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The IEEE ITS Society Newsletter is published quarterly in January, April, July, and October. The current and all past issues of the Newsletter may be downloaded at no charge from the Society’s web site: http://sites.ieee.org/itss/.

You may subscribe to or unsubscribe from announcements at the same web site. Announcements are sent to approximately 10,000 ITS professionals from industry, academia, and government.

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Announcements, feature articles, book and meetings reviews, opinions, letters to the editor, professional activities, Abstracts of reports, and other material of interest to the ITS community are solicited. Please submit electronic material for consideration in any of the following formats: Microsoft Word, OpenOffice, plain ASCII, rich text format (rtf), or portable document format (pdf) to the Editor-in-Chief at yaobinchen@ieee.org.

SOCIETY NEWS

From the Editor

by Yaobin Chen

I hope you all have a relaxing and productive summer except for those living in the southern hemisphere. One of our Society flagship conferences, the 2012 IEEE Intelligent Vehicles Symposium (IV12) was successfully held on June 4-7 in historical and beautiful Alcalá de Henares, Spain. A summary report is included in this issue. As you are reading this issue, several other ITS Society sponsored conferences have been/are being held, such as ICVES’12, MESA’12, etc. Our flagship conference, ITSC12 will be held in Anchorage, Alaska September 17-19. More information about these conferences will be reported in the October issue of the Newsletter.

In this issue, we will again start off with “Message from the President” by Dr. Christoph Stiller, the current ITS Society President. I hope you will continue to enjoy a safe and great summer!
This month the new Thomson Reuters Journal Citation Reports (JCR) were published, better known as the Impact Factors. To put it simple, an Impact Factor quantifies how often a Journal paper is cited in average, i.e. the Impact Factor of a Journal is the ratio $X/Y$, where $X$ denotes the number of citations of a journal in the last two years while $Y$ denotes the total number of papers published in that journal during the same time period. Many scientists consider the Impact Factor as a metric for journal quality and this factor is frequently used to rank the publication performance of a scientist.

I was very pleased, that our IEEE Transactions on Intelligent Transportation Systems was once again ranked highest in the Transportation Science and Technology category and it is now ranked 12th among all 133 IEEE journals and magazines. Moreover, it could improve on its own record reaching 3.4 for 2011 from 2.2 in 2010. First of all, I want to thank our Editor-in-Chief, Fei-Yue Wang, the Associate Editors, and last not least the Reviewers for their dedication and work that stands behind these numbers. I know that the selection process of those contributions that are really high quality and that matter to science in our field is a challenging task conducted completely by volunteers. Second, I feel that these numbers confirm the concept of IEEE to share outstanding scientific results in an organization that is not interested in any monetary profits and that considers scientific progress as a merit that is to be shared equally and internationally for the advancements of humanity. I know from many volunteers that they share the vision behind this policy of the IEEE ITS Society.

With our IEEE Transactions of Intelligent Transportation Systems, the IEEE Intelligent Transportation Systems Magazine and the IEEE Intelligent Transportation Systems Newsletter, each offered in a quarterly interval, our society offers one journal on ITS every month to our members.

Beyond our journals, conferences are our main medium to disseminate high quality scientific progress in our field. The ITS Society requires three independent reviews for every conference contribution, before it can be accepted. Our conferences constitute the meeting points for scientists from industry and academia to share and discuss scientific results and industrial news. The picture below has been taken at the vehicle demonstration day of the IEEE Intelligent Vehicles Symposium in Spain this June showing Miguel Angel Sotelo, the General Chair of this successful conference with myself. I enjoyed meeting with colleagues and other stakeholders in our field. I received inspirations for my own work from the many discussions in the charming Spanish atmosphere.
While writing this message I am travelling to the IEEE International Conference on Vehicular Electronics and Safety, ICVES in Istanbul and when you read this message it might be short before the IEEE Intelligent Transportation Systems Conference, ITSC in Anchorage. I am looking forward to both these meetings in our community!

See you at ITSC 2012 in Anchorage!
The ITSS Executive Committee met on June 7, 2012 and the ITSS Board of Governors met on June 8, 2012 in Alcala de Henares, Spain for its summer meeting. This is the first time we have held a BOG/ExCom meeting in conjunction with IV. The next and last BOG/ExCom meeting of the year will be held on September 15-16, 2012 in conjunction with ITSC in Anchorage, Alaska. The June ExCom meeting was attended by all 10 members of the ExCom, and the BOG was attended by 14 of the 24 BOG members.

The ExCom members in attendance are shown in the image above. From left to right, Jayne Cerone (IEEE, not an ExCom member), Alberto Broggi (Past President), Daniel Zeng (VP Publication Activities), Jeffrey Miller (VP Administrative Activities and Magazine Editor-in-Chief), Urbano Nunes (VP Technical Activities), Fei-Yue Wang (Transactions Editor-in-Chief), Christoph Stiller (President), Yaobin Chen (Newsletter Editor-in-Chief), Jason Geng (VP Member Activities), Matt Barth (VP Conference Activities), and Daniel Dailey (VP Financial Activities). The meeting took place at the Escuela Politecnica in Alcala de Henares. The 5-hour ExCom meeting ended just after 8:00p.m., providing just enough time to head back to the hotel and enjoy some traditional Spanish cuisine. The BOG meeting began at 9:00a.m. the next morning and lasted until just after 2:00p.m. Miguel Angel Sotelo provided a delicious meal at
the engineering cafeteria following the BOG meeting. Each of the members of the ExCom
gave a detailed presentation about all of the activities that have been and will be conducted.
Discussion ensued on many topics, and the main points are summarized here.

- All three of the ITSS publications (Transactions, Magazine, Newsletter) are doing well.
The Magazine needs to try to attract more papers. An impact factor will hopefully be com-
ing sometime in late 2013 or early 2014.
- Conference attendance and publications are doing well. We would like to schedule IV and
  ITSC at least 3 years in advance.
- Membership in the ITSS is just above 1000. We are going to work on encouraging more
  student participation through outreach activities and student networking at conferences, as
  well as social networking.
- Christoph Stiller would like for the society to focus on growing membership, improving
  publications, and enhancing conference activities.

Here are the upcoming conferences with confirmed locations in ITSS:

- ITSC 2012 – Anchorage, Alaska, USA
- ITSC 2013 – The Hague, Netherlands
- ITSC 2014 – Qingdao, China
- ITSC 2015 – Las Palmas, Canary Islands
- IV 2013 – Brisbane, Australia
- ISI 2012 – Washington DC, USA
- ISI 2013 – Seattle, Washington, USA
- MESA/SOLI 2012 – Suzhou, China
- VNC 2012 – Seoul, Korea

Financially the society is doing well and staying consistent. We are operating close to break-
even for 2012.

To promote student activities at conferences, $2000 will be allocated to student outreach for
each IV and ITSC annually. This will first be implemented at ITSC 2012.

Urbano Nunes, the VP for Technical Activities, is working on developing a purpose for the
technical committees so they can stay focused and understand their existence.

ITS Now is moving forward under the leadership of Daniel Zeng, the VP for Publications. ITS
Now will publish 10-15 papers on the ITSS web site with an editorial explaining how the pa-
ers all fit together. This will be provided to our members at no additional cost.

The Transactions is trying to reduce the amount of time that elapses from first submission to
final decision. A lot of discussion ensued on this topic though since many parts of the decision
process depend on other volunteers. The Magazine has approximately one paper submitted
weekly, and more special issues are being proposed. The impact factor requires 3 years of on-
time publication, so we are hopefully looking at late 2013 or early 2014 before we will acquire
one.

If you have any questions about anything covered at the meeting, feel free to contact the VP
Administrative Activities, Jeffrey Miller, at jeffrey.miller@ieee.org.
Message from the Past President and the Nominations and Appointments Committee Chair

Dear IEEE ITS member,

I'm writing to you in my capacity as Chair of the IEEE ITSS Nominations and Appointments Committee. As you probably know, every year we need to appoint 5 new Board of Governors (BOG) members. The term of BOG members is three years and in these three years BOG members are expected to actively participate in all decisions of the Society and attend the BOG meetings, which are generally scheduled either as a teleconference or back to back with our flagship conference, the IEEE Intelligent Transportation Systems Conference.

Therefore I'm seeking nominations for such candidates (self-nominations are also acceptable), together with a brief CV (in plain text form; no Word, pdf,... please!). In case the candidate was already part of the Board of Governors, please also describe how he/she served the Board in the past.

You can check the current BOG members here: http://sites.ieee.org/itss/introduction/board-of-governors/.

Administrativia:
- I will need to receive the list of possible candidates ASAP
- I will forward the list to IEEE
- IEEE will contact all IEEE ITS members (postal mail or email) and ask for a ballot vote (generally in the September timeframe)
- New elected members will start their term in 2013 and will conclude their service on Dec 31, 2015.

The members of the N&A Committee are:
- Umit Ozguner
- Steve Shladover
- Chip White

Thanks again for your attention to this important matter,

Alberto Broggi
Past President IEEE ITS Society
Chair, Nominations and Appointments
The 2012 IEEE Intelligent Vehicles Symposium (IV’12), sponsored by the IEEE ITS Society, was held in Alcalá de Henares, Spain. The scope and application of intelligent vehicles technologies have dramatically evolved since the first IV conference celebrated in Tokyo, in 1990. Along the 22 years of history of IV conferences, the automobile has suffered an extraordinary metamorphosis from being the key element in road safety and autonomous driving to becoming the cornerstone in transport sustainability and energy efficient policies worldwide. Accordingly, Intelligent Vehicles have adapted their technological features in order to achieve full connectivity (vehicle-to-vehicle, vehicle-to-infrastructure, vehicle-to-road user), to become eco-friendly and, in a few words, to get socially and economically valuable and acceptable. In this rapidly changing and global scenario, the Intelligent Vehicles scientific and industrial community has demonstrated to be part of the solution. It is a privilege for us to host the Intelligent Vehicles Symposium in Spain for the first time in the history of IV conferences, particularly now that Spanish industry is being revitalized by new developments in the automotive sector.

IV’12 participants gathering for reception at the historical Paraninfo room.
The IV12 call for papers led to 300 submissions and 1 special session proposal. 194 submissions of these were selected for publication in a rigorous review process conducted by the Program Chair, Meng Lu, and two Program Co-Chairs Matthew Barth and Ljubo Vlacic, supported by 44 members in the International Program Committee. On Sunday preceding the main symposium, six workshops were offered in a Workshops day organized by Rafael Toledo: 1) The First International Workshop on IPv6-based Vehicular Networks (Vehi6), organized by José Santa and Jong-Hyouk Lee, 2) Workshop on Human Factors in Intelligent Vehicles, organized by Cristina Olaverri and Rosaldo Rossetti, 3) Workshop on Navigation, Perception, Accurate Positioning and Mapping for Intelligent Vehicles, organized by David Bétaille, Vicente Milanes, Jorge Villagrán, Rafael Toledo-Moreo, Juan Nieto, Martin Adams and Eduardo Nebot, 4) Advances in Heavy Vehicle Safety, Energy Efficiency, and Controls, organized by Hocine Imine and Dongpu Cao, 5) Perception in Robotics, organized by Luis Miguel Bergasa, Rafael Barea and Manuel Ocaña, and 6) Ambient Intelligence for Tomorrow’s Intelligent Transportation Systems, organized by Matthew Fullerton and Cristina Beltrán.

The main symposium is characterized by a single session format so that all attendees remain in a single room for multilateral communications in an informal atmosphere. The presentations included a Panel Discussion about “Autonomous Driving: current trends and future perspectives”, participated by Juhani Jääskeläinen, Chris Urmson, Ralf Herrtwich, Christoph Stiller and Alberto Broggi, and moderated by Miguel Ángel Sotelo. Keynote talks have been given on ‘Realizing Self-driving Vehicles’ by Chris Urmson; on ‘Smart Cars for Safe Pedestrians’ by Dariu Gavrila; and on ‘Toward Environmental Sustainability in a Connected World’ by Robert Bertini.

The social program led the participants through some historical sites of Alcalá de Henares. The reception was held in the Paraninfo room and Patio de Filósofos (Philosophers Patio). The banquet took place at Hotel El Parador, a reconstructed magnificent seventeenth-century building, the former Santo Tomás Dominican Convent and School. The symposium has been accompanied by an exhibition that displayed the latest devices, tools and technologies in intelligent vehicles. On-the-road demonstrations of latest vehicles from research and industry were a remarkable component of the symposium. The Demonstration Chair, Eugenio Naranjo, has organized this event nearby Alcalá de Henares in INTA proving ground. Participants were able to experience perception, V2I communication, cooperative assistance functions, and autonomous driving.
in 8 vehicles. Sebastián Sánchez Prieto, María Teresa de Pedro, Luis Miguel Bergasa, Jonas Sjöber, Ming Yang, David Fernández Llorca, Miguel Ángel García Garrido and José María Armingol complete the IV’12 Organizing Committee. Without their generous contribution, the organization of this symposium would have been simply impossible.

339 participants from 31 countries led by Germany, Japan, France, USA, Spain, and China attended the main symposium. 143 attendees were present at the workshops, and 128 participants experienced the rides in demonstration vehicles. A Selection Committee composed of 5 international experts from academia and industry has presented best paper awards for the best oral contributions to Martin Liebner (First Prize) and Maximilian Muffert (Second Prize), the best PhD paper awards to Stephanie Lefèvre (First Prize) and Michael Aeberhard (Second Prize), as well as the best poster contributions to Quan Tran (First Prize) and Feihu Zhang (Second Prize).

We hope IV12 provides the participants pleasant memories of the time spent in the historical city of Alcalá de Henares, cradle of Miguel de Cervantes, the greatest Spanish writer in history. More pictures from IV12 are available at the symposium website: http://www.robesafe.es/iv2012.
Anchorage, Alaska, USA
September 16-19, 2012

Intelligent Transportation Systems (ITS) hold the promise of improving mobility, safety, and security, while ensuring energy efficiency and reducing environmental impacts of transportation systems.

Call for Participation

Participation in the ITSS flagship conference, the Intelligent Transportation Systems Conference, is sought. Original and innovative contributions in ITS research and advanced implementations and deployments have been submitted for technical sessions, including articles conveying new developments in theory, analytical, and numerical simulation and modeling, experimentation, advanced deployment and case studies, results of laboratory or field operational tests, and other related creative endeavors as well as special educational developments for ITS curricula. The conference theme is The Wild Frontier in Intelligent Transportation. The technical areas include but are not limited to the following:

- Traffic theory, modeling, simulation
- Intelligent algorithms
- Sensors and actuators
- Vision systems and processing
- Safety Systems
- Security Systems
- Evacuation Systems
- Traffic and Communications Networks
- Traffic Control Systems
- V2V and V2I Communications
- ITS User Services: ATMS, ATIS, AVCS, etc.
- Intelligent Vehicles
- Driver Assistance
- Vehicle Collision Avoidance
- Integrated Safety Systems
- Commercial Vehicle Operations
- Multi-modal ITS
- ITS Implementation
- Pedestrian and Bicyclist Safety and Mobility Systems
- ITS for Special Needs
- Emergency Services
- Environmental and Green Transportation

In the tradition of successful IEEE ITS Conferences, only the highest quality papers have been accepted through an online peer review process. The final version of the accepted papers will be included in the Conference proceedings only after at least one author officially registers and presents the paper at the Conference. Please visit the conference web site (http://www.itsc2012.org) for more information on registering for the conference. On behalf of the organizing committee, we hope to see you in Anchorage, Alaska!

General Chair: Prof. Jeffrey Miller, University of Alaska Anchorage, USA
Program Co-Chairs: Prof. Wei-Bin Zhang, University of California, Berkeley, USA
Prof. Yinhai Wang, University of Washington, USA
Finance Chair: Prof. James Krogmeier, Purdue University, USA
Publications Chair: Prof. Heng Wei, University of Cincinnati, USA
Workshop/Tutorials Chair: Prof. Zhiheng Li, Tsinghua University, China
Local Arrangement Chair: Prof. Sun-il Kim, University of Alaska Anchorage, USA
Student Activities Chair: Prof. Brendan Morris, University of Nevada, Las Vegas, USA
Registration Chair: Prof. Javier Jesus Sanchez Medina, Universidad de Las Palmas de Gran Canaria, Canary Island, Spain
Publicity Co-Chairs: Prof. Urbano Nunes, University of Coimbra, Portugal
Prof. Fei-Yue Wang, Chinese Academy of Sciences, China
Prof. Matthew Barth, University of California, Riverside, USA
Call for Papers

THE INTELLIGENT VEHICLES SYMPOSIUM (IV’13) is the premier annual forum sponsored by the IEEE INTELLIGENT TRANSPORTATION SYSTEMS SOCIETY (ITSS). Researchers, academics, practitioners, and students from universities, industry, and government agencies are invited to discuss research and applications for Intelligent Vehicles and Cooperative Vehicle Systems. The technical presentations are characterized by a single session format so that all attendees remain in a single room for multilateral communications in an informal atmosphere. Tutorials will be offered on the first day followed by three days of presentations. An exhibition area will be available for the presentation of products and projects.

The IFAC – INTELLIGENT AUTONOMOUS VEHICLES CONFERENCE IAV’13 will also be held at Gold Coast, from 26 June to 28 June 2013. It is the very first time, since their inception, that these two premier conferences will be held back-to-back. A special reduced conference fee will thus be on offer to intelligent autonomous vehicles researchers and practitioners towards encouraging them to attend both events and explore underpinning synergies. For details please visit www.iav2013.org

The IV’13 Program topics include but are not limited to:
- Advanced Driver Assistance Systems
- Automated Vehicles
- Vehicular Safety, Active and Passive
- Vehicle Environment Perception
- Driver State and Intent Recognition
- Eco-driving and Energy-Efficient Vehicles
- Impact on Traffic Flows
- Cooperative Vehicle – Infrastructure Systems
- Collision Avoidance
- Pedestrian Protection
- V2I/V2V Communication
- Proximity Detection Technology
- Assistive Mobility Systems
- Proximity Awareness Technology
- Intelligent Ground, Air and Space Vehicles
- Autonomous/Driverless Vehicles
- Image, Radar and Lidar Signal Processing
- Information Fusion
- Vehicle Control
- Telematics
- Human Factors and HMI
- Electric and Hybrid Vehicle Technologies
- Novel Interfaces and Displays
- Intelligent Vehicle Software Architecture

For detailed submission instructions visit the conference website at www.iv2013.org

Important Dates
- Workshop, Special Session and Tutorial Proposals: 01 November 2012
- Paper Submission: 01 November 2012
- Notification of Acceptance: 15 January 2013
- Early Registration: 15 February 2013
- Final paper Submission: 28 February 2013

Proposals
For special sessions, demonstrations, and exhibition proposals please contact respective chair.
FIRST ANNOUNCEMENT

AND

CALL FOR PAPERS

FAST-zero ‘13

SECOND INTERNATIONAL SYMPOSIUM ON

FUTURE ACTIVE SAFETY TECHNOLOGY

TOWARD ZERO TRAFFIC ACCIDENTS

SEPTEMBER 22-26, 2013

NAGOYA, JAPAN

at Nagoya University

Deadline for Abstracts: November 15, 2012

URL: http://www.fast-zero13.info/

E-mail: fast-zero13@ics-inc.co.jp

Organized by

FAST-zero’13 Organizing Committee,
Society of Automotive Engineers of Japan, Inc. (JSAE)

In Association with

Correspondence

All inquiries and proposals concerning the symposium should be addressed to FAST-zero’13 Secretariat:
E-mail: fast-zero13@ics-inc.co.jp

SYMPOSIUM LOCATION

The symposium will be held at Nagoya University, in the ES building, located in front of Nagoya Daigaku subway station. The campus can be reached by subway within 30 minutes from Nagoya or Kanayama station.
Address: Furo-cho, Chikusa-ku, Nagoya 464-8603, Japan

SYMPOSIUM TOPICS

- On-Board Sensing Active Safety Systems
  - On-Board Sensing Driver Assistance Systems
  - Autonomous Driving Vehicle
  - Vehicle Dynamics Control
  - Vehicular Sensors and Environment Perception
- Communication-Based Active Safety Systems
  - Cooperative Driver Assistance Systems
  - X2X Communications and Safety Telematics
  - ITS and ICT for Safety Applications
- Driver Characteristics and Human Factors
  - Driver Monitoring and Driver State Detection
  - Driver Behavior Modeling
  - Driver Characteristics Studies
  - Driver Assessment and Training
  - Cooperation Between Drivers and Assistance Systems
  - Human Machine Interface
  - Driver Overdependence and Distrust on Assistance Systems
- Methodologies for Active Safety Research
  - Safety Impact Assessment of Active Safety Devices
  - Driving Simulators
  - Traffic Simulation
  - Active Safety Testing Methods and Tools
  - Vehicular Signal Processing
  - Field Operational Test
  - Safety and Security of Vehicle Embedded Systems
- Other Related Topics on Active Safety Technologies

OFFICIAL LANGUAGE FOR PAPERS & PRESENTATIONS

The official language of the symposium for both paper and presentation is English. Oral presentation will be made in parallel sessions during the symposium. All contributed papers will be published in the FAST-zero ’13 proceedings.

PAPER SUBMISSION

Electronic submission is highly recommended. The extended abstract in PDF or DOC format should be submitted through the Paper Submission Page at following website:
http://www.fast-zero13.info/

At least one author for each technical paper must register and pay the symposium registration fee before the electronic submission of full paper. Accepted full papers with registered author(s) will be published in Symposium Proceedings.
FAST-zero ’13
Second International Symposium on Future Active Safety Technology Toward zero traffic accidents

Introduction
With the annual estimate for fatalities from car accidents around the world reaching 1,200,000, drastically reducing such accidents has become imperative. Researchers and engineers in the field of active safety from Japan and other countries are working hard to achieve this goal.

Developments in autonomous-detection and cooperative driving assistance systems are currently underway in Asia, US and Europe, and positive results can be expected to come from these large scale projects.

Characteristic driver behavior has become an important aspect of consideration in the fundamental design of these driving assistance systems, and advanced testing tools such as driving simulators are used in this research area, both in Japan and in other countries. A driver model which can recreate accidents caused by driver error has also been proposed, and developments using several vehicles with this driver model installed as a safety transportation simulator are underway.

Following the success of the first FAST-zero ’11 symposium in Tokyo, we are expecting further discussions and more exchange of information about active safety by specialists from both industrial and academic circles. We foresee substantial contributions and further developments in both technological and academic research in this area. In our aim to attain a world where there are zero traffic accidents, we continue to organize this biennial international symposium to discuss future active safety technologies.

Organized by
FAST-zero’13 Organizing Committee of the Society of the Automotive Engineers of Japan, Inc. (JSAE)

In Association with
- Nagoya University
- International Federation of Automotive Engineering Societies (FISITA)
- International Federation of Automatic Control, Technical Committee on Automotive Control (IFAC)
- IEEE-Intelligent Transportation Systems Society (ITSS)
- ITS-Japan
- International Association of Traffic and Safety Sciences (IATSS)
- Japan Society of Mechanical Engineers (JSME)
- Society of Instrument and Control Engineers (SICE)

Organization
General Chair:
Y. Furukawa (Shibaura Inst. of Tech.)

Steering Committee
T. Suetomi (Mazda Motor Corp.) : Chair
H. Yoshida (National Defense Academy) : Co-Chair

Local Organizing Committee
K. Takeda (Nagoya Univ.) : Chair
C. Miyajima (Nagoya Univ.) : General Secretariat
Y. Miichi (Toyota Motor Corp.)
T. Miyamoto (Hino Motors Corp.)
Y. Ninomiya (Toyota CRDL)
P. Raksincharoensak (Tokyo Univ. of Agri. and Tech.)
M. Shino (Univ. of Tokyo)

Call for Papers
Authors intending to present a paper at the FAST-zero ‘13 symposium are invited to submit an extended abstract in English, with a length of approximately 1000 words. The extended abstract should clearly reflect the contents of the paper, and should not exceed 2 pages of A4 size (including figures).

The extended abstract must be accompanied by the following information:
1. Title of paper
2. Name of author(s)
3. Affiliation(s)
4. Symposium topics (up to 3 - see list of topics)
5. Abstract (approx. 1000 words, including figures)
6. Corresponding author
   Name, Affiliation, Complete mailing address,
   E-mail address, Telephone number,
   and Facsimile number

For practical reasons, the total number of papers must be limited. The International Scientific Committee will select the final papers.

Important Dates
Deadline for abstracts: November 15, 2012
Notification of acceptance: January 31, 2013
Deadline for full papers: May 10, 2013
Deadline for author registration: May 10, 2013
ICIRT 2013 Call for Papers
2013 IEEE International Conference on Intelligent Rail Transportation

Sponsors: IEEE Intelligent Transportation Systems Society,
Chinese Association of Automation, China Railway Society
Aug.30-Sept.1, 2013, Beijing, China

THEME
2013 IEEE International Conference on Intelligent Rail Transportation (IEEE ICIRT 2013) will be held on Aug.30-Sept.1, 2013 at the Beijing Friendship Hotel. The conference is sponsored by the IEEE Intelligent Transportation Systems Society, Chinese Association of Automation and China Railway Society. And it is organized by Beijing Jiaotong University and Institute of Automation Chinese Academy of Sciences. The theme of IEEE ICIRT 2013 is “Security, Efficiency and Intelligence”. Experts will be invited to give frontier lectures, make speeches in group and discuss ideas freely. The aim is to provide an open platform for the scholars in the technologies, theories and engineering applications of rail transit to carry out academic exchanges. All accepted papers will be published by IEEE, which will be indexed by EI and ISTP. Welcome experts and scholars both domestic and abroad to contribute to the conference.

TOPICS OF INTEREST (BUT NOT LIMITED TO)
- Rail transit system modeling method
- Train protection control
- Energy saving and environment protecting control technology
- Safe reliability
- Communication technology and its application
- Parallel control and management for rail transit system
- Systems operation organization and dispatching
- Train control system simulation and testing
- Multi-objective optimization control of rail transit
- Computer simulation
- Fault detection and diagnosis
- Multi-agent theory and application
- Automatic operation
- Human factors in rail transit system

PAPER SUBMISSION
Regular paper submission: Complete manuscripts in PDF must be submitted through website http://icirt.bjtu.edu.cn electronically. Manuscripts should be at most six pages in the IEEE two-column format including figures, tables, and references.
Invited paper submission: Proposals for invited sessions should be submitted to the Program Chair. Full manuscripts should be submitted in the same manner as regular papers after the proposal has been accepted. The proposal should include a one-page summary of the proposed session with authors’ name, affiliation, title of the abstract with five extended abstracts (no more than 1000 words) attached. Please contact us at icirt.ieee@gmail.com.

IMPORTANT DATES
Proposal submission deadline for invited sessions: January 30, 2013
Full paper submission deadline: March 30, 2013
Notification of acceptance: April 15, 2013
Camera-ready copy due: May 15, 2013
ICCVE 2012 is the first-ever Connected Vehicles conference that gathers all the relevant communities together. During the 5-day conference, more than 2,000 experts, practitioners and policy makers from all around the world will present the latest innovations and advances on connected vehicles, share the experience and insights, forecast the trends and opportunities, and discuss the policy, economics and social implications. We are proudly and excitedly inviting you to participate in and enjoy this world-class festival.
The 1st ACM/IEEE/IFAC/TRB International Conference on
Connected Vehicles
and Expo

Dec 12-16, 2012  |  China National Convention Center, Beijing, China

Topics of interest include, but are not limited to:

- Wireless Communications and Vehicular Networking
- Mobile Internet, Mobility Internet and Internet of Things
- Cooperative Driving, Intelligent and Autonomous Vehicles
- Automotive Electronics and Automatic Control
- Transportation and Connected Vehicles
- Electric Vehicle and Transportation Electrification
- Geographic, Spatial and Social Information Systems
- Manufacturing and Product Safety Engineering in Connected Vehicles
- Practices, Recommendations and Standards in Connected Vehicles
- Policy, Economics and Social Implications of Connected Vehicles

Technically Sponsored by:

- ACM (Association for Computing Machinery)
- IEEE Communications Society
- IEEE Computer Society
- IEEE Consumer Electronics Society
- IEEE Industrial Electronics Society
- IEEE Intelligent Transportation Systems Society
- IEEE Vehicular Technology Society
- IEEE Standards Association
- IFAC (International Federation of Automatic Control)
- TRB (Transportation Research Board)

For more information, visit www.ICCVE.org

2012 International Conference on Connected Vehicles & Expo
Wireless communication for intelligent transportation systems (ITS) is a promising technology to improve safety and security for all transport modes, to reduce traffic congestion, to optimize the use of existing infrastructures (road, rail maritime, fluvial) and support information services in vehicles with the general purpose of reducing the impact of transport on the environment. The development of sustainable mobility is a key challenge for the development of urban areas. A new era of vehicular technology that includes vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication is already there in the public transport domain and this should be generalized. This era will be driven by both (pre-competitive) public-sector and private-sector funding. Safety-related applications are not only taken into consideration, but non-safety multimedia content providers are also becoming a new topic of research. Key players in the industry, such as automotive companies, public transport operators, railway industries and government agencies, are investing heavily in the advanced research and development of many ITS technologies and applications. This research effort primarily focuses on the system development and standardization of telematics. During recent ITS developments, transportation telematics techniques have exhibited much progress, e.g., interaction between vehicles and the infrastructure for delivering services such as road-side assistance, automatic crash notification, concierge assistance and vehicle condition reports. These progresses are also really important in the public transport domain (buses, metro, trains, tramways) for which V2V and V2I for safety and non safety applications are a key component for the exploitation but also for reducing energy consumption. A number of IEEE 802.11p-like equipment prototypes have been built, and several technical reports based on field trials have demonstrated the lack of cutting-edge techniques to improve system performance. Furthermore, all these applications require accurate and reliable positioning using GNSS solutions alone or enhanced with map-matching and sensors fusion. Technology and applications for ITS and telematics design are rapidly emerging, and there is a critical need to bring together professional researchers, intelligent engineers, academia, industry, standard committees, the private sector and the public sector to exchange new ideas. This conference aims to spur research progress by serving as a forum in which both academia and industry can share experiences and report original work regarding all aspects of vehicular communication, e.g., Vehicular Ad hoc Networks (VANETs), cooperative systems, information dissemination, road and rail safety, information and emergency services, etc. Our primary goal is to promote meaningful research in the cross-layered design of architectures, algorithms and applications for vehicular communication environments in all transport modes.

**Track1: Smart Vehicle**
- Video/Audio signal processing for driver-assistance systems
- In-vehicle communications/telematics
- Analog/Digital circuit design for in-car smart systems
- SoC architecture/platform for smart vehicle systems
- Green design techniques for ITS
- Security and privacy in vehicular networks
- Field operational tests and testbeds for smart vehicular
- Vehicle collision avoidance
- Sensors and actuators

**Track2: Intelligent Transportation Systems (ITS)**
- Data-collection, organization and dissemination methods
- New ITS/Telematics applications
- Ongoing ITS/Telematics activities

**Call for Paper**

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**Importance Dates**
- Manuscript Submission Due: May 31, 2012
- Final Acceptance notification: July 31, 2012
- Final Manuscript Due: August 31, 2012
- Early Registration: August 30, 2012

**General Chair:** Jia-Chin Lin  
jiachin@ieee.org

**Contact:** Chi-Sheng Lin  
info@nucomm.org

**Track3: Telecommunications and Positioning**
- V2V, V2I and V2X communications
- Network protocols including MAC, routing, addressing, multicast, TCP protocols and end-to-end quality of service, resource management, security and privacy
- Design with multiple wireless data links (802.11p, 802.11x, WiMAX, WiFi, cell phone, LTE-A, GPS)
- Mobility or handover technology
- System-level, board-level and chip-level electronics
-PHY issues: channel measurements, channel modeling, channel estimation, antenna arrangement, pilot arrangement, etc.
- Physical layer and antenna technologies for vehicular networks
- RF propagation models for vehicular networks
- Radio resource management for vehicular networks
-GPS, GALILEO and terrestrial solutions for accurate and reliable positioning of vehicles

**Track4: Green Life Toward Blue Planet**
- Field operational tests and testbeds for vehicular networks
- Assessment of impact of vehicular networks on transportation efficiency and safety
- Emission modeling and environmental impact assessment
- Regional requirements and their consequences
- Interference-Management and Spectrally-Efficient Technologies
- Resource-Efficient Networking Technology and Application Design
- Cross-Layer Design/Optimization and Green Transceiver Design
- Novel technologies to reduce human electromagnetic exposure and electromagnetic pollution
Conference Calendar

This section lists upcoming ITS-related conferences, workshops, or exhibits. Contributions are welcome; please send announcements to itsconfs@ce.unipr.it.

2012

September 3-6, 2012
IEEE Vehicular Technology Conference: VTC2012-Fall
Quebec City, Canada
http://www.ieeevtc.org/vtc2012fall/index.php

September 16-19, 2012
IEEE Intelligent Transportation Systems Conference
Anchorage, Alaska, USA
http://www.itsc2012.org

September 16-19, 2012
National Rural ITS Conference
Biloxi, Mississipi, USA
http://www.nritsconference.org

October 3-5, 2012
2012 IEEE Multi-Conference on Systems and Control
Dubrovnik, Croatia
http://www.msc2012.org/

October 7-12, 2012
2012 IEEE/RSJ International Conference on Intelligent Robots and Systems
Vilamoura-Algarve, Portugal
http://www.iros2012.org/site/

October 10-13, 2012
12th International Conference on Transport Systems Telematics
Katowice-Ustroń, Poland

October 22-26, 2012
19th World Congress on ITS
Vienna, Austria
http://2012.itsworldcongress.com/content

November 5-8, 2012
12th International Conference on ITS Telecommunications
Taipei, Taiwan
Submission due by: May 31, 2012
http://www.itst2012.org

Dec 12-16, 2012
International Conference on Connected Vehicles and Expos
Beijing, China
Submission due by: August 15, 2012
http://www.ICCVE.org

2013

Feb 21-23, 2013
VISIGRAPP Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications
Barcelona, Spain
http://www.visigrapp.org/

April 16-18, 2013
SAE 2013 World Congress
Detroit, Michigan, USA
Submissions due by: September 1st
http://www.sae.org/congress/techprogram/cfp.pdf

May 6-10, 2013
2013 IEEE International Conference on Robotics and Automation (ICRA 2013)
Karlsruhe - Germany
Submissions due by September 17, 2012
http://www.icra2013.org/

May 27-31, 2013
IEEE International Symposium on Industrial Electronics (ISIE 2013)
Submission of Full Papers November 30, 2012
Special Session Proposals November 10, 2012
http://www.isie2013.org/

June 2-5, 2013
IEEE Vehicular Technology Conference: VTC2013-Spring
Dresden, Germany
Submissions due by: September 30
http://www.ieeevtc.org/vtc2013spring/index.php

June 23-26, 2013
The 2013 IEEE Intelligent Vehicles Symposium
Workshop and Tutorial Proposals: 01 November 2012
Special Session Proposals: 01 November 2012
Paper Submission: 01 November 2012
Gold Coast, Australia
http://www.iv2013.org/

June 27-28, 2013
ICIAP 2013 : International Conference on Image Analysis and Processing
Paris, France
Submissions due by: January 31, 2013

June 26-28, 2013
IFAC Intelligent Autonomous Vehicles Conference IAV’13
Gold Coast, Australia
http://www.iav2013.org

Jun 23-28, 2013
26th IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2013)
Portland OR., USA
Submissions due by Nov 4, 2012
http://www.pamitc.org/cvpr13/

July 15-16, 2013
International Conference on Vehicular Electronics and Safety (ICVES 2013)
Stockholm, Sweden
Submissions due by: January 31, 2013
http://www.waset.org/conferences/2013/stockholm/icves/

Aug 27-30, 2013
2013 IEEE Multi-Conference on Systems and Control (MSC)
Hyderabad, India

September 25-27, 2013
International Conference on Sustainable Automotive Technologies
Ingolstadt, Germany
Submissions due after: August 1st
http://www.icsat2013.com

October 14-18, 2013
20th World Congress on ITS
Tokyo, Japan
AN ADAPTIVE LONGITUDINAL DRIVING ASSISTANCE SYSTEM BASED ON DRIVER CHARACTERISTICS

WANG, JIANQIAN; ZHANG, LEI; ZHANG, DEZHAO; LI, KEQIANG

A prototype of a longitudinal driving assistance system is developed, which is adaptive to driver behavior. Its functions include Adaptive Cruise Control and Forward Collision Warning/Avoidance. The research data came from driver car-following tests in real traffic environments. Based on the data analysis, a driver model imitating the driver’s operation is established to generate the desired throttle depression and braking pressure. Algorithms for collision warning and automatic braking activation are designed based on the driver’s pedal deflection timing during approach (gap-closing). A self-learning algorithm for driver characteristics is proposed based on the Recursive Least Square method with a forgetting factor. Using this algorithm, the parameters of the driver model can be identified from the data in the manual operation phase, and the identification result is applied during the automatic control phase in real-time. A test-bed with electronic throttle and electro-hydraulic brake actuator is developed for system validation. The experimental results show that the self-learning algorithm is effective and the system can to some extent adapt to individual characteristics.

ECO-ROUTING NAVIGATION SYSTEM BASED ON MULTI-SOURCE HISTORICAL AND REAL-TIME TRAFFIC INFORMATION

BORIBOONSOMSIN, KANOK; BARTH, MATTHEW; ZHU, WEIHUA; VU, ALEXANDER

Due to increased public awareness on global climate change as well as other energy and environmental problems, a variety of strategies are being developed and used to reduce the energy consumption and environmental impact of roadway travel. In the area of Advanced Traveler Information Systems, recent efforts have been made in developing a new navigation concept called “eco-routing” that finds a route requiring the least amount of fuel and/or producing the least amount of emissions. This paper presents an eco-routing navigation system that determines the most eco-friendly route between a trip origin and a destination. It consists of several components, including: (a) a Dynamic Roadway Network database, which is a digital map of roadway network that integrates historical and real-time traffic information from multiple data sources through an embedded data fusion algorithm; (b) an Energy/Emissions Operational Parameter Set, which is a compilation of energy/emission factors for a variety of vehicle types under various roadway characteristics and traffic conditions; (c) a routing engine, which contains shortest-path algorithms used for optimal route calculation; and (d) user interfaces that receive origin-destination inputs from users and display route maps to the users. Each of the system components and the system architecture are described. Example results are also presented to prove the validity of the eco-routing concept and to demonstrate the operability of the developed eco-routing navigation system. In addition, the current limitations of the system and the areas for future improvements are discussed.

SENSITIVITY ANALYSIS OF AN EVOLUTIONARY BASED TIME DEPENDENT ORIGIN/DESTINATION ESTIMATION FRAMEWORK

KATTAN, LINA; ABDULHAI, BAHER

The paper presents sensitivity analysis results for a distributed evolutionary implementation of the estimation of time-dependent origin-destination (TDOD) matrices. The system uses a non-iterative OD estimation process, which attempts to minimize the discrepancy between observed link flow counts and assigned counts. At the same time, the system anchors the search process to the vicinity of an apriori OD matrix to maintain travel patterns and OD structure.
The sensitivity analysis examines various factors that are expected to affect the performance of the evolutionary based TDOD estimation method. The factors examined are: congestion levels, network size, size of the search space and degree of precision of the apriori matrix. Simulation results for the waterfront network in Toronto show that the algorithm is robust in terms of replicating observed vehicle counts and the closeness to the real demand. The use of distributed evolutionary algorithm is also shown to provide good results for a large network and within fast computing speeds. However, the quality of the estimated OD relative to the true OD is shown to deteriorate if a totally random apriori matrix is used as a starting point, which has no structural resemblance to the prevailing OD patterns in the network. Also, the quality of the estimated OD matrix was found to deteriorate as congestion levels increased and as the network size increased. It is notable that in all cases the estimated OD matrix resulted in better matching flows.

**LOCAL PATH PLANNING FOR OFF-ROAD AUTONOMOUS DRIVING WITH AVOIDANCE OF STATIC OBSTACLES**

CHU, KEONYUP; LEE, MINCHAE; SUNWOO, MYOUNGHO

In this paper, a real-time path planning algorithm is presented that provides an optimal path for off-road autonomous driving with static obstacles avoidance. The proposed planning algorithm computes a path based on a set of predefined waypoints. The predefined waypoints provide the base frame of a curvilinear coordinate system in order to generate path candidates for autonomous vehicle path planning. Each candidate is converted to a Cartesian coordinate system and evaluated using obstacle data. To select the optimal path, the priority of each path is determined by considering the path safety cost, path smoothness, and path consistency. The proposed path planning algorithms were applied to the autonomous vehicle A1 which won the 2010 Autonomous Vehicle Competition organized by the Hyundai-Kia Automotive Group in Korea.

**ESTIMATING RELEVANCE FOR THE EMERGENCY ELECTRONIC BRAKE LIGHT APPLICATION**

SZCZUREK, PIOTR; XU, BO; WOLFSON, OURI; LIN, JIE

In this paper, we compare two methods of estimating relevance for the emergency electronic brake light application. One uses an analytically derived formula based on the minimal safety gap required to avoid a collision. The other method uses a machine learning approach. The application works by disseminating reports about vehicles that are performing emergency deceleration in effort to warn drivers about the need to perform emergency braking. Vehicles which receive such reports have to decide whether the information contained in the report is relevant to the driver, and warn the driver if that is the case. Common ways to determine relevance are based on the lane or direction information, but using only these attributes can lead to many false warnings, which can desensitize the driver. Desensitized drivers may ignore warnings or turn off the system completely, thus eliminating any safety benefits of the application. We show that the machine learning method, in comparison to the analytically derived formula, is able to significantly reduce the number of false warnings by learning from the actions drivers take after receiving a report. The methods were compared using simulated experiments with a range of traffic and communication parameters.

**NIGHTTIME BRAKE-LIGHT DETECTION BY NAKAGAMI IMAGING**

CHEN, DUAN-YU; LIN, YU-HAO; PENG, YANG-JIE
Given the rapid expansion of car ownership worldwide, vehicle safety is an increasingly critical issue in the automobile industry. The reduced cost of cameras and optical devices has made it economically feasible to deploy front-mounted intelligent systems for visual-based event detection for forward collision avoidance and mitigation. While driving at night, vehicles in front are generally visible by their tail and brake lights. The brake lights are particularly important because they signal deceleration and potential collision. Therefore, in this paper, we propose a novel visual-based approach, based on the Nakagami-m distribution, for detecting brake lights at night by analyzing the tail lights. Rather than using the knowledge of the heuristic features, such as the symmetry, position and size of the rear-facing vehicle, we focus on finding the invariant features to model brake light scattering by Nakagami imaging and therefore conduct the detection process in a part-based manner. Experiments on an extensive dataset show that our proposed system can effectively detect vehicle braking under different lighting and traffic conditions, and thus demonstrates its feasibility in real-world environments.

QUASI-LINEAR OPTIMAL PATH CONTROLLER APPLIED TO POST IMPACT VEHICLE DYNAMICS

YANG, DERONG; GORDON, TIM; JACOBSON, BENGST; JONASSON, MATS

This paper investigates brake-based path control of a passenger vehicle, aimed at reducing secondary collision risk following an initial impact in a traffic accident. This risk may be reduced if lateral deviations from the pre-impact path can be minimized, at least on straight roads. Numerical optimization has previously shown that the coupled control of lateral forces and yaw moments can be applied to effectively minimize such path deviations. In this paper, a quasi-linear optimal controller (QLOC) is proposed to achieve this control target. QLOC uses nonlinear optimal control theory to provide a semi-explicit approximation for optimal post impact path control. The controller design method is novel, combining linear co-state dynamics with nonlinear constraints due to tire friction limits. A fully closed-loop form of the controller is presented, applicable to multiple-event accidents occurring on straight roads, including adaptive estimation of the time instant at maximum deviation. The controller achieves performance very similar to that of open-loop numerical optimization. Assuming the vehicle remains on the road surface after the impact, and assuming the brake actuators remain operational, it is verified that the path controller is effective over a wide range of post-impact kinematic conditions. It is expected that the QLOC controller will prove useful in other cases where chassis systems directly control the vehicle path, for example in crash-imminent avoidance maneuvers.

FORMAL LANGUAGE MODELING AND SIMULATIONS OF INCIDENT MANAGEMENT

SHLAYAN, NEVEEN; KACHROO, PUSHKIN

Traffic Incident Management (TIM) is a multi-jurisdictional process. Complications with communications, compatibility, coordination, institutional responsibilities, and legal issues are inherent in the traffic incident management system. Increased delay in incident clearance due to various conflicts has vital economical, safety, environmental, and social impacts. Therefore, a thorough and rigorous modeling of the system is necessary to better understand its properties and systematically discern issues that might arise. The goal of this study is to develop modeling tools for the incident management process. Formal language automata theory is proposed for modeling and analysis since incident management can be viewed as a series of discrete events. Using formal methods allows us to use the tools that are well established in this field in order to systematically study incident management processes. Formal language and automata theory is the foundation for numerous hardware and software development with applications in digital design, compilers, and programming languages. Formal language and automata theory provide us with powerful tools for developing, analyzing, and debugging such models. A systematic structure of an incident management model permits a methodical identification of the system's "bugs". This study demonstrates the development of models of some first response incident management agencies through a case study in the Las Vegas...
A novel approach is proposed to enable vehicles to estimate their instantaneous position with lane-level accuracy, which is not achievable using Global Navigation Satellite Systems (GNSS). This system can be used to enhance position-based applications such as Intelligent Transportation Systems (ITS), including navigation and lane-level traffic guidance and warning. The system uses the Carrier Frequency Offset (CFO) of the Dedicated Short Range Communication (DSRC) signal, broadcast by two infrastructure beacons. The main advantages of the proposed method over other potential technologies such as Radio Frequency Identification (RFID) and buried loops are its simpler required infrastructure and functionality using vehicular communication platforms. Analysis of the proposed technique indicates acceptable reliability and performance. Empirical test results confirm the viability of the method.

Motion detection and segmentation of traffic vehicles in outdoor environment especially under non-ideal weather conditions, in the presence of camera noise and with variable or unfavorable luminance conditions is still an area of active research. Gaussian based background modeling is commonly used to detect moving objects in computer vision systems. However it has some limitations, it cannot deal effectively with sudden change in illumination, snowfall, fog and repetitive motions such as swaying leaves. These non-ideal outdoor conditions result in false motion detection. We propose an alternative technique to detect and segment the moving vehicles by making use of dynamically adaptive threshold using full search sum of absolute difference (FSSAD) algorithm. We show that motion energy obtained using sequence of frames can be effectively used to differentiate between moving vehicles and dynamic background. FSSAD being computationally expensive, we propose a modification using adaptive-motion-threshold that not only reduces the false motion but also improves computational efficiency. Performance evaluation of our proposed framework has been carried out on publicly available benchmark datasets. Qualitative comparison with other methods proposed in the literature shows that our approach achieves better segmentation as well as is suitable for real time implementation.

Rail extraction - determining the position of the rails ahead of a train - is one of the basic tasks for vision-based driver support in railways. This paper introduces an approach that extracts rails by matching edge features to candidate rail patterns modeled as sequences of parabola segments. Patterns are pre-computed in a semi-automatic offline stage for areas near the camera, and generated on the fly for more distant regions. Our approach was designed to address the challenges posed by the open environment without requiring explicit knowledge about train speed or camera parameters/position, and running fast enough for practical use without specialized hardware. Evaluation was performed on hours of videos captured under real operation conditions, considering the requirements of a system in
which a camera with zoom lens mounted on a pan-tilt unit captures images from the area ahead with increased resolution.

SLIDING MODE OBSERVER BASED ADAPTIVE SLIP RATIO CONTROL FOR ELECTRIC AND HYBRID VEHICLES

SUBUDHI, BIDYADHAR; GE, SAM

The paper presents sliding mode observer based adaptive sliding mode control and neural network control for effective tracking of the slip ratio applicable to electric vehicles (EVs) and hybrid electric vehicles (HEVs) where electric motors are used to achieve braking in addition to propulsion. The proposed sliding mode observer alleviates the difficulty in choosing its gains. To adapt the road condition parameter for better performance, a Lyapunov based adaptation is integrated with the sliding mode controller. The resulting adaptive controller performs very well in achieving slip tracking in the face of parameter uncertainties. Further, to cope up with the uncertainties and unknown nonlinearity involved with the vehicle slip dynamics, a non-model based neural network controller is developed using the function approximation properties of the multilayer perceptrons.

VEHICLE VELOCITY OBSERVER DESIGN USING 6D IMU AND MULTIPLE OBSERVER APPROACH

OH, JIWON; CHOI, SEIBUM

This study mainly focuses on the accurate estimation of the vehicle velocities of all axes, using the data received from a low-cost 6D IMU. The data include the vehicle linear acceleration and angular rates of all axes. Additionally, the observer uses the wheel speed sensors and steering wheel angle information, which are already available in most of the recent production cars. Utilizing the above mentioned information, based on the combination of a bicycle model and a kinematic model, multiple observer system that computes the weighted sum estimation dependent on the cornering stiffness adaptation is adopted to observe the lateral vehicle velocity, as well as longitudinal and vertical velocities. Stability of each component of the proposed observer is investigated, and a set of assessment to confirm the performance of the entire system is arranged via experiments using a real production SUV.

DISTRIBUTED MODELING IN A MAPREDUCE FRAMEWORK FOR DATA-DRIVEN TRAFFIC FLOW FORECASTING

CHEN, CHENG; LIU, ZHONG; LIN, WEIHUA; LI, SHUANGSHUANG; WANG, KAI

With the availability of more and more new data sources collected for transportation in recent years, the computational effort for traffic flow forecasting in stand-alone modes has become more and more demanding for large scale networks. Distributed modeling strategies can be utilized to reduce the computational effort. In this paper, we present a MapReduce-based approach to processing distributed data for designing a MapReduce framework of a traffic forecasting system, including its system architecture and data-processing algorithms. The work presented here can be applied to many traffic forecasting systems with models requiring a learning process (e.g. the neural network approach). We show that the learning process of the forecasting model under our framework can be accelerated from a computational perspective. Meanwhile, model fusion, the key problem of distributed modeling, is explicitly treated in this paper to enhance the capability of the forecasting system in data processing and storage.
LEARNING THE DYNAMICS OF ARTERIAL TRAFFIC FROM PROBE DATA USING A DYNAMIC BAYESIAN NETWORK

HOFLEITNER, AUDE; HERRING, RYAN; ABBEEL, PIETER; BAYEN, ALEX

Estimating and predicting traffic conditions in arterial networks using probe data has proven to be a substantial challenge. Sparse probe data represents the vast majority of the data available on arterial roads. This article proposes a probabilistic modeling framework for estimating and predicting arterial travel time distributions using sparsely observed probe vehicles. We introduce a model based on hydrodynamic traffic theory to learn the density of vehicles on arterial road segments, illustrating the distribution of delay within a road segment. The characterization of this distribution is essential to use probe vehicles for traffic estimation: probe vehicles report their location at random locations and the travel times between location reports must be scaled properly to match the map discretization. A dynamic Bayesian network represents the spatio-temporal dependencies on the network and provides a flexible framework to learn traffic dynamics from historical data and perform real-time estimation with streaming data. The model is evaluated using data from a fleet of 500 probe vehicles in San Francisco, CA, which send GPS data to our server every minute. The numerical experiments analyze the learning and estimation capabilities on a subnetwork with more than 800 links. The sampling rate of the probe vehicles does not provide detailed information about the location where vehicles encountered delay or the reason for any delay (i.e. signal delay, congestion delay, etc.). The model provides an increase in estimation accuracy of 35% when compared to a baseline approach for processing probe vehicle data.

A SIMPLE FREE-FLOW TRAFFIC MODEL FOR VEHICULAR INTERMITTENTLY CONNECTED NETWORKS

KHABBAZ, MAURICE; FAWAZ, WISSAM; ASSI, CHADI

The performance of vehicular data networks is critically affected by vehicular traffic. This manuscript presents a comprehensive and traffic-theory-inspired macroscopic description of vehicular traffic behaviour over roadway facilities operating under Free-flow traffic conditions. Based on this description a simple and tractable macroscopic traffic model is proposed. Extensive simulations are conducted to verify the validity of the proposed model and its high accuracy.

HIGHLY AUTOMATED DRIVING ON FREEWAYS IN REAL TRAFFIC USING A PROBABILISTIC FRAMEWORK

ARDELT, MICHAEL; COESTER, CONSTANTIN; KAEMPCHEN, NICO

A system and in particular a decision-making concept is presented that facilitates highly automated driving on freeways in real traffic. The system is capable of conducting fully automated lane change maneuvers with no need for driver approval. Due to the application in real traffic, a robust functionality and the general safety of all traffic participants are among the main requirements. Regarding these requirements, the consideration of measurement uncertainties demonstrates a major challenge. For this reason, a fully integrated probabilistic concept is developed. By means of this approach, uncertainties are regarded in the entire process of determining driving maneuvers. While this includes also the perception tasks, this contribution puts a focus on the driving strategy and the decision-making process for the execution of driving maneuvers. With this approach the BMW Group Research and Technology managed to drive 100% automated in real traffic on the freeway A9 from Munich to Ingolstadt showing a robust, comfortable and safe driving behavior, even during multiple automated lane change maneuvers.
**TRACK-TO-TRACK FUSION WITH ASYNCHRONOUS SENSORS USING INFORMATION MATRIX FUSION FOR SURROUND ENVIRONMENT PERCEPTION**

AEBERHARD, MICHAEL; SCHLICHTHÄRLE, STEFAN; KAEMPCHEN, NICO; BERTRAM, TORSTEN

Driver assistance systems and automated driving applications in the future will require a reliable and flexible surround environment perception. Sensor data fusion is typically used to increase reliability and the observable field-of-view. In this paper, a novel approach to track-to-track fusion in a high-level sensor data fusion architecture for automotive surround environment perception using information matrix fusion (IMF) is presented. It is shown that IMF produces the same good accuracy in state estimation as a low-level centralized Kalman filter, which is widely known to be the most accurate method of fusion. Additionally, as opposed to state-of-the-art track-to-track fusion algorithms, the presented approach guarantees a globally-maintained track over time as an object passes in and out of the field-of-view of several sensors, as required in surround environment perception. As opposed to the often used cascaded Kalman filter for track-to-track fusion, it is shown that the IMF algorithm has a smaller error and maintains consistency in the state estimation. The proposed approach using information matrix fusion is compared to other track-to-track fusion algorithms in simulation and is shown to perform well using real sensor data in a prototype vehicle with a 12-sensor configuration for surround environment perception in highly automated driving applications.

**SHORT-TERM TRAFFIC SPEED FORECASTING BASED ON DATA RECORDED AT IRREGULAR INTERVALS**

YE, QING; SZETO, W.Y.; WONG, S.C

The recent growth in demand for proactive real-time transportation management systems has led to major advances in short-time traffic forecasting methods. Recent studies have introduced time series theory, neural networks, and genetic algorithms to short-term traffic forecasting to make forecasts more reliable, efficient, and accurate. However, most of these methods can only deal with data recorded at regular time intervals, which restricts the range of data collection tools to presence-type detectors or other equipment that generates regular data. The study reported here is an attempt to extend several existing time series forecasting methods to accommodate data recorded at irregular time intervals, which would allow transportation management systems to obtain predicted traffic speeds from intermittent data sources such as GPS. To improve the forecasting performance, acceleration information was introduced and information from segments adjacent to the current forecasting segment adopted. The study tested several methods using GPS data from 480 Hong Kong taxis. The results show that the best performance in terms of mean absolute relative error is obtained by using a neural network model that aggregates speed information and acceleration information from the current forecasting segment and adjacent segments.

**A REAL-TIME VEHICLE NAVIGATION ALGORITHM IN SENSOR NETWORK ENVIRONMENTS**

CHEN, C. L. PHILIP; ZHOU, JIN; ZHAO, WEI

In a large-scale wireless sensor traffic network, collecting and processing of the global real-time traffic information are often unreliable. Making real-time navigation decision becomes an arduous task. To address this issue, an efficient Wireless-Sensor-Network-based real-time vehicle navigation algorithm is proposed, in which multiple local traffic information are considered to make navigation decision in a quick and accurate way. At the same time, a general distance metric is defined for the processing of both exact and fuzzy data. In addition, the algorithm can provide various navigation decisions according to the choice of different attributes to meet the diverse navigation requirements of drivers. Simulation results show the suitability and efficiency of the proposed algorithm.
QUEUING NETWORK MODELING OF DRIVER LATERAL CONTROL WITH OR WITHOUT A COGNITIVE DISTRACTION TASK

BI, LUZHENG; GAN, GUODONG; SHANG, JUNXING; LIU, YILI

In this paper, we propose a computational model of driver lateral control based on the Queuing Network cognitive architecture and the driver preview model about driver lateral control activities. This computational model was applied to model the dual-task of driving with a cognitive distraction task. The comparison between human driver data and model simulation data shows that this computational model can perform vehicle lateral control well and its performance is consistent with that of drivers under the single-task and dual-task driving conditions. Furthermore, we examine the effectiveness of some parameters of the model in representing different styles of driving and discuss the value of this computational model in facilitating the evaluation of vehicle dynamics and driver assistant systems and providing new insights into the research of unmanned vehicle control techniques.

COOPERATIVE DRIVING WITH A HEAVY-DUTY TRUCK IN MIXED TRAFFIC: EXPERIMENTAL RESULTS

NIEUWENHUIJZE, MAARTEN; VAN KEULEN, THIJS; ONCU, SINAN; BONSEN, BRAM; NIJMEIJER, HENK

This paper describes the implementation and testing of a Cooperative Adaptive Cruise Control (CACC) strategy on a heavy-duty truck. The adopted control strategy utilizes additional information exchange through wireless communication to improve vehicle following behavior achieved by the underlying Adaptive Cruise Controller (ACC). The control method is evaluated in a mixed traffic condition. It is shown that the truck can perform smooth predecessor following in most of the test scenarios even for small inter-vehicle distances. Furthermore, the results demonstrate how string stability is effected by wireless communication imperfections and ac-(de)celeration limitations of the heavy-duty truck in an inhomogeneous platoon.

THE DEVELOPMENT OF A COOPERATIVE HEAVY-DUTY VEHICLE FOR THE GCDC 2011: TEAM SCOOP

MÅRTENSSON, JONAS; ALAM, ASSAD; BEHERE, SAGAR; KHAN, ALTAMASH; KJELLBERG, JOAKIM; LIANG, KUO-YUN; PETTERSSON, HENRIK; SUNDMAN, DENNIS

The first edition of the Grand Cooperative Driving Challenge (GCDC) was held in the Netherlands in May 2011. Nine international teams were competing in urban and highway platooning scenarios with prototype vehicles using cooperative adaptive cruise control. Team Scoop, a collaboration between KTH Royal Institute of Technology in Stockholm and Scania CV AB in Södertälje, participated in the GCDC with a Scania R-series tractor unit. This paper describes the development and design of team Scoop's prototype system for the GCDC. In particular we present considerations regarding system architecture, state estimation and sensor fusion, design and implementation of control algorithms and implementation issues regarding the wireless communication. The purpose of the paper is to give a broad overview of the different components that are needed to develop a cooperative driving system; from architectural design, workflow and functional requirements descriptions to the specific implementation of algorithms for state estimation and control. The approach is more pragmatic than scientific; it collects a number of existing technologies and gives an implementation oriented view of a cooperative vehicle. The main conclusion is that it is possible, with a modest effort, to design and implement a system that can function well in cooperation with other vehicles in realistic traffic scenarios.
This paper describes the Halmstad University entry in the Grand Cooperative Driving Challenge, a competition in vehicle platooning. Cooperative platooning has potential to improve traffic flow by mitigating shock wave effects which otherwise may occur in dense traffic. A longitudinal controller is developed that uses information exchanged via wireless communication with other cooperative vehicles to achieve string-stable platooning. The controller is integrated into a production vehicle together with a positioning system, communication system and human-machine interface. A highly modular system architecture enabled rapid development and testing of the various subsystems. In the competition, which took place in May 2011 on a closed-off highway in the Netherlands, the Halmstad University team finished second among nine competing teams.

This paper presents the cooperative adaptive cruise control implementation of Team Mekar at the Grand Cooperative Driving Challenge. The Team Mekar vehicle used a dSpace microautobox for access to the vehicle CAN (Controller Area Network) bus and for control of the autonomous throttle intervention and of the electric motor operated brake pedal. The vehicle was equipped with RTK GPS (Real Time Kinematic – Global Positioning System) and an IEEE 802.11p modem installed in an on-board computer for V2V (Vehicle to Vehicle) communication. The Team Mekar vehicle did not have an OEM supplied ACC. ACC/CACC (Adaptive Cruise Control/Cooperative Adaptive Cruise Control) based on V2V communicated GPS position/velocity and preceding vehicle acceleration feedforward were implemented in the Team Mekar vehicle. This paper presents experimental and simulation results of the Team Mekar CACC implementation along with a discussion of the problems encountered during the Grand Cooperative Driving Challenge (GCDC) cooperative mobility runs.

In May 2011, the Grand Cooperative Driving Challenge (GCDC) was held, providing the possibility for the teams to develop and compare their cooperative driving solutions in a competitive setting. The challenge was organised to further accelerate developments in the area of cooperative driving. Nine international teams challenged each other to handle an urban as well as a highway scenario. These scenarios have been chosen such that the performance of the implementation of CACC of each participant can be judged. Evaluation of the vehicle behavior has been performed by means of video-based roadside units installed at the test site in the Netherlands, capable of tracking the individual vehicles, in addition to the information obtained through wireless communication. Judgment criteria include both macro-scale criteria, such as platoon length and traffic light throughput, as well as an individual criterion, being string stability. Most teams performed well, although clear differences in performance and reliability could be observed. The GCDC showed that it is possible to drive cooperatively with heterogeneous systems. It is envisioned to make the GCDC a regular event and to further extend the active role of roadside communication units as well as including automated lateral vehicle control.
PHASE DIAGRAM ANALYSIS BASED ON A TEMPORAL-SPATIAL QUEUEING MODEL

CHEN, XIQUN; LI, LI; LI, ZHIHENG

In this paper, we propose a simple temporal-spatial queueing model to quantitatively address some typical congestion patterns that were observed around on/off-ramps. In particular, we examine three prime factors that play important roles in ramping traffic scenarios: the time $\tau$ for a vehicle to join a jam queue, the time $\tau_{out}$ for this vehicle to depart from this jam queue, and the time interval $T$ for the ramping vehicle to merge into the mainline. Based on Newell’s simplified car-following model, we show how $\tau$ changes with the main road flow rate $q_{\text{main}}$. Meanwhile, $T$ is the reciprocal of the ramping road flow rate $q_{\text{ramp}}$. Thus, we analytically derive the macroscopic phase diagram plotted on the $q_{\text{main}}$-versus-$q_{\text{ramp}}$ plane and $\tau$-versus-$T$ plane based on the proposed model. Further study shows that the new queueing model not only reserves the merits of Newell’s model on the microscopic level but helps quantify the contributions of these parameters in characterizing macroscopic congestion patterns as well. Previous approaches distinguished phases merely through simulations, but our model could derive analytical boundaries for the phases. The phase transition conditions obtained by this model agree well with simulations and empirical observations. These findings help reveal the origins of some well-known phenomena during traffic congestion.

STOCHASTIC LANE SHAPE ESTIMATION USING LOCAL IMAGE DESCRIPTORS

LIU, GUOLIANG; WOERGÖTER, FLORENTIN; MARKELIC, IRENE

In this paper, we present a novel measurement model for particle filter based lane shape estimation. Recently, the particle filter has been widely used for solving lane detection and tracking problems, due to its simplicity, robustness and efficiency. The key part of the particle filter is the measurement model, which describes how well a generated hypothesis (a particle) fits current visual cues in the image. Previous methods often simply combine multiple visual cues in a likelihood function without considering the uncertainties of local visual cues, and the accurate probability relationship between visual cues and lane model. In contrast, this paper derives a new measurement model by utilizing multiple kernel density to precisely estimate this probability relationship. The uncertainties of local visual cues are considered and modeled by Gaussian kernels. Specifically, we use a linear-parabolic model to describe the shape of lane boundaries on a top-view image, and a partitioned particle filter (PPF) integrating it with our novel measurement model to estimate lane shapes in consecutive frames. Finally, the robustness of the proposed algorithm with the new measurement model is demonstrated on the DRIVSCO datasets.

SELF-COACHING SYSTEM BASED ON RECORDED DRIVING DATA: LEARNING FROM ONE'S EXPERIENCES

TAKEDA, KAZUYA; MIYAJIYA, CHIYOMI; SUZUKI, TATSUYA; ANGKITITRAKUL, PONGTEP; KURUMIDA, KENJI; KUROYANAGI, YUICHI; ISHIKAWA, HIROAKI; TERASHIMA, RYUTA; WAKITA, TOSHIHIRO; OIKAWA, MASATO; KOMADA, YUICHI

This paper describes the development of a self-coaching system to improve driving behavior by allowing drivers to review a record of their own driving activity. By employing stochastic driver-behavior modeling, the proposed system is able to detect a wide range of potentially hazardous situations, which conventional event data recorders are not able to capture, including those involving latent risks, which drivers themselves are unaware of. By utilizing these automatically detected hazardous situations, our web-based system offers a user-friendly interface for drivers to navigate and review each hazardous situation in detail (e.g., driving scenes are categorized into different types of hazardous situations, and are displayed with corresponding multi-modal driving signals). Furthermore, the system provides feedback on each risky driving behavior and suggests how users can safely respond to such situations. The proposed system establishes a cooperative relationship between the driver, the vehicle, and the driving environment, leading to the development of the next-generation of safety systems and paving the way for an alternative form of driving education that could further reduce the number of fatal accidents. The system's potential benefits are
demonstrated through preliminary, extensive evaluation of an on-road experiment, showing that safe-driving behavior can be improved significantly when drivers use the proposed system.

**RELATIVE POSITIONING ENHANCEMENT IN VANETS: A TIGHT INTEGRATION APPROACH**

ALAM, NIMA; TABATABAEI BALAEI, ASGHAR; DEMPSTER, ANDREW

Position information is a fundamental requirement for many vehicular applications such as navigation, Intelligent Transportation Systems (ITS), collision avoidance, and Location Based Services (LBS). Relative positioning is effective for many applications including collision avoidance and LBS. Although Global Navigation Satellite Systems (GNSS) can be used for absolute or relative positioning, the level of accuracy does not meet the requirements of many applications. Cooperative Positioning (CP) techniques, fusing data from different sources, can be used for improving the performance of absolute or relative positioning in a Vehicular Ad hoc Network (VANET). VANET CP systems are mostly based on radio ranging, which is not viable, despite being assumed in much of the literature. Considering this and the emerging vehicular communication technologies, a CP method is presented to improve the relative positioning between two vehicles within a VANET, fusing the available low-level Global Positioning System (GPS) data. The proposed method does not depend on any radio ranging technique. The performance of the proposed method is verified by analytical and experimental results. Although the principles of the proposed method are similar to those of differential solutions such as Differential GPS (DGPS), the proposed technique outperforms DGPS with about 37% and 45% enhancement in accuracy and precision of relative positioning respectively.

**ENERGY MANAGEMENT FOR FUEL-CELL HYBRID VEHICLES, BASED ON SPECIFIC FUEL CONSUMPTION DUE TO LOAD SHIFTING**

SARIOĞLU, İSMAIL LEVENT; KLEIN, OLAF; SCHRÖDER, HENDRIK; KÜÇÜKAY, FERIT

Energy management is integral to the design of fuel-cell hybrid vehicles (FCHVs) as well as topology and component sizing. Therefore an optimal energy management strategy is crucial for a successful FCHV concept. The goal in this optimization process is to coordinate the energy sources and power components on a vehicle such a way that the total consumption is minimized. We defined a new strategy, which quantifies the shifts in the operating point of the fuel cell system by using the specific fuel consumption due to load shifting and adapts the conditions for a possible shifting of the operating point of the fuel cell system in order to reduce the total fuel consumption. This paper illustrates the simulation results of the proposed strategy in comparison with existing strategies. The main focus is given on the improvement in fuel consumption, the effect of the new approach on utilization of the power sources concerning their aging mechanisms and the effect of varying conditions by time. The results indicate that the goal of reduction in total fuel consumption is achieved.

**VIP-WAVE: ON THE FEASIBILITY OF IP COMMUNICATIONS IN 802.11P VEHICULAR NETWORKS**

CESPEDES, SANDRA; LU, NING; SHEN, XUEMIN

Vehicular communications networks, such as 802.11p/WAVE, are becoming a fundamental platform for providing real-time access to safety and entertainment information. In particular, infotainment applications—and consequently IP-based communications—are key to leverage market penetration and deployment costs of the 802.11p/WAVE network. However, the operation and performance of IP in 802.11p/WAVE are still unclear, as the WAVE standard
guidelines for being IP-compliant are rather minimal. This paper studies the 802.11p/WAVE standard and its limitations for the support of infrastructure-based IP applications, and proposes the Vehicular IP in WAVE (VIP-WAVE) framework. VIP-WAVE defines the IP configuration for extended and non-extended IP services, and a mobility management scheme supported by Proxy Mobile IPv6 over WAVE. It also exploits multi-hop communications to improve the network performance along roads with different levels of infrastructure presence. Furthermore, an analytical model considering mobility, handoff delays, collisions, and channel conditions, is developed for evaluating the performance of IP communications in WAVE. Extensive simulations are performed to demonstrate the accuracy of our analytical model and the effectiveness of VIP-WAVE in making feasible the deployment of IP applications in the vehicular network.

A GPU BASED PARALLEL GENETIC ALGORITHM FOR GENERATING DAILY ACTIVITY PLANS

WANG, KAI; SHEN, ZHEN

As the computing technologies develop, there is a trend in traffic simulation research that the focus is moving from macro- and meso-simulation to micro-simulation, as the micro-simulation can provide more detailed quantitative results. Moreover, the success of the Artificial societies-Computational experiments-Parallel execution (ACP) approach indicates that integrating other metropolitan systems such as logistic, infrastructure, legal and regulatory, weather and environmental systems to build an Artificial Transportation System (ATS) can be helpful in solving Intelligent Transportation Systems (ITS) problems. However, the computation burden is very heavy as there are many agents interacting in parallel in the ATS. Therefore, a parallel computing tool is desirable. We think that we can employ Graphics Processing Unit (GPU), which has been applied in many areas. In this paper we use a GPU-adapted Parallel Genetic Algorithm (PGA) to solve the problem of generating daily activity plans for individual and household agents in the ATS, which is important as the activity plans determine the traffic demand in the ATS. Previous research has shown that GA is effective but the computation burden is heavy. We extend the work to GPU and test our method on an NVIDIA Tesla C2050 GPU for two scenarios of generating plans for 1,000 individual agents and 1,000 three-person household agents. Speedup factors of 23 and 32 are obtained compared with implementations on a mainstream CPU.

INTEGRATED TRAFFIC AND COMMUNICATION PERFORMANCE EVALUATION OF AN INTELLIGENT VEHICLE INFRASTRUCTURE INTEGRATION (VII) SYSTEM FOR ONLINE TRAVEL TIME PREDICTION

MA, YONGCHANG; CHOWDHURY, MASHRUR; SADEK, ADEL; JEIHANI, MANSOUREH

This paper presents a framework for online highway travel time prediction using traffic measurements that are likely to be available from Vehicle Infrastructure Integration (VII) systems, in which vehicle and infrastructure devices communicate to improve mobility and safety. In the proposed intelligent VII system, two artificial intelligence (AI) paradigms, namely Artificial Neural Networks (ANN) and Support Vector Regression (SVR), are used to determine future travel time based on such information as current travel time, VII-enabled vehicles’ flow and density. The development and performance evaluation of the VII-ANN and VII-SVR frameworks, in both of the traffic and communications domains, were conducted, using an integrated simulation platform, for a highway network in Greenville, South Carolina. Specifically, the simulation platform allows for implementing traffic surveillance and management methods in the traffic simulator PARAMICS, and for evaluating different communication protocols and network parameters in the communication network simulator, ns-2. The study’s findings reveal that the designed communications system was capable of supporting the travel time prediction functionality. They also demonstrate that the travel time prediction accuracy of the VII-AI framework was superior to a baseline instantaneous travel time prediction algorithm, with the VII-SVR model slightly outperforming the VII-ANN model. Moreover, the VII-AI framework was shown to be capable of performing reasonably well during non-recurrent congestion scenarios, which traditionally have challenged traffic sensor-based highway travel time prediction methods.
A PREDICTIVE TRAFFIC CONTROLLER FOR SUSTAINABLE MOBILITY USING PARAMETRIZED CONTROL POLICIES

ZEGEYE, SOLOMON KIDANE; DE SCHUTTER, BART; HELLEndoorn, Hans; Breunesse, Ewald; Hegyi, Andreas

We present a freeway-traffic control strategy that continuously adapts the traffic control measures to the prevailing traffic conditions and that features faster computation speed than conventional model-based predictive control (MPC). The control approach is based on the principles of state feedback control and MPC. Instead of computing the control input sequence, the proposed controller optimizes the parameters of control laws that parametrize the control input sequences. In this way, the computational burden of the controller is reduced substantially. We demonstrate the proposed control approach on a calibrated model of a part of the Dutch A12 freeway using variable speed limits and ramp metering rate.

GLOBAL VERSUS LOCAL MPC ALGORITHMS IN FREEWAYS TRAFFIC CONTROL WITH RAMP METERING AND VARIABLE SPEED LIMITS

DOMÍNGUEZ FREJO, JOSÉ RAMÓN; FERNÁNDEZ CAMACHO, EDUARDO

This paper compares global and local MPC algorithms in a traffic network controlled by ITS signals (ramp metering and variable speed limits). It will be shown that the local techniques have a suboptimal behavior and that centralized techniques are difficult to implement in real time. In order to deal with this problem, a local MPC with only one communication cycle at each sampling time is proposed. This controller improves the local controller performance and, although it is suboptimal with regards to the centralized controller behavior, it can be implemented in real time.

EVACUATION PLANNING BASED ON THE CONTRAFLow TECHNIQUE WITH CONSIDERATION OF EVACUATION PRIORITIES AND TRAFFIC SETUP TIME

WANG, J.W.; WANG, H.F.; ZHANG, WENJUN; IP, W.H.; FURUTA, K.

Evacuation planning with the contraflow technique is a complex planning problem. The problem is further complicated when more realistic situations such as evacuation priorities and the setup time for the contraflow operation are considered. Such a complex problem has not been discussed in the present literature. In this paper, we present a multiple objective optimization model for this problem and a two-layer algorithm to solve this model. Experiments on three transportation networks with different network scales are presented to show the excellent performance of the proposed model and algorithm.

VEHICLE POSITIONING USING GSM AND CASCADE-CONNECTED ANN STRUCTURES

BORENOVIC, MILOS; NESKOVIC, ALEKSANDAR; NESKOVIC, NATASA

Procuring the location information for intelligent transportation systems is a popular topic amongst researchers. This paper investigates the vehicle location algorithm based upon the received signal strengths from the available GSM networks. The performances of positioning models, consisted of cascade-connected Artificial Neural Network (ANN) multilayer feedforward structures, employing space-partitioning principle, are compared to the single ANN multilayer feedforward model in terms of accuracy, number of subspaces and other positioning relevant parameters. Cascade-connected ANN structures make use of the fact that a vehicle can be found only in a subspace of the entire...
environment (roads) to improve the positioning accuracy. The best performing cascade-connected ANN structure achieved an average error of 26m, and a median error of less than 5m, which is accurate enough for most of the vehicle location services. Using the same received signal strength database obtained by measurements it was shown that the proposed model outperforms kNN and EKF trained ANN positioning algorithms. Moreover, the presented ANN structures replace not only the positioning algorithms, but also the overloaded map-matching process.

**DRIVER’S ADAPTATION TO ADAPTIVE CRUISE CONTROL: EXAMINATION OF AUTOMATIC AND MANUAL BRAKING**

XIONG, HUIMIN; BOYLE, LINDA

Drivers may adapt to the automatic braking control feature available on adaptive cruise control (ACC) in ways unintended by designers. This study examines drivers’ adaptation using a conceptual model of adaptive behavior developed and examined quantitatively using logistic regression techniques. Data for this model comes from a field operational test on the use of an advanced collision avoidance system, which integrated forward collision warning and ACC functions. A sample of “closing” events was extracted from a subset of this ACC data. The logistic regression model predicted the drivers’ likelihood to intervene (i.e., manually brake) whenever ACC began braking or slowing down the vehicle. The results indicate that several factors influence drivers’ response including the environment, selected gap setting, speed, and drivers’ age. Safety consequences and the design of future ACC systems based on drivers’ adaptation to these factors are discussed.

**A PROTOTYPE OF THE NEXT GENERATION JOURNAL SYSTEM FOR ITS: ACADEMIC SOCIAL NETWORKING AND MEDIA BASED ON WEB 3.0**

LAI, GUANPI; WEN, DING; ZHANG, QINGPENG; GAO, YANQING; ZHUO, FENG; KE, GUANYAN; LU, HAO

Since the first peer reviewed journal appeared in later seventeenth century, journals have been the most important platform for scientists to publish articles. Over the last decade, the fast growth of online social networking and media services have brought us numerous valuable data and lots of applications to track the topic trends in a field, and facilitate the collaborations between scientists, thus made the Web 2.0 and the emerging Web 3.0 as essential as the electronic and paper formats for managing scientific journals. In this paper, we propose a working prototype for an intelligent journal system for intelligent transportation systems based on the idea of Web 3.0 based next generation of journal systems: intelligent journal systems. Some preliminary results are presented to show the validity of our system.

**PREDICTIVE PREVENTION OF LOSS OF VEHICLE CONTROL FOR ROADWAY DEPARTURE AVOIDANCE**

ALI, MOHAMMAD; FALCONE, PAOLO; OLSSON, CLAES; SJÖBERG, JONAS

In this paper, we investigate predictive approaches to the problem of roadway departure prevention via automated steering and braking. We assume a sensing infrastructure detecting road geometry and consider a two layer accident avoidance framework consisting of a threat assessment and an intervention layer. A novel active safety function for prevention of loss of vehicle control is proposed and implemented using the considered accident avoidance framework. Simulation and experimental results are presented, showing that the proposed approach effectively
exploits road preview information in order to prevent the vehicle from operating in regions of the state space where standard Electronic Stability Control (ESC) systems are normally activated.
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