Computer Organization Laboratory

Toshiaki Miyazaki
Professor

Hiroshi Saito
Senior Associate Professor

Peng Li
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Apidet Booranawong
Visiting Researcher

The following researches are progressed in Computer Organization Laboratory:

Toshiaki Miyazaki: has the following topics:

- *Die-hard sensor network:* A wireless sensor network that has an autonomous function alternation mechanism among sensor nodes as well as ordinary wireless sensor network capabilities such as automatic network establishment. With this mechanism, we can realized self-organized and maintenance-free sensor network systems. Its applications include surveillance of disaster-hit region, and river and forest monitoring. We are developing not only sensor-node hardware but also protocols equipped to the sensor node.

- *Resilient Information Management System (RIM):* The aim of this research project is to realize an information sharing system that should be introduced in disaster-hit area, and works without the Internet. Using RIM, people will be able to share various kinds of information and events happened in the disaster-hit area using their own smartphones/tablets using a locally WiFi network established by the RIM server.

- *Human activity monitoring using passive RFID tags:* The goal of this research is to develop a living activity and health condition monitoring and analyzing system in smart home. This system can identify human activities, such as walking, dining and sleeping, by collecting radio signals reflected by passive RFID tags that are widely attached to household appliances and furniture in smart home, without requiring any special devices worn by human. By using big data technology to extract unique patterns of activities, it can

quickly report emergent events, like sudden illness, elder falling, fire and intruders. By analyzing long-term human-activities, this system can monitor human health condition and discover latent disease. Furthermore, this system can share the identified human activity and associated patterns with other smart devices in smart home, so that they can collaborate to provide a healthy, convenient, energy-efficient and safe living condition.

- *Custom computing:* A research field to realize a dedicated hardware using programmable logic devices such as FPGAs (Field Programmable Gate Arrays) in order to solve a give problem effectively. We focused on realizing a hardware sorter that performs high-speed sorting of huge amount of data.

Hiroshi Saito:
   Our research interests are design automation of asynchronous circuits and applications of sensor networks.

- Asynchronous circuits are circuits where circuit components are controlled by pairs of local handshake signals instead of a global clock signal. Because of the absence of a global clock signal, asynchronous circuits are low power and low electromagnetic interference compared to synchronous counter parts which use global clock signals. We are developing design support environment to implement asynchronous circuits on Application Specific Integrated Circuits (ASICs) and Field Programmable Gate Arrays (FPGAs), developing a transformation tool from a synchronous register transfer level (RTL) model to an asynchronous RTL model, and designing a low power asynchronous processor.

- With the advance of sensors and communication modules, the era of Internet-of-Things (IoTs) is reached. In wireless sensor networks, sensor nodes are required to be driven by a battery. To extend the life time of nodes, it is required to realize low power sensor nodes. Therefore, we develop a low power sensor node to be used in wireless sensor networks. In addition, as an application of sensor networks, we are developing a wild animal detection system based on machine learning.

Peng Li:
   My research interests mainly focus on wireless communication and networking, specifically wireless sensor networks green and energy-efficient mobile networks

Division of Computer Engineering

and cross-layer optimization for wireless networks. I also have interests on cloud computing, big data processing and smart grid. These topics are studied from two aspects. First, new techniques and approaches will be proposed to enhance network system performance. Prototypes are developed to evaluate their feasibility. Second, new algorithms will be designed and evaluated using advanced theoretical methods, like convex optimization, stochastic optimization, game and auction theories.

Refereed academic journal

[hiroshis-201-031-01:2017] M. Imai H. Saito and T. Yoneda. Task Scheduling Based Redundant Task Allocation Method for the Multi-Core Systems with the DTTR Scheme. *IEICE TRANSACTIONS on Fundamentals of Electronics, Communications and Computer Sciences*, Vol.E100-A(No.7):1363–1373, 2017.

In this paper, we propose a redundant task allocation method for multi-core systems based on the Duplication with Temporary Triple-Modular Redundancy and Reconfiguration (DTTR) scheme.

[hiroshis-201-031-02:2017] N. Jindapetch A. Booranawong and H. Saito. A System for Detection and Tracking of Human Movements Using RSSI Signals. *IEEE Sensors Journal*, Volume:18(Issue:6):2531–2544, 2018.

A device-free human detection and tracking system using a received signal strength indicator (RSSI) for an indoor environment is presented in this paper.

[miyazaki-201-031-01:2017] X. He, K. Wang, H. Huang, T. Miyazaki, Y. Wang, and S. Huo. Green Resource Allocation based on Deep Reinforcement Learning in Content-Centric IoT. *IEEE Transactions on Emerging Topics in Computing*, PP(99):DOI:10.1109/TETC.2018.2805718, 2018.

In the era of information, the green services of content-centric IoT are expected to offer users the better satisfaction of Quality of Experience (QoE) than that in a conventional IoT. Nevertheless, the network traffic and new demands from IoT users increase along with the promising of the content-centric computing system. Therefore, the satisfaction of QoE will become the major challenge in the content-centric computing system for IoT users. In this article, to enhance the satisfaction of QoE, we propose QoE models to evaluate the qualities of the IoT concerning both network and users. The value of QoE does not only refer to the network cost, but also the Mean Opinion Score (MOS) of users. Therefore, our models could capture the influence factors from network cost and services for IoT users based on IoT conditions. Specially, we mainly focus on the issues of cache allocation and transmission rate. Under this content-centric IoT, aiming to allocate the cache capacity among content-centric computing nodes and handle the transmission rates under a constrained total network cost and MOS for the whole IoT, we devote our efforts to the following two aspects. First, we formulate the QoE as a green resource allocation problem under the different transmission rate to acquire the best QoE. Then, in the basis

of the node centrality, we will propose a suboptimal dynamic approach, which is suitable for IoT with content delivery frequently. Furthermore, we present a green resource allocation algorithm based on Deep Reinforcement Learning (DRL) to improve accuracy of QoE adaptively. Simulation results reveal that our proposals could achieve high QoE performance for content-centric IoT.

[miyazaki-201-031-02:2017] K. Wang, L. Yuan, T. Mizayaki, D. Zeng, S. Guo, and Y. Sun. Strategic antieavesdropping game for physical layer security in wireless cooperative networks. *IEEE Transactions on Vehicular Technology*, 66(10):9448–9457, 2017.

This paper deals with the secure communication issues of wireless cooperative networks in the presence of multiple friendly but selfish intermediate nodes. On account of the broadcast nature of wireless communications, it is assailable to malicious eavesdropping. To tackle this challenge in the paper, we present a relay and jammer selection strategy that selects the jammer and relay nodes from intermediate nodes to improve the security of the eavesdropping attacks. The jammer is used to broadcast artificial interference noise on the eavesdropper. The relay acts as a traditional relay that retransmits source signal from the source to the intended destination. For achieving the maximum secrecy capacity by the selected nodes, we introduce a power allocation approach of intermediate nodes that is formulated as a Bertrand game based on price competition. We prove that an optimal pricing scheme can maximize the secrecy capacity and achieve the optimal profits for the selfish friendly nodes. Then, a new particle swarm with simulated anneal optimization algorithm is employed to obtain the solution of pricing and node selection. Finally, the simulation results verify our theoretical analysis.

[miyazaki-201-031-03:2017] P. Li, T. Miyazaki, K. Wang, S. Guo, and W. Zhuang. Vehicle-assist resilient information and network system for disaster management. *IEEE Trans. Emerg. Topics Comput.*, 5(3):438–448, 2017.

After big disasters, a damaged area can be out of contact because of severe damage of existing network infrastructures. Meanwhile, high demands for network connections to the disaster area will arise to collect damage information and disseminate rescue instructions. In this paper, we design a vehicle-assist resilient information and network system for disaster management, despite of the Internet unavailability. It contains three main components: (1) smartphone apps that provide functions of SOS reporting, life and medical resources request/provision, and safe road navigation; (2) mobile stations that assist data exchange between smartphone apps and servers; (3) geo-distributed servers

that collect user data, conduct distributed data analysis, and make disaster management decisions. Since the vehicle-assist network is critical to connect isolated smartphones and servers, we continue to study the scheduling problem of mobile stations. Given a number of disaster management tasks, such as sensing, information collection, and message dissemination, we propose online algorithms that schedules mobile stations for disaster management tasks with the objective of maximizing the total weight of finished tasks, without any knowledge of future task arrivals. We derive the competitive ratio of our proposed algorithms and conduct extensive simulations for performance evaluation.

[miyazaki-201-031-04:2017] K. Wang, L. Yuan, T. Mizayaki, Y. Sun, and S. Guo. Anti-eavesdropping with selfish jamming in wireless networks: a bertrand game approach. *IEEE Transactions on Vehicular Technology*, 66(7):6268–6279, 2017.

Wireless communications are vulnerable to eavesdropping attacks due to their broadcast nature. To deal with their emerging challenge of physical layer security, in this paper, we study the antieavesdropping problem in the presence of selfish jammers, who desire to achieve maximum profit for themselves. We consider both the single-channel multijammer (SCMJ) model and the multichannel single-jammer (MCSJ) model. We investigate the interaction between the source that transmits secret information and friendly jammer nodes who assist the source by interfering with the eavesdropper. This problem is formulated as an oligopoly market consisting of a few firms and a buyer. By modeling the problem as a Bertrand game based on price competition, we obtain the optimal pricing scheme for the friendly, while for selfish jammers, the utility of those jammers is maximized. For the SCMJ model, we prove the existence of Bertrand Equilibrium by deriving a closed-form expression for the optimal price strategy. For the MCSJ model, a closed-form expression for power allocation is derived, based on which a new algorithm is designed to obtain the optimal strategy of the jammer. Finally, via simulations, we verify our theoretical analysis

[pengli-201-031-01:2017] Toshiaki Miyazaki Xiaofei Liao Hai Jin Albert Y. Zomaya Kun Wang Peng Li, Song Guo. Traffic-aware Geo-distributed Big Data Analytics with Predictable Job Completion Time. *IEEE Transactions on Parallel and Distributed Systems*, 3(6), June 2017.

In this paper, we study to minimize the inter-DC traffic generated by MapReduce jobs targeting on geo-distributed big data, while providing predicted job

completion time. To achieve this goal, we formulate an optimization problem by jointly considering input data movement and task placement. Furthermore, we guarantee predictable job completion time by applying the chance-constrained optimization technique, such that the MapReduce job can finish within a predefined job completion time with high probability. To evaluate the performance of our proposal, we conduct extensive simulations using real traces generated by a set of queries on Hive. The results show that our proposal can reduce 55 percent inter-DC traffic compared with centralized processing by aggregating all data to a single data center.

[pengli-201-031-02:2017] Kun Wang Song Guo Peng Li, Toshiaki Miyazaki and Weihua Zhuang. Vehicle-Assist Resilient Information and Network System for Disaster Management. *IEEE Transactions on Emerging Topics in Computing*, 5(3), September 2017.

In this paper, we design a vehicle-assist resilient information and network system for disaster management, despite of the Internet unavailability. It contains three main components: (1) smartphone apps that provide functions of SOS reporting, life and medical resources request/provision, and safe road navigation; (2) mobile stations that assist data exchange between smartphone apps and servers; (3) geo-distributed servers that collect user data, conduct distributed data analysis, and make disaster management decisions.

[pengli-201-031-03:2017] Peng Li Huawei Huang, Song Guo and Toshiaki Miyazaki. Stochastic Analysis on the Deactivation-Controlled Epidemic Routing in DTNs with Multiple Sinks. *Ad Hoc and Sensor Wireless Networks*, 38(1), September 2017.

In this paper, instead of relying on such assumption, we jointly consider the deactivation-rate over relay nodes and the number of sinks deployed in the network as the primary tunable system parameters. Our goal is to describe how these two incentive parameters affect the performance of a message delivery procedure in DTNs.

[pengli-201-031-04:2017] Song Guo Alex X Liu Peng Li Xiulong Liu, Keqiu Li and Kun Wang. Top-K Queries for Categorized RFID Systems. *IEEE/ACM Transactions on Networking*, 25(5), October 2017.

For categorized RFID systems, this paper studies the practically important problem of top-k queries, which is to find the top-k smallest and (or) the top-k largest categories, as well as the sizes of such categories. In this paper, we propose a Top-k Query (TKQ) protocol and two supplementary techniques

called segmented perfect hashing (SPH) and switching to framed slotted aloha (STA) for optimizing TKQ.

[pengli-201-031-05:2017] Huining Li Peng Li Deze Zeng Kun Wang, Xiaoxuan Hu and Song Guo. A Survey on Energy Internet Communications for Sustainability. *IEEE Transactions on Sustainable Computing*, 2(3), July 2017.

A Survey on Energy Internet Communications for Sustainability

[pengli-201-031-06:2017] Song Guo Weifa Liang Huawei Huang, Peng Li and Kun Wang. Near-Optimal Deployment of Service Chains by Exploiting Correlations between Network Functions. *IEEE Transactions on Cloud Computing*, 2017.

In this paper, we study the service chain deployment by exploiting two types of correlations between network functions: the Coordination Effect due to information exchanges among multiple VMs running the same network function, and the Traffic-Change Effect where the volume of outgoing traffic is not necessarily equal to the volume of its incoming traffic at each network function because of packet manipulations such as compression and encryption.

[pengli-201-031-07:2017] Peng Li Hai Jin Lin Li Wei Zhang, Xiaofei Liao and Bingbing Zhou. Fine-Grained Scheduling in Cloud Gaming on Heterogeneous CPU-GPU Clusters. *IEEE Network*, 2017.

In this article, we propose a novel cloud gaming design, referred to as FGCG, with fine-grained scheduling to maximize resource utilization on a heterogeneous CPU-GPU cluster. Specifically, we decompose game workloads into small and independent render tasks that can be freely dispatched to different machines.

Refereed proceedings of an academic conference

[miyazaki-201-031-05:2017] A. Ikeda, N. Akiyama, and T. Miyazaki. Formal Verification for Wireless Sensor Network in Consideration of Communication Errors. In *IEEE ICOIN2018*, pages 666–670, Jan. 2018.

Wireless sensor networks (WSNs) consist of many wireless sensor nodes and their behavior is often programmable. However, it is hard to check the correctness of new program for wireless sensor nodes because each node works

autonomously. In this paper, we propose a formal verification framework that can detect not only algorithmic errors but also communication ones, which cannot be handled by previous formal verification approaches for WSNs. Using our environment, the program describing sensor node behavior can be verified before installing it in the sensor node. After describing communication model and system structure, we show how it works using an example.

[miyazaki-201-031-06:2017] Y. Igarashi and T. Miyazaki. A DTN Routing Algorithm Adopting the Community and Centrality Parameters Used in Social Networks. In *IEEE ICOIN2018*, pages 211–216, Jan. 2018.

A delay tolerant network (DTN) realizes a message exchange among mobile terminals without static communication network structures. However, current probability-based DTN routing algorithms do not accurately take into account the selection of messages that should be forwarded to other terminals. This often produces many redundant messages in the field, and causes an overflow in message buffer at each terminal. In this paper, we propose a DTN routing algorithm that controls message forwarding in each terminal using parameters named " Community " and " Centrality. " According to the evaluation considering real situations, our routing algorithm reduces 86redundant messages, compared to the epidemic routing algorithm, without compromising on the quality of the message delivery among the mobile terminals.

[miyazaki-201-031-07:2017] K. Anazawa, T. Miyazaki, P. Li, and X. Wang. Big Data Synchronization among Isolated Data Servers in Disaster. In *IEEE GLOBECOM 2017*, page DOI:10.1109/GLOCOM.2017.8254994, Dec. 2017.

When a large-scale disaster happens, efficient network connection and communication becomes difficult due to serious damage of existing network infrastructures. Meantime, people have strong demands of information sharing with each other for evacuation and disaster-relief activities in such a disaster environment. To serve these heavy communication demands, establishing local area networks (LANs) consisting of portable servers has been considered as one of the most promising solutions. Based on the established LANs, people can share disaster-related information in covered area. However, due to the lack of stable Internet connection, these LANs are isolated and cannot be synchronized in real time. To tackle this problem, in this paper, we propose an intermittent data synchronization scheme by introducing moving vehicles as relays to exchange data between isolated data servers after disasters. With

the objective of maximizing the synchronized weighted data volume under the capability constraints of the mobile relay, we formulate a stochastic programming problem for trajectory planning. We leverage queueing theory and the Lyapunov-drift technique to solve this problem in an online setting, which is practical for a real disaster environment. Our theoretical analysis shows that the performance gap of our proposed online algorithm is O(1/V) of the optimum. Additionally, extensive simulations and comparisons with other algorithms are conducted to show the superior performance of our proposed online algorithm.

[miyazaki-201-031-08:2017] X. Hu, K. Naya, P. Li, T. Miyazaki, and K. Wang. Non-invasive sleep monitoring based on RFID. In *2017 IEEE HEALTHCOM*, page DOI:10.1109/HealthCom.2017.8210832, Oct. 2017.

Some sleep disorders, such as sleep apnea, restless legs syndromes (RLS), and periodic limb movement disorder (PLMD), require a full-night sleep monitoring for diagnosis. Conventional sleep monitoring devices are disturbing and inconvenient for daily scene applications. In this poster paper, we propose a sleep monitoring system by embedding RFID tags into bed cloth and realize two main functions: breath monitoring and body movement detection. We apply a finite impulse response low pass filter to get smooth breath signal wave and use a convolutional neural network (CNN) algorithm to identify the movement of person objects. Finally, we conduct experiments to evaluate the breath monitoring in a real world scenario. The experiment results show that our monitoring system can monitor breath with a high accuracy.

[miyazaki-201-031-09:2017] P. Li, T. Miyazaki, and S. Guo. Traffic-aware Task Placement with Guaranteed Job Completion Time for Geo-distributed Big Data. In *IEEE ICC 2017*, page DOI: 10.1109/ICC.2017.7996541, May 2017.

Big data analysis is usually casted into parallel jobs running on geo-distributed data centers. Different from a single data center, geo-distributed environment imposes big challenges for big data analytics due to the limited network bandwidth between data centers located in different regions. Although research efforts have been devoted to geo-distributed big data, the results are still far from being efficient because of their suboptimal performance or high complexity. In this paper, we propose a traffic-aware task placement to minimize job completion time of big data jobs. We formulate the problem as a non-convex optimization problem and design an algorithm

to solve it with proved performance gap. Finally, extensive simulations are conducted to evaluate the performance of our proposal. The simulation results show that our algorithm can reduce job completion time by 40all data for centralized processing. Meanwhile, it has only 10gap with the optimal solution, but its problem-solving time is extremely small.

[pengli-201-031-08:2017] Peng Li Kazuya Anazawa, Toshiaki Miyazaki and Xiaoyan Wang. Big Data Synchronization among Isolated Data Servers in Disaster. In *IEEE Global Communications Conference (GLOBE-COM)*, 2017.

In this paper, we propose an intermittent data synchronization scheme by introducing moving vehicles as relays to exchange data between isolated data servers after disasters. With the objective of maximizing the synchronized weighted data volume under the capability constraints of the mobile relay, we formulate a stochastic programming problem for trajectory planning.

[pengli-201-031-09:2017] Peng Li Hai Jin Wei Zhang, Xiaofei Liao and Li Lin. ShareRender: Bypassing GPU Virtualization to Enable Fine-grained Resource Sharing for Cloud Gaming. In *ACM Multimedia Conference (MM)*, 2017.

In this paper, we present ShareRender, a cloud gaming sys- tem that o oads graphics workloads within VMs directly to GPUs, bypassing GPU virtualization. For each game running in a VM, ShareRender starts a graphics wrapper to intercept frame rendering requests and assign them to render agents responsible for frame rendering on GPUs. Thanks to the exible workload assignment among multiple render agents, ShareRender enables ne-grained resource sharing at the frame-level to signi cantly improve GPU utilization.

[pengli-201-031-10:2017] Toshiaki Miyazaki Peng Li and Song Guo. Traffic-aware Task Placement with Guaranteed Job Completion Time for Geo-distributed Big Data. In *IEEE International Conference on Communications (ICC)*, 2017.

In this paper, we propose a traffic-aware task placement to minimize job completion time of big data jobs. We formulate the problem as a non-convex optimization problem and design an algorithm to solve it with proved performance gap. Finally, extensive simulations are conducted to evaluate the performance of our proposal.

[pengli-201-031-11:2017] Song Guo Xiaofei Liao Hai Jin Zaiyang Tang, Peng Li

and Daqing Zhang. Selective Traffic Offloading on the Flay: a Machine Learning Approach. In *2017 IEEE 37th International Conference on Distributed Computing Systems (ICDCS)*, 2017.

In this paper, we propose a selective traffic offloading scheme implemented as a smartphone middleware in a software-defined fashion, which consists of a packet classifier and a traffic scheduler. Using a light-weight machine learning approach exploiting unique smartphone context information, the packet classifier identifies packets generated on the fly as offloadable or not with substantially improved efficiency and feasibility on resource limited smartphones compared to traditional approaches.

[pengli-201-031-12:2017] Peng Li Yu Gu Xiaoyan Wang, Masahiro Umehira and Yusheng Ji. Fine-grained Incentive Mechanism for Sensing Augmented Spectrum Database. In *IEEE Global Communications Conference (GLOBECOM)*, 2017.

In this paper, we propose a novel fine-grained incentive mechanism for sensing augmented spectrum database. We first present a reverse auction framework, which minimizes the operator's total expenditure subject to the quality requirement of each spot that needs to be augmented. Then we propose a practical incentive mechanism to solve the auction problem, which is proven to be truthful, individual rational and computationally efficient.

[pengli-201-031-13:2017] Lin Gu Peng Li Deze Zeng, Jie Zhang and Hong Yao. Minimize Coflow Completion Time via Joint Optimization of Flow Scheduling and Processor Placement. In *IEEE Global Communications Conference (GLOBECOM)*, 2017.

In this paper, we are motivated to investigate the problem of coflow completion time minimization with joint consideration of coflow scheduling and data processor placement. We first formally describe the problem into a mixed integer non-linear programming (MINLP) problem.

Unrefeered proceedings of an academic conference

[miyazaki-201-031-10:2017] T. Miyazaki. RIM: Resilient Information Management System in Network-Isolated Environment after Disaster. In *ICT Disaster Response Conference*, volume Invited Talk, Cebu, Philippines, Sept. 2017.

Summary of Achievement

[miyazaki-201-031-11:2017] T. Miyazaki. Management of Big Data and Information in Disaster Scene (Invited Talk). In *IEICE SIG of Services Computing SC2017-5*, volume 117, pages 21–26, June 2017.

[miyazaki-201-031-12:2017] N. Kagome and T. Miyazaki. An Approach to Bedtime Breath Monitoring Using Passive RFIDs. In *IPSJ 80th National Convention*, volume 2V-07, March 2018.

[miyazaki-201-031-13:2017] S. Adachi and T. Miyazaki. Distributed Database System Using In-Memory Data Compression for a Large-Scale Sensor Network. In *IPSJ 80th National Convention*, volume 4L-01, March 2018.

The student encouragement award

[miyazaki-201-031-14:2017] Y. Maruyama and K. Anazawa T. Miyazaki. Localization of Smartphones and Its Visualization for Seeking Victims. In *IPSJ 80th National Convention*, volume 5S-01, March 2017.

[miyazaki-201-031-15:2017] Y. Igarashi and T. Miyazaki. DTN Routing Algorithm Performing Effective Message Transfer Using Social Network Parameters. In *IPSJ 80th National Convention*, volume 6V-09, March 2017.

[miyazaki-201-031-16:2017] N. Akiyama, A. Ikeda, and T. Miyazaki. An Approach to Formal Verification for Wireless Sensor Network Behavior Specified Using C Language. In *IPSJ 80th National Convention*, volume 7S-01, March 2017.

The student encouragement award

[miyazaki-201-031-17:2017] N. Yasuta and T. Miyazaki. A Hardware Sorter Using 2-port Memory and Parallel Processing. In *IPSJ 80th National Convention*, volume 7S-01, March 2017.

[miyazaki-201-031-18:2017] Y. Maruyama, K. Anazawa, and T. Miyazaki. Mobile Terminal Finder for Seeking Victims in Disaster Environment. In *IEEE student session in 2017 Tohoku-Section Joint Convention of Institutes of Electrical and Information Engineers, Japan*, volume 2B01, Aug. 2017.

Student Awards: The encouragement prize

[miyazaki-201-031-19:2017] Y. Igarashi and T. Miyazaki. DTN Routing Algorithm Using Social Network Parameters. In *IEEE student session in 2017*

Tohoku-Section Joint Convention of Institutes of Electrical and Information Engineers, Japan, volume 2B03, Aug. 2017.

[miyazaki-201-031-20:2017] Q. Zang, X. Luo, P. Li, and T. Miyazaki. Indoor Living Activity Identification using RFID. In *IEEE student session in 2017 Tohoku-Section Joint Convention of Institutes of Electrical and Information Engineers, Japan*, volume 2B20, Aug. 2017.

Research grants from scientific research funds and public organizations

[hiroshis-201-031-03:2017] H. Saito. Grant-in-Aid for Scientific Research (C), 2015-2017.

[miyazaki-201-031-21:2017] T. Miyazaki. Ministry of Education Scientific Research Fund, 2015-2017.

[miyazaki-201-031-22:2017] T. Miyazaki. Strategic Information and Communications R&D Promotion Programme (SCOPE), 2016–2018.

[miyazaki-201-031-23:2017] T. Miyazaki. Cross-ministerial Strategic Innovation Promotion Program (SIP), 2014–2018.

Academic society activities

[hiroshis-201-031-04:2017] H. Saito, 2017.

Steering Committee of IPSJ-SLDM

[hiroshis-201-031-05:2017] H. Saito, May 2017.

Technical Program Committee of ASYNC 2017

[hiroshis-201-031-06:2017] H. Saito, Sept. 2017.

Publicity Co-chair of MCSoC 2017

[hiroshis-201-031-07:2017] H. Saito, Sept. 2017.

Technical Program Committee of MCSoC 2017

Summary of Achievement

[hiroshis-201-031-08:2017] H. Saito, Sept. 2017.

Technical Committee of FDL 2017

[hiroshis-201-031-09:2017] H. Saito, Mar. 2017.

Technical Committee of SASIMI 2017

[miyazaki-201-031-24:2017] T. Miyazaki, 2016 – present.

Steering Committee Member, IEICE Technical Group for Function Integrated Information System (FIIS)

[miyazaki-201-031-25:2017] T. Miyazaki, 2017.

Steering Committee Member, MCSoC-17 (IEEE 11th International Symposium on Embedded Multicore Systems-on-Chip), Seoul Korea

[miyazaki-201-031-26:2017] T. Miyazaki, 2014 – present.

IEICE Senior Member

[miyazaki-201-031-27:2017] T. Miyazaki, 2014 – present.

IPSJ Senior Member

[miyazaki-201-031-28:2017] T. Miyazaki, 2012 – present.

IEEE Senior Member

Advisor for undergraduate research and graduate research

[hiroshis-201-031-10:2017] T. Urakawa. HOG Feature-based Human Detection using Raspberry Pi and FPGA, University of Aizu, 2017.

Master thesis

[hiroshis-201-031-11:2017] J. Furushima. Design of Low Power Asynchronous MIPS Processors on FPGA, University of Aizu, 2017.

Master thesis

[hiroshis-201-031-12:2017] K. Yoshimi. Design and Evaluation of Asynchronous Circuits with Bundled-data Implementation for ASIC Implementation, University of Aizu, 2017.

Master thesis

[hiroshis-201-031-13:2017] R. Hiramoto. A Detection System for Bears using Raspberry Pi and Convolutional Neural Network, University of Aizu, 2017.

Graduation research

[hiroshis-201-031-14:2017] T. Kudo. Evaluation of Asynchronous Pipelined Controllers using FPGAs, University of Aizu, 2017.

Graduation research

[hiroshis-201-031-15:2017] S. Kunii. Implementation of a Reliable Multi-core System based on the DTTR Scheme on FPGA, University of Aizu, 2017.

Graduation research

[miyazaki-201-031-29:2017] Kagome Naya. Graduation Thesis: Non-contact Bedtime Breath Monitoring Using Passive RFID, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

[miyazaki-201-031-30:2017] Yasuyuki Maruyama. Graduation Thesis: Smartphone Finder for Seeking Victims in Disaster Environment, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

[miyazaki-201-031-31:2017] Shohei Hasegawa. Graduation Thesis: Data Compression Using Huffman Coding for Distributed Key-Value Database System Used in Large-Scale Sensor Network, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

[miyazaki-201-031-32:2017] Shimpei Abe. Graduation Thesis: Detecting Direction of an Object Using Passive RFIDs, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

[miyazaki-201-031-33:2017] Naoki Yasuta. Graduation Thesis: A High-Performance Scalable Data Sorting Hardware, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

[miyazaki-201-031-34:2017] Kazuya Anazawa. Master Thesis: Data Synchronization Method among Data Servers Using Mobile Relays in Network Isolated Environment after Disasters, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

Summary of Achievement

[miyazaki-201-031-35:2017] Naoki Akiyama. Master Thesis: Formal Verification Environment Dedicated to Verifying Wireless Sensor Network Behaviors, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

[miyazaki-201-031-36:2017] Seiichi Adachi. Master Thesis: Effective Sensor Data Management and Time-Space Search Using Scalable Distributed Database System, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

[miyazaki-201-031-37:2017] Yusuke Igarashi. Master Thesis: Social-Network Based Approach to Routing Algorithm for Delay Tolerant Networks, University of Aizu, 2017.

Thesis Advisor: T. Miyazaki

Advisor of a student club or circle

[hiroshis-201-031-16:2017] Triathlon Club

Other significant contribution toward university planning, management, or administration

[hiroshis-201-031-17:2017] Member of Academic Affair Committee in the Undergraduate School

[hiroshis-201-031-18:2017] Member of Curriculum Working Group

Did you participate in Public Lectures, and/or Open Campus? (Yes or No) If yes, please describe what you did.

[hiroshis-201-031-19:2017] Joining open campus on August and October

Research achievement that can be used for University-Industry collaboration and its characteristics.(for UBIC's information)

[hiroshis-201-031-20:2017] Electronic design automation tools for asynchronous circuits

[hiroshis-201-031-21:2017] Electronic design automation tools for reliable multi-core systems

[hiroshis-201-031-22:2017] A support system for snow removal using Arduino and sensor network