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Web Archive and Electronic Newsletter Subscription

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 website:

www.ieee.org/itss

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

Editorial Board

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Information for Contributors

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 c.herget@ieee.org.

SOCIETY NEWS

From the Editor

by Charles Herget

This issue of the Newsletter contains our usual society news, announcements, conferences, and abstracts from the most recent issue of the Society’s Transactions. I have been thinking that a useful addition to the Newsletter might be to include links to interesting articles on ITS available on the Internet. To try out the concept, let me suggest that you may be interested in reading the article by John Voelcker entitled “Top 10 Tech Cars of 2009.” The article is in the latest issue of IEEE Spectrum Online at http://www.spectrum.ieee.org/apr09/8327/. John Voelcker is IEEE Spectrum’s automotive editor. If there is enough interest in including this feature in the Newsletter, we would need an Associate Editor to provide an article for each issue. If anyone is interested, please send me an email at c.herget@ieee.org.
Editor-in-Chief,
IEEE Intelligent Transportation Systems Magazine

by Christoph Stiller

Dear Colleagues:

It is my pleasure to introduce the new Magazine of our IEEE Intelligent Transportation Systems Society.

The first issue is expected mid 2009. It will be provided to all of our ITSS members and can also be purchased by non-ITSS members.

The Magazine emphasizes on providing information of general interest to all members of the ITS society, serving as a dissemination vehicle for scientists and practitioners in the ITS community to learn the state of the art development and progress on ITS research and applications.

We welcome articles that
- provide innovative research ideas with application results,
- report significant application case studies, and
- raise awareness of pressing research and application challenges in all areas of Intelligent Transportation Systems.

We also welcome manuscripts that provide an overview on a recent topic, new concepts for ITS, or a tutorial on methods that are particularly relevant to ITS.

Please find more information and the call for papers to our new Magazine at www.ieee.org/itss clicking on ‘Magazine’.

We are looking forward to receiving high level contributions.

Announcements

2008 IEEE ITSS Awards
submitted by Fei-Yue Wang, Editor-in-Chief, IEEE Transactions on ITS

Chelsea (Chip) C. White III, Georgia Institute of Technology, USA, receives the 2008 IEEE ITSS ITS Outstanding Research Award for his significant contribution in "Research and Development in Global Transportation and Logistic Systems".

Petros A. Ioannou, University of Southern California, USA, receives the 2008 IEEE ITSS ITS...
Outstanding Application Award for his significant contribution in "Intelligent and Adaptive Cruise Control Technology and Applications."

VisLab, Parma University, Italy, receives the 2008 IEEE ITSS Lead Award for significant contribution in "Research and Development in Intelligent Vehicular Systems and Driving Safety Enhancement Technology."

For 2009 IEEE ITSS ITS Outstanding Research Award and Lead Award, please send your nomination to Prof. Fei-Yue Wang at feiyue@ieee.org before May 1, 2009. For 2008 IEEE ITSS ITS Outstanding Application Award, please send your nomination to Prof. Christoph Stiller, stiller@mrt.uka.de before May 1, 2009.

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**IEEE Medal for Environmental and Safety Technologies**
(Sponsored by: Toyota Motor Corporation)

*submitted by Alberto Broggi, President-Elect, IEEE ITS Society*

The IEEE Medal for Environmental and Safety Technologies was established in August 2008.

It may be presented each year to an individual, or to a team up to three in number, for outstanding accomplishments in the application of technology in the fields of interest of IEEE that improve the environment and/or public safety.

The first presentation is scheduled for June 2010. The award consists of a gold medal, bronze replica, certificate and cash honorarium.

In the evaluation process, the following criteria are considered: public benefits of the contribution; degree of improvement in important performance metrics; innovative design, development or application engineering; favorable influence of the contribution on technical professions.

Recipient selection is administered by the Medals Council of the IEEE Awards Board.

The committee includes:

- Fumio Harashima, Chair
- Alberto Broggi
- Thomas Conte
- Toshio Fukuda
- Thomas N. Rubinstein
- Mark Schaffer
- Robert Shapiro
- C. K. Toh
- Pravin Varaiya
- Joseph Ziomek

Nomination Deadline - 1 July, 2009

Web site: [www.ieee.org/portal/pages/about/awards/sums/environmentmdl.html](http://www.ieee.org/portal/pages/about/awards/sums/environmentmdl.html)

To discuss nominations, please contact Alberto Broggi at broggi@vislab.it.
Call for Papers

IEEE Intelligent Transportation Systems Magazine

Scope

Innovations in mobility require close interaction between research and practitioners in all aspects of Intelligent Transportation Systems. As the new dissemination magazine of the IEEE ITS Society, the IEEE Intelligent Transportation System Magazine establishes an interdisciplinary forum connecting experts in all fields of ITS. It publishes news on ITS as well as peer-reviewed articles quarterly that

- provide innovative research ideas and application results,
- report significant application case studies, and
- raise awareness of pressing research and application challenges

in all areas of intelligent transportation systems.

Topics

- Ground, Air, and Water Transportation Systems
- Information Management (Databases, Data Fusion)
- Sensors (Infrastructure and Vehicle-Based)
- Sensor Data Processing (Video, Radar, Lidar, etc.)
- Human-Machine Interfaces
- Communication (v2v, v2i)
- Social, Economic, and Ecologic impact

- Field Studies & Implementation Reports
- Control (Traffic and Vehicle)
- Decision Systems
- Simulation
- Reliability and Safety
- Standards & Public Policies
- Technology Forecast & Transfer

Paper Submission

Authors may submit Regular or Short Technical Papers, Tutorials, Surveys, Technology Reviews, Reports on Successful Implementations, Policy, or Educational Issues, directly to the Editor-in-Chief. Papers will be reviewed by independent reviewers and accepted papers will be published in the IEEE ITS Magazine.

IEEE ITS Society web site

Up to date information on the IEEE ITS Magazine is provided at the official ITSS web site www.ieee.org/itss

Editor-inChief

For paper submission and further publication guidelines contact the Editor-in-Chief: Prof. Christoph Stiller, Institut für Mess- und Regelungstechnik, Universität Karlsruhe (TH), 76131 Karlsruhe, Germany; email: stiller@mrt.uka.de
Since the advent of Intelligent Transportation Systems, research on the use of information for real-time transportation system management has been much conducted. The recent advances in wireless and sensor technologies have rapidly promoted the seamless integration of information of various types from transportation networks to benefit drivers and provide a wide array of transportation-oriented services. These advances in information technology and wireless communications have enabled innovative and cost-effective mobile services and applications for traffic networks. It is envisioned that inter-vehicle and infrastructure-to-vehicle communications would become technically practical in the near future, resulting in an operational “internet on the road”. Due to its interdisciplinary nature, this area has sparked a great deal of interest among researchers in wireless communication, transportation and traffic engineering, vehicular technologies, network operational research, etc. In addition, the area has gained significant traction with both public agencies and private industry. The goal of this special issue is to bring together the recent advances in vehicular infrastructure integration (VII) and vehicle to vehicle communications (V2V) paradigms that aim to develop efficient information dissemination systems to significantly improve traffic management, safety, and control. The topics of interest include but are not limited to:

- Vehicle to vehicle and vehicle-to-infrastructure communications technologies
- Vehicle mobility management with communications
- Vehicular network modeling and performance analysis
- Algorithms and protocols addressing the integration of communication and transportation layers
- Security and Privacy Issues of VII and V2V systems
- VII and V2V simulation, implementation, and field testing
- VII and V2V applications to road safety

High-quality papers are solicited and will undergo the normal peer-review procedure of the journal for inclusion in the Special Issue. Manuscripts should be submitted before the deadline at [http://mc.manuscriptcentral.com/t-its/](http://mc.manuscriptcentral.com/t-its/) by selecting the manuscript type “Special Issue on VII and V2V”.

**Guest Editors:**
Professor Satish Ukkusuri, Rensselaer Polytechnic Institute, e-mail: ukkuss@rpi.edu
Professor Tricia Chigan, Michigan Technological University, email: cchigan@mtu.edu
Dr. Yibing Wang, Monash University, e-mail: vibing.wang@eng.monash.edu.au

**Important Dates:**
Submission of Manuscripts: 31 July 2009
Peer-Review Results: 31 October 2009
Final Accepted Paper: 31 December 2009
Special Issue Publication: 2010
IEEE ITSS Best Ph.D. Dissertation Award

Purpose and Selection Criteria
The prestigious IEEE ITSS Best Ph.D. Dissertation Award is given annually for the best dissertation in any ITS area that is innovative and relevant to practice. This award is established to encourage doctoral research that combines theory and practice, makes in-depth technical contributions, or is interdisciplinary in nature, having the potential to contribute to the ITSS and broaden the ITS topic areas from either the methodological or application perspectives.

Application material
Each application must consist of the following material:
1. A doctoral dissertation written by the applicant in any language no more than 18 months prior to the submission deadline and not previously submitted.
2. A summary of the dissertation in English of up to 3 pages in length written by the Ph.D. candidate highlighting the significance of the problem, the technical approach taken, application context and potential, and the scope of the dissertation.
3. A self-contained paper in English based on the dissertation written primarily by the Ph.D. candidate following the Transactions on ITS regular paper requirements.
4. A letter of recommendation from the applicant’s dissertation advisor that comments on the significance of the research, attests to the originality of the work, and comments on the engagement of the student in the field of ITS.

IEEE ITSS Best Practice Award for Engineers

Purpose and Selection Criteria
The IEEE ITSS Best Practice Award for ITS Engineers is given annually for ITS engineers and teams who have developed and deployed successful ITS systems or implementations. This award is established to recognize, promote, and publicize major application innovations with real-world impact.

Application material
Each application must consist of the following material:
1. A 5-page summary of the ITS application providing sufficient detail for evaluation of the novelty and impact of the work
2. At most 3 letters of recommendation from the customers or users of the developed application attesting to its significance and practical impact

Application and Selection Process for either Award
Please upload the application packet in pdf-format until May 1, 2009 to the following internet address: http://www.mrt.uni-karlsruhe.de/itssAward

Applications by email are not accepted.

Dedicated selection committees will evaluate the applications for the IEEE ITSS Awards and propose candidates for final approval by the ITSS Board of Governors. The first prize winners will receive awards of USD 1000 each. The second prize winner of the Best Ph.D. Dissertation Award will receive USD 500. Award certificates will be given out at the ITSC 2009 conference where the recipients will be asked to give a brief presentation of their work.
Conferences

ITS Society Sponsored Conferences

The Society sponsors six conferences each year.

The schedule for 2009 and announcements follow.

2009

June 3-5
Intelligent Vehicle Symposium (IV)
Xi’an, Shanxi, China
http://www.ieeeiv.net/

June 8-11
Intelligence and Security Informatics (ISI)
Dallas, Texas USA

July 22-24
Service Operations, Logistics and Informatics (SOLI)
Chicago, Illinois USA
http://liu.ece.uic.edu/SOLI09/

August 30-September 2
Mechatronic and Embedded Systems and Applications (MESA)
San Diego, California USA
http://iel.ucdavis.edu/mesa/MESA09/

September 23-25
Vehicular Electronics and Safety (VES)
Pune, India
http://ewh.ieee.org/r10/bombay/icves/icves09.ppt

October 3-7
Intelligent Transportation Systems Conference (ITSC)
Saint Louis, Missouri USA
http://www.ieee.org/itss
Call for Papers

2009 IEEE Intelligent Vehicles Symposium
Sponsored by the IEEE Intelligent Transportation Systems Society
Hosted by Xian Jiaotong University & Institution Automation, Chinese Academy of Sciences
June 3-5, 2009, Kempinski Hotel Xi’an, Shaanxi, China

THE INTELLIGENT VEHICLES SYMPOSIUM (IV’09) is an annual forum sponsored by the IEEE INTELLIGENT TRANSPORTATION SYSTEMS SOCIETY (ITSS). It gathers researchers from industry and universities to discuss research and applications for Intelligent Vehicles and Intelligent Infrastructures. 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, most of the papers will be poster presentations. Papers dealing with all aspects of vehicle-related intelligent systems and cooperation between vehicles and infrastructures are solicited for IV’09.

Program Topics

- Driver Assistance Systems
- Automated Vehicles
- Active and Passive Safety
- Integrated Safety Systems
- Vehicle Environment Perception
- System Architecture
- Smart Infrastructure
- Impact on Traffic Flows
- Cooperative Vehicle-Highway Systems
- Collision Avoidance
- Inter-Vehicle Communications
- Floating Car Data for Safety
- Dedicated Short Range Communications
- IVI
- Sensors
- Image, Radar, Lidar Signal Processing
- Information Fusion
- Vehicle Control
- Telematics
- Decision and Expert Systems
- Communications and Networks
- Human Factors
- Human Machine Interaction
- Others

Important Dates

- Paper submission deadline: Dec. 15, 2008
- Notification of acceptance: Feb. 28, 2009
- Camera-ready manuscript due for proceedings: Mar. 25, 2009
- Workshop proposal deadline: Feb. 1, 2009
- Demo proposal deadline: Mar. 15, 2009

Demonstrations

On June 5, the road right next to the conference venue will be closed for normal traffic in order to provide a perfect site for demonstrations of intelligent vehicles. The demonstration conditions and program will be published on the website.

Further Information

Further information can be found on our website www.ieeeiv.net. If you want to organize a special session, workshop or demonstration you can contact the organization committee at ieeeiv2009@gmail.com or iv09@aiar.xjtu.edu.cn.

General Chair
NanNing Zheng
Xian Jiaotong Univ.
nzheng@mail.xjtu.edu.cn

Program Chair
Fei-Yue Wang
CAS & Univ. of Arizona
feiyue@ieee.org
Conference Scope and Background
Intelligence and Security Informatics (ISI) has been established as an interdisciplinary subject that focuses on the development and use of advanced information technologies, including methodologies, models and algorithms, infrastructure, systems, and tools, for local, national/international, and global security related applications through an integrated technological, organizational, behavioral, and policy based approach. The themes of the 2009 IEEE ISI conference will cover context-aware data analysis, effective counterterrorism, and public education on cybercrime detection. The conference will provide a stimulating forum for ISI researchers all over the world to exchange ideas and report research results.

Paper Submission/Areas of Interest
Submissions may include systems, methodology, testbed, modeling, evaluation, policy, and position papers. Research should be relevant to informatics, organization, and/or public policy in applications of counter-terrorism or protection of local/national/international/global security in the physical world and/or cyberspace. Proposals for tutorials and special-topic workshops in any areas of Intelligence and Security Informatics research and practice are also welcome. The ISI 2009 conference proceedings will be published by the IEEE Press. Topics include but are not limited to:

I. Information Sharing and Data/Text Mining
- Intelligence-related knowledge discovery
- Criminal data mining and network analysis
- Criminal/intelligence info. sharing and visualization
- Web-based intelligence monitoring & event detection
- Deception and intent detection
- Cybercrime detection and digital forensics
- Spatio-temporal data analysis/GIS for crime analysis and security informatics
- Image and video analysis for intention detection
- Authorship analysis and identification
- Applications of digital library technologies in intelligence
- Data processing, preservation, sharing, and analysis
- Agents and collaborative systems for intelligence sharing
- HCI and user interfaces of relevance to ISI
- Information sharing policy and governance
- Privacy, security, and civil liberties issues
- Computerized community security and surveillance systems
- Context-aware data analysis

II. Infrastructure Protection and Emergency Responses
- Cyberinfrastructure design and protection
- Intrusion detection
- Bio-terrorism tracking, alerting, and analysis
- Bioterrorism information infrastructure
- Transportation and communication infrastructure protection
- Border/transportation safety
- Emergency response and management
- Disaster prevention, detection, and management
- Communication and decision support for search and rescue
- Decision support systems for real-time/near real-time security-related events
- Assisting citizen response to terrorism and catastrophic events
- Computer forensics and crime lead discovery
- Cryptography & anti-fraud IT
- Immigration and security

III. Terrorism Informatics
- Terrorism related analytical methodologies and software tools
- Terrorism knowledge portals and databases
- Terrorist incident chronology databases
- Terrorism root cause analysis
- Social network analysis (radicalization, recruitment, conducting operations), visualization, and simulation
- Forecasting terrorism
- Countering terrorism
- Measuring the impact of terrorism on society
- Measuring the effectiveness of counter-terrorism campaigns
- Crime intelligence and cyberspace crime investigation

Organizing Committee
Bhavani Thuraisingham, Univ. of Texas at Dallas, Conference Co-Chair
Hsinchun Chen, Univ. of Arizona, Conference Co-Chair
Latifur R Khan, Univ. of Texas at Dallas, Program Co-Chair
Daniel Zeng, Univ. of Ariz. & Chinese Acad. of Sciences, Program Co-Chair
Lina Zhou, Univ. of Maryland, Baltimore County, Program Co-Chair
Chris Yang, Drexel Univ., Publication Co-Chair
Min-Yuh Day, Natl. Taiwan Univ., Publication Co-Chair
Catherine A. Larson, Univ. of Arizona, Local Arrangements

Hosts
The University of Texas at Dallas
The University of Arizona

Sponsors
IEEE Intelligent Transportation Systems Society
The University of Texas at Dallas
Air Force Office of Scientific Research
Intelligence Advanced Research Projects Agency
Raytheon Corporation
National Science Foundation
2009 IEEE International Conference on Service Operations, Logistics and Informatics

The 2009 IEEE International Conference on Service Operations, Logistics and Informatics will be held in Chicago, July 22–24, 2009. This conference will provide a remarkable opportunity for the academic and industrial communities to address new challenges and share solutions, and discuss future research directions. It will feature plenary speeches, industrial panel sessions, lecture sessions, interactive sessions, and invited/special sessions. Papers related to services/logistics design, innovations, marketing, operations, and informatics are strongly encouraged. Technical topics of the conference include but are not limited to:

- Theory in Service Science, Boundaryless, Information Inflation, Mobile & Network Fusion
- Service Design, Engineering, Operations, and Innovations
- Logistics & Supply Chain Management
- Material Flow (MF) Science and Technology
- Service/Event Management & Manufacturing
- Information & Communications Technology and Systems (ICTS)
- Electronic Commerce & Knowledge Management

PAPER SUBMISSION
Manuscripts must be electronically submitted through the conference website http://liu.ece.uic.edu/SOLI09/. Submitted manuscripts should be at most six (6) pages in IEEE two-column format, including figures, tables, and references. Please use the LaTeX style file or Microsoft Word template available from the conference website to prepare your manuscript. All submissions MUST be in PDF format.

IMPORTANT DATES
Special session proposals deadline --------------- February 1, 2009
Paper submission deadline---------------------- February 1, 2009
Notification of acceptance----------------------- April 1, 2009
Camera-ready copy due-------------------------- May 1, 2009

Sponsors: IEEE Intelligent Transportation Systems Society, INFORMS Service Science Section, AIS SIG on E-Business, Chinese Academy of Sciences, University of Illinois at Chicago
CALL FOR PAPERS

MESA09 – 2009 ASME/IEEE International Conference on Mechatronic and Embedded Systems and Applications
August 30 – September 2, 2009, San Diego Convention Center

Advisory Committee
Jorge Angeles, McGill University
David M. Auslander, Univ. of California, Berkeley
Kevin C. Craig, Rensselaer Polytechnic Institute
Krishna C. Gupta, Univ. of Illinois at Chicago
C. S. George Lee, Purdue University
Ren C. Luo, National Taiwan University
Bahram Ravani, Univ. of California, Davis
T. J. Tarn, Washington University
Masayoshi Tomizuka, U. of California, Berkeley
Feiyue Wang, Univ. of Arizona & Chinese Academy of Sciences

General Chair
Harry H. Cheng, Univ. of California, Davis, USA

Program Chair
YangQuan Chen, Utah State University, Logan, USA

Chair of the Honors and Awards Committee
Zuomin Dong, University of Victoria, Canada

Executive Secretariat Contact E-Mail: 09mesa@gmail.com

Symposia and Symposium Chairs
Automation and Robotics in Environmental and Agricultural Applications
Uriel A. Rosa, Univ. of California, Davis, USA

Autonomous Systems and Ambient Intelligence
Hyo-Sung Ahn, Gwangju Institute of Science & Tech., Korea

Bio-Mechatronics and Bio-sensors
Lei Zuo, SUNY Stonybrook, USA
Shane Xie, the University of Auckland, New Zealand

Cyber-Physical Systems
YangQuan Chen, Utah State Univ., USA
Xiaoqi Chen, University of Canterbury, New Zealand

Embedded Soft Computing
Riccardo Caponetto, University of Catania, Italy

Embedded System Infrastructure and Theory
Martin Horauer, UAS Technikum Wien, Austria

Learning Control and Diagnosis in Mechatronic Systems
Wen Chen, Wayne State University, USA

Mechatronics Control and Electrical Vehicles
Chengbin Ma, UM-SJTU Joint Institute, Shanghai Jiaotong Univ.

Mechatronic and Embedded System Applications
Primo Zingaretti, Politecnich University of Marche, Ancona, Italy

Sensor Networks
Bo Chen, Michigan Technological University, USA

Small Unmanned Aerial Vehicle Technologies & Applications
YangQuan Chen, Utah State University, USA

Holger Voos, Hochschule Ravensburg-Weingarten, Germany

International Program Committee:
http://www.asmeconferences.org/IDETC09/

Technical Co-Sponsors
ASME Division of Design Engineering
IEEE Intelligent Transportation Systems Society
IEEE Control Systems Society

Objectives
Mechanical and electrical systems show an increasing integration of mechanics with electronics and information processing. This integration is between the components (hardware) and the information-driven functions (software), resulting in integrated systems called mechatronic systems. The development of mechatronic systems involves finding an optimal balance between the basic mechanical structure, sensor and actuators, automatic digital information processing and control in which embedded systems play a key role. The field of embedded system and mechatronics is becoming evermore challenging; issues in embedded software lie at the focus of researchers both in industry and academia. The goal of this 5th ASME/IEEE MESA, MESA09, is to bring together experts from the fields of mechatronic and embedded systems, disseminate the recent advances made in the area, discuss future research directions, and exchange application experience. The conference program is organized in a number of symposia.

Paper Submission
Complete manuscripts in PDF format must be electronically submitted to the conference website: http://www.asmeconferences.org/IDETC09/

Venue
MESA09 will be held within the 2009 ASME International Design Engineering Technical Conferences (IDETC).

Important Dates
February 06, 2009: Abstract, Proposal for Special Session
February 13, 2009: Full paper due
April 24, 2009: Author Notification of Acceptance
April 24, 2009: Submission of 1903 Form (Copyright)
May 15, 2009: Submission of Final Paper
August 30, 2009: First day of conference
September 2, 2009: Last day of conference

Companion Web Site
http://iel.ucdavis.edu/mesa/MESA09/
The IEEE Intelligent Transportation Systems Society (ITSS) is sponsoring its 12th international conference on basic research and applications of leading advances in communications, computer, control, and electronics technologies related to Intelligent Transportation Systems (ITS).

**CALL FOR PAPERS**

**Program Topics**

**Travel and Traffic Management**
- Travel Information and Guidance
- Ride Matching And Reservation
- Traveler Services Information
- Traffic Control
- Incident Management
- Travel Demand Management
- Emissions Testing And Mitigation
- Highway-rail Intersection
- Complex Adaptive Systems for ITS

**Public Transportation Management**
- Public Transportation Management
- En-route Transit Information
- Personalized Public Transit
- Public Travel Security

**Commercial Vehicle Operations**
- Commercial Vehicle Electronic Clearance
- Automated Roadside Safety Inspection
- On-board Safety Monitoring
- Commercial Vehicle Administrative Processes
- Hazardous Material Incident Response
- Commercial Fleet Management

**Advanced Vehicle Safety Systems**
- Collision Avoidance
- Vision Enhancement
- Advanced Safety Systems
- Automated Vehicle Operation

**Infrastructure Management**
- Health Monitoring of Bridges, Road, etc.
- Smart or Intelligent Sensor Systems

**ITS Modeling and Analysis**
- Data Mining and Analysis
- Travel Behavior under ITS
- Simulation and Modeling
- Traffic Theory for ITS
- Statistical Modeling
- Optimization and Control: Theory and Modeling
- Geographic Information Systems
- Hardware in the Loop Simulation
- Software in the Loop Simulation
- Artificial Transportation Systems

**Emergency Management and Transportation Security**
- Emergency Notification & Personal Security
- Emergency Vehicle Management
- ITS and National Security
- Parallel Management Systems for Transportation Emergency

**Other Topics**
- Imaging and Image Analysis
- Multi-Sensor Fusion
- Cooperative Systems
- Intelligent Transportation Space
- Agent-based Methods for Traffic and Vehicular Systems

**Electronic Payment**

**Paper Submission**

Complete manuscripts in PDF format must be electronically submitted for peer-review in IEEE standard-format. Detailed submission instructions can be found through conference website at campus.mst.edu/itsc2009

- Manuscript Submission Deadline: May 1, 2009
- Notification of Acceptance Date: July 15, 2009
- Final Paper Submission Date: August 15, 2009
- Special Session Proposal Deadline: 1 April 2009
ICVES – 2009

2009 IEEE INTERNATIONAL CONFERENCE ON VEHICULAR ELECTRONICS AND SAFETY

November 10-12, 2009
PUNE, INDIA

Call for Papers

The International Conference on Vehicular Electronics and Safety (ICVES) is an annual meeting sponsored by the IEEE Intelligent Transportation Systems Society (ITSS) as a forum for researchers from industry and universities to discuss research and applications in Vehicle Electronics and Safety. Papers dealing with all aspects of vehicle electronics and vehicle safety related to intelligent systems are solicited for this fourth meeting, ICVES-2009. The topics include, but are not limited to, the following:

Theme: Vehicular Electronics and Safety

Sub themes:

Active and Passive Safety Systems
Vehicle Hardware and Software
Vehicular Power Networks
Vehicle Testing
Vehicle and Engine Control
Vehicular Measurement Systems-Technology
Embedded Operating Systems
Vehicular Signal Processing Systems
Vehicular Sensors and Sensor networks
Image Sensors and Pattern Recognition for Vehicles
Inter-Vehicular Communication and Telematics, X-by Wire Technology
Micro-electromechanical Systems
Electro Magnetic Compatibility
Navigation and localization Systems
Human Machine Interaction, Driver Assistance and Warning Systems
Diagnostics
Any other topic related to Vehicular Electronics and Safety

For more details visit [http://www.icves-9.com](http://www.icves-9.com)

Dr. U.B. Desai – General Chair  ubdesai@ee.iitb.ac.in
Dr. D.J. Doke – General Co-Chair – dattadoke@hotmail.com
Dr. Y.P. Nerkar – Organizing Chair – ypnerkar@yahoo.com

Important dates:
Paper submission deadline: August, 1, 2009.
Notification of acceptance: September, 1, 2009
Conference Calendar

by Massimo Bertozzi and Paolo Grisleri

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

2009

April 20-23
SAE 2009 World Congress
Detroit, Michigan, USA
http://www.sae.org/congress/

April 26-29
IEEE 69th Vehicular Technology Conference (VTC2009-Spring)
Barcelona, Spain
http://www.ieeevtc.org/vtc2009spring/

May 11-13
IEEE International Conference on Virtual Environments, Human Computer Interfaces and Measurement System (VECIMS2009)
Hong Kong, China
http://vecims.ieee-ims.org

May 13-17
2009 IEEE International Conference on Robotics and Automation
Kobe, Japan
http://www.icra2009.org

May 18-19
2009 Vehicle Active Safety Symposium (VASS 2009)
Indianapolis, IN, U.S.A.
http://www.engr.iupui.edu/tasi/VASS09/index.php

May 26-29
International Transport Forum on Transport and Globalisation
Leipzig, Germany
http://www.internationaltransportforum.org
May 27-31
10th International Conference on Application of Advanced Technologies in Transportation
Athens GREECE
http://www.civil.ntua.gr/aatt/aatt.html

June 1-3
Intelligent Transportation Society America's 2009 Annual Meeting & Exposition
National Harbor, MD, U.S.A.
http://www.itsa.org/annualmeeting/c396/
ITSA_Events/2009_Annual_Meeting_and_Exposition.html

June 22-23
International Conference on Models and Technology for Intelligent Transportation Systems
Rome, Italy

July 8-10
3rd IEEE Multi-conference on Systems and Control (MSC2009)
Saint Petersburg, Russia
http://conf.physcon.ru/msc09/index.html

July 8-10
9th Intelligent Transport System Asia-Pacific Forum
Bangkok, Thailand
http://www.its-ap2009.in.th/

July 13-15
IASTED Control and Applications
Cambridge, United Kingdom
http://www.iasted.org/conferences/home-651.html

July 16-18
International Symposium on Transportation and Traffic Theory
Hong Kong
http://www.isttt18.org

September 2-4
12th IFAC Symposium on Control in Transportation Systems (CTS’09)
Redondo Beach, CA, U.S.A.
http://ee.usc.edu/CTS09

September 8-11
International Conference on Image Analysis and Processing (ICIAP2009)
Salerno, Italy
http://www iciap2009.org
September 10-11
IIID Traffic&Transport 2009
Vienna, Austria
Submission due by: May 10
http://www.iiid-expertforum.net/

September 20-23
IEEE 70th Vehicular Technology Conference (VTC2009-Fall)
Anchorage, AK, U.S.A.
http://www.ieeevtc.org/vtc2009fall/

September 21-25
ITS, World Congress
Stockholm, Sweden
http://www.itsworldcongress.com

October 11-15
St. Louis, MO, USA

October 12-15
7th International Conference on Computer Vision System (ICVS2009)
Liege, Belgium
Submission due by: May 4
http://icvs2009.intelsig.be

November 2-4
IASTED Intelligent Systems and Control
Submission due by: June 12
Cambridge, MA, U.S.A.
http://www.iasted.org/conferences/home-665.html

November 4-7
9th International Conference on Transport Systems Telematics
Katowice-Ustroń, Poland
http://www.tst-conference.org

December 16-18
Artificial Intelligence Applications in Intelligent Transportation Systems
4th Indian International Conference on Artificial Intelligence
Tumkur (near Bangalore), India
http://www.iiconference.org/iicai09/its.html
http://www.iasted.org/conferences/home-665.html
The 12th IFAC Symposium on Control in Transportation Systems (CTS’09) will be held Wednesday through Friday September 2-4, 2009 at the Crowne Plaza Hotel, Redondo Beach, California, USA. The use of automatic control and associated technologies for improving the efficiency of transportation systems is an essential part of any modern continuously evolving society. The CTS’09 Symposium will provide an international forum for the recent developments and advances in control and associated technologies for traffic and transportation systems, including road-, rail-, air- and waterborne transportation. Specific topics and areas include but not limited to:

- Intelligent Transportation Systems; Automated Highway Systems
- Intelligent/Automated Vehicles; Ramp Metering and Speed limit Control
- Modeling, Control and Optimization of Transportation Systems
- Traffic Light Control
- Sensor Technologies for Control; Weigh in Motion
- Public Transportation
- Freight Transportation: Control, Optimization, Routing etc
- Rail Transportation: maglev, control, scheduling, modeling, simulations
- Marine Transportation: Control, scheduling
- Ports and Terminals; Air transportation
- Safety and warning devices, Human factors
- Simulation Tools/Commercial software

**Venue:** The venue of CTS’09 is the Crowne Plaza Hotel in Redondo Beach, California, [http://www.cpredondobeachhotel.com/](http://www.cpredondobeachhotel.com/). Redondo Beach is one of the most picturesque, welcoming beach cities on the West Coast. The hotel is right across the Redondo Beach Marina and Pier and within walking distance to a beautiful sandy beach, shops and restaurants, and 7 miles from the Los Angeles International Airport.
'The paradigm shift goes from a car receiving information only to a car communicating bi-directionally with its environment. The car will become an open system and the car industry will see a change in much the same way that mainframe computer vendors and incumbent telecom operators saw their world change within a decade. We invite all the bright minds to create the best solution and to test them in an open challenge. Who will become the Microsoft of the car operating system? It will take decades, five system generations of evolution, but the automobile will become a real auto (auto) mobile.”

Egbert-Jan Sol
CTO, TNO Science and Industry

Challenge
TNO and HTAS (High Tech Automotive Systems) have started a three year pending project, Grand Cooperative Driving Challenge (GCDC), which will start with a workshop on May 14th, 2009. The GCDC demonstrates the possibilities of cooperative driving in order to reduce the incidence of traffic jams, minimise CO₂ emissions and prevent accidents on the road, based on state-of-the-art technology. Cooperative systems offer the drivers, highways authorities and the infrastructure itself more information about the vehicles, their location, their intention and the road conditions. Renowned R&D teams from universities, industry and knowledge institutions from around the world are being invited to take part in this challenge through the stimulating medium of competition. Those bold enough to take up the challenge will have to negotiate their vehicles as efficiently as possible through a range of predetermined traffic scenarios. The extent to which the traffic flow is improved by this and the speed at which this improvement can be implemented will be uppermost in the judges’ minds. The challenge is thus a unique tool for the rapid transfer of research findings to real-life driving conditions.

The route to success
The GCDC begins in 2009, with the finals scheduled for 2011. In brief, the timetable is:

- May 14th, 2009: Workshop in Helmond, the Netherlands to swap ideas on rules, protocols and technology (more preparation workshops will be scheduled).
- March 2010: Cooperative technology demonstration based on Shockwave Traffic Jam Experiment at the showcase event involving the CVIS, SAFESPOT and COOPERS R&D projects. This demonstration will be in Amsterdam, the Netherlands.
- 2011: Actual highway challenge between Helmond and Eindhoven, the Netherlands.

After 2011, the organisers intend to make the challenge an annual international event in which new and gradually more challenging traffic situations will be addressed to stimulate the development of cooperative technology in the longer term.

First preparing workshop
On May 14th, potential participants and interested financiers can learn about the GCDC details and at the same time they will be able to influence the content of the challenge. More information can be found on the website http://www.gcdc.nl/about.html.

This workshop, which is free of charge, coincides with the ‘Cooperative Systems on the Road’ event being held on the public roads in the southern Dutch city of Helmond from May 12-14 (http://www.testsitehelmond.org). You can register for the workshop up to April 24th at the website http://www.gcdc.nl/workshopmay09/index.php. Places are limited so please sign up as soon as possible.
For more information, mail anton.gerrits@tno.nl.
Abstracts of Papers

IEEE Transactions on Intelligent Transportation Systems, vol.10, no.1, March 2009


Abstract: In-car positioning and navigation has been a killer application for Global Positioning System (GPS) receivers, and a variety of electronics for consumers and professionals have been launched on a large scale. Positioning technologies based on stand-alone GPS receivers are vulnerable and, thus, have to be supported by additional information sources to obtain the desired accuracy, integrity, availability, and continuity of service. A survey of the information sources and information fusion technologies used in current in-car navigation systems is presented. The pros and cons of the four commonly used information sources, namely, 1) receivers for radio-based positioning using satellites, 2) vehicle motion sensors, 3) vehicle models, and 4) digital map information, are described. Common filters to combine the information from the various sources are discussed. The expansion of the number of satellites and the number of satellite systems, with their usage of available radio spectrum, is an enabler for further development, in combination with the rapid development of microelectromechanical inertial sensors and refined digital maps.

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Abstract: This paper describes a precision positioning technique that can be applied to vehicles in urban areas. The proposed technique mitigates Global Positioning System (GPS) multipath by means of an omnidirectional infrared (IR) camera that can eliminate the need for invisible satellites [a satellite detected by the receiver but without line of sight (LOS)] by using IR images. Some simple GPS multipath mitigation techniques, such as the installation of antennas away from buildings and using choke ring antennas, are well known. Further, various correlator techniques can also be employed. However, when a direct signal cannot be received by the antenna, these techniques do not provide satisfactory results because they presume that the antenna chiefly receives direct signals. On the other hand, the proposed technique can mitigate GPS multipath, even if a direct signal cannot be received because it can recognize the surrounding environment by means of an omnidirectional IR camera. With the IR camera, the sky appears distinctively dark; this facilitates the detection of the borderline between the sky and the surrounding buildings, which are captured in white, due to the difference in the atmospheric transmittance rate between visible light and IR rays. Positioning is performed only with visible satellites having fewer multipath errors and without using invisible satellites. With the proposed system, static and kinematic evaluations in which invisible satellites are discriminated through observation using an omnidirectional IR camera are conducted. Hence, signals are received even if satellites are hidden behind buildings; furthermore, the exclusion of satellites having
large errors from the positioning computation becomes possible. The evaluation results confirm
the effectiveness of the proposed technique and the feasibility of highly accurate positioning.

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Canale, M.; Fagiano, L.; Ferrara, A.; Vecchio, C., "Comparing Internal Model Control and Slid-
ing-Mode Approaches for Vehicle Yaw Control," pp.31-41.

Abstract: In this paper, the problem of vehicle yaw control using a rear active differential is in-
vestigated. The proposed control structure employs a reference generator designed to improve
vehicle handling, a feedforward contribution that enhances the transient system response, and a
feedback controller. Due to system uncertainties and the wide range of operating situations,
which are typical of the automotive context, a robust control technique is needed to guarantee
system stability. Two different robust feedback controllers, which are based on internal model
control and sliding mode methodologies, respectively, are designed, and their performances are
compared by means of extensive simulation tests performed using a realistic 14-degree-of-
freedom (DOF) model of the considered vehicle. The obtained results show the effectiveness of
the proposed control structure with both feedback controllers and highlight their respective
benefits and drawbacks. The presented comparative study is a first step to devise a new mixed
control strategy that is able to exploit the benefits of both the considered techniques.

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Zhaohui Wu; Yanfei Liu; Gang Pan, "A Smart Car Control Model for Brake Comfort Based on

Abstract: This paper demonstrates a novel car-following model focused on passenger comfort,
for example, a rapid deceleration will make passengers uncomfortable. The brake comfort
model of car following was set up according to the relationship between vehicle deceleration
and passenger comfort levels. The model calculates the controlled car's acceleration by measur-
ing the distance between the controlled car and its preceding car, as well as the velocity of the
controlled car. By controlling the car's acceleration, the model is able to keep riders feeling
comfortable. The friction coefficient between the car and the road surface is also considered.
Experiments show that the model is highly compatible with real cases.

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Abstract: The responsibility of a vision-based lane departure warning (LDW) system is to alert
a driver of an unintended lane departure. Because these systems solely rely on the vision sen-
or's ability to detect the lane markings on the roadway, these systems are extremely sensitive to
the roadway conditions. When a vehicle's LDW system fails to detect lane markers on the road-
way, it loses its ability to alert the driver of an unintended lane departure. The goal of this re-
search is to use GPS combined with inertial sensors and a high-accuracy map to assist a vision-
based LDW system. GPS navigation systems are available in many automobiles, along with automotive-grade inertial sensors. The low accuracy of a typical GPS receiver found in an automotive navigation system is largely attributed to a position error. This error is too large to allow the GPS receiver to locate a vehicle in a particular lane on a roadway. A method to measure this error using a vision-based LDW system, together with a high-accuracy map, is presented in this paper. With the error known, the accuracy of the GPS receiver is increased to a high-enough level to localize the vehicle on a particular lane. Next, a method fusing GPS/inertial navigation sensor/vision and a high-accuracy map for highway lane tracking is presented. This method provides a backup lateral offset measurement that can be used for LDW when the LDW vision system loses track of the lane markings.

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Abstract: In this paper, an aggregation approach is proposed for traffic flow prediction that is based on the moving average (MA), exponential smoothing (ES), autoregressive MA (ARIMA), and neural network (NN) models. The aggregation approach assembles information from relevant time series. The source time series is the traffic flow volume that is collected 24 h/day over several years. The three relevant time series are a weekly similarity time series, a daily similarity time series, and an hourly time series, which can be directly generated from the source time series. The MA, ES, and ARIMA models are selected to give predictions of the three relevant time series. The predictions that result from the different models are used as the basis of the NN in the aggregation stage. The output of the trained NN serves as the final prediction. To assess the performance of the different models, the naive, ARIMA, nonparametric regression, NN, and data aggregation (DA) models are applied to the prediction of a real vehicle traffic flow, from which data have been collected at a data-collection point that is located on National Highway 107, Guangzhou, Guangdong, China. The outcome suggests that the DA model obtains a more accurate forecast than any individual model alone. The aggregation strategy can offer substantial benefits in terms of improving operational forecasting.

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Shen Cherng; Chiung-Yao Fang; Chia-Pei Chen; Sei-Wang Chen, "Critical Motion Detection of Nearby Moving Vehicles in a Vision-Based Driver-Assistance System," pp.70-82.

Abstract: Driving always involves risk. Various means have been proposed to reduce the risk. Critical motion detection of nearby moving vehicles is one of the important means of preventing accidents. In this paper, a computational model, which is referred to as the dynamic visual model (DVM), is proposed to detect critical motions of nearby vehicles while driving on a highway. The DVM is motivated by the human visual system and consists of three analyzers: 1) sensory analyzers, 2) perceptual analyzers, and 3) conceptual analyzers. In addition, a memory, which is called the episodic memory, is incorporated, through which a number of features of the system, including hierarchical processing, configurability, adaptive response, and selective attention, are realized. A series of experimental results with both single and multiple critical mo-
tions are demonstrated and show the feasibility of the proposed system.

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Abstract: The security of border and transportation systems is a critical component of the national strategy for homeland security. The security concerns at the border are not independent of law enforcement in border-area jurisdictions because the information known by local law enforcement agencies may provide valuable leads that are useful for securing the border and transportation infrastructure. The combined analysis of law enforcement information and data generated by vehicle license plate readers at international borders can be used to identify suspicious vehicles and people at ports of entry. This not only generates better quality leads for border protection agents but may also serve to reduce wait times for commerce, vehicles, and people as they cross the border. This paper explores the use of criminal activity networks (CANs) to analyze information from law enforcement and other sources to provide value for transportation and border security. We analyze the topological characteristics of CAN of individuals and vehicles in a multiple jurisdiction scenario. The advantages of exploring the relationships of individuals and vehicles are shown. We find that large narcotic networks are small world with short average path lengths ranging from 4.5 to 8.5 and have scale-free degree distributions with power law exponents of 0.85-1.3. In addition, we find that utilizing information from multiple jurisdictions provides higher quality leads by reducing the average shortest-path lengths. The inclusion of vehicular relationships and border-crossing information generates more investigative leads that can aid in securing the border and transportation infrastructure.

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Abstract: This paper presents a model predictive controller (MPC) structure for solving the path-tracking problem of terrestrial autonomous vehicles. To achieve the desired performance during high-speed driving, the controller architecture considers both the kinematic and the dynamic control in a cascade structure. Our study contains a comparative study between two kinematic linear predictive control strategies: The first strategy is based on the successive linearization concept, and the other strategy combines a local reference frame with an approaching path strategy. Our goal is to search for the strategy that best comprises the performance and hardware-cost criteria. For the dynamic controller, a decentralized predictive controller based on a linearized model of the vehicle is used. Practical experiments obtained using an autonomous "Mini-Bajardo vehicle equipped with an embedded computing system are presented. These results confirm that the proposed MPC structure is the solution that better matches the target criteria.

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Abstract: Transportation and border security systems have a common goal: to allow law-abiding people to pass through security and detain those people who intend to harm. Understanding how intention is concealed and how it might be detected should help in attaining this goal. In this paper, we introduce a multidisciplinary theoretical model of intent concealment along with three verbal and nonverbal automated methods for detecting intent: message feature mining, speech act profiling, and kinesic analysis. This paper also reviews a program of empirical research supporting this model, including several previously published studies and the results of a proof-of-concept study. These studies support the model by showing that aspects of intent can be detected at a rate that is higher than chance. Finally, this paper discusses the implications of these findings in an airport-screening scenario.

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Abstract: The high variability of sign appearance in uncontrolled environments has made the detection and classification of road signs a challenging problem in computer vision. In this paper, we introduce a novel approach for the detection and classification of traffic signs. Detection is based on a boosted detectors cascade, trained with a novel evolutionary version of Adaboost, which allows the use of large feature spaces. Classification is defined as a multiclass categorization problem. A battery of classifiers is trained to split classes in an Error-Correcting Output Code (ECOC) framework. We propose an ECOC design through a forest of optimal tree structures that are embedded in the ECOC matrix. The novel system offers high performance and better accuracy than the state-of-the-art strategies and is potentially better in terms of noise, affine deformation, partial occlusions, and reduced illumination.

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Abstract: This paper describes a method for designing an intelligent system to improve driver safety. A prototype of the system, which was designed by following this method, is presented. Driver physiological data acquired from sensors on the steering wheel are correlated, using statistical multivariate analysis, to the driver's vigilance level, which was evaluated using polysomnography. A driving simulation was conducted with a mechanical platform, whose data were also acquired and studied the same way. The parameters chosen for the evaluation of driver vigilance are used for the first time in such a system. Data are analyzed offline to set up a real-time driver vigilance controller. The data analysis results in one vigilance-level index for the current driver and situation.

Abstract: For GPS positioning, it is normally required that there be at least four GPS satellites in view. However, due to the frequent blockage of signals in an urban environment, it is difficult to meet that requirement; therefore, the operation of the GPS receiver may be interrupted. How to deal with this problem so that the service can be continuous is the main theme of this paper. The pseudorange predictor and the receiver clock bias predictor may be used to estimate the pseudorange and clock bias, respectively. The altitude-hold algorithm is developed to provide additional information under the assumption that the altitude of the vehicle is approximately a constant, which is deemed appropriate for urban applications. Furthermore, for land vehicles, it may be assumed that the speed of the vehicle is not significantly varying so that the constraint-filtering method with soft constraint may be applied. The integration of these methods yields a successful algorithm to manage the ill-conditioned positioning problem if the number of visible satellites drops to below 4. From both static and dynamic experimental results, it is shown that the proposed methodology indeed gives rise to an effective scheme that can sustain the service for a few minutes, even if there is no satellite in view at all.


Abstract: This work is driven by our vision that cybernetic transport systems (CTSs) based on fully automated urban vehicles (cybercars) will be seen on city roads and new dedicated infrastructures in the near future. These automated vehicles can be heterogeneous systems, such as human-driven traffic, each having different features and functionalities. In our case, we have developed a control architecture that can manage automatic driving of two cars: 1) CyCabs and 2) automated mass-produced cars. This architecture is interoperable and generates humanlike control of vehicles in any situation. Installation and communication with each vehicle are easy. The autonomous route-tracking behaviors are similar, even if the mechanical, electronic, software, and hardware configurations are different for both cars. The results of the developments shown in this paper are part of the European Union (EU) CyberCars-2 Project, which is currently under deployment.


Abstract: The primary purpose of night-vision systems in civilian vehicles is to help drivers detect pedestrians. Pedestrian detection distance with night-vision systems has been modeled based on image metrics. However, the probability of pedestrian detection, in particular considering the factor of distance, has not been modeled based on image metrics. In this paper, we
first describe a model of the probability of pedestrian detection, which compares several combinations of image-based clutter, contrast, and pedestrian size metrics using a simple mathematical equation. Next, we describe a model of the probability of pedestrian detection as a function of distance and image-based metrics by combining the model of pedestrian-detection probability and a model that represents the relationship between the distance to a pedestrian and an image-based pedestrian size metric. In the final model, image-based metrics are used to predict pedestrian-detection performance and can also be used to evaluate and support the development of night-vision systems in vehicles.

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Abstract: In this paper, an analytical dynamic node-based model is proposed both to represent flows on a highway traffic network and to be utilized as an integral part of a dynamic network loading (DNL) process by solving a continuous DNL problem. The proposed model formulation has an integrate base structured with a mesoscopic link load-computing component that explicitly takes into account the acceleration behavior of discrete vehicle packets and an algorithm written with a set of nodal rules considering the constraints of link dynamics, flow conservation, flow propagation, and boundary conditions. The solution to the model formulation is obtained by simulation, where the coded algorithm of the proposed solution method is run after designing a discrete version of the problem. The performance of the proposed model, as a DNL model, is tested on a sample highway network following its validation study that is obtained on a sample highway node. It is seen that the proposed model provides consistent approximations to link flow dynamics. The new dynamic node model proposed in this paper is unique in that it encapsulates a mesoscopic approach in node-based flow dynamics modeling.

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Abstract: This paper focuses on the robustness and reliability of a future-trajectory-based cooperative collision warning system (CCWS), which estimates and communicates vehicle positions and predicts and processes future trajectories for collision decision making. The feasibility of the system design has been demonstrated in previous work, and this paper analyzes the error propagation and its impact on detection performance. The reliability of the CCWS heavily depends on the reliability of the differential Global Positioning System (DGPS)-based positioning system and the reliability of intervehicle communication. This paper uses the Kalman filter technique to statistically characterize the errors in position estimation and trajectory prediction, incorporates communication errors as part of the prediction error, and accordingly determines the probability of conflicts and the quality of the detection performance. Results with experimental data are presented to illustrate the error propagation and to demonstrate the reliability of the system.

Abstract: The prediction of lane changes has been proven to be useful for collision avoidance support in road vehicles. This paper proposes an interactive multiple model (IMM)-based method for predicting lane changes in highways. The sensor unit consists of a set of low-cost Global Positioning System/inertial measurement unit (GPS/IMU) sensors and an odometry cap-tor for collecting velocity measurements. Extended Kalman filters (EKFs) running in parallel and integrated by an IMM-based algorithm provide positioning and maneuver predictions to the user. The maneuver states Change Lane (CL) and Keep Lane (KL) are defined by two models that describe different dynamics. Different model sets have been studied to meet the needs of the IMM-based algorithm. Real trials in highway scenarios show the capability of the system to predict lane changes in straight and curved road stretches with very short latency times.


Abstract: A new maritime navigation system based on a laser range-finder scanner for obstacle avoidance and precise maneuvering operations is described in this paper. The main novelty of this work is the adaptation and implementation of known technology for laser range finding and algorithms for target tracking into a system that operates in real time and has been tested in different natural sea and inland navigation scenarios. The principal components of this system, namely, 1) the laser range finder, 2) the scanning unit, and 3) the data processing and displaying unit, are described in detail. Ladar images are dense horizontally and sparse vertically as a compromise between capturing relevant features and quick frame formation. Images are processed for range outlier removal, and significant observable patterns are extracted. This multiple-target tracking problem is tackled using robust Kalman filtering techniques for continuous tracking of each detected observation. We minimize unreliable track initializations and preserve tracks from deletion during temporal misobservations. The evaluation in open-sea and inland water-ways gave good results, making the system valid for precise maneuvering, fluent navigation, and accident mitigation. Objects of interest, from boats to ships, are detected and robustly tracked; pier and lock chamber sketches are reliable; bridge height estimation is precise; and narrow waterways (river banks and bridge columns) are correctly detected. The prototype developed can be considered to be a very valuable complementary device to traditional radar-based techniques that are not totally valid for accurate short-range exploration, improving efficiency and safety in ship operations.
## Officers

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<td>Fei-Yue Wang, CAS, China, and U. of Arizona, Tucson, AZ, USA</td>
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