



What is the Sustainable ITS project?

ITS - Intelligent Transport System or Intelligent Transport Services - tries to solve various transport related issues through traffic, control, and computer & communication engineering techniques for achieving liveable societies. The issues include those to mitigate negative effects produced by transport, such as how to increase road safety, or how to reduce NOX emission, and those to encourage the positive effects of transport, such as how to provide mobile multimedia environment or how to give the freedom of mobility to handicapped and elderly citizens.

Achieving these goals requires not only leading edge research results in each independent research areas, but also inter-disciplinary research results through team-working and intense discussions among researchers in these research fields.

ITS, in particular the Intelligent-Transport-Service aspect, requires us to change our attitude toward research. Seed-oriented, or interest-driven research, as was common in our research community, is inappropriate for achieving such service-oriented goals. ITS requires need-oriented research by setting up proper goals through intense discussion amongst government, private and academic researchers and planners.

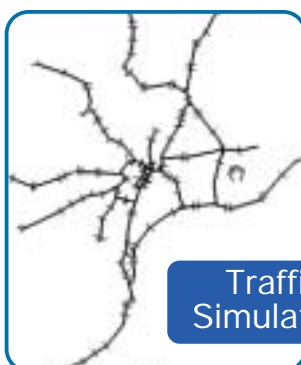
The Sustainable ITS project, sponsored by the Center for Collaborative Research (CCR), provides not only an inter-disciplinary research environment consisting of traffic, control, computer & communication, and other engineering fields but also for multi-sector research environment consisting of private, government and academic researchers and planners. Through the engagement between these inter-disciplinary and multi-sector research members, the project aims to provide advanced ITS services, to create new ITS industries and to help to achieve liveable societies.

Goals of the project

The title of our project, Sustainable ITS, reflects the dual aspects of our research. ITS research & development aims to provide safe, clean, and efficient mobility for sustainable societies. At the same time, for the healthy expansion of ITS research & development community, it is necessary to be accepted by taxpayers and sponsoring agencies for its usefulness, and by the business community for its potential in creating new ITS industries. The Sustainable ITS project aims both to create sustainable mobile societies and to create new ITS industries.

The project has the following objectives which are of benefits for participating companies:

- 1) To create new ITS concepts, meanings and research directions through discussions amongst researchers from different backgrounds;
- 2) To efficiently conduct research by sharing common research facilities, tools and research results amongst researchers from ITS related private companies and universities;
- 3) To set up new alliances, for the creation of new ITS businesses, amongst private companies with different component techniques;
- 4) To cultivate new human resources and to easily build up its own ITS R&D teams;
- 5) To access transportation related database owned by the public sectors, otherwise un-available, through the CCR partner program; and
- 6) To become a member of the international research community through the exchange of international visitors and professors to CCR.



CCR private-academia partnership program

Center for Collaborative Research (CCR), located at the Komaba Research Campus of the University of Tokyo, is jointly sponsored by the Institute of Industrial Science and the Research Center for Advanced Science and Technology of the University of Tokyo. CCR has two aspects in its missions: a research branch and a common facility. As a research branch of the university, CCR conducts large-scale private-academia joint projects under the U-Tokyo partner program. As a common facility for U-Tokyo researchers, CCR provides support services to all university-wide researchers for commercializing their research results under the U-Tokyo incubation program.

Sustainable ITS project started as a CCR partner program in April 2003, with the participation of the following seven partner companies:

Aisin AW
Social System Research Institute
Chodai
Toshiba
Panasonic
Mitsubishi Heavy Industries
Mitsubishi Precision

This project is, in part, supported by Ministry of Education, Culture, Sports, Science and Technology, Grant-in-Aid for Scientific Research (A) and by Ministry of Land, Infrastructure and Transport. Its advisory board members consists of those from National Police Agency, Ministry of Economy, Trade and Industry, Ministry of Land Infrastructure and Transport, Japan Highway Public Corporation, Metropolitan Expressway Public Corporation, Chiba Institute of Technology, Tokyo Metropolitan University, Saitama University, Nihon University, Toyota and Nissan .

Overview of the project

The central theme of this project is to develop a mixed-reality based experimental space for transportation for observing & measuring drivers behaviors, such as decision process for route choices, driving behaviors and



information responses in the experimental space, and to utilize such results for detailed evaluations of ITS system & designs.

The project, as shown in the figure below, has a three-layer structure. The first layer is a mixed reality based transportation space. The second layer is basic research on the human factor using the environment, and the third layer is ITS application research utilizing the research results.

The first layer, the mixed reality transportation space, consists of systematic and well-organized connections between a virtual laboratory and a real observation laboratory. The virtual laboratory develops a realistic virtual environment through the combination of a driving simulator and traffic simulation so as to be able to examine interactions of a driver in the simulator with surrounding virtual vehicles and pedestrians in a realistic setup. On the other hand, the real observation laboratory stores and manages observed data from various ITS sensors as well as experiment vehicles so as to feed reality into the virtual laboratory.

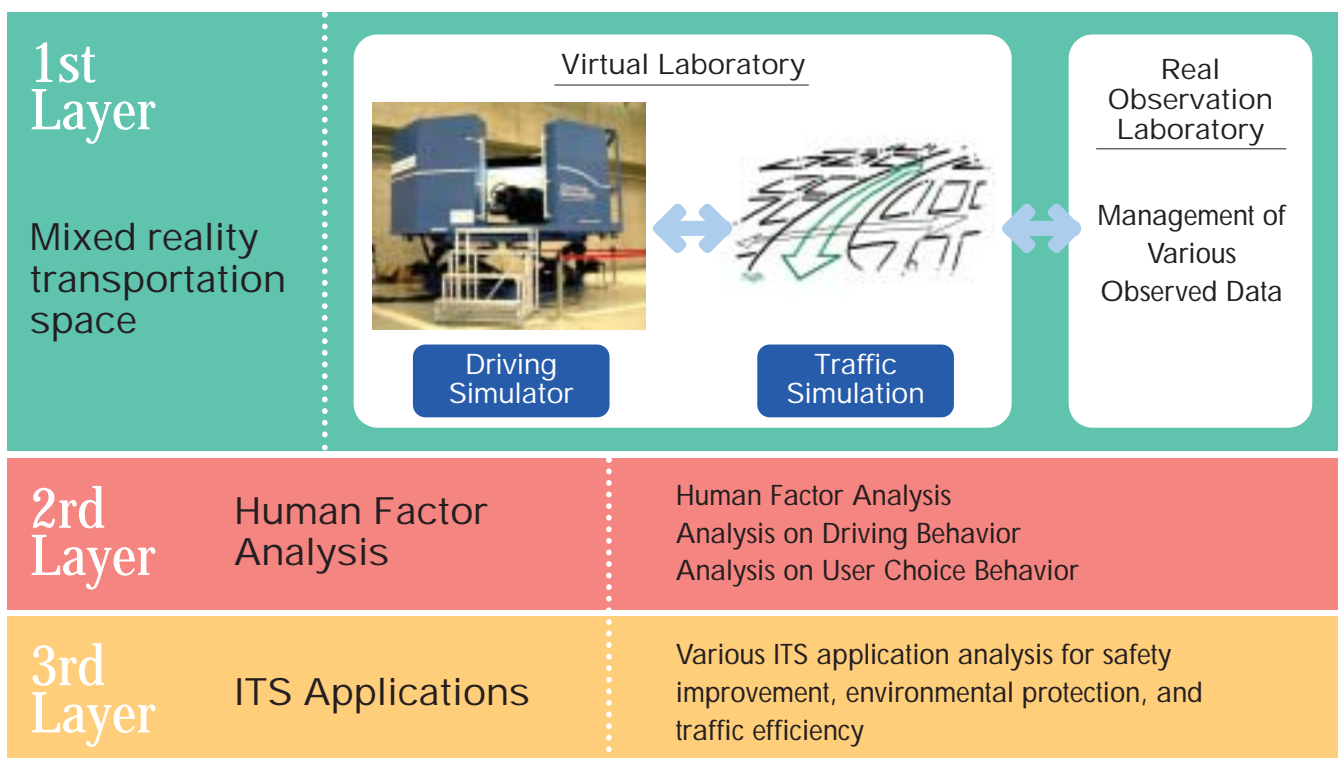
The virtual laboratory further includes interactions

between the driver and surrounding infrastructures. Here, the interaction includes not only primal static ones from the road infrastructures but also the secondary dynamic ones, such as traffic jams, unsafe conditions, modification of information provided by the infrastructures, and different traffic signal controls due to the behaviors of the driver and its surrounding vehicles and pedestrians. By combining these interactions with virtual vehicles, virtual pedestrians, and virtual infrastructures, we can get a realistic as well as a controlled environment for traffic experiments.

This systematic combination of real and controlled environment provides a totally new research paradigm. Traditional transport research has been conducted either through small-scale questionnaire-based experiments or large-scale expensive social experiments. This intermediate environment fills the gap between these two extreme cases for conducting convenient-but-realistic intermediate-scale research environment.

The second layer conducts a series of basic research, using the virtual environment, through the evaluation of human behaviors. Human behavior is one of the most important yet one of the largest unknown factors when evaluating traffic policies. This layer will provide an evaluation of various driving behaviors such as behaviors towards ITS equipments, responses from drivers towards traffic information, and driver's decision behaviors of route and trip timing, through the utilization of the mixed reality transportation space.

The third layer, application research based on the collected data, provides an evaluation of ITS system design and guidelines for the next generation of ITS systems in order to achieve sustainable and liveable societies.



Organisation Structure of Sustainable ITS Research Group

CCR • IIS

Interdisciplinary Engineering

【CCR】

Image Processing (Prof. Ikeuchi)
 Traffic Engineering (Prof. Kuwahara)
 Vehicle Dynamics & Control (Prof. Suda)

【Visiting Professors】

Prof. Tanaka (Toyota Map Master)
 Prof. Edward Chung (Australia)
 Prof. Staffan Nordmark (Sweden)

【Laboratories】

Ikeuchi, Kuwahara and Suda Labs

Private Companies

Toshiba (Electronic, Communication)
 Panasonic (Electronic, Communication)
 Aisin AW (Car Navigation)
 Mitsubishi Heavy Industries (Electronic, Machinery)
 Mitsubishi Precision (Simulator)
 Social System Research Institute (Consulting)
 Chodai (Consulting)

Sustainable ITS

Ministry University Industry

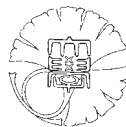
National Police Agency	Tokyo Metropolitan University
Ministry of Economy, Trade and Industry	Saitama University
Ministry of Land Infrastructure and Transport	Chiba Institute of Technology
Metropolitan Expressway Public Corporation	TOYOTA
Japan Highway Public Corporation	NISSAN
Nihon University	

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