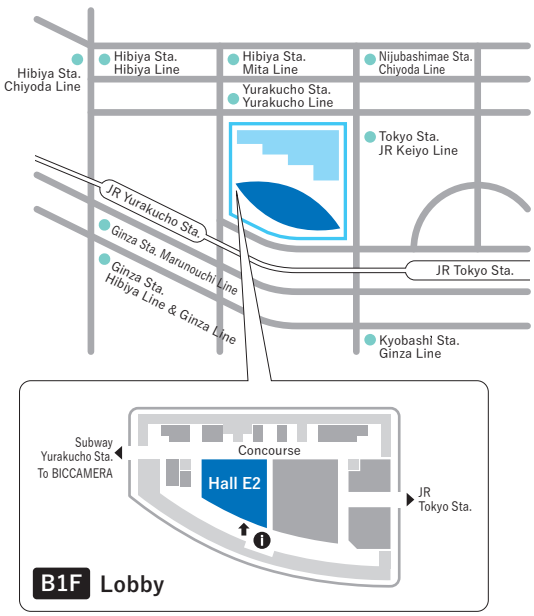
ACCESS

Tokyo International Forum
B2F (Hall E2)

3-5-1 Marunouchi, Chiyoda-ku, Tokyo, Japan
Tel: +81-3-5221-9000



From Narita Airport
80-90 minutes to Tokyo Station by Limousine Bus
53 minutes to Tokyo Station by JR Narita Express

JR
5-minute walk from Tokyo Station (connected by B1 concourse with Keiyo Line at Tokyo Station)
1-minute walk from Yurakucho Station

Subway
1-minute walk from Yurakucho Station (connected by B1 concourse)

From Haneda Airport
23 minutes to Hamamatsucho Station by Monorail
4 minutes from JR Hamamatsucho Station to Yurakucho Station

Organized by

Keio Leading-edge Laboratory of Science and Technology (KLL)

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Tel: +81-45-566-1794 Fax: +81-45-566-1436
E-mail: ktm@kll.keio.ac.jp

Supported by Nikkan Kogyo Shimbun Ltd.

www.kll.keio.ac.jp/ktm/

20th Annual
Keio Science and
Technology Exhibition

20th Anniversary

KEIO TECHNO MALL 2019

Beyond imagination
– March towards the future

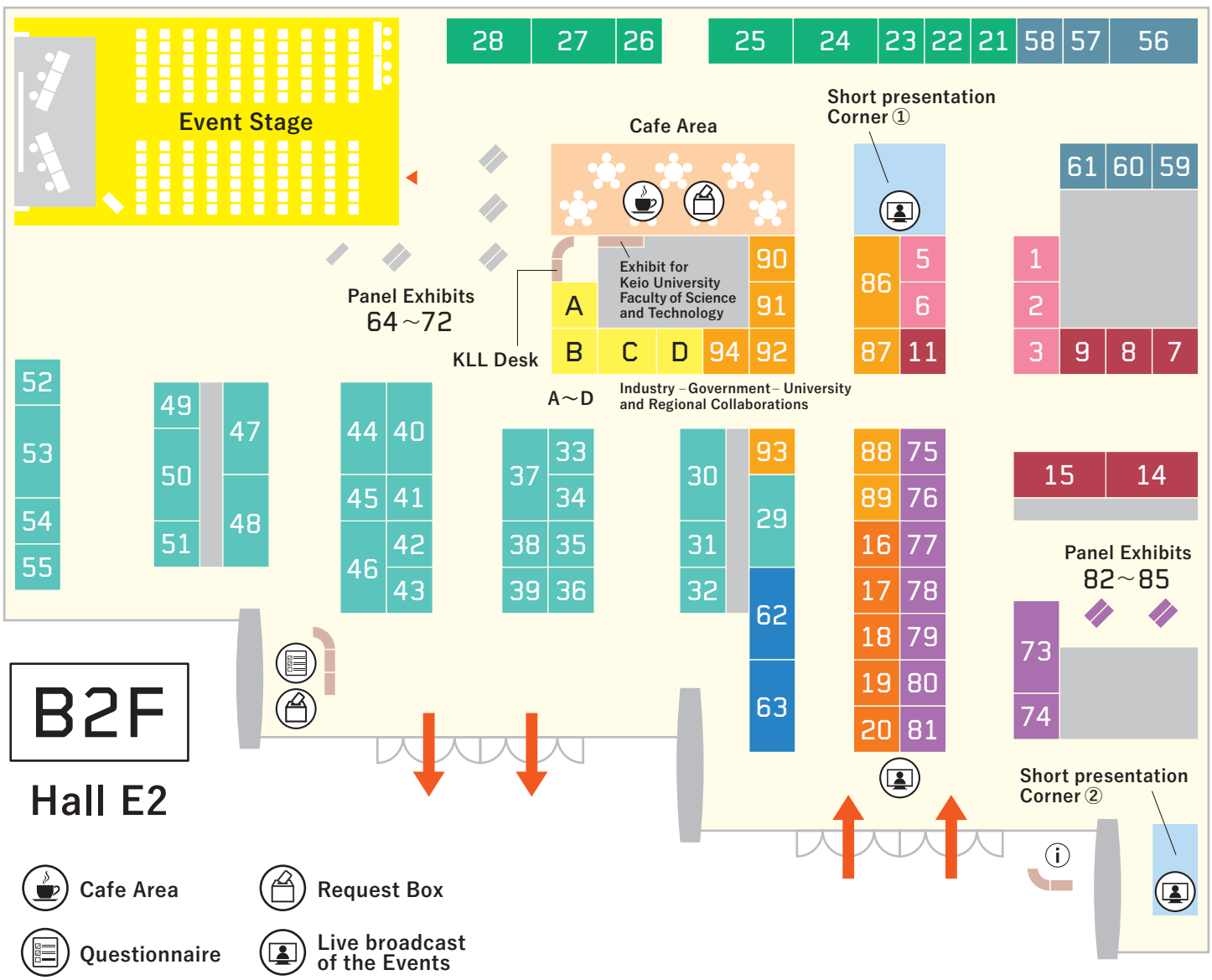
12.13 [FRI]
10:00-18:00

Admission Free

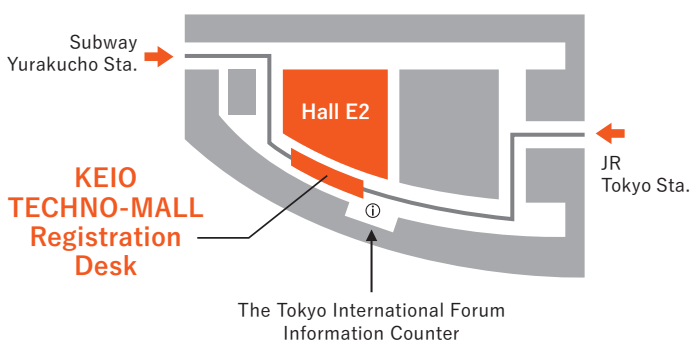
Tokyo International Forum B2F (Hall E2)

For the floor map,
please refer to the facing page at the beginning.

Floor Map



B1F Lobby



- Biomedical
- Materials
- Electronics
- Society & Environment
- Information and Communication
- Mechanics
- Other Fields
- Group Exhibition Zone: Chemistry and Biology
- Venture Zones

KEIO TECHNO-MALL
provides four platforms

Encounters with researchers and subjects of research 1

You can be sure of unexpected encounters and first-hand information otherwise unattainable on the internet.
More than just topics related directly to your own products or business, perhaps, you will find subjects of research with prospects for new business expansion.

Expanded scope and greater flexibility 2

By learning about the actual research at exhibition booths, talking directly with the researchers and feeling actual objects, you will be able to get a real feeling for the expanse of possibilities. Also, with regard to collaboration with universities, Keio Leading-edge Laboratory of Science and Technology (KLL) will respond flexibly to requests for advice about procedures and contractual aspects.

Publicizing of research results 3

With the KEIO TECHNO-MALL being a venue for the objective and academic publication of research results, you can demonstrate the outcomes of industry-academia collaboration, and you can utilize it for business expansion.

Search for product / technology possibilities 4

Proposals for the utilization of your products and technologies in helping research are also very welcome.
The KEIO TECHNO-MALL provides a platform for linking to the development of new products and technologies amid the flow of people, objects, funds and information.

KEIO TECHNO MALL 2019

Program of Events
Outline of Exhibits

Event Information

Venue Event Stage

Symposium Session Ⅰ

10:30-11:10

Blockchain's current status quo and its future

Discussion about Blockchain's current status quo and future from financial application perspectives.

Facilitator:
OKUMA, Masahito
Member of Board Directors,
Digital Garage, Inc.

TAKANASHI, Yuta
Deputy Director for International Affairs,
Financial Services Agency, Government of Japan

KAWADA, Yuji
Senior Researcher,
Mitsubishi Research Institute, Inc.

WATANABE, Taro
DG Lab CTO (Blockchain),
Digital Garage, Inc.

Symposium Session Ⅱ

11:30-12:30

So much fun with quantum computing

Keio University is leading quantum software development research utilizing world best quantum computer IBM-Q. This panel introduces its excitement, results and future applications including financial technology.

ITOH, Kohei
Professor,
Dept. of Applied Physics and Physico-informatics,
Faculty of Science and Technology

AMANO, Hideharu
Professor,
Dept. of Information and Computer Science,
Faculty of Science and Technology

HIBIKI, Norio
Professor,
Dept. of Administration Engineering,
Faculty of Science and Technology

Chairperson:
YAMANAKA, Naoaki
Professor,
Dept. of Information and Computer Science,
Faculty of Science and Technology

Event Information

Venue Event Stage

Symposium Session Ⅲ

13:30-15:00

IoT health life research in a super-aging society

In the 21st century super aging society, support for health promotion and healthy longevity is essential. IoT Health Life Research integrates the expertise and technology of researchers from a wide range of academic fields, and develops technologies such as health maintenance and management, detection of signs of non-disease to illness, and so on.

NISHIKAWA, Kazumi
Director,
Healthcare Industries Division, Ministry of Economy, Trade and Industry

FUKUDA, Takeshi
Director of IBM Research-Tokyo
IBM Japan, Ltd.

KISHIMOTO, Taishiro
Assistant Professor,
Dept. of Neuropsychiatry,
Keio University School of Medicine

MITSUKURA, Yasue
Professor,
Dept. of System Design Engineering,
Faculty of Science and Technology

Facilitator:
YASUI, Masato
Professor,
Dept. of Pharmacology,
Keio University School of Medicine
Director, KGRI

Special Speech

16:00-17:00

Life science innovation based on the integration of medicine and technology in Japan

— Regulation reforms with respect to R&D and commercialization —

Integration of medicine and technology has been greatly expected to promote the life science innovation which contributes to better quality of medicine and care, consequently leading the economic growth and fiscal reconstruction. It is important for successful commercialization to develop proper strategies with reference to recent regulation reforms.

FURUKAWA, Toshiharu
MD, MBA, PhD
Member of House of Councillors
Professor, Keio University Law School
Attorney-at-law, TMI Associates

Chairperson:
MITSUKURA, Yasue
Professor,
Dept. of System Design Engineering,
Faculty of Science and Technology

For Event Schedules, please refer to the end.

*Please note that content, etc. of events are subject to change due to unavoidable circumstances on the day of the exhibit.

Outline of Exhibits

☐ Notice
Booth 4, 10, 12 and 13 have been canceled.

☐ Special symbols used in the following exhibition descriptions

Keio Patent — Technology involving patent rights held by Keio University. For further information, please inquire at the KLL Desk.

Short Presentation — Short Presentations; See last page for the timetable.

Biomedical

Biomedical | Medical / Welfare

BOOTH 1

Simple detection of sleep apnea syndrome by contactless measurement!

Keio Patent

Professor **MITSUKURA, Yasue**
Department of System Design Engineering
Professor **YASUI, Masato**
Department of Pharmacology, Keio University School of Medicine
Professor **FUKUNAGA, Koichi**
Department of Pulmonary Medicine, Keio University School of Medicine

In this study, we propose a non-contact method to easily detect sleep apnea syndrome.

Biomedical | Medical / Welfare

BOOTH 2

Heart Rate Detection by Contactless

Keio Patent

Professor **MITSUKURA, Yasue**
Department of System Design Engineering

In this study, we introduce how to measure the heart rate by contactless.

Biomedical | Medical / Welfare

BOOTH 3

Development of techniques for quantifying various symptoms of mental disease

Keio Patent

Professor **SAKAKIBARA, Yasubumi**
Department of Biosciences and Informatics
Professor **MITSUKURA, Yasue**
Department of System Design Engineering
Assistant Professor **KISHIMOTO, Taishiro**
Department of Neuropsychiatry, Keio University School of Medicine

In this study, biosignals were used to evaluate mental disease. It aims to make a simple biomarker by quantitatively evaluation (for example, signals of voice, brain waves, facial expressions, etc.).

Biomedical | Medical / Welfare

BOOTH 5

Total Health Care

Keio Patent

Professor **OTSUKI, Tomoaki**
Department of Information and Computer Science

We are working on the development of various technologies to realize total health care including monitoring and understanding of mental illness. We will introduce technologies for detecting biosignals such as respiration and heart beats using non-contact devices, for detecting abnormalities such as fall and fainting, and for estimating emotions from texts.

Biomedical | Medical / Welfare

BOOTH 6

Innovative micro / nano system for healthcare, medical, and information communication technologies

Keio Patent

Professor **MIKI, Norihisa**
Department of Mechanical Engineering

Candle-like Micro EEG electrodes for brain technology, human interface system for tactile and taste sensations, and artificial kidneys to drastically improve patients' QOL will be introduced.

Materials

Materials | Environment

BOOTH 7

Durability improvement of perovskite solar cells by diamond-like carbon coating

Professor **SUZUKI, Tetsuya**
Department of Mechanical Engineering

Perovskite solar cells, which are attracting attention as low-cost, high-efficiency solar cells, deteriorate with time and conversion efficiency decreases. We aim to improve the durability of perovskite solar cells by coating diamond-like carbon with excellent gas barrier properties and light transmission on perovskite solar cells.

Materials | Society / Infrastructure

BOOTH 8

Nondestructive inspection with advanced light sources (from semiconductors to polymers)

Keio Patent

Professor **WATANABE, Shinichi**
Department of Physics

We introduce new nondestructive inspection methods using terahertz spectroscopy and dual comb spectroscopy. Various applications are expected, such as strain inspection of rubbers, orientation and crystallinity analysis of plastics, and refractive-index analysis of semiconductors.

Materials | Society / Infrastructure

BOOTH 9

The refractive index distribution type polymer optical amplifier and electro-chemiluminescence device

Associate Professor **NIHEI, Eisuke**
Department of Applied Physics and Physico-informatics

We will introduce the principle and the feature of the polymer optical amplifier made by negative type refractive index distribution wave guide and the organic ECL device which can be applied as the next generation display.

Materials | Industry

BOOTH 11

Advanced material simulation research created by cutting-edge machine learning (AI) technology

Assistant Professor **MURAMATSU, Mayu**
Department of Mechanical Engineering
Professor **YASUOKA, Kenji**
Department of Mechanical Engineering

In this booth, we introduce the research examples of advanced materials simulations ranging from molecular scale to continuum scale, using the cutting-edge machine learning (AI) technologies.

Materials | Industry

BOOTH 14

Nano-Processing of Next Generation Materials

Keio Patent

Professor **YAN, Jiwang**
Department of Mechanical Engineering

We develop new technologies for nano-scale processing and surface property control of materials in order to improve the functional capability and added value of industrial products. We deal with super hard alloys, ceramics, semiconductors, diamond, CFRP, and so on. Recently, we have succeeded in generation of silicon nanostructures by laser irradiation on waste silicon sludge to produce high-performance lithium-ion batteries.

Materials | Industry

BOOTH 15

High-performance Optical Component Fabrication

Keio Patent

Professor **YAN, Jiwang**
Department of Mechanical Engineering

We develop new fabrication technologies for nano-precision free-form optics and their molds by using multi-axis numerical control ultraprecision machines. High-speed surface finishing of optical crystals, such as Si, Ge, ZnSe, CaF_2, etc. has been realized by ductile machining technology. Recently, we also succeeded in fabricating ultra-thin Si-HDPE hybrid lenses for future IR devises.

Electronics

Electronics | Medical / Welfare

BOOTH 16

Data Acquisition and Robotics —Human Motion Analysis and Control—

Professor **MURAKAMI, Toshiyuki**
Department of System Design Engineering

Optimal control design of support devices for human motion is considered. This makes it possible to improve the reliability of the support devices. Also it is expected to be extended to the soft robotics like human motion and the skill enhancements of human operation.

Electronics | Industry

BOOTH 17

High-Precision Motion Controller

Professor **KATSURA, Seiichiro**
Department of System Design Engineering

This technology can attain both high-robustness and the flexible command-generation of motion systems by designing parallel operator using an field-programmable-gate-array (FPGA). It is possible to improve the performance of precise positioning and robust control of robots, etc.

Electronics | Society / Infrastructure

BOOTH 18

Embedded Real-time System

Keio Patent

Professor **YAMASAKI, Nobuyuki**
Department of Information and Computer Science

We demonstrate some cutting-edge embedded technologies such as Responsive Multithreaded Processor (RMTP) for distributed real-time systems including spacecraft control and humanoid robot, RMTP SoC, RMTP SiP, and Responsive Link that is a real-time communication standard.

Electronics | Society / Infrastructure

BOOTH 19

Innovative next-generation devices using magnetics

Keio Patent

Associate Professor **KAIJU, Hideo**
Department of Applied Physics and Physico-informatics

In near future, an advanced information processing will be needed in IoT, Bigdata, and AI, which have attracted much interest in recent years. In this demonstration, we show the study on innovative devices using magnetics, such as highly sensitive magnetic sensors and magnetic memory devices, for the realization of the next-generation information processing.

Electronics | Society / Infrastructure

BOOTH 20

Center for Spintronics Research Network at Keio University

Professor **NOZAKI, Yukio**
Department of Physics
Associate Professor **ANDO, Kazuya**
Department of Applied Physics and Physico-informatics

The purpose of "Spintronics research community in Japan" project is to implement and strengthen "Spintronics Research Infrastructure and Network". In this project, we plan to further promote collaborations among research groups and institutions not only in Japan but also worldwide, strengthen the research activities in universities and industries, and cultivate the next generation of young researchers and engineers.

Society & Environment

Society & Environment | Society / Infrastructure

BOOTH 21

External HMI for communication between automated vehicle and peripheral traffic participant and evaluation of in-vehicle human machine interface

Professor **DAIMON, Tatsuru**
Department of Administration Engineering

We conduct experimental studies on designing and evaluating vehicle motion and eHMI (external Human Machine Interface) of automated vehicle to realize safe, secure and smooth communication between automated vehicle and peripheral traffic participant, based on psychological and cognitive aspects of the traffic participants.

Society & Environment | Society / Infrastructure

BOOTH 22

Meta-heuristic solution for vehicle routing problem with drones

Professor **DAIMON, Tatsuru**
Department of Administration Engineering

Vehicle Routing Problem with Drones (VRPD) is a constraint optimization problem to minimize the routes of ground vehicles and drones (unmanned aerial vehicles), based on the number of vehicles, link cost (travel time), load capacity of each vehicle, battery capacity of each drone and regulations of the drone flight. We study fast algorithm of meta-heuristic solving VRPD in order to help the ground vehicles in serving customers, especially focusing on optimizing routes of drones and ground vehicles when permitting the drones are launched from the roof of ground vehicles.

Society & Environment | Society / Infrastructure

BOOTH 23

Study of driver behavior in automated driving — Analysis and assistance

Professor **DAIMON, Tatsuru**
Department of Administration Engineering

We conduct experimental studies of driver cognitive characteristic and driving maneuver in transition from automated driving to manual driving in level-3 automated vehicles. Based on the fundamental characteristics of driver behavior in the transition, we study method or assistance on the safe and smooth transition, especially information contents and human machine interface.

Society & Environment | Industry

BOOTH 24

Build quality in process by data

Professor **YAMADA, Shu**
Department of Administration Engineering

The research subject includes the approach to build quality in process by data analysis in order to get high customer satisfaction. The major directions are theory and application of design of experiments, data analysis of customer usage data for design process and total quality management in organization.

Society & Environment | Society / Infrastructure

BOOTH 25

Data Analysis : Quantification for Customer Satisfaction, Analysis for Management, Marketing, Medical and Sports Data

Professor **SUZUKI, Hideo**
Department of Administration Engineering

Nowadays, in various fields, the use of data analysis attracts attention. In the field of marketing, analysis of data for customer questionnaire survey and the Web environment are conducted. In the medical and sports fields, the use of data analysis is being practiced. We present several data analyses, such as case studies of quantifying customer satisfaction, analysis for management, marketing, medical and sports data.

Society & Environment | Society / Infrastructure

BOOTH 26

Control of Cyber Physical and Human System

Professor **NAMERIKAWA, Toru**
Department of System Design Engineering

Distributed and cooperative control problems for large-scale networked systems are studied in Namerikawa laboratory via both of control theoretical and application approaches. The current main topic of Namerikawa Lab is the developments of safe, reliable and resilient control/prediction methodologies for electrical power network and smart city and smart infrastructure. The other important topic is the developments of cooperative formation control strategies for multi-agent systems including unmanned aerial vehicles.

Society & Environment | Society / Infrastructure

BOOTH 27

Evacuation Planning based on Simulation and Data from IoT Sensors, and Application of Virtual reality techniques to Improve Evacuation Skil

Assistant Professor **IIJIMA, Tadashi**
Department of Administration Engineering

Our research goal is to realize navigation technique for evacuees by real-time planning and notification of an adequate evacuation plan. In order to make the adequate plan, it's necessary to combine various techniques, such as agent-based simulation, physical simulation of disasters, IoT sensor Technology, and virtual reality techniques for visualization.

Society & Environment | Society / Infrastructure

BOOTH 28

Facilitating Modeling and Enhancing Security of Social Systems

Assistant Professor **IIJIMA, Tadashi**
Department of Administration Engineering

Our research goal is to make social systems work efficiently and safely. To automate and to enhance security level of business processes are important. This laboratory has been researched such technologies. For the former, there are mining, and conformance verification techniques. For the latter, there are security technologies for complex organization structure and IoT sensors.

Information and Communication

Information and Communication | Society / Infrastructure

BOOTH 29

Smart Community Implementation and Standardization

Short Presentation

Professor **NISHI, Hiroaki**
Department of System Design Engineering

local implementation of smart community are introduced by illustrating the Smart Town project cooperated with a local government. In this project, common data platform for handling local information was designed. It provides safe and flexible local community services by integrating and managing data sharing, data publishing, and data anonymization. Concerning standardization activities are also introduced.

Information and Communication | Industry

BOOTH 30

Quantum computing at IBM Q Network Hub

Professor **YAMAMOTO, Naoki**
Department of Applied Physics and Physico-informatics

Keio University Quantum Computing Center is the hub that can use "IBM Q" which is a real machine of the latest quantum computer through cloud. We are working to develop quantum computing software with IBM Q Hub members.

Information and Communication | Entertainment

BOOTH 31

Automatic comic generation system

Professor **HAGIWARA, Masafumi**
Department of Information and Computer Science

An automatic comic generation system is demonstrated. It generates a comic from texts and some images. Interactive operations are also employed to reflect user's preference.

Information and Communication | Society / Infrastructure

BOOTH 32

Research and Development on Photonic Networks Using Broad Wavelength Range of T-band and O-band

Professor **TSUDA, Hiroyuki**
Department of Electronics and Electrical Engineering
Associate Professor **KUBO, Ryogo**
Department of Electronics and Electrical Engineering

Arrayed-waveguide grating routers for newly developing waveband (T-band, 1000-1260nm) are fabricated. It realizes low-cost, ultra large capacity transmission systems for data center networks.

Information and Communication | Society / Infrastructure

BOOTH 33

A Method for Detecting Internet Traffic Anomaly by Deep Learning

Professor **TERAOKA, Fumio**
Department of Information and Computer Science

In the Internet, traffic dynamics change due to various factors such as device failure, attack activity, and social events. Therefore, for stable operation of the Internet, a general-purpose anomaly detection method is required for various factors. This research, we propose a general anomaly detection method for Internet traffic by deep learning.

Information and Communication | Society / Infrastructure

BOOTH 34

IoT system with self-reliant wind power supply and Wi-Fi multi-hop communication that enables transmission of still images

Professor **TERAOKA, Fumio**
Department of Information and Computer Science

Existing IoT systems collects only sensor data (a few bytes) using low power wide area communication technology (coverage: a few km, speed: a few tens kbps). This research aims at developing an IoT system that enables to collect image data (a few Mbytes) using self-reliant wind power supply and Wi-Fi multi-hop communication technology in a wide field.

Information and Communication | Society / Infrastructure

BOOTH 35

AFC (Application Function Chaining): Network Application Infrastructure for 5G / IoT

Professor **TERAOKA, Fumio**
Department of Information and Computer Science

We propose an infrastructure which enables low-latency and big data processing applications by chaining multiple small functions (AF: Application Functions) distributed on edge servers and cloud servers in a 5G network.

Information and Communication | Industry

BOOTH 36

Flow-in-Cloud (FiC), a multi FPGA system

Professor **AMANO, Hideharu**
Department of Information and Computer Science

Field Programmable Gate Array (FPGA) is a device that can freely change the internal logic configuration and can perform specific operations faster than general purpose CPU. Flow-in-Cloud (FiC) is a system in which many FPGAs are connected by high-speed serial links. It aims to implement large-scale applications using abundant resources.

Information and Communication | Entertainment

BOOTH 37

The world of networked digital-data

Short Presentation

Associate Professor **KANEKO, Kunitake**
Department of Information and Computer Science

Although digital data continues to increase, it is becoming difficult to use it seamlessly across applications. To solve this problem, we are working on a development of our general-purpose underlying data connectivity platform and its peripheral technologies.

Information and Communication | Other Areas

BOOTH 38

Exploration of New Mathematical Methods in Artificial Intelligence and Machine Learning

Short Presentation

Professor **BANNAI, Kenichi**
Department of Mathematics

There has been great advancement in the field of artificial intelligence and machine learning each time new theory such as statistics and optimization was introduced. The purpose of this research, which includes joint research with RIKEN AIP is an attempt to introduce new pure mathematical methods to the field of Machine Learning.

Information and Communication | Entertainment

BOOTH 39

Content network based on hypergraphs

Professor **BANNAI, Kenichi**
Department of Mathematics
Associate Professor **KANEKO, Kunitake**
Department of Information and Computer Science

This research for content networks focuses on hypergraphs that can represent multinomial relations (sets) rather than ordinary graph that represents binary relations. Using hypergraph representation and graph algorithm techniques, we aim to provide a chance to see various interesting contents.

Information and Communication | Entertainment

BOOTH 40

Application of Facial Expression Recognition Using Wearable Optical Sensors

Research Associate **MASAI, Katsutoshi**
Department of Information and Computer Science
Associate Professor **SUGIMOTO, Maki**
Department of Information and Computer Science

We introduce facial expression recognition technology using wearable optical sensors. The distance from the skin surface to the sensor is acquired as the reflection intensity by the photo reflective sensors. By that, it is possible to detect not only emotions but also various facial expressions and eye movements. We introduce an application example using this technology.

Information and Communication | Medical / Welfare

BOOTH 41

Interactive Systems That Induce Health Enhancement Actions

Assistant Professor **SUGIURA, Yuta**
Department of Information and Computer Science

We introduced interactive systems that induce health enhancement actions. Our final goal is Extension of “healthy life expectancy”.

Information and Communication | Society / Infrastructure

BOOTH 42

Data Collection and Location Privacy Preservation for Vehicle Networks

Professor **SHIGENO, Hiroshi**
Department of Information and Computer Science

We are conducting research to realize a dynamic and adaptive vehicle networks. As a part of this research, we are researching on data collection for vehicles applying a new network infrastructure and location privacy preservation with pseudonyms.

Information and Communication | Other Areas

BOOTH 43

Autonomous AI co-existing with Human

Professor **KURIHARA, Satoshi**
Department of Administration Engineering

Constructing autonomous AI co-existing with human is quit important issue for upcoming low birthrate and aging society in Japan. In addition to machine learning technology, autonomous interaction ability such as anticipating human behavior based on recognizing environment will become core technology. We will show and discuss about current study through demonstration using some robots.

Information and Communication | Society / Infrastructure

BOOTH 44

Massively Parallel and Elastic Network Infrastructure with Fault Torrance

Professor **YAMANAKA, Naoaki**
Department of Information and Computer Science

As the traffic on the Internet keeps increasing, it is necessary to handle a massive volume of traffic. Therefore, we propose an architecture of network nodes which can flexibly accommodate diverse traffic. We also propose a routing method which has tolerance against failures of network devices.

Information and Communication | Society / Infrastructure

BOOTH 45

Ambient Visualization

Professor **FUJISHIRO, Issei**
Department of Information and Computer Science

This booth demonstrates the latest R&Ds of ambient visualization systems aiming at supporting our daily lives through the provision of adaptive content of information. Representative examples of these include rewind--visual exploration of Web video viewing history for self-reflection and hydro--an authoring tool for interactive hybrid-image advertisements on large display.

Information and Communication | Entertainment

BOOTH 46

Interactive Intelligent Systems

Professor **IMAI, Michita**
Department of Information and Computer Science

We are studying interactive intelligence to realize a fluent interaction between human and machines. We design systems that plans actions interactively incorporating the cognitive traits of human. Today, we are presenting interactive robots and the machine learning adapting to people and explain our thoughts behind them.

Information and Communication | Society / Infrastructure

BOOTH 47

Traffic Efficiency Improvement by Cooperative Control using Network Assisted Autonomous Driving Platform

Professor **YAMANAKA, Naoaki**
Department of Information and Computer Science

Currently, research and development of autonomous driving technology is actively conducted. In this research, some of the functions of autonomous driving are transferred to the network. It enables control that was considered difficult only by standalone autonomous vehicles and provides advanced automated driving technology that improves traffic efficiency by performing appropriate processing.

Information and Communication | Entertainment

BOOTH 48

Real-time free viewpoint video distribution by efficient feature points generation and multiple video synthesis servers

Professor **YAMANAKA, Naoaki**
Department of Information and Computer Science

In recent years, free-viewpoint video has been put into practical use in sports watching. However, free-viewpoint video requires processing of images taken from multiple viewpoints, making real-time processing difficult. Therefore, we are trying to drastically reduce processing time by improving the generation efficiency of each frame.

Information and Communication | Society / Infrastructure

BOOTH 49

Information resource binding with Web Index

Professor **TOYAMA, Motomichi**
Department of Information and Computer Science

We introduce the software system to bind the words in screen of mobile phone or PC to information resource like related Web page in a single action.

Information and Communication | Industry

BOOTH 50

Polymer Optical Waveguide Devices for Exa-scale Computing

Keio Patent

Professor **ISHIGURE, Takaaki**
Department of Applied Physics and Physico-informatics

For realizing Exa-Flops scale high-performance computers, "On-board optical interconnect technologies" toward the inter-chip optical wiring have drawn much attentions. In our research, polymer optical waveguide devices are designed and then, fabricated for enabling high-bandwidth-density optical wiring, and their capabilities in Exa-Flops scale computing are demonstrated.

Information and Communication | Industry

BOOTH 51

Super high speed QR code recognition by event camera

Keio Patent Short Presentation

Professor **AOKI, Yoshimitsu**
Department of Electronics and Electrical Engineering

We constructed a QR code recognition system using an event camera that records only changes in brightness as events at high speed. Real-time demo introduces recognition performance.

Information and Communication | Entertainment

BOOTH 52

Complement of 360 degree image by GAN

Short Presentation

Professor **AOKI, Yoshimitsu**
Department of Electronics and Electrical Engineering

We introduce a new method that uses GAN to complement the remaining area, taking as input a part of the 360-degree image. In order to express distortion specific to 360-degree image, we have proposed a Generator that includes a Dilated Convolution layer. We will show the result of automatic generation of 360 degree image in the demonstration.

Information and Communication | Industry

BOOTH 53

Computer vision studies for realizing "Kizuki" Robot

Keio Patent Short Presentation

Professor **AOKI, Yoshimitsu**
Department of Electronics and Electrical Engineering

In order to realize robots that coexist with people in living space, we introduce examples of research on functions that recognize surrounding environment, objects and people, and understand scenes using visual information.

Information and Communication | Entertainment

BOOTH 54

Automatic recognition system of sports event by time series DNN

Short Presentation

Professor **AOKI, Yoshimitsu**
Department of Electronics and Electrical Engineering

We introduce a system that automatically detects various sports events (such as tennis shots) using time-series Deep Neural Networks.

Information and Communication | Other Areas

BOOTH 55

Domain adaptation technology in image segmentation

Short Presentation

Professor **AOKI, Yoshimitsu**
Department of Electronics and Electrical Engineering

In the field of image recognition, degradation of recognition performance in different domains from learning data is an issue. In this study, we will exhibit domain adaptation technology for cell image segmentation task.

Mechanics

Mechanics | Medical / Welfare

BOOTH 56

living and life Support Robot

Associate Professor **NAKAZAWA, Kazuo**
Department of System Design Engineering

We will give a demonstration of a mobile robot for the purpose of the living and life support. Various sensors such as range image sensors are attached on the robot and we can control remotely while judging sensor information. The robot can go to a destination by remote controlling and can avoiding obstacles automatically.

Mechanics | Industry

BOOTH 57

MEMS highly sensitive force sensor

Assistant Professor **TAKAHASHI, Hidetoshi**
Department of Mechanical Engineering

Our research field includes the development of piezoresistive force sensors utilizing MEMS technology and their applications. We introduce Pitot tube and wave height sensor using highly sensitive differential pressure sensor chip.

Mechanics | Industry

BOOTH 58

Application of vibration and wave to structure maintenance and energy harvesting

Professor **SUGIURA, Toshihiko**
Department of Mechanical Engineering

Our research aims to achieve vibration reduction and energy harvesting by transferring the vibrational energy of a structure to an electrical circuit system using the coupling of mechanical and electrical systems. We are also developing some methods to detect and quantitatively evaluate structural defects and bonding failures using ultrasonic waves.

Mechanics | Industry

BOOTH 59

Ultra-precision machining and intelligent machining system

Professor **KAKINUMA, Yasuhiro**
Department of System Design Engineering
Professor **TANABE, Takasumi**
Department of Electronics and Electrical Engineering

We research on a novel production process of optical elements using nanoscale cutting and ultra-precision grinding. In addition, we are working on development of intelligent machine tools which have ability to control machining force and vibration according to cutting state. In our booth, we will exhibit samples of optical elements produced by ultra-precision machining and show the developed intelligent machine tools.

Mechanics | Agriculture, Forestry and Fisheries

BOOTH 60

Demonstration of smart farming system using agricultural robot supporting farmers

Professor **TAKAHASHI, Masaki**
Department of System Design Engineering
Associate Professor **ISHIGAMI, Genya**
Department of Mechanical Engineering

We propose a novel smart farming system using agricultural support robot and cloud work management system. We develop and verify the sensing technology and motion control of robot for supporting farmers and a framework to record and manage the farm work and crop yield in the real field.

Mechanics | Industry

BOOTH 61

Application of laser metal 3D printer

Assistant Professor **KOIKE, Ryo**
Department of System Design Engineering
Professor **KAKINUMA, Yasuhiro** Department of System Design Engineering
Professor **AOYAMA, Hideki** Department of System Design Engineering
Professor **SUZUKI, Tetsuya** Department of Mechanical Engineering

Metal 3D printing technology (AM: Additive Manufacturing) has started to be used in various fields like aerospace and automobile industries. Our study is aiming to establish a new application of metal AM such as a jointing technology and porous metal fabrication from viewpoints of fluid-dynamics and material science.

Other Fields

Other Fields | Industry

BOOTH 62

Applied Abstraction and Integrated Design

Keio Patent

Professor **KATSURA, Seiichiro**
Department of System Design Engineering

The target of “applied abstraction” is to reveal solutions that build a bridge between infinite-analysis of science and synthesis of engineering by integrated system design, aiming for creating simple and strong ideas toward construction of future human-support systems and robots.

Other Fields | Industry

BOOTH 63

Data Robotics

Keio Patent

Professor **KATSURA, Seiichiro**
Department of System Design Engineering

This technology is integration of database and control for attainment of robot’s flexible motion. It is possible to extend robots’ functions such as skill transfer and complicated task execution, etc.

Panel Presentations

Biomedical | Medical / Welfare

PANEL 64

The development of microthermofluidic devices for life science research

Keio Patent

Associate Professor **TAGUCHI, Yoshihiro**
Department of System Design Engineering
Associate Professor **SUDO, Ryo**
Department of System Design Engineering

This project develops microthermofluidic devices for life science research by the integration of microfluidic devices, which have been developed from the standpoint of bioengineering and bioMEMS, and micro-optical detection systems, which have been developed from the standpoint of thermal engineering and optical MEMS.

Biomedical | Medical / Welfare

PANEL 65

Real-time Monitoring of Lipid Accumulation in Adipocyte Using Electrical Impedance Measurement

Associate Professor **MIYATA, Shogo**
Department of Mechanical Engineering

Degeneration of adipocyte causes obesity, metabolic syndrome, and other diseases. To treat these diseases, an effective in vitro evaluation and drug-screening system culture is required. We will introduce our novel real-time monitoring system for lipid accumulation in adipocyte-culture model.

Materials | Environment

PANEL 66

High-resolution imaging of nano-materials

Associate Professor **SHIMIZU, Tomoko**
Department of Applied Physics and Physico-informatics

Scanning probe microscopy allows us to see the material surfaces at the atomic and single-molecular scale. We introduce the design concept of our new instrument applicable to nano-materials, and recent results of the observation of nano-size organic molecular films.

Materials | Medical / Welfare

PANEL 67

Micro cell-culture device to control curvature of cell-adhering plane

Research Associate **YAMASHITA, Tadahiro**
Department of System Design Engineering
Associate Professor **SUDO, Ryo**
Department of System Design Engineering

Recent studies have clarified that cells actively sense the surrounding microstructure and control their function. To pursue the mechanism how cells recognize the geometrical properties of the surrounding environment, a new cell culture microdevice that can spatiotemporally control the curvature of the cell-adhering plane was developed.

Electronics | Industry

PANEL 68

Ultrasmall optical spectrometer

Keio Patent

Professor **TANABE, Takasumi**
Department of Electronics and Electrical Engineering

We are developing ultrasmall optical spectrometer, which could be used for optical communication network monitoring, and food analysis.

Society & Environment | Medical / Welfare

PANEL 69

A New Smart Wellness Home by Designing Activities of Daily Living

Research Associate **OGAWA, Ami**
Department of System Design Engineering

The promotion of exercises is effective for the prevention of lifestyle-related diseases and disuse syndrome. A new smart wellness home that we suggest gives the appropriate physical load for each resident in each situation by changing the designs of furniture and floor plans.

Information and Communication | Society / Infrastructure

PANEL 70

PRINTEPS : An Integrated Intelligent Application Development Platform

Professor **YAMAGUCHI, Takahira**
Department of Administration Engineering
Associate Professor **MORITA, Takeshi**
Department of Administration Engineering

System development using general-purpose robots takes a lot of time. If the intelligent software is incorporated, cost (human, monetary, time) will be even higher. Therefore, in order to facilitate the development of the intelligent system using a robot, we perform research and development for building tools and intellectual software.

Information and Communication | Society / Infrastructure

PANEL 71

Design of Address Assignment in Inter-module Communication for Reconfigurable Communication Processor

Professor **YAMANAKA, Naoaki**
Department of Information and Computer Science

A dedicated interface is required for each communication service, and in recent years the demand for services has been rapidly changing, so additional investment such as replacement of hardware is required. Therefore, we are researching “Reconfigurable Communication Processor”, which is a “resource pool” type router that dynamically allocates the required functions and performance according to the demand for services.

Information and Communication | Society / Infrastructure

PANEL 72

Safe web interface and high-efficient data delivery in IoT

Professor **SASASE, Iwao**
Department of Information and Computer Science

In IoT, generality, the power-saving and security & privacy are desired. We consider Power-saving in IoT, a multi-purposed data delivery system and the web interface which satisfies high security and privacy.

Group Exhibition Zone: Chemistry and Biology

We here introduce “Group Exhibition Zone: Chemistry and Biology” consisting of 9 booths and 4 panel sessions covering a wealth of topics ranging from the development of new life-enriching materials and technologies to the proposal of medical technologies that encompass the multifaceted spectrum of life and living organisms. With its multiplicity of specialized fields and research approaches, its content spans the Departments of Chemistry, Applied Chemistry, and Biosciences and Informatics, enabling free nanoworld control. We look forward to the emergence of deeper insights and more advanced developments arising from interactions with many visitors and guests at the Group Exhibition. Be sure to sound the depths and explore the range of leading trends in chemistry and biology.

Short Presentation

Short Presentation

Time / 12:45-13:15 Venue / Short presentation Corner②

* Refer to the Floor Map on page 02 and 03 to find the venue.

Other Fields | Other Areas

BOOTH 73 Let’s make polymer particles that are of great benefit to mankind and nature

Professor **FUJIMOTO, Keiji**
Department of Applied Chemistry
Assistant Professor **FUKUI, Yuuka**
Department of Applied Chemistry

We are creating a variety of polymer particles from synthetic and natural materials, which will be of great benefit to mankind and nature. We are also fabricating supra-structured materials assembled from these polymer particles. So, we will show you their utility and attractiveness.

Materials | Industry

BOOTH 74 Electrochemical measurements for electrochemical devices using quartz crystal electrodes

Research Associate **SERIZAWA, Nobuyuki**
Department of Applied Chemistry

The detailed analysis of electrode reactions is necessary for development of electrochemical devices. The small change in electrode mass and distribution of the electrolyte can be detected by the electrochemical measurements using quartz crystal electrodes. This study aims the measurements under the conditions which simulate practical electrochemical devices.

Materials | Industry

BOOTH 75 Advanced Synthetic Methodology for Functional Nanoclusters

Keio Patent

Professor **NAKAJIMA, Atsushi**
Department of Chemistry

Nanoclusters consisting of several to tens atoms are expected to be novel functional materials, because they exhibit unique optical response and reactivity due to rich surface atoms and discrete electronic states. We have developed two original methods using magnetron sputtering and a fine micro-reactor.

Biomedical | Medical / Welfare

BOOTH 76 Chemical Sensing Devices for Healthcare and Environmental Applications

Keio Patent Short Presentation

Professor **CITTERIO, Daniel**
Department of Applied Chemistry
Assistant Professor **HIRUTA, Yuki**
Department of Applied Chemistry

Our laboratory works on the development of user-friendly(bio)chemical sensing devices for environmental and healthcare applications. Relying on paper as low-cost and single-use substrate, in combination with printing technology, we aim at realizing flexibly designable and mass-producible sensing devices.

Biomedical | Medical / Welfare

BOOTH 77 Organic materials for medical analysis

Keio Patent

Assistant Professor **HIRUTA, Yuki**
Department of Applied Chemistry
Professor **CITTERIO, Daniel**
Department of Applied Chemistry

We developed organic materials for medical analysis. In our laboratory, we are developing (1) functional fluorescent / luminescent probes, (2) organic / inorganic hybrid separation materials, (3) stimuli responsive polymer materials.

Biomedical | Medical / Welfare

BOOTH 78 Machine learning and network inference for medical applications

Keio Patent

Associate Professor **FUNAHASHI, Akira**
Department of Biosciences and Informatics
Research Associate **YAMADA, Takahiro**
Department of Biosciences and Informatics

We developed an accurate embryo quantification and medical diagnosis algorithm by image analysis using deep learning. We also developed a network inference algorithm using high-throughput data analysis. The inferred network enables to identify target genes directly linked to the pathogenesis efficiently.

Society & Environment | Society / Infrastructure

BOOTH 79 Visualization and reduction of particulate matter-derived risks to facilitate “subways with the world’s cleanest air”

Associate Professor **OKUDA, Tomoaki**
Department of Applied Chemistry

The subway system is an enclosed space and the attendant concerns about contaminated air, no systematic investigations on the air quality in subways have been carried out. This project aims to visualize and reduce the particulate matter-derived risks to facilitate “subways with the world’s cleanest air.”

Society & Environment | Environment

BOOTH 80 Characterization of particle surface for particle removal technology of atmospheric particles —Measurement of particle morphology and charging state—

Research Associate **IWATA, Ayumi**
Department of Applied Chemistry
Associate Professor **OKUDA, Tomoaki**
Department of Applied Chemistry

The efficiently particle removal technology is necessary for the manufacturing process of instruments and maintaining the power generation efficiency by solar panels. By understanding the adhesion of particles from particles properties, we try to develop the technology.

Materials | Medical / Welfare

BOOTH 81 New technology developed for in vitro evaluation methods of UV protection efficacies of sunscreens

Keio Patent

Professor **ASAKURA, Kouichi**
Department of Applied Chemistry

Concerns have been increased for the establishment of reliable and reproducible in vitro evaluation method of UV protection efficacies of sunscreens, since it gives results more quickly, is less expensive and is more ethical. We are unveiling new technology for commercially available in vitro evaluation method.

Biomedical | Medical / Welfare

PANEL 82 Discovery and Delivery of Next-Generation Biopharmaceuticals

Keio Patent Short Presentation

Professor **DOI, Nobuhide**
Department of Biosciences and Informatics

Biopharmaceuticals based on biopolymers such as antibodies, peptides, and nucleic acids are attracting attention because of their advantages such as fewer side effects and higher efficacy than conventional small molecule drug products. However, the challenges of high cost and low membrane permeability remained. We are developing new technologies to overcome these issues.

Other Fields | Education

PANEL 83

Searching for mechanisms to make transparent ascidian

Associate Professor **HOTTA, Kohji**
Department of Biosciences and Informatics

Searching the mechanism to make the transparent animals transparent.

Society & Environment | Industry

PANEL 84

Surface cleaning by water flow with ultrasound and fine bubbles

Professor **TERASAKA, Koichi**
Department of Applied Chemistry
Associate Professor **ANDO, Keita** Department of Mechanical Engineering
Professor **SUGIURA, Toshihiko** Department of Mechanical Engineering
Assistant Professor **FUJIOKA, Satoko** Department of Applied Chemistry

A high-performance, water-based cleaning technique was developed using synergetic effects of ultrasound and fine bubbles (of micron sizes or even smaller). With our approach, surface contamination can be removed more quickly and mildly in comparison to conventional ultrasonic cleaning techniques.

Materials | Industry

PANEL 85

Development of next-generation bioreactor with contactless interface

Keio Patent

Associate Professor **MATSUBARA, Teruhiko**
Department of Biosciences and Informatics
Professor **TAKEMURA, Kenjiro**
Department of Mechanical Engineering

Chemical and biological reactions in laboratory often perform in glass and plastics. If containerless processing is materialized, risks of unforeseen issues induced by contact with reaction flask including contamination and alteration of reactants would be reduce. We are trying to develop next-generation bioreactor with contactless interface.

Venture Zones

Keio University is working actively in creation, investment, and technical support and cooperation for venture enterprises in order to implement and invest in society the advances in research at its Faculty of Science and Technology. Within this zone, it introduces venture enterprise and technological collaboration, and welcomes support and cooperation for the creation of new businesses and new markets utilizing the cutting-edge technologies for venture enterprises.
Introductions in particular include faculty and student business concepts adopted in this fiscal year as targets of incubation and preparatory support by the Keio Leading-edge Laboratory of Science and Technology (KLL), which will form the seeds for venture enterprises.

Venture Zones

BOOTH 86

A showcase of Business Ideas from Students Supported by KLL

Keio Leading-edge Laboratory of Science and Technology

The KLL provides technical support and cooperation to venture companies and people who are interested to start a business. In this session, we will introduce the business ideas from the students who were accepted for incubation support as one of KLL's activities.

Venture Zones

BOOTH 87

High QOL healthcare using Salt-Chip®

LTaste, Inc.

Salt intake reduction is effective for hypertension, cardiovascular, and kidney disease patients. However, the salt reduction affects the taste of dishes, culminating in loss of appetite and QOL. Our company develops Salt-Chip®, which can provide sufficient salt taste for 5 min with only less than 0.1 g of salts. Salt-Chip® enables effective and high-QOL salt intake reduction.

Venture Zones

BOOTH 88

Integrated Support Platform for Dementia Diagnosis

Splink Inc.

We are developing a number of technologies for dementia diagnosis, such as the diagnosis of the cause of dementia, the quantitative assessment of brain atrophy and the estimation of β-amyloid positivity, with deep learning models, and providing a platform that supports integrated diagnosis for dementia.

Venture Zones

BOOTH 89

Pre-disease analysis and disease risk prediction with hybrid type AI engine

AXiON Research Inc.

Provide health science (disease risk prediction and health program) services with ecosystem partners utilizing software which enables pre-disease health-index analysis and disease risk prediction with AXiREngine®, a hybrid-AI consists of Knowledge-based Expert System and Deep Learning Big-Data Analysis System, and hardware which accelerate learning and inference as core technologies.

Venture Zones

BOOTH 90

Development of photoacoustic diagnosis imaging system for 3D visualizing of small vessels in the human body

Luxonus Inc.

We are developing imaging modality that can safely and easily obtain 3D imaging of blood vessels and lymph vessels with high resolution using photoacoustic technology that combines light and ultrasound technologies. It is expected that diagnostic imaging with this system prior to surgery will shorten the operation time, improve the treatment effect, and lead to early diagnosis.

Venture Zones

BOOTH 91

Development of Next Generation Lithium-ion Battery (All Polymer Battery)

APB Corporation

We are researching and developing next generation lithium-ion battery. To adopt bipolar system that electric current flows vertically to current collector, and polymer resin to base members, we realize high reliability in case of abnormality, high energy density, high flexibility of shape and size, and innovative production process.

Venture Zones

BOOTH 92

Real-haptics makes gentleness in the robots

Motion Lib, Inc.

It is still difficult for robots to grab things with the "good" amount of force. Real-haptics technology makes gentleness in the robot motion. "AbcCore" is an IC chip for easy installation of real-haptics in commercial use. Over 50 joint research projects are working toward the practical applications.

Venture Zones

BOOTH 93

A new bio material which uses eggshell

Bioapatite Corporation

Because it is made from raw material called eggshell it contains minerals such as magnesium and potassium, and its composition is similar to bones and teeth. Therefore, it has better biocompatibility than mineral-derived apatite. In addition, since it is synthesized by our original wet manufacturing method, the particle size is small, and it is also characterized by adsorptive power compared to other hydroxyapatites.

Venture Zones

BOOTH 94

App for Health Promotion

Game for IT, Inc.

Health promotion app for the elderly "Flower Garden" for training calves. When you set a target and raise and lower heel, the flowers will gradually bloom. While enjoying the exciting screen, it improves continuity and promotes health.

Industry–Government–University and Regional Collaborations

The booth for industry–government–university and regional collaboration marks the selection in November 2018 of the Keio University Office for Open Innovation, which was established to further the activities of industry–government–university collaboration, as a platform for the MEXT Open Innovation Development Project, and introduces the activities of university globalization furtherance by the Keio University Global Research Institute (KGRI) established in November 2016 as the base for an international research university contributing to advances worldwide.
The introductions extend to the activities and business programs of the Yokohama Industrial Development Corporation (IDEC) and the Kawasaki Institute of Industrial Promotion (KIIP), partners with KLL in industry-university collaboration.

BOOTH A

Keio University Office for Open Innovation

Open Innovation centered at the University

We aim to provide solutions by bridging research results as seeds at the University and needs of companies which seek accelerated innovation. In particular, we are working on three spaces : licensing of intellectual properties owned by the University, launching large-scale joint research with companies, and supporting start-ups and entrepreneurs from the University including commercialization and IPOs. We commit Open Innovation by implementing research seeds into the society.

BOOTH B

Keio University Global Research Institute (KGRI)

IoT health life research in a super-aging society

In the 21st century super aging society, support for health promotion and healthy longevity is essential. IoT Health Life Research integrates the expertise and technology of researchers from a wide range of academic fields, and develops technologies such as health maintenance and management, detection of signs of non-disease to illness, and so on.

BOOTH C

Yokohama Industrial Development Corporation (IDEC)

BOOTH D

Kawasaki Institute of Industry Promotion (KIIP)

KEIO TECHNO-MALL 2019 Event Schedule

Event Stage

9:55 Opening Address

10:05-10:10 Opening Ceremony

10:30-11:10
Symposium Session Ⅰ
Blockchain's current status quo and its future

11:30-12:30
Symposium Session Ⅱ
So much fun with quantum computing

13:30-15:00
Symposium Session Ⅲ
IoT health life research in a super-aging society

16:00-17:00
Special Speech
Life science innovation based on the integration of medicine and technology in Japan
— Regulation reforms with respect to R&D and commercialization —

Short presentation Corner ①

9:55 Live broadcast of the Opening Address

10:05-10:10 Live broadcast of the Opening Ceremony

10:15-10:30 Live broadcast of the Interview ① KOIKE, Ryo, Dept. of System Design Engineering

10:30-11:10
Live broadcast of the Symposium Session Ⅰ

11:15-11:30 Live broadcast of the Interview ② SUGIURA, Yuta, Dept. of Information and Computer Science

11:45-12:05 AOKI, Yoshimitsu
Dept. of Electrical Engineering
Latest researches on image AI and its industrial applications

12:20-12:40 NISHI, Hiroaki
Dept. of System Design Engineering
Let's design the future society from the perspectives of IoT, Edge, 5G, and Smart City

12:55-13:15 BANNAI, Kenichi
Dept. of Mathematics
Applications of Mathematics to Theories in Machine Learning

13:35-14:25
Make your dreams happen
— Business Plan Contest —

15:10-15:30 KANEKO, Kunitake
Dept. of Information and Computer Science
Towards the era of connecting data

16:00-17:00
Live broadcast of the Special Speech

Short presentation Corner ②

11:30-12:30
Live broadcast of the Symposium Session Ⅱ

12:45-13:15
Short Presentation
Group Exhibition Zone: Chemistry and Biology

13:30-15:00
Live broadcast of the Symposium Session Ⅲ

15:10-15:30 DOI, Nobuhide
Dept. of Biosciences and Informatics
Discovery and Delivery of Next-Generation Biopharmaceuticals

15:35-15:55 CITTERIO, Daniel
Dept. of Applied Chemistry
Simple and Low-Cost Analytical Devices for Healthcare and Environmental Applications

* Please note that content, etc. of events are subject to change due to unavoidable circumstances on the day of the exhibit.

* For Event Information, please refer to the pages 06-09.