IoT-SNAP

Tuesday, 20 April

[IoT-SNAP-1] 15:30-17:10
IoT-SNAP Plenay
Chairs: Ronald Freund
Fraunhofer Heinrich Hertz Institute
Norihiro Hagita
ATR Intelligent Robotics and Communicatuon Laboratories

IoT-SNAP-Opening 15:30

Opening Remarks

IoT-SNAP-1-01 15:40 ***Keynote***

Forefront of Quantum Computing
Kohei Itoh
Keio University
Recent advancement in quantum computing is introduced. The first half of the talk encompasses the status of hardware developments such as superconducting qubits, ion trap qubits, silicon qubits, and photon qubits. The second half of the talk introduces the status of algorithm and software research at IBM Q Network Hub @ Keio University. Here both academic and industrial contributions of quantum computing research are highlighted.

IoT-SNAP-1-02 16:25 ***Keynote***

Communication by Light - Solutions for future IoT
Dominic Schulz
Heinrich Hertz Institute (HHI)
Optical wireless communication, also denoted as LiFi, is the communication by light and represents an alternative to radio frequencies for wireless transmission. With the properties of light, gigabit per second data rates, mobility support and low latencies, LiFi is a promising technology to serve the demanding requirements of future IoT applications. In this talk our current work of LiFi for various use cases is presented and the benefits for the IoT are highlighted.

Wednesday, 21 April

[IoT-SNAP-2] 10:00-11:30
Network
Chairs: Ved P Kafle
National Institute of Information and Communications Technology
Koji Sato
Mitsubishi Electric Corporation

IoT-SNAP-2-01 10:00 ***Invited***

The trend of Automotive Optical Ethernet: Technology and Standardization
Manabu Kagami
Nagoya Institute of Technology
This paper introduces the technical overview of the Automotive Optical Ethernet standard and the status of standardization in IEEE, ISO, and IEC.

IoT-SNAP-2-02 10:30 ***Invited***

Approaches to 5G Commercialization and Prospects for 6G
Yoshihisa Kishiyama
NTT DOCOMO, INC.
Commercial 5G services have already been launched around the world, and there is a growing interest in considering 6G and wireless technologies in the 2030s. In this presentation, we describe NTT DOCOMO's R & D efforts toward 5G, its worldview toward 6G, and wireless technology.

IoT-SNAP-2-03 11:00

Evaluation of Transmission Characteristics of Analog Radio over Plastic Optical Fiber with C-RAN Mobile Fronthaul System
Hiroki Yasuda[1,2], Hsuan Yun Kao[3], Toshinori Suzuki[1], Shota Ishimura[3], Kazuki Tanaka[3,2], Takamitsu Aiba[1], Tomohiro Wakabayashi[1], Tetsuya Kawanishi[2]
[1]Yazaki Corporation, [2]Waseda University, [3]KDDI Research, Inc.
We evaluate transmission characteristics of analog radio over plastic optical fiber with 28-GHz and 400-MHz bandwidth radio frequency signals when it is adapted to C-RAN mobile fronthaul system.

IoT-SNAP-2-04 11:15

Concept of Integrated Radar and Communication Transceiver
Atsushi Kanno
National Institute of Information and Communications Technology
The co-existence of the communication and ranging signal in a packet is proposed using a versatile transceiver configuration. The methods and feasibility for ranging are also discussed.

[IoT-SNAP-3] 11:30-11:36
IoT-SNAP Poster short talk
Chairs: Ved P Kafle
National Institute of Information and Communications Technology
Koji Sato
Mitsubishi Electric Corporation

IoT-SNAP-3-01 11:30

Basic Study of Pseudo Random Readout Profile Sensor for Compressed Sensing
Keisuke Uchida[1], Munenori Takumi[1,2], Katsuhiro Ishii[2], Ken-ichi Kitayama[2]
[1]Hamamatsu Photonics K.K., [2]The Graduate School for the Creation of New Photonics Industries
We proposed a pseudo random readout profile sensor for compressed sensing without optical modulators and demonstrated the proof-of-concept via numerical simulation.

IoT-SNAP-3-02 11:33

Defect detection method for clutch disk inspection using AI
Motoki Okazaki, Ryouhei Hanayama
The Graduate School for the Creation of New Photonics Industries
We propose a defect detection method for clutch disk using AI. It can be utilize to detect defects, which cannot be detected by conventional methods.

[IoT-SNAP-4] 15:30-17:15
AI
Chairs: Takahiro Ishii
Fujikura Ltd.
Akira Yamada
DOCOMO R&D Center

IoT-SNAP-4-01 15:30 ***Invited***

Visual Explanation of Deep Learning using Attention Branch Network
Hironobu Fujiyoshi
Chubu University
In this talk, we introduce Attention Branch Network (ABN), which outputs attention, an area that deep learning focuses on when determining inferential results. ABN is a deep learning network that can contribute to improving recognition performance while acquiring the attention mechanism. This technology holds great promise as an approach for interpreting the basis for decisions output by an AI system.

IoT-SNAP-4-02 16:00 ***Invited***

Multi-modal based conversational AI empowered by GPU
Xianchao Wu
NVIDIA
The talk covers speech recognition, natural language understanding and text-to-speech for end-to-end building multilingual conversational AI. Empowered by NVIDIA's NeMo, Megatron-BERT/GPT2 in model-parallel of 512+ GPUs and Triton inference server open-source solutions, we could build low latency real-time voice-to-voice chatbots for a list of languages to connect people with real-world services.

IoT-SNAP-4-03 16:30

Improving CNN-based Tracking Method for Visual Feedback System to Perform Online Tracking at 300fps
Chanrathnak Borann, Masaki Yamashita, Hiromasa Oku
Gunma University
In this research, we employed a state-of-the-art CNN-based GOTURN tracker by fine-tuning the network and incorporating it into an auto pan/tilt camera. The proposed method enabled a visual feedback system to perform online tracking at a speed exceeding 300 [fps].

IoT-SNAP-4-04 16:45

Multilayer dielectric mirror designing for high-power laser handling phase-only spatial light modulator
Tsubasa Watanabe, Yasushi Ohbayashi, Yu Takiguchi, Hiroshi Tanaka, Haruyoshi Toyoda
Hamamatsu Photonics K.K.
We report new designing of multilayer dielectric mirror deposited inside a phase-only spatial light modulator to avoid the damage by high power laser irradiation.

IoT-SNAP-4-05 17:00

24-hour activity quantification of stroke rehabilitation inpatients with an IoT wearable sensor network system
Takayuki Ogasawara[1], Masahiko Mukaino[2], Kenichi Matsunaga[1], Yohei Otaka[2], Hiroyoshi Togo[1], Masumi Yamaguchi[1], Hiroshi Nakashima[1], Shingo Tsukada[1], Eiichi Saitoh[2]
[1]NTT Corporation, [2]Fujita Health University
To quantify the 24-hour activity of stroke inpatients, we have developed a wearable system composed of smart clothing, networking devices, and a server.

IoT-SNAP

Thursday, 22 April

[IoT-SNAP-5] 10:00-11:45
Applications and use cases
Chairs: Takayuki Ogasawara
NTT Device Innovation Center
Yasuhisa Inada
Panasonic Corporation

IoT-SNAP-5-04 10:00 ***Invited***

Digital Transformation in Yamaha Motor
Norio Yamada
Yamaha Motor Co., Ltd.
Yamaha Motor has set up "Yamaha Motor to the Next Stage" as Digital Transformation in order to utilize the latest digital technology and data toward the realization of a long-term vision. And implementing three DX initiatives at the same time with linking each other. The outline of those activities will be introduced in this session.

IoT-SNAP-5-05 10:30 ***Invited***

Precision Agriculture with Remote Sensing
Kazuo Oki
Kyoto University of Advanced Science
Agricultural monitoring with remote sensing imagery can provide information on crop growth, which can be used for the agricultural management of a large agricultural area. Moreover, by obtaining information on crop coverage, crop production can be reliably predicted. For these reasons, the use of remote sensing technology to manage agricultural land has been increasing. Here, I introduce some new remote sensing methods for precision agriculture.

IoT-SNAP-5-06 11:00

A proposal on the access control mechanism for real time IoT services using ICN technology
Atsuko Yokotani[1], Hiroshi Mineno[1], Tetsuya Yokotani[2]
[1]Shizuoka University, [2]Kanazawa Institute of Technology
In this study, a mechanism is proposed for IoT services to avoid DDoS attacks using the demand assignment approach in ICN technology.

IoT-SNAP-5-07 11:15 ***Invited***

Environment monitoring using existing optical cables
Yukihide Yoda, Yoshiaki Aono, Koyo Mori
NEC
We propose using existing optical cables for distributed fiber optic sensing. It is enable to senses the world and give society new value such as providing efficient safety by monitoring infrastructure.

[IoT-SNAP-6] 13:30-15:10
Sensing
Chairs: Hiromasa Oku
Gunma University
Haruyoshi Toyoda
Hamamatsu Photonics K.K.

IoT-SNAP-6-01 13:30 ***Invited***

Remote sensing technology for agricultural field information using drone imagery
Ryo Sugiura
National Agriculture and Food Research Organization (NARO)
Aerial imaging using drones demonstrates significant potential for crop growth monitoring in large agricultural fields. Drone imagery provides sufficient details to view the crop status and even individual plants in a field. In this study, several image processing methods were developed to measure crop growth and detect crop diseases.

IoT-SNAP-6-02 14:00

Possible design of Rotman-lens antenna array for 90-GHz-band foreign object debris detection system
Atsushi Kanno, Naokatsu Yamamoto
National Institute of Information and Communications Technology
We review the Rotman-lens antenna array for rotation-less radar head. The comparable footprint can be realized by vertically stack configuration of antenna units.

IoT-SNAP-6-03 14:15 ***Invited***

Optical Sensing for Cyber Physical System at Sensing System Research Center of AIST
Makoto Fujimaki
AIST
The development of the IoT society requires the development of high-performance sensing systems to collect various meaningful information. In response to such demands, AIST launched the Sensing System Research Center (SSRC) in April 2019. SSRC is developing sensors based on optical, MEMS, and electronical technologies. In this talk, I will introduce optical sensing technologies that SSRC has been developing.

IoT-SNAP-6-04 14:45

Monitoring of skin volatiles using gas-phase biosensor for the non-invasive evaluation of volatile blood compounds
Takahiro Arakawa, Takuma Suzuki, Kenta Iitani, Koji Toma, Kohji Mitsubayashi
Tokyo Medical and Dental University
A highly sensitive and selective biochemical gas sensor (optical fiber-based biosensor) and real-time monitoring system with skin gas cell were constructed for the determination of ethanol gas concentration on human skin.

IoT-SNAP-Closing 15:00

Closing Remarks

Poster

[IoT-SNAP-P]
IoT-SNAP Poster Session

IoT-SNAP-P-01

Basic Study of Pseudo Random Readout Profile Sensor for Compressed Sensing
Keisuke Uchida[1], Munenori Takumi[1,2], Katsuhiro Ishii[2], Ken-ichi Kitayama[2]
[1]Hamamatsu Photonics K.K., [2]The Graduate School for the Creation of New Photonics Industries
We proposed a pseudo random readout profile sensor for compressed sensing without optical modulators and demonstrated the proof-of-concept via numerical simulation.

IoT-SNAP-P-02

Defect detection method for clutch disk inspection using AI
Motoki Okazaki, Ryouhei Hanayama
The Graduate School for the Creation of New Photonics Industries
We propose a defect detection method for clutch disk using AI. It can be utilize to detect defects, which cannot be detected by conventional methods.