Program

The Joint International Conference of the 5th

AGILEHAND Plenary Meeting & 2024 IEEE/CAA

Journal of Automatica Sinica Conference

Hachioji, Tokyo, Japan

December 2-6, 2024

Tokyo University of Technology
AgileHand Project
IEEE/CAA Journal of Automatica Sinica
FUJI TECHNOLOGY PRESS LTD.
IEEE IES Technical Committee on Human Factors
Hachioji MICE

APM&JAS 2024 Program

December 2 (Monday): Registration

14:00 ~ 17:00: Registration (Research Building C-104, Hachioji Campus, TUT)

December 3 (Tuesday): Registration, Agilenhand plenary meetings, Welcome reception

09:00 ~ 12:00: Registration (LEB hall, Hachioji Campus, TUT)

12:00 ~ 13:30: Lunch (Student Canteen, 4F, ROSE Kitchen A and B, Hachioji Campus, TUT)

14:00 ~ 17:00: Agilenhand plenary meetings 1-4 (LEB 207, Hachioji Campus, TUT)

18:00 ~ 20:00: Welcome reception (Shirokiya, Hachioji)

December 4 (Wednesday): Agilenhand plenary meetings and APM&JAS

09:00 ~ 11:30: Agilenhand plenary meeting 5-8 (LB D 301, Hachioji Campus, TUT)

11:30 ~ 12:45: Lunch (Student Canteen, 4F, ROSE Kitchen A and B, Hachioji Campus, TUT)

12:45 ~ 13:00: Group photo (12:45 meet in Student Canteen, Hachioji Campus, TUT)

13:00 ~ 17:30: APM&JAS (LEB 402 and 403, Hachioji Campus, TUT)

18:00 ~ 20:00: Gala dinner (Nihonkaku)

December 5 (Thursday): Technique visit and culture visit

09:00 ~ 11:30: TUT Hachioji Campus Technique visit (08:50 meet at the entrance of Research Building C**)**

11:30 ~ 12:20: Lunch (Student Canteen, 4F, ROSE Kitchen A and B, Hachioji Campus, TUT)

12:20 ~ 13:00: Campus visit

13:00 ~ 16:30: Culture visit (Mt. Takao)

17:00 ~ 19:00: Dinner (Ukai Toriyama, Asakawa, Hachioji)

December 6 (Friday): Industrial visit (08:50 meet at the entrance of KEIO Plaza Hotel Hachioji)

09:00 ~ 11:30: Industrial visit (Shimada Electric Manufacturing Company)

LEB: Learning and Experiment Building (講義実験棟) LB D: Learning Building D (講義棟 D)

Free Wifi for the conference:

SSID (for 5 GHz standard): TEUES24-5G SSID (for 2.4 GHz standard): TEUES24-24G

Key (for both 5 GHz and 2.4 GHz): Guest&N29T

Plenary Lecture

Plenary Lecturer:

Professor Qing-Long Han
Pro Vice-Chancellor (Research Quality), Swinburne University of Technology, Australia

Title: Dynamic Event-Triggered Distributed Coordination Control

Abstract: Distributed coordination control is the current trend in networked systems and finds prosperous applications across a variety of fields, such as smart grids and intelligent transportation systems. One fundamental issue in coordinating and controlling a large group of distributed and networked agents is the influence of intermittent inter-agent interactions caused by constrained communication resources. Event-triggered communication scheduling stands out as a promising enabler to strike a balance between the desired control performance and the satisfactory resource efficiency. What distinguishes dynamic event-triggered scheduling from traditional static event-triggered scheduling is that the triggering mechanism can be dynamically adjusted over time in accordance with both available system information and additional dynamic variables. This talk provides an up-to-date overview of dynamic event-triggered distributed coordination control. The motivation of dynamic event-triggered scheduling is first introduced in the context of distributed coordination control. Then some techniques of dynamic event-triggered distributed coordination control are discussed in detail. Implementation and design issues are well addressed. Furthermore, this talk exemplifies two applications of dynamic event-triggered distributed coordination control in the fields of microgrids and automated vehicles. Several challenges are suggested to direct future research.

Professor Han is Pro Vice-Chancellor (Research Quality) and a Distinguished Professor at Swinburne University of Technology, Melbourne, Australia. He held various academic and management positions at Griffith University and Central Queensland University, Australia. He received the Ph.D. degree in Control Engineering from East China University of Science and Technology in 1997.

Professor Han was awarded the 2024 IEEE Dr.-Ing. Eugene Mittelmann Achievement Award (the Highest Award in Industrial Electronics), the 2021 Norbert Wiener Award (the Highest Award in systems science and engineering, and cybernetics), the 2021 M. A. Sargent Medal (the Highest Award of the Electrical College Board of Engineers Australia), the IEEE Systems, Man, and Cybernetics Society Andrew P. Sage Best Transactions Paper Award in 2022, 2020, and 2019, respectively, the IEEE/CAA Journal of Automatica Sinica Norbert Wiener Review Award in 2021, and the IEEE Transactions on Industrial Informatics Outstanding Paper Award in 2020.

Professor Han is a Member of the Academia Europaea (The Academy of Europe) (MAE). He is a Fellow of The Institute of Electrical and Electronics Engineers (FIEEE), a Fellow of The International Federation of Automatic Control (FIFAC), an Honorary Fellow of The Institution of Engineers Australia (HonFIEAust), and a Fellow of The Chinese Association of Automation (FCAA). He is a Highly Cited Researcher in both Engineering and Computer Science (Clarivate). He has served as an AdCom Member of IEEE Industrial Electronics Society (IES), a Member of IEEE IES Fellows Committee, a Member of IEEE IES Publications Committee, Chair of IEEE IES Technical Committee on Networked Control Systems, and the Co-Editor-in-Chief of IEEE Transactions on Industrial Informatics. He is currently the Editor-in-Chief of IEEE/CAA Journal of Automatica Sinica and the Co-Editor of Australian Journal of Electrical and Electronic Engineering.

Keynote

Keynote Speaker:

Yuki Nakagawa
CEO of RT Corporation

Title: Transforming Light-Task Automation with AI and Robotics for Food Factories

Abstract: The integration of humanoid robots with advanced AI technologies has opened new frontiers in light-task automation within food factories.

This presentation explores how humanoid robots, equipped with cutting-edge sensors and embodied AI algorithms, are transforming the food industry by performing tasks that traditionally require human dexterity and decision-making. Focusing on applications across the food supply chain, including primary processing, manufacturing, and service industries, we will highlight the development and deployment of humanoid robots capable of collaborating seamlessly with humans.

By examining case studies and recent advancements, this talk aims to provide the future of task automation and its broader implications for both academia and industry.

Yuki Nakagawa is the founder and president of RT Corporation. RT was raised in 2005 for education and factory automation with AI and robotics. She is also the executive director of the New Technology Foundation, which organizes Micromouse, a maze analysis robot contest, and ROS society as a board member of ROSConJP (from 2018) and Open Robotics (USA, from 2022), a general incorporated association in Japan. In 2020, she received the Strait of Magellan Award. In 2022, she was certified as a fellow of robot education and food robotics from the Robotics Society of Japan. Since 2024, IEEE RAS industrial advisory group member.

APM&JAS 2024 Program (4 December, Wednesday)

12:45: Meet in Student Canteen, 4F, ROSE Kitchen B, Hachioji Campus, TUT

12:45 ~ 13:00: Group photo

13:00 ~ 13:10: Opening Ceremony (Room: LEB 402)

13:10 ~ 13:40 Plenary Lecture (Room: LEB 402)
Title: Dynamic Event-Triggered Distributed Coordination Control
Speaker: Qing-Long Han **Chair: Ciarapica Filippo Emanuele**

13:40 ~ 14:00 Keynote (Room: LEB 402)
Title: Transforming Light-Task Automation with AI and Robotics for Food Factories
Speaker: Yuki Nakagawa **Chair: Mihoko Niitsuma**

14:00 ~ 15:40 Technical Section 1 (Room: LEB 402)
Co-Chairs: Ruben Costa and Yuki Ueno

14:00 ~ 14:20
High Precision Tracking Control for Rotational Systems by Spatial Equivalent-Input-Disturbance Repetitive Control
Yujian Zhou, Jinhua She, Feng Wang, Seiichi Kawata

14:20 ~ 14:40
A Koopman-based Equivalent-Input-Disturbance Tremor-Suppressing Strategy
Mingyuan Xie, Jinhua She, Zhen-Tao Liu, Daiki Sato, Seiichi Kawata

14:40 ~ 15:00
A Robotic Vision System for Automatic Fish Quality Grading and Packaging
Mohamed L. Mekhalf, Saigopal Vasudevan, Jorge S. Calado, Dong Le Anh, Pablo Malvido Fresnillo, Jose Ferreira, Pedro Garcia, Paul Ian Chippendale, Ricardo J. Gonc¸alves, Jose L. M. Lastra, Fabio Poiesi

15:00 ~ 15:20
Posture Estimation and Obstacle Detection by Embedding Distance-Measuring Sensors in a Spherical Mobile Robot
Ryota Nakagawa, Yuki Ueno

15:20 ~ 15:40
A Comprehensive Overview of AGILEHAND Architecture and Integration
Mansoor Ahmed, Ruben Costa, Rui Branco, Jorge Calado, José Ferreira, Filippo Ciarapica, Franciso Fraile, Mohamed Mekhalfi

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15:40 ~ 15:50

Coffee break

15:50 ~ 17:30 Technical Section 2 (Room: LEB 402)

Co-Chairs: Daisuke Tsubakino and Dalila Antunes

15:50 ~ 16:10
An Algebraic Property of a Stochastic Riccati Equation for a Class of Stochastic LQ Optimal Control
Kento Fujita, Daisuke Tsubakino, Shinji Hara

16:10 ~ 16:30
Hierarchical LQ Optimal Control for LTI Systems with Low-rank Physical Interconnection
Daisuke Tsubakino, Shinji Hara

16:30 ~ 16:50
Digital Twin-Driven Demand Forecasting for Soft and Deformable Food Products
Laura Lucantoni, Stefano Croci, Giovanni Mazzuto, Severino Perenzoni, Filippo Emanuele Ciarapica, Maurizio Bevilacqua

16:50 ~ 17:10
Transforming Workforce Skills, Health, and Safety through Digitalization in Soft Product Manufacturing
Hezam Haidar, Paula Pereira, Margarida Tomás, Filippo Emanuele Ciarapica, Dalila Antunes

17:10 ~ 17:30
Remaining Useful Life Prediction for Tool Considering Individual Differences
Baokang Zhang, Jiahui Huang, Ning Li, Kentaro Ishii, Ryuichi Yashima, Takahiro Arakawa

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14:00 ~ 15:40 Technical Section 3 (Room: LEB 403)
Co-Chairs: Christophe Normand and Yinli Chen

14:00 ~ 14:20
Peak Factor Method for Predicting Maximum Response and Control Force on Across-Wind Direction for Active Structural Control
Yinli Chen, Ryuki Kamano, Daiki Sato, Kou Miyamoto

14:20 ~ 14:40
Exploring Dataset Generation Methods for Instance Segmentation: Application for Stacked Meat Products
Hoang Pham, Dong Le, Pablo Malvido Fresnillo, Saigopal Vasudevan, Jose L. Martinez Lastra

14:40 ~ 15:00
Human-Robot Collaboration System With Task Prediction and Spatial Memory
Kota Tahara, Yuya Sugimoto, Mihoko Niitsuma

15:00 ~ 15:20
Equivalent Passive Model for Gain-Scheduling Control of Active Base-isolated Structures with Nonlinear Viscous Dampers
Yunhao Zhang, Daiki Sato, Yinli Chen, Jinhua She, Kou Miyamoto

15:20 ~ 15:40
Effect of Noise in Wind Force Estimation Using Equivalent-Input-Disturbance Method for Nonlinear Systems
Razelle Dennise A. Soriano, Daiki Sato, Chen Yinli, Kou Miyamoto

15:40 ~ 15:50
Coffee break

15:50 ~ 17:10 Technical Section 4 (Room: LEB 403)
Co-Chairs: Masami Iwase and Giuseppe Aiello

15:50 ~ 16:10
Development of Cable Laying Robot based on Reconfigurable Single Actuator Wave Mechanism
Yuki Sadasue, Fuga Inagaki, Masami Iwase

16:10 ~ 16:30
Development of a Nonverbal Information Analysis System based on Wearable Device
Jiaren Hu, Jinseok Woo

16:30 ~ 16:50
Proposal of Mobile Robot-Restrained UAV Trainer
Daichi Arai, Edwardo F. Fukushima

16:50 ~ 17:10
Interior Acoustic Control System Using Boundary Vibration with Giant Magnetostrictive Actuator: Experimental Consideration on Installation Point of Actuator for Improvement of Noise Reduction
Wu Wenbao, Yudai Tanaka, Kentaro Sawada, Taro Kato, Ikkei Kobayashi, Jumpei Kuroda, Daigo Uchino, Kazuki Ogawa, Keigo Ikeda, Ayato Endo, Takayoshi Narita, Hideaki Kato

17:30 ~ 17:40 Closing Ceremony (Room: LEB 402)

18:00 ~ 20:00: Gala dinner (Nihonkaku) (17:30 leave from LEB 402)

APM&JAS 2024 Program (5 December, Thursday)

09:00 ~ 10:30: Laboratory visit **(**08:50 meet at the entrance of Research Building C**)**
Laboratories: C106, C107, and C203, Research Building C, Hachioji Campus, TUT

Lab C106: Light and Energy (Ohkubo)

Lab C107: Land and Sea Mobile Robotics (Fukushima)

Lab C203: Human-Centric Mobility (Woo)

10:30 ~ 11:30: Digital Twin Center (Administration Building, Hachioji Campus, TUT)

11:30 ~ 12:20: Lunch (Student Canteen, 4F, ROSE Kitchen A and B)

12:20 ~ 13:00: Campus visit (16F, Katayanagi Research Institute)

13:00 ~ 16:30: Mt. Takao (13:00 meet at 16F, Katayanagi Research Institute)

17:00 ~ 19:00: Dinner (Ukai Toriyama, Takao) (Leave at 16:30 to Ukai Toriyama)

APM&JAS 2024 Program (6 December, Friday)

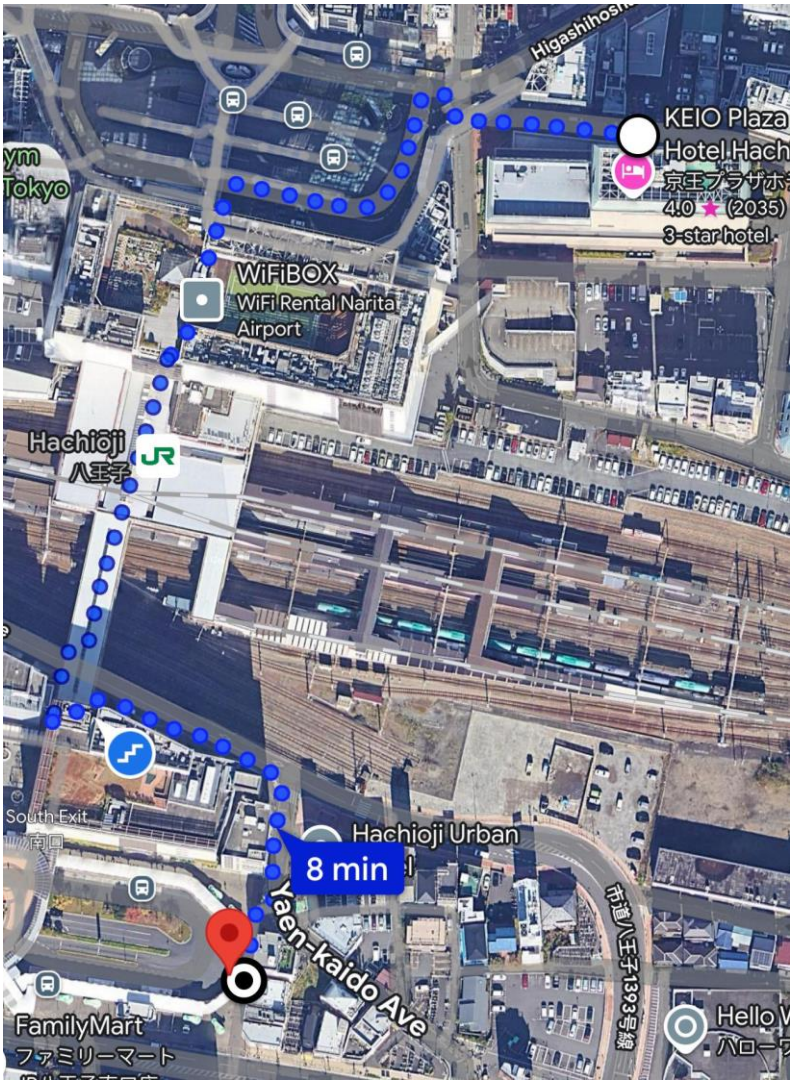
09:00 ~ 11:30: Industrial visit (Shimada Electric Manufacturing Company)
(08:50 meet at the entrance of KEIO Plaza Hotel Hachioji**)**

Shimada Electric Manufacturing Company

Established in 1933, this factory in Hachioji manufactures elevator lights, indicators, panels and buttons. While you may never care about the design of an elevator button,, Shimada products are undoubtedly unique and instantly recognizable. On a huge wall, there are more than 1,000 elevator buttons of different shapes and colors that light up when pressed, and you can try to press them all as fast as you can.

Map

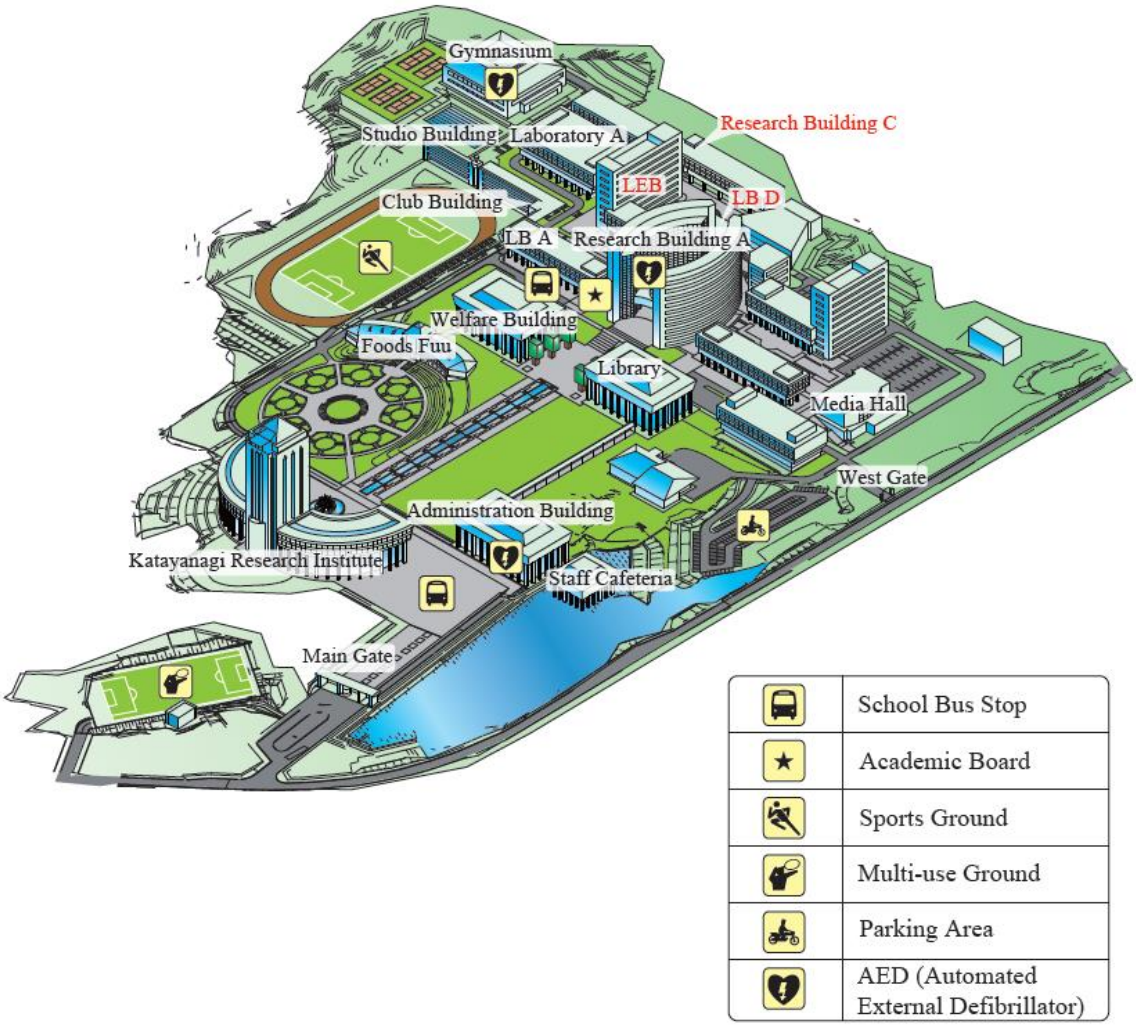
From KEIO Plaza Hotel Hachioji to the school bus stop at JR Hachioji Station (JR Hachioji South Exit, Bus stop 4)



School bus schedule:
https://www.teu.ac.jp/campus/access/2024_0408bus.html#schedule02

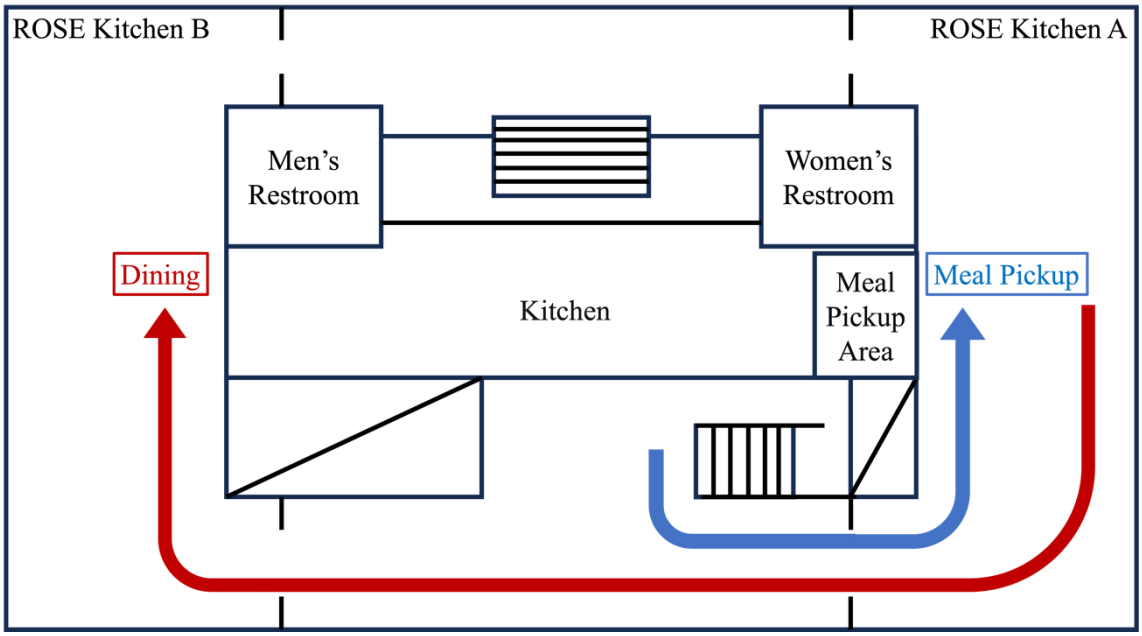
Bus stop 4
JR Hachioji South Exit

School Map



	School Bus Stop
★	Academic Board
	Sports Ground
	Multi-use Ground
	Parking Area
	AED (Automated External Defibrillator)

ROSE Kitchen A and B (Student Canteen 4F)

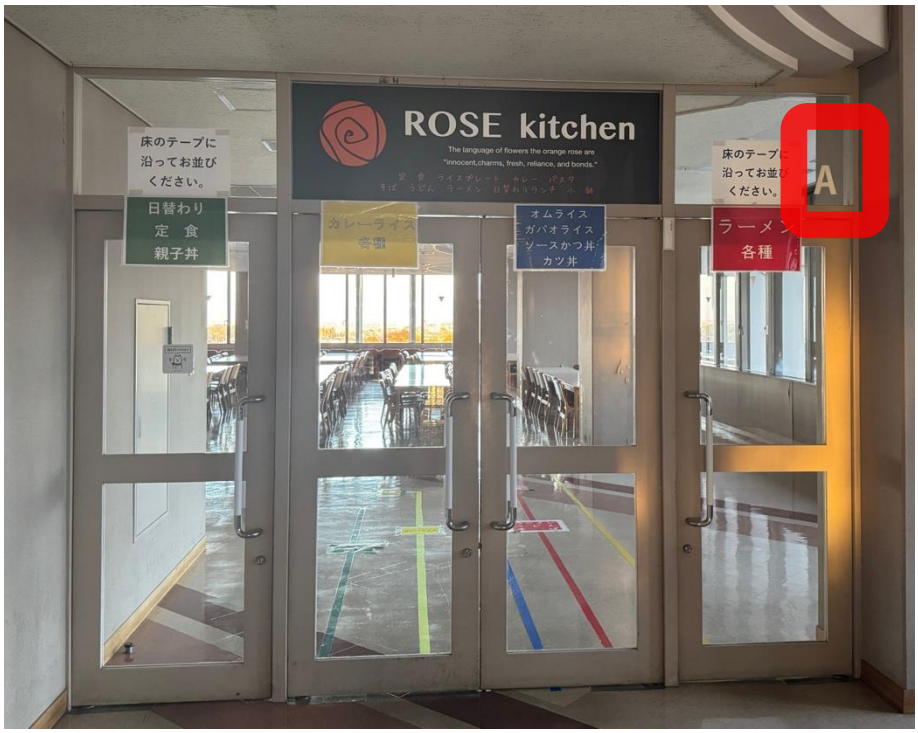


Procedures for Lunch

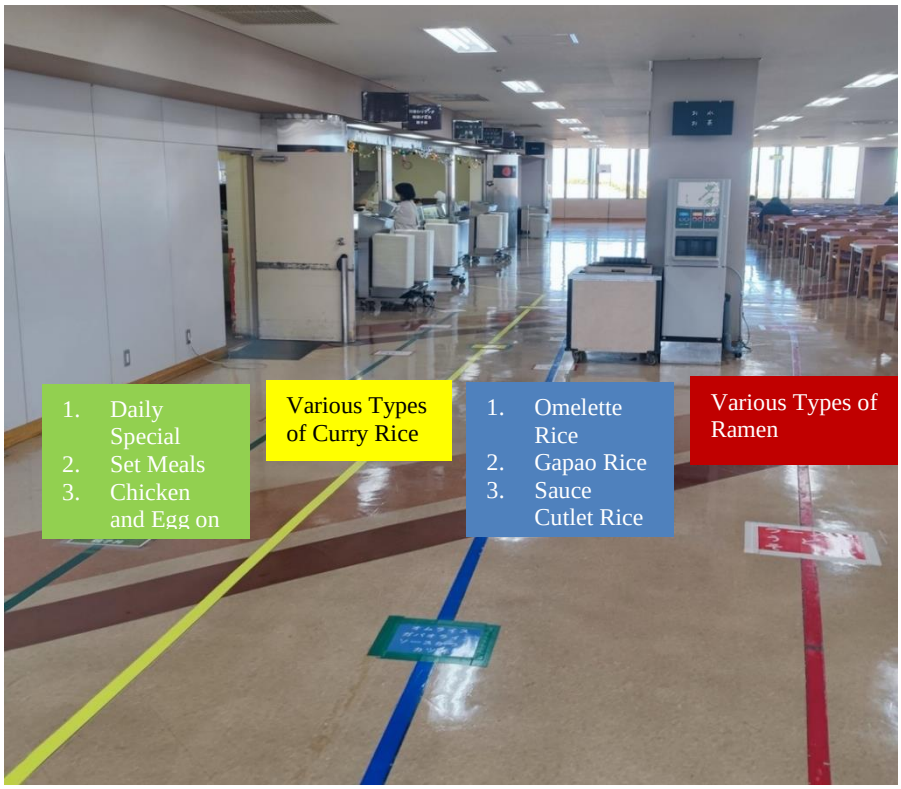
Step 1: Turn right after entering Student Canteen.

Step 2: Go up to the 4th floor (ROSE Kitchen A on the right side and ROSE Kitchen B on the left side).

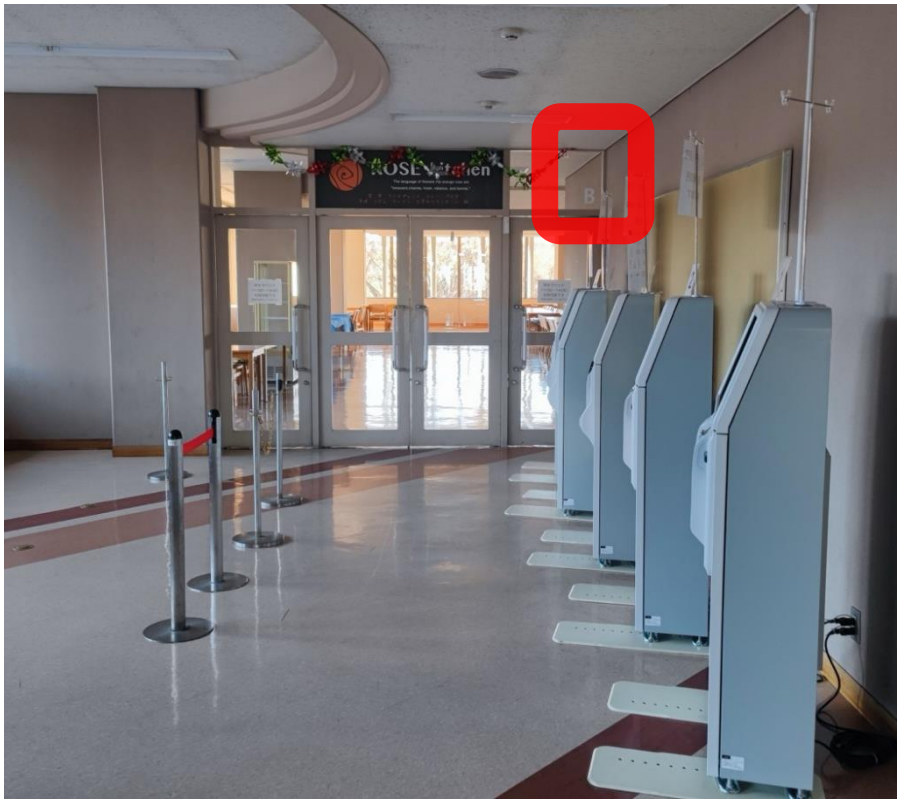
Step 3: Go to **ROSE Kitchen A**



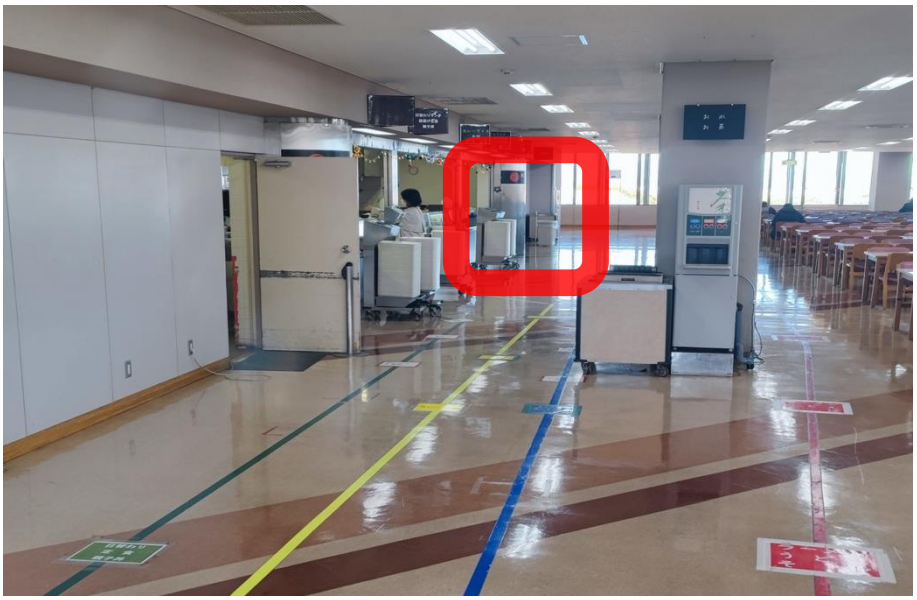
Step 4: Follow the guide line to the lunch counter of your choice.



Step 5: Take your lunch to **<u>ROSE Kitchen B</u>** and eat there.



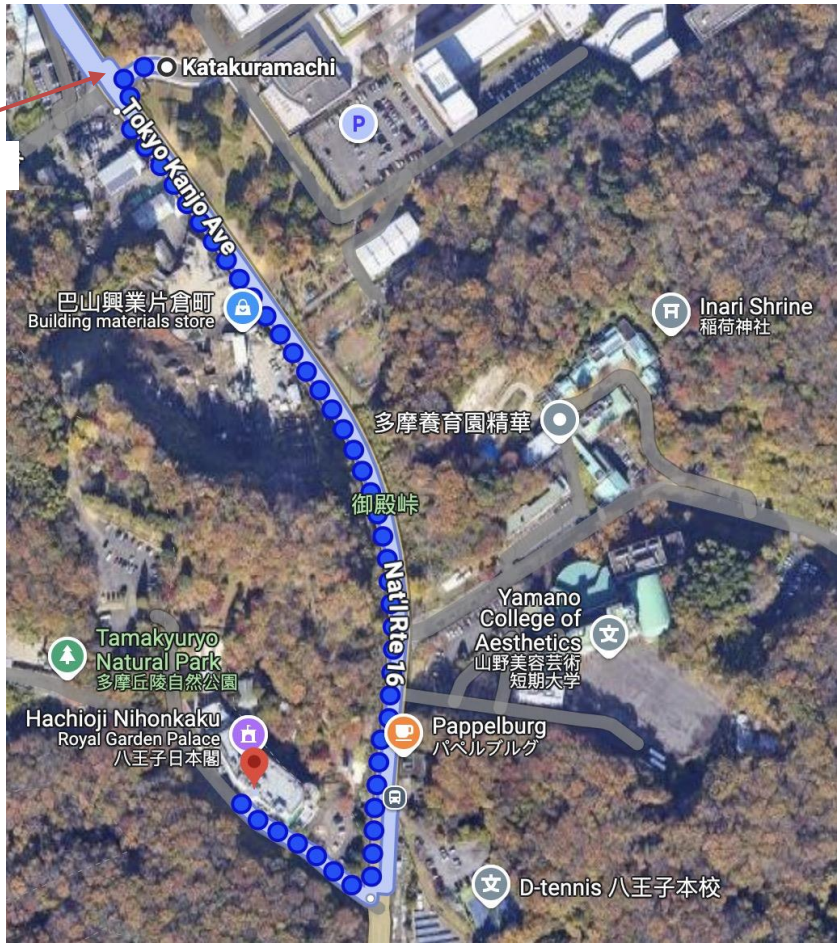
Step 6: After meal, take the dishes to the dish return slot in **ROSE Kitchen A**.



Nihonkaku (Gala dinner)

From Tokyo University of Technology to Nihonkaku (about a 10-min walk)

West Gate of TUT



Map

From KEIO Plaza Hotel Hachioji to Shimada Electric Manufacturing Company