

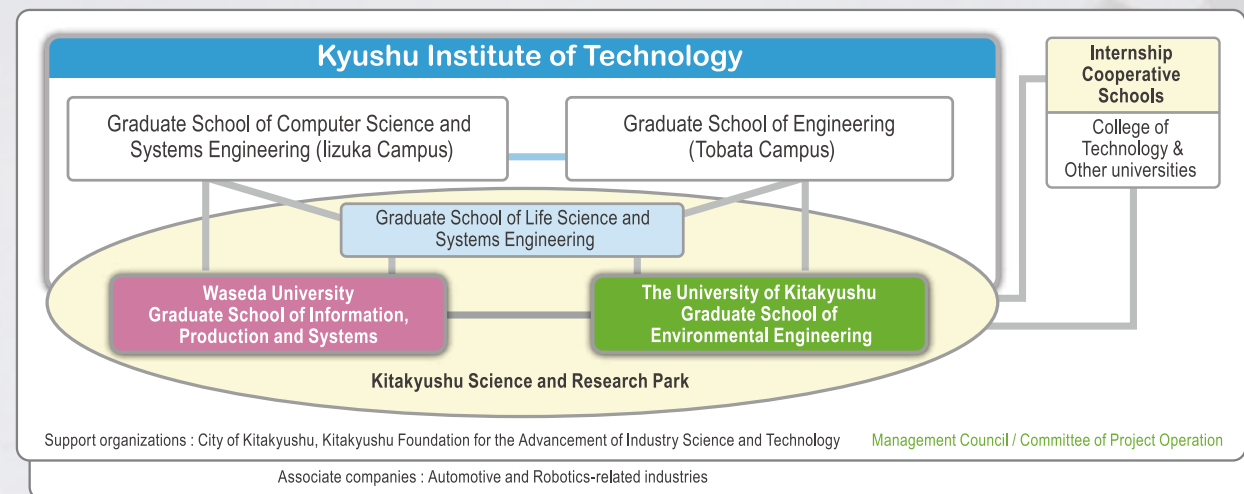
Welcome to Car-Robo Joint Graduate School

Cutting-edge technological advances have been achieved in both the automobile and robot industries. For example, a driving safety support system has been installed even in small cars, and intelligent cleaning robots are used widely in homes around the world. The development of intelligent robots for nursing and household services is also anticipated, addressing the needs of aging societies. This outlook highlights the necessity to continue and enhance the development of intelligent cars and service robots, an endeavor that involves several fields of engineering such as **mechanics, electronics, and control and information engineering**. There is a need for **engineers who have advanced specializations and comprehensive knowledge of interdisciplinary engineering**. However, the present engineering education systems in universities, which divide the fields by specialization, make it difficult to foster such engineers.

In the northern Kyushu region of Japan, the automotive industry is a key industry, with production reaching nearly 1.5 million vehicles per year. Robotics has established a presence in this region, with enterprises such as an industrial robot manufacturer and venture corporations making service robots. An exciting industrial infrastructure for both cars and robots is developing in northern Kyushu.

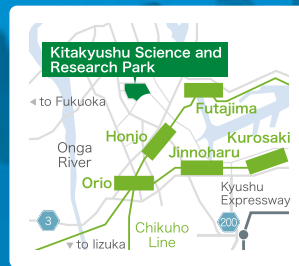
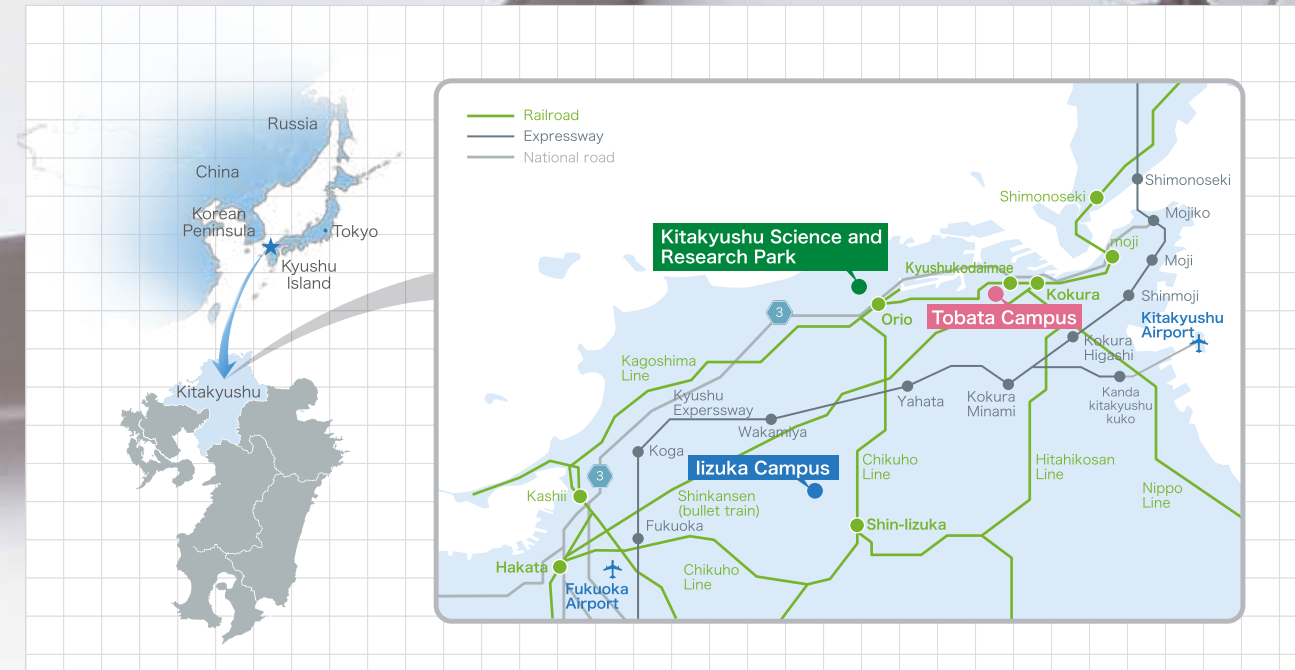
The Kitakyushu Science and Research Park has a campus that includes three graduate schools of engineering: **Kyushu Institute of Technology, the University of Kitakyushu, and Waseda University**, which are national, public, and private universities, respectively. In 2008 these schools established The Joint Graduate School Car Electronics Course, which has received high evaluations. **The Joint Graduate School Intelligent Car and Robotics Course** started in 2012, offered by these three graduate schools in the Kitakyushu Science and Research Park plus the Graduate School of Engineering in Tobata and the Graduate School of Computer Science and Systems Engineering in Iizuka, supported by companies such as **Toyota Motor, Nissan Motor, Denso, and Yaskawa Electric Corporation as well as a ministry of Japan***. This program utilizes the know-how gained through the earlier Car Electronics Course, combines several fields of expertise to enhance the functionality of intelligent cars and robots, and establishes a new educational structure.

The purpose of the Joint Graduate School is to **foster highly skilled personnel** who will **gain practical ability as leaders to support next-generation technology, mastering their special fields, understanding the peripheral technology, and leading research and development teams in technical fields focusing on intelligent car and robot technology**. Substantial development is anticipated in the field of intelligent electric cars, and the Joint Graduate School Intelligent Car and Robotics Course is expected to be an integral driver in this development.



*This program has been supported since 2012 by the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan, as a Program for Promoting Inter-University Collaborative Education.

Access Map



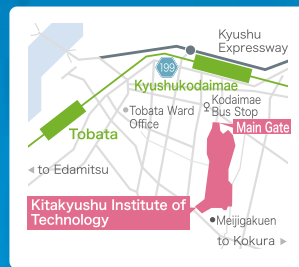
Kitakyushu Science and Research Park

For public transportation:

- JR Orio Station → Orio Station West Gate Bus Stop (Orio Eki Nishiguchi Bus Tei) → City Bus (Shiei Bus) → KSRP Gakentoshi Hibikino Bus Stop (Gakentoshi Hibikino Bus Tei) ※ It takes 15 minutes

For driving:

- Kitakyushu Highway Kurosaki Exit. Get off at Kurosaki Orio Exit and head toward Orio → Kitakyushu Science and Research Park ※ it takes 20 minutes from Kitakyushu Highway Kurosaki Exit.

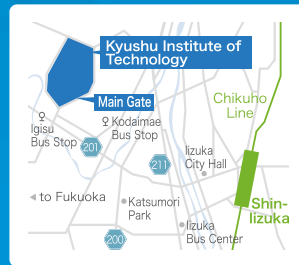


Kyushu Institute of Technology (Tobata campus)

For public transportation:

- JR Kokura Station → Kagoshima Line → Get off at Kyushu Kou Dai Mae Station. Walk 8 minutes ※ it takes 15 minutes total

- JR Hakata Station → Kagoshima Line → Get off at Kyushu Kou Dai Mae Station. Walk 8 minutes. ※ it takes 1 hour and 15 minutes by rapid train, 2 hours by local train



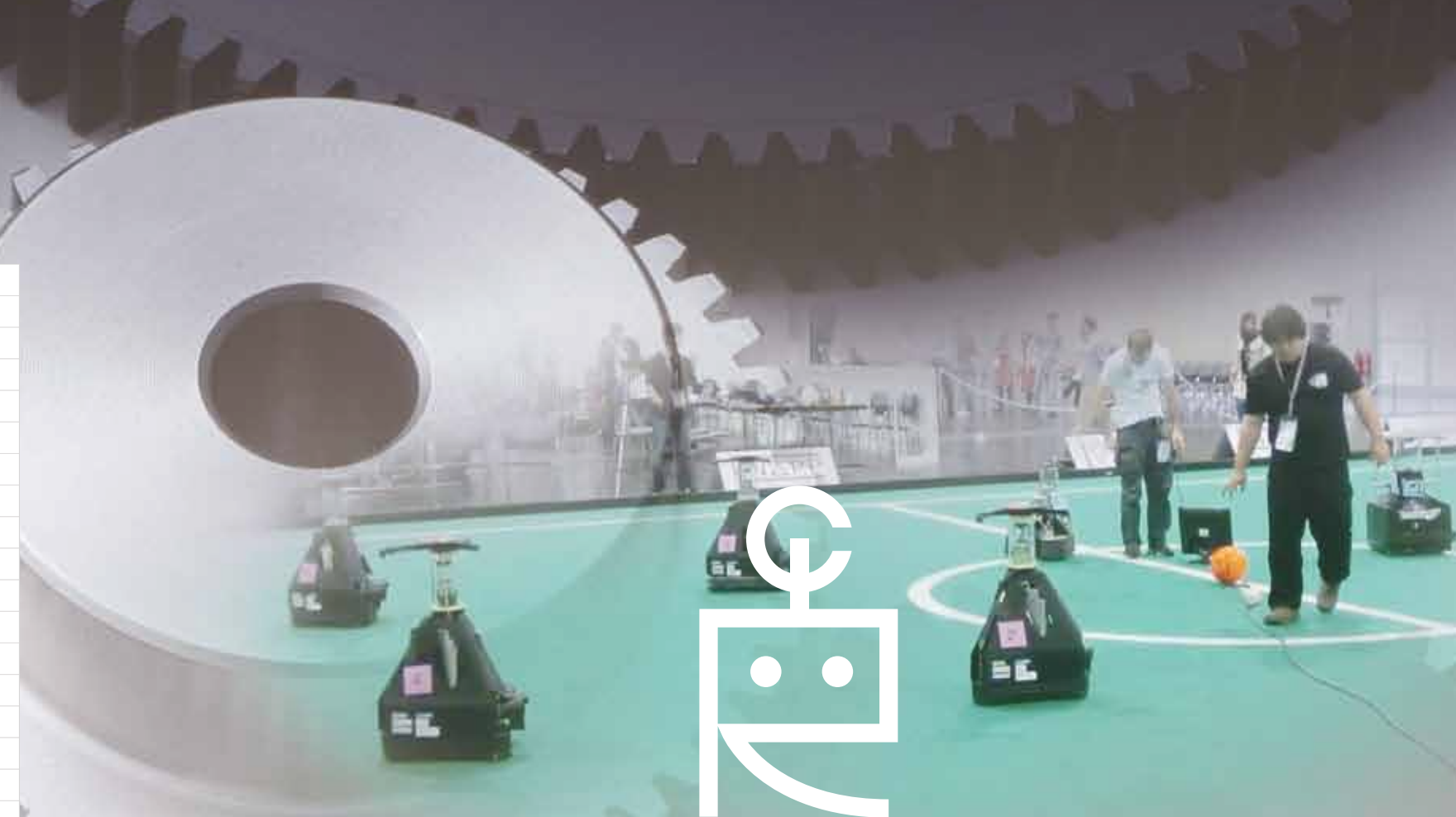
Kyushu Institute of Technology (Iizuka campus)

For public transportation:

- JR Hakata Station → Fukuohu Yutaka Line → Get off at Shin Iizuka Station ※ it takes 40 minutes by rapid train, 55 minutes by local train
- JR Kokura Station → Kagoshima Line → Transfer at Orio station to Fukuohu Yutaka Line (Chikuho Line) → Get off at Shin Iizuka Station ※ it takes about 1 hour.
- From Shin Iizuka Station, by school bus (every 20-30 minutes) ※ it takes 14 minutes.

For driving:

- From Fukuoka direction → Yagiya Toge to Tagawa direction, turn left at Gomuta Junction ※ it takes 10 minutes from JR Shin Iizuka Station



CAR-ROBO JOINT GRAD SCHOOL

Joint Graduate School Intelligent Car & Robotics Course



INTELLIGENT CAR & ROBOTICS

Kitakyushu Science and Research Park, Japan

The University of Kitakyushu

Kyushu Institute of Technology

Waseda University

Joint Graduate School Intelligent Car & Robotics Course

Promotion Office of Joint Graduate School:
car-robo-jimu@isse.kyutech.ac.jp
<http://www.kyutech.ac.jp/car-robo/english/>



INTELLIGENT CAR & ROBOTICS

Comprehensive Practicum Subjects held in two weeks from mid-August to mid-September, and accepted as international internship course

Moving robot control

The control of systems consisting of multiple robots with several sensors and actuators that perform coordinated tasks is currently an important and challenging field of research. In the Moving Robot Control practicum, students learn the action control and cooperative control system of plural autonomous moving robots which are designed to play soccer (RoboCup Soccer Robots). The practicum has two main sections: I, the design and manufacturing of mechanical structures and control circuits using CAD software, and II, software programming exercises for motion control, self-localization, and cooperative action algorithms. The knowledge obtained is implemented in the design and execution of the robots' functions, and the engineering achievements are evaluated through pseudo-soccer matches and the students' presentations. Students are also encouraged to read the official rule book of the RoboCup Mid-size League in order to extract significant technical issues for developing a group of soccer-player robots.



@home service robot manufacturing

Using plural service robots for housekeeping at home (@home robots), students learn different techniques that are required for making autonomous service robots, such as machining CAD techniques using a 3D printer, sensing techniques using RGB-D sensors and laser range sensors, simultaneous localization and mapping (SLAM) techniques, arm/hand control, autonomous robot motion control, and image/speech recognition techniques. Team projects are also part of this practicum, in which the students are responsible for mastering and developing required techniques. On the final day, a competition to evaluate the students' achievements is held in which the developed @home robots are made to perform several designed tasks.



Recognition programming (held at Iizuka campus)

Students develop and improve the software programming of image processing for both driver monitoring (face direction and drowsiness estimation) for inside the car, and road condition recognition (e.g., traffic sign recognition, lane and pedestrian detection) for the car's outside view, where the images are obtained by a vehicle-installed camera. Then, applying the developed techniques to practical use in real environments, students try to improve their processing speed and robustness in recognition operation. They also participate in a comprehensive practicum using the developed techniques with high-performance GPS (RTK-GPS) and hand-held smart devices.



Driver Assistance Sensing Technologies

Students study the concept of applied measurement engineering, sensors, their structures and interfaces, and signal processing. Especially, a systematic study is carried out by the use of various sensors: radar, laser radar, infrared cameras, optical sensors and imaging sensors, which play a central role in intelligent cars and robots. Also, they can construct high performance and functionality sensor fusion systems with an FPGA and a signal processor. On the final day, a competition evaluating their achievements is held using the developed driver assistance sensor systems.



Minicar / minirobot manufacturing

Students construct a small vehicle or a mini-robot by designing the parts with CAD/CAM, building a mechanism and considering the control method for tracing desired routes or running on rough roads. They experience the essence of robot design while learning advanced technologies of software development using MATLAB and hardware design based on CAN in-vehicle communication systems. Their individual work is complemented by projects in which teams compete with each other in a competition testing obstacle-avoidance navigation or bad-road traveling. This practicum is for students who have no special knowledge about programming and hardware such as CAN bus and ECUs (electronic control units), and the purpose of this practicum is to acquire the basic techniques required for developing automobile/robotics controls.



Small-size EV autodiving control

Students develop autonomous driving systems for small-size EVs (electric vehicles). They also develop control systems for mini-EVs and conduct control simulations using a vehicle simulator. Students use real EVs in the practicum for autonomous driving control, and students take their share of the responsibility for developing techniques including the implementation of sensing devices such as stereo-cameras and laser-range sensors, and techniques for self-localization, route search, and driving control. On the final day, a competition evaluating their achievements is held in which the developed EVs perform autonomous driving.



Features of the Three Universities

Kyushu Institute of Technology (Kyutech)

Features

A national engineering university with a one hundred year history. Based on our fundamental principle, "to instill a deep knowledge of science and engineering in high caliber students", we set our goal to become "information sources to send out knowledge and culture".

Affiliated Graduate Schools

Graduate School of Life Science and Systems Engineering (LSSE) (in Kitakyushu Science and Research Park)

Research and developing innovative computer and information systems. Fostering highly-skilled information engineers and researchers to lead the 21st century.

[Strengths in this course]

Robotics, Brain-Like Intelligent Devices and Brain-Inspired

Information Processing Technology

Graduate School of Engineering (in Tobata Campus)

The top-runner of research and development in space, energy and QOL areas.

[Strengths in this course]

Mechanical Engineering

Graduate School of Computer Science and Systems Engineering (in Iizuka Campus)

Research and developing innovative computer and information systems. Fostering highly-skilled information engineers and researchers to lead the 21st century.

[Strengths in this course]

Information Engineering, Image Processing, and Pattern Recognition



Graduate School of Life Science and Systems Engineering (LSSE) (in Kitakyushu Science and Research Park)



Graduate School of Engineering (in Tobata Campus)



Graduate School of Computer Science and Systems Engineering (in Iizuka Campus)

The University of Kitakyushu

Features

A prefectural and municipal university with a sixty year history, having a total number of 7,000 students. Five faculties and four graduate schools have been established in both the Kitagata and Hibikino Campuses.

Affiliated Graduate School

Graduate School of Environmental Engineering (in Kitakyushu Science and Research Park)

Conducting peerless research and technology development blending environmental and information technologies. Fostering engineers who play active roles in ubiquitous society.

[Strengths in this course]

Machining technique, sensing technology, information/communication technology and embedded system technology.



Waseda University

Features

The most famous private university in Japan, having a proud 125-year tradition producing many celebrities. It has 10 faculties, 13 departments and 21 graduate schools.

Affiliated Graduate School

Graduate School of Information, Production and Systems (IPS) (in Kitakyushu Science and Research Park)

Integrate the three fields: I (Information Architecture), P (Production System) and S (System LSI) through a total perspective. Fostering a large number of highly-skilled engineers and researchers for an international era aiming at co-creation of knowledge in the Asia-Pacific region.

[Strengths in this course]

Automobile Engineering

