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Abstract of Presentations on October 27

[13:00-, R1005] RHN: Home Networks & Services

☐ Effect of QoS Degradation on Parallax Effect in Web Services (pp. 1 - 2)

Yuna Adachi and Yoshihiro Ito (Nagoya Institute of Technology, Japan)

This paper studies an effect of QoS degradation on the parallax effect for Web services by experiment. In the experiment, the authors consider 23 actual Web services and assess QoE of them. The experimental results show that, for some services, even if QoS is deteriorated, the parallax effect can be maintained. Moreover, the authors discuss the common characteristics among the services.

☐ Assessment of Sense of Presence for 3D IP Phone Service Under Actual Environments (pp. 3 - 4)

Tsubota Minoru and Yoshihiro Ito (Nagoya Institute of Technology, Japan)

This paper assesses the sense of presence for the 3D IP phone service with the binaural recording, which has been proposed by the authors, by experiments with actual environments. In the experiment, the authors consider seven actual environments, e.g., waiting for a train at the station, watching a sports game, and so on. The experimental results show that, under actual environments, the 3D IP phone service can give higher sense of presence than a monaural IP phone. Consequently, the authors confirm the practicality of our 3D IP phone service.

☐ Story Creation Approach for Sensor Network Application Development (pp. 5 - 6)

Ren Ohmura (Toyohashi University of Technology, Japan)

This study proposes a story creation approach for developing a sensor/home network application. In this approach, a device on a network is regarded as a character on a story. Then, the device's state and action is defined by the description of the character with a natural language corresponding to an ECA rule. Transmitting messages among the devices are dealt as conversation among the characters. This paper will show the detailed concept and an actual application development environment taking this approach. The result of experiment, in which 18 kids and 6 adults were involved, showed the usefulness of the approach.

☐ Predicting Collective User Preference for Optimal Comfort Level in Smart Buildings (pp. 7 - 11)

Syafril Bandara (The University of Tokyo, Japan); Takeshi Yashiro (YRP Ubiquitous Networking Laboratory, Japan); M. Fahim Ferdous Khan, Noboru Koshizuka and Ken Sakamura (The University of Tokyo, Japan)

The idea of smart building has become closer to reality due to the emergence of ubiquitous computing technologies. However, how a computational system can optimize user comfort level, which affects the quality of work of all occupants in buildings, still remains an open question. Since multiple users share building spaces and they have hierarchical relationship to each other, it is necessary to consider collective user preference. In this paper, we propose an algorithm to predict users' preferences based on the hierarchy of the occupants, which can be used as a decision mechanism in smart building environments.

A smart community simulator that simulates electrical power consumption and thermal energy consumption is being developed by the authors. The simulator is designed to be able to work with modules implemented as individual external emulators of many kinds of facilities and homes. With this simulator, we can change aspects and features of the community and estimate the long-term effects of these changes on the community as a whole. In this paper we introduced the design and implementation of the simulator.

[13:00-, R1006] SAS: Student Award Session

In this paper, we assess the quality of experience (QoE) about the operability of a haptic interface device for work in which a user operates an industrial robot with a force sensor at a remote location by using the haptic interface device while watching a video. We treat work of putting a metal rod attached to the tip of the industrial robot arm into a hole, and we demonstrate how much the operability is degraded owing to the network delay. To improve the operability, we also perform the adaptive reaction force control, which we previously proposed, and investigate its effect.

Education of network security has attracted a lot of attentions due to increasing unauthorized access, lack of engineers who have network security skills. Although practice using actual computer networks is highly important for network security education, it requires costs to prepare a computer network for practice. We have proposed a network security learning system by constructing a virtual network on one PC so that low-cost, easy and safe practice can be accomplished. In this paper, we introduce an attacker agent that automatically attacks servers in a fixed pattern for supporting practical learning of defense techniques safely on a virtual network.

This paper aims to propose a solution to skin color detection problem when existing multiple skin-color target persons in the image. The AdaBoost algorithm is used to detect the position of the face, and the dominant color of every face regions is used as the initial skin color sample. A new type of sample update mechanism is used to increase the skin color detection accuracy rate,

with a constraint mechanism controlling the number of iterations, allowing the proposed system to find out a more complete and smooth skin color regions.

☐ Improving Heuristic Search for RTS-Game Unit Micromanagement Using Reinforcement Learning (pp. 25 - 26)

Kamon Supaphon, Tung Nguyen, Tomohiro Harada, Ruck Thawonmas and Ikuko Nishikawa (Ritsumeikan University, Japan)

This paper proposes a method that uses reinforcement learning to improve heuristic search for unit micromanagement in real-time strategy (RTS) games. In the RTS game, unit micromanagement describes how the player controls their units. One of the most commonly used algorithms for unit micromanagement is heuristic search. Due to the fact that the RTS game has large number of states and large action space, the heuristic search algorithm has to rely on an evaluation method that only searches with a certain limited depth. We therefore apply reinforcement learning to achieve an evaluation method with high accuracy.

☐ Multi-Task Reinforcement Learning with Associative Memory Models Considering the Multiple Distributions of MDPs (pp. 27 - 29)

Fumihiro Kinbara, Shohei Kato and Munehiro Nakamura (Nagoya Institute of Technology, Japan)

Multi-task reinforcement learning is one of the promising approaches in reinforcement learning problems. While the formulation of the multi-task reinforcement learning problem have been established in a previous study, only a single distribution of the tasks has been considered. However, we assume that the formulation can hardly be applied to real-world problems. This paper presents a method of expanding the formulation to a more general problem by considering multiple distributions of tasks. In addition, we propose an agent model with associative memory models, then apply it to an expanded multi-task reinforcement learning problem.

[13:00-, R1007] OS-AAT: Recent Audio & Acoustic Technology

☐ [Invited] Future 3D Audio Technologies for Consumer Use (pp. 30 - 33)

Makoto Otani (Kyoto University, Japan)

Audio engineers and acousticians have been putting lots of effort on realizing three-dimensional (3D) audio technologies aiming at realization of truly high-fidelity audio, highly realistic virtual reality environment, and next-generation telecommunications. Fortunately, such efforts resulted in establishment of some theories providing physical and mathematical backgrounds for 3D audio technologies and some have been realized in laboratories. However, to apply them to consumer use, there remain lots of practical issues to be solved. This paper reviews state-of-the-art 3D audio techniques and prospects for applying them to a consumer use.

☐ Design and Performance Evaluation of a Stereo Sound Reproduction System with a Complementary Distributed Mode Loudspeaker (pp. 34 - 37)

Kosuke Goto and Kazuhiko Kawahara (Kyushu University, Japan)

This paper proposes an effective method to use a Distributed Mode Loudspeaker (DML). DMLs are loudspeakers with strong diffusion properties. In this paper, we proposed a sound reproduction system with a DML. The sound field generated by the proposed reproduction

system is measured by the index of diffusivity. As a result, it is concluded that the sound field generated by the proposed reproduction system has a higher diffusivity when compared with a conventional reproduction system. The proposed system also demonstrates strong results with respect to the influence of the chamber's acoustic boundary on sound quality.

☐ Word Intelligibility of Bone Conductive Sound When Wearing Ear Plugs (pp. 38 - 39)

Takuma Fujimoto and Mikio Mori (University of Fukui, Japan)

In this study, we measured and compared the word intelligibility of air conductive and bone conductive sound when wearing ear plugs in both ears by speech audiometry. The correct responses of word intelligibility of bone conductive sound tended to be better than those of sound heard through air conduction even in a high signal-to-noise environment. This effect was only elicited when earplugs were used in both ears.

☐ Linear-phased Graphic Equalizer Applied to Direct Stream Digital Signal (pp. 40 - 41)

Yuto Yasui (Nagoya Institute of Technology Graduate School of Engineering, Japan); Satoshi Hirano, Tomio Goto and Masaru Sakurai (Nagoya Institute of Technology, Japan)

In this paper, we propose a design method for a linear phase graphic equalizer that processes DSD (Direct Stream Digital) signals. DSD is one of the formats used for Super Audio CDs (SACDs). We apply a frequency sampling method to the graphic equalizer. The frequency sampling method can reduce circuit sizes when processing oversampling signals. We implemented the proposed circuit on the Zynq-7000 all-programmable system-on-a-chip (SoC).

[15:00-, R1006] AS: Award Session

☐ CSCB Tools: Tool for Supporting the Design of Systems Based on SOA (pp. 42 - 43)

Toshiyuki Miyamoto (Osaka University, Japan)

A service-oriented architecture builds the entire system using a combination of independent software components. The problem of synthesizing service implementation models from choreography representing the overall specifications of service interaction is known as the choreography realization problem. We proposed a semi-formal method, which is called CSCB method, for synthesizing hierarchical state machine models for the choreography realization problem. In this paper, we introduce a prototype tool of our method. Our tools have been implemented as a plug-in of Rational Software Architect.

☐ Activity Recognition and Its Applications for Elder Care Based on Mono-type Sensor Network (pp. 44 - 47)

Yi-Chong Zeng, Yu-Shian Chiu and Wen-Tsung Chang (Institute for Information Industry, Taiwan)

Total fertility rate of the world comes down every year. Low fertility rate implies the coming of aging societies, it raises high pressure to younger for the elder care. The objective of activity recognition is helpful for smart space technology in efficient allocation of manpower for elder care. We propose the activity recognition scheme performed on mono-type sensor network in space. Probability-based classification is available by analyzing sensor signal in order to train parameters of activity recognizers. The experiment results demonstrate that our scheme is capable of recognizing activities, generating activity of daily living, and detecting anomaly.

☐ Real-Time Data Compression for Thermal-controlled Three-Dimensional DRAM Systems (pp. 48 - 49)

Shu-Yen Lin, Jin-Yi Lin, Kai-Wei Chang and Cheng-Hung Huang
(Yuan Ze University, Taiwan)

In this work, we propose a half-size frequent pattern compression algorithm (HSFPC) for the 3D DRAM system. In the 3D DRAM system, the access data compressed by HSFPC can achieve better compression rate than by the traditional compression method, frequent pattern compression (FPC). In our experiments, the 3D DRAM system using HSFPC can reduce the peak temperature by 0.5°C ~ 4.5°C compared with the one using FPC.

☐ Lightweight Image Sensor Node for Next Generation IoT (pp. 50 - 51)

Tetsuo Furuichi (MegaChips Corporation, Japan)

We designed a lightweight image sensor nodes that can handle the image data as a next-generation IoT devices, and verified its effectiveness. Specifically, the image sensing module made in a small hardware has enabled always running. The resulting image data, once stored in the smart phone, then sent the data to the cloud server via the Internet. Cloud server extracts the valid data from the resulting image data. This combination reduces the system cost, achieves small size, low power consumption, scalability and versatility. So this system will become one of good solutions for the next generation IoT system.

☐ Study on Effect of Congestion Control of Multipath TCP on Web-QoE (pp. 52 - 53)

Yasuomi Muraki and Yoshihiro Ito (Nagoya Institute of Technology, Japan)

This paper studies effect of congestion control of Multipath TCP(MPTCP) on Web-QoE by experiments for Web services. In the experiment, the authors treat three congestion controls of MPTCP: TCP NewReno, TCP Vegas and MPTCP LIA and target two actual Web services; they utilize the Web usability as QoE parameters. The experimental results show that there are little difference between the effects of congestion controls in Web-QoE.

☐ IoT Device Management Framework for Smart Home Scenarios (pp. 54 - 55)

Thinagaran Perumal (University Putra Malaysia & IEEE Consumer Electronics Society, Malaysia); Soumya Kanti Datta (EURECOM, France); Christian Bonnet (Institut Eurecom, France)

The paradigm of the Internet of Things (IoT) requires pervasive connectivity to billions of heterogeneous devices. In recent time, rapid growth of IoT devices in smart home environment envisioned a wide range of novel services and applications. However, due to the inherent heterogeneity, home environment is becoming complex making device management extremely difficult. This paper proposes a lightweight IoT device management framework for smart home services. The framework can be deployed at home gateways and consumer smart devices. A prototype implementation and performance evaluation results are also presented.

Abstract of Presentations on October 28

[09:30-, R1004] OS-ACE: Formal Approach to Consumer Electronics

☐ [Invited] A Solvable Simplified Model for Elevator Group Control Studies (pp. 56 - 60)

Sandor Markon (Kobe Institute of Computing, Japan)

We describe in some detail the technique of using a simplified model of a complex discrete dynamic system, in our case an elevator group control system, as a benchmark for control and optimization studies. The simplified system is constructed in a way that balances between two conflicting requirements: it retains the most important dynamical characteristics of the target system; but at the same time it allows exact solution by algorithmic methods. As a concrete example, we show the derivation of the "S-ring" model from a formal model of elevator group supervisory control, describe the solution process, and illustrate using the exact solution to benchmark some optimization methods. We also describe one variant, the "S-lane" model, and show its solution, as an example of extending the technique to related other problems.

☐ A Simplified Mathematical Modeling and Zone Scheduling for Multi-Directional Multi-Car Elevators (pp. 61 - 64)

Shunya Ishimaru and Shingo Yamaguchi (Yamaguchi University, Japan)

ThyssenKrupp Elevator has proposed a multi-directional multi-car elevator product, called MULTI. In this paper, we proposed a simplified mathematical model for multi-directional multi-car elevators. This model is based on Markon's S-ring, which is for single-car elevators. In addition, we proposed zone scheduling for multi-directional multi-car elevators, and analyzed the proposed scheduling by applying them to the simulation.

☐ Petri Net-based Parallel Model Checking with a Splitting Procedure (pp. 65 - 68)

Muhammad Syafiq Bin Ab Malek, Mohd Anuaruddin Bin Ahmadon and Shingo Yamaguchi (Yamaguchi University, Japan)

Model checking is very important to analyse the behavior of consumer electronic products. However, in case of large-scale behavior, the analysis takes a lot of time. In this paper, we propose a Petri net-based framework of parallel model checking and a Petri net splitting procedure. The proposed framework is useful to reduce the size of the net, thereby reduce the analysis time. This parallel model checking allows us to analyse the property of each splitted nets simultaneously. We illustrate the proposed framework with a product called as i-Refrigerator as an application example.

☐ SMT-based Scheduling of Distributed Mediator for Web Service Composition (pp. 69 - 70)

Yoshiki Maeda and Toshimitsu Ushio (Osaka University, Japan)

A mediator that performs tasks such as the conversion of data formats is used to achieve a correct composition of web services in Service Oriented Architecture(SOA). In this paper, we consider a distributed mediator with several sub-mediators implemented on a multiprocessor. We represent constraints on the distributed mediator by an SMT formula. We use an SMT solver to check the satisfiability of the formula and, if it is satisfiable, then we obtain the assignment of the tasks to the sub-mediators and a feasible schedule in each sub-mediator. We

also consider fair load balancing among the sub-mediators.

☐ Formal Verification of Dynamically Reconfigurable Systems (pp. 71 - 75)

Ryo Yanase, Tatsunori Sakai and Makoto Sakai (Kanazawa University & Graduate School of Natural Science and Technology, Japan); Satoshi Yamane (Kanazawa University, Japan)

A dynamically reconfigurable system can perform complicated operations with dynamically changing the configuration. For ensuring the safety of the system, a model checking is one of the efficient formal approach. In our work, we define the specification language of a dynamically reconfigurable system and propose the model checking algorithm of verifying safety properties.

☐ Distributed CFG-based Symbolic Execution for Assembly Programs (pp. 76 - 80)

Takumi Adachi, Satoshi Yamane and Kouhei Sakurai (Kanazawa University, Japan)

The symbolic execution is one of the effective dynamic verification methods and there are some researches on application of it to assembly programs. However, symbolic execution has well-known problems: First, symbolic execution can't deal with some programs with containing loops. Second, symbolic execution sometimes causes the path explosion. In particular, assembly programs are more often suffered from these problems because of its characteristic control flow such as interruptions. In this paper, we propose the Distributed CFG(Control Flow Graph)-based Symbolic Execution to solve these problems.

[09:30-, R1005] OS-IOT: Consumer Centric Internet of Things (CC-IoT FG)

☐ [Invited] Self-adaptive Middleware Framework for Internet of Things (pp. 81 - 82)

Soojin Park (Sogang University, Korea); JaeSeung Song (Sejong University, Korea)

A recent trend in Internet of Things (IoT) is to connect billions of ordinary objects to the Internet and allows these objects to exchange data for smarter services. As smartphones have widely spread in the world and generate various data, it will represent a large portion of heterogeneous interconnected IoT devices. This trend influence users to perceive that the usability of the smartphone mobile application represents the usability of the general IoT service. This article introduces a novel IoT middleware framework to improve the usability of a mobile application, and thereby improve the usability of the IoT service provided through the mobile application. The core idea of our self-adaptive IoT middleware framework is to monitor and analyze application user's behavior, identify symptoms reducing application usability, and autonomously improve the application's interface for users without any intervention from the application developer. The effectiveness of the proposed framework is shown through case studies comparing several different mobile applications from a same business domain.

☐ Search Engine Based Resource Discovery Framework for Internet of Things (pp. 83 - 85)

Soumya Kanti Datta (EURECOM, France); Christian Bonnet (Institut Eurecom, France)

This paper proposes a search engine based resource discovery framework for Internet of Things (IoT) to discover resources, their capabilities, properties and URIs to access them regardless of communication technology. There is a central registry to store configurations of objects and they are indexed. Based on discovery request parameters, the search engine "looks up" the indices and returns the URI(s) to directly access the resource(s). The functionalities of

the proposed framework are exposed to the consumers using RESTful web services. The framework is generic enough to be deployed in cloud platforms, M2M gateways and lightweight mobile application running on smartphones.

☐ Internet of Things (IoT) Enabled Water Monitoring System (pp. 86 - 87)

Thinagaran Perumal (University Putra Malaysia & IEEE Consumer Electronics Society, Malaysia); Md Nasir Sulaiman (Universiti Putra Malaysia, Malaysia); Leong Cy (Catrino, Malaysia)

Due to global environmental situation, the management of water is very vital to the survival of human and the plant itself. With the rapid development of technology and its integration in our life, there is need for different consumer products that achieve effective and efficient management of water are designed. Our system is based on IoT mechanism with water level sensor detecting the desired parameter, and if the water level reaches the parameter, the signal will be send to Twitter and Cloud server whereas the alarm will make a sound and LED will light up.

☐ PUF as a Sensor (pp. 88 - 92)

Koichi Shimizu and Takeshi Sugawara (Mitsubishi Electric Corp., Japan); Daisuke Suzuki (Mitsubishi Electric Corporation, Japan)

The idea of using physical unclonable function (PUF) as a sensor is proposed. Environment-dependent behavior of PUF, which is conventionally unwanted, is used for sensing. Such PUF-based sensors have advantages over ordinary sensors. As a proof of concept, a voltage sensor is prototyped using an ASIC implementing the glitch PUF. The performance of the PUF-based sensor is evaluated by injecting pulses to power supply. The experiment emulates a hostile environment in which an attacker tries to inject faults. As a result, the PUF-based sensor successfully detects the injected pulses at high accuracy.

☐ Study of Web Service Estimation Using Only Ethernet Frame Header or IP Packet Header (pp. 93 - 94)

Daichi Sugita and Yoshihiro Ito (Nagoya Institute of Technology, Japan)

This paper proposes a Web service estimation method by using only Ethernet frame header or IP packet header and confirms effectiveness of the method by experiment. Within the frame header of packet header, the proposed method uses only information that is not encrypted, such as the length, the interval and so on. Therefore, the method can be applied to secure communication. This paper includes two experiments. One is for extraction of traffic characteristics, and the other is for evaluation of the method. From the experimental results, the authors confirm that some Web services can be estimated exactly by our method.

[09:30–, R1006] OS-PSH(1): Large Scale Signal Processing in Smart House (1)

☐ Dual-Side Bidding Scheme for Channel Allocation in Cognitive Radio (pp. 95 - 96)

Wen Hsing Kuo (Yuan-Ze University, Taiwan); Ting-Yang Lin and Yu-Ling Hong (Yuan Ze University, Taiwan)

The basic idea of cognitive radio (CR) is to release the unused channels of the licensed users to better utilize the radio resource. We propose an auction scheme called Dual-Side Bidding, which maximizes the overall utilization. After a single round of the sealed bidding, the channel

allocation can be decided. The proposed scheme not only has very low overhead because of its single-round approach, but also prevent users from colluding due to its dual-side design. The results of simulations also show that the performance of our method is approximate to the optimal solution.

☐ Adaptive Joint Source and Channel Optimization Using Packet Loss Visibility Model

Chuan-Jia Wang, Ting-Lan Lin and Hsin-Chin Lee
(Chung Yuan Christian University, Taiwan);
Yangming Wen (Jimei University, P.R. China)

In this paper, we proposed an adaptive weighting for joint source and channel rate-distortion optimization. The weighting is adjusted based on some measurements of MSE in previous encoded MB. The resulting videos for source loss, channel loss and the combination perform better than our prior work; the proposed method has higher winning rate over H.264 standard with the rate being 48.33%, 45.33% and 93.66%. Another novelty is that the proposed method does not require prior knowledge about the performance of different weightings, and the optimal weighting can be found adaptively.

☐ Book Spine Segmentation for Various Book Orientations

Chih Chang Yu (Institute for Information Industry, Taiwan);
Rui-Jun Zhang and Hsu-Yung Cheng (National Central University, Taiwan)

This work proposes a novel approach to separate books which are placed disorderly on a bookshelf. This work applies grayscale morphological reconstruction and L0 gradient minimization to erase texts on books while preserving book boundaries. Afterwards, Hough transform and the proposed SVM-based recovery scheme are applied to find book boundaries accurately. The proposed SVM-based recovery scheme is able to recover the book boundaries missed by Hough transform without incurring noticeable false alarm detections. Experiments demonstrate that the proposed method is able to segment books which are placed in various orientations.

☐ A Framework for a Consumer-end Energy Management System in the Smart Grid

Yi-Wen Chen and Wei-Yu Chiu (Yuan Ze University, Taiwan)

Home appliances, smart phones, smart meters, dynamic pricing, and a data center with cloud-computing technologies are combined to construct a consumer-end energy management system. In the proposed framework, a power user in a grid can use a smart phone to adjust their power consumption induced by home appliances or other electronic devices based on the ambient environment and pricing signals. As the result, the proposed system can help reduce power consumption and improve energy efficiency.

☐ A Framework for Automatic Program Detection System

Teng-Kuei Juan and Wei-Yu Chiu (Yuan Ze University, Taiwan);
Shih-Gang Chen (National Central University, Taiwan)

An automatic program detection system is constructed using advanced technologies including the metadata service and identification of image and sound. By using this system, a user can have three ways to inform them about the starting of a TV program. During advertisement, the user has three modes to select for a better time management. This system

can improve the experience of watching TV in a substantial way.

[09:30-, R1007] OS-AIR(1): Artificial Intelligence & Robotics (1)

☐ Semi-Supervised Learning Based Activity Recognition From Sensor Data

Ryunosuke Matsushige (Kwansei Gakuin University, Japan); Koh Kakusho (Kyoto University, Japan); Takeshi Okadome (Kwansei Gakuin University, Japan)

The semi-supervised kernel logistic regression (SSKLR), developed for the classification of human behaviors from sensor data, takes the form of a linear combination of kernel functions associated with each of the labeled and unlabeled data from the training set. Its model parameters are determined, using an EM algorithm, by maximizing the expectation of the joint distribution over the posterior for selected unlabeled data that are in a neighborhood of one of labeled data. Tests for two types of human behaviors reveal that, using acceleration data as input, SSKLR classifies the behaviors better than some existing models.

☐ Concept Lattice Reduction Using Attribute Inference

Hayato Ishigure and Atsuko Mutoh (Nagoya Institute of Technology, Japan); Tohgoroh Matsui (Chubu University, Japan); Nobuhiro Inuzuka (Nagoya Institute of Technology, Japan)

Formal Concept Analysis (FCA) is a data analysis method and it outputs a concept structure called a concept lattice. One of the problems of FCA is that the size of a concept lattice becomes far larger as data becomes larger. Various methods for reducing a concept lattice have been proposed, but they have disadvantage, e.g. reduced one is not a lattice. In this paper, we propose a method for reduction using attribute inference based on an approximate implication. We also evaluated some methods regarding that a reduced lattice has noise.

☐ CHOBONYAN: Soft-Stuffed Robot in Palmtop Size and Light Weight for Therapy

Rina Hayashi (Nippon Soken Inc., Japan); Shohei Kato (Nagoya Institute of Technology, Japan)

The development of small and light robot that can easily contact even if elderly people is important in recent years, while the application of robot-assisted therapy is spreading out with great progress in robot technologies. In this study, we proposed the architecture of the robot using the driving system by muscle wires and made soft cat robot in palmtop size and light weight.

☐ How Cognitive Biases Works on Word Alignment

Taichi Matsui, Shohei Kato and Munehiro Nakamura (Nagoya Institute of Technology, Japan)

The gap between the daily reasoning and logical reasoning is called cognitive biases. We applied this cognitive biases to word alignment. At first, we expected that cognitive bias would improve the Alignment Error Rate (AER). However, cognitive biases doesn't improve the performance compared to the standard method for word alignment. While applying cognitive bias to word alignment simply doesn't outperform existing basic method, they showed better performance than most fundamental methods which use co-occurrence measurement.

☐ A Friendship Network Model on Heider's Balance Theory Considering Assertiveness and Empathy (pp. 117 - 119)

Tatsuki Okubo, Shohei Kato and Atsuko Mutoh (Nagoya Institute of Technology, Japan)

A student with various personality exists in the classroom community such as junior high schools, and there it is demanded that teachers performs appropriate class administration.Therefore the study on classroom forming model using the multi agent system is conducted frequently. One of such studies includes the one which pays its attention to the communication between agents. In this report, we focus on the study and suggest the simulation that is almost a more real communication method. We observe what kind of group is formed by a simulation experiment and examine the results.

[11:30-, R1003] DEM(1): Demo! Session (1)

☐ A Stream Merge Method to Reduce Load for Sensor Data Stream Delivery (pp. 120 - 121)

Ei Khaing Win, Tomoki Yoshihisa and Yoshimasa Ishi (Osaka University, Japan); Tomoya Kawakami (Nara Institute of Science and Technology, Japan); Yuuichi Teranishi (NICT & Osaka University, Japan); Shinji Shimojo (Osaka University, Japan)

Sensor data stream delivery technology takes an important role for the applications. As the number of the streams increases, the server's load caused by the delivery such as the computational power, memory usage, network bandwidth, etc. increases. However, there has never been a method to reduce the number of the streams for sensor data stream delivery. Hence, we propose a stream merge method to reduce the server's load for sensor data stream delivery. In the demonstration, we will show how our proposed method reduces the number of the streams by visualizing various communication situations.

☐ Deforming Sound Polyhedron (pp. 122 - 124)

Mitsugu Suzuki and R. Jitsunari (Shimane University, Japan); Yuki Nakamura (Shimane Toyopet Motor Sales co. Ltd, Japan)

Speaker system with surfaces of regular polyhedron were invented to reduce acoustic strain by asymmetrically laid out of speaker units, and its goal was simulating a sounding body of perfect sphere, or a point more ideally, and the electrical signals that drive speaker units and the characteristics of the speaker units should be well homogenized. In this study, we intended to spuriously deform the shape of the sound polyhedron by controlling delays and amplitudes of the electrical signals sent to the speaker units.

☐ Demo: FPGA Implementation of an IEEE802.15.4g MR-OFDM Baseband Modem for Smart Metering Utility Networks (pp. 125 - 126)

Augusto Queiroz, Gabriel da Silva, Cesar G Chaves, Tiago Perez, Daniel Garcia, Denise Alves, Maique Garcia and Eduardo de Lima (Eldorado Research Institute, Brazil)

This demo presents the implementation of an MR-OFDM baseband modem, in FPGA, compliant with the recently released IEEE802.15.4g standard. Such standard is devoted to Smart Metering Utility Networks. The modem was designed using VHDL and prototyped on Altera's device 5CGXFCC5C6F27C7N . The prototype supports all MR-OFDM configurations and its maximum FPGA speed is 65.16MHz. The modem was evaluated as follows: parameters measured by an Electronic Energy Meter (active power, reactive power, current, voltage and frequency) were used at the transmitter side, the transmitted signal was corrupted by the

wireless channel and AWGN, and then processed by the OFDM receiver.

☐ Development of a Wireless Physiological Computing Platform Using a National Instruments' myRIO Embedded Device (pp. 127 - 128)

Guanghao Sun (The University of Electro-Communications, Japan);
Takemi Matsui and Yasuyuki Watai (Tokyo Metropolitan University, Japan)

We designed a physiological computing platform, which is easy to configure and setup using NI' myRIO embedded device. The proposed platform consisted of three basic modules. The physiological signals captured via the biosensors were sent wirelessly using the myRIO's analog input channels to a PC or mobile handheld devices such as, tablet or smartphone. The signal processing procedures were conducted using a graphical design software LabVIEW. The signals and computing results were displayed to the user via the screen. In this paper, we demonstrated effectiveness of proposed platform on non-contact measurement of the heart and respiration rates using microwave radar.

☐ Development of LED Illumination-Based Spy Photo-Prevention System (pp. 129 - 130)

Kyosuke Kageyama and Kohei Sugiyama (University of Ritsumeikan, Japan);
Takeshi Kumaki (Ritsumeikan University & Dept. of VLSI System Design, Japan);
Takeshi Fujino (Ritsumeikan University, Japan)

Various crimes can be committed by using camera-equipped mobile device. In particular, spy photo and digital shoplifting are increasing rapidly. No direct countermeasures have been taken against these crimes, so potential victims have to prevent these crimes themselves. To overcome these problems for realizing safe society, this research demonstrates a crime prevention technology called spy photo-prevention System (SPS) that uses an LED visible light beacon to prevent a camera function for taking spy photos.

☐ Dual Display of Virtual Machines for Automotive Infotainment Systems (pp. 131 - 132)

Hyunwoo Joe, Dongwook Kang, Jin-Ah Shin, Vincent Dupre, SooYoung Kim,
Taeho Kim and Chaedeok Lim (Electronics and Telecommunications
Research Institute (ETRI), Korea)

We introduce GPU sharing between virtual machines on an embedded hypervisor. To achieve GPU virtualization, we apply an API remoting method which requires low overhead to OpenGL ES. For multimedia application, we target in-vehicle infotainment system and configure two guest virtual machines. The digital cluster is implemented on a bare-metal virtual machine. Furthermore, for multimedia application, we implement a linux-compatible 3D navigation. The framework can display both guest virtual machines on a single display panel so that output could be allocated separately on the panel. With this work, we explored how to virtualize GPU on a hypervisor for automotive systems.

☐ Evaluation System for Digital Audio by 1-Bit Stream Using FPGA (pp. 133 - 134)

Hiroaki Yamashita, Shinya Kano, Satoshi Hirano, Tomio Goto and Masaru Sakurai
(Nagoya Institute of Technology, Japan)

In digital audio systems, the $\Delta\Sigma$ modulator has been widely utilized as a Digital-to-Analog Converter (DAC) for Class-D amplifiers, and an Analog-to-Digital Converter (ADC). In general, to evaluate the $\Delta\Sigma$ modulator, an expensive analog signal generator or high-performance DAC is required. In this paper, we realize a novel system using a Field-Programmable Gate Array (FPGA), PC, and power supply. Our system allows evaluation of the

ΔΣ modulator using a 1-bit stream instead of an analog signal.

☐ Measurement of the Differential Transfer Function Between Bone-Conduction and Air-Conduction for Sound Localization (pp. 135 - 138)

Satoki Ogiso, Koichi Mizutani, Keiichi Zempo and Naoto Wakatsuki (University of Tsukuba, Japan)

In this paper, the measurement method of the difference between air-conduction and bone-conduction transfer functions and the effect of the filter generated from it were described. The transfer function was measured by canceling air-conduction and bone-conduction sound each other. The transfer function was measured for 30 kinds of frequencies ranging from 100 Hz to 15 kHz for 6 subjects. Through the experiments, it was confirmed that the sound localization feeling was added to the sound from bone-conduction headphone.

☐ Measurement of the Distance Difference of Acoustic Beacons Using Direct Conversion Receiver (pp. 139 - 142)

Keiichi Zempo, Satoki Ogiso, Koichi Mizutani and Naoto Wakatsuki (University of Tsukuba, Japan)

The purpose of this paper is to develop the acoustic method of the distance measurement between the microphones and the loudspeakers with the aim of indoor localization. These distance differences are calculated by the phase difference of the multiple frequencies, which are included in the transmitted acoustic signals, using direct conversion receivers. Moreover the beacons were identified by frequency for the multiple simultaneous measurements. Through the numerical experiments, we have confirmed that the proposed method could detect the distance differences enough to locate of the target beacons by using a few microphones.

☐ Portable Vision-based Response Analyzer with Sheet Bending Recognition (pp. 143 - 144)

Manabu Ito and Motoki Miura (Kyushu Institute of Technology, Japan)

Device-free response analyzer system has been proposed to reduce the management tasks of student devices. Conventional device-free response analyzer systems utilize a PC and cameras to realize the recognition of the fiducial markers. However, the installation of the PC and cameras requires additional burdens for teachers. We have implemented the function of device-free response analyzer on a tablet OS. Thanks to the portability of the tablets, the teachers can easily conduct the response analyzer lecture. We have also implemented a sheet bending recognition, which enhances the modality of the marker-based response analyzer, to our system.

☐ Spot and Set: Controlling Lighting Patterns of LEDs Through a Smartphone (pp. 145 - 146)

Daigo Nagase (Tokyo University of Agriculture and Technology, Japan); Kaori Fujinami (Tokyo University of Agriculture and Technology & Daily Life Computing Lab., Japan)

Various social events exist in a year, among which Christmas is one of the most popular one. Illumination plays a role on making a good atmosphere during an event. Usually, people illuminate trees and walls by laying cables with a bunch of LEDs; however, they do not have controls over the lighting patterns, instead they just select one from preset. In this paper, we propose a system to control lighting patterns of LEDs, in which a user's smartphone terminal works as a controller.

☐ Study on the Coding Efficiency Impacts Using Larger Intra Prediction Unit Size Than HEVC (pp. 147 - 150)

Takeshi Tsukuba and Tomohiro Ikai (Sharp Corporation, Japan)

This paper presents the coding efficiency impacts using larger intra prediction unit size (PU extension) than HEVC, which is implemented on the HEVC reference software HM-16.4. It is reported that the PU extension up to 128x128 can achieve 0.07 % and 0.18 % on average for normal QPs and high QPs using 49 frames respectively in all intra configuration. The gain by 128x128 Intra PU extension is only smaller than that of 64x64 Intra PU of 0.18%. For further study, combination of prediction mode increase, efficient prediction mode signaling and transform size extension should be studied.

☐ Visualization of Similar News Articles with Network Analysis and Text Mining (pp. 151 - 152)

Takayuki Imai and Keita Nakamura (National Institute of Technology, Gunma College, Japan); Toshiaki Ohmameuda (Gunma National College of Technology, Japan)

This paper proposes the method to classify news articles by combining TF-IDF and N-gram. This method extracts characteristic words from each news article and classify news based on these words. Numerical experiment results show the relationship among the news articles and visualize the similar articles with networks. Additionally, the authors compare proposal method with only TF-IDF in order to verify the effectiveness of this method.

☐ Computer Maka Dai Shogi (pp. 153 - 154)

Yasuyuki Nakane (Osaka Electro-Communication University, Japan); Hisako Hara (Osaka Electro-Communication University & Faculty of Information Science and Arts, Japan); Tomoyuki Takami (Osaka Electro-Communication University, Japan)

Maka Dai Shogi is one of large-board variants of Shogi games, which appears to have been invented during the Heian period. It was played on a 19x19 board with 96 pieces each. Unfortunately, there are little references of large Shogi variants, but we could find enough information of Maka Dai Shogi in some descriptions of them to play the game. As it is difficult for beginners to play it, we have developed computer Maka Dai Shogi as a support tools.

[11:30-, R1003] POS(1): Poster Session (1)

☐ A Comparative Study on Access Control Methods for ITS Radio Communications Systems (pp. 155 - 158)

Takahiro Yokomori, Masahiro Fujii, Hiroyuki Hatano, Atsushi Ito and Yu Watanabe (Utsunomiya University, Japan)

The CSMA/CA adopted for IVC essentially has a hidden station problem in which transmitted frames collide because a station cannot sense the frame from another one. The decentralized TDMA can reduce frame collision caused by the hidden station problem. There is room for comparative studies between CSMA/CA based on ARIB STD-T109 and the decentralized TDMA. In this paper, we compare performances of CSMA/CA with those of the decentralized TDMA in the hidden station environment by computer simulations. From the simulation results, we show that the decentralized TDMA outperforms CSMA/CA although the decentralized TDMA causes a constant delay time.

☐ A Low Noise CMOS Subharmonic Mixer for LTE-A Applications (pp. 159 - 161)

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

This paper presents a low noise down-conversion subharmonic mixer for Long-Term-Evolution Advanced (LTEA) application. The proposed mixer adopts the bulk-driven to improve the switching speed of local oscillator (LO) stage and noise issue. This work exhibits the operating frequency of 3.51 GHz and the LO frequency of 1.75 GHz. The simulation results show the power conversion gain of 6.6 dB, single side-band noise figure (SSB NF) of 10.9 dB, and input second-order intercept point (IIP2) of 22 dBm. The mixer implemented by tsmc 0.18m CMOS process consumes 3.8 mA of current from a 1.5 V power supply.

☐ A Low-cost Implementation of Lecture Distribution System Utilizing FPGA and Mobile Devices (pp. 162 - 163)

Tomohiro Tatta and Toshiaki Ukai (University of FUKUI, Japan);
Farhanah Ibrahim (University of FUKUI, Malaysia);
Shinji Fukuma and Shin-ichiro Mori (University of FUKUI, Japan)

In recent years, lecture using the projector and the screen is being performed at the university. However, the rear of the students in a large classroom is difficult to visually recognize the screen. This paper proposes a Low-cost Lecture Distribution System by using a camera and FPGA and student's mobile devices. This system detects the laser pointer spot and output the slide image with a pointer cursor in a mobile device's Web browser.

☐ A Study on Highly Effective IVC System Using TV White Space (pp. 164 - 167)

Yuri Igarashi, Masahiro Fujii, Hiroyuki Hatano, Atsushi Ito and Yu Watanabe
(Utsunomiya University, Japan)

In this paper, we propose a new communication system for Intelligent Transport Systems (ITS). The concern with an efficient use of the TV White Space (TVWS) has been growing. We investigate the communication systems by using the TVWS in order to improve the spectral efficiency for ITS. By using the TVWS, it is possible to obtain an decentralized effect owing to the division of simultaneous stations into the channels. By computer simulations, we show that the proposed system with double bandwidth can provide more than double performance.

☐ Achieving Optimal Illumination Conditions Using Local Search (pp. 168 - 172)

Marios Sioutis (Japan Advanced Institute of Science and Technology, Japan);
Yuto Lim (Japan Advanced Institute of Science and Technology (JAIST)
& School of Information Science, Japan); Yasuo Tan (JAIST, Japan)

In this research we attempt to achieve optimal illumination conditions in enclosed spaces that contain multiple illumination devices using local search algorithms. Given an illumination request, the problem space which consists of the combination of all possible device settings is explored with the use of local search algorithms. The illumination effects of devices are modelled on an approach based on ray-tracing.

☐ Adaptive Directional Lifting Wavelet-Based Lossless Image Coding with Directional Data Hiding (pp. 173 - 174)

Makoto Shin and Seisuke Kyochi (The University of Kitakyushu, Japan)

This paper introduces a secure image coding method using adaptive directional lifting wavelet transform (ADLWT)-based lossless image coding with directional data hiding. ADL is an image dependent directional transform that provides sparser representation of images and attains higher compression performance compared with the conventional discrete WT employed in JPEG2000. Since direction data used in ADLWT is required for inverse transform and should be transmitted to the decoder, it can be utilized as secret key for decoding. In this paper, we show an algorithm that embeds direction data into wavelet domain while keeping almost the same bit rates.

☐ Analysis of Vibration Characteristics for Body-Braille Reading Accuracy

(pp. 175 - 176)

Akinori Tajima and Satoshi Ohtsuka
(National Institute of Technology, Gunma College, Japan)

We have developed Body-Braille as an information transmission support tool for Deaf-Blind people. In this paper, improving the readability of Body-Braille is the goal. We investigated the optimal characteristics through two experiments. One is the reading of Body-Braille when produced by three types of motors. The other is the reading of Body-Braille while changing the frequency with a fixed amplitude. As a result of the experiments, we revealed that the readability was influenced by both amplitude and frequency of the vibrator. Moreover we found that the optimal frequency band of the vibrator was in the range of 70Hz to 100Hz.

☐ Automated Content Detection on TVs and Computer Monitors (pp. 177 - 178)

Waldir Silva (Universidade Federal do Amazonas, Brazil);
Eddie B de Lima Filho (Centro de Ciência, Tecnologia e Inovação do Pólo Industrial de Manaus - CT-PIM & Universidade Federal do Amazonas - UFAM, Brazil);
Wheidima Melo (Universidade do Estado do Amazonas, Brazil);
Felipe Farias (Universidade Federal do Amazonas, Brazil)

Several quality tests are performed during the manufacturing process of a television or computer monitor, one of the most important is the visual inspection of images

☐ Bounded Model Checking of C++ Programs Based on the Qt Framework

(pp. 179 - 180)

Felipe Rodrigues Monteiro Sousa and Lucas Cordeiro (Federal University of Amazonas, Brazil); Eddie B de Lima Filho (Centro de Ciência, Tecnologia e Inovação do Pólo Industrial de Manaus - CT-PIM & Universidade Federal do Amazonas - UFAM, Brazil)

The software development process for embedded systems is getting faster and faster, which generally incurs an increase in the associated complexity. As a consequence, consumer electronics companies usually invest a lot of resources in fast and automatic verification processes, in order to create robust systems and reduce product recall rates. Because of that, the present paper proposes a simplified version of the Qt framework, which is integrated into the Efficient SMT-Based Bounded Model Checking tool to verify actual applications that use the mentioned framework. The method proposed in this paper presents success rate of 94.45%, for the developed test suite.

☐ Color Contrast Enhanced RGBW Conversion (pp. 181 - 182)

Bongjoe Kim and Kyuha Choi (Samsung, Korea)

RGBW display can emit higher intensity level compared to RGB display but one of

drawbacks is reduced color saturation. In this paper, we propose RGBW conversion method which considers reduced color saturation problem. Experiment results show that the proposed method is more effective than conventional methods in terms of saturation and intensity enhancement.

☐ Comparison of Synchronization Methods for Robust Audio Watermarks (pp. 183 - 184)

Joji Yamada and Kazuhiro Kondo (Yamagata University, Japan)

We compared a number of frame synchronization methods for audio watermarks. M-sequence was embedded into the phase of the host signal for synchronization. We compared the detection accuracy of the Cross-Power Spectrum Analysis (CSPA) and the Smoothed Coherence Transform (SCT) method for additive noise. The CSPA showed higher detection rates by about 30% when 5-point smoothing was applied to the correlation. We plan to test other deterioration including analog channels using the CSPA.

☐ Detection Technique for Hardware Trojans Using Machine Learning in Frequency Domain (pp. 185 - 186)

Takato Iwase, Yusuke Nozaki and Masaya Yoshikawa (Meijo University, Japan); Takeshi Kumaki (Ritsumeikan University & Dept. of VLSI System Design, Japan)

Recently, the threat of hardware Trojan has been highlighted. A hardware Trojan is a hardware virus. When predetermined conditions are satisfied, that malicious virus performs subversive activities, such as a system shutdown and the leaking of important information, without the circuit users even being aware of that activity. Therefore, it is important to detect the consumer electronic devices with hardware Trojans from a viewpoint of security. This study proposes a new detection technique for hardware Trojan. The proposed method introduces machine learning for the detection. Experiments using actual devices prove the validity of the proposed method.

☐ Development of 4K Driving Simulator and Measurement of Eye Movement and Physiological Data During the Driving (pp. 187 - 188)

Gaku Iizuka, Yuta Saito and Mitsuho Yamada (Tokai University, Japan)

We have been researching a method that can induce a driver to drive more safely and more comfortably by grasping the mental state of the driver. For this purpose, we developed a 4K DS system to more realistically create the sense of driving through a landscape. We analyzed the gazing point distribution, oxygen concentration in the brain, pulse rate, skin potential, and the surface temperature of the face while driving. They simulated driving the full 120-km length of a road over the course of one hour. In the results, characteristic changes were seen in all parameters in every subject.

☐ Development of Self Learning System Using 3D Image Sensor for Novice Drummer (pp. 189 - 190)

Mitsumasa Hirano and Youji Ochi (Kindai University, Japan); Nobukazu Iguchi (Kinki University, Japan)

Playing motion of the percussion is important to play the music, and it can learn efficiently by coaching from expert. However, if novice drummer cannot get coaching from expert, they practice the percussion by oneself with the use of book. Then, it is difficult for novice drummer to calculate of practice result. We have been developing self learning system for novice

drummer. Using this system, novice drummer can look see percentage of a much between instruction and practice.

☐ Dyed Banknotes Detection System Using Digital Image Processing (pp. 191 - 192)

Gabriel Penalber, Luiz Silva, Kenny Vinente and Waldir Silva (Universidade Federal do Amazonas, Brazil); Wheidima Melo (Universidade do Estado do Amazonas, Brazil)

Currently, there is a growing demand for automated teller machine (ATM) in the cities. Due to the large concentration of banknotes, these devices have been targets of theft with explosives. When this action occurs, generally, the ATM dyes the banknotes using a degradation agent in order to avoid the use of banknotes and helps the police to identify criminals. In this article, we propose a dyed banknotes detection system using digital image processing tools. In the experiments performed to test images 72 and five systems, we found that the results are excellent with respect to detection error and the runtime.

☐ Error Detection Method for Recognizing 2D Reflector Code by Using Infrared Laser Radar (pp. 193 - 194)

Tomotaka Wada, Hiroki Yasuhara and Yusuke Shikiji (Kansai University, Japan)

We propose an error detection method to recognize 2D reflector code by using infrared laser radar in order to improve the accuracy of recognition. Through experiments, we show that the proposed method is able to detect error caused by dirt.

☐ Evidence of Stochastic Resonance of Auditory Steady-State Response in Electroencephalogram for Brain Machine Interface (pp. 195 - 199)

Fumiya Tanaka, Atsushi Matsubara and Seiji Nishifuji (Yamaguchi University, Japan)

Stochastic resonance is a phenomenon observed in nonlinear systems that random noise with optimal level amplifies a weak periodic signal. In some biological systems, stochastic resonance has been found to be utilized to improve signal transmission. Recently the stochastic resonance effects have been evidenced in photic driving human electroencephalogram (EEG) and demonstrated to improve performance of brain machine interface (BMI) using steady state visual evoked potentials. The present study is aimed at giving evidence of stochastic resonance behavior in human auditory steady state response in EEG for developing a high-performance auditory BMI available independently of visual function.

☐ Hand Posture and Gesture Recognition Using MYO Armband and Spectral Collaborative Representation Based Classification (pp. 200 - 201)

Ali Boyali, Naohisa Hashimoto and Osamu Matsumoto (National Institute of Advanced Industrial Science and Technology, Japan)

In this paper, we propose the use of Collaborative based Representation in Spectral Domain to recognize the postures and gestures from the Electromyography (EMG) recordings acquired by a recently introduced sensor; Thalmic Labs' MYO armband. The recognition accuracy obtained for a set of six hand gestures and postures is promising with an accuracy over 97 % which is a competent result in the related literature. The algorithms are developed for creating an intuitive human machine interface for navigating a robotic wheelchair.

☐ Hardware Trojan for Ultra Lightweight Block Cipher Piccolo (pp. 202 - 203)

Kohei Nohara, Yusuke Nozaki and Masaya Yoshikawa (Meijo University, Japan)

Recently, portable devices for communication are widely used. The security is the most important problem for devices. Usually, the confidential information is protected encryption data. These portable devices have area constraint. Therefore, AES is the most popular encryption standard, cannot be applied to the devices. Lightweight block ciphers require small area for their implementations. Therefore, lightweight block ciphers are used in portable devices. On the other hand, the threat of hardware Trojan against cipher circuit has been pointed out. This study proposes a new hardware Trojan and examines to the characteristic of the proposed hardware Trojan by using a FPGA.

☐ Helicobacter Pylori Infection Detection From Gastric X-ray Images Using KLFDA-based Decision Fusion (pp. 204 - 205)

Kenta Ishihara, Takahiro Ogawa and Miki Haseyama (Hokkaido University, Japan)

This paper presents the performance improvement of Helicobacter pylori (H. pylori) infection detection using Kernel Local Fisher Discriminant Analysis (KLFDA)-based decision fusion. As the biggest contribution of this paper, the proposed method extracts more discriminative features based on KLFDA for decision fusion. Since the decision fusion employed in this paper can consider not only the detection results but also the visual features, by calculating more discriminative features via KLFDA, more accurate decision fusion becomes feasible. Furthermore, experimental results show the effectiveness of the proposed method.

☐ Home Network That Can Control Living Condition Adaptive Based on Human Behavior (pp. 206 - 208)

Takaya Sakao and Tomohiro Okazaki (Ryukoku University, Japan); Takako Nonaka (Shonan Institute of Technology, Japan); Tomohiro Hase (Ryukoku University, Japan)

This paper describes the home network where living condition can be net adaption based on human behavior. We Proposed the new detection method of human behavior by the acceleration sensors that got togged up. To verify own proposed, the temperature and luminance can be set adaptively for asleep posture and seated posture.

☐ Image Retargeting Method by Similarity Transformation, Cropping and Letterboxing Operators (pp. 209 - 210)

Kazu Mishiba and Yuji Oyamada (Tottori University, Japan); Katsuya Kondo (Tottori University & Graduate School of Eng., Japan)

Image retargeting methods change the size of images to an arbitrary resolution while protecting visually important regions from distortion. Conventional retargeting methods fail to avoid distortion in the case where visually important regions are distributed all over the image. To solve this problem, we propose a novel image retargeting method that combines image warping with cropping and letterboxing operators. Letterboxing has the advantage of producing results without distortion or content loss although being unable to use the entire display area. Experimental results demonstrated the effectiveness of our method.

☐ Improving Detection Accuracy Utilizing Super-Resolution (pp. 211 - 212)

Takaaki Murakami, Taito Takeuchi, Tomio Goto, Satoshi Hirano and Masaru Sakurai (Nagoya Institute of Technology, Japan)

In this paper, we propose a method for detecting a specific object that has been determined in advance. Further, we aim to improve recognition accuracy by utilizing a super-resolution

method to generate a high-resolution image from a low-resolution image. To achieve these goals, our proposed method employs a total variation regularization filter, a shock filter, and a pulse enhancement filter. The experimental results show that our method generates accurate high resolution images, and improves the accuracy of distant object detection.

☐ Iris Recognition Using Minimum Average Correlation Energy and Principal Component

Volnei Klehm (Samsung, Brazil); Kenny Vinente (Universidade Federal do Amazonas, Brazil); Wheidima Melo (Universidade do Estado do Amazonas, Brazil); Waldir Silva and Felipe Farias (Universidade Federal do Amazonas, Brazil)

Biometric systems have great importance in modern society. Today, we can find biometric systems using hardware technologies to provide an increasingly fast response. Partly this is possible due to the use of algorithms of digital signal processing which are used in these systems, such as the correlation filters. In this paper, we explore a change in correlation filters, using the principal component analysis, to provide robustness to the filters. Finally, the experiments demonstrate that the modification provides good results for a biometric recognition system human iris.

☐ LDA-based Music Recommendation with CF-based Similar User Selection

Shohei Kinoshita, Takahiro Ogawa and Miki Haseyama (Hokkaido University, Japan)

This paper presents a Latent Dirichlet Allocation (LDA)-based music recommendation method with collaborative filtering (CF)-based similar user selection. By applying LDA to music, we can estimate latent topics of music. However, we have to effectively reduce the size of the target dataset applied to LDA in order to recommend music from a large dataset. Therefore, the proposed method limits the size of the dataset by using CF-based similar user selection, and recommends music considering latent topics of music. Experimental results show the effectiveness of our method.

☐ Measurement System of Accommodation and Convergence At the Same Time

Yuki Yokoyama, Shinya Mochiduki, Hideaki Takahira and Mitsuho Yamada (Tokai University, Japan)

We have studied human behavior while using a small tablet or a digital book in terms of eye movement. We developed an experimental device that measures the lens accommodation and convergence eye movement simultaneously and can be combined with equipment that moves visual target in the depth direction. We also evaluated its measurement accuracy.

☐ Missing Texture Reconstruction Via Power Spectrum-based Sparse Representation

Yuma Tanaka, Takahiro Ogawa and Miki Haseyama (Hokkaido University, Japan)

This paper presents a method for missing texture reconstruction via power spectrum-based sparse representation. We reconstruct missing areas based on minimizing the mean square error between power spectra (P-MSE). In our method, missing areas are reconstructed by embedding some known patches. Mathematically, we obtain the optimal linear combination of measurement patches by P-MSE minimization. The optimization can be solved as a

combinatorial problem based on sparse representaion. In this way, the optimal approximation which minimizes the P-MSE is obtained and we embed it in the missing area. Experimental results show effectiveness of our method for reconstructing texture images.

☐ Novel Image Enhancement for Super-Resolution (pp. 223 - 224)

Kyohei Goto, Tomio Goto, Satoshi Hirano and Masaru Sakurai
(Nagoya Institute of Technology, Japan)

To increase image resolution, super resolution technique has been studied. However, most of the technique has enormous amount of calculation and cannot obtain super-resolution moving pictures in real time. In this paper, we propose a novel super-resolution, which does not require many calculation cost. Our method utilizes only simple process, for example enhancement filtering technique based on P.D.E. Our system does not adopt the convergence calculation and the feedback processing. Therefore, it is almost certain that it is possible for video super-resolution in real-time by adopting ASIC or FPGA approaches.

☐ On an Efficient Masking System Using Human Head Tracking Parametric Speaker System (pp. 225 - 226)

Makoto Oba and Kazuhiro Kondo (Yamagata University, Japan)

We investigated the feasibility of using a head-tracking parametric speaker system to steer a directional beam of masker towards the head of the subject to be masked (maskee). The parametric speaker is placed on an iRobot-like platform, and follows the maskee using the Kinect sensor. We investigated the tracking performance using a dummy head, and found it to be better than an actual human by about 10%. Mask samples will be recorded using the dummy head, and presented to listeners for masking evaluations. We will have results of the masking performance evaluation by the conference date.

☐ Pipelined Turbo Multiuser Detection and Kalman Channel Estimation for MU-MIMO SC-FDMA Systems (pp. 227 - 230)

Yu-Kuan Chang, Fang-Biau Ueng, Kuan-Hung Wu and Yun-Yu Li
(National Chung-Hsing University, Taiwan)

By combining 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 employ the space-frequency block code (SFBC) on each transmitted block for the multiuser scenario. It is necessary to joint consider the channel estimation, multiuser detection and turbo equalization for MU-MIMO SC-FDMA system. For practical implementation, the designed system must with low latency, low computation complexity and good channel tracking capability.

☐ Power-saving Evaluation of the Demand Responsive Intelligent Bus Stop System Using a Camera (pp. 231 - 234)

Kento Yamamoto and Takeshi Nagasaki (Future University Hakodate, Japan);
Masashi Toda (Kumamoto University, Japan);
Keiji Hirata and Hitoshi Matsubara (Future University Hakodate, Japan)

In this paper, we propose the power saving method of the intelligent bus stop for demand responsive bus. To save the power of the intelligent bus stop, we use normally off computing to execute its function only when users use it. When we practice a demonstration experiment in Nanae town, the error rate of pyroelectric sensor to detect users is 37 %. The power

consumption of communication function to communicate with bus server is the biggest of all functions in it. To save the power consumption, we reduce the communications to the server by improving detection using a camera.

☐ Proposal of a Mobile Application to Support the Teaching of a Community's Historical Tradition in an After-School Activity (pp. 235 - 239)

Mana Fukuyasu and Satoshi Nishishita (Graduate School of Information Science, Nagoya University, Japan); Mayu Urata (Graduate School of International Development, Nagoya University, Japan); Mamoru Endo and Takami Yasuda (Nagoya University, Japan)

This paper shows the research of the historical folklore activity using ICT. Historical education has several problems such as shortage of guide person and educational contents. For solving theses problems, we developed the area guide application. The result of experiment for after school activities, we certified users learned local history deeply and had more interest about it with the application.

☐ Real-Time, Near-Infrared Fluorescence Imaging System (pp. 240 - 242)

Rui-Cian Weng (Instrument Technology Research Center, National Applied Research Laboratories, Taiwan)

An infrared camera captures images of objects that emit radiation in the infrared region of the electromagnetic spectrum. In this study, a fluorescence imaging system involving a specifically designed infrared camera was developed. CCDs can detect infrared light in the invisible region of the electromagnetic spectrum (>780 nm); however, a low-pass filter is installed in front of the CCD to filter out most infrared light and prevent the light from affecting the quality of color photos.

☐ Stock Food Management System with Sensing the Weight for Minimizing User's Load (pp. 243 - 245)

Minami Okada, Keiko Yamamoto, Itaru Kuramoto and Yoshihiro Tsujino (Kyoto Institute of Technology, Japan)

Refrigerators have some stock foods which we want to keep enough amount of, e.g. milk, eggs, and so on. However, we cannot always realize the actual amounts of them because some other persons could change the amounts. In this paper, we propose a food stock management system, which improve the trade-off between precision and time. The system gets a photo and a weight of a each stock food automatically, and a user links manually the photo and the weight of the stock food together, which the user puts into or takes out from the refrigerator.

☐ Super-Resolution for X-ray Images (pp. 246 - 247)

Masato Shimizu, Hidetoshi Kariya, Tomio Goto, Satoshi Hirano and Masaru Sakurai (Nagoya Institute of Technology, Japan)

Super-resolution technique have been widely used in various consumer electronics such as television, aerospace image and medical imaging. In medical imaging, X-ray images have much noise and low resolution because of radiation dose. In this paper, we propose a novel super-resolution method for X-ray images and a novel measurement algorithm for treatment of Rheumatoid Arthritis (RA) using X-ray images processed by our proposed super-resolution method. Experimental results show that high quality super-resolution images are obtained and our proposed measurement algorithm is effective for RA medical examinations.

☐ Towards a Singing Voice Attenuation System Using Active Noise Control

(pp. 248 - 249)

Keisuke Matsuura and Kazuhiro Kondo (Yamagata University, Japan)

We have been investigating on the possibility of controlling singing voice using active noise control technology. We proposed a novel structure of conduction pipes with absorption material lining into which the singer can sing into. We compared the efficiency of ANC with conventional conduction path pipes, and found that the new structure enhances the ANC performance depending on the phonetic content.

☐ Video Genre Estimation From Relationship Between Motion and Facial Features Using SLPCCA

(pp. 250 - 251)

Yuma Sasaka, Takahiro Ogawa and Miki Haseyama (Hokkaido University, Japan)

In this paper, we propose an efficient video genre estimation method based on the relationship between facial features and motion features. In the proposed method, we utilize supervised locality preserving canonical correlation analysis (SLPCCA), which is derived in the proposed method, to maximize the correlation between facial features and motion features. Moreover, by using SLPCCA, we can consider not only the correlation but also class information. Finally, by applying Support Vector Machine (SVM) to the SLPCCA-based feature vectors, we realize a successful video genre estimation. Experimental results show the effectiveness of our method.

☐ VMS Video Search System Based on Object Detection

(pp. 252 - 253)

Jong Gook Ko and Jongyoul Park (ETRI, Korea)

When incident was happened, we should look at all of the video stored from a number of CCTV cameras. For that, a lot of time and effort are needed to retrieve all of the videos. This paper describes a study about system that recognizing a number of objects in video and searching for large videos by the recognized object. And this paper describes preferentially human detection technology among objects in image. We also employed HDFS (Hadoop Distributed File System) and Map-Reduce framework for processing large scale video data.

☐ Web Image Visualization Considering Image Content Based on Visual and Tag Features

(pp. 254 - 255)

Kouhei Tateno, Takahiro Ogawa and Miki Haseyama (Hokkaido University, Japan)

This paper presents a Web image visualization considering image content based on visual and tag features. In this paper, we focus on tagged images on social media websites. Since these tags represent the image content according to the subjectivity of the user, using these tags is efficient for the image visualization. Thus, by using visual and tag features, the proposed method can take account of the semantic contents. Specifically, the proposed method applies Locality Preserving Canonical Correlation Analysis (LPCCA) to these two features to obtain the dimensionality reduction results, i.e., the visualization result.

[14:00-, R1004] OS-ASN: Ambient Sensor Network & Applications for Smart Space

☐ [Invited] Cloud Based VR System with Immersive Interfaces to Collect Multimodal Data in Human-Robot Interaction (pp. 256 - 259)

Yoshinobu Hagiwara (Ritsumeikan University, Japan)

In this study, we present a cloud VR system with immersive interfaces to collect human gaze and body motion behaviors. Human beings can log in to the VR space and communicate with a robot by the proposed system. HMD and motion capture device provide immersive visualization and motion control. Human gaze and body motion behaviors are collected to database during the human-robot interaction. An application experiment to share object concept demonstrates the availability of the proposed system.

☐ Actual Running Performance Monitoring for Personal Trainer System Based on Perceptive Sportswear (pp. 260 - 261)

Yuya Koyama and Michiko Nishiyama (Soka University, Japan); Kazuhiro Watanabe (Soka University Japan, Japan)

Unconstrained monitoring of runner's body movements is important for grasping the running performances based on natural body motions. A perceptive sportswear, which means a wear itself having the perception to monitor human body motions without constraint, can be realized by using hetero-core fiber optics with advantages of thinness, light-weight, and flexibility. We have developed such sportswear with the embedded optical fiber which can monitor the body motion based on the light intensity changes. In this report, the perceptive sportswear with the mobile capability has first been tested in actual running field for monitoring the body forms and paces during running.

☐ Smart Appliance Network as Cyber Physical Systems -Creating Value to Meet Various Consumer Lifestyles (pp. 262 - 264)

Ayaka Kimura and Satoshi Nakae (Panasonic Corporation, Japan); Masaaki Terano (Panasonic Corp., Japan); Takeshi Takenaka and Ken Fukuda (AIST, Japan); Yoshinobu Yamamoto (The National Institute of Advanced Industrial Science and Technology, Japan)

This paper discusses the possibility of a smart appliance network to enhance values for users with various lifestyles. It introduces an example of data analysis whereby lifestyle survey data from 3,000 participants is integrated with actual log data from their smart appliances. Results indicate a possibility to enhance value for each appliance user considering five lifestyle factors. Finally it illustrates how a smart appliance network could create a new eco-system among manufacturing, services and consumers as a Cyber Physical Systems.

☐ An Identification Method for Optical Fiber Sensors in Sensor Network Applications (pp. 265 - 268)

Koki Fuchigami and Norihiko Shinomiya (Soka University, Japan)

This research proposes an identification method of sensor reactions using the Internet standard protocol: Simple Network Management Protocol (SNMP) in sensor networks. We have developed Optical Sensory Nerve network (OSN) with optical fiber sensors in order to solve issues on electricity and communication limitations in wireless sensor networks. Although OSN has used a commercial device with SNMP functions to detect the sensor reactions in previous research, there are issues about limited performance scalability. This

paper describes SNMP Agent software using the protocol and examines whether the software can expand a scale of the OSN application.

[14:00-, R1006] OS-PSH(2): Large Scale Signal Processing in Smart House (2)

☐ Room Size Estimation From Acoustic Impulse Responses (pp. 269 - 270)

Shih-Hau Fang and Che Kuan Lin (Yuan Ze University, Taiwan)

This paper investigates how to estimate the room size from acoustic impulse responses.First, we utilize the adaptive signal processing, namely least mean square algorithm, to iteratively approximate the acoustic impulse response (AIR), which indicates the room geometry with multipath. Next, given the virtual sources and the computed AIR, the proposed approach is cable of determining the room size based on the constrains of the mapping between virtual sources and the arrival ranking of AIR. Simulation results verify the effectiveness of the proposed approach.

☐ Database-Driven Quality Prediction for Mobile Wireless Networks in Smart Home Environments (pp. 271 - 272)

Po-Chiang Lin (Yuan Ze University, Taiwan)

In this paper we propose a database-driven quality prediction system for mobile wireless networks in smart home environments. Smart handheld devices obtain location information from smart home tags such as Bluetooth Low Energy and Near Field Communication tags, and collect various quality measurement of mobile wireless networks. The measurement reports are uploaded to the database server periodically or on demand. By applying machine learning techniques which use the measurement reports as the training data, the quality in the smart home environments could be predicted.

☐ Optimal Smart Gateway Deployment for the Internet of Things in Smart Home Environments (pp. 273 - 274)

Po-Chiang Lin (Yuan Ze University, Taiwan)

For the Internet of Things in smart home environments, the smart gateway is the key component to collect/disseminate information from/to various sensors/actuators. In this paper we investigate the smart gateway deployment problem in smart home environments. This problem is formulated as a constrained optimization problem with the objective to minimize the deployment cost subject to the constraints that all service areas should be covered. The smart gateway deployment problem under consideration is a binary integer programming problem. We solve it by the branch and bound method which could effectively reduce the complexity.

☐ An Application Management Scheme Among M2M Gateways (pp. 275 - 276)

Wen-Hsing Kuo, Ya-Yang Lu and Ying-Hsueh Lu (Yuan Ze University, Taiwan)

Digital home is a popular technology, and various applications are provided. Users can subscribe desired applications and execute them on mobile gateways or home gateways. However, there are no exiting technologies that can automatically activate/migrate/discover applications among gateways. This paper proposes an application management scheme, which manages the application by considering their utility and cost basing on the information in their

provided profiles. Applications can be activated/deactivated and transferred under different conditions, and the management and execution cost can be reduced. The elaboration results show that the proposed scheme can effectively reduce the manual control overhead and the energy consumption.

☐ Block-based SRAM Architecture and Thermal-Aware Memory Mappings for Three-dimensional Channel Decoding Systems (pp. 277 - 278)

Shu-Yen Lin, Cheng-Hung Lin and Ho-Yun Su (Yuan Ze University, Taiwan)

In this work, the 3D block-based SRAM architecture and the thermal-aware memory mappings are proposed for the 3D channel decoding systems. The 3D block-based SRAM is proposed by analyzing the memory utilization with different sizes of the memory elements. Based on this architecture, the thermal-aware memory mappings are discussed by minimizing the vertical stacking of the active MEs and avoiding the successive access of the MEs. In our experiments, the peak temperature can be reduced by 2.6°C ~ 22.2°C compared to the worst mappings.

[14:00-, R1007] OS-AIR(2): Artificial Intelligence & Robotics (2)

☐ Development Support of Nash-Q Learning Agent on Agent Framework DASH (pp. 279 - 280)

Masato Hibino, Takahiro Uchiya and Ichi Takumi (Nagoya Institute of Technology, Japan); Tetsuo Kinoshita (Tohoku University, Japan)

Agent-oriented computing is a technique to run a big-scale system by cooperation among plural agents. An agent with learning ability is called a “Learning Agent”. A learning agent learns past actions, and changes the movement knowledge dynamically. A learning agent can solve a complicated problem in intellectual action. However, when a user wants to use a learning agent, little support exists for the development of a learning agent in an agent framework. Therefore, we introduce the development support of learning agent into the DASH agent framework.

☐ Extension with Intelligent Agents for the Spoken Dialogue System for Smartphones (pp. 281 - 282)

Takahiro Uchiya, Ryosuke Nakano and Daisuke Yamamoto (Nagoya Institute of Technology, Japan); Ryota Nishimura (KeioUniversity, Japan); Ichi Takumi (Nagoya Institute of Technology, Japan)

MMDAgent has been proposed as a voice dialogue system capable of voice interaction in real time with 3D character . In order to improve the convenience by enlarging the operating environment, the “Smart Mei-chan” has been proposed transplanted with MMDAgent on Android smartphone. In the scenario definition method of this toolkit , it is difficult to create complex interactive scenarios. In this study, in order to solve this problem, we propose a mechanism for extending “Smart Mei-chan” by software agents.

☐ A Method of Identifying Students Who Require Guidance Using Bayesian Network (pp. 283 - 287)

Hirotaka Itoh, Masaya Nishiwaki and Kenji Funahashi (Nagoya Institute of Technology, Japan)

The presence of students repeating years and withdrawing from school is a concern at most

universities. Our research is intended to use student data accumulated through past to support academic guidance, in order to resolve this issue. It is hoped that numbers of students repeating years and withdrawing students will decrease in the future through defining students at high risk of repeating years and withdrawing as students requiring attention, identifying such students early, and concentrating guidance efforts on them. In this paper, we use a Bayesian network to construct a model for identifying students who require attention.

☐ Forecasting Future Students' Academic Level and Analyzing Students' Feature Using Schooling Logs (pp. 288 - 291)

Yuma Itoh, Hirotaka Itoh and Kenji Funahashi (Nagoya Institute of Technology, Japan)

Most educational institutions manage students' data digitally. These data are maintained on servers in campus. We planned the use in educational guidance of the data collected in these systems. In this study, we forecast students' future academic level using attendance data and grade data. We use a Bayesian network as forecasting method and analyze students' feature.

Abstract of Presentations on October 29

[09:30-, R1004] RAV: AV Processing & Streaming

☐ Simplifying Soft Demapper Design for Software DVB-T2 Channel Decoder

(pp. 292 - 293)

Shingchern D You (National Taipei University of Technology, Taiwan)

This paper proposes a simplified soft demapper for DVB-T2 (Second Generation Digital Video Broadcasting-Terrestrial) receiver based on conventional 1-D demapper. Simulation results show that the simplified 1-D demapper has 1 to 2 dB degradation for various channels. When compared with the 2-D soft demapper, the simplified 1-D LLR approach offers a ten-fold complexity reduction, and is a possible alternative approach if the receiver is to be implemented in software.

☐ Measurement of Contrast Reduction and Its Application to LCD Backlight Control

(pp. 294 - 297)

Jae-Woo Kim, Kyu-Ho Lee and Jin-Gon Bae (Korea University, Korea); Hyung-geun Kim (SAMSUNG Electronics, Korea); Jong-Ok Kim (Korea University, Korea)

This paper proposes an image contrast reduction measurement method, and applies it to LCD backlight dimming. A new key concept, burstiness, is introduced in measuring the contrast reduction. Using burstiness, an adaptive backlight dimming algorithm is designed to trade-off contrast reduction and power consumption. Experiments show that using burstiness enables extra power saving while perception quality is maintained.

☐ Efficient Image Denoising Scheme for Removal of Impulse Noise

(pp. 298 - 299)

LiZhong Hou (National Ilan University, P.R. China); Chien-Feng Kuo, Zhi-Hong Lin and Chu Yu (National Ilan University, Taiwan)

In the transmission, digital images often disturbed by various interferences, leading to the image corrupted severely. For a better visual quality and further use in digital image processing systems, noise must be removed. In this study, the proposed scheme can efficiently remove fixed-valued and random-valued impulse noise sources while preserving image edges. It has better image quality than those of the conventional linear and non-linear filters. The proposed scheme also maintains the edge of the restoration image due to preserving image edge details. Because its procedure is simple, it is suited for real-time applications and hardware implementation.

☐ Fast CU Algorithm and Complexity Control for HEVC

(pp. 300 - 301)

Jiunn-Tsair Fang (Ming Chuan University, Taiwan); Chien-Hao Kuo, Chang-Rui Lai and Pao-Chi Chang (National Central University, Taiwan)

The latest video compression standard HEVC provides the coding unit (CU), defined by quad-tree structures, to achieve high coding efficiency. Compared with previous standards, HEVC encoder increases much computational complexity to levels inappropriate for applications of power-constrained devices. This work thus proposes a fast CU algorithm to improve coding efficiency, and distributes the complexity to the CU layer. Experimental results show that the loss of average BD-PSNR is about 0.1 dB with BD-bitrate 2% increment as the complexity was reduced to 60%.

☐ Content Based Image Retrieval Utilizing HEVC Intra Coding Features (pp. 302 - 303)

Pao-Chi Chang (National Central University, Taiwan)

In this paper, a content-based image retrieval technique applied to compression domain for the newest video coding standard,HEVC,is developed. We propose to extract the features from intra frames which are only partially decoded. The directions of intra mode are taken as a part of feature by filtering noises and the corresponded sizes of prediction unit are divided into two groups. Then the histogram of the signal power of residuals is combined as a feature. The experimental results show the proposed method can reduce the resource consumption and achieve a good retrieval performance in Oxford 5K dataset.

[09:30-, R1005] OS-CNW: Systems & Applications for Consumer Networks

☐ Experiment and Evaluation of Crowd Sourcing Model for Creation of Voice Interaction Scenario (pp. 304 - 305)

Yuichi Matsushita (Nagoya Institute of Technology & Graduate School of Engineering, Japan); Takahiro Uchiya (Nagoya Institute of Technology, Japan); Ryota Nishimura (KeioUniversity, Japan); Daisuke Yamamoto and Ichi Takumi (Nagoya Institute of Technology, Japan)

This university publishing voice interaction system tool kit “MMDAgent” as open source software. MMDAgent talks to people by loading an FST(Finite State Transducer)script which written voice interaction scenario. However, it is difficult to edit it by large number of people simultaneously. So, it costs tremendous labor to describe abundant voice interaction scenario in FSTscript. Therefore, in this study, We propose construction of crowdsourcing environment for creation of voice interaction scenario for realization of a system for editing an FSTscript by large number people easily.

☐ 3D Augmented Reality Marker Expands Workable Fields of Virtual Reality Action Games (pp. 306 - 310)

Makoto Usami (Kanagawa Institute of Technology & KAIT, Japan); Masao Isshiki (Kanagawa Institute of Technology and Keio University, Japan); Hiroshi Sugimura and Kyohei Miura (Kanagawa Institute of Technology, Japan)

VR action games require a quick response to human fast actions with hand-held devices. It is not easy to achieve the games by using simple devices. Authors discuss the VR game system by utilizing visual recognitions of a 3D AR marker to track hands-motions. In previous study, there was a problem in the 3D AR Marker which limited to work at only achromatic color backgrounds. Authors newly developed 3D AR Marker to be used even in chromatic color backgrounds and succeeded to expand workable fields of VR games by utilizing consumer-graded devices.

☐ Development of Information Living Integrated by Home Appliances and Web Services (pp. 311 - 312)

Masayuki Kaneko and Kazuki Arima (Kanagawa Institute of Technology, Japan); Makoto Usami (Kanagawa Institute of Technology & KAIT, Japan); Hiroshi Sugimura (Kanagawa Institute of Technology, Japan); Masao Isshiki (Kanagawa Institute of Technology and Keio University, Japan); Keishin Koh (Kanagawa Institute of Technology, Japan)

In this paper, we propose information living to integrate home appliances and web services. The system has several functions which display information of web services and control home

appliances. The system is controlled by natural actions which are gestures and voice in order to simple control apparatus and is assembled by three major modules which the sound recognition, the gesture recognition and a projector. We describe the entire process, the implementation and the evaluation of a prototype system.

☐ Intelligent Home Security System Using Agent-based IoT Devices (pp. 313 - 314)

Zhaoqing Peng (Northeastern University, P.R. China); Takumi Kato, Hideyuki Takahashi and Tetsuo Kinoshita (Tohoku University, Japan)

Since there are several network-enabled devices and its services, the demand for the smarter utilization of such devices is growing in several fields. This paper focuses on the home security domain, which has been an important topic for daily lives. To realize more intelligent home security system (IHSS), we propose IHSS utilizing the Internet of Things (IoT) devices based on multi-agent approach. The proposed system is capable of monitoring sensors and autonomously controlling actuators, such as robots and Unmanned Aerial/Ground Vehicles (UAV/UGV) to flexibly construct security services. We have implemented a prototype system, confirmed the effectiveness of our proposal.

☐ Emission Timing Controller by Single Board Computer for Public Address System (pp. 315 - 316)

Taira Onoguchi (Kumamoto University, Japan); Yoshifumi Chisaki (Kumamoto University & Graduate School of Science and Technology, Japan)

The Great East Japan Earthquake revealed the importance of a public address system with outdoor loudspeakers for emergency announcements and the difficulty of its intelligibility. To achieve a public address system with sufficient intelligibility for residents, one important factor is to suppress sound overlap caused by the simultaneous emission of other loudspeakers. In this paper, the controller of an emission timing control method is built with a single board computer. Functions to increase reliability of a public address system are also implemented to the controller.

[09:30-, R1006] OS-AIP(1): Advanced Image Processing (1)

☐ Blurry Edge Detection and Sharpness Measure Using Color Line Model with K-means Clustering (pp. 317 - 319)

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

We propose a scheme to detect blurry edge and compute sharpness measure. The key is color line model which models a pixel color is the linear mixture of two dominant colors in small patch. K-means clustering with principal component analysis is exploited to classify colors into two groups. Dominant color is defined as average color of group. Subsequently, weighting of color is computed. In this work, weighting is available for blurry edge detection, and color difference between synthesized color and original color is available for sharpness measure. The proposed scheme has better performance in blurry edge detection and sharpness measurement.

☐ Blind Restoration of Blurred Images Using Local Patches (pp. 320 - 321)

Hiroki Senshiki, Tomio Goto, Satoshi Hirano and Masaru Sakurai (Nagoya Institute of Technology, Japan)

In this paper, we propose a blind method that rapidly restores blurred images using local patches. In this method, a portion of the blurred image is used for PSF (point spread function)

estimation. In addition, we propose an automatic PSF size calculation algorithm that generates an autocorrelation map (auto map). Experimental results show that our proposed method generates accurate deblurred images, and processing time is significantly lower than that of the conventional deblurring method.

☐ A Low Complexity Depth Map Compression Approach for Microsoft Kinect Devices (pp. 322 - 323)

Christin Panjaitan, Chung-An Shen and Shanq-Jang Ruan
(National Taiwan University of Science and Technology, Taiwan)

This paper proposes a low complexity depth video compression approach for the Microsoft Kinect device. In this framework, the depth image is transformed through divisive normalized bilateral filter (DNBL) and through padding in order to remove failure in the depth map. Furthermore, in order to reduce the computational complexity, in the filtering process, we employ blocks partition, where each non-overlapped block uses a different window size based on the detected edge information. The reformed depth map is then fed into the H.264/AVC encoder. The experimental results show that the proposed approach can reduce the computational complexity while maintaining the performance.

☐ Reflectance Estimation Using Multiple Exposure Images (pp. 324 - 325)

Yusuke Shirahashi (Univ Kitakyushu, Japan);
Ryo Matsuoka and Masahiro Okuda (The University of Kitakyushu, Japan)

The paper introduces a method for the reflectance estimation using multiple exposures. The estimation problem is stated as a sparse optimization problem, and the solution is obtained via a convex optimization method.

☐ Two-step Learning Based Super Resolution and Its Application to 3D Medical Volumes (pp. 326 - 327)

Yuto Kondo, Xian-Hua Han and Yen-Wei Chen (Ritsumeikan University, Japan)

In medical diagnosis, high resolution (HR) images are indispensable for giving more correct decision. However, in order to obtain HR medical images, it is necessary to impose long-time, which will lead to heavy burden to the patient. Therefore the super resolution technique, which can generate HR images from LR images based on machine learning, attracts hot attention recently. However, the conventional learning based SR generally cannot recover high frequency information. In this paper, we integrate a further learning step into the conventional method, and proposes a two-step learning based SR, which is prospected to recover most high frequency information lost in the available LR input. Furthermore, we also propose to use HR axial plane images of input volumes as HR training data to reconstruct HR coronal plane and sagittal plane images.

☐ A Novel Method for Product Brand Ranking in Consumer Networks (pp. 328 - 329)

Thi Thi Zin (University of Miyazaki & Faculty of Engineering, Japan);
Pyke Tin and Hiromitsu Hama (Osaka City University, Japan)

In this paper, a novel method for ranking consumer product brands by using link structures among the consumers is presented. The proposed ranking system will be established according to importance, popularity, reliability and relevancy based on consumer communication network. Using a modified version of the PageRank algorithm, the proposed ranking system is enforced by assigning each of them an authoritative score. In addition, the scores with respect to

producers are also calculated by taking a time factor into account. Some experimental works are carried out to confirm the effectiveness of the proposed system.

[09:30-, R1007] OS-GAM: Game Amusement

☐ Optimization and Simplification of Dynamic Scripting with Evolution Strategy and Fuzzy Control in a Fighting Game AI (pp. 330 - 331)

Yasutomo Kanetsuki, Ruck Thawonmas and Susumu Nakata
(Ritsumeikan University, Japan)

We develop a combination of evolution strategy (ES) and fuzzy control (FC) to optimize and simplify an existing dynamic scripting (DS) AI called CodeMonkey for fighting game FightingICE. A major issue in DS is that the user has to decide a lot of parameters whose process is not simple.In addition, a complex user-defined-action-rule set for DS is required.The purpose of our work is to automate this troublesome process and improve the performance of the DS technique.We apply (1+1)-ES with the one-fifth rule for tuning parameters and FC for easing defining additional action rules. We verify our AI's performance in FightingICE.

☐ Towards Universal Kinect Interface for Fighting Games (pp. 332 - 333)

Pujana Paliyawan (Ritsumeikan University, Japan);
Kingkarn Sookhanaphibarn and Worawat Choensawat (Bangkok University, Thailand);
Ruck Thawonmas (Ritsumeikan University, Japan)

This paper presents an approach towards developing a universal Kinect interface supporting game-playing. The proposed interface is designed to be used with existing fighting games of any sort. Players can define their own postures and map them to keystrokes for sending input to a targeted game without the need of accessing game source code. We describe the overview of the interface system; including motion segmentation, posture feature extraction, and posture-to-key mapping.

☐ Investigating Kinect-based Fighting Game AIs That Encourage Their Players to Use Various Skills (pp. 334 - 335)

Makoto Ishihara, Taichi Miyazaki, Pujana Paliyawan, Chun Chu,
Tomohiro Harada and Ruck Thawonmas (Ritsumeikan University, Japan)

This paper investigate AIs that increase their players' amount of exercise by encouraging the usage of various skills in fighting game FightingICE, using Kinect as the input interface. In our experiment, two types of AIs are used as the opponent against a human player. One of the AIs is based on the k-nearest neighbor algorithm and fuzzy control, and the other is based on UCT, a variation of Monte-Carlo Tree Search. Our results show that the players use more different skills when playing the game against the UCT AI.

☐ The Difference of Player's Action Code by Playing Experience in Combat Oriented Situation of FPS Game (pp. 336 - 338)

Gyuhyeok Choi and Mijin Kim (Dongseo University, Korea)

It may be a good use for setting and changing components of game levels to analyze a FPS game player's goal-oriented action pattern. This article chooses test groups for novice and expert depending on game players' experience and verifies game actions seen through repetitive experiences. Furthermore, the actions which appear group by group are classified and coded so that the level of interaction with players according to game level may be ascertained

with their change process. Accordingly, this study may be helpful to suggest a detailed modification method for correct expectation and game level in the situation of each gameplay.

☐ Development of Game Player Analysis with Physiological Indexes (pp. 339 - 340)

Masayuki Ueno (Osaka Electro-Communication University, Japan);
Shinjiro Wada (Poole Gakuin College, Japan);
Tomoyuki Takami (Osaka Electro-Communication University, Japan)

The video game player have highly concentration on the play. The monitoring system of game player's physiological indexes have been developed. The recorded data is analyzed the relationship between physiological index and concentration level. The analysis will be useful to evaluate objectively the game on development process.

☐ The Sightseeing Information Website Which the Game is Utilized (pp. 341 - 342)

Makio Fukuda (Osaka International University & Faculty of Contemporary Social Studies, Japan); Chou Hou (Osaka International University, Japan)

We included the game in the web site to offer sightseeing information. The user play this game in web site, they can get more detailed sightseeing information. Specifically, when the user go to a tourist spot actually, a marker is scanned by the user's mobile device. Then the quiz about the tourist spot is shown to the user's mobile device. Further, the marker is put up by the spot in the tourist spot. The user goes around the tourist spot while answering the quiz. The user gets the score dependent on the degree of correct answer of the quiz.

[09:30-, R1008] OS-ELT: e-Learning Technologies and Their Applications

☐ A Study of Performance Detection Method for a Guitar Skill Learning Using Kinect Sensor (pp. 343 - 345)

Yoshitaka Kashiwagi and Youji Ochi (Kindai University, Japan);
Yasuo Miyoshi, Yuichiro Mori and Ryo Okamoto (Kochi University, Japan)

In recent years, the studies of educational support systems using motion sensor have attracted attention to support the acquisition of physical skills of learning. Our target domain is a guitar learning. We focus on Microsoft Kinect Sensor to support the guitar performance. In this paper, we report on the detection method of a guitar and a player's performance.

☐ An Operator Fill-in-blank Problem for Algorithm Understanding in Java Programming Learning Assistant System (pp. 346 - 347)

Nobuo Funabiki, Shin Sasaki and Ta Na (Okayama University, Japan);
Wen-Chung Kao (National Taiwan Normal University, Taiwan)

A Web-based Java Programming Learning Assistant System (JPLAS) has been developed to help novice students studying Java programming through self-learning. As one function, JPLAS provides the fill-in-blank problem that requests filling in the blank elements in a given code with blanks. In this paper, we propose to blank operators in conditional expressions of core statements in the code so that students can understand the structure to realize the specification. For preliminary evaluations, we generated six operator fill-in-blank problems, and assigned them to students where the number of answer submissions per blank has increased from that of conventional problems.

☐ Correlation Analysis of Fill-in-blank Problem Solutions to Final Programming

Results in Java Programming Course (pp. 348 - 349)

Ta Na, Nobuo Funabiki and Nobuya Ishihara (Okayama University, Japan); Wen-Chung Kao (National Taiwan Normal University, Taiwan)

To assist Java programming educations, we have developed a Web-based Java Programming Learning Assistant System (JPLAS). JPLAS provides fill-in-blank problems to study the Java grammar and fundamental programming by filling blank elements that are composed of reserved words, identifiers, and control symbols in a high-quality code. During the last semester, we assigned 121 problems with 1,552 questions to 46 students taking our Java programming course. In this paper, we analyze correlations of problem solving results of students to their final programming results.

☐ A Function for Generating Debugging Questions in a Java Programming Learning Assistant System (pp. 350 - 353)

Shingo Yamaguchi and Takato Mohri (Yamaguchi University, Japan); Nobuo Funabiki (Okayama University, Japan)

Today many universities offer courses for learning Java programming. Debugging cannot be avoided in programming. Nevertheless, there are not many chances to debug programs for students, particularly written by another person. In this paper, for increasing that chance, we propose a function for generating a new kind of questions that are called debugging questions. A debugging question requires students to debug a program mixed with bugs. This function provides three ways of mixing bugs: deletion of reserved words, swapping of variables, and replacement by lists. We implemented this function into a Java programming learning assistant system, called JPLAS. We also discussed the usefulness by evaluating the function.

☐ An Extension of Statement Fill-in-blank Problem in Java Programming Learning Assistant System (pp. 354 - 358)

Nobuya Ishihara, Nobuo Funabiki and Ta Na (Okayama University, Japan)

To assist Java programming studies, we have developed a Web-based Java Programming Learning Assistant System (JPLAS). A function of JPLAS is that it provides statement fill-in-blank problems. Previously, we blank only the core statement in a code with one class using the Program Dependence Graph (PDG), and do not consider the features of object-oriented programming in Java that uses multiple classes and in collaborations with other systems such as database. In this paper, we focus on coded blank statements. We verify the effectiveness of our proposal through the Java programming course at our department.

[11:30-, R1003] DEM(2): Demo! Session (2)

☐ A Dynamic Conversion Scheme to Provide Suitable Contents Type for User's Environments on the Web (pp. 359 - 360)

Kyuyeong Jeon (KAIST, Korea); Jinhong Yang (Korea Advanced Institute of Science and Technology & KAIST, Korea); Sungkwan Jung (Korea Advanced Institute of Science and Technology, Korea); Yongrok Kim, Sooji Jeon and Jun Kyun Choi (KAIST, Korea)

To provide a better user experience, we have to consider type of device and place. It means that the contents should have capabilities to be converted into several types. In this paper, we suggest a scheme to provide still-cut images from the moving images without user's or contents provider's effort. We also show you how to adapt the scheme to the web through demonstration.

☐ A Fraud Detection System for Real-time Messaging Communication on Android Facebook Messenger (pp. 361 - 363)

Kuo-Hui Yeh (National Dong Hwa University, Taiwan);
Nai-Wei Lo (National Taiwan University of Science and Technology, Taiwan);
Lin-Chih Chen (National Dong Hwa University, Taiwan);
Ping-Hsien Lin (National Taiwan University of Science and Technology, Taiwan)

In this paper, we develop a fraud detection system based on real-time messaging content analysis. An integrated platform consisting of natural language processing, matrix pre-processing, content analysis via latent semantic model and cosine similarity is proposed. We collect a series of fraud events in Taiwan and construct major analysis modules of the proposed fraud detection system. Then, a mobile application is built for Android based smartphones as the content retrieval and alert notification for doubtful logs and fraud events.

☐ A Screen Composition Method for Mobile Interactive Multi-Display Environment (pp. 364 - 365)

Sanghong Ahn and Hyeontaek Oh (KAIST, Korea); Seokhyun Song (Republic of Korea Naval Academy, Korea); Jinhong Yang (Korea Advanced Institute of Science and Technology & KAIST, Korea); Jun Kyun Choi (KAIST, Korea)

To date, a mobile multi-screen system is emerged to satisfy customer's requirement for playing various interactive contents with bigger screen size. However, it is an inconvenient job to configure visual mapping for screen locations. To resolve this problem, we propose an intuitive composition method for an interactive multi-screen system. With proposed method, we present scenarios that compose a visual screen with multiple display devices which have various screen size.

☐ About Multi-Level LEDs Driving in Visible Light Communication (pp. 366 - 367)

Yasuhiro Fukumori, Yuta Ikeda and Wataru Uemura (Ryukoku University, Japan)

It is proposed a method for distributing different information from the duct rail using a positive voltage as well as a negative voltage.

☐ Caption Support System for Complementary Dialogical Information Using See-Through Head Mounted Display (pp. 368 - 371)

Kazuki Suemitsu, Keiichi Zempo, Koichi Mizutani and Naoto Wakatsuki (University of Tsukuba, Japan)

The aim of this paper is to realize the compensation of dialogical information for deaf people. In this paper, we developed a portable caption support system consist of a see-through head mounted display, a directional microphone array and a speech recognition system. For users convenience, the dialogical information of the person in the front was captioned as a result of the directional characteristic of the microphone array. With these interfaces, the proposed system would provide the complementary dialogical information.

☐ Construction of Next Generation Mobile Video on Demand Delivery System Using Broadcast and Communication Integration Environments (pp. 372 - 373)

Tomoya Kawakami (Nara Institute of Science and Technology, Japan); Tomoki Yoshihisa (Osaka University, Japan); Yusuke Gotoh (Okayama University & Graduate School of Natural Science and Technology, Japan)

We develop server software and a client application to construct a video delivery system. The server software is installed to a Windows PC to delivery videos on demand. The client application is installed to Android devices to request video delivery and watch the delivered videos.

☐ Development of Automatic Barrier Detection System for Wheelchair (pp. 374 - 376)

Hiroki Taniue, Jun'ichi Kaneko and Kazuyuki Kojima (Saitama University, Japan)

This paper proposes a system which can automatically detect and log positions where a wheel chair traveling is difficult. We have been developing a pavement surface inspection system which can automatically detect and report barriers for wheel chair users by measuring and analyzing GPS logs, acceleration data, point clouds of pavement surface, and sphere camera images. In this paper, we add torque sensors into the system and predict a traveling difficulty by using a relationship between hand rim Torque and user comfortability.

☐ Lighting Color Control System Using Smartphone with Human Body Communication Module (pp. 377 - 378)

Dairoku Muramatsu (The University of Tokyo, Japan); Ken Sasaki (University of Tokyo, Japan)

In order to prototype applications and evaluate characteristics of human body communication (HBC), transmitter/receiver modules were designed. A transmitter module incorporated a direct digital synthesizer (DDS) to provide a modulated signal. A receiver module utilized the 10.7-MHz intermediate frequency part of the low-power radio receiver module. These newly designed modules are compatible with wide range of systems because the interfaces of the modules consist of USB port. As an example, a lighting color control system was implemented by using the HBC modules and a smartphone. This system realized intuitive color control of the lighting.

☐ Localization of Acoustic Marker in Inside Environments Based on the Level Difference Between a Pair of Microphones (pp. 379 - 383)

Rihito Muto, Koichi Mizutani, Naoto Wakatsuki and Keiichi Zempo (University of Tsukuba, Japan)

The purpose of this paper is to localize people in inside environments, where GPS signals are hard to be received, applying the level difference between a pair of microphones which were installed in the building. We propose a system which offers a simple calculation and a few microphones to localize the position of a person with the acoustic marker. Through the experiments in anechoic chamber, it was confirmed that the level difference would express the location of the acoustic marker consequence of distance difference between the acoustic marker and the microphones.

☐ Simultaneous Power Transmissions Among Specified Sources and Consumers Through Shared Power Lines (pp. 384 - 385)

Naoki Nampei, Takahiro Onishi and Hisayoshi Sugiyama (Osaka City University, Japan)

An example system of pulsed power network is demonstrated. The pulsed power network is already proposed in our recent papers. In the proposed network, simultaneous power transmissions among specified power sources and consumers are possible through shared power lines. This advantage is verified by the demo-system where two power sources and two

consumers are assumed to be operated in the pulsed power network.

☐ Small Sound Extraction Using Virtual Counter Sound Source Method in Loud Noise Environment (pp. 386 - 388)

Keiichi Zempo, Yukino Hirai, Takuto Sakai, Koichi Mizutani and Naoto Wakatsuki (University of Tsukuba, Japan); Hiroshi Yosinaga (National Institute for Land and Infrastructure Management, Japan)

The purpose of this research is searching human voice rapidly in noise environment such as disaster sites. In this paper, we plan to reduce the repeat number of noise elimination which were provided by repetitive processing of virtual counter sound source method, based on Delayed-Sum method. Though the experiments with noise of heavy machine, the effectiveness of proposed method were confirmed.

☐ Spotlighting for Guiding to Articles on Display (pp. 389 - 392)

Amahaya Kenta and Kittaka Ryuuji (Fukuyama University, Japan); Keita Watanabe (DNP Informaition Systems Co., Ltd., Japan); Noboru Nakamichi (Fukuyama University, Japan); Toshiya Yamada (NTT IT, Japan)

A pointing gesture is performed for sharing recognition to an object. In this research, we propose a spotlighting system for focusing on the object intuitively. The system consists of a pointing system and a focus area operation interface. A user moves a focus area by making a fist and moving as catch hold of a focus area. A position of the focus area is fixed by opening up a user's hand. A user can narrow focus by using zoomable function of the focus area. The system supports sharing recognition to an object by a fully-zoomable focus area.

[11:30-, R1003] POS(2): Poster Session (2)

☐ A 15/20/30/40 GHz Multi-band Push-Push VCO Using Dual-Resonant LC Resonator (pp. 393 - 394)

Ro-Min Weng and Ren-Yuan Huang (National Dong Hwa University, Taiwan)

A quad-band voltage-controlled oscillator (QBVCO) is proposed for multi-band satellite communication systems. The presented QBVCO is designed with a transformer feedback topology in a standard 180-nm CMOS technology. By improving the LC-tanks, the output signals of QBVCO exhibit four oscillation frequencies within the satellite communication bands. The lower bands, 15/20GHz, are generated by adopting dual-resonant LC resonators. The lower bands can be tuned by varying the control voltage of the varactors. The higher bands, 30/40GHz, are obtained by adding a push-push frequency doubler. The power consumption is 11.31mW at 1.5V supply voltage.

☐ A Compensation Method of Sound Source Direction Perceived Through Bone-conduction Headphones by Emphasizing Interaural Level Difference (pp. 395 - 398)

Yoshiki Chigira and Mamoru Iwaki (Niigata University, Japan)

Perceived directions of sound sources presented through bone-conduction (BC) headphones inclined toward the center, rather than air-conduction headphones. Such difference losses some merit of BC headphones as hearing aids. We previously proposed a design concept to compensate the discrepancy of perceived direction of arrival for BC headphones based on emphasis of interaural level difference (ILD). In this study, we have implemented the compensation method and evaluated its performance. As a result, the perceived direction

through BC headphones was improved with the proposed ILD emphasis although little difference still remained.

☐ A Market Analysis of Technologies Towards the Disappearing of Electronics (pp. 399 - 400)

Gianluca Zaffiro (Telecom Italia, Italy)

Miniaturization of computation, thanks to Moore's Law, goes to every object including those we wear and are around us. This trend is facilitated by general purpose modules that bring in the community of designers not having specific electronic skills. Printed Electronics, using organic materials, makes it possible to create edible, disposable and perishable IoT devices. 3D Printing can embed electronic materials into any bearing structure, transforming dumb objects into digitally alive ones through Structural Electronics. The spread of smart devices fosters the development of super batteries, energy harvesting and wireless transfer. In this work these trends are described and analyzed.

☐ A Operation Method for the Digital Signage by Watch-type Wristbands with Acceleration Sensors (pp. 401 - 403)

Tomohiro Okazaki, Takaya Sakao and Tomohiro Hase (Ryukoku University, Japan)

This paper describes the display operation method for the digital signage. We proposed new wear interface using by watch-type wristband with acceleration sensors to detect motions for display operation. To verify own proposed, we experimented on six operation, and were able to a device it correctly.

☐ A Phyletic Model for Evaluating Phylogenetic Tree Estimation (pp. 404 - 407)

Ryosuke Enosawa, Atsuko Mutoh and Nobuhiro Inuzuka (Nagoya Institute of Technology, Japan)

Various methods to estimate phyletic trees and cladograms are proposed in the field of phylogenetics. However, it is not clear whether these estimation methods work with real various phyletic relationships. To evaluate these methods, we propose a phyletic model generating various phyletic relationships in this paper. In experiments, we generated various phyletic relationships by the proposed model and evaluated an estimation method using the generated relationships.

☐ A Prognostics Framework for Reliability Optimization of Mass-Produced Vehicle Onboard Diagnostics System (pp. 408 - 409)

Bernard Fong (Automotive Parts and Accessory Systems R&D Centre, New Zealand); Kim Fung Tsang (City University of Hong Kong, Hong Kong)

Assistive automobile and infortainment systems have been fitted as standard equipment in most modern medium to high end motor vehicles. While these system offer numerous advantages to consumers in enhancing operability and driving safety, there is little incentive for motor vehicle manufacturers to adopt such technology unless their return-on-investment (ROI) can be fully realized. This paper proposes a prognostics and health management (PHM) based solution for profit enhancement to the manufacturers as well as to improve consumer experience.

☐ A Prototype System with Eye Control for New Type of Hospital Beds (pp. 410 - 411)

Chia-Yen Yang (Ming Chuan University, Taiwan); Min-Ru Tsai (Ming Chuan University, Taoyuan, Taiwan); Chong Kai Huang (Ming Chuan University, Taiwan); Cihun-Siyong Gong and Shiang-Wei Li (Chang Gung University, Taiwan)

In this study, we tried to build up a handy system which can help bedridden patients to control hospital beds in several lying positions that match their preferences closely by only moving their eyes. This equipment had advantages of light and handy. Besides, we also constructed a model of our homemade hospital bed with six specific bed boards. This new type may help users to change their lying positions in left right tilt.

☐ A Study of Learning Data Size for Automatic Face Area Detection in Sequential Thermal Images (pp. 412 - 413)

Tsuyoshi Takahashi, Bo Wu and Yoichi Kageyama (Akita University, Japan); Masaki Ishii (Akita Prefectural University, Japan); Makoto Nishida (Akita University, Japan)

Chronological change of temperature on cheeks includes important information to detect an emotion occurrence. To measure the specific region of face skin temperature accurately, we have developed a face detection method from sequential thermal image acquired in 30fps. In this paper, we investigated minimum quantity of learning data that is sufficient to create a high accurate face area detector. The experimental results for five persons showed that high detection rate was obtained when using over 350 images.

☐ A Study on the Physiological Effects of Auditory Stimulus with Heart Rate Variability During Cycling (pp. 414 - 415)

Tohru Kiryu (Niigata University & Grad School of Science and Technology, Japan); Caijilahu Bao (Grad. School of Science and Technology of Niigata University, Japan)

Music activates central emotions and promote the release of biochemical materials that could change the physiological activities. In this study, physiological and psychological effects of auditory stimuli were investigated by synchronizing the rhythm of music stimulus with that of HR during exercise. We propose a multi-time-scale autonomic regulation model that consists of trigger and accumulation effects with different timescales. As validation experiments, fifteen participants a 3-min-long music section repetitive five times (total 15-min) continuously during pedaling controlled workload. The results revealed that, the negative group significantly increased LF/HF ratio than positive group in every task (** $p < 0.01$).

☐ An Efficient Data Loading Mechanism for List-style UI with Content Separation and Parallel Processing in Mobile Systems (pp. 416 - 417)

Wen Wei Chuang, Chao Yang Wu, Yu Fong Sun and Shanq-Jang Ruan (National Taiwan University of Science and Technology, Taiwan)

Consumer electronics and network are developed rapidly, accessing abundant data is very usual. List-style UI is frequently used to perform the data. However, the conventional mechanism of data processing for list-style UI is sluggish. This paper proposes LDVI mechanism to optimize data processing performance for list-style UI. Significantly, the consumption of system resources for LDVI approaches to a constant range. Therefore, LDVI not only optimizes the operation of list-style UI but performs better user experience. In our experiments, the performance of LDVI is enhanced by at least 8.74%, the CPU activity percentage is reduced by at least 3.14%.

☐ Analysis of Head Movement When Viewing A Wide-Viewing-Angle Display

Shinya Mochiduki, Hideaki Takahira and Mitsuho Yamada (Tokai University, Japan)

We assumed that not only viewing distance but also viewing position is affected to the distribution of the gazing points when viewing high definition image from the short distance.So we measured gaze movement when viewing the image from two viewing distances 0.75H (51cm; H is the display height) and 1.5H (102cm), and three viewing positions (center, right and left). Tendency was indicated that the amount of head rotation of 0.75H was bigger than that of 1.5H but that the difference was small by the analysis of head movement components from the gaze movement components.

☐ Analysis of the Thermal Comfort and Power Consumption in Apartment Domain

Konlakorn Wongpatikaseree and Takashi Okada (Japan Advanced Institute of Science and Technology, Japan); Yasuo Tan (JAIST, Japan)

Energy saving in living space is the most popular issue. Several domains relate to the energy saving. One of them is a thermal comfort. The ways to analyze the room temperature have been proposed, especially in home domain. However, considering only home structure is not enough for energy management system (EMS). Other building structures are needed to be identified. Therefore, we aim to analyze the room temperature and power consumption in apartment domain. The results showed that each room in apartment could transfer the heat to other rooms through the walls, and the room temperature affects the use of air-conditioner.

☐ Assessing and Counteracting the Effects of Interference on GNSS Signals

Yu Tsai Chen and Kuan Jen Lin (Fu Jen Catholic University, Taiwan)

PNDs (Portable Navigation Devices) are widely used in commercial and military applications. GNSS (global navigation satellite system) signals typically have low strengths when reaching a PND and are therefore susceptible to various interference signals. In this paper, we will study the effects of interference resulted from various sources. Furthermore, countermeasures are proposed to reduce the bad effects. Test system was built and examined to show the improvement on the quality of GNSS signals.

☐ BCI-based Control of Electric Wheelchair

Nobuaki Kobayashi and Masahiro Nakagawa (Nagaoka University of Technology, Japan)

BCI (Brain-computer Interface) has been attracting attention as an interface to connect the brain to external devices. Here, we suggest a novel BCI system that accurately recognizes and isolates emotions like delight, anger, sorrow, and pleasure using an Emotion Fractal-dimension Analysis Method (EFAM), which can quantify emotions based on data obtained by electroencephalography, and control an electric wheelchair using the information. With this method, a high average rate of recognizing emotions of 55-60% and markedly high rate of isolating them of over 97% can be achieved.

☐ Cloud Based Sports Analytics Using Semantic Web Tools and Technologies

Khalid Mahmood (Oakland University, USA); Hiro Takahashi (DTS, Japan)

The "variety" aspect of Big data is of immense significance since it accommodates the numerous formats of information - Structured, Unstructured and Semi-structured This paper presents novel idea of cloud based video analytics using speech processing, Natural Language Processing and semantic web technologies, along with analysis of sensory data obtained from players body sensors. The long term goal of our proposed system based on deep learning is to give answers like what is the best combination of players for next N minutes of the game by performing detailed analysis on variety of big data.

☐ Consideration of Method for Restricting Use of Smartphone Based on Forced Character Entry (pp. 434 - 435)

Tomoki Kajinami, Yuuto Hirata and Hiroyuki Tsuji (Kanagawa Institute of Technology, Japan)

This paper considers a method for restricting the use of a smartphone based on forced character entry. The long-range goal of this research is to suppress mobile phone addiction. Previous methods to achieve this goal have generally been shotgun approaches and have been designed for youngster users. The concept of this research is to consider a method for lowering the motivation for using the phone instead of a shotgun approach. This study implemented a character entry screen that was displayed on the phone based on an established time limit and investigated lowering the user's motivation for using the phone.

☐ Design of Programmable Power-Quality Signal Generator for Power Disturbance Testing of Consumer Electronics (pp. 436 - 437)

Cheng-I Chen and Chieh-Yin Cheng (National Central University, Taiwan); Yeong-Chin Chen (Asia University, Taiwan)

This paper is to describe the design process and methods of a programmable power-quality signal generator to help perform the power disturbance testing of consumer electronics. Programmable ability is that the arbitrary waveform can be generated and provide the alternating current (AC) power output. The power output with arbitrary waveform can be used to emulate a power supply with power-quality disturbances. This system can be used to perform the training for the design of filter to filter off a power source of pollution into the clean sine wave or can be used to test equipment for power pollution interference.

☐ Development of Electric Fence Management System Using Wireless Network Technology (pp. 438 - 441)

Arata Kobayashi, Kazuki Ashida and Koichi Karasawa (National Institute of Technology, Nagano College, Japan); Shigeru Tokida (Kyowa Techno, Japan)

Traditional electric fence has been helpful as a guard of crops. However, the voltage of it occasionally drops because of weeds touching. Furthermore, the owners of the fence have to check the voltage but they cannot know it without going there. An electric fence management system we develop uses wireless communication, and it enables the owners to know the voltage and the state of the electric fence and monitor it from remote locations safely. This paper describes a demonstration experiment in a mountainous region, and suggests an approach to resolve some problems.

☐ Evaluation of Energy Losses in Yuan Ze University Campus (pp. 442 - 443)

Nien-Che Yang and Wei-Chih Tseng (Yuan Ze University, Taiwan)

In this study, an energy loss analysis technique for campus distribution systems is proposed.

For energy losses evaluations, the mathematical models of system components are established and verified. To examine the factors affecting energy losses of a distribution system, the full-scale digital models of distribution systems are developed as a platform. Furthermore, the continuous three-phase power flow is used to evaluate the whole system energy losses. In this study, the distribution systems in Yuan Ze University are adopted as benchmarks for evaluating and solving energy loss problems.

☐ Heightening Upper Limit Frequency of Wideband Antenna Using Asymmetrical Radiating Elements (pp. 444 - 445)

Shota Zempo and Fukuro Koshiji (Tokyo Polytechnic University, Japan); Kohji Koshiji (Tokyo University of Science, Japan)

In recent years, cognitive radio system is receiving particular attention as a promising technology in order to materialize efficient network access. In this paper, heightening upper limit frequency of the wideband antenna for cognitive radio system was investigated by employing three types of the antenna element variations. As a result, the antenna, employing asymmetrical elements, with the VSWR less than 2.0 in the frequency range of 3.1 GHz to 18 GHz was obtained. As for the radiation patterns, although the slightly distorted radiation patterns due to employing the asymmetrical elements were observed, it is acceptable in practical use.

☐ History Based Heuristic Feed Querying Scheme in Web Feed Aggregator (pp. 446 - 450)

Hyeontaek Oh (KAIST, Korea); Seokhyun Song (Republic of Korea Naval Academy, Korea); Sanghong Ahn and Jun Kyun Choi (KAIST, Korea)

There has been a dramatic increase in the use of XML data to deliver information over the Web. Many Web sites are now publishing feeds (most commonly known as RSS; often called really simple syndication) for their subscribers. To improve performance of content syndication system, history based pattern learning approaches are mainly used. This paper proposes a new feed querying scheme which is used in web feed aggregator. Heuristic approach is adopted to handle various feed publishing pattern. The simulation confirms that proposed scheme shows performance improvements in both item missing probability and post-it delay compared with conventional studies.

☐ Indoor Positioning Method for Augmented Audio Reality Navigation Systems Using iBeacons (pp. 451 - 452)

Chiaki Takahashi and Kazuhiro Kondo (Yamagata University, Japan)

We studied the feasibility of the use of iBeacons for position detection in indoor navigation systems. We initially used four iBeacons located at corners of a room, and compiled a database of the radio wave strength from these. Then we matched the detected strength at an unknown location to the database to estimate the current position. The overall average accuracy was 0.8 m. This accuracy should be enough for our system using augmented audio reality, to be implemented in the future. However, we would like to test the effect of increasing the iBeacons for improved accuracy as well.

☐ Measurement of an Empathy While Watching Images (pp. 453 - 457)

Hideaki Takahira, Shinya Mochiduki and Mitsuho Yamada (Tokai University, Japan)

At movies theaters and with the new very large home television screens, multiple people simultaneously watch video images together. In this study, we further developed our system that measures two persons' gaze movements simultaneously as they watch video images, in order to evaluate the degree of agreement in their interest and their empathy while viewing the images. We measured the gaze movements among pairs of six adult subjects while they viewed three genres of TV programs, and we analyzed the subjects' head movements as well as gazing points.

☐ Multiband Planar Antenna for Wireless LAN (pp. 458 - 461)

Yoshiki Yui, Takuya Hiraguri, Koichi Karasawa, Kazuki Ashida, Hidetoshi Nakayama and Toshiro Nakashima (National Institute of Technology, Nagano College, Japan); Takahisa Karakama (Faverights Corporation, Japan); Tutomu Kaneko (Nissei Limited, Japan)

A new multiband planar antenna for wireless LAN is proposed and examined, compared with the conventional antenna, FML2.4W. From the results, the maximum values of the absolute gain for the proposed antenna are equal to or higher than those for FML2.4W in two frequency bands, 2.4GHz, from 5.2GHz to 5.8GHz.

☐ Object Recognition Focused on Interaction with Human Being (pp. 462 - 466)

Tatsuki Ishijima and Masaki Ishii (Akita Prefectural University, Japan)

In recent years, robots have become part of the home. High-recognition functions are necessary for a robot to coexist with a human being. When a human being recognizes an object, the interaction around the object is important information. That is, a person, an object, and the recognition of the interaction in the environment greatly influence the human being's recognition function. In this paper, we detect a basic interaction with a human being and an object, and discuss a method that recognizes an object based on an image when the interaction occurs.

☐ Pedestrian Meta-Strategy Analysis of Collision Avoidance with Two Autonomous Agents (pp. 467 - 469)

Kensuke Miyamoto (Keio University, Japan); Norifumi Watanabe (Tokyo University of Technology, Japan); Yoshiyasu Takefuji (Keio University, Japan)

In this paper, we aim to build an agent model that enables cooperative behaviors by estimation human intention. Human changes their action decision process by other's behavior. So, we analyze human behavior with switching action decision process. We have targeted collision avoidance as an example of a simple cooperative behavior. We have set two agents with Meta-Strategy model to a virtual environment SIGVerse. We have analyzed subject's walking trajectories, when two agents have different behavior strategies. It was confirmed that subjects switch their avoidance behaviors by agents' strategies.

☐ Position of the Egocenter in the Perception of Peri-Personal Space Using Haptics (pp. 470 - 472)

Ryo Wako and Saho Ayabe-Kanamura (University of Tsukuba, Japan)

Spatial representations of peri-personal space formed from haptics are known to show non-veridical characteristics, which have been suggested to be the result of the egocentric reference frame. The current study investigated the position of the egocenter when perceiving space through haptics in order to understand how positions in space are encoded and whether there are positions in space that are easily perceived with arm movements. Understanding of human

characteristics in the perception of space using haptics will shed light into user friendly designs of interfaces which are manipulated using the hands.

☐ Slim NFC Antenna Integration Into Metal-Covered Tablet and All-In-One Desktop PC (pp. 473 - 476)

Hideto Horikoshi and Yoshio Nishioka
(Lenovo & Yamato Development Laboratory, Japan)

This paper reviews new slim NFC antenna integrated under the bezel of the metal-covered tablet. The conventional NFC antenna of the tablet was integrated under the rear cover because the material of the rear cover of the conventional tablet was ABS plastic which allowed NFC magnetic field to radiate through the rear cover. However, some materials of the rear cover of tablets and all-in-one desktops were metals which did not allow NFC magnetic field to radiate through the rear cover. In order to resolve this problem, slim NFC antenna was developed and integrated under the bezel on the panel side.

☐ Statistical Fault Analysis for a Lightweight Block Cipher TWINE (pp. 477 - 478)

Yusuke Nozaki, Kensaku Asahi and Masaya Yoshikawa (Meijo University, Japan)

The security of embedded devices has attracted attention. Lightweight block ciphers are effective for the security of embedded devices because it can be utilized in small area. Regarding security, the threat of fault analysis for a cryptographic circuit has been reported. Fault analysis analyzes the confidential information illegally. To ensure the security of embedded devices, the research against fault analysis for a lightweight block cipher circuit is very important. This study proposed a new fault analysis method for TWINE which is one of the most popular lightweight block ciphers. Experiments using FPGA show the validity of the proposed method.

☐ Supporting System with Hand Gesture for Location-based Augmented Reality (pp. 479 - 480)

Jun Minagawa and Woong Choi (National Institute of Technology, Gunma College, Japan); Liang Li (Ristumeikan University, Japan); Satoshi Tsurumi, Nobuto Hirakoso and Nobuo Sasaki (National Institute of Technology, Gunma College, Japan); Kozaburo Hachimura (Ristumeikan University, Japan)

We proposed a supporting system for location-based AR that enables user to handle virtual object without AR markers and hand mounting instruments. We also carried out design and implementation of the proposed system. It makes possible to calculate global coordinates of hands and recognize hand gestures through a combination of depth sensor, motion capture system, and head mounted display. To evaluate the performance of the proposed system, we carried out the taskes of moving, generating, and eliminating of virtual object. The recognition rates for all tasks are above 90%.

☐ Transmission Characteristics Through the Bent Arm Wearing Magnetically-Coupled Coils for Body Area Communication (pp. 481 - 482)

Yusuke Fujita and Fukuro Koshiji (Tokyo Polytechnic University, Japan); Kohji Koshiji (Tokyo University of Science, Japan)

We have proposed body area networks using magnetic coupling between coils worn on an arm, and confirmed that the transmission characteristics were improved more than 20 dB compared with those of the conventional human body communication using electrodes in

contact with the body. However, the arm will be bent with various angles in daily life. In this paper, transmission characteristics between the wearable coils worn on the bent arm and magnetic field distributions around the coils and arm were investigated. As a result, the transmission characteristics were stable and hardly influenced against bending the human arm with various angles.

☐ WiFi Positioning System Without AP Locations for Indoor Evacuation Guidance

(pp. 483 - 484)

Masaya Ohta, Jun Sasakai, Seiya Takahashi and Katsumi Yamashita
(Osaka Prefecture University, Japan)

This research considers an application for a smartphone to support indoor evacuation guidance used in a building which contains many laboratories at a university, and proposes a simple WiFi positioning system without AP locations. The proposed system can recognize user's location by using a hierarchical neural network and the input of the network is only a list of detected SSIDs by a smartphone. The system is implemented on the smartphone and evaluated the recognition rate.

[14:00-, R1004] REM: Embedded Technologies

☐ FPGA Implementation of Automatic Speech Recognition in a Car Environment

(pp. 485 - 486)

Dong-Fong Syu, Su-Wei Syu, Shanq-Jang Ruan, Yu-Chang Huang and Chuan-Kai Yang
(National Taiwan University of Science and Technology, Taiwan)

This paper presents the FPGA implementation of an ASR system in a car environment. The voice feature vectors are extracted by using Mel-Frequency Cepstral Coefficients and compared by using FastDTW algorithms. The recognition rate of the proposed system is 81.5%. Both MFCC and FastDTW algorithms are implemented by Verilog HDL. The target device is chosen as Altera DE2-115.

☐ On-Chip Glitch-Free Backup Clock Changer with Noise Canceller and Edge Detector for Safety MCU Clock System (pp. 487 - 488)

Joonghyun An and Jeonghun Cho (Kyungpook National University, Korea);
Daejin Park (Kyungpook National University (KNU), Korea)

Severe electrical situations such as high voltage/frequency surge may cause malfunctioning of the clock source. Due to the broken clock, the clock-less status of the system may enter into an abnormal state in driving several dangerous output. In this paper, we propose an on-chip clock controller architecture to detect automatically clock failure and to switch the safe backup clock. The implemented edge detector (ED) unit identifies the abnormal low-frequency status of the clock source. The noise canceller (NC) using delay chain circuit of the clock pulse can detect the glitch status of the system clock.

☐ An Embedded System of TCP/IP Communication by Using FPGA (pp. 489 - 492)

Atsushi Nakanishi (Kanagawa Institute of Technology, Japan)

In this paper, we propose a new embedded system of TCP/IP communication by Using FPGA. This system not exist CPU, TCP/IP standard modules are implemented to this embedded system. Conventional TCP/IP modules generate some header of packet by CPU, that is, it required CPU. Therefore, the transfer rate of conventional system is not stable. In this

paper, we implement the 100BASE TCP/IP protocol stack to an embedded system by using FPGA, and it reports that proposed system does not require a CPU.

☐ Provisional Process Migration From IoT Devices: A Performance Study (pp. 493 - 494)

Tsukasa-Pierre Nakao and Makoto Oya (Shonan Institute of Technology, Japan)

In prospective consumer spaces where a great number of autonomous Internet of Things (IoT) devices are loosely cooperating with each other, many requests can unexpectedly concentrate on a single IoT device. We are researching a system which would allow a process on an IoT device to provisionally migrate to a backup computer in such cases. As the first step, this paper proposes a method of running the core image of an IoT controller on a backup computer with a different architecture. We then evaluate its performance, which demonstrates the appropriateness of the direction of this research.

[14:00-, R1005] OS-HLT: Health Monitoring & Life Support Technology

☐ Estimating Visual Fatigue Caused by Display Operations with Temperature Rise Sensed on Human Eyelids (pp. 495 - 496)

Tetsuya Muraoka (Daiichi Institute of Technology, Japan); Hiroaki Ikeda (IKEDA Technologies, Inc., Japan)

Estimation of whether visual fatigue caused by display operations on personal computers will be tolerable is very important to keep one's eyes healthy. Newly described are the mathematical model analyses of temperature rises on the eyelids of each operator and interpretations allied to this matter. Note that the temperature rises of this mode were optically sensed to have been caused by visual fatigue due to visual accommodation change during display operations on personal computers.

☐ Brain Machine Interface Available in Eyes-Closed State in Terms of Event-Related Desynchronization and Synchronization During a Mental Task (pp. 497 - 501)

Seiji Nishifuji, Yuya Sugita and Hitoshi Hirano (Yamaguchi University, Japan)

The present study aimed at developing a novel 2-class of brain machine interface (BMI) independent of oculomotor control using event-related modulation of steady state visual evoked potential (SSVEP) associated with a mental task under eyes-closed condition. The magnitudes of SSVEP in the posterior regions of eleven healthy subjects were significantly modulated by performing each of mental focus and image recalling tasks. The classification accuracies of the proposed BMI using the event-related modulations were 80 % for mental focus and 75 % for the image recall in average across all the subjects, respectively.

☐ The Visualization System of Center of Pressure and Base of Support in Sit-to-Stand Movement (pp. 502 - 503)

Masaki Nakamura, Akira Urashima and Tomoji Toriyama (Toyama Prefectural University, Japan); Yuuki Aiboshi (Mukaiyama Hospital, Japan); Toshihiro Ninomiya (Kishiwadaeishinkai Hospital, Japan); Noriyuki Fukumoto (Yamato University, Japan)

A sit-to-stand (STS) movement is important to understand how the balance function of a rehabilitation patient is recovered. For analyzing a STS movement, we propose a system to visualize center of pressure (COP) and base of support (BOS) while a patient standing from a seated position. Our system consists of (1) load sensors to obtain COP and (2) sheet and pressure sensors to obtain BOS. A prototype system has been tested by occupational and

physical therapists worked in rehabilitation hospitals and has been used in practical treatment for rehabilitation patients. We report the results of our questionnaire of those experiments.

☐ Control Method for Assistive Devices for Upper Limbs (pp. 504 - 506)

Ryoichi Suzuki (Kanazawa Institute of Technology, Japan)

The purpose of this research is to propose a control method for an assistive devices for upper limbs. The disturbance estimation property of the internal model control is applied to estimate motion intention of users. The proposed control method is implemented to an experimental prototype of the assistive device for upper limbs. Effectiveness of the proposed method is verified by experiments.

☐ Intelligent Control of USM Using a Modified NN with PSO (pp. 507 - 510)

Shenglin Mu (National Institute of Technology, Hiroshima College, Japan); Kanya Tanaka, Shota Nakashima, Hiromosa Tomimoto and Shingo Aramaki (Yamaguchi University, Japan)

A control method for an attractive actuator of Ultrasonic Motors (USMs) is introduced in this paper. The USMs are expected to play more important roles in medical and welfare areas. In this research, an intelligent PID control method using Neural Network (NN) combined with type Particle Swarm Optimization (PSO) is developed. In the method, the intelligent controller is designed based on variable gain type PID control using NN. The gains of PID gains are adjusted by the proposed method in real-time. The effectiveness of the method is verified by experimental results.

[14:00-, R1006] OS-AIP(2): Advanced Image Processing (2)

☐ 3D Point Cloud Cluster Analysis Based on Principal Component Analysis of Normal-vectors (pp. 511 - 512)

Takeshi Hayata (National Defense Academy, Japan); Tomitaka Hotta (National Defense Academy of Japan, Japan); Munetoshi Iwakiri (National Defense Academy, Japan)

Technical demands for extraction of significant components from spatial models are increasing as 3D sensor and its application technology had been developed and popularized. In this paper, we propose 3D point cloud cluster analysis based on the principal component analysis of normal-vectors. The distribution of normal vectors depends on a 3D surface shape. We discussed the principal component analysis of the distribution of normal vectors to the point cloud. The results of the experiment showed that our method could classify a point cloud as an edge, a vertex and a plane.

☐ Image Classification Based on Integration of EEG and Visual Features Via LFDA-MSLPCCA (pp. 513 - 514)

Kento Sugata, Takahiro Ogawa and Miki Haseyama (Hokkaido University, Japan)

This paper presents a novel image classification based on integration of EEG and visual features. In the proposed method, we merge the obtained classification results which separately using EEG and visual features, based on kernelized version of decision-level fusion via Multiset Supervised Locality Preserving Canonical Correlation Analysis (MSLPCCA) to obtain final classification results. When the number of samples is fewer than the dimension of a sample data, we have to reduce their dimension. Therefore, we introduce Local Fisher Discriminant Analysis (LFDA), then the integration of all of the classifications results becomes

feasible by MSLPCCA based on LFDA.

☐ Electromyographic Signal Compression Based on Two-dimensional Techniques

(pp. 515 - 516)

Wheidima Melo (Universidade do Estado do Amazonas, Brazil); Eddie B de Lima Filho (Centro de Ciência, Tecnologia e Inovação do Pólo Industrial de Manaus - CT-PIM & Universidade Federal do Amazonas - UFAM, Brazil); Waldir Silva (Universidade Federal do Amazonas, Brazil)

This paper presents an investigation regarding the performance of video and image encoders, when applied to the compression of surface electromyographic signals. In addition, a new preprocessing technique is introduced, called euclidean distance sorting (EDS), which has the potential to increase the exploitation of intersegment correlations. The experiments were carried out with real isometric records, which were first preprocessed and then compressed with the JPEG2000, H.264/AVC, and high efficiency video coding (HEVC) algorithms. It is clear that the proposed scheme is effective, given that the combination of EDS and JPEG2000 or HEVC even outperform state-of-the-art schemes present in the literature.

☐ Document Classification for Copy-Mode Decision (pp. 517 - 518)

Sunok Kim, Sungwook Yoon, Sangwook Baek and Chulhee Lee (Yonsei University, Korea)

We proposed a low-complexity document classification algorithm to select copy mode. The goal is to select a suitable copy mode during copying process. We first analyzed scanned images and classified them into three modes: text, image, mixed modes. To classify images, we used several features, which include pixel density with low brightness, edge length and text line components. Experimental results showed that the proposed algorithm provided about 95% classification accuracy.

☐ Visual Analysis Framework for Two-person Interaction (pp. 519 - 520)

Thi Thi Zin (University of Miyazaki & Faculty of Engineering, Japan); Junpei Kurohane (Fujitsu Kyusyu Network Technologies Limited, Japan)

In this paper, a novel approach to two person interaction method is presented in which pose representation is based on the feature of silhouette images. Specifically, the proposed method makes use of human silhouettes to classify actions and interactions of human present in a scene video. The classes of interactions will include punching, pushing, kicking, hand-shaking, and hugging. Moreover, the detected interactions are further divided into violence or non-violence so that a suitable security measures would be taken.

☐ Discriminative Filtering with Principal Component Analysis and Adaptive Alignment

(pp. 521 - 522)

Kenny Vinente (Universidade Federal do Amazonas, Brazil); Wheidima Melo (Universidade do Estado do Amazonas, Brazil); Waldir Silva (Universidade Federal do Amazonas, Brazil); Eddie B de Lima Filho (Centro de Ciência, Tecnologia e Inovação do Pólo Industrial de Manaus - CT-PIM & Universidade Federal do Amazonas - UFAM, Brazil); Luiz Silva and Felipe Farias (Universidade Federal do Amazonas, Brazil)

Discriminative filtering is a pattern recognition technique which seeks to maximize the energy of output signal when a pattern is found. To improve the robustness, was incorporated the principal component analysis in discriminative filters design. In this work, we proposed a new technique for design of the discriminative filters, called adaptive alignment. To evaluation,

we used a facial fiducial points detection system with BioID database

[14:00-, R1007] OS-ECP: Entertainment Computing

☐ Detecting KIRAKIRA Japanese Names Focusing on Usage of Kanji Characters

Ryosuke Yamanishi, Junpei Oizumi, Yoko Nishihara and Junichi Fukumoto
(Ritsumeikan University, Japan)

This paper proposes a method to detect KIRAKIRA Japanese names that mean strange and unusual names. The proposed method focuses on usage of Kanji characters such as number of characters and syllables, unknown pronunciation of Kanji, number of stroke count for Kanji and mismatching of gender and Kanji. Based on the above features, KIRAKIRA names are automatically detected by using Support Vector Machine. Through the experiments to detect KIRAKIRA names, it was confirmed that the proposed method well detect KIRAKIRA names for 81.8% accuracy, 76.9% precision, and 91.8% recall.

☐ Treasure Hunt Game to Persuade Visitors to Walk Around a Shopping Mall

Asuka Wakao, Kohei Matsumura, Mao Suzuki and Haruo Noma
(Ritsumeikan University, Japan)

We propose a treasure hunting game aimed at changing shopping behavior. Shopping malls consist of various tenants. However, visitors tend to visit particular tenants. We thus aimed to persuade mall visitors to walk around through playing a game. We designed the treasure hunt game on a smart phone by introducing some gamification techniques. As the result of our user study, we confirmed that the proposed method motivates participants to walk around the shopping mall while hunting for the treasure. Further analysis suggested that our method suits shopping activities of groups such as families.

☐ Haconiwa: A Toolkit for Introducing Novice Users to Electronic Circuits

Saki Sakaguchi, Sayaka Shimada, Nanae Shirozu and Mitsunori Matsushita
(Kansai University, Japan)

This paper proposes a “Haconiwa,” a toolkit for studying how to build a basic electronic circuit intuitively. The toolkit intends to provide a trigger to get interested in an electronic circuit. The toolkit will foster an interest in electronic devices and provide users with the pleasure involved in making products. This toolkit consists of two types of modules: basement modules and object modules (e.g., LED, battery, and switch). Appearance of the object modules can be decorated by a user, with fancywork and needlework. By connecting these decorated modules with basement modules, users can make their own original miniature scenery.

☐ Predicting the Opponent’s Action Using the k-Nearest Neighbor Algorithm and a Substring Tree Structure

Yuto Nakagawa (Rtisumeikan University, Japan); Kaito Yamamoto, Chun Chu, Tomohiro Harada and Ruck Thawonmas (Ritsumeikan University, Japan)

This paper proposes a technique for predicting the opponent’s next action accurately by combining the k-nearest neighbor algorithm and substring tree structure. Furthermore, our AI, employing the proposed technique, is enhanced by the implementation of Boltzmann equation

control. The proposed method and the AI are evaluated on a fighting game AI competition platform, and their results attest to their effectiveness.

☐ Procedural Generation of Angry Birds Levels That Adapt to the Player's Skills Using Genetic Algorithm (pp. 535 - 536)

Misaki Kaidan, Chun Chu, Tomohiro Harada and Ruck Thawonmas
(Ritsumeikan University, Japan)

This paper proposes a procedural generation method that automatically creates game levels for Angry Birds, a famous mobile game, using genetic algorithm. By adjusting the parameters of the genetic algorithm according to the player's gameplay results, our proposed method can generate game levels that adapt to the player's skills. Our experiment proves that the proposed method is able to procedurally generate game levels that befit the player's skill.

[14:00-, R1008] RMC: Mobile Computing & Communications

☐ An Enhanced Single-Binary Turbo Decoding Scheme for Turbo MIMO Systems (pp. 537 - 538)

Cheng-Hung Lin, Chih-Hsuan Chiang, Shu-Wei Guo and Shu-Yen Lin
(Yuan Ze University, Taiwan)

In this paper, an enhanced single-binary (SB) turbo decoding scheme is proposed to provide reliable extrinsic information to the detector of turbo multiple-input multiple-output (MIMO) system. By using the state metrics of the systematic bits of SB turbo decoding, the proposed scheme generates the extrinsic information of parity bits with reduced operations. Simulations of a 4 Ã— 4 turbo MIMO system under 16-QAM modulation and Long Term Evolution (LTE) rate-1/3 turbo code reveals that this proposed scheme combined with multiplying extrinsic information by distinct scaling factors achieves BER performance gains compared with the conventional scheme.

☐ Evaluations of 4K/2K Video Streaming Using MPEG-DASH with Buffering Behavior Analysis (pp. 539 - 540)

Harada Rintaro (Waseda University & Fundamental Science and Engineering, Japan);
Kenji Kanai and Jiro Katto (Waseda University, Japan)

In this paper, we evaluate performances of 4K/2K video streaming using DASH-JS over 2.4/5GHz WiFi networks. We confirmed that fluctuation of reception quality was mainly caused by the minimum representation rate of MPEG-DASH contents and overlapped ON cycles for packet transmission.

☐ QoS Improvement of Mobile 4K Video by Using Radio Quality Map (pp. 541 - 542)

Takenaka Sakiko (Waseda University & Fundamental Science and Engineering, Japan);
Kenji Kanai and Jiro Katto (Waseda University, Japan)

Effective use of various wireless network interfaces is expected. In this paper, we evaluate Quality of Service characteristics of mobile 4K video using a radio communication quality map. We collect radio communication quality (e.g. throughput) by smartphones and visualize the quality in a heat map. Using this map, we select two routes that are expected to bring the highest and the lowest communication quality. We then evaluate QoS characteristic of 4K video streaming using MPEG-DASH on these two routes. The result shows that a good route user can achieve 1.5 times higher communication quality than a bad route user.

☐ The Design and Realization of APD Receiving Circuit Used in M-ary VLC

(pp. 543 - 544)

Song Wei and Dong Shiliang (Jiangsu University of Technology, P.R. China);
Ziyan Jia (National Mobile Communications Research Laboratory,
Southeast University, P.R. China)

the paper aims at the application requirement of m-ary modulation communication system, and designs the component of APD receiving circuit, and analyzes circuit structure and function of each part of the system of high voltage circuit. lastly, the detection module of m-ary visible light communication (VLC) receiving circuit's relevant test is carried out. The results show that the design is valid and feasible and the APD receiving circuit has the advantages of high gain, wide bandwidth, good stability, which has good application value on m-ary visible light communication and provide the basis for the further studies of m-ary VLC.

Abstract of Presentations on October 30

[09:30-, R1004] OS-MVD: Microelectronics & VLSI Design

☐ A Pixel-Configurable CMOS Image Sensor for an Intelligent Surveillance System

(pp. 545 - 549)

Jieun Yoo, Seoul Namgung and Minkyu Song (Dongguk University, Korea)

A CMOS Image Sensor (CIS) mounted on a surveillance system does not always record a picture in a high resolution mode. In a normal state without any events or accidents, it is possible to take a picture in a low resolution mode to reduce power consumption. In this paper, a novel low power CIS which has two kinds of resolution mode is discussed to implement an intelligent surveillance system. The prototype CIS chip is based on a 0.11μm CMOS process and satisfies a QVGA resolution (320×240).

☐ Standard Cell Implementation of Buskeeper PUF with Symmetric Inverters and Neighboring Cells for Passing Randomness Tests

(pp. 550 - 551)

Yasuhiro Ogasahara (National Institute of Advanced Industrial Science and Technology (AIST), Japan); Yohei Hori (AIST, Japan); Hanpei Koike (National Institute of Advanced Industrial Science and Technology (AIST), Japan)

In this paper, from the measurement results on silicon, we validate that symmetric inverters placement including neighboring cells of buskeeper PUF achieves not only fine uniqueness but also sufficient randomness which was not presented in past works. We also demonstrate that our symmetric implementation enables fine PUF performance regardless of pMOS and nMOS width of inverters in foundry-dependent standard cell libraries. Our measurement results of 65280 bit buskeeper PUFs with suggested design on silicon passed 10 randomness tests, and achieved 2.118% within-class HD, (average)=0.5001 and (standard deviation)=0.0359 class-to-class HD, and 0.9992 entropy/bit.

☐ Comparative Analysis of Carbon Nanotube Field Effect Transistors

(pp. 552 - 555)

Amandeep Singh (Dr B R Ambedkar National Institute of Technology, India); Mamta Khosla (Dr B R Ambedkar Natinal Institute of Technology, Jalandhar, India); Balwinder Raj (Dr B R Ambedkar National Institute of Technology, India)

This paper presents the design, performance evaluation and comparative analysis of different types of Carbon Nanotube Field Effect Transistor (CNTFET). Different CNTFET namely Schottky Barrier, Partially Gated, Conventional, and Tunnel CNTFET are simulated using NanoTCAD ViDES. The simulation results are presented and devices have been compared on the basis of different parameters i.e. ION/IOFF ratio, Transconductance, Inverse Subthreshold Slope. It has been found that Conventional gives the highest ION/IOFF ratio, Tunnel and Partial Gated gives steep Subthreshold Slope but Tunnel benefits with well controlled off state. Partial Gated gives highest Transconductance.

☐ Performance Enhancement of Junctionless Nanowire FET with Laterally Graded Channel Doping and High-κ Spacers

(pp. 556 - 559)

Sanjeev Sharma (Dr B R Ambedkar National Institute of Technology Jalandhar, India); Balwinder Raj (Dr B R Ambedkar National Institute of Technology, India); Mamta Khosla (Dr B R Ambedkar Natinal Institute of Technology, Jalandhar, India)

We propose the use of laterally graded channel doping and High-κ Spacers positioned on both sides of gate oxide to improve the Performance and thereby, the scalability of Junctionless Nanowire Field Effect Transistors (JLNWFET). The performance parameters of the device considered in this study are ION/IOFF ratio, Drain-Induced Barrier Lowering (DIBL) and Sub Threshold Slope (SS). Using extensive 3-D TCAD simulations, we have analyzed that the OFF-state leakage, DIBL and SS can be reduced owing to the combined use of laterally graded-doping channel and High-κ Spacers.

☐ Thermally Aware Modeling and Performance for MWCNT Bundle as VLSI Interconnects for High Performance Integrated Circuits (pp. 560 - 564)

Karmjit Singh Sandha (Thapar University, India); Balwinder Raj (NIT Jalandhar, India)

In the recent times MWCNT bundle interconnects at global interconnect level, has been considered as an alternative to the conventional copper interconnects. In this paper, the influence of temperature on mean free path (MFP) of MWCNT bundle as interconnects is presented. The temperature dependent MFP is used to evaluate the impedance parameters of MWCNT bundle for nanoscaled technology nodes. Further, a similar analysis is performed for copper interconnects to compare the results with MWCNT bundle. Results show that MWCNT interconnects offered lesser resistances compared to copper interconnects for temperature ranging from 200K-450K at 32nm, 22nm and 16nm technology nodes.

[09:30-, R1005] RSE: Security & Rights Management

☐ Side-channel AttacK User Reference Architecture Board SAKURA-W for Security Evaluation of IC Card (pp. 565 - 569)

Masato Matsubayashi (The University of Electro- Communications, Japan); Akashi Satoh (The University of Electro-Communications, Japan)

Side-channel Attack User Reference Architecture board SAKURA-W for was developed to evaluate physical security of IC card equipped with cryptographic function. SAKURA-W works as a daughter board of SAKURA-G and uses hardware resource of SAKURA-G such as a controller FPGA and a USB interface. In this paper, we describe basic functionality of SAKURA-W, and show its advantages over SASEBO-W that is a conventional IC card evaluation board through side-channel attack experiments using AES software on a 8-bit processor IC card ATMega163.

☐ Unequal Security Protection for Secure Multimedia Communication (pp. 570 - 571)

Yiu-Wing Leung and Yuen Tan Hou (Hong Kong Baptist University, Hong Kong)

In some multimedia communication applications for portable devices, the media should be encrypted for confidentiality and privacy. Since portable devices have relatively limited resources, it would be desirable if these resources could be better utilized to give better security protection to the media. In this paper, we study and optimize a new method, called unequal security encryption, which applies multiple encryption methods (with different security strength and processing time) to encrypt different parts of the media (with different importance). This method can provide better security protection subject to the given computing resources for encryption.

☐ FPGA Implementation of Authenticated Encryption Algorithm Minalpher

Makiko Kosugi (University of Electro-Communications, Japan); Masahiro Yasuda (MTM, Japan); Akashi Satoh (The University of Electro-Communications, Japan)

A new authenticated encryption algorithm Minalpher submitted to CAESAR (Competition for Authenticated Encryption: Security, Applicability, and Robustness) was implemented on various FPGA devices with straightforward and pipelined hardware architectures. Then, its performances in operating speed, hardware size, and power consumption were compared with a current standard algorithm AES-GCM to show the advantages of Minalpher in compact and high-speed hardware implementations.

☐ Blockchain Contract: A Complete Consensus Using Blockchain

Hiroki Watanabe, Shigeru Fujimura, Atsushi Nakadaira, Yasuhiko Miyazaki and Akihito Akutsu (NTT, Japan); Junichi Kishigami (Muroran Institute of Technology, Japan)

A proposal is made to use blockchain technology for recording contracts. A new protocol using the technology is described that makes it possible to confirm that contractor consent has been obtained and to archive the contractual document in the blockchain.

[09:30–, R1006] OS-CBS: Recent Advancements in Cyber Security

☐ A Petri Net-based Framework of Intrusion Detection Systems

Zhaolong Gou, Mohd Anuaruddin Bin Ahmadon and Shingo Yamaguchi (Yamaguchi University, Japan); Brij Gupta (National Institute of Technology Kurukshetra, India)

Intrusion Detection Systems (IDSes) are very important for network security. Some IDSes store the models of attackers' behaviors into their database, and compare event traces with the models to identify attacks. IDSes must cope with new attacks. It would increase the number of attack behavior models in the database. In this paper, we propose a Petri net-based framework of IDSes. This consists of two primary functions: detection and updating. In the detection function, we first model an attacker's behavior as a Petri net, and then use the model to detect the attack. In the updating function, we can fuse two or more similar models into one model thanks to Petri net theory. We showed the effectiveness of the framework with an application example.

☐ DDoS Detection and Filtering Technique in Cloud Environment Using GARCH Model

Omkar Badve and Brij Gupta (National Institute of Technology Kurukshetra, India); Shingo Yamaguchi and Zhaolong Gou (Yamaguchi University, Japan)

This paper presents the algorithm which detects and filters the Distributed Denial-of-Service (DDoS) attack traffic in Cloud environment. Presented algorithm uses non-linear time series (GARCH) model to correctly predict the traffic state. Filtering is done with the help of back propagation Artificial Neural Network (ANN) on the traffic which exceeds the certain limit specified by some threshold.

[09:30-, R1007] RUI: User Interfaces & Experience in CE

☐ A Visualization by Innovated Squarified Treemap for Somatosensory Data Analysis

(pp. 587 - 588)

Yen-Jung Lai and Po-Hsun Cheng (National Kaohsiung Normal University, Taiwan);
Chi-Run Rau (Taipei Medical University, Taiwan);
Ling-Wei Lu (National Kaohsiung Normal University, Taiwan)

Enormous information in the Internet, especially in the health care field, makes users cannot get the information they want in time. To let medical staffs, even patients and users, absorb information quickly, data visualization converts information to graphic mode. But some treemap algorithms are not suitable for displaying on certain conditions. This study proposes an improved algorithm, Innovated Squarified Treemap (iSqT), to process the information by data visualization. A comparison shows that our iSqT algorithm is better performance than original Squarified Treemap algorithm. We expect this paper to make the information be read easier by our iSqT approach.

☐ A Study of the Location Search by Use of Relative Position of Landmarks From Spatial Cognition

(pp. 589 - 592)

Takeo Sakairi (Mitsubishi Electric Coorporation & Advanced Technology R&D Center, Japan)

The purpose of this paper is to report on a new location search by Web-GIS. Previous a location search uses keywords that are expressed the location by means of words. However our proposed method uses relative position of landmarks that are imagined the place in our mind. As a result of the experimental by the prototype, we found that the proposed method can search the location by plotting average five landmarks.

☐ Granite-Based Touch-Sensing Floor for Machinery Safety and Exergaming

(pp. 593 - 594)

Hatem Elfekey (German University in Cairo, Egypt); Hany A. Bastawrous (Institute of Superconductor and Electronic Materials, University of Wollongong, Australia)

Touch-sensing floor technologies are attractive due to their use in several applications. Such technologies include infra-red, resistive, capacitive and pressure sensing. Nonetheless, these technologies require special tiles or costly setups. For simplicity and cost effectiveness, we propose a new touch-sensing technology that can use granite as the touch interface. This can be achieved by utilizing the effects of extremely low frequency fields on the human body and the electrical characteristics of the granite. Using the proposed technology, granite floors can be transformed into touch-sensing floors capable of human presence detection in various applications such as machinery safety and exergaming.

☐ Muscle Analysis of Hand and Forearm During Tapping Using Surface Electromyography

(pp. 595 - 598)

Masayuki Yokoyama, Ryohei Koyama and Masao Yanagisawa (Waseda University, Japan)

Surface electromyography (sEMG) is one of the promising sensors to handle biological information especially for user interfaces with low hardware cost. However, sEMG signals are noisy and the sensor position affects to the signal-to-noise ratio (SNR). Assuming sEMG sensors to be inputs of wearable controllers of some devices, we examined the SNR of sEMG signals of a forearm muscle and two hand muscles when tapped on a desk by the index finger.

As a result, the SNR of sEMG signals of hands were higher than the one of the signals of forearms.

☐ Home Appliance Control by a Hand Gesture Recognition Belt in LED Array Lamp Case (pp. 599 - 600)

Chi-Huang Hung and Y. W. Bai (Fu Jen Catholic University, Taiwan);
Hsu Yao Wu (Fu-Jen Catholic University, Taiwan)

in this paper, we design a wearable appliance gesture remote controller that is composed of two parts: a hand gesture recognition belt and a receiver unit. The controller uses both an accelerometer and a gyroscope to discern hand gestures and a Kalman filter to reduce some jitter noise such as an individual's hands that are trembling slightly. The receiver unit can decode the received information and echo the corresponding action. This design incorporates an LED array lamp as the home appliance used to control the on/off function and the dimming function.

[09:30–, R1008] OS-MAT(1): Mobile Application Technology (1)

☐ A Visible Corner-Landmark Based Route Finding Algorithm for Pedestrian Navigation (pp. 601 - 602)

Kengo Takeda (Waseda University, Japan);
Tomoyuki Nitta and Daisuke Shindou (Zenrin DataCom Co., LTD., Japan);
Masao Yanagisawa and Nozomu Togawa (Waseda University, Japan)

Although many GPS-based pedestrian navigations are released, their instructions at decision points are not sufficient. This is mainly due to the lack of landmark informations. They may cause pedestrians to pass decision points or misunderstand when to turn. This paper proposes a visible corner-landmark based route finding algorithm. The proposed algorithm is based on visibility edges for landmarks and can obtain a pedestrian route that has visible landmarks on its corner points. Experiments demonstrate that the proposed algorithm can maximize the visible corner landmarks included in the generated routes.

☐ A Study on Identifying Battery-Draining Android Applications in Screen-Off State (pp. 603 - 604)

Shun Kurihara and Shoki Fukuda (Kogakuin University, Japan); Ayano Koyanagi (Ochanomizu University, Japan); Ayumu Kubota and Akihiro Nakarai (KDDI R&D Laboratories Inc., Japan); Masato Oguchi (Ochanomizu University, Japan); Saneyasu Yamaguchi (Kogakuin University, Japan)

In this paper, we propose a method for identifying applications which largely drain battery in Screen-off state in Android devices. We monitor the wake-up of Android devices and estimate the power consumption of each application with the monitoring results. Our experimental results demonstrate that our method can identify power draining applications effectively.

☐ [Invited] Estimation of Core Temperature Based on a Human Thermal Model Using a Wearable Sensor (pp. 605 - 609)

Akira Uchiyama, Takashi Hamatani and Teruo Higashino (Osaka University, Japan)

In this work, we present a novel approach to estimate core temperature with a wrist-worn sensor and ambient sensors. Our approach estimates core temperature by combining biological and ambient information with a human thermal model which formulates heat production in a

body and heat transfer between human body core, skin, and the environment based on thermal physics. For increasing accuracy, we update individual parameters in the model online by leveraging skin temperature as a reference. From real experiments, we have found a positive result showing that our method improves the accuracy by 12% to the default individual parameter set.

☐ A Study on Coverage Control Algorithm for MANET (pp. 610 - 611)

Young-jun Oh and Kang-whan Lee
(Korea University of Technology and Education, Korea)

Mobile Ad hoc Networks (MANET) is consists of a node that has mobility, MANET builds cluster formation for using energy efficient Coverage Control algorithm. In existing LEACH algorithm, the network elects cluster head node in coverage area by distribution function. However, when the cluster head node, that, elected by distribution function, has divided the coverage area unevenly, the network can't consume energy efficiency. To solve this problem, we proposed CSWC (Coverage Scheduling Weight-value Control) algorithm. As the results, the proposed algorithm is set balance coverage area, the network consumes energy efficiency.

☐ Dumb Design, Dumber Usage of Mobile Database (pp. 612 - 613)

Myungsik Kim and Eunryoung Lim (Hanyang University, Korea);
Seongjin Lee (Hanyang univ, Korea); Youjip Won (Hanyang University, Korea)

In this work, we captured 36 days of I/O trace from NEXUS 5 and analyzed database usage of each application. We found that 70% of synchronous write I/Os are snet_files_info.db, es0.db, and gmail.com.db. There were 1533 records in snet_files_info.db that has to be updated for Google mobile service which creates write amplification of six million. Out of 62 tables in es0.db, only 2 tables were the most frequently used tables, but surprisingly the two tables share almost exact data. mailstore.x@gmail.com.db creates heavy synchronous writes during during checkpoint operation.

☐ Developing an Astronomy Education System in Science Museum Using Push Notifications (pp. 614 - 618)

Chiaki Kudo, Naoki Kohara, Mayu Urata, Mamoru Endo and Takami Yasuda (Nagoya University, Japan); Katsuhiro Mouri (NagoYa City Science Museum, Japan);
Takumi Hamatani (TOPPAN PRINTING Co., LTD., Japan)

Astronomy education needs flexible education programs in accordance with various seasonal phenomena. However, panels or exhibits in science museums are often too static to behave dynamically to serve the purpose. In this paper, we represent a method to accomplish this purpose, and propose an easily updatable mobile guiding system, which provides the push notifications to encourage visitors to approach the exhibits. We had 19 people test the system, and found the notifications had better effect for walking inside the exhibition room.

[10:10-, R1006] RAE: Automotive Entertainment & Information

☐ Steering Wheel-based Adaptive Headlight Controller with Symmetric Angle Sensor Compensator for Functional Safety Requirement (pp. 619 - 620)

Jiae Youn, Meng Di Yin and Jeonghun Cho (Kyungpook National University, Korea);
Daejin Park (Kyungpook National University (KNU), Korea)

Steering angle-based adaptive headlight controller for safe operation in emergency situations

is proposed by adopting the compensation method of the symmetric two angle sensor data. Adding the intelligence in automotive applications results in increased chance of unsafe operations, requiring the integration of additional safety functions. In this paper, we introduce our efforts to integrate the safety observer with the adaptive headlight controller, still providing safe angle control in an abnormal situations by the steering angle. If the symmetric behavior of two angles is broken in the unknown interruption, the backup angles are restored into the active angle control value.

☐ Giving Formal Roles to Elevators for Breaking Symmetry in Static Elevator Operation Problems (pp. 621 - 625)

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

In this paper, we propose a technique to decrease computational times in solving an integer linear programming (ILP) model for the static elevator operation problem. The proposed technique defines the assignment pattern number (APN) for each elevator, which is calculated from a binary vector which represents assignments of passengers to a corresponding elevator. The proposed technique is to add constraints to enforce an elevator with a smaller index to have a smaller APN. The effectiveness of that technique is numerically examined by applying a mathematical solver to ILP equations generated from some problem instances.

[12:30-, R1004] OS-SCC: Smart Cloud Computing

☐ Secure Protocol with Variable Security Level Using Secret Sharing Scheme (pp. 626 - 627)

Shohei Ueno and Atsushi Kanai (Hosei University, Japan); Shigeaki Tanimoto (Chiba Institute of Technology, Japan); Hiroyuki Sato (The University of Tokyo, Japan)

The security level of conventional secure protocols is fixed after security environment negotiation. However, communications differ in confidentiality in accordance with their contents. For this reason, a conventional protocol that always keeps the security level constant throughout the whole session is considered to be more secure than necessary. Since transmission efficiency is generally improved by lowering the security level, transmission efficiency is sacrificed when a conventional secure protocol is used. In this study, the secure protocol that dynamically and optimally changes the security level is proposed to solve this problem.

☐ Dynamic Risk Evaluation Model as a Security Field (pp. 628 - 629)

Shimazu Masahiko and Atsushi Kanai (Hosei University, Japan); Shigeaki Tanimoto (Chiba Institute of Technology, Japan); Hiroyuki Sato (The University of Tokyo, Japan)

Generally, high security information management leads to high confidentiality. However, high confidentiality causes low availability. Therefore, we think availability can be by choosing the appropriate security level depending on the changing risk. Thus, this paper proposes a risk evaluation model, in which risk is quantitatively evaluated using the value of information, protection level, and threat level.

☐ Cost Reduction Effect on Running Costs in ISMS Based on Sensors (pp. 630 - 631)

Shoichi Yoneda, Shigeaki Tanimoto and Michio Shimomura (Chiba Institute of Technology, Japan); Hiroyuki Sato (The University of Tokyo, Japan); Atsushi Kanai (Hosei University, Japan)

The ICT environment has been rapidly developed by cloud computing and has become far more convenient to use. On the other hand, the negative side also exists, such as threats of viruses and unlawful access. Information Security Management System (ISMS) is desired to manage the safe and secure use of the ICT environment at enterprises. However, deployment of ISMS is not sufficient because of its cost. In this paper, we propose use of a sensor as a cost reduction method for ISMS deployment. Concretely, the cost reduction effect of ISMS was clarified by using a sensor.

☐ Flying Cloud Server on Disaster Situation (pp. 632 - 633)

Hiroaki Matsuoka and Toru Kobayashi (Nagasaki University, Japan)

We have developed Flying Cloud Server, which is a drone equipped with a wireless LAN base station and web server. With this device, even in situations in which the electric power infrastructure and/or wireless network have been interrupted due to large-scale disaster, smart phone users will be able to share information and photos of the affected area with others through the Smart Device. Through my research, We have measured the range and connectivity of Flying Cloud Server as and confirmed its effectiveness at sharing information in a disaster setting.

☐ Measurement System for Wearable Devices of Intra-body Communication Using Electro-Optic Technique (pp. 634 - 637)

Daiki Ayuzawa, Yasuaki Takizawa, Sayaka Sugo, Kazuki Matsumoto and Mitsuru Shinagawa (Hosei University, Japan)

This paper describes a measurement system for a wearable device of intra-body communication, in which the human body is used as a transmission medium. An instrument driven by AC power overestimates a voltage signal around the human body received by the wearable device, preventing precise measurements from being performed. We developed a new measurement system using an electro-optic technique to enable precise measurements. The wearable device is electrically isolated from the instrument. The measurement system has a bandwidth from 10 kHz to 20 MHz and a 40-dB signal-to-noise ratio.

☐ Service Oriented Architecture for Global System Wide Information Management (pp. 638 - 639)

Xiaodong Lu and Tadashi Koga (Electronic Navigation Research Institute, Japan)

The System Wide Information Management (SWIM) concept is to change the conventional Air Traffic Management (ATM) information architecture from point-to-point data exchanges to system-wide interoperability. However, how to construct the local and global SWIM by applying Service Oriented Architecture (SOA) and Cloud based technologies is still under discussion. In this paper, the SWIM framework and SOA-based global SWIM construction through an international demonstration are presented.

[12:30-, R1005] RWL: Wireless & RF in CE

☐ A Wireless LAN Device Model for High Fidelity Software Emulation (pp. 640 - 641)

Takaaki Kawai (Shizuoka University, Japan); Shigeru Kaneda (Space-Time Engineering, LLC., USA); Mineo Takai (University of California, Los Angeles & Osaka University, USA); Hiroshi Mineno (Shizuoka University, Japan)

Physical system and simulators are in trade-off relationship as wireless LAN evaluation

environment. Number of physical machines, field limitations, reproducibility of radio propagation and fidelity to physical system are challenging issue. In this paper, we propose a Wireless LAN Device Model for High Fidelity Software Emulation to solve the trade-off relationship. We integrate a simulator and virtual machines to create simulation models which are high fidelity to physical machine. In addition, we implement virtual wireless LAN device in virtual machine to achieve device-level emulation. In evaluation, our method reduced difference of throughput between physical system and simulator down to 43.1%.

☐ Comparative Study of Channel Estimation Methods for LTE Downlink Transmission (pp. 642 - 643)

Shingchern D You and Yu-Sun Liu (National Taipei University of Technology, Taiwan)

This paper studies several channel estimation methods for LTE (Long Term Evolution) receivers in the FDD (Frequency-Division Duplexing) mode. The simulation results show that a 2-D 8-symbol linear estimation is sufficient for simulated channels. Higher complexity methods such as 2-D cubic convolution interpolation and Piecewise Cubic Hermite Interpolating Polynomial (PCHIP) do not significantly outperform the linear interpolation.

☐ Equivalent Output Impedance of a Transmitter-Human Body System as Viewed From a Receiver for Human Body Communication (pp. 644 - 645)

Naruto Arai and Dairoku Muramatsu (The University of Tokyo, Japan); Ken Sasaki (University of Tokyo, Japan)

When a transmitter for human body communication is worn by a human user, this transmitter-human body system can be regarded as a signal source as viewed from a receiver that is in contact with the human body. We need to know this equivalent output impedance to design the front end of a receiver. However, the impedance is dependent on several parameters. Relationships among these parameters and some issues on front end design will be reported.

☐ Highly Reliable Wireless Control System for Tomato Nutriculture (pp. 646 - 647)

Hirofumi Ibayashi, Yukimasa Kaneda, PengKun Li and Hiroshi Mineno (Shizuoka University, Japan)

In the field of horticulture, various environmental control systems have recently been proposed and implemented. Some systems target cultivation of high quality vegetables and require reliable environmental and device control data reception such as nutrient solution control for tomatoes. However, leaves or metal pipes prevent wireless sensor networks (WSNs) from collecting environmental data or controlling devices. Therefore, in this paper, we propose a wireless control system for tomato nutriculture even in severe conditions. Implementing a highly reliable wireless control system using 429MHz band and two channel access mechanisms, we archived wireless communication without packet loss.

☐ Indoor Optical-Wireless Code-Shift-Keying with Two-Stages Demodulation (pp. 648 - 652)

Shota Takayanagi and Hiromasa Habuchi (Ibaraki University, Japan); Yusuke Kozawa (Tokyo University of Science, Japan)

In this paper, the code-shift-keying (CSK) system using the extended pseudo orthogonal M-sequence (EPOM) with two-stages demodulation is considered in optical-wireless channel. EPOM is one of optical pseudo-noise (PN) codes designed by the fusion of two PN codes. This paper compares the CSK system using EPOM with the CSK system using the conventional

optical PN code under the same information transmission efficiency. Consequently, the CSK system using EPOM is superior to the CSK system using the conventional optical PN code.

☐ Development of a Time Synchronization System Based on Visible Light Communication (pp. 653 - 654)

Huai-Kuei Wu and Tzu-Hung Lin (Ling-Tung University, Taiwan)

Accurate time is essential in modern society; hence, the question of how to achieve accurate time synchronization of timekeeping devices at low cost is an important issue. Moreover, accurate time synchronization is required for instruments in factories and laboratories in closed networks to ensure the smooth operation of different processes to further improve the product quality. Using light emitting diodes (LEDs) for indoor lighting to conduct visible light communication, this system enables the broadcast transmission of time-related information to achieve time synchronization of all timekeeping devices.

[12:30-, R1006] RHM: Home Medical & Healthcare

☐ Automatic Detection of ST Depression on ECG (pp. 655 - 657)

Koji Kashihara and Yoshio Kan (The University of Tokushima, Japan)

It is required to find the abnormality of ECG signals at the early stage. The analytical method for ECG signals was proposed to detect the ST depression automatically.

☐ A Smart Pill Box with Remind and Consumption Confirmation Functions (pp. 658 - 659)

Huai-Kuei Wu (Ling-Tung University, Taiwan); Chi-Ming Wong (Jinwen University of Science and Technology, Taiwan); Pang-Hsing Liu, Sheng-Po Peng, Xun-Cong Wang, Chih-Hi Lin and Kuan-Hui Tu (Ling-Tung University, Taiwan)

The natural decline in physical function with aging leads to an increase in incidences of various chronic diseases in elderly; most patients with chronic diseases need to take medications over a prolonged period of time in order to stabilize their conditions. Ensuring that the patients consume the right medication at the appropriate time becomes crucial. This paper proposes a smart pill box equipped with a camera and based on the medicine bag concept. The matrix bar code printed on the medicine bags is used to interact with the pill box in order to perform pill remind and confirm functions.

☐ A Comparison of Python and Java Capabilities on Somatosensory Game for Cloud-based Rehabilitation System (pp. 660 - 661)

I-Ju Cheng, Po-Hsun Cheng, Shih-Yin Tsai, Chen Pin-Hao, Fu-Chien Yang and Ling-Wei Lu (National Kaohsiung Normal University, Taiwan); Chi-Run Rau (Taipei Medical University, Taiwan)

Somatosensory game for rehabilitation system might be a trend. However, the cloud-based rehabilitation systems may be connected by the amount of users. Therefore, the performance and stability are very important. To find out the suitable language to write this system, we chose Java and Python to test which one is better. Further, we write a simulation system and a monitoring system to collect CPU and memory usage. As compared with two languages, the Python server consumes fewer resources than the Java server. Therefore, the computing server is more effective to process the data by Python in our environment.

[12:30-, R1007] OS-ISC: Image Safety & Comfortability in Virtual Reality Space

☐ [Invited] Toward the Detection of the Onset of Virtual Reality Sickness by Autonomic Indices (pp. 662 - 663)

Chizuru Nakagawa (Railway Technical Research Institute, Japan)

We studied the response of autonomic nervous system in 'sickness' induced by visual and motion stimulus, to establish a guideline for designing systems free from the sickness. This paper reports the results of our second basic experiment with four projected screens and a 6-DOF motion base. We identified the characteristic changes in respiration and heart rate related with the sickness again, which we had already found. Furthermore, we found and inspected an interesting index that very low frequency waves (about 0.05-0.2Hz) appear in the ECG baseline and are often observed when the participant of the experiment has fallen into the sickness.

☐ Effects of Visual Induced Motion Sickness of Stereoscopic 3D Interactive Video (pp. 664 - 665)

Naoki Kobayashi and Hiroki Yamazaki (Saitama Medical University, Japan); Yutetsu Momose (Yokosuka General Hospital, Uwamachi, Japan); Masahiro Ishikawa (Saitama Medical University, Japan)

We study the effects of visual induced motion sickness (VIMS) of Stereoscopic 3D interactive video as compared to the 2D condition using a subjective score and bio-signal index. LF/HF ratio from R-R interval from ECG and respiration is used as the bio-signal index. The results show that 3D video yields significantly higher subjective discomfort scores than 2D video. However, the bio-signal index with 3D is not significantly different. Concerning to the relationship between global motion vector (GMV) and body motion, the cross-correlation between GMV-pan and horizontal body motion in 2D interactive condition is higher than that in 3D.

☐ Evaluation of Visual Fatigue While Watching Artificial Three-Dimensional Image with Vertical Parallax (pp. 666 - 667)

Katsuhiro Sasaki, Makoto Yoshizawa, Norihiro Sugita and Makoto Abe (Tohoku University, Japan)

In this study, we evaluated visual fatigue induced by watching an artificial three-dimensional image with vertical parallax. We conducted an experiment in which fifteen subjects completed a task of three-dimensional images with four different angles of vertical parallax, 0.0, 0.4, 0.6, and 0.8 degrees. Visual fatigue was evaluated based on a flicker test and a simulation sickness questionnaire after the task. Experimental results showed that the flicker value decreased mostly after watching the three-dimensional image with the vertical parallactic angle of 0.6 degrees.

☐ 3D Visual Fatigue: Interaction Between Ranges of Binocular Disparity and Interocular Crosstalk (pp. 668 - 669)

Hiroyasu Ujike and Hiroshi Watanabe (National Institute of Advanced Industrial Science and Technology, Japan)

We investigated biomedical effects of stereoscopic 3D (s3D) images on visual fatigue, especially the effects of binocular disparity range and interocular crosstalk. Fifteen observers,

aged from 22 to 59, watched s3D images for approx. 10 minutes performing visual searches of a target moving in depth among 90 distracters. The results showed that for larger crosstalk and larger disparity range, (i) search time was longer, (ii) subjective score of uncomfortability was larger, and (iii) total score of visual fatigue questionnaire was larger. Moreover, the search time and the scores increased more drastically with disparity range when crosstalk is smaller.

☐ Remote Monitoring of Autonomic Nervous System Indices Using Video Cameras

(pp. 670 - 671)

Makoto Yoshizawa (Tohoku University, Japan); Akira Tanaka (Fukushima University, Japan); Norihiro Sugita, Makoto Abe, Noriyasu Homma and Tomoyuki Yambe (Tohoku University, Japan)

A video camera can be used to extract the photoplethysmogram by processing the green component of a video signal (G-signal) of a human body taken with a video camera. This is an affordable, remote and non-contact measurement method to obtain not only heart rate but also blood pressure information. In this study, a tool for obtaining the pulse transit time which correlates with blood pressure has been developed. It is expected that this tool can be used to evaluate plural persons' autonomic function using only one video camera.

[12:30-, R1008] OS-MAT(2): Mobile Application Technology (2)

☐ A Landmark-based Route Recommendation Method for Pedestrian Walking Strategies

(pp. 672 - 673)

Siya Bao (Waseda Unniversity, Japan); Tomoyuki Nitta and Daisuke Shindou (Zenrin DataCom Co., LTD., Japan); Masao Yanagisawa and Nozomu Togawa (Waseda University, Japan)

This paper proposes a landmark-based route recommendation method for enjoyable walking atmosphere strategies by accumulating and analyzing geographical information.We utilize landmark categorization and region clustering to obtain effective elements. Experimental results demonstrate that our proposed method improves walking environment quality and confirms that it is applicable in both urban and rural areas.

☐ Road Information-Sharing System for Bicycle Users Using Smartphones

(pp. 674 - 678)

Jun Iwasaki, Akira Yamamoto and Shigeo Kaneda (Doshisha University, Japan)

Bicycles are valuable for commuting, exercising, and sightseeing. A conventional study proposed methods of obtaining hazard information for bicycle users. However, these systems require a probe bicycle. Thus, this paper proposes a road information-sharing system using a smartphone. Each smartphone detects the road status and bicycle location, and this information is shared by the road-information sharing system. We propose a method of detecting dangerous (poor visibility) intersections and congested road conditions using a decision-tree classifier. Cross-validation analysis showed 82 percent accuracy. Also, a multi-agent simulation model proved that the server application scheme and wireless repeater node scheme are practical.

☐ A Study of Fair Usage Policy Effects on VoIP Quality From Social Networking Applications (pp. 679 - 680)

Apiwan Wiangjan (King Mongkut's University of Technology North Bangkok & Faculty of Information Technology, Thailand); Pongpisit Wuttidittachotti (Faculty of Information Technology, King Mongkut's University of Technology North Bangkok, Thailand); Therdpong Daengsi (Faculty of Information Technology, King Mongkut's University of Technology North Bangkok & JADS Comm Ltd., Thailand)

This paper presents a study of VoIP quality from social networking applications over 3G with Fair Usage Policy (FUP) using stationary tests. It has been found that VoIP quality over 3G with FUP from the same VoIP applications tend to provide lower VoIP quality than using over 3G with Access Unlimited Internet Service (AUIS), particularly Skype provides lower VoIP quality obviously. Also it has been found that over 3G with FUP, LINE tends to provide better VoIP quality than Skype and Tango although there is no significant difference (p-value > 0.05), while OOVOO provides the lowest VoIP quality.

☐ A Study of Distributed Routing Path Using Dynamic Density in Mobile Ad-hoc Networks (pp. 681 - 682)

Dong-keun Oh (The Korea University Of Technology and Education, Korea); Kang-whan Lee (Korea University of Technology and Education, Korea)

Mobile ad hoc routing protocols allow frequently exchanging topology. For reducing overhead by topology, hierarchical network algorithms are researched. When load balancing the object node difficult to send message to cluster head node with over-traffic load. To solve these problems, we proposed Load Tolerance using Density-distribution algorithm. This proposed algorithm, the node measures dynamic density using flow in the coverage. Since then we convert the dynamic density to the sum of distance between the nodes in the cluster. As a simulation results, the packet delivery ratio of the proposed algorithm is higher than other algorithm

☐ Experiments of Position Estimation by BLE Beacons on Actual Situations (pp. 683 - 684)

Tomoya Mori (Nagoya Institute of Technology, Japan)

To obtain an accurate position in a room, we use signal strength of Bluetooth beacons and develop position estimation methods. In our college, we aim to introduce the position estimation system on college. We have installed a number of Bluetooth beacon devices in and around a room and observed RSSI of beacons by portable devices to achieve fundamental knowledge of beacons and estimate their position. In this paper, we take some experiments on different phenomena and with different devices. We confirm that our method can separate completely whether a device is in a room or not.