PATH Connects in France

PATH has participated in an international collaborative effort with INRETS (Institut National de Recherche sur les Transports et leur Sécurité), a national research organization in transportation, beginning in 1989 with a one-year visit to PATH by Dr. Jean-Luc Ygnace, who became part of the research team at the Richmond Field Station working in the ATIS area. In 1991 Monique Vernet, researcher at INRETS, joined PATH for nine months to study human factors and ergonomics. In our latest exchange, PATH researcher Dr. Youngbin Yim traveled to France to work with Ygnace on an ATMIS demonstration project focused in and around Paris.

An information system for drivers called SIRIU (Système d’Information Routière Intelligible aux Usagers) using variable message signs (VMS) has been in operation in the Paris region since December 1992. Part of the DRIVE II program and the largest urban pilot project of its kind in Europe, SIRIU provides real-time traffic information via 200 remotely controlled vari-
Some Reflections on the International IVHS Community

These goals are served best in an open and synergistic environment. PATH people are encouraged to network with peers to keep aware of progress at the leading edge and to participate in intellectual discourse to stimulate ideas and innovation. This begins at conferences where people meet and thrive when experts become friends and interact by phone, fax, and e-mail in an information exchange that can become a torrent of creativity.

This principle of interaction knows no geographic boundaries. The California PATH community is extremely diversified, with investigators from many cultures and nations. Visitors to PATH headquarters virtually every week, come from many parts of the world, but our outreach to others is also important.

PATH welcomes these opportunities to interact because we work hard to stay on the forefront of research in the field of new IVHS knowledge. Our chances are increased because we have many friends in the automotive, electronics, aerospace, and defense industries; in national laboratories; and in academia. Equally important is a program scale and level of researcher talent, which have allowed production of significant research findings in large quantity.

We believe these attributes create a snowballing effect of greater collaboration.

An example of this environment nurturing strong networks is the early July Japan study tour by Deputty Director/AVCS Program Manager Steve Sibaldower and I were privileged to take. We arranged, during two weeks, to visit the research laboratories and test tracks of Aoki Seki, Honda, Mazda, Nissan, and Toyota, as well as government ministries and the University of Tokyo. We then attended the Intel- ligen: Vehicles '93 Symposium at Waseda University.

The hospitality at every step was superb, and the willingness of our hosts to share technical information was outstanding. To our delight, we found PATH’s work to be consistent in sophistication and priority with theirs. We also learned firsthand that interaction problems among academia, government, and industry are universal. Although we planned intense information gathering, we reciprocated with presentations about PATH. We believe the exchange was genuinely appreciated by all, and the environment was certainly conducive to making and strengthening friendships.

The Symposium was additionally rewarding because top people from automotive research worldwide were present and shared their latest findings. There were 152 attendees (87 from Japan) with Prometheus program papers from Daimler Benz, Volvo, Fiat, and others, providing in-depth information on AVCS that is difficult to obtain elsewhere.

We learned a great deal about machine vision, lane keeping, collision avoidance, headway keeping, and other incremental work that will eventually coalesce into automated highway concepts. This, however, was the by-product of our point here that freely given human interaction is the precursor to landmark technical advances. For this, PATH is well positioned and will work hard to deserve the collegiality of the world’s finest IVHS researchers.

The reader is invited to critically review the articles in this edition, which repeatedly make the case for international collaboration, and to reflect on the benefits of stronger professional networks.

An American in Paris

The Symposium was additionally rewarding because top people from automotive research worldwide were present and shared their latest findings. There were 152 attendees (87 from Japan) with Prometheus program papers from Daimler Benz, Volvo, Fiat, and others, providing in-depth information on AVCS that is difficult to obtain elsewhere.

We learned a great deal about machine vision, lane keeping, collision avoidance, headway keeping, and other incremental work that will eventually coalesce into automated highway concepts. This, however, was the by-product of our point here that freely given human interaction is the precursor to landmark technical advances. For this, PATH is well positioned and will work hard to deserve the collegiality of the world's finest IVHS researchers.

The reader is invited to critically review the articles in this edition, which repeatedly make the case for international collaboration, and to reflect on the benefits of stronger professional networks.
An American in Paris

During the last four years, traffic has grown four to six percent per year on the network... the annual congestion cost... was estimated to be 100 million hours delay...

The Department invited INRETS to conduct a preliminary investigation of the effectiveness of the SIRIUS system, the extent to which variable message signs affect motorists' route choices, and whether motorists respond to different types of messages. Ygnace and Yim have completed a study on the first link of the network that was implemented with VMS and data collectors providing information every 20 seconds—an access ramp connecting A86 with Department Road 45 (D45). A variable message sign displaying traffic conditions on A86 is located downstream of the slow lane off-ramp of D45. When A86 is congested downstream, drivers receive information on queue length and may choose to take A86 or to stay on D45.

Data on number of vehicles, density, and vehicle speed gathered over a three-month period from December 1992 through February 1993 provided a sample of 120 cases of traffic flow five minutes before and five minutes after changing messages on the signs. In addition, time-series data on traffic volume were analyzed over a 15-20 minute period in one-minute increments before and after changing messages in order to trace the traffic flow patterns on this ramp. The study found significant differences in traffic volume before and after messages changed. Traffic on the access ramp decreased when messages changed from "free-flowing" to "congested" and increased when messages changed from congestion to free-flowing. Although it is not clear what percent of traffic shifted to A86 from D45 due to variable message signs, there is evidence that traffic flow on the ramp during the congestion message was relatively constant during both morning and evening peak hours.

The SIRIUS project includes a three-year evaluation of the system and the impact of VMS on travel behavior. Results of these studies on VMS will provide a basis for assessing driver behavior using in-vehicle route guidance devices, beginning in 1994 with about 500 specially equipped vehicles, and evaluating the net effects of the system through a combination of VMS and in-vehicle communication devices.

Future research also will include a quantitative analysis of traffic diversion patterns in the region. For example, as traffic is redistributed through VMS, the radial network of roads is developing into a spider-web pattern, giving drivers more options in moving from one route to another. This presents technical and operational problems, both in reserving connecting roads for redirection of traffic from congested links, and in providing sufficient information to communicate to drivers the essential facts of a complex traffic situation. The Department is seeking solutions to such problems so SIRIUS can develop into a comprehensive system serving the entire freeway network of the Paris region.

New Incident Database Collected on Bay Area Freeway

The morning rush hour commute has slowed to a crawl, up ahead cars are attempting to avoid a lane that appears to be blocked—it's another day of frustration in getting to your destination on schedule. But this time help is on the way in the form of a white truck gradually making its way to the stalled vehicle. Men in white suits jump out, lift the hood, and proceed to get the vehicle moving. Slowly traffic picks up speed again. A delay has occurred, but the impact on your plans for the day has been minimized and your stress level drops. These angels of traffic jams are known as the Freeway Service Patrol (FSPs), a trial attempt at solving some of the congestion problems on selected stretches of freeways. Administered by Caltrans, the California Highway Patrol (CHP), and the Metropolitan Transportation Commission (MTC), the program began in September 1992 and is currently operating on limited sections of six Bay Area freeways. Additional coverage is planned through 1993.

A study headed by Professor Pravin Varaiya and Dr. Alex Skabardonis at the University of California at Berkeley is evaluating the effectiveness of the Freeway Service Patrol by collecting detailed incident data before and after implementation of the FSPs. Based on factors such as availability of loop detectors, lack of shoulders, no current construction, and recurrent congestion, an 8.5 mile section known as a "hot spot" along I-880 in the city of Hayward, California, was selected as the location for the field evaluation. Measures of effectiveness of the FSPs were determined to be savings in vehicle hours of delay, and reduction in emissions, fuel consumption, accidents, and time for detection and clearance of incidents.

Data collection and analysis have not been completed on the characteristics of the test site before implementation of the FSPs. Participants drove specially equipped vehicles on the study area for 24 days, Monday through Friday, 8 hours a day during February and March 1993. Three categories of data—vehicle data, incident data, and loop detector data—were combined to produce a complete representation of the operational characteristics of the study area.

Five instrumented vehicles provided by Caltrans were dispatched at 5-minute headways during the morning and evening commute hours. All vehicles were equipped with a transmission speedometer transducer to collect distance data, a rate of turn indicator, a magnetic compass for direction data, a global positioning system (GPS) receiver, a two-way radio, and a laptop computer. Drivers logged each test run.
from the Marina Boulevard exit to the Whipple Avenue exit and back, and reported via radio each incident observed, such as accident, stall, or breakdown, number of lanes affected, description of the vehicles involved, location, time, and update on status. The CHP's Computer Aided Dispatch system provided similar information, and tow truck operators within the study area contributed data on forms prepared and distributed with the assistance of the CHP. Information from each data source was correlated to produce a set of incident records. In addition, each incident was recorded via the in-vehicle laptop computer.

Nineteen loop detector stations recorded speed, flow, and occupancy at one-second intervals from 73 detectors on the on-and off-ramps and 340 detectors along the freeway. Data on speed, flow, and occupancy at one-second intervals were stored on PC DOS-based microcomputers at each station. The controllers at the end of each beat were equipped with the Interactive Routine Data Access (INRAD) system, which communicates with instrumented vehicles traveling over the loops (see Infomation, Spring 1992, for more on the INRAD system), and provided synchronization with the loop data and recording of the travel time through the length of the study section. Data were continued verified and checked against assigned thresholds for speed, flow, and occupancy for each loop, distribution of traffic across lanes, and changes in data between upstream and downstream loops at a single location. Differences of less than one percent were found between the flows estimated from the loop data and the flows measured from data extracted from video recordings made at selected times and locations.

A total of 899 test runs produced 144 hours or 1 gigabyte of data during the 24-day field experiments. In addition to the amount of data obtained, a unique feature of the database is the interaction of its components. Observations on incidents through the logs can be correlated with the vehicle runs. The occurrence of an incident can be superimposed on a vehicle's trajectory for assessment of the impact on the vehicle's travel time. The severity of congestion and the effects of incidents throughout the study area can be analyzed by synchronization of vehicle runs with loop data collected through the INRAD system.

The second phase of data collection while the Freeway Service Patrol is in operation is scheduled to begin mid-October. Former PATH researcher, Professor Haitham Al-Dweik, developed a methodology for evaluating incident congestion which will be applied to the data collected in the before and after studies, in a related project at the University of Central Florida. PATH is now proceeding with plans to make this unique data set available to researchers. For further information contact Robert Tam at 510/231-5656.

PATH Hosts International Visitors

Mr. Nobuki Takubo of the National Police Agency, National Research Institute of Police Science, Tokyo, Japan, has joined PATH for a one-year visit. His area of research in the Automotive Engineering Section is on human factors in road safety. During his stay at PATH he will work with Tony Hitchcock and Steven Shladover on IVHS safety.

PATH hosted visitors from INRETS who were in Berkeley for the 13th International Symposium on Transportation and Traffic Theory. Mr. Jean-Baptiste Lesart, Division Manager of Traffic Engineering in Lyon and Mr. Pierre Tesier, Department Manager of Traffic Engineering in Paris, joined the PATH staff for a pot-luck luncheon on July 20 and then met with PATH researchers to discuss common interests. They also visited Professors Carlos Daganzo, Gordon Newell, and Mark Hansen, and Dr. Ted Chvala of the Institute of Transportation Studies on the Berkeley campus, and met French interns here for the summer from the Ecole Nationale des Travaux Publics, working with Professor Adib Kanafani, Dr. Asad Khatib, and Dr. Youngbin Yim on PATH research projects. Researchers from the Nordic Institute for Studies in Urban and Regional Planning (NORDPLAN), Stockholm, were hosted in May by ATMIS/DOCTOR Randolph Hall, and joined by Mark Miller and Youngbin Yim. NORDPLAN is an inter-disciplinary, inter-nordic institute for studies on transportation and communications, information technology, and the structure and organization of business life. It is administered by the Nordic Council of Ministers, and directed by a board of representatives from the five Nordic countries appointed by the Nordic Council of Ministers.

Dr. Yuri Afanasieiev, Deputy General Director of the J.I. Mendeleev Institute for Metrology in St. Petersburg, Russia, a leading expert on magnezit, spent an afternoon at PATH in June, meeting with Dr. Steven Shladover and Wei-Bin Zhang, Fumihiko Ushijama, Project Manager of the Vehicle Research and Advanced Engineering Division, and Kazuo Miiki, Senior Researcher, Mechanical Engineering Division, both of Toyota Motor Corporation, met with PATH researchers and discussed their work on development of a new driving simulator in a seminar at UC Berkeley in May. Kyumori Yamada of Nissan Motor Company visited PATH headquarters and presented a seminar on advanced safety vehicle research in September.

Professor Markos Papageorgiou of the Technische Universität, Munich, visiting researcher in traffic flow modeling and control, visited Professors Petros Ioannou at the University of Southern California, in June and Professor Yavin Yarar in July at UC Berkeley, during August and September. He presented a short course, "Traffic Flow and Control," which was widely attended at both institutions.

Dr. Bart van Arem of TNO Policy Research, The Netherlands, Dr. John Smith of the Australian National University in Canberra, Mr. Masao Kurosawa of the University of Tokyo, and Mr. Takanori Aikawa of the Nomura Research Institute, Tokyo, each spent a day in July meeting with PATH researchers in ATMIS and AVCS.
Packet Radio Architecture for IVHS:  
Where the Tire Meets the Wireless Revolution

Andreas Polydoros, University of Southern California

The world is going digital, exclusively, and wireless— to a good degree. Anyone with a digital wristwatch, a computer, or a fax machine is well aware of the first truth, and anyone who owns a cordless phone is familiar with the second. Digital cellular technology will soon be used in all forms of broadcasting, from satellite Direct Audio Broadcasting (DAB) of high-quality FM directly to home or car, to High-Definition TV (HDTV), interactive-TV (pay-per-view movies and assorted transactions from the home), wireless Personal Communication Services (PCS), including Low Earth Orbiting (LEO) satellite systems now being designed, and multimedia machines for education and entertainment. A huge market already exists for these technologies, or is fast being created, the industrial players have the resources to design and deploy them, and the legal/regulatory framework is being readied to accommodate them.

What does this digital communication revolution have to do with IVHS? Plenty, as it turns out. Packet Radio Architectures (PRA), a set of design options centered around the notion of radio transmissions within a dense network of distributed antennas installed in cars as well as in a future terrestrial infrastructure, are under study at the University of Southern California as part of the broader PATH research into future communication options for IVHS. Radio has been selected in this study as the medium of choice for wireless data transport, since it is currently used more extensively than either optical (lasers) or sound waves, and it promises to lead to inexpensive and widely available components. Packetized communication, the other main feature of the architecture under study, pertains to the process of "chopping" communication into small pieces or "packets," which are then exchanged between transmitters and receivers by following specific rules (called Link Access Protocols). Whether the message to be exchanged at each point in time is short in duration, is as the case in many of the envisioned AMTIS and probably most (if not all) of the AVCS applications and services, it proves advantageous from the standpoint of channel utilization to use such packet switching techniques. On the other hand, applications that imply large messages, high data rates, and heavy usage of the channel, such as transfers of large files or video over the air, might be better served by reserving a portion of the channel for one's own use (circuit switching), as is now done for telephony. Whether these two classes of applications should use separate frequency bands or can be merged and designed as a composite packetized system is one of the many architectural questions now under consideration in our study at USC.

Packet radio technology has been experimented with over the last fifteen years or so for large, complex, highly mobile networks such as those found in the defense world, specifically for rapidly deployable forces. It has also been implemented commercially for smaller, multipoint-to-point networks such as ground-based paging systems and mobile satellite paging, dispatch, position location, and short messaging systems. Tracking companies, emergency vehicles, and other fleet management operations have capitalized on these recent systems to improve their efficiency. They have all benefited from the great strides made by the digital communication technology—advances in modulation, error correction, anti-interference techniques, digital switching, and channel-access techniques— which in turn have been made possible by the spectacular progress in microelectronics. Since the signals to be exchanged in this class of applications are by nature short (they exclude images and voice) and the areas of coverage typically large (metropolitan, regional, and even sub-national, as covered by a satellite beam), packet radio is a natural for them. In fact, packetized data overlays are currently planned by the cellular operators as a new value-added service and will soon be available. It is expected that at least some of the IVHS needs (most likely those without time criticality as an element) will be satisfied by this newswagen in the packet radio world.

This previous experience is helpful in visualizing packet radio as a suitable vehicle for IVHS, but it cannot be scoffed at outright due to inadequacies of the envisioned AVCS applications. For example, there will be hundreds or even thousands of users or a segment of a freeway, each generating message traffic in a highly dynamic fashion. Many of these messages will demand extremely high reliability and almost instantaneous success during transmission, a particular for automated freeway maneuvers. And, finally, it is expected that information will flow back and forth between the vehicles and the infrastructure, or from vehicle to vehicle, in a possibly unpredictable way. Some fresh thinking needs to be injected into the communication-architectural process for the IVHS environment.

Work currently in progress at USC is concerned with a more focused side of the overall IVHS communication problem as it is viewed in its totality from the governmental and industrial perspective. It deals with architectures that include fixed, distributed, dedicated communication nodes (called base stations), to which all the mobiles are to be connected (in a wireless fashion, of course) via a cellular structure much like the one envisioned for PCS, except geared specifically to IVHS and centered around the freeways.
Engineering Update

Packet Radio Architecture

way system. These base stations will transmit and receive information to and from the vehicles using these packet radio techniques. For ATMS applications, information will then be relayed to some central nodes or the Traffic Management Center (TMC). Information will also flow from the TMC to these base stations. The two-way links for this latter part of the overall communication process can be either through dedicated ground networks (fiber, wire, etc.), or through additional point-to-point wireless links. For AVCS communication, the base stations can also serve as intermediary nodes for exchange of information between moving vehicles, although it is conceivable that certain types of information can be exchanged directly between vehicles.

Designing and building such a system is a multi-faceted and challenging endeavor. Not only should the details of the information flow be worked out in a flexible and efficient way, but many other aspects of the problem must be addressed as appropriate "frequency estimates" for upcoming land mobile and ITS applications of either the shared (Part 15) or exclusive kind. For short-range applications, higher frequencies may be more suitable as the propagation gets naturally more confined to a smaller area for the same emitted power. At some point the layout question is the assignment of frequencies per cell, a choice closely related to other signal design questions as well as issues of propagation and technology availability and cost, moving gradually from more technical to more politico-economic. Even as the question to one of understanding a particular signal design option, the answers are far from clear. That is because mobile digital cellular technology is not yet thoroughly understood from an academic perspective, a fact that can be attributed to the strong interaction between the layers of a wireless network—a new situation and distinct from experience with the fixed, wired-network communication community with its fairly neat separation of layers. Again, this is due to the open-air, wireless nature of the transmission, which tends to distort the signals as they propagate and potentially mixes them with everyday else's on the air at that time. Add to that the novel aspects of the AVCS application and the research needs becomes clear.

Certain options, including TDMA (Time Division Multiple Access) and CDMA (Code Division Multiple Access) have been analyzed at USC, whereby certain simplifying assumptions are gradually removed in order to ensure the realistic applicability of the presumed mathematical models. One of the intermediate goals of the study is to assess the feasibility of a single combined AVCS communication system wherein functions separation takes place at the logica.

Here is an update on some recent PATH publications. A complete list, including working papers and technical memoranda, can be obtained from the Institute of Transportation Studies, University of California, 109 McLaughlin Hall, Berkeley, CA 94720; FAX: 510-642-1246.

PATH Research Reports

A Communication Architecture for IVHS S. Streissig, J. Warlind; UCB-ITS-PRR-92-10


The Role of Advanced Traveler Information Systems in Incident Management J. Al-Dubaisi; UCB-ITS-PRR-92-3

Methods of Analysis of IVHS Safety; and Executive Summary A. Hitchcock; UCB-ITS-PRR-92-13 and 92-14

Fault Tree Analysis of an Automated Freeway with Vehicle-Borne Intelligence A. Hitchcock; UCB-ITS-PRR-92-15

Transitional Platoon Maneuvers in an Automated Highway System K. Hadrick, V.K. Narenbr, K.-S. Chang; UCB-ITS-PRR-92-16

Message Volumes for Two Examples of Automated Freeway A. Hitchcock; UCB-ITS-PRR-93-1


Simulation of IVHS on the Smart Corridor Using the INTEGRATION Model Y. Gardes, A.D. Mag; UCB-ITS-PRR-93-3

Vehicle to Roadside Communications Study A. Pobedono; et al.; UCB-ITS-PRR-93-4


continued on page 12
Conference Review

International Symposium on Transportation and Traffic Theory Gathered in Berkeley

The 12th International Symposium on Transportation and Traffic Theory, sponsored in part by Caltrans and PATH, convened on the Berkeley campus for a three-day conference in July. The symposium is unique in the world of transportation meetings because of its small, international membership, recognized throughout the world as being in the forefront of theoretical research. In an atmosphere reminiscent of a gathering of old friends, researchers came together to present and discuss alternate mathematical models and statistical theories underlying the practical problems of traffic management.

Thirteen countries were represented at seven sessions throughout the conference. Some of the problems addressed in the presentations included:

- Mathematical descriptions of the complex phenomena of speed, density, and volume of freeway traffic flow, and their relationships to prediction of congestion and the effectiveness of controls such as ramp metering;
- Statistical theories for estimation of origin/destination flows, prediction of the number of vehicles likely to use a certain link in the future, and the development of dynamic rerouting strategies.

This 12th symposium since 1959, and the second to be held in Berkeley, was hosted by Professor Carlos Daganzo and dedicated to Professor Gordon Newell, both of the Institute of Transportation Studies at UC Berkeley. A highlight of the symposium was a reception in Newell's honor, held in the outdoor patio at the Clark Kerr Campus, at which friends and students paid tribute to Newell and his many contributions.

A recognized leader in his field and an inspiration to his colleagues and students, Newell has been a pioneer in tackling the mathematical and theoretical essentials of complex transportation and traffic problems.

Plans are underway for the 13th symposium, which will be held in France in 1996. Proceedings of the 12th symposium can be ordered from the Institute of Transportation Studies, 109 McLaughlin Hall, University of California, Berkeley CA 94720; FAX: 510-642-1246.

PATH Goes Down Under  

Professors Karl Hedrick, Masayoshi Tomizuka, and David Auslander of the Mechanical Engineering Department at UC Berkeley brought PATH research results to Sydney, Australia, where they attended the 12th World Congress of the International Federation of Automatic Control (IFAC), in July. At the previous meeting in 1992, IFAC established the Technical Committee on Automotive Control, chaired by Dr. William F. Powers of Ford Motor Company, and co-chaired by Professor Hedrick, Mr. Tomikata Inoue of Toyota Motor Company, and Professor Uwe Kiencke of Karlsruhe University. One of the tasks of the committee was to develop five technical sessions for the special conference theme of the Sydney meeting on Automotive Control Systems: Engine Control Systems, Intelligent Vehicle Highway Systems, Vehicle Dynamics and Control, and Vehicle Systems Methodology. In addition, a plenary address, "Control Configured Automoblie in the 21st Century," by Dr. Powers, was developed.

Hedrick chaired the session on Intelligent Vehicle Highway Systems, and presented a joint paper with Tomizuka entitled, "Automated Vehicle Control for IVHS Systems," which described their longitudinal and lateral control research in the PATH program. Another paper on PATH research in that session was "Adaptive Throttle Control for Automatic Vehicle Following," by Professors Petros Ioannou and Tom Xu of the University of Southern California. Other papers presented ongoing research projects in Japan and Europe.

Tomizuka co-chaired the session on "Vehicle Dynamics and Control," which included papers on suspension control systems and preview control. Other sessions included papers on emission control systems, engine modeling, four-wheel steering, and drive systems, integrated control of torque, steering, and suspension systems, and fuzzy techniques applied to the human driver.

Auslander spent the week prior to the conference at the University of Sydney where he was invited to teach a short course in the Department of Mechanical and Mechatronic Engineering on "Design and Implementation of Reliable Real-Time Software." His presentation at the IFAC conference was entitled, "Control of Complex Mechanical Systems."
Conference Update

UPDATE ON CONFERENCES

IVHS America Coordinating Council

The IVHS America Coordinating Council meets October 6 and 7, at the ANA Hotel in downtown San Francisco. On the agenda for council members and guests is a tour of PATH headquarters featuring research conducted under the PATH program, and current Bay Area and Caltrans transportation projects.

PATH Goes to VNIS

The 4th International Vehicle Navigation and Information Systems Conference will convene October 12-15 at the Ottawa Congress Centre in Canada. Don Orme will preside at the session on Measuring Functional System Performance: User Interfaces and Performance Evaluation. Jacob Tsao, Randolph Hall, and Steven Shladover will present a joint paper on Design Options for Operating Automated Highway Systems, and Steven Shladover is serving as the Topic Organizer for the sessions on Advanced Vehicle Control Systems. Wei-Bin Zhang's presentation on Vehicle Health Monitoring for IVHS Malfunction Management is included in that session.

Transportation and Traffic Theory Symposium

Randolph Hall, former Director of the ATMIS Program at PATH, presented Scheduling Timed Transfers at Hub Terminals at the 12th International Symposium on Transportation and Traffic Theory at Berkeley (the Symposium is featured on page 12 of this issue). Professor Carlos Daganzo of ITS at UC Berkeley served as chairman, and Professor Ryusuki Kitanura of UC Davis presented Weighting Methods for Choice-Based Panels with Correlated Attraction and Initial Choice.

CHINA, JAPAN

Professor Karl Hedrick of UC Berkeley, Mechanical Engineering, traveled to Chengdu, China, in August where he presented a paper on Dynamic Coupling in Vehicles Under Automatic Control, at the 13th International Association of Vehicle System Dynamics: Dynamics of Vehicles on Roads and Tracks. Hedrick is a member of the international technical committee of the Symposium on Advanced Vehicle Control '94 (AVEC), a biannual conference sponsored by the Ministry of International Trade and Industry and the Japan Society of Automotive Engineers, which will meet in Tsukuba City, Japan, in October 1994.

PATH Director Donald Orme and Deputy Director Steven Shladover attended the Intelligent Vehicles '93 Conference at Waseda University during their July visit to Japan (see the Director's column in this issue for more on their trip to Japan).

PAC RIM

Over 1,000 people attended the Pacific Rim TransTech Third International Conference on Applications of Advanced Technologies in Transportation Engineering, sponsored by the American Society of Civil Engineers. The conference theme, "J.B. Ride Into the Future," represented the focus on technologically advanced solutions to the transportation challenges of the 21st century, with particular emphasis on the transportation future of the Pacific Rim. As the Gateway to the Pacific Rim, Seattle proved to be the perfect setting for this well-organized, internationally attended meeting, sponsored by the Washington State Department of Transportation and the Federal Highway Administration. PATH had a large presence, with sessions moderated by Mark Miller of PATH and Stephen Ritchie of UC Irvine, and nine presentations by program principals or affiliates:

- The Bay Area Advanced Transfer Information System Tested: Research Issues, Asad Khattak, PATH, and Hitham Al-Dekk, former PATH research now at the University of Central Florida
- Traveler Information and Traffic Management Around Paris: Strategic Issues, Jean-Luc Ygnace, INRETS, and Youngbin Yim, PATH
- Dynamic Traveler Information and Transit Ridership, Youngbin Yim, PATH
- Key Issues in Evaluating IVHS, Thomas A. Horan, Georgia Mason University

Receive Intellimation every quarter!!

To get on the Intellimation mailing list, simply FAX the following information to us:

Name, title, Company, type of business Address Phone and FAX Primary area of interest in IVHS

Our FAX is (510) 231-9565

local motion

ARRIVALS

Three new people have been added to the AVCS program area. Scott Rayninger and Mireille Brunoeck joined PATH in June as staff engineers reporting to Deputy Director Steven Shladover. Scott has a B.S. in theoretical and applied mechanics from the University of Illinois, Urbana-Champaign and comes to PATH via Hughes Aircraft in Los Angeles where he was part of the Missile Systems Group. Mireille was formerly at Integrated Systems, Inc., in Santa Clara, California, where she was manager of the simulation group. She received her Master's degree in electrical engineering at UC Berkeley.

DEPARTURES

ATMIS Program Director Randolph Hall accepted a faculty position at the University of Southern California and left in August to begin teaching in the School of Business Administration. Randy was with PATH for two years, and during that time he established a close and productive working relationship with his research groups at PATH, the ATMIS Council, Caltrans, and faculty state-wide. His contributions to the success of PATH will be missed, and we all wish him well in his new endeavor.

Mark Fun joined PATH in May as assistant to PATH Director, Donald Orme. Mark was in program planning at Douglas Aircraft and has a B.S. in engineering from UC Berkeley and an M.B.A. from the University of Southern California. Bin Ran completed his doctorate at the University of Illinois at Chicago and joined the ATMIS program area in June. At Illinois, he was active in development of probe vehicle algorithms for the ADVANCE Project. He is conducting research on dynamic traffic assignment, probe vehicle problems, and applications of cell transmission models.
Yonnel Gardes departed for his home in France in July, after receiving his Master's degree in Transportation Engineering. Yonnel was part of the PATH program for three years, studying under Professor Adolf D. May at ITS, conducting research on simulation of IVHS strategies on the Santa Monica Freeway corridor. Yonnel also participated in a PATH project with Dr. Alex Skabardonis on analysis of interactions between route guidance systems and real-time traffic signal control using the INTEGRATION simulation model. His assignment in France will be with the French Ministry of Transportation.

Huei Peng is now a member of the faculty at the University of Michigan in the Department of Mechanical Engineering, and departed for Ann Arbor in August. Peng worked with Professor Masayoshi Tomizuka at UC Berkeley, and as a PATH researcher with the lateral control project. He developed a preview control algorithm for automatic vehicle lane tracking which was validated by both computer simulations and experiments.