



Ceremony to Celebrate the Installation of Experimental Intersection Was Held

The experimental intersection was installed in the Chiba Experiment Station (CES), Institute of Industrial Science (IIS), The University of Tokyo (UT), at the end of October 2006. It is expected that this would be effectively utilized for practical ITS studies and developments in industry-academia-government collaboration.

The ITS center held the ceremony to celebrate the installation there on 10 November 2006, when the Open House of CES was held. We invited Prof. Shigefumi Nishio, Vice-President of UT, Prof. Takafumi Fujita, Director of Division of University Corporation Relations of UT, Prof. Hidetoshi Yokoi, Director of the Center for Collaborative Research (CCR), Dr. Ching-Yao Chan, Visiting Professor of CCR / Associate Research Engineer of the California PATH Program, Prof. Masafumi Maeda, Director of IIS, and Prof. Taketo Uomoto, Director of CES, as special guests. Prof. Katsushi Ikeuchi, Director of the ITS Center, Prof. Yoshihiro Suda, and Mr. Toshihisa Tanaka, who are members of the ITS Center, attended the ceremony. Prof. Takahiro Suzuki, a member of the ITS Center, acted as Master of Ceremonies. At the ceremony, we celebrated the ribbon-cutting with all guests and attendants, lighting traffic signals by Prof. Nishio, and opening the decorative ball by Prof. Maeda. Then, all guests and attendants crossed at the crosswalk first, and electric vehicles driven by Prof. Ikeuchi and staffs of Prof. Yoichi Hori's laboratory passed through the intersection.

This experimental intersection is efficient for experimentation and evaluation in the real environment. Under the integrated traffic experimental environment "Mixed Reality Traffic Space," the ITS Center is working on its improvement and expansion. This installation would be a memorable first step.

The Open House of CES is the event where laboratories working prominently in CES introduce their achievements and equipment. This is held on the second Friday of November. The ITS Center introduces its activities each time. The subject is "Expansion of Sustainable ITS Studies and Projects," including "Introduction of Sustainable ITS Studies and Projects," and "Introduction of Experimental Intersection." Core members' laboratories also made presentations with panels as follows: "Introduction of ITS Group in Ikeuchi Laboratory," "Development of Traffic Simulation" (Kuwahara Laboratory), "Investigation of Various Traffic Phenomena and its Solution" (Kuwahara Laboratory), "Suda Lab ITS Project (Mechanical Engineering Approach)", and "Identification of Human Driver Model for a Universal ITS Simulator" (Suzuki Laboratory). The ITS Center also disseminates information about its activities widely through distribution of its flyer, newsletters that had been issued before, and the technical report of IIS "Seisan-Kenkyu" *(Feature on Symposium Commemorating the Establishment of ITS Center, Vol.58, No.3, issued in 2006).

* Articles of "Seisan-Kenkyu" are now available at <http://www.iis.u-tokyo.ac.jp/>.

Kochi ITS Seminar – UT ITS Seminar Series (1) held

“Kochi ITS Seminar : ITS Seminar Series (1), The University of Tokyo” was held on 14 November, 2006, at The Museum of Art, Kochi, under the auspices of Kochi ITS PC*1, ITS Center*2, and under the joint auspices of NILIM*3, Tosa NHO*4, Kochi Pref., and KUT*5.

In the first session, entitled “Activities in ITS Center, The Univ. of Tokyo,” Katsushi Ikeuchi (Director of the ITS Center) and other core members (Kuwahara, Suda, Suzuki, and Tanaka) took the platform and introduced our ITS research and development for the next generation in panel-discussion style. In the second session, Hideto Hatakenaka (Senior Researcher, NILIM), Yasuhiko Kumagai (Professor, KUT Regional ITS Infrastructure Research Center), Yasuyuki Matsui (Head of Tosa NHO), Hiromichi Kubo (Head of Road Division, Kochi Prefecture) introduced various ITS research and development activities in the Kochi Prefecture. In the last session all the presenters formed a panel discussion, discussing such issues as the differences between central and regional ITS research and development, the praiseworthy stance of the Kochi Prefecture towards community-oriented and effective measures under a limited budget, and the utilization of facilities and research outcomes of the ITS Center for promoting such efforts.

The ITS Center is planning to continue this kind of project and to gather and disseminate information that can help meet regional needs, concentrating on topics such as “Human resources development for regional ITS,” “Evolving community-oriented ITS,” and “Creating ITS business in regions by cooperation between industry, government and academia.”

*1 Kochi ITS PC = Kochi Prefecture ITS Promotion Council

*2 ITS Center = Collaborative Research Center for Advanced Mobility, Institute of Industrial Science, The University of Tokyo

*3 NILIM = National Institute for Land and Infrastructure Management, Ministry of Land, Infrastructure and Transport

*4 Tosa NHO = Tosa National Highway Office, Shikoku Regional Development Bureau, Ministry of Land, Infrastructure and Transport

*5 KUT = Kochi University of Technology



Special Course in ITS for Working People 2006

The Special Course in ITS for Working People 2006 was held on Oct. 29 and 30 at Komaba Convention Hall, under the joint auspices of CCR, FPIS*1, and the ITS Center. This time, compared to last time, the number of sessions and the number of presenters was doubled, and the contents was enhanced. This may have contributed to gathering more than 250 requests for participation from companies, local governments, and universities, including students.

CCR held the Course as conceived last year, driven by the conviction that their important task is to make a broad contribution to society by developing human resources in this field / usually not easy in companies and local governments / and by widely releasing cooperative study results in "Sustainable ITS" since 2003.

The course was organized by presentation of lectures by core and support members of the ITS Center, culminating in the presentation of Prof. Masao Kuwahara, an alternate director of CCR. In the evening of the first day, a fellowship banquet was held with 70 attendees. Also, after the last lecture on the second day, participants had an opportunity to visit laboratories of Center members and to experience the latest study results at the university. It is expected that the participants will become competent human resources in next-generation ITS, and the Course has been a help for future human networking, research and development, and practical application.

*1 FPIS = The Foundation for the Promotion of Industrial Science

11/29 Chairman Mr.Toshihisa TANAKA

[Opening Speech]

Prof. Hidetoshi YOKOI (Director of Center for Collaborative Research, The University of Tokyo)

Prof. Katsushi IKEUCHI (Director of Collaborative Research Center for Advanced Mobility (ITS center))

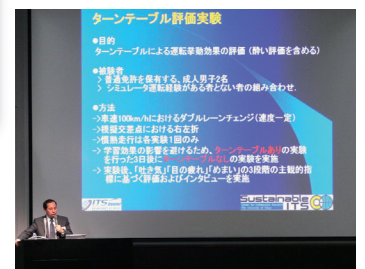
Title of Lecture	Lecturer
『ITS for Livable Society』	Prof. Katsushi IKEUCHI
『Traffic Management with Better Exploitation of ITS』	Prof. Masao KUWAHARA
『Impact of Cutting Down of Exhaust Pollutant Gases and Particles from Automobiles on Air Contamination Close to Heavy Traffic Road』	Prof. Shinsuke KATO
『Mixed Reality Traffic Space with Universal Driving Simulator』	Prof. Yoshihiro SUDA
『Human Driver Model for Integrated ITS Platform and Advanced Driver Assistance and Traffic Control with the Model』	Associate Prof. Takahiro SUZUKI
『Control of Electric Vehicle and Prospect of Super-capacitor』	Prof. Yoichi HORI

11/30 Chairman Prof.Takahiro SUZUKI

Title of Lecture	Lecturer
『On WYSIWYAS Navigation - Intuitive Route Guidance - 』	Prof. Takaaki HASEGAWA, SAITAMA Univ.
『Laser-based Tracking of Moving Objects, and Moving Objects' Tracking from Moving Platform』	Ms. Huijing Zhao <small>Visiting Associate Professor Center for Spatial Information Science, at the University of Tokyo</small>
『Outline of Internet ITS.』	Mr. Shigetoshi AZUMA, TOYOTA Corp.
『Possibility of driving assistance in aged society by utilizing ITS.』	Prof. Ichiro KAGEYAMA, NIHON Univ.

[Closing Address]

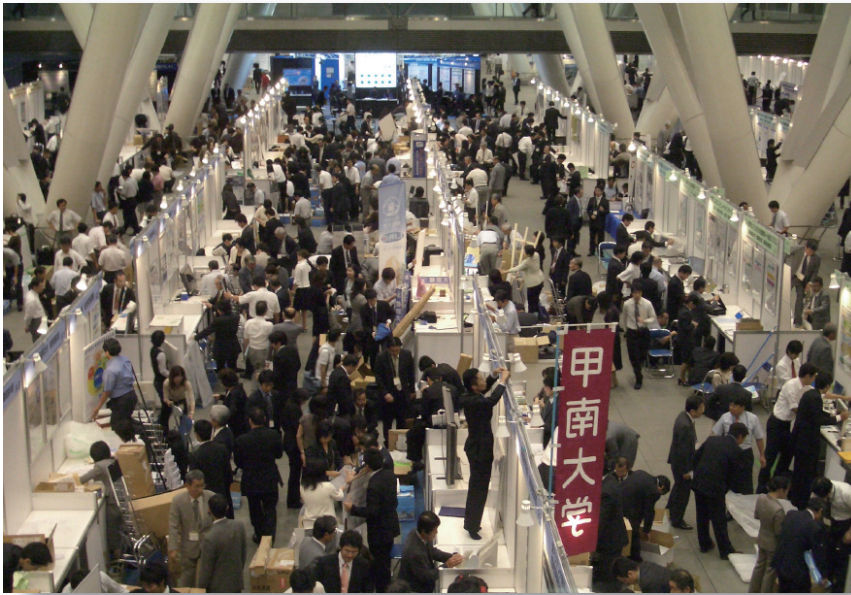
Prof. Masao KUWAHARA (Acting Director of Center for Collaborative Research, The University of Tokyo)



Exhibition in Innovation JAPAN 2006 -University Fair-

The ITS center exhibited our activities in “Innovation JAPAN 2006,” which was held September 13-15, 2006, at Tokyo International Forum. This event is presented by Japan Science and Technology Agency (JST) and New Energy and Industrial Technology Development Organization (NEDO) in order to produce opportunities to meet the joint needs of university researchers and industries.

We made a display of the mixed reality traffic experiment system as the only exhibitor from The University of Tokyo. We introduced our activities with a couple of panels and demonstrated the system using the desktop driving simulator connected with the traffic simulator. The number of visitors during the session totaled 39,650, and many visitors came to our booth also. They experienced driving of the simulator that reproduced realistic traffic conditions, and they reacted to the system enthusiastically.

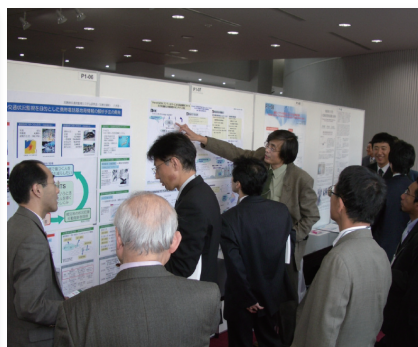


5th ITS Symposium

The Fifth ITS symposium was held December 6-7, 2006, at IIS, The University of Tokyo. This annual symposium is presented by ITS Japan, and the ITS Center cooperates as a joint host.

The symposium consists of organized sessions on both days as well as the poster session on the first day and the keynote lecture on the second day. At the keynote lecture, Dr. Kiyoshi Goto, Director of R&D Center, Tokyo Electric Power Company, made a presentation on diffusion of electric vehicles. The themes of seven organized sessions were “Safe Driving,” “Sensing,” “Field Operation Test (FOT),” “Safety - Approach from Vehicle's Aspect,” “ITS on Community Road,” “Pedestrian,” and “Map.” Not only did many audience members join in the discussion, but also many questions and comments were raised in the discussion time, which made those sessions lively. In the poster session, 43 posters were displayed in the foyer next to the convention hall, and eager discussions occurred between presenters and the audience. There was a banquet on the evening of the first day, including the award ceremony for the poster session. At the banquet, participants engaged in discussions fostering a closer relationship beyond their research fields and industries. This symposium achieved great success, attracting 308 participants from government sectors, private companies, and universities. This was an increase of more than 30% from last year.

The members of ITS center made one oral presentation and eight poster presentations in this symposium. Through discussion with the audience, we got a lot of valuable comments for future research. The details of the presented papers are listed on page 9.



IEEE Intelligent Vehicles Symposium (IV 2006)

IEEE Intelligent Vehicles Symposium (IV 2006) was held from June 13-16, 2006, at the Institute of Industrial Science, The University of Tokyo. IV is an annual academic conference organized by the IEEE ITS Society, and known as one of the most high-quality international conferences in the ITS information field. This time, Dr. Ikeuchi, the head of our Center, has assumed the general chair of the conference, and Dr. Suda, Dr. Kuwahara, Dr. Suzuki, and some staff member of the Center also managed the conference as several committee chairs and members.

The conference has set up 39 single-track oral presentations and 55 poster presentations under sessions such as human/driver assistance, sensors and vision-based systems, collision detection & avoidance, pedestrian problems, sensor fusion, and navigation. Invited talks were also made by Dr. U. Ozguner (Ohio State Univ.), Dr. J. M. Blosseville (INRETS), and Dr. H. Amano (Toyota Corporation). The number of participants exceeded 160, and included representatives from industry, government, and academia of domestic and foreign countries. On the last day, a technical tour to the National Institute for Land and Infrastructure Management, Ministry of Land, Infrastructure and Transport in Tsukuba, was held. There, participants enjoyed a demonstration of the SMARTWAY.

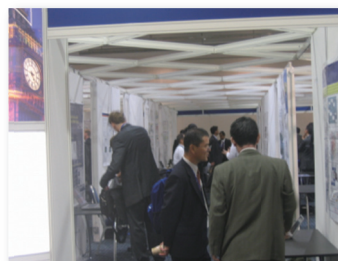
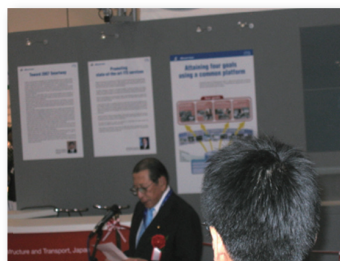
Concurrently with the conference, a kick-off meeting of FACT (French-Asia Cyber Transportation, an academic collaborative activity between France, Japan, China, and Korea in the field of ITS information and robotics research) was also held. In the meeting, Dr. C. Laugier, the INRIA representative, discussed the project plan and other matters with Dr. Ikeuchi and his colleagues.



13th ITS World Congress

The Thirteenth ITS World Congress 2006 was held October 8-12 at ExCeL (Exhibition Centre London), UK. It is held in October every year as an opportunity for parties interested in ITS to get together, make presentations on the latest research, discuss transport policies, and display cutting-edge technologies. The ITS center has been participating positively every year since 2003, and displayed the mixed reality traffic experiment system in Nagoya, 2004.

There were more than 8,000 participants from 75 countries in the world, and presentations / discussions were held in over 200 ITS-related sessions. We made six presentations in this congress, dispatching research outcome to the world and discussing with overseas researchers. The details of the papers presented are listed on page 9.



In 2006, the former Sustainable ITS Project in CCR has completed the first stage after three years, and grown to several projects as described below. In addition to "Utilization of Universal Driving Simulator for Human, Vehicle, and Traffic Research" which takes over the former project, the new project "Collaborative Development of Next-generation ITS Sensing Vehicle" between many-to-many laboratories and industries was inaugurated. Other than those above, several collaborative research activities are going on, such as "Dilemma Zone", and "Application Research using Experiment Vehicle/Driving Simulator". Also, in the "Virtual Asukakyo Project" by Ikeuchi laboratory, it can be said that a new possibility for "mobility" beyond space-time is suggested.

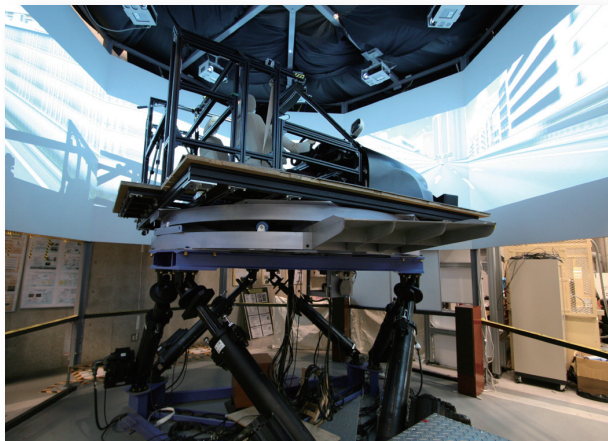
Collaborative Development of Next-generation ITS Sensing Vehicle

In June 2006, the ITS Center started a new research project, "Development of ITS sensing vehicle for next-generation ITS," collaborating with core-member labs, several support-member labs, Aero Asahi Corp., Asia Air Survey Co. Ltd., Denso Corp., and Toyota Mapmaster Inc. Greater dependence has been placed on applied ITS for safety and reassurance, quality levels required in a characteristic analysis of drivers and driving environment, traffic flow analysis, and reconstruction/representation of cyber city models for navigation and driving simulation. Meanwhile, technologies for acquiring and processing real-world information required for such issues are still not well-established in basic areas, such as positioning problems when GPS is unavailable. In this research, we aim to develop several methods to acquire and process real-world information such as geometric/photometric information of constructs, behavior of self/peripheral vehicles, and behavior of drivers in traffic scenes through designing a special sensing vehicle. Moreover, we plan to apply these accomplishments to construction of digital maps and improvement of driving simulation. The project is planned in a 3-year scheme. In the first year, specification of the vehicle is laid down, and specific research themes are figured out.



Utilization of Universal Driving Simulator for Human, Vehicle, and Traffic Research

The Driving Simulator Research Group (DS-group) was set up in June 2006 as the ITS Center's new research project. The DS-group consists of core-professors' labs, AISHI AW CO., LTD., SOCIAL SYSTEM RESEARCH INSTITUTE INC., MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD., and MITSUBISHI PRECISION CO., LTD. These companies are a car navigation system manufacturer, civil engineering consultant, an electronic manufacturer, and a flight simulator manufacturer, respectively. Even though research is different in each company, all their studies are centered around the use of a universal driving simulator for human, vehicle, and traffic research (DS). For sharing of intelligence and information, and exchange of opinions, a DS-group's meeting is held once or twice a month. Major topics of the meeting are as follows: reports of the progress of the study, study sessions, scheduling of use of DS, agreements to manage DS-group smoothly, etc. The presentation of a brief summary and a plan of each study, and a study session of the microscope traffic simulation system called "KAKUMO" were mainly placed on the agenda. The experiments with the use of the experimental intersection installed in Chiba Experiment Station, Institute of Industrial Science, The University of Tokyo, and for evaluation of the effect of the turntable mechanism are planned.



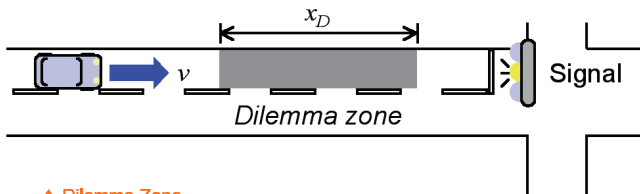
▲ Universal Driving Simulator for Human, Vehicle, and Traffic Research



▲ Experimental Intersection in Chiba Experiment Station

Dilemma Zone

As the traffic signal transitions to the amber phase at a signalized intersection, drivers in approaching vehicles must make a decision to either stop behind the stop line or to proceed through the intersection. Within the so-called “dilemma zone,” drivers are unable to make a decision. The dilemma zone is represented as a distance x_D shown in the left figure. x_D changes with the velocity of the approaching vehicle, the reaction time of a driver to take braking actions, the deceleration rate of a vehicle, and the time of the amber signal phase. Since it is very difficult for drivers to face dilemma zone situations anytime on an actual road, there are almost no surveys about the dilemma zone. In response, the experiments were conducted with the use of a Driving Simulator (DS). DS offers an environment where drivers are able to drive in a virtual space, so one of the advantages of DS is to develop experiments that cannot be conducted with a real car or in a field. The scenario for the city road as shown in the right figure was provided, and the situations that drivers face within the dilemma zone were offered in the experiments. The data of the stopping behavior of drivers in the dilemma zone, such as braking, and other aspects of vehicle behavior, such as position and vehicle velocity, were detected. Some knowledge was obtained through these experiments. Experiments with the use of the experimental intersection in Chiba Experiment Station and a real car will be carried out in the future.



▲ Dilemma Zone



▲ Image of Experimental Scenario

Application Research Using Experiment Vehicle / Driving Simulator

As an application of research using experimental vehicles and driving simulators, we conducted the following research in 2006. The experimental vehicle MAESTRO (Measurement vehicle with Advanced Equipment System for TRaffic Operation), which can measure a vehicle's maneuvering in a detailed way in an actual traffic situation, is used to observe following and lane-changing behaviors in relatively congested situations on intercity motorways. From this observation, the vehicle maneuvers by itself, and surrounding vehicles in near-capacity situations are estimated precisely by integrating information from a GPS device, speed / acceleration meters, and image sensors. The result will be utilized for modeling in future research.

On the other hand, the driving simulator, in cooperation with the traffic simulator, was used for experiments in following and lane-changing behavior and road shoulder utilization in a sag section on an intercity motorway. The experiment of following and lane-changing behavior aims at investigating the process by which congestion occurs and developing a model of driving behavior by analyzing behaviors of the drivers being tested. In the experiment of road shoulder utilization, driving behavior was analyzed from a safety aspect when the road shoulder was used for an additional lane, and this experiment provided information in examining the feasibility of new measures for congestion alleviation.



▲ Driving Experiment Using the Driving Simulator



▲ Image of Shoulder Lane Usage Scenario

Virtual Asukakyo Project

The Ikeuchi laboratory is endeavoring to restore ruins of the ancient Asukakyo City in Asuka Village, Nara, by using MR (Mixed Reality) technology. By looking through a special goggle, tourists can appreciate a synthesized view of the present landscape of the village overlaid with the virtual image of the spectacle in ancient times, restored with CG. Since the village falls under the Ancient Capitals Preservation Law, it is difficult to restore cultural objects by a replica, and, moreover, since there are still several theories on the restoration of Asukakyo, restoration using MR technology where the models can be easily replaced is highly effective.

In the aspect of research, we were able to add shadows of virtual objects corresponding to the real illumination environment by using “basis images,” and to change the viewpoint by introducing a “shadowing plane.” We also improved synthesizing algorithms to be computed on GPU in real time. In November 2006 we held a public open event on the site, where more than 900 visitors enjoyed a time-travel experience to the ancient time, seeing Kawaradera Temple and Asukakyo City in the 7th century viewed from Amakashioka Hill observatory, at the foot of which Iruka Sogano's residence once existed, as the legend goes.

In the future, aiming at sightseeing guidance in ITS, we will try to miniaturize the devices to be equipped on an electric cart, and develop the “Asuka Whole Museum” where tourists can see the ancient landscape everywhere in Asuka Village.

<http://www.cvl.iis.u-tokyo.ac.jp/~kakuta/virtual-asukakyo>



Academic Presentations

Published Papers

Title	Author	Journal Title
Analysis of road potential and bottlenecks based on operating speed	H. Warita, H. Okamura, H. Morita, H. Kuwahara, E. Chug	International Journal of ITS Research Vol.4, No.1, pp.39-46 2006.12
A Probabilistic Method for Vehicle Detection and Class Recognition	S. Mohottala, M. Kagesawa, K. Ikeuchi	IEICE Transactions on Information and Systems, Vol. J89-D, No. 4, pp.816-825 2006.04
Distortion-Free Fusion of Multiple Video Camera Images UsingEPI Analysis	T. Mikami, T. Oo, S. Ono, H. Kawasaki, Y. Osawa, K. Ikeuchi	IEICE Transactions on Information and Systems, Vol. J89-D, No. 6, pp.1336-1347 2006.06
Traffic Control Systems	T. Oda	JSAE, Vol.60, No.2, pp. 59-63
Online Traffic Signal Control for Reducing Vehicle Carbon DioxideEmissions	T. Oda, T. Otokita, S. Niikura	IEEJ Trans. IA, Vol.126, No.11, pp.1522-1530

Conference Presentations

Title	Author	Forum	Presentation date	Location
Spatio-temporal analysis and its application of image and range data acquired from moving sensors	S. Ono, K. Ikeuchi	IPSJ SIG-CVIM (Computer Vision and Image Media)	2006/5/18	Nara
Identification of Human Driver Model for a Universal ITS Simulator	K. Kondo, H. Miyamoto, N. Webster, M. Onuki, T. Suzuki, Y. Suda, M. Kuwahara	ROBOMECC'06 (JSME)	5/28	Tokyo
A Photo-realistic Driving Simulation with Free Viewpoint by Real-time Image Processing	S. Ono, K. Ogawara, M. Kageswa, H. Kawasaki, M. Onuki, J. Abeki, K. Honda, K. Ikeuchi	Driving Simulation Conference Asia-Pacific (DSC-A/P)	5/31	Tsukuba
Development of Traffic Simulation Model considering the Influence of On-street Parking	S. Tanaka, M. Kuwahara, T. Shiraishi	33rd Conference of Infrastructure Planning	6/11	Sendai
Multiple video camera calibration by space-time analysis in spherical coordinates system	T. Mikami, S. Ono, H. Kawasaki, K. Ikeuchi	Meeting on Image Recognition and Understanding (MIRU)	7/20	Sendai
Space-time Analysis of Spherical Projection Image	S. Ono, T. Mikami, H. Kawasaki, K. Ikeuchi	The 18th International Conference on Pattern Recognition (ICPR)	8/21	Hong Kong, China
Validation of the Interactive Traffic Simulation for the Universal Driving Simulator	Y. Suda, Steven E. Shaladover, Y. Takahashi, M. Onuki, K. Matsushita, M. Kotani, D. Yamaguchi	JSME MechanicalEngineering Congress, 2006 Japan (MECJ-06)	9/19	Kumamoto
Analysis of driver characterisitc in speed control model	H. Miyamoto, M. Onuki, T. Suzuki, Y. Suda	2006 JSAE Annual Congress (Autumn)	9/28	Sapporo
Vehicle classification in traffic surveillance	S. Mohottala, M. Kagesawa, K. Ikeuchi	13th ITS World Congress	10/10	London, UK
Safety Evaluation of On-street Parking Scheme Using Virtual Reality Traffic Experiment System	S. Tanaka, M. Kuwahara, Y. Suda, K. Honda, T. Shiraishi, M. Onuki, M. Kano	13th ITS World Congress	10/11	London, UK
Real-image based driving view synthesizing system for innovative traffic everpiment Space	K. Ogawara, S. Ono, M. Kagesawa, H. Kawasaki, K. Ikeuchi,	IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Workshop	10/10	Beijing, China
Stopping Behavior of Drivers in Dilemma Zone: Analysis via Driving Simulator	T. Oda, Y. Suda, S. Tanaka, D. Yamaguchi	Technical Meeting on Transportation and Electric Railway and ITS, IEEJ	11/21	Kyoto
Investigation of dynamic use of road shoulder as a travel lane on a congested expressway	A. Iwanaga, M. Kuwahara, S. Tanaka	5th Symposium on ITS	12/6	IIS
A development of travel time prediction algorithm during incident on expressway	Y. Oba, H. Ueno, H. Warita, H. Morita, M. Kuwahara	5th Symposium on ITS	12/6	IIS
Analysis of driver characterisitc in speed control model at Sag	H. Miyamoto, M. Onuki, T. Suzuki, Y. Suda	5th Symposium on ITS	12/6	IIS
Calibration of Human-Driver Model Interactive with Surrounding Vehicles	K. Kondo, T. Suzuki, N. Webster, M. Kuwahara	5th Symposium on ITS	12/6	IIS
Application of Driving Simulator to Dilemma Zone Experiment	T. Oda, S. Tanaka, Y. Suda, D. Yamaguchi	5th Symposium on ITS	12/6	IIS
Visual Reconstruction of an Intersection by Integrating Cameras on Multiple Vehicles	D. Ota, S. Ono, K. Ikeuchi	5th Symposium on ITS	12/6	IIS
3D Modeling and Refinement of Residential Maps Using Range Scanners	L. Tong, S. Ono, M. Kagesawa, K. Ikeuchi	5th Symposium on ITS	12/6	IIS
Spectral Based Optical Analysis of 3D Urban Space	A. Ikari, T. Higo, D. Miyazaki, S. Ono, K. Ikeuchi	5th Symposium on ITS	12/6	IIS
Microscopic Pedestrian Movement Model in Congested Conditions	M. Asano, M. Kuwahara, S. Tanaka	5th Symposium on ITS	12/7	IIS
Application of Driving Simulator to Dilemma Zone Experiment	T. Oda, S. Tanaka, Y. Suda, D. Yamaguchi	JSME 14th Transportation and Logistics Conference (TRANSLOG 2006)	12/15	Kawasaki
Construction of Drift-Free Omni Images by Spherical Space-Time Analysis	T. Mikami, S. Ono, K. Ogawara, H. Kawasaki, K. Ikeuchi	IEICE General Conference	2007/3/21	Nagoya

International Cooperation Activities on ITS

The ITS Center, The University of Tokyo entered into a Memorandum Of Understanding (MOU) on research cooperation with Monash University in Australia (November 2006), Carnegie Mellon University in US, and INRETS in France (March 2007). The Center improved and expanded the ITS research network in Europe, US, Asia, and Oceania. The Center is providing concluding an MOU with Tsinghua University in China and the Massachusetts Institute of Technology (MIT) in the U.S. The Center is also planning a Japan-China-France International Symposium on ITS Research Cooperation in conjunction with the ITS World Congress in Beijing, October 2007.

A kick-off meeting of France-Asia Cyber Transportation (FACT), which is a research exchange program among Japan, China, Korea, and France in conjunction with IEEE Intelligent Vehicles (IV) was held at the Institute of Industrial Science, The University of Tokyo, June 2006 (See page 5 for details).

The Center invited Dr. Ching-Yao Chan, Associate Research Engineer of the California PATH Program, as a foreign visiting professor of the Sustainable ITS Project, Center for Collaborative Research (CCR). The Center entered into an MOU with PATH last year. Dr. Chan gave valuable advice about the development of experimental environments for ITS and the installation of the experimental intersection in Chiba Experiment Station, Institute of Industrial Science, during his tenure of eight months.

The Center is also expanding the cooperation hub in EPFL, with which the Center entered into an MOU, through Prof. Kuwahara's visit there in September and October 2006.

The Center will continue international cooperation activities and advance the formulation of an international hub for ITS research in 2007.

LAVOC Research Activities on ITS

In 2006, LAVOC, the Traffic Facilities Laboratory at EPFL, Switzerland was successful in securing research funds for 3 projects for a period of 3 years. In addition to these projects, we are also engaged in 2 European projects INTRO (Intelligent Roads) and COST352 (Influence of Modern In-vehicle Information Systems on Road Safety Requirements). This year LAVOC has taken on a new PhD student, Minh-hai Pham and a post-doctoral fellow Dr Olivier de Mouzon, from INRETS, France. The involvement of Dr Nour-Eddin El-Faouzi and Dr Olivier de Mouzon in LAVOC research shows the strong collaboration with INRETS.



Edward Chung

<http://lavoc.epfl.ch/EN/index.php>

The 3 new projects are described below:

● Urban network travel time estimation

Travel time estimation has long been the topic of research and most of the research is limited to freeways where a good correlation between the point speed and link speed can be established. However, the problem on urban network is more challenging due to number of reasons, such as presence of signalised and non-signalised intersections. Unlike VICS in Japan, there is usually no dynamic route guidance on arterials in Europe. Hence, there is a need for an efficient and accurate model for estimating travel time on urban network.

The proposed travel time estimation model is based on analytical method for travel time estimation, in which average travel time on a link between two intersections is estimated as the average area between cumulative arrival and departure profiles. To accurately estimate travel time, the proposed model best estimates arrival and departure profiles by integrating signal controller data (signal phase and timings) with detector data (counts and occupancy).

The expected outcome of this research is a model that provides reliable and good estimates of travel time on an urban network. In addition to providing information for dynamic route guidance, the proposed model will be a valuable tool for traffic control, intelligent traffic management and estimating the system performance and service quality of arterials.

● Improved method for dynamic OD estimation

Most Origin-Destination (OD) matrices used for traffic operation studies are adapted from OD estimated for transport planning. As the resolution demanded of a transport planning model is less rigorous, the use of this OD matrix for dynamic traffic assignment in micro simulation may not be appropriate. Instead of adjusting static ODs using Wardrop's user equilibrium, this research uses micro simulation to achieve a dynamic equilibrium which will be the basis for time dependent OD estimation. Challenges in this research include calibration of the simulation model and adjustment of OD matrices to ensure convergence of the methodology. The results of this research will be an integrated approach to estimate dynamic OD matrices suitable for transport planning and traffic operations.

● Fusion of safety indicators

The big influence of the meteorology on traffic conditions and in particular traffic safety, makes the study of the meteorological data particularly important and interesting. One of the innovative aspects of this project is to use the meteorological sensors, which are at present used only for the winter maintenance (salting), to improve the road safety in real time, according to the local meteorology.

The main objectives of this project within the framework of the safety of the motorway traffic are to develop a method of combining the indicators to know with confidence the state of traffic safety and to take into account weather conditions in the safety indicators (fog, wet road, snows, frost), notably by the effect of these conditions on the road friction, visibility, etc. The goal is to help manage the motorway traffic in terms of safety, notably by disseminating information to the users to reduce the risk of accident.

This year LAVOC also hosted Prof Kuwahara in Switzerland and we look forward to continuing exchanges with The University of Tokyo.

A REFLECTION ON 2006 VISIT TO CCR-ITS

It has been a tremendous privilege for me to spend the last eight months visiting the Center for Collaborative Research (CCR) at The University of Tokyo. From a professional perspective, my stay at CCR has been intellectually stimulating. In addition, the experience of being a resident for an extended period of time in the city of Tokyo was culturally educational and personally exciting. I would have to say that the year of 2006 was most rewarding and satisfying. However, all good parties must come to an end eventually, and I will be bidding farewell to friends at CCR soon. With mixed feelings of joy and sadness, I would like to take this opportunity to offer some observations on my brief tenure at CCR.

Before coming to CCR, I have worked as a researcher for 12 years at California PATH, a research organization at the University of California at Berkeley in the United States. PATH, www.path.berkeley.edu, is well known for its leading-edge transportation research with a special focus on Intelligent Transportation Systems (ITS). Currently, the research activities at PATH can be categorized into four major programs:

- (1) Policy and Behavioral Research,
- (2) Transportation Safety Research,
- (3) Traffic Operations Research, and
- (4) Transit Operations Research.

During my stay at CCR, I have come into contact with many dedicated and capable researchers and professionals, particularly those who work in the Sustainable ITS Industrial Collaborative Project at CCR and Collaborative Research Center for Advanced Mobility (ITS Center) at the Institute of Industrial Science (IIS), The University of Tokyo. Although I was not totally surprised, I found striking similarities between CCR-ITS and California PATH. The two research programs are both associated with prestigious universities, and they have both assembled great teams of talents from diverse disciplines. Furthermore, both organizations have demonstrated visionary leadership in ITS research, not only in the development of essential technologies but also real-world deployment of ITS applications. Moreover, it is meaningful that CCR-ITS and PATH both realize that a strong alliance among government agencies, industrial partners and academia institutions is critical in the long-term policy making and sustainable deployment of ITS. As a result, it is not by coincidence that one will find broad participation by different sectors, including technology providers, university laboratories, highway operators and management identities, in many projects at CCR-ITS and PATH respectively.

It is also noteworthy that these two institutions place considerable emphasis on applied research with significant resources dedicated to experimental activities. This is an indication that their visions for advanced transportation systems are pursued with an acute sense of what the society practically demands. For example, at CCR-ITS the expertise of image processing from Prof. Ikeuchi's group, traffic modeling from Prof. Kuwahara's group and multi-body dynamics and control from Prof. Suda's group are synergistically combined for the development of a Universal Driving Simulator, with significant joint efforts by industrial partners. As another example, an ITS intersection test facility was built and unveiled recently at Chiba Experiment Station to allow in-depth assessment of driver behaviors and traffic safety functions. Such experimentally oriented approaches provide a wonderful environment for the training of the next generation of young and promising engineers. In addition, it offers a realistic test bed for traffic practitioners to identify and resolve integration and implementation issues in a real-time manner. In all, there are significant resemblances in the philosophy of CCR-ITS and PATH while the two organizations each possesses distinctive specialties and unique characteristics.

As ITS transitions into the next phase of integrated and expanded user services after the past two decades of initial developments, it is conceivable that ample "intelligence" will be made available for either roadside or vehicle onboard devices. This trend is occurring in conjunction with the provision of sophisticated functionalities in all modes of transportation. To facilitate various services, the continuing drive to acquire more inputs and to supply more outputs seems inevitable due to the increasingly affordable resources of computing, sensing, and communication. For instance, a variety of ITS projects in Japan, Europe, and US are already initiated to test the concept of vehicle-roadway cooperation by utilizing wireless technologies. Under these cooperative concepts, data sharing between vehicles and infrastructure will enable a whole spectrum of new services for traveler information, traffic management and safety applications.

In order to effectively realize the benefits of the aforementioned advanced systems for the traveling public, the intended functionalities must be reliably implemented and efficiently operated. More importantly, for the smooth execution of traveler information and driver assistance applications, the information must be conveyed to the drivers concisely and timely through well-designed human-vehicle interfaces. In light of such potential ITS trends, the needs for integrating various technologies and evaluating driver behaviors are of greater importance and urgency than ever. Looking toward the future, one can confidently foresee that research and development endeavors in the ITS arena will remain active for years to come.

It is with great expectation that I envision ITS-CCR and PATH to continue playing leading roles in ITS and related transportation research. I also hope that with common interests yet mutually complementary strengths, the two organizations will maintain strong ties with frequent communication and collaboration. Last but not least, I wish to express my sincere gratitude to Prof. Suda, his whole research team and CCR for their gracious support and warm hospitality during my visit.



Ching-Yao Chan
<http://path.berkeley.edu/~cychan/>

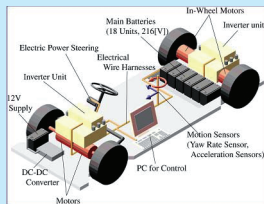


Hori Laboratory

By utilizing electric motor's quick torque generation, we can realize novel motion control for the Electric Vehicle (EV). Effective adhesion control of tires enables usage of lower loss tires, which improves fuel consumption drastically.

A 4-wheel-driven car achieves high performance vehicle dynamics control. Easily known motor torque is used for road surface estimation, where the car tells us "We have entered a snowy road!". The test vehicles "UOT March-II" with independent 4 in-wheel motors and "Cadwell EV" are used for experiments. Present topics are (1) Estimation and control of body slip angle β , (2) Dynamic optimal distribution control of driving force, (3) Optimal speed pattern generation for ride comfort, (4) Hybrid braking of electric and hydraulic systems, and (5) Decoupling control of DYC and AFS.

New vehicles "C-COMS I & II" have been recently completed. The capacitor used in these vehicles has these advantages: (1) Long life ("Physical battery" without chemical reaction), (2) Large current charge/discharge (30-seconds charge is possible!), (3) Environment friendly without heavy metal usage, (4) Remaining energy can be known from terminal voltage. If a few problems below will be solved, it must change the car world: (5) Electronic circuit is the key (Capacitor is the "Can of energy and wisdom"), and (6) Still low energy and power densities ("Nano-gate capacitor will solve the problem.")



Hasegawa Laboratory (Saitama University)

We are now researching on the ITS area defined as "human and things transport systems sophisticated by IT (Information Technology)" based on systems innovation theory. Considering the layered architecture of ITS fields shown in Fig.1, our fields include ITS communication, positioning of human and things, human machine interfaces (HMI) for ITS, and the ITS platform supported by them, in addition, ITS applications on the ITS platform; for example, driving assistance systems, advanced demand signals (ADS) schemes, WYSIWYAS (What You See Is What You Are Suggested) navigation systems that provide intuitive navigation environments to users, Liver ITS platform (LIP) depicted in Fig.2, airport passenger ITS (APITS), and so on. All of them are based on the thinking way of "the systems innovation economy-activation triangle in the ubiquitous age" illustrated in Fig.3.

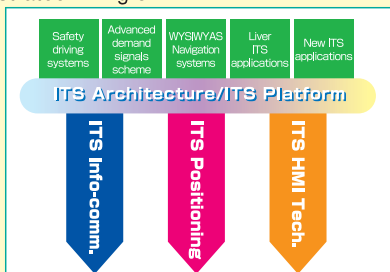


Fig.1 Research Fields of Hasegawa Lab.

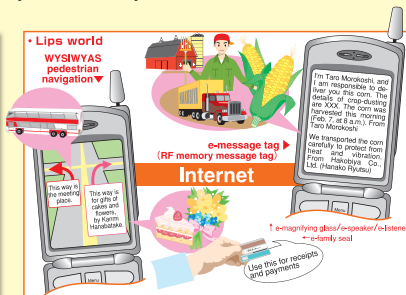


Fig.2 Liver ITS Platform Service world.

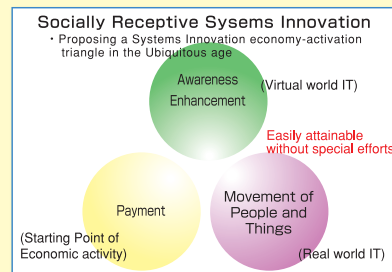


Fig.3 Systems Innovation Economy-Activation Triangle in the Ubiquitous Age (e-commerce, context marketing, cash on delivery, e-money...)

Contact



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