207 - 211)

Himanshu Shukla (Samsung Electronics, India); Young-Ho Choi (Samsung Electronics, Korea); Vivek Singh (Samsung Electronics, India); JaeOok Kwon (Samsung Electronics, Korea); Cheulhee Hahm (Samsung Electronics, Korea)

Restricting vulnerable process and its file I/O behaviors is important for securing an embedded device against intrusions, malware infection and information leakage. On embedded device like Smart TV, user can connect to internet using Web Browser process and can download many applications and games. These applications or games may have viruses or vulnerable code. If attacker with root privilege is able to launch new process (using fork () in Linux system) then the downloaded virus program will also get root privileges and hence vulnerable application with root user privileges may corrupt the whole system. This paper proposes a new method to protect the system from this kind of security threats. For experiment and result verification, proposed method uses LSM framework and TOMOYO module. It implements the LSM hook in fork/exec system call path to control the privileges of vulnerable application/binary. Android addresses this problem by writing a wrapper to fork system call in their framework, which modifies credential of new process. However they leave security hole, if application directly calls fork () system call.

☐ A Petri Net Based Support for Derivative Development of Consumer Electronic Products (pp. 212 - 216)

Mohd Anuaruddin Bin Ahmadon (Yamaguchi University, Japan); Shingo Yamaguchi (Yamaguchi University, Japan)

We propose a Petri net based support in derivative development of consumer electronics. A product should be extended so as to be backward compatible. In this method, we convert the product's design (the UML activity diagram) to a Petri net, and then apply Petri nets' analysis technique, called projection inheritance, to verification of backward compatibility. We illustrate the proposed method with an example in which an intelligent refrigerator is extended.

☐ Energy and Area Saving Effect of Dynamic Partial Reconfiguration on a 28-nm Process FPGA (pp. 217 - 218)

Yohei Hori (AIST, Japan); Toshihiro Katashita (National Institute of Advanced Industrial Science and Technology, Japan); Kazukuni Kobara (AIST, Japan)

We empirically evaluated the energy and areasaving effect of Dynamic Partial Reconfiguration (DPR) of a 28-nm process FPGA. DPR is a technology where a portion of the entire circuit is replaced with another one, while the other parts of the circuit still continue running. Using DPR, different functionalities are not necessarily implemented at once; only required modules need be implemented on the FPGA. Therefore, a DPR system requires less hardware resources, and consequently, can save the power consumption of the system. We explored the effectiveness of DPR in saving energy and area of a multi-algorithm cryptoprocessor on Kintex-7 FPGA on SASEBO-GIII board. The cryptoprocessor supports the six ISO/IEC 18033-3 block cipher algorithms: AES, Camellia, SEED, TDEA, MISTY1, and CAST-128. In a DPR cryptoprocessor, only one cipher module is implemented at once, and it is overwritten when a different algorithm is required. Compared to the non-DPR cryptoprocessor, the DPR cryptoprocessor can reduce up to 74% hardware resource (slice) and 3.4% energy consumption.

☐ Dynamic Battery Charging Voltage Optimization for the Longer Battery Runtime and Lifespan (pp. 219 - 223)

Takumi Imai (Lenovo Japan, Japan); Hiromitsu Yamaguchi (Lenovo Japan, Japan)

When a battery is kept to be fully charged, battery lifespan is reduced due to storage deterioration. When a battery is often charged and discharged, battery lifespan is also reduced due to cycle deterioration. The Dual Mode battery introduced in this paper provides Runtime mode and Lifespan mode for laptop PCs to balance the battery runtime and lifespan. A battery is charged by a higher charging voltage in Runtime mode to get the longer battery runtime, while the battery is charged by a lower charging voltage in Lifespan mode to get the longer battery lifespan. This paper discusses automatic mode switching between Runtime mode and Lifespan mode by monitoring battery usage, and proposes the algorithm to get both the long battery runtime and the longer battery lifespan. This paper also shows that how battery lifespan is increased by the proposed algorithm based on the user tests conducted over 1 year.

[16:00–, R105] Smart Grid & CE (2)

☐ Analysis of Home Appliance Usage Preference for Energy Saving: Preliminary Results (pp. 224 - 228)

Teruhisa Miura (Central Research Institute of Electric Power Industry, Japan)

Daily energy saving activities in home are important for sustainability. They require a great deal of labor and the motivation for such activities is difficult to last long. In order to save energy effectively and easily, we aim to develop the system which can automatically control appliances according to user preference. In this paper, we analyze home appliance usage logs and attempt to extract user preference for appliances. Through preliminary analysis, we found possibilities of estimating user preference for appliances from home appliance usage logs.

☐ A Software HEMS Framework for Consumer Electronics (pp. 229 - 230)

Takeshi Yashiro (YRP Ubiquitous Networking Laboratory, Japan); Shinsuke Kobayashi (YRP Ubiquitous Networking Laboratory, Japan); Noboru Koshizuka (The University of Tokyo, Japan); Ken Sakamura (The University of Tokyo, Japan)

The importance of HEMS (home energy management system) has been increasing rapidly due to the global energy problem becoming more significant. Although many of the HEMS

have been proposed so far, they are seldom accepted in real residents because of the high cost for providing this service. In order to solve this problem, we propose a software HEMS framework which is totally different from existing solutions in that they do not require any additional hardware. Instead of adding meters to household appliances, we add software on embedded systems that estimates how much electricity is consumed from operating system kernel and device driver information. We have implemented this system on T-Kernel, and the evaluation results showed that our framework can be effectively used to implement HEMS without any additional hardware cost.

☐ Efficient Data Collection for Smart Grid Using Wireless Sensor Networks

(pp. 231 - 232)

Kwangsoo Kim (ETRI, Korea); HyoChan Bang (ETRI, Korea); Seong-il Jin (Chungnam National University, Korea)

Data collection is an essential operation in smart grids using wireless sensor networks. In a smart grid, a smart meter generates power usage and a data collection unit periodically collects it from every smart meter. This paper focuses on a central data collection problem of how to quickly collect every power usage from every smart meter without collisions. To solve the problem, we divide a tree that a sensor network constructs into several branches. Each branch consists of all meters included in a path from a data collection unit to a leaf meter, and a conflict-free query schedule is generated based on branches. The novel method avoids collisions between a query and a query response as well as between query responses. The experimental results show that this method can achieve both collision avoidance and fast query processing at the same time.

☐ iFarm: Development of Cloud-based System of Cultivation Management for Precision Agriculture

(pp. 233 - 234)

Yukikazu Murakami (Kagawa National College of Technology, Japan); Kristanto Tirto Utomo Slamet (Chiba University, Japan); Keita Hosono (Okayama University, Japan); Umezawa Takeshi (Chiba University, Japan); Noritaka Osawa (Chiba University, Japan)

Precision agriculture is aimed at optimizing farming management and it requires records of agricultural work. Farmers conventionally write records on paper but it is difficult and tedious to check past agricultural-work data and control the cost of agricultural products. A system of cultivation management, iFarm, is proposed, which was developed to support efficient farming management. The system consists of smartphone applications, Web browsers and a cloud server. Farmers on farmland can easily refer to work plans, enter field data into the cloud system, and share them with head office in real time by using smartphones. Farmers at head office can analyze data in the cloud system with a Web browser and estimate farming costs and form work plans based on their analyses.

Abstract of Presentations on October 3

[13:00–, Lobby] Poster (2)

☐ 920MHz Band Collinear Type Planar Antenna (pp. 235 - 238)

Koichi Karasawa (Nagano National College of Technology, Japan); Takahisa Karakama (Carmers, Japan); Tutomu Kaneko (Nissei Limited, Japan); Toshiki Maki (Nagano National College of Technology, Japan); Yuta Murayama (Nagano National College of Technology, Japan); Yuki Karasawa (Nagano National College of Technology, Japan)

Two collinear type planar antennas (a dipole antenna and a spiral antenna) for the 920MHz band are proposed and examined. From the results, the maximum of the absolute gain is about 3.25dBi and the non-directional pattern is obtained for the dipole antenna. Also, the maximum of the absolute gain is about 2.1dBi and a miniaturized antenna is realized for the spiral antenna.

☐ A 1 V bulk-controlled gm-boosted CMOS mixer for LTE-A Applications (pp. 239 - 242)

Hung-Che Wei (National Kaohsiung Marine University, Taiwan); Chih-Lung Hsiao (Lunghwa University of Science and Technology, Taiwan)

A 1 V 1.4 ~ 3.6 GHz high linearity CMOS mixer for LTE-A applications is presented. The transconductor stage of the mixer adopts bulk-controlled, gm-boosted, and current reuse techniques to improve the conversion gain and linearity for low voltage operation. The mixer features the maximum power conversion gain of 12.3 dB, input third-order intercept point of 4.8 dBm, and the minimum single sideband noise figure of 16.9 dB. The DC supply voltage can be scaled down to 1 V with the mixer core current consumption of 4.6 mA.

☐ A 128/512/1024/2048-Point Pipeline FFT/IFFT Architecture for Mobile WiMAX

(pp. 243 - 244)

Chu Yu (National ILan University, Taiwan)

This paper presents a low-power radix-2 pipeline FFT architecture with 128/512/1024/2048 points for mobile WiMAX. A single-path delay feedback style was adopted as the hardware architecture of the proposed design. For the embedded memory, the proposed design adopts low-power single-port register files to implement delay-line buffers, which can obtain an efficient power reduction. Finally, the proposed design requires approximately 140K gates, and its power consumption is approximately 18 mW at 20 MHz.

☐ A Big Data Application Framework for Consumer Behavior Analysis (pp. 245 - 246)

Thi Thi Zin (Osaka City University, Japan); Pyke Tin (Osaka City University, Japan); Hiromitsu Hama (Osaka City University, Japan); Takashi Toriu (Osaka City University, Japan)

More than ever before, the amount of data about consumers, suppliers and products has been exploding in today consumer world referred as “Big Data”. In addition, more data is available to the consumer world from multiple sources including social network platforms. In order to deal with such amount of data, a new emerging technology “Big Data Analytics” is explored and employed for analyzing consumer behaviors and searching their information needs. Specifically, this paper proposes a Big Data application framework for analyzing consumer behaviors by using topological data structure, co-occurrence methodology and Markov chain

theory. First, the consumer related data is translated into a topological data structure. Second, using topological relationships, a co-occurrence matrix is formed to deduce Markov chain model for consumer behavior analysis. Finally, some simulation results are shown to confirm the effectiveness of the proposed framework.

☐ A fully integrated switched-capacitor filter design for ECG application (pp. 247 - 248)

Chih-Lung Hsiao (Lunghwa University of Science and Technology, Taiwan); Hung-Che Wei (National Kaohsiung Marine University, Taiwan); Ren-Bin Huang (Lunghwa University of Science and Technology, Taiwan); Kuang-Ying Tan (Lunghwa University of Science and Technology, Taiwan)

A fully integrated switched-capacitor filter design is presented in this paper. The band-pass filter is composed by a high-pass and low pass filter. The passband of the filter is 0.05Hz-150Hz which is suited for ECG signal application. A notch filter is added in order to suppress the 60Hz induced noise. The switched capacitor technology is used to replace the large resistor. This circuit is design with TSMC 0.35μm process.

☐ A Gradient Based Edge Sensing Scheme for Color Filter Array Demosaicking (pp. 249 - 252)

Da-Cheng Sung (National Taiwan University, Taiwan)

The digital still camera acquires the color data using single sensor in which only one color element can be recorded at each pixel. Efficient demosaicking algorithm is necessary to rebuild the other two missing color elements in each pixel. This paper proposed a gradient based edge sensing algorithm for color filter array interpolation to enhance the edge information and avoid zipper effect. Our method first extracts the gradient in different directions and exploits the gradient edge detection to restore the color channel in detail. Experiment results show that our algorithm performs superiorly in PSNR and visual image quality compared with other algorithms.

☐ A Learning Support System for 9 × 9 Multiplication Table with Kinect (pp. 253 - 257)

Noriko Akazawa (The University of Electro-Communications, Japan); Yuki Takei (University of Electro-Communications, Japan); Mitsugu Suzuki (Shimane University, Japan); Yasuichi Nakayama (The University of Electro-Communications, Japan); Hiroyasu Kakuda (The University of Electro-Communications, Japan)

We propose a learning support system for the 9 × 9 multiplication table "KuKu" and have implemented it using Kinect motion capture to recognize "air characters" written by the body actions of KuKu learners. We explain how to implement the system, report the results of a trial with elementary school students, and suggest the future directions of the system.

☐ A Planar Dual-band Slot Antenna Design for Access Point Application (pp. 258 - 259)

Sen Wang (National Taipei University of Technology, Taiwan); Meng-Ju Chiang (Inventec Appliances Corp., Taiwan); Chun-Chieh Hsu (National Taipei University of Technology, Taiwan)

This paper shows a compact planar dual-band slot antenna for Access point (AP) application. The proposed slot antenna fabricated on a low cost FR-4 substrate has a small size of 40 × 40 × 0.8 mm^3. By inserting of a pair of spiral-shape strip, two resonant bands are excited. The proposed T-shaped tuning stub achieves high-band input impedance matching and increases the bandwidth of high-band. The return loss of the proposed design exhibits that two wide

operating bands are over the bandwidths of 7.4% at center frequency of 2445 MHz and 34% at center frequency of 5484 MHz, respectively. The two resonant bands of the prototype show the broadside radiation patterns with the antenna efficiency of 54% and 85%, respectively.

☐ A Rating Prediction Method for E-Commerce application Using Ordinal Regression based on LDA with Multi-modal Features (pp. 260 - 261)

Takayuki Kawashima (Hokkaido University, Japan); Takahiro Ogawa (Hokkaido University, Japan); Miki Haseyama (Hokkaido University, Japan)

This paper presents a new method for rating prediction in e-commerce, which uses ordinal regression based on linear discriminant analysis (LDA) with multi-modal features. In order to realize accurate recommendation in e-commerce, the proposed method estimates each user's rating for target items. Note that we define the rating as "the degree of preference for each item by a user." For estimating the target user's preference of each item from the past ratings of other items, the proposed method performs training from pairs of "ratings of items" and their feature vectors using ordinal regression based on LDA. Furthermore, in this approach, new features are obtained by applying canonical correlation analysis (CCA) to textual and visual features extracted from review's texts and images on the Web, respectively. Therefore, higher performance of the rating prediction can be realized by our method than that when using single kind of features. Experimental results obtained by applying the proposed method to an actual movie data set, which has been provided by SNAP, show the effectiveness of the proposed method.

☐ A Study on the Surveillance System Using Soft Biometric Information (pp. 262 - 266)

Yukari Koga (University of Kitakyushu, Japan); Yasushi Yamazaki (The University of Kitakyushu, Japan); Masatsugu Ichino (University of Electro-Communications, Japan)

Recently, with the spread of surveillance cameras, high-performance surveillance systems have been attracting much interest in information security and computer vision. On the other hand, there is also a need for simple surveillance systems that use less computer resources, have lower installation and operating costs, and consider the privacy of the people being identified. Moreover, human tracking and identification within and between cameras' views is required in surveillance systems. For this type of simple surveillance system, we propose a human tracking and identification method for within and between cameras' views by using soft biometric information. The results of the simulation using human gait video data confirmed the effectiveness of the proposed method.

☐ A Wideband Antenna with Fan-Shaped and Trapezoidal Elements on Printed Circuit Board for Ultra Wideband Radio (pp. 267 - 268)

Kazuya Hiraguri (Kokushikan University, Japan); Fukuro Koshiji (Kokushikan University, Japan); Kohji Koshiji (Tokyo University of Science, Japan)

In this paper, a half-sized unbalanced dipole antenna with fan-shaped and trapezoidal radiators on an printed circuit board was proposed. The VSWR and radiation patterns of the proposed antenna were investigated. As a result, the VSWR characteristics less than 2.0 and relative bandwidth of 110 % over the frequency band of 3.1 GHz to 10.8 GHz from the experiments were obtained from a measurement. As the radiation patterns, the similar radiation patterns with an usual dipole antenna such as eight-shape and omni-directional radiation patterns were obtained at 3.1 GHz. Although the radiation patterns at 6.8 GHz and 10.6 GHz were slightly distorted compared with those of the usual dipole antennas, it is acceptable in

practical use because the orientation of mobile devices in which the antenna could be built may change frequently, depending on how a user uses the devices.

☐ Active RFID Tag Drive Using Thermoelectric Conversion Element (pp. 269 - 270)

Ryosuke Saeki (Shibaura Institute of Technology, Japan); Junichi Yoshino (Salesian Polytechnic, Japan); Masahiro Inoue (Shibaura Institute of Technology, Japan)

This paper proposes active RFID tag drive by a thermoelectric conversion element by using temperature difference between outside air and human skin. In recent years, energy harvesting techniques have been attracting attention. Powers saving sensors driven by energy harvesting techniques are expected to eliminate maintenance such as battery replacement. Therefore, in this study, the active RFID tags were driven by the thermoelectric conversion elements by using temperature difference. Furthermore, the performance of the thermoelectric conversion elements was evaluated and compared to commercial Lithium battery. As a result, active RFID tag driven by the thermoelectric conversion element has proved to have the same performance as active RFID tag driven by Lithium battery. Therefore, it was confirmed that the driving of the active RFID tag using a thermoelectric conversion element is feasible.

☐ Adaptive Parameter Setting for Pass Region Estimation in Soccer Videos and Its Performance Verification (pp. 271 - 272)

Sho Takahashi (Hokkaido University, Japan); Miki Haseyama (Hokkaido University, Japan)

This paper proposes an accurate pass region estimation method by introducing adaptive parameter settings.Our previous paper proposed a pass region estimation method by utilizing average values of ball and player velocities.However, such velocities vary according to player density and skill. Therefore, in order to realize a more accurate pass region estimation, the proposed method obtains parameters, which are ball and player velocities, from player positions in a target soccer video. By introducing the above parameter settings to pass region estimation, more realistic pass region can be obtained. Consequently, the accurate method of pass region estimation is realized.

☐ An Interactive Rewards Card System Embedded in Smartphones and a Cloud Server (pp. 273 - 274)

Masa-aki Fukase (Hirosaki University, Japan); Kohta Okamoto (Hirosaki University, Japan)

In order to make a rewards card system more convenient, we embed it in a system over Internet by using smart phones and a cloud server, which installs Web pages and database (DB). The rewards card system developed in this study provides interactivity, security, and consistency without sacrificing response time. While the system is made fully interactive among clients, merchants, and the cloud server, it also keeps security and consistency due to the sophisticated co-design of the system and adequately restricting access to DB. We verify the system running and evaluate the usefulness.

☐ Blind Receiver for MIMO SC-FDMA Communications (pp. 275 - 279)

Yu-Kuan Chang (National Chung-Hsing University, Taiwan); Fang-Biau Ueng (National Chung-Hsing University, Taiwan); Shun-Rong Lee (National Chung-Hsing University, Taiwan); Ye-Shun Shen (National Formosa University, Taiwan); Kuan-Hung Wu (National Chung-Hsing University, Taiwan)

Because SC-FDMA (Single Carrier Frequency Division Multiple Access) is with the desirable characteristics of OFDMA and the low PAPR (Peak-to-Average Power Ratio) of single-carrier transmission schemes, it has been adopted as the uplink transmission scheme in 3GPP LTE (3rd Generation Partnership Project Long Term Evolution) to approach the demand for data transmission rates and error performance. By combining multiple-input multiple-output (MIMO) techniques with the SC-FDMA modulation scheme, MIMO SC-FDMA systems can achieve high data rates over broadband wireless channels. In this paper, we study the blind channel estimation algorithm. Based on the property of Space Frequency Block Coding (SFBC), we develop the frequency domain minimum mean-square error (MMSE) and zero-forcing (ZF) equalizers with multiuser interference cancellation (MUIC) technique on each subcarrier to recover the transmitted symbols. Some simulation examples for uplink scenario are given to demonstrate the effectiveness of the proposed receivers.

☐ D-B-S Separation and Tone Reproduction Using DCT Band Splitting for LDR Image Transmission (pp. 280 - 281)

Geun-Young Lee (Kyungpook National University, Korea); Sung-Hak Lee (Kyungpook National University, Korea); Kyu-Ik Sohng (Kyungpook National University, Korea)

In pursuance of the tone mapping for LDR images,the proposed method inserts the tone mapping into JPEG baseline not as post-processing. First, an image is decomposed in detail, base, surround images in term of DCT coefficients. Then, a surround-adaptive tone mapping is applied to the base image. In addition, a compensation module is added for the defects such as desaturation and sharpness falling resulted by tone mapping. As a result, it is confirmed that transmitted JPEG images are enhanced in term of image quality.

☐ Design and Implementation of a Head-Pose Estimation System Used with Large-scale Screens (pp. 282 - 283)

Sang-Heon Lee (Daegu Gyeongbuk Institute of Science & Technology, Korea); Myoung-Kyu Sohn (Daegu Gyeongbuk Institute of Science & Technology, Korea); Dong-Ju Kim (Daegu Gyeongbuk Institute of Science & Technology, Korea); Hyunduk Kim (Daegu Gyeongbuk Institute of Science & Technology, Korea); Nuri Ryu (Daegu Gyeongbuk Institute of Science & Technology, Korea)

In this paper, we propose a novel head-pose estimation system for use with a large-scale screen to provide intelligent interaction with content. The head image of the user is captured from a RGB-D (red, green, blue pixel value, and depth data) camera connected to a large-scale display system. The head orientation of the user is then estimated from the RGB-D data by using the random regression forest algorithm. The random regression forest algorithm is a very powerful tool for generalization problems that does not suffer from overfitting. By using the head-pose estimation system, the user's region-of-interest (ROI) is found in a large-scale screen. After the ROI is found, various intelligent interactions with content can be possible. As future work, a hand gesture recognition system will be jointly connected with this head-pose estimation system in order to control the user's gestures more precisely in the ROI.

Portable devices can support many multimedia communication applications (e.g., voice & video calls, movie-on-demand, etc.). For some applications, the media should be encrypted for confidentiality, privacy or access control. Since portable devices are equipped with low-end CPUs and powered by batteries, it is desirable that encryption and decryption would not use significant CPU time and battery energy. In this paper, we propose a dynamic encryption protocol for secure multimedia communication. It dynamically applies multiple cryptographic algorithms to encrypt different parts of the media contents, where some algorithms may be computation-intensive ones for stronger security protection and other algorithms may be lightweight ones for smaller CPU and energy usage. This protocol has two desirable features: i) it provides desirable and adjustable tradeoff between security and CPU/energy usage, and ii) it is applicable to any media and encoding methods.

Human body communication is expected as a new human interface for communications between wearable devices. Thus, it is important to investigate the input impedance characteristics of the electrodes for improving the qualities of communication. For rapid and freedom analysis, an approximation model is needed. In this paper, we proposed newly developed homogenous human arm model which consists of single material. Input impedance characteristics of the homogenous model were compared with that of multilayered cylindrical model which has a multilayered cylindrical structure. As a result, it was found that the input impedance characteristics of two models were well consistent at 10 MHz. On the other hand, it was found that transmission characteristics and electric fields around the model were different in each model. These analysis results show that the newly developed homogenous model is useful for calculating input impedance, but still need improvements for calculating transmission characteristics and electric fields around the model.

An information bearing pattern which is less obstructive than wide-spread bar codes and a method of acquiring information from printed matters with a pattern on them are proposed. Two basic patterns are assigned “0” or “1” respectively. One geometrical pattern is created combining these two patterns. As a method which can decode an image rotated in the scanning process, a square covering the black pixels at the end of four directions of the image is first determined. The rotation is eliminated by rotating the image such that the area of the square is minimized. Then the position of the pattern is discovered from the black pixels in the four directions of the picture. This way surrounding blanks are excluded in decoding. Moreover anchor information is embedded in the four corners enabling the detection of rotations by multiples of 90 degrees. We show that the proposed method works properly even if the scanned picture is rotated through computer simulations.

☐ PMV Calculation and Intelligent Control Algorithm for Location-based Human Adaptive Air-conditioner (pp. 292 - 296)

JuKyoung Lee (Pusan National University, Korea); Suk Lee (Pusan National University, Korea); HyunHee Kim (Pukyung National University, Korea); Kyung-Chang Lee (Pukyong National University, Korea)

If an appliance perceives the location or health condition of a resident in the smart home, it can provide more intelligent service actively. Thus, residents manually control the air conditioning in a passive service environment, whereas a location-based human-adaptive air conditioner autonomously regulates the temperature in a smart home according to residents' patterns of living or health status. This research is focused on developing a human-adaptive air conditioner that functions by measuring human factors with a non-terminal-based indoor positioning system, to provide high-quality intelligent service. In this paper, the feasibility of the design is evaluated experimentally on a test bed, using a pyroelectric infrared sensor-based location-aware system (PILAS) as the positioning system.

☐ Real-Time Measurement for Digital Audio System Using FPGA (pp. 297 - 298)

Shohei Yamashita (Nagoya Institute of Technology, Japan); Satoru Takemoto (Nagoya Institute of Technology, Japan); Satoshi Hirano (Nagoya Institute of Technology, Japan); Tomio Goto (Nagoya Institute of Technology, Japan); Masaru Sakurai (Nagoya Insitute of Technology, Japan)

In digital audio systems, ΔΣ modulators are generally used as analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The ΔΣ modulator has a noise-shaping property that causes quantization noise within the signal band to move the signal to a higher frequency range. Therefore, a high signal-to-noise ratio (SNR) is achieved. In a system using ΔΣ modulators, digital processing is indispensable for certain processes, and computer simulations are required to evaluate the system. In this paper, we propose a novel system to evaluate real signals by using a field-programmable gate array (FPGA) in real time. Our system enables evaluations for ADCs and DACs as well as other consumer devices, such as audio visual systems.

☐ Safe Microcontrollers with Error Protection Encoder-Decoder using Bit-Inversion Techniques for On-Chip Flash Integrity Verification (pp. 299 - 300)

Daejin Park (Korea Advanced Institute of Science and Technology (KAIST), Korea)

The code memory integrity of embedded flash memory in the microcontroller is becoming important for applications requiring safety-critical operations like automotive ICs. Software-driven or hardware supports for the memory protection are required to guarantee the safe-conscious code execution of the downloaded firmware in microcontrollers. The protection method requires more power consumption in decoding the additional padding bits. In this paper, the protection hardware in the read-path of the embedded flash memory in the microcontroller chip is proposed to improve the power consumption with a small amount of logic gates overhead. The conventional error correction code (ECC) hardware data path is integrated with our newly-designed binary bit-inversion decoder with zero overhead inversion flags to decrease the power consumption in decoding the binary code blocks. The 8 bits error correction code per 64 bits code blocks (72:64 SEC-DED) are applied to 64KB flash memory with the separated region of the flash memory for ECC padding bits.

☐ Spoofing Face Detection based on Spatial and Temporal Features Analysis

Chin-Lun Lai (Oriental Institute of Technology, Taiwan); Jun-Horng Chen (Oriental Institute of Technology, Taiwan); Jing-Ying Hsu (Wistron Corp., Taiwan); Chih-Hong Chu (Wistron Corporation, Taiwan)

In this paper, a smart spoofing face detection method is proposed to increase the reliability of face recognition system. Via the simple spatial-temporal spectral analysis and border edge detection, people with fake face as the recognition system input will be pick out efficiently and effectively. Experimental results show that the proposed method is competitive and practical to be implemented in the smart equipments.

☐ The Hardware Design of Effective SAO for HEVC Decoder

Seungyong Park (Graduate School of Information and Communication Hanbat National University, Korea); Kwangki Ryoo (Graduate School of Information and Communication Hanbat National University, Korea)

In this paper, we propose an SAO hardware architecture with less processing time, computations and reduced hardware area for a high performance HEVC decoder. The proposed SAO hardware architecture introduces the design processing 8x8 CU to reduce the hardware area and uses internal registers to support 64x64 CU processing. Instead of previous top-down block partitioning, it uses bottom-up block partitioning to minimize the amount of calculation and processing time. As a result of synthesizing the proposed architecture with TSMC 180nm library, the gate area is 30.7k and the maximum frequency is 250MHz.

☐ The Impact of Feedback Information on Energy Consumption for Building Types

Yoon-Sik Yoo (ETRI, Korea); Il-Woo Lee (ETRI, Korea)

The paper presents the analysis of the energy consumption patterns and energy saving effect according to the energy information providing method and the building types. This paper also compares the electric power consumption patterns in energy consumption data gathered from the monitoring system according to Korean-style building types and discuss the potential of impact of energy saving effect.

☐ The Positioning Method based on the Integration of Video Camera Image and Sensor Data

Naoya Tsujita (Doshisha University, Japan); Shigeo Kaneda (Doshisha University, Japan); Takuya Sugimoto (Doshisha University, Japan)

We propose the method of a two-dimensional location identification based on the integration of the acceleration sensor and video camera data. The problem that the subject lost from camera image often cause from the object. On the other hand, the acceleration sensor data doesn’t determine the exact position, because the integration /differentiation are twice required to integrate the sensing data. To resolve the above problem, this paper employs linear relationship between acceleration value and speed of the human movement. The linear relationship decreases the number of integration/differentiation in the data and determines more the exact position.

☐ Turbo OFDM-CDMA Receiver with Varying Stepsize in Multipath Fading Channels

Hsuan-Fu Wang (NCHU, Taiwan); Ye-Shun Shen (National Formosa University, Taiwan); Jui-Chi Chang (NCHU, Taiwan); Fang-Biau Ueng (National Chung-Hsing University, Taiwan); Kuan-Hung Wu (National Chung-Hsing University, Taiwan)

The receiver performance can be improved dramatically by employing equalizer and turbo code. This paper investigates adaptive receivers with turbo decoder for orthogonal frequency division multiplexing-code division multiple access (OFDM-CDMA) systems in multipath channels. The LMS algorithm is used as the adaptive algorithm for the de-spreading equalizers which jointly perform equalization and single user detection in downlink multiuser environment. The varying stepsize equalizer jointed with turbo decoder is presented. Simulation results show that the system performances can substantially be improved if the adaptive equalizer can properly utilize the extrinsic information from the turbo decoder.

☐ WebSocket Proxy System for Mobile Devices (pp. 315 - 317)

Hirotaka Nakajima (Keio University, Japan); Masao Isshiki (Keio University, Japan); Yoshiyasu Takefuji (Keio University, Japan)

HTTP is absolute essential part of the Internet. However, in the large delayed network such as mobile data network, the performance of HTTP is influenced by "TCP acknowledgement delay". In this paper, HTTP over WebSocket proxy system is proposed to defeat the delay. In proposal, HTTP is used to achieve end-to-end communication. Each HTTP request and response is encapsulated into WebSocket packet at the client and server. In this paper, proposed system is implemented on Android smartphone and evaluated delay difference characteristics.

[14:00–, R102] SS-7: Game Amusement (1)

☐ Scout of the Route of Entry into the Enemy Camp in StarCraft with Potential Field

Kiyohito Kawase (Ritsumeikan University, Japan); Ruck Thawonmas (Ritsumeikan University, Japan)

In StarCraft, a popular RTS game, reconnaissance of the enemy camp is essential in order to anticipate the tactics and strategies of the enemy. However, if enemy forces are located in the shortest path to its camp, it is not possible for scouts to reach its enemy camp by using a standard shortest pathfinder. In this paper, we propose a method for controlling scouts using potential fields, which improves the possibility that our scouts discover a penetration route to the enemy camp.

☐ Fighting Game Artificial Intelligence Competition Platform (pp. 320 - 323)

Feiyu Lu (Ritsumeikan University, Japan); Kaito Yamamoto (Ritsumeikan University, Japan); Luis Nomura (Ritsumeikan University, Japan); Syunsuke Mizuno (Ritsumeikan University, Japan); YoungMin Lee (Ritsumeikan University, Japan); Ruck Thawonmas (Ritsumeikan University, Japan)

Game playing has provided an interesting framework for developing and testing artificial intelligence (AI) algorithms, with well-known examples such as Go and Chess.Since the first chess programs were written, there has been steady progress in the level of play to the point where current systems can challenge top-class human players. Recently, academia groups have

created competitions to evaluate and compare AI methods,such as Ms Pac-Man versus Ghost Team and Student StarCraft AI Tournament. Those tournaments define their rules and goals based on the game they selected, according to which intelligent techniques and technologies are developed. We focus on a genre called fighting game. Examples of fighting games are Street Fighter, Tekken, and Mortal Kombat. To select the winner in the fighting game is simple: the winner is the character with less damage or the last one standing. In this paper we introduce a brand new competition1 based on a 2D fighting game written in Java.

☐ Comparison of Task Performance with Different Entertainment Elements

(pp. 324 - 328)

Tomohiro Ichinose (Nara National College of Technology, Japan);
Hidetake Uwano (Nara National College of Technology, Japan)

This paper quantitatively compare the effectiveness of entertainment elements which enhance the workers' motivation and work performance. The authors select three entertainment elements which were used in previous studies; 1)Contest, 2)Improvement, and 3)Collection. Three system which implements the entertainment elements were used in student experiment to measure the task performance. The result of the experiment shows that the all entertainment elements increase the task efficiency and motivation compared with non-entertainment support. Among the three elements, Contest increase the work efficiency the most, and Collection increase the work motivation the most.

☐ Application of Reinforcement Learning to the Card Game Wizard (pp. 329 - 333)

Jana Backhus (Hokkaido University, Japan); Hidetoshi Nonaka (Hokkaido University, Japan); Takeshi Yoshikawa (Hokkaido University, Japan); Masanori Sugimoto (Hokkaido University, Japan)

This article proposes an application using a reinforcement learning (RL) approach to the card game Wizard. The aim is to create a computer player that is able to learn a winning strategy for the game by himself. Wizard is a partially observable competitive multiplayer game that consists of two game phases, forecasting and trick playing. The biggest challenges in creating a strong player are dealing with multiple rounds which have a different grade of imperfection and the decision on the forecast at the beginning of every game round. We introduce an RL approach to the problem by adopting an existing RL algorithm to the playing phase of the game and by implementing an evaluator of the player's hand card using a Multi-Player-Perceptron to conduct the forecast. The results of our experiments show that the player is able to improve his playing strategy through learning. At the beginning the performance of the learning agent is very bad due to the bad forecasting behavior, but he is able to improve his performance over a few training episodes from 0% won games to approximately 25.68% won games in an experiment with 4 players. Therefore he plays equally strong as his opponents and even outperforms one of them.

☐ Improvement in the Fun of the Board Game By A.R. Introduction (pp. 334 - 338)

Makio Fukuda (Osaka International University, Japan);
Hisayoshi Horioka (Graduate School of Osaka International University, Japan)

This research introduces A.R. (Augmented Reality) into "Sugoroku" which exists traditionally as a board game, and this research aims it at raising the fun which this game originally has. By scanning the marker beacon system on the face of the board of "Sugoroku" with a PC camera, the 3D image and letter by CG are displayed on the realistic face of the

board. By this method, improvement in the reaction velocity of a notice of the required information in the game can be aimed at, and this method can support using information realistic about the playing game. As a result, the Board Game becomes more interesting.

[14:00–, R103] AV Processing & Digital Media

☐ Efficient Registration Based on Global 3D Motion Vector for Sequential Point Clouds

(pp. 339 - 340)

Kazuma Uenishi (National Defence Academy of Japan, Japan); Munetoshi Iwakiri (National Defense Academy, Japan)

Recently, acceleration of registration for sequential point clouds is a major research. However, ICP algorithm requires long computation time generally, and correspondence based methods depend on accuracy of feature point matching. In this paper, we estimated a 3D motion vector including influence of rotations, applied it ICP and correspondences based method. According to experiments using actual data, we confirmed proposal methods were same accuracy and faster than ICP.

☐ Implementation of MPEG-2 Video Compression Artifact Reduction System on GPU

(pp. 341 - 342)

Takafumi Fukuoka (Nagoya Institute of Technology, Japan); Tomio Goto (Nagoya Institute of Technology, Japan); Satoshi Hirano (Nagoya Institute of Technology, Japan); Masaru Sakurai (Nagoya Insitute of Technology, Japan)

In this paper, we present our study on an MPEG-2 video compression noise reduction system that is based on the total variation regularization method and that uses the GPU. This system is very effective in removing image compression noise without losing picture sharpness. The problem with applying the total variation regularization method to motion pictures is the huge computational cost. Therefore, we implemented this system on the GPU, which is capable of massive computation in parallel, and we measured how fast it is processed. The experimental results show that the processing time of our system for Full HD images on the GPU is 14.86 ms, which is less than the 16.7 ms, for one frame time of HDTV. This result shows that our system can be applied to consumer devices such as HDTVs and PCs. Our system enables the adoption of noise removal for the next-generation HDTVs with 4K × 2K panels.

☐ High Performance Hardware Architecture for Multi-mode 1-D Forward Transform of HEVC

(pp. 343 - 344)

Kihyun Kim (Graduated School of Information and Communication Hanbat National University, Korea); Kwangki Ryoo (Graduate School of Information and Communication Hanbat National University, Korea)

This paper suggests an HEVC 1-D forward transform hardware architecture that supports four TU sizes (4x4, 8x8, 16x16, and 32x32) and yields high throughput. In the proposed transform hardware architecture, coefficient multiplication is required for all TU sizes using a common computation unit equipped with a shifter and adder. Based on the synthesis results using the TSMC 180nm CMOS process and on video of QFHD, maximum operation frequency is 400MHz. The proposed transform can achieve a high throughput rate of 10-Gpels/cycle with 159k of gate area. In addition, it treats all the TU sizes of 4x4, 8x8, 16x16, and 32x32 in 38 cycles equally.

☐ Quantitative Image Quality Evaluation for Mobile Display in Outdoor Environment

(pp. 345 - 347)

Byungseok Min (Samsung Electronics, Korea); Hyung Jun Park (Samsung Electronics, Korea)

The Image quality of a mobile display in outdoor environment is evaluated in quantitative methodology. Contrast and colorfulness were chosen as the main quality factors among several quality attributes such as sharpness, lightness, noise and naturalness, and expressed in Just Noticeable Difference unit to correlate the image quality metric with human visual system. The overall image quality metric is determined by two quality metrics using contrast and colorfulness, respectively. These two quality attributes are obtained from measured XYZ values of the test image on mobile display in outdoor environment.

[14:00–, R104] SS-2: Digital Health & Fitness (1)

☐ Early Detection System Considering Types of Dementia by Behavior Sensing

(pp. 348 - 349)

Yuki Abe (Shibaura Institute of Technology, Japan); Machiko Toya (Shibaura Institute of Technology, Japan); Masahiro Inoue (Shibaura Institute of Technology, Japan)

If dementia is detected at an early stage, the progress of the disease can be slowed. Therefore, early detection of dementia is important. In this study, we propose a system for elderly people living alone which detects suspicion of dementia at an early stage of the disease. In addition, the system determines types of dementia by initial symptom of the elderly people. We compared two different analytical methods for determining initial symptom from obtained data. The first method is an analytical method by threshold and the second method is an analytical method by trend of data. We evaluated validity and immediacy of the analytical methods by scenarios.

☐ Automatic Recording of Meal Patterns using Conductive Chopsticks (pp. 350 - 351)

Hirotoshi Amemiya (Doshisha University, Japan); Yuki Yamagishi (Doshisha University, Japan); Shigeo Kaneda (Doshisha University, Japan)

Dietary education continues to attract attention. One target of such attention is the meals consumed alone by senior citizens whose eating habits are often unhealthy, inadequate, and irregular. To solve this problem, the life-log data of eating habits are effective. However, conventional sensing approaches with video cameras suffer from privacy concerns and low accuracy from poor lighting conditions. This paper proposes to solve this problem with a new method that records an ingestion log without burdening users. Our proposed method, which focuses on the closed circuit conductivity that is constructed from food, chopsticks, and a human body, determines the resistance value of the closed circuit and detects two actions: grasping food and carrying it to the mouth. We implemented our prototype chopsticks and experimentally verified our proposed methods. The accuracy of carrying food to the mouth exceeded 99% using F-measure. Our evaluation also clarified that our proposed method identifies participants who fail to join meal communities around a table.

☐ An Extension of Menu Planning Algorithm for Two-phase Homemade Cooking

Nobuo Funabiki (Okayama University, Japan); Yukiko Matsushima (Okayama University, Japan); Toru Nakanishi (Okayama University, Japan); Kan Watanabe (Okayama University, Japan)

Nowadays, many people keep busy lives due to working in companies, studying in schools, or taking care of children or senior parents. As a result, it has become very hard for them to cook foods for suppers by themselves at home after long-hour duties at daytime in weekdays. Previously, to assist homemade cooking of such busy people, we proposed a two-phase cooking such that the preparation phase of cooking foods that they will eat on the following weekdays is performed on a weekend, and the finishing phase for the foods for a supper is completed on the day in short time. Then, we presented a menu planning algorithm to assist generating one-week menus for this two-phase cooking. Unfortunately, we found that this algorithm has the following drawbacks in practical use: 1) the selection of food preference is not easy, 2) the use of preferred ingredients for cooking cannot be directly specified, and 3) the nutrition balance of foods in a menu is not considered. In this paper, we extend this algorithm to solve them by newly defining a preference index and the food balance guide by Japanese government. We verify the effectiveness of the extended algorithm through generating five-day menus from 241 food candidates.

☐ Proposal of the driving environment information sharing system using the probe bicycle

Yuta Kawachi (Doshisha University, Japan); Yusuke Tabata (Doshisha University, Japan); Shigeo Kaneda (Doshisha University, Japan)

Bicycle users cycling in crowded roads are influenced by the surrounding road situation. If the bicycle users can get the information of the road situation, they can choose an appropriate route for cycling. In this paper, we propose a web application system which shares driving environment information. System uses both cycling speed measured by a photoelectric sensor, and rudder angle of the handle measured by a rotary encoder to estimate the degrees of how crowded the road is. Through the experimental cycling, we clarified the relationship between the sensing data and avoidance behaviors. Moreover, we derived calculation formula of the degrees of how crowded roads are by multiple regression analysis.

☐ A Method of Estimating Outdoor Situation for Lifelog Generation

Go Tanaka (Shizuoka University, Japan); Hiroshi Mineno (Shizuoka University, Japan)

We propose a method of estimating the situation in the outdoors for generating high quality lifelog. The algorithm of estimating outdoor situation is possible to distinguish and estimate several situations in the same location. This algorithm estimates situations by using a decision tree of machine learning. We do decision tree analysis by using explanatory variables such as transportation means, sensor data, and social data. Experimental results show that we can achieve high levels of accuracy which F-Measure is about 0.8 or more.

[14:00–, R105] SS-1: Consumer Networks & Systems (1)

☐ Safety Route Guidance System Using Participatory Sensing (pp. 363 - 364)

S Kusano (Shibaura Institute of Technology, Japan); Masahiro Inoue (Shibaura Institute of Technology, Japan)

This study proposes a safety route guidance system used after a natural disaster by gathering sensing data from pedestrians' smartphones. In order to find the problems caused by a disaster such as collapsed house, fissures and floods, the system uses the information retrieved from pedestrians' smartphones with GPS receivers and accelerometers. In addition, the system does not use the information from the map data before the disaster for detecting the geographical information in case of large-scale disasters. Therefore, the map data after a disaster is mapped with only the information after the disaster. As a result, pedestrians' moving paths and walking states are evaluated and used for evacuation guidance.

☐ An SVM Based Irrigation Control System for Home Gardening (pp. 365 - 366)

Yuya Suzuki (Shizuoka University, Japan); Hirofumi Ibayashi (Shizuoka University, Japan); Hiroshi Mineno (Shizuoka University, Japan)

In recent years, various agricultural support systems have been proposed and implemented. However it is difficult for beginners in home gardening to use existing agricultural support system. Therefore, in this paper, we propose an agricultural cloud support system that is SVM-based agricultural automatics irrigation system that adjusts the quantity of water automatically based on sensor data. This system enables that if users don't have expertise in agriculture about irrigation, they can irrigate properly.

☐ A Brand-independent Low Memory Footprint Universal Remote Control Method for Resource-constrained Wearable Remote Controller (pp. 367 - 368)

Lei Jing (University of Aizu, Japan)

Handhold Universal Remote Controller (URC) is bulky, confusing, and not always at hand. Wearable controller is compact, intuitive, and always available. Wearable controller share some same issues as handhold controller such as line-of-sight and operation angle of infrared signal, one-for-all encoding method for control command, etc. Meanwhile, different with the handhold controller, the wearable controller with limited computing resources like memory. Therefore, the memory cost on preinstalling the control command for different brands is unaffordable for the resource-constrained wearable device. In this paper, we present a brand-independent low memory footprint method for resource constrained wearable remote controller. A middle device putting in front of each home appliance is used to relay the RF signal to infrared signal. A signal encoding and decoding method are proposed to learn and generate various kinds of infrared control command. In the feasibility experiment, a real test bed is deployed in the home scenario. As a result, different kinds of home appliance can be successfully controlled using a finger-worn controller with an 8 bit MPU and 4 KB RAM. Therefore, the proposed method is promising to facilitate the home automation using wearable controller.

☐ A Communication Load Model for P2P Camera Data Stream Delivery Systems (pp. 369 - 370)

Tomoki Yoshihisa (Osaka University, Japan); Yoshimasa Ishi (Osaka University, Japan); Tomoya Kawakami (Kobe University, Japan); Yuuichi Teranishi (NICT, Japan)

P2P camera data stream delivery, in which source nodes such as live cameras collect their image data cyclically and deliver the data to users' terminals, are widely used. For P2P camera data stream delivery, some methods to distribute the communication load of source nodes have been proposed. However, the communication load models of these researches are simple and do not consider the upper limit. In this paper, we discuss and propose a communication load model considering the upper limit.

☐ On the improvement of file browsing time in single client NFS system (pp. 371 - 375)

Amit Sahrawat (Samsung India Electronics Pvt. Ltd, India); Namjae Jeon (Samsung, Korea); JaeOok Kwon (Samsung Electronics, Korea); Cheulhee Hahm (Samsung Electronics, Korea); Vivek Trivedi (Samsung India Electronics Pvt Ltd, India)

The Network File System (NFS) is one of the most popular remote file system protocols for accessing directories and files over the network. If NFS mount point has thousands of files (e.g. a directory containing 5000 files), there is a significant performance drop in directory browsing (traverse, open(), stat() and read()) time as compared to local file system browsing (traverse, open(), stat() and read()) time. In order to reduce the file browsing time in the NFS with single client system, this paper presents the modification of a conventional NFS protocol usage with multiple client systems. Experimental results show the proposed implementation gives 44.6% performance improvement over a conventional one.

[16:00–, R102] SS-7: Game Amusement (2)

☐ Game Prototyping with Community-driven Narrative (pp. 376 - 378)

Sylker Silva (Kyushu University, Japan); Kiyoshi Tomimatsu (Kyushu University, Japan)

Indie game development and academic game prototyping sometimes require a small team or even a single person to develop an entire system. In either case, the deadline could be a serious problem. Chances are that an indie developer or an academic researcher wants to create a very complex game, like a Massively Multiplayer Online Game. This is maybe the worst-case scenario when the resources are very limited. This paper proposes a community-driven narrative to mitigate one of the biggest problems in the creation process: inventing the game story and background. In order to focus on technical development, a game designer can reach a well-established community, with a well-formed self-universe, and create from there instead of from scratch. To demonstrate this creation process, this work uses the Actor-Network Method to analyze the Skynerd Protocol game development case, a player-driven Massively Multiplayer Online Game born from doctoral research about contextual learning in massively games.

☐ Evolution of Camerawork in Automatic Comic Generation Using Interactive Genetic Algorithm with Feedbacks from the User Model (pp. 379 - 380)

Kenta Tsuji (Ritsumeikan University, Japan); Ruck Thawonmas (Ritsumeikan University, Japan)

In our previous systems for automatic comic generation, camerawork parameters were determined by using an interactive genetic algorithm (IGA) with direct user feedbacks or was determined manually through an equipped user interface. The former approach periodically needs direct feedbacks, on multiple comics generated during evolution, from the user, imposing a burden on the the user. The latter approach asks the user to manually perform the camerawork

setting for every frame, which lacks diversity because only one comic is produced. In this work, we propose a method that combines the above two: ask the user to manually set the camerawork for each frame, construct the user model based on the determined camerawork parameters, and use the user model, instead of the user themselves, to give feedbacks in IGA. We aim at reducing the user's burden while achieving highly satisfactory resulting comics.

☐ Make Once, Play Anywhere! (pp. 381 - 384)

Shigeto Okuda (Kyoto Computer Gakuin, Japan);
Keiji Emi (The Kyoto College of Graduate Studies for Informatics, Japan)

We are going to show you how to make a game easily with using EPUB 3 that has some interactive function based on HTML5 related technology. EPUB 3 is e-book standard form. If you have just an EPUB reader on a game console or an OS, you can play it on any platform. We are going to show you a game demo in this paper.

☐ Evaluation and Analysis of Spatial Training Game for molding arts (pp. 385 - 386)

Masayuki Ueno (Osaka Electro-Communication University, Japan); Shinjiro Wada (Poole Gakuin College, Japan); Yutaka Kida (Kyoto Saga University of Arts, Japan); Noboru Ashida (Fukui National College of Technology, Japan); Ueda (Osaka Electro-Communication University, Japan)

A spatial training game for three-dimensional molding arts has been developed. This paper described about experiments and the result to evaluate the training game with micro-cognitive operation approach. The result suggests effectivity of this type of training game on three-dimensional molding arts.

☐ Aliens on the Bus: A Family of Pervasive Games (pp. 387 - 391)

Klaus P Jantke (Fraunhofer IDMT, Germany);
Oksana Arnold (Erfurt University of Applied Sciences, Germany);
Sebastian Spundflasch (Ilmenau University of Technology, Germany)

There is an interesting category of digital games particularly challenging consumer electronics: pervasive games. On the one hand, pervasive games appear extremely promising for purposes such as learning and for encouraging players to engage in healthy outdoor activities. They widen the horizon of games contents by direct access to reality. On the other hand, a larger number of pervasive games failed badly bearing abundant evidence for the need of better understanding the essentials of pervasive games and of the experiences in playing pervasively. The authors have developed not only a single pervasive game concept, but a whole family of concepts quite suitable for systematically challenging consumer electronics aiming at a wide spectrum of effects ranging from amusement to game-based learning.

[16:00–, R103] User Interfaces & Experience in CE (1)

☐ User dependent interface based on facial expression (pp. 392 - 393)

Euisun Kim (Handong Global University, Korea); Yunseok Lee (Handong Global University, Korea); Sungyoon Lee (Handong University, Korea); Jaehyo Kim (Handong Global University, Korea)

This study is about the feasibility test of calibration and customizing method based on channel selection according to task and user dependent factors using multichanneled MES

device. Simple threshold methods were applied to evaluate the activation of each channel. Generally, interface utilizing biological signals has been known for its instability and complexity of the system, however, by choosing proper channels figuring out user's intention and utilizing the channels as command signals, its system can be simple and stabilized.

☐ Toward Realistic Implementation of Brain-Computer Interface for TV Channel Control (pp. 394 - 396)

Miyoung Kim (Samsung Electronics, Korea); Taeho Hwang (DMC R&D Center, Samsung Electronics, Korea); Eunmi Oh (Samsung Electronics, Korea); Minsu Hwangbo (Samsung Electronics, Korea)

In recent studies, there have been attempts to control smart devices using Brain-Computer Interface (BCI) as a proof-of-concept. BCI can be a new interface between the human brain and various consumer electronic devices. Among various BCI paradigms, we adopted P300-based BCI which has higher accuracy with less variability among subjects and requires less training. We have explored the feasibility of TV channel selection based on BCI at typical home environment in terms of viewing distance (3 meters) and screen size (46 inches). Four candidate channel menus in video type were displayed on each quadrant of TV screen. On the upper-left or upper-right corner of each rectangular channel menu, visual stimulus was flashed to elicit Event Related Potentials (ERP). With 8 subjects, we achieved 92.3% average accuracy using 16 EEG channels and 89.6% average accuracy using only 3 EEG channels positioned on the midline sites of human brain. We found an optimal subset of EEG channels while keeping the performance.

☐ Extensions of Cooking Guidance Function on Android Tablet for Homemade Cooking Assistance System (pp. 397 - 401)

Yukiko Matsushima (Okayama University, Japan); Nobuo Funabiki (Okayama University, Japan); Yijia Zhang (Okayama University, Japan); Toru Nakanishi (Okayama University, Japan); Kan Watanabe (Okayama University, Japan)

Previously, we proposed a cooking-step scheduling algorithm to find a schedule of applying the cooking steps in the recipes for efficiently cooking multiple dishes simultaneously, to help healthy and cost-efficient lives for busy person. Then, we implemented a cooking guidance function on an Android tablet to navigate the cooking schedule in a kitchen. Although we confirmed the effectiveness through cooking experiments, we found three problems: 1) a user may click a starting button even if the previous required steps are not completed, 2) a user may miss the proper timing to stop a cooking-step, and 3) the duration time for a cooking-step may be varied by a user skill or a dish nature. In this paper, we extend the cooking guidance function by adding three features of starting condition checking, time-up alarming, and cooking rescheduling to solve these problems. We verify the effectiveness of the extended guidance function through experimentally cooking four dishes.

☐ QR-Label Printing System for Superstores Enabling Visually Impaired Customers to Identify Purchased Products (pp. 402 - 406)

Tomohiro Haraikawa (University of Tsukuba, Japan); Hidehiko Nishi (Panasonic Advanced Technology Development Co., Ltd., Japan); Shun Mizuno (Shizuoka University, Japan); Akichika Shiomi (Shizuoka University, Japan)

Although superstores can help visually impaired customers with their in-store shopping, they cannot help them identify the products after the customers take them home. We designed a

QR-Label and realized an on-demand printing system for superstores. Visually impaired customers can listen to product information at home through their mobile phone by using it to scan the QR-Label placed on each of the purchased packages.

☐ Introduction of a Wireless Body-Braille Device and a Self-learning System

(pp. 407 - 409)

Satoshi Ohtsuka (Gunma National College of Technology, Japan); Nobuyuki Sasaki (Tsukuba University of Technology, Japan)

Body-Braille is a mechanism for presenting one Braille cell using micro-vibrators on any part of the body. One application of Body-Braille is the Helen Keller Phone system which is a communication system for deaf-blind people. It is currently in the commercial stage. Since it is expected that users of Body-Braille will increase in number, a self-learning system for Body-Braille is required. Moreover, such a self-learning system must be easy for deaf-blind users to use. In this paper, we describe a wireless device which we have developed for this purpose and details of a self-learning system for Body-Braille. In order to test the system, we performed an experiment in which 14 subjects recognized Body-braille patterns in the first stage of self-learning. The recognition rate was 74.1%. However, post-experiment interviews revealed a keystroke issue that if corrected, would yield a 92.0% recognition rate.

[16:00–, R104] SS-2: Digital Health & Fitness (2)

☐ Conceptual Design of Personal Wellness Record for Mobile Health Monitoring

(pp. 410 - 411)

HongSeok Na (The Cyber University of Korea, Korea); YounSik Choi (eRionet, Inc., Korea)

Mobile health monitoring, with different biosensors embedded into mobile phone and body area network, provides an environment of monitoring daily activities for managing personal health. However, the lack of integration on monitored information constraints the opportunity on discovering life pattern and more comprehensive understanding for a person's health status. In this paper, we proposed a conceptual model for managing personal wellness information as PWR which provides a basis on integrating monitored information from various devices and a mobile health platform ensuring preventive and proactive service. We expect that the integrated model of personal wellness management will be a base structure for mobile health monitoring system which provides a person with increased confidence and a better quality life.

☐ Observation of Movement State using Surface EMG Signal (pp. 412 - 416)

Keigo Owada (Future University Hakodate, Japan); Masashi Toda (Kumamoto University, Japan); Shigeru Sakurazawa (Future University Hakodate, Japan); Junichi Akita (Kanazawa University, Japan); Kazuaki Kondo (Kyoto University, Japan); Yuichi Nakamura (Kyoto University, Japan)

The person performs movement depending on various purposes.Purposes are interaction to environment and change of the movement state.We focused on change of the movement state.The purpose of this study observes the state of the muscle on different movement state and same motion for surface EMG.We prepared for two experiments that were the same motion.Two experiments vary in an movement state. As a result, surface EMG was different in agonist and antagonist.It is thought that person takes efficient activity.

☐ Adaptive Gait Recognition Model and Automatic Velocity-robust Feature Selection Based on A New Constrained Expectation Conditional-Maximization Learning Algorithm (pp. 417 - 421)

Dapeng Zhang (RIKEN, Japan); Shinkichi Inagaki (Nagoya University, Japan); Ryojun Ikeura (Mie University, Japan); Tatsuya Suzuki (Nagoya University, Japan)

A robust and compact human motion model is desirable in many security applications from public facilities to personal devices. Shape features are extracted from the perspective of computer vision in most researches. However, most of them are application-dependent. In order to explore more dynamical features of human motion and to make the human model adaptable to the varying environments, a new Stochastic Switched Auto-regressive Model together with an innovative Constrained Expectation Conditional-Maximization algorithm which utilizes pre-knowledge from feature space analysis is proposed. The proposed model has a circular topology consisted of 2 pairs of correlated states and the constrained ECM algorithm is proposed under the model's unique structure.

The problem is complicated by the fact that, even though the dominant features are dynamic, there are significant static features. Modeling the underlying behavior is challenging especially with a method that does not guarantee that the sequence converges to a maximum likelihood estimator. In the end the model can produce a probability distribution over the latent variables with point estimates. The modeling method can be reviewed as approximating maximum likelihood in a non-Bayesian way with adaptability to changing walking velocity.

☐ Periodic Body Sway Caused by Sound Source Movement Through Hearing Sensation (pp. 422 - 426)

Mamoru Iwaki (Niigata University, Japan); Keisuke Tokunaga (Niigata University, Japan); Tohru Kiryu (University of Niigata, Japan)

Illusory sensations of posture and motion can be perceived in some situations. For example, visually induced self-motion has been studied, while we can demonstrate self-motion and body sway caused by virtually moving sound-sources. We investigated such self-motion and body sway. The center of pressure and the sensation level of self-motion were measured and analyzed to discuss their characteristics in terms of the interaural time difference (ITD) and interaural level difference (ILD) caused by moving sound. As a result, periodic body sway synchronized with sound source movement was observed. Larger ITD and ILD had an influence on self-motion and body sway. In addition, azimuths for ITD and ILD did not need to be matched. Characteristics of auditory induced body sway might be expected to apply for healthcare and fitness fields.

☐ Study on Ship Navigators' Mental Workload for Ship Handling Based on Salivary NO3- (pp. 427 - 430)

Kenichi Kitamura (Kobe University, Japan); Koji Murai (Kobe University, Japan); Yuji Hayashi (Kobe University, Japan); Keiichi Fukushi (Kobe University, Japan); Shin-ichi Wakida (National Institute of Advanced Industrial Science and Technology, Japan); Nobuo Mitomo (Nihon University, Japan); Takashi Miyado (Kinki Polytechnic College, Japan); Kenji Yoshimura (National Maritime Research Institute, Japan); Kenjiro Hikida (National Maritime Research Institute, Japan)

The evaluation of mental workload/ performance has usually depended on professionals (captain, pilot) who have a lot of experience on board. We are mainly attempting to evaluate a ship navigator's mental workload based on a physiological index. The physiological indices,

heart rate variability (R-R interval), nasal temperature, and salivary amylase, sharply respond to events of ship handling. Moreover, we have found a possibility of salivary NO_3^- as a good index for evaluating the mental workload. The salivary NO_3^- is expected to have a specific characteristic to represent quick response on the spot and the trend like moving average. We confirmed the response of students for simulator based training, and we were carried out the experiment for professionals on a real ship. This paper proposes that salivary NO_3^- shows a navigator's mental workload for ship handling in a simulator, and we also show the heart rate variability (LF/HF, heart rate) to support the results of NO_3^-. This research, to evaluate the mental workload of navigators using salivary NO_3^-, is first challenge worldwide.

[16:00–, R105] SS-1: Consumer Networks & Systems (2)

☐ Development of Web-QoE evaluation system for wireless LAN with combination of simulator and network emulator (pp. 431 - 432)

Ryosuke Koshimura (Nagoya Institute of Technology, Japan); Yoshihiro Ito (Nagoya Institute of Technology, Japan)

This paper shows development of a system for assessment of Web-QoE over wireless LANs. By simulation, we can easily consist various types of experimental networks, such as a wireless network, but cannot perform Web-QoE (Quality of Experience of Web services) assessment. On the other hand, we can utilize a network emulator to assess Web-QoE instead of using actual networks. However, such a network emulator cannot imitate many kinds of networks flexibly. Thus, the authors have developed a new system by combining a simulator with a network emulator. This paper confirms that this system is effective in assessment of Web-QoE by experiment.

☐ Design of a Flexible and Service-Aware Middleware over Pervasive Environments (pp. 433 - 435)

Wei-Chieh Sun (National Pingtung University of Science and Technology, Taiwan); Hsu Yang Kung (National Pingtung University of Science and Technology, Taiwan)

The middleware for pervasive computing assists mobile user and service provider to transparently access heterogeneous services. This paper proposes a Service-Aware Middleware based on pervasive computing environment (PSAM). PSAM extends IETF Service Location Protocol (SLP) and Mesh-enhanced Service Location Protocol (mSLP) to provide scalable pervasive services. This paper also proposes a novel Service Plug-and-Play control procedure, which works as hardware Plug-and-Play service for legal users to provide flexible network application services over accessible heterogeneous service domains. The proposed mSLP provides users easily to access network services using consumer electronics devices.

☐ Multiagent-based Microgrid with Electric Vehicle Allocation Planning (pp. 436 - 437)

Anita Purba Nilam Hapsari (Gadjah Mada University, Japan); Takumi Kato (Tohoku University, Japan); Hideyuki Takahashi (Tohoku University, Japan); Kazuto Sasai (Tohoku University, Japan); Gen Kitagata (Tohoku University, Japan); Tetsuo Kinoshita (Tohoku University, Japan)

In the field of power system, there are several new paradigms of power grid, which are trying to address various issues. The new power grid paradigms are expected to be more resilient to survive the difficulties during a disaster. This paper focuses on microgrid and proposes an allocation planning method for electric vehicle (EV) in a multiagent-based

microgrid. The proposed method allocates EV to provide the demanding loads with power, and we performed an experiment to confirm the effectiveness of the method.

☐ An Enhanced Routing Algorithm for Congestion Control in A Home Energy Management System (pp. 438 - 439)

Qi Liu (Nanjing University of Information Science and Technology, P.R. China); Hong Wei Qian (School of Computer and Software, P.R. China); Baowei Wang (Hunan University, P.R. China); Jian Shen (Chosun University, Korea); Nigel Linge (University of Salford, United Kingdom)

Wireless communication is well used in home energy management systems (HEMS). ZigBee, as a typical example helps to achieve cheap and fast deployment, but also brings resource limits and performance issues. An enhanced routing algorithm is therefore present in this paper to improve congestion detection and avoidance. Better performance has been achieved according to the experiments conducted in a practical environment.

☐ An Energy-Saving Office Lighting Control System Linked to Employee's Entry/Exist (pp. 440 - 444)

Yosuke Kaneko (Information Technology R&D Center, Japan); Masahito Matsushita (Mitsubishi Electric Corporation, Japan); Shinji Kitagami (Misubishi Electric Corp., Japan); Ryozo Kiyohara (Kanagawa Institute of Technology, Japan)

For conserving energy in the lighting of office buildings, we developed an lighting energy-saving control system by coordinating the access control system and the lighting control system. Our system controls the light dimming rate depending on the presence or absence of employee in a floor. By evaluating this system in an actual office building, we confirmed that it could reduce the power consumption for lighting by about 25%.

Abstract of Presentations on October 4

[14:00–, R102] SS-4: Future TV & Image Processing Technologies

☐ Fast and High-quality Regional Histogram Equalization (pp. 445 - 446)

Wataru Okado (Nagoya Institute of Technology, Japan); Tomio Goto (Nagoya Institute of Technology, Japan); Satoshi Hirano (Nagoya Institute of Technology, Japan); Masaru Sakurai (Nagoya Insitute of Technology, Japan)

In this paper, we propose a novel adaptive histogram equalization method. In our proposed method, an image is divided into several blocks and histogram equalization (HE) is performed for each block. We utilize dynamic range separate histogram equalization (DRSHE) for each block and realize quasi-regional histogram equalization. Experimental results indicate that the performance of our proposed method is very similar to that of the Retinex method, whereas the computation time is much smaller than that of the Retinex method.

☐ Improving Image Quality of Super-resolution with Total Variation Regularization and Shock Filter (pp. 447 - 448)

Fumiya Nagashima (Nagoya Institute of Technology, Japan); Masashi Watanabe (Nagoya Institute of Technology, Japan); Tomio Goto (Nagoya Institute of Technology, Japan); Satoshi Hirano (Nagoya Institute of Technology, Japan); Masaru Sakurai (Nagoya Insitute of Technology, Japan)

The need for super-resolution technology increases with increasing sizes of display devices. In this paper, we propose a super-resolution system that combines a total variation filter and a shock filter, which is a non-linear filter, to emphasize the edges in images and to obtain high-resolution images in a short time. In this study, we improved the performance of the shock filter to obtain higher quality images. We consider this system to be a practical solution, especially for the super-resolution of video signals for devices, such as HDTV receivers and PCs with 4K-pixel display panels.

☐ Error Minimization of Radiometric Compensation for Subpixel Reflectance Variation (pp. 449 - 450)

Shoichiro Mihara (Osaka University, Japan); Daisuke Iwai (Osaka University, Japan); Kosuke Sato (Osaka University, Japan)

We propose a novel radiometric compensation method of a projector-camera system by applying a 10 megapixel camera to reduce the artifacts around regions where the reflectance of projection surface changes steeply. The proposed method densely measures the reflection of a single projected pixel region on a projection surface with multiple camera pixels, and consequently computes multiple color-mixing matrices for the projected pixel. By using the matrices, we calculate a projection color so that the displayed colors in the projector pixel region are as close to a target appearance as possible by applying a linear least squares method. Through real projection experiments, we confirm that the proposed method can reduce the artifacts around regions where reflectance changes steeply.

☐ Accuracy Enhancement of Image Segmentation Using Adaptive Anisotropic Diffusion (pp. 451 - 452)

Jae Sung Lim (Pohang University of Science and Technology (POSTECH), Korea)

This paper proposes a new pre-processing method to enhance accuracy of image segmentation. The proposed method produces a de-textured image which gives appropriate help to improve the segmentation quality when the existing segmentation method, histogram-based clustering, is applied on the simplified image. For obtaining this simplified image, we perform the de-texturing using an adaptive anisotropic diffusion model. Then, the histogram-based clustering is performed on the de-textured image to obtain segmentation results. In the experiments the Berkeley Segmentation Dataset, probabilistic rand index (PRI) and segmentation covering (SC) values are used for evaluating the segmentation quality. Experimental results showed that the segmentation accuracy of the histogram-based clustering was improved by using pre-processing in terms of average PRI and SC values by up to 0.86%, 14%, respectively.

☐ Optimal control between the object position and view point in the 2 screen's L-type stereoscopic display system (pp. 453 - 455)

Yoshihiko Sakashita (Shonan Institute of Technology, Japan)

An main argument concerns the characteristics of the system for realizing a stereoscopic image displayed by the small screen number, and show the Action Description. When viewed from a particular direction, disadvantage here is that the three-dimensional impression of the image object is lost. This report shows the operation principle of an instruction and instructions by the controller with an infrared detection sensor shows a method for detecting the inclination in the lateral direction of the head by the acceleration sensor next. Next, in order to complement the observations from a direction stereoscopic effect eliminated by utilizing these features, the report on the operation control and the control to move in wrap viewpoint position to an object captured on the object, move, or rotate.

[14:00–, R103] User Interfaces & Experience in CE (2)

☐ QoE Assessment of Will Transmission Using Haptics: Influence of Network Delay (pp. 456 - 460)

Pingguo Huang (Tokyo University of Science, Japan); Qi Zeng (Nagoya Institute of Technology, Japan); Yutaka Ishibashi (Nagoya Institute of Technology, Japan)

This paper deals with collaborative work in which two users lift and move an object cooperatively to eliminate a target in a 3D virtual space. In the work, the users transmit their wills about movement direction of the object to each other by haptics. By experiment, we investigate the influence of network delay on will transmission using haptics. As a result, we demonstrate that it becomes more difficult to transmit the wills accurately as the network delay increases.

☐ QoE Assessment of Joint Haptic Drum Performance (pp. 461 - 465)

Mya Sithu (Nagoya Institute of Technology, Japan); Yutaka Ishibashi (Nagoya Institute of Technology, Japan)

This paper investigates the effect of local lag control on the synchronization quality of sound, interactivity, and comprehensive quality as QoE (Quality of Experience) in a networked haptic drum system. We handle joint performance in the system, where two users play a drum set in a 3D virtual space with the same rhythm at the same tempo. As a result, we illustrate that QoE depends on the network delay, and there exists the optimum value of local lag according to the

network delay.

☐ Influences of Inter-Stream Synchronization Errors among Haptic Media, Sound, and Video on Quality of Experience in Networked Ensemble (pp. 466 - 470)

Qi Zeng (Nagoya Institute of Technology, Japan); Yutaka Ishibashi (Nagoya Institute of Technology, Japan); Norishige Fukushima (Nagoya Institute of Technology, Japan); Shinji Sugawara (Chiba Institute of Technology, Japan); Kostas Psannis (University of Macedonia, Greece)

In this paper, we deal with a networked ensemble with a keyboard harmonica and a tambourine by using haptic media, sound, and video, and we investigate the influence of inter-stream synchronization errors among haptic media, sound, and video by quality of experience (QoE) assessment. In the QoE assessment, we handle two cases (cases 1 and 2). In case 1, we use low quality sound and normal video as well as haptic media. In case 2, we employ higher quality sound and stereo video with higher resolusion than those in case 1.

☐ Empirical Study Regarding Representing Roughness with Haptic Devices (pp. 471 - 473)

Manabu Ishihara (Oyama National College of Technology, Japan)

In this study, we examined methods of sensing roughness with haptic displays. Representation of paper quality applies to dictionaries, notebooks and other everyday items, not just calligraphy and washi paper. In contrast, the discrimination thresholds were $Z(0.75) = 0.0685$ for dynamic friction and $Z(0.75) = 0.0466$ for static friction. Considering the limitations placed on normal force, this means change in force can only be sensed up to 0.685 [N] and 0.466 [N], respectively.

☐ Moving IME Panel for Text Input Method and Shapekey Prototype (pp. 474 - 478)

Mitsuhiro Yamazaki (Lenovo Japan Ltd., Japan); Akihiko Mizutani (Lenovo Japan Ltd., Japan); Jedd Benedict Kris Mahilum (AWS Inc., Japan)

We devised a novel text input method editor (IME) for smartphone and tablet devices, providing a moving panel as the user interface. We prototyped an IME named “Shapekey” based on this concept and evaluated the impacts of the moving panel. We also compared it with existing IMEs such as T9 input or flick input etc. Analysis and discussion are given to show the possibility of this concept to achieve better input efficiency.

[14:00–, R104] Home, Automotive & Wireless Network

☐ Dynamic Sleep Period Control of ONUs for Differentiated Broadband Access Services (pp. 479 - 480)

Yoshiaki Maneyama (Keio University, Japan); Ryogo Kubo (Keio University, Japan)

Network services are diversified, and each service requires different quality of service (QoS). This paper proposes a QoS-aware sleep controller for energy-efficient optical network units (ONUs), which are installed at customer premises. The proposed controller reduces the power consumption of ONUs, while maintaining the QoS for downstream traffic at a constant level. Introducing a feedback control technique to the controller improves the QoS compared with conventional controllers. Simulation results confirm the proposed controller provides better performance than a conventional controller in terms of power consumption and average

queuing delay.

☐ Energy-Efficient Peer-to-Peer Communication with Network Coding over WDM/TDM-PON (pp. 481 - 482)

Takumi Ichikawa (Keio University, Japan); Masashi Tadokoro (NTT, Japan); Takahiro Kubo (NTT DOCOMO, INC., Japan); Takashi Yamada (NTT, Japan); Ken-Ichi Suzuki (NTT, Japan); Naoto Yoshimoto (NTT, Japan); Ryogo Kubo (Keio University, Japan)

Peer-to-peer (P2P) applications are of growing importance in designing access/home networks. This paper proposes an energy-efficient P2P communication architecture over a wavelength division multiplexing/time division multiplexing passive optical network (WDM/TDM-PON). The proposed architecture includes adaptive link rate (ALR) and network coding (NC) techniques. Simulation results show that the proposed architecture can reduce the power consumption of a communication device effectively in the presence of bidirectional P2P traffic.

☐ Enhanced Motion Estimation for Driver Assistance Systems - Integration of a Curved Road Model (pp. 483 - 487)

Gregor Schewior (Leibniz Universität Hannover, Germany); Holger Blume (Leibniz Universitaet Hannover, Germany)

This paper presents an extended efficient model-based approach for the improvement of motion vector fields for driver assistance systems. Through the integration of a curved road model the quality of motion vector fields, estimated by a predictive block-based motion estimator working on video signals which are captured by a front camera inside a car, is significantly increased. The optimization step is performed by modeling synthetic motion vector fields of typical driving scenes acting in an iterative step as additional motion vector candidates. The proposed enhanced approach which is effective for all kinds of driving situations provides a significant improvement in terms of objective and subjective performance while requiring only low computational overhead.

☐ Bit Transmission Error Correction Scheme for FlexRay Based Automotive Communication Systems (pp. 488 - 490)

Inhyuk Choi (Yonsei University, Korea); Taewoo Han (Yonsei University, Korea); Sungho Kang (Yonsei University, Korea)

In the FlexRay communication network systems which are configured as a large number of ECUs (Electronic Control Units) and network topologies, the receivers have the different asymmetric transmission delays which cause the transmission errors. As the complexity of the communication network topology in vehicle increases, the asymmetric delay is getting longer. In this paper, the error estimation and correction scheme to ensure the integrity of the signal during operation when the transmission error occurs due to the asymmetric delay is proposed. Simulation results show the proposed scheme can correct the transmission errors effectively in performance.

[16:00–, R102] SS-5: Smart TV

☐ A Stream Delivery Scheme with Carousel Broadcasting on Hybrid NVoD Systems

(pp. 505 - 506)

Tomoki Yoshihisa (Osaka University, Japan); Shojiro Nishio (Osaka University, Japan)

video stream delivery on hybrid NVoD (Near Video on Demand) systems has attracted great attention. Some schemes to reduce the interruption time on hybrid NVoD systems have been proposed. However, these schemes do not fully exploit the advantage of the carousel broadcasting. In this paper, we propose a stream delivery scheme with carousel broadcasting on hybrid NVoD systems.

☐ A Proposal of Smart TV System focused on Findability

(pp. 507 - 508)

Toru Kobayashi (Nagasaki University, Japan)

I propose a Smart TV System focused on findability. This system allows us to retrieve information without typing-in search key words. It also allows us to see retrieved information via multi-screen environment based on the intuitive user interface. I show an information finding model as a fundamental concept of this system, system configuration and user interface. I believe that this system will solve the problem of information retrieval capability differentials among users.

☐ IPTV-The Next Generation Television

(pp. 509 - 513)

Bhuvaneshwari N (Shridevi Institute of Engineering and Technology, Tumkur, India); Aman Aryaputra (Shridevi Institute of Engineering and Technology, Tumkur, India)

Technology innovation fast-forwards natural selection in the telecommunications marketplace by destroying old markets and creating new ones in their place. IPTV usually means distribution of television or video content over a controlled IP network, where the end consumer receives the information through a set-top box which is connected to its normal broadband connection. Just because its name is IPTV (Internet Protocol Television) it does not mean that information is sent over the internet, only that IP protocol is used. So we should not consider streaming video over the internet as IPTV. Many of the world's major telecommunications providers are exploring IPTV as a new revenue opportunity from their existing markets and as a defensive measure against encroachment from more conventional Cable Television services. Also, there is a growing number of IPTV installations within schools, universities, corporations and local institutions.

Will the content of IPTV be different from that of the traditional video delivery systems of broadcast television, video recordings, cable television and satellite television? How are the new IPTV business structured? What new modes of intermediation are replacing older forms in this market? Are things moving away from a mass audience model for high end television toward a more niche oriented approach? These are some of the questions that we have tried to answer in this paper. We have also given an insight to the hope of IPTV in Indian market.

[16:00–, R103] User Interfaces & Experience in CE (3)

This paper demonstrates the future possibility to integrate "Instant Quantitative Feedback System" into any educational or other relevant settings. Our study concerns how the instant feedback system on text data collected from the audience had an effect on learner's ore presenter's attitude, comparing the effects of the two types of the instant feedback system: the "clicker" type quantitative feedback and the qualitative feedback based on the text data. Our study was carried out in two different types of English classes of the Japanese national university. One class is a high-level class and the other is a low level class. Our study suggests that the proposed qualitative feedback system is useful in two ways: For low-level learners, the system encourages them to express their ideas and opinions better in free text style and to understand how the audience felt about their presentation. For high-level learners, the qualitative feedback system seems to provide them with the opportunities to summarize their ideas and opinions more deeply.

6to4 is one of the transitional technologies for coexistence of IPv4 and IPv6 and uses tunneling. Using 6to4, however, communication quality is degraded due to overhead of tunneling. In this paper, we investigate the effect of the degradation of communication quality in 6to4 on Web usability that is user experience quality of the Web service. From experimental results, we found that the effect of Web usability due to degradation of 6to4 depends on Web service.

Web services run on the Internet and the deterioration communication quality on the Internet has a great influence on Web usability. The communication quality has a hierarchical structure because the Internet architecture has also a hierarchical structure. This paper studies the relationship between multiple network performance evaluations between layers and then, we propose the evaluation method by using path analysis to evaluate the effects on Web usability. The experimental results show that satisfaction, one of the scales for Web usability, has a strong relationship with the number of packet retransmission per unit time in TCP layer and it was influenced by packet loss rate in IP layer indirectly. As a consequence, we confirmed the effectiveness of the evaluation method by using path analysis.

☐ Inter-Stream Synchronization Control with Group Synchronization Algorithm

Hiroya Sannomiya (Nagoya Institute of Technology, Japan); Junya Osada (Nagoya Institute of Technology, Japan); Yutaka Ishibashi (Nagoya Institute of Technology, Japan); Norishige Fukushima (Nagoya Institute of Technology, Japan); Shinji Sugawara (Chiba Institute of Technology, Japan)

In this paper, we propose inter-stream synchronization control which uses a group (or inter-destination) synchronization algorithm. The control can attain high quality of intra-stream synchronization of multiple media streams by allowing inter-stream synchronization errors among the media streams to some extent. By carrying out an experiment with haptic media and video, we examine the behavior of the control.

[16:00–, R104] Security & Rights Management

☐ A Stable Key Generation from PUF Responses with a Fuzzy Extractor for Cryptographic Authentications

Masato Taniguchi (Ritsumeikan University, Japan); Mitsuru Shiozaki (Ritsumeikan University, Japan); Hiroshi Kubo (Ritumeikan University, Japan); Takeshi Fujino (Ritsumeikan University, Japan)

Physical Unclonable Functions (PUFs) extract inherent characteristics caused by process variations, and generate unique challenge-response pairs. Some bits of PUF responses are slightly unstable, then the Fuzzy Extractors (FEs) are used to correct the error bits. This paper proposes the new soft-decision FEs considering the instability caused by voltage fluctuation. We applied this method to our novel RG-DTM PUF fabricated by 0.18um CMOS technology. It was demonstrated that the block error rate is reduced to 1/10 compared to the conventional soft-decision FE.

☐ Secret Sharing Scheme for Cloud Computing using IDs

Satoshi Takahashi (Tokyo University of Science, Japan); Shiro Kobayashi (Tokyo University of Science, Japan); Hyunho Kang (Tokyo University of Science, Japan); Keiichi Iwamura (Tokyo University of Science, Japan)

Secret sharing schemes can be used in cloud computing to allow many participants to distribute multiple data. However, the application of (k,n) secret sharing to cloud systems causes a large increase in storage capacity, making it unsuitable for systems with many secrets to distribute. Moreover, using the ramp scheme to reduce the required storage capacity causes gradual information leakage. Therefore, in this paper, we propose a new secret sharing scheme that is computationally secure and can reduce the number of shares. We compare the proposed method with conventional schemes.

☐ Reducing Public-Key Size in an Anonymous Credential System for CNF Formulas with Constant-Size Proofs

Nasima Begum (Okayama University, Japan); Toru Nakanishi (Okayama University, Japan); Nobuo Funabiki (Okayama University, Japan)

To enhance the user privacy at authentications, an anonymous credential system has been designed to allow a user to anonymously convince a verifier of the possession of a certificate issued by the issuing authority. In this system, a user can prove relations on his/her attributes

embedded into the certificate. Previously, we have proposed an anonymous credential system with constant-size proofs and faster proof generations for CNF formulas than the existing system. In the system, in the verification, some value should be included in some set S. Unfortunately, this system has a problem of requiring long public parameters that is proportional to the size of the set S. In this paper, we propose an extension to reduce the public key by separating this set S into two sets S1 and S2 with logarithmic sizes such that u1 is in S1 and u2 is in S2 if and only if u1+u2 is in S. Furthermore, we evaluate the efficiency based on the implementation.

☐ A storage-saving secret sharing scheme suitable for sensor networks (pp. 534 - 535)

Yoshihide Nagai (Tokyo University of Science, Japan); Hyunho Kang (Tokyo University of Science, Japan); Keiichi Iwamura (Tokyo University of Science, Japan)

A high-speed secret sharing scheme using XOR has been proposed. This scheme solves the problem of large calculations, but it cannot solve the problem of data size. The RAMP secret sharing scheme has also been developed. This has the problem that it leaks partial information. Therefore, we propose a method for reducing the high-speed data capacity of the secret sharing scheme using XOR. This solves the problems of data size and information leakage, overcoming the main problems of the two previous schemes.

☐ Detection of malware infection using score level fusion with Kernel Fisher Discriminant Analysis (pp. 536 - 537)

Masatsugu Ichino (University of Electro-Communications, Japan); Yusuke Ohtsuki (University of Electro-Communications, Japan); Mitsuhiro Hatada (NTT Communications Corporation, Japan); Hiroshi Yoshiura (The University of Electro-Communications, Japan)

The malware attack is increasing in both breadth and depth, and damage from botnets, whose activities are unabated, and infections from the Web have recently increased. We therefore studied the malware infection detection method by comparing malware traffic with normal traffic. We propose the malware infection detection using score level feature fusion with Kernel Fisher Discriminant Analysis.

☐ Round addition DFA for microcontroller implemented the Triple DES (pp. 538 - 539)

Hideki Yoshikawa (Tohoku Gakuin University, Japan)

This article presents a method of round addition attack on triple DES block ciphers using differential fault analysis(DFA). For a single DES, the secret key can be easily extracted using one correct ciphertext and two faulty ciphertexts. Even for triple DES, it is shown that the secret key can also extracted, similarly to single DES.

[16:00–, R105] SS-3: Smart Elevators

☐ A Study of Car Control and Assignment Problem in MCE Systems Using Hybrid Method (pp. 540 - 543)

Tatsuya Minegishi (Osaka University, Japan); Toshiyuki Miyamoto (Osaka University, Japan)

As the height of buildings grows, the demand of enhancing transportation capacity in buildings has been increasing. One of the solutions could be increasing the number of elevator

shafts. A dilemma, however, exists that most of the floor space is occupied by the elevator shafts if a lot of elevator shafts were installed. Therefore, multi-car elevator (MCE) systems, which have several elevator cars in a shaft, attracts people's attention. Optimization of car control and call assignment is necessary to control MCE systems safety and transport passengers rapidly. We have been studying the optimization problem, which is called a car control and assignment problem (CCAP) in MCE systems, and proposed Integer Program (IP) and Mixed Integer Program (MIP). They, however, have a problem that it takes long time to solve. In this paper, we propose a new method, which is called a Hybrid solving Method for Mce systems (HMM), solving the CCAP using Mixed Integer Program (MIP) and Constraint Program (CP), and evaluate it through computational experiments.

☐ Control Algorithm for Multi-Car Elevators with High Transportation Flexibility

(pp. 544 - 545)

Takeshi Fujimura (Kwansei Gakuin University, Japan); Shohei Ueno (Kwansei Gakuin University, Japan); Hiroshi Tsuji (Kwansei Gakuin University, Japan); Hiroyoshi Miwa (Kwansei Gakuin University, Japan)

Recently multi-car elevator (MCE) consisting of several elevator cars in a single elevator shaft received great interest as transportation systems for high-rise buildings. Algorithms for efficiently controlling elevator cars are necessary to put MCEs to practical use. We propose an algorithm for controlling MCE to reduce passenger-waiting time. The algorithm allocates requests to elevator cars by using a local search method to reduce the waste time during which cars cannot transport passengers. We show that the proposed algorithm performs well by simulation.

☐ Multi-Car Elevator Control Using Dynamic Zoning (pp. 546 - 549)

Hiroki Ishihara (Nagoya Institute of Technology, Japan); Shohei Kato (Nagoya Institute of Technology, Japan)

Zone drive system is an effective way to control the safety of Multi-Car Elevators. Zone is a constant range that restricts the movement of the car. So, constant zone decreases operating efficiency. On the other hand, operating methods without zone, such as scheduled operating, are able to operate efficiently. However, there is a problem that the cars may collide. To solve the problem, we propose a method for operating MCE by using dynamic zone allocation focusing on safety and to operate efficiently.

☐ Group Control of 2-Shafts Elevator System for Peak Power Cut and Service Performance (pp. 550 - 551)

Kentaro Nakayama (Tokyo Institute of Technology, Japan); Koji Takahashi (Tokyo Institute of Technology, Japan)

Discontinuing the use of one of two elevators for peak power cut worsens their service performance. The paper describes the method that can maintain service performance with peak power cut in 2 shafts elevator system. The maximum power of the proposed method is as same as that of one shaft operation, and the service performance is nearly equal to that of two shaft operation.

☐ Multi-Car Multi-Shaft Elevator System Design Problem and a Solution Method Based on CPN Tools (pp. 552 - 555)

Ishida Norihide (Yamaguchi University, Japan);
Shingo Yamaguchi (Yamaguchi University, Japan)

In this paper, we tackle a problem that designs multi-car multi-shaft elevator systems. We first formalize the problem as a multi-objective optimization problem. Then to solve the problem, we propose a method utilizing a high-level Petri net tool, CPN Tools. CPN Tools enables us to model and simulate various design of elevator systems. We apply the proposed method to 10 instances of the problem, and then discuss those results.

☐ A Formal Method of Developing Elevator Group Controllers Based on S-ring and SPIN (pp. 556 - 559)

Shingo Yamaguchi (Yamaguchi University, Japan);
Kazuya Nagafuji (Yamaguchi University, Japan)

We propose a formal method of developing elevator group controllers. In this method, we use a simplified elevator system model, called S-ring, to mathematically describe a group controller and its requirements. We also utilize a model checking tool, called SPIN, to exhaustively check whether the group controller satisfies the requirements. We give two application examples and illustrate the effectiveness of our method.