

## Laboratory Profile

# Aerospace and Intelligent Systems Laboratory (AIS Lab) ▶ <http://aislab.sdm.keio.ac.jp/>

### Director

#### Associate Prof. Naohiko Kohtake

Prof. Kohtake worked in R&D at the Japan Aerospace Exploration Agency (JAXA) and the European Space Agency. His specialties are design and management of space systems and ubiquitous systems, systems engineering, and user interfaces.

### Lab Profile

At the Aerospace Intelligent Systems Lab (AIS Lab.), Associate Prof. Naohiko Kohtake, Assistant Prof. Nobuaki Minato and Assistant Prof. Sun Kim are the main members who conduct research together with professors and students that possess rich work experience in the aerospace field including Prof. Ohkami, Prof. Nishimura and Associate Prof. Shirasaka. The research topics are varied, from aerospace systems

### Main faculty members

#### Deputy Director

#### Assistant Prof. Nobuaki Minato

Prof. Minato worked for Japan Aerospace Exploration Agency (JAXA) and Avion de Transport Regional, Toulouse, France (ATR.) His specialties are business system dynamics and aerospace management.

#### Assistant Prof. Sun Kim

Prof. Kim was a research assistant at Stanford University, after working for BMW AG, Johnson and Johnson, and serving in the Korean Army. His specialties are design for manufacturing, DFX, service science, location-based services, and healthcare engineering.



Observations / Interviews



Workshop



Simulations



Rapid Prototyping



Practical Experiments

to systems closely related to daily life, so that the achievements of the research can be shared and can contribute to society. The research includes not only technological research but also value creation in society and financial feasibility. The goal is to propose new services, products and systems from the users' standpoint. AIS Lab meets every Monday for seminars and discussions.

## Main research topics

### 1 Location service with space technology



Quasi-zenith satellites © JAXA

Positioning technology, such as GPS, is broadening the field of application, as more than 60 million mobile phones in Japan are equipped with GPS location service. Accordingly, many location services have been created, including the provision of safety and security information; examples include emergency messages, informing parents of their children's location, and customer guidance by location-based advertisements. AIS Lab conducts research in cooperation with public, private and academic organizations, mainly on Indoor Messaging System (IMES) technology created by Japanese space technology, and basic technologies such as positioning technology and space information technology required in the development of positioning services and their platforms, and new positioning services. In particular, AIS lab is cooperating with JAXA, telecom and railway industries, and advertising agencies in design and demonstration experiments for commercial viability.

### 3 Integration of design approach and systems engineering

AIS Lab conducts research to change society and business by integrating design approach and systems engineering. Design methods for increasingly complex systems and services are created, applied, and evaluated on their effectiveness. In particular, product service systems, location-based services, and healthcare delivery systems are examples. Our specialty is conducting practical research by collaborating with relevant business industries.



Lab Summer Camp in 2010

### 2 Sustainable business design method and management theory



Communication System Dynamics Simulator

“Sustainability” tends to be thought of as relating to global environment or biodiversity, but the basic concept of sustainable design can be applied to businesses and social systems. AIS Lab is engaged in research on the most appropriate design methods and management methods applying sustainability to large-scale and complex business systems and social systems, such as the joint research with a French graduate school on a sustainable air transport system, and development with a foreign company of simulators to optimize a marketing communication strategy. The SORA seminar is held every Wednesday evening on Hiyoshi Campus. Non-member business participants are also welcome to attend to learn more about aerospace research and education.

### 4 Other research

In addition, faculty members and students individually conduct research on themes they find of interest in collaboration, where necessary, with related parties inside and outside the lab. The main research topics are as follows:

- Design and operation of a space situational awareness system to observe space debris
- Location-based service platform to be able to customize privacy and usability
- Building of a compound location sensing platform for indoor and outdoor seamless positioning system
- Safe and smooth snow removal system for roads in snow zones
- Finance scheme for dual-use satellite
- Application of systems engineering method to small satellite development

The AIS Lab is actively involved in international collaborations and participates in student exchanges with foreign organizations. For example, an SDM student is studying at OTB Research Center, Delft University of Technology (TU Delft), in the Netherlands, and two students from TU Delft are working at the AIS Lab.



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System Design and Management