



INTELLIGENT
TRANSPORTATION
SYSTEMS

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IEEE ITS SOCIETY NEWSLETTER

Vol. 15, No. 1 January 2013

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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 web site: <http://sites.ieee.org/its/>.

You may subscribe to or unsubscribe from announcements at the same web site. Announcements are sent to approximately 16,000 ITS professionals from industry, academia, and government.

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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 miguel.sotelo@uah.es.

SOCIETY NEWS

From the Editor

Miguel Ángel Sotelo



It is an exciting time for the field of Intelligent Transportation Systems and it is with great pleasure that I take on the responsibilities of Editor-in-Chief of IEEE ITSS Newsletter. Under the brilliant leadership of Dr. Yaobin Chen, the past Editor-in-Chief, and with the great efforts of the associate editors and all other contributors, mainly the ITSS Executive Committee members, the ITSS Newsletter has been timely serving the ITS community in the last years. I am fully committed to do my best and try to continue this path of excellence in the coming period. Yaobin, thanks for everything and good luck in your new role as VP Technical Activities!

In this issue, we will start once more with the "Message from the President" by Dr. Christoph Stiller, the current ITS Society President. You will also find the 2013 ITS Awards Call for Nomination, Conferences Call for Papers and Calendar, and other news and announcements that I hope will be of your interest. Let me sincerely wish you a successful and fruitful 2013!

Message from President:

Nothing changes on New Year's Day

By Dr. Christoph Stiller, President

First of all let me wish all our society members a happy and successful new year 2013! Indeed, 2012 has been an exciting year for our society and the occasion of the New Year may be a good time to reflect some of what has been accomplished in 2012 and what is planned for 2013.



Our conferences enjoyed strong participation and have established themselves as the meeting platform for experts from academia, industry and policy makers in intelligent transportation systems. Our two flagship conferences, the International IEEE Conference on Intelligent Transportation Systems (ITSC) and the IEEE Intelligent Vehicles Symposium (IV) toggle between continents to be close to our international community.



To support networking among Ph.D. students, pre-conference tours will be conducted for them at many of our conferences. The first ITS student excursion had been organized by Brendan Morris before ITSC 12 in Anchorage, Alaska that led the participants to a couple of glaciers.

The picture shows on the left Jeffrey Miller, General Chair of ITSC 12 and Editor-in-Chief of the ITS Magazine and on the right Matthew Barth, the society's President-Elect with myself and some Tequilas at the ITSC 12 reception.

In 2013 ITSC will be held in Europe and IV – for the first time – in Australia. These are augmented by a number of events partly conducted in cooperation with other societies:

- IEEE International Conference on ITS Intelligence and Security Informatics,
- IEEE International Conference on ITS Vehicular Electronics and Safety,
- IEEE International Conference on ITS Service Operations and Logistics and Informatics,
- IEEE Vehicular Networking Conference,
- IEEE/ASME International Conference on Mechatronic and Embedded Systems and Applications

In 2013 we will additionally sponsor the IEEE International Conference on Intelligent Rail Transportation (ICIRT) for the first time to foster the research community in the important field of railway systems. ICIRT will be in Beijing, China, from August 30th to September 1st, 2013.

With our IEEE Transactions on Intelligent Transportation Systems that enjoys the highest impact factor among all transportation journals, the IEEE Intelligent Transportation Systems Magazine and the IEEE Intelligent Transportation Systems Newsletter we offer one publication every month to our members. Recently, we have launched our new publication ITS Now that responds to the increasing demand for on-line journals by providing topical issues with selected papers from the ITS field. Daniel Zeng, our Vice President Publications has launched this new format. For 2013, an additional ITSS podcast channel is in preparation under the leadership of Javier Sanchez-Medina that will provide short news to the on-line community and smart phone users.

Our Technical Activity Boards have been strengthened under the leadership of Urbano Nunes, the society's Vice President for Technical Activities. As he is leaving this position, let me give him special thanks for his work that has advanced us in this field. From 2013 Yaobin Chen, our former Newsletter Editor will continue as Vice President for Technical Activities.

Before closing let me thank the numerous volunteers who drive all activities in our society as conference organizers, reviewers, editors, chairs, officers, members in the Board of Governors and in so many other positions. I am aware that I could have extended the list of our activities and the people involved.

While indeed nothing particularly changes just on New Years Day, you see that we are part of an ever changing society and thus 2013 shall become another exciting year for us. By the way, if you have not yet renewed your IEEE ITSS membership for 2013, now is the time to do so.

As one highlight in 2013 let us now look forward to our first large conference on the new continent. See you in June at IV 2013 at the Australian Gold Coast!



Christoph Stiller
President IEEE ITSS

2012 Board of Governors Election Results

Each year, the members of the Society elect five members to serve a three year term on the Board of Governors (BoG), the Society's governing body. The BoG consists of the fifteen elected members (five each year for a three-year term) and the officers of the Society.

The candidates for election are nominated by the Society's Nominations Committee. The chair of the Committee is designated in the Society's bylaws. This year, the chair was again Bill Scherer who was president in 2008-2009. IEEE has announced the results of the election for the Board of Governors. The following five candidates have been elected to a three year term beginning January 1, 2013.



Hans van Lint
Associate Professor
Delft University of
Technology
Delft
The Netherlands



Javier Sánchez Medina
Associate Professor
University of Las Palmas de
Gran Canaria. CICEI
Spain



Nobuyuki Ozaki
Toshiba Corporation
Senior Fellow
Japan



Bart de Schutter
Full Professor
Delft Center for Systems
and Control
Delft University of Tech-
nology
Delft
The Netherlands



Emily Sopensky
Iris Company
CEO
USA

IEEE ITS Outstanding Research Award
IEEE ITS Outstanding Application Award
IEEE ITS Institutional Lead Award

Call for Nomination of Awards

Purpose and Selection Criteria

The prestigious IEEE ITS Outstanding Research Award, IEEE ITS Outstanding Application Award, and IEEE ITS Lead Award are given annually for ITS researchers, practitioners, and research/development teams who have made significant contributions to research in ITS related fields (for ITS Research Award), developed and deployed successful ITS systems or implementations (for ITS Application Award), and demonstrated leadership in promoting ITS technologies (for ITS Institutional Lead Award). These awards are established to recognize, promote, and publicize major research contribution, application innovations with real-world impact, and ITS institutional leadership.

Application Materials

Each application must consist of the following materials:

- (1) A 5-page summary statement providing sufficient detail for evaluation of the innovations and impacts of the work.
- (2) At least 3 letters of recommendation from the recognized peer researchers, customers or users of the developed application, and organizations attesting to its significance and impact.

A dedicated selection committee will evaluate all qualified applications for the IEEE ITS Awards and make selections. Award selections will be announced October 2013 at the ITSC 2013 conference in Hague, Netherland, where the recipients will be asked to give featured presentations of their work.

Please email applications before **June 1, 2013** to ITSS Vice President of Membership: jason.geng@ieee.org.

IEEE ITSS Best Ph.D. Dissertation Award Call for Application of Award

Purpose and Selection Criteria

The prestigious IEEE ITSS Best Ph.D. Dissertation Award is given annually for the best dissertations in any ITS areas that are 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.

Eligibility of Applicant

Applicant should pass his/her doctoral degree defense within the period no more than 18 months prior to the date of application (June 15, 2013). Applicant must be a member or student member of IEEE ITSS by the date of application.

Application materials

Each application must consist of the following materials:

1. A doctoral dissertation written by the applicant in any language no more than 18 months prior to the submission deadline.
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. Published paper(s) in English based on the dissertation written primarily by the Ph.D. candidate on scientific journals such as the IEEE Transactions on ITS or the IEEE ITS Magazine.
4. All publications by the applicant in the related field(s).
5. 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 and the ITSS.

Award Prizes and Presentations:

The first place prize winners will receive awards of USD 1,000. The second place prize winner will receive USD 500. Award selections will be announced October 2013 at the ITSC 2013 conference in Hague, Netherland, where the recipients will be asked to give brief presentations of their work. Awardees work will be featured in ITSS Transactions, ITS Magazine, and ITS Newsletter, when appropriate.

Applications and Selection Processes for Awards

A dedicated selection committee will evaluate all qualified applications for the IEEE ITS Best Ph.D. Dissertation Awards and make selections.

Please email single-package application before **June 15, 2013** to ITSS Vice President of Membership: jason.geng@ieee.org.

IEEE Fellow Nomination

IEEE Fellow is a distinction reserved for select IEEE members whose extraordinary accomplishments in any of the IEEE fields of interest are deemed fitting of this prestigious grade elevation. All nomination, reference and endorsement forms must be submitted to the IEEE Fellow Committee by the **01 March 2013 deadline**.

For details, please refer to IEEE website:

http://www.ieee.org/membership_services/membership/fellows/index.html

IEEE Senior Member Nomination

Senior member is the highest grade for which IEEE members can apply. IEEE members can self-nominate, or be nominated, for Senior member grade. To be eligible for application or nomination, candidates must:

- be engineers, scientists, educators, technical executives, or originators in IEEE-designated fields;
- have experience reflecting professional maturity;
- have been in professional practice for at least ten years;
- show significant performance over a period of at least five of their years in professional practice.

Prospective members who would like to apply directly for Senior member grade should join IEEE and then submit the Senior member Application Form as an IEEE member number is required on the senior member application. There is no additional fee to apply for senior member grade. For detailed information, see IEEE Website:

http://www.ieee.org/membership_services/membership/senior/index.html

Benefits of Senior Membership

- **Recognition:** The professional recognition of your peers for technical and professional excellence.
- **Senior member plaque:** Since January 1999, all newly elevated Senior members have received an engraved Senior Member plaque to be proudly displayed for colleagues, clients and employers to see. The plaque, an attractive fine wood with bronze engraving, is sent within six to eight weeks after elevation.
- **US\$25 coupon:** IEEE will recognize all newly elevated Senior members with a coupon worth up to US\$25. This coupon can be used to join one new IEEE society. The coupon expires on 31 December of the year in which it is received.
- **Letter of commendation:** A letter of commendation will be sent to your employer on the achievement of Senior member grade (upon the request of the newly elected Senior member).

- **Announcements:** Announcement of elevation can be made in section/society and/or local newsletters, newspapers and notices.
- **Leadership eligibility:** Senior members are eligible to hold executive IEEE volunteer positions.
- **Ability to refer other candidates:** Senior members can serve as a reference for other applicants for senior membership.
- **Review panel:** Senior members are invited to be on the panel to review senior member applications.
- **US\$25 referral coupon:** Newly elevated Senior members are encouraged to find the next innovators of tomorrow and invite them to join IEEE. Invite them to join and the new IEEE member will receive \$25 off their first year of membership.

Jason Geng
VP for Membership
jason.geng@ieee.org



IEEE Medal for Environmental and Safety Technologies

RECOGNIZING THE EXTRAORDINARY

Nomination Deadline:
1 July (Annually)

Selection criteria include:

- (a) Public benefits of the contribution
- (b) Degree in improvement in important performance metrics
- (c) Innovative design, development, or application engineering
- (d) favorable influence on the contribution on technical professions



For outstanding accomplishments in the application of technology in the fields of interest to IEEE that improve the environment and/or public safety.

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

PRESENTED TO - An individual or team, up to three in number

PRIZE - Recipient will receive a gold medal, a bronze replica, certificate, and USD20,000 honorarium shared equally among all recipients

SPONSORS – Toyota Motor Corporation

Nomination guidelines and forms can be downloaded from the IEEE Awards Web site at:

<http://www.ieee.org/about/awards/medals/envsaf.html>



2012 IEEE Vehicular Networking Conference (VNC2012) - Report

By Onur Altintas
VNC 2012 General Co-chair

The Fourth IEEE Vehicular Networking Conference (IEEE VNC 2012) was held in Seoul, Korea on November 14-16, 2012 at the Conference Center of Yonsei University. Vehicular Networking Conference, which started in Tokyo in 2009, has been moving among the continents since then. With the 2012 edition, we successfully completed VNC's first world tour in Seoul.

VNC has been a unique conference sponsored by both the Intelligent Transportation Systems Society and the Communications Society of IEEE. It brings together these distinct communities to facilitate learning and to benefit from each others' experience in the respective fields. Despite the fact that VNC concentrates on a single and relatively narrow subject area, i.e., vehicular networking, the conference every year brings together a fairly large audience.

In the 2012 edition, the conference received 78 submissions of which 25 were accepted for the main technical program. Ten submissions were accepted as work in progress for the poster session. We also held a demo session in which five interesting demonstrations were displayed. Our Technical Program Committee co-chairs, Frank Kargl, Falko Dressler, Elmar Schoch, Jong-Moon Chung, and Giovanni Pau worked diligently to make VNC 2012 program another high quality one. Special thanks go to Jong-Moon Chung of Yonsei University. In addition to being one of our TPC co-chairs, he tirelessly handled every detail of the local organization flawlessly. We would also like to acknowledge our platinum sponsor Toyota InfoTechnology Center, as well as our Korean sponsors Yonsei University, u-Office Wireless Network and Research Center, and KAIST-IREC.

As for the program, besides the papers, posters and demos, we invited Prof. Marco Gruteser of Winlab, Rutgers University, who presented the first keynote of the conference. Prof. Gruteser's talk focused on visual communications as part of vehicle-to-vehicle (V2V) communications. Our second keynote speaker was Dr. Andre Weimerskirch of ESCRYPT who gave us an overview of the security and privacy challenges in the V2V deployment from the perspective of US and European automakers and policymakers. On the third day, Dr. Hyun Seo Oh of ETRI presented an overview of V2X communications technology and applications in Korea.

Paper presentations and attendee demography covered a wide range of countries, including Austria, Croatia, Cyprus, France, Germany, Italy, Japan, Korea, Luxemburg, The Netherlands, Portugal, Singapore, Sweden, Turkey and USA.

The conference covered the entire area of topics in vehicular networking; such as protocols, applications, wireless channel modeling, data dissemination, privacy and security, as well as new evaluation and simulation methods.

The conference web site is at <http://www.ieee-vnc.org/2012/>



Venue (Yonsei University Conference Center)



Opening Session



Conference Banquet

On behalf of the VNC 2012 general co-chairs, Wai Chen, Geert Heijenk, and Hyun Seo Oh, I would like to thank for the support of ITSS as well as that of ComSoc throughout the years. Finally, I would like to encourage more participation from the ITSS community, either by submitting papers, by organizing panels and invited sessions or simply by attending the conference. The next VNC will be held in Boston, on October 23-25, 2013.

Onur Altintas
VNC 2012 General Co-chair

2012 IEEE ITS Conference (ITSC2012) - Student Activities Report

By Brendan Morris
Chair of Student Activities Committee

The 2012 Intelligent Transportation Systems Conference (ITSC) began what will hopefully become a new conference tradition, sponsored Student Activities. Thanks to the generous support of the IEEE Intelligent Transportation Systems Society (ITSS), the conference hosted two separate events specifically for students. The first event was a full day glacier sight-seeing tour and the second was a bike ride. These events were designed to give students an opportunity to network with their colleagues, greater student involvement in the society, and to enjoy the natural beauty of Alaska. The students who took advantage of the sponsored activities came from diverse backgrounds, as is expected from the society's flagship conference. They are studying topics such as network simulation, travel time estimation, data mining for predictive maintenance, mobile communication, and driving simulation and represented a number of countries, including France, Germany, Portugal, Sweden, Spain, and the United States.

Glacier Tour



A full day glacier site-seeing tour was scheduled for the Saturday before the start of the conference. Conference attendees were offered discounted rates on boat tours of the majestic glaciers of the Prince William Sound. The society provided the students free ground transportation to Whittier with a narrated coach tour along the scenic Seward Highway. The charter provided morning pickup from the Anchorage Hilton with narration and picture stops at Beluga Point, Girdwood Station and Portage Glacier Valley. The trip to Whittier took the group through the Anton Anderson Memorial Tunnel, the longest highway tunnel in North America, before dropping off the passengers in the tiny town of Whittier where the 26 Glacier Cruise adventure began.



The Phillips 26 Glacier Cruise took passengers across Prince William Sound to see a number of Alaska's famed glaciers. The cruise was narrated by a Chugach National Forest Service Ranger to provide an insider's view of the area and to teach all about the natural history of the area. The day turned out to be a very cold one. The rain came down and came down hard for most of the day, but everyone was still happy. The inside of the ship was warm with plenty of hot coffee and tea as well as a meal of fish and chips to keep us energized for the tour of all the glaciers. During the cruise, we caught glimpses of a bald eagle, seals, and a number of playful otters. Due to weather conditions, the full 26 glacier route was not feasible but still we were given plenty of opportunity to see the glaciers up close. Thanks to the overcast conditions, we actually were able to get beautiful deep blue reflections off the ice.



Anchorage Bike Ride



The second Student Activity, on the final day of the conference, was a scenic bicycle tour of Anchorage. The Tony Knowles Coastal Trail is known as the best way to experience Anchorage. The paved trail follows the water line past the airport into the wilderness and provides the best opportunity to encounter wildlife.



Unfortunately, the Wednesday of the bike ride was again another cold and wet day. Still, 10 souls layered their warmest clothes and braved the elements. Each attendee checked out a bike and was given a pair of blue rubber gloves, obtained from the local surplus store. These gloves ensured nobody lost any fingers from the cold. The riders set off along the trail, rolling through the rain and large puddles. The ride was cold and damp but it was all worth the discomfort when we encountered a bull moose just beyond the airport. After seeing the king of the Anchorage wild we knew we had seen what we wanted and headed back home to the warmth of the hotel.



Conclusion

Despite the uncooperative weather, the Student Activities were a great success. 20 people were able to go out and explore the beauty of Alaska and develop new friendships. In fact, many of Glacier Cruise attendees could be seen together at every break and lunch hour of the conference. The supported activities, along with registration discounts, will undoubtedly improve student involvement in and ensure we have plenty of fresh faces in the society for years to come.

Acknowledgements

This year's student activities would not have been possible without the generous support of the IEEE ITSS. We are indebted to Jason Geng, VP of Member Activities, who has been a champion for student involvement in ITSS. A special thank you goes to Jeffrey Miller, University of Alaska, Anchorage, who created the Chair of Student Activities position and was instrumental in the execution of the activities. As chair of ITSC2012, he was committed to providing a spectacular experience for all attendees.

Brendan Morris
Chair of Student Activities Committee
Assistant Professor
University of Nevada, Las Vegas

16th International IEEE Conference on Intelligent Transportation Systems **Intelligent Transportation Systems for All Transportation Modes**

The IEEE Conference on Intelligent Transportation Systems is the annual flagship conference of the IEEE Intelligent Transportation Systems Society. IEEE-ITSC2013 welcomes articles in the field of Intelligent Transportation Systems, conveying new developments in theory, analytical and numerical simulation and modeling, experimentation, advanced deployment and case studies, results of laboratory or field operational tests.

The theme of the IEEE-ITSC2013 conference is Intelligent Transportation Systems for All Transportation Modes. Major advances in information and communication technology are enabling a vast array of new possibilities in transportation. ITS are emerging worldwide to make transportation more efficient, reliable, cleaner and safer. ITS are used in road, water, rail and air transportation to collect information about transportation flows from a multitude of sources and manage them effectively, shifting collective traffic and transportation management paradigms towards end user orientation.

Organizing committee

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Bart van Arem

General Co-Chair

Hans van Lint

Program Chair

Andreas Hegyi

Program Co-Chair

Bart De Schutter

Special Sessions Chair

Alfredo Núñez

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Vincent Marchau

Local Arrangements and Registration Chair

Nicole Fontein

Local Arrangements and Registration Co-Chair

Charelle Heuser

Regional Program Chairs

Matthew Barth (America)

Shunsuke Kamijo (Asia/ Australia)

Miguel Angel Sotelo (Europe)

Program Topics

The technical areas include but are not limited to the following:

- Multi-modal ITS
- Advanced Public Transportation Management
- Ports, Waterways, Inland navigation, and Vessel Traffic Management
- Modeling, Simulation, and Control of Pedestrians and Cyclists
- Air, Road, and Rail Traffic Management
- ITS User services
- Emergency Management
- Transportation Networks
- Emissions, Noise, Environment
- Management of Exceptional Events: Incidents, Evacuation, Emergency Management
- Security Systems
- Safety Systems
- Driver and Traveler Support Systems
- Commercial Vehicle Operations
- Intelligent logistics
- Sensing and Intervening, Detectors and Actuators
- Data Management Systems
- Communication in ITS
- Cooperative Techniques and Systems
- Intelligent Vehicles
- Vision, and Environment Perception
- Electric Vehicle Transportation Systems
- Electronic Payment Systems
- Intelligent Techniques in ITS
- Traffic Theory for ITS
- Modeling, Control and Simulation
- Human Factors, Travel Behavior
- ITS Field Tests and Implementation

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.

Special Sessions, Tutorials, and Workshops

Special session organization is encouraged. Proposals for workshops, tutorials, and special sessions should be submitted via the conference submission website.

Best Paper Award and Best Student Paper Award

A "Best Paper Award" and a "Best Student Paper Award" will be conferred to the author(s) of a full paper presented at the conference, selected by the Awards Committee. The "Best Student Paper Award" will be given to a paper of which the first author is an MSc or PhD student.

Journal and Magazine Publication of Selected Papers

Selected papers of exceptional quality will be invited for submission to a special issue of the IEEE Transactions on Intelligent Transportation Systems or the IEEE Intelligent Transportation Systems Magazine. Authors will be asked to revise their papers according to the standards of the Transactions or the Magazine. The papers will be subject to the Transactions' and Magazine's review process.

Important Dates

Special session proposal submission deadline: February 25, 2013

Full paper submission deadline: March 15, 2013

Workshop/tutorial proposal submission deadline: May 1, 2013

Notification of acceptance: June 1, 2013

Final paper submission deadline: July 1, 2013



Gemeente Den Haag



ICIRT 2013 Call for Papers

2013 IEEE International Conference on Intelligent Rail Transportation

Advisory Chairs:

Ruwei Dai, China
Youxian Sun, China
Yongfu Sun, China

General Chairs:

Bin Ning, China
Feiyue Wang, China

Program Committee Chair:

Tao Tang, China

Organizing Committee Chairs:

Zujun Yu, China
Baigen Cai, China

General Secretary:

Hairong Dong, China

Publications Chair:

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Ali Hessami, UK
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Feiyue Wang, China
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Guanrong Chen, Hongkong
Jaime Tamarit, Spain
Jian Chu, China
Lihua Xie, Singapore
Masayuki Matsumoto, Japan
Ulrich Weidmann, Switzerland
Xiaohua Xia, South Africa
Ziyong Gao, China

Organizing Committee:

Yue Ma, China
Xubin Sun, China
Wei Shangguan, China
Fang Cao, China
Hongxia Zhao, China

Registration Chairs:

Shigen Gao, China
Xiaoxia Yang, China

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



Conference on Agent-Based Modeling in Transportation Planning and Operations

September 30-October 2, 2013

The Inn at Virginia Tech and Skelton Center

Conference Website: <http://www.cpe.vt.edu/abmconf/index.html>

-Call for Abstracts-

(Qualified papers will be published in a special issue of *Transportation Journal: Part C*)

General Information

The Conference on Agent-Based Modeling in Transportation Planning and Operations provides an international forum on the latest technical developments and research in the field of transportation planning and operations using agent-based approaches. Researchers, academicians, practitioners, and industry and government agencies are invited to this conference to discuss their research and applications pertaining to agent-based modeling in transportation planning and operations. The conference is supported by the Mid-Atlantic University Transportation Center Program and by Virginia Tech.

Conference Objectives

The conference has the following objectives:

- Present the current state of the art/science in agent-based modeling in transportation.
- Provide the lessons learned from the current research efforts in this field.
- Define where the future lies in this type of modeling effort and what steps and research agendas need to be taken to ensure its success.

Conference Topics

Topics of interest in agent-based modeling include but are not limited to:

- Developing the daily activities of travelers
- Spatial markets simulations (housing, demographics, firm-graphics)
- Routing of travelers in a dynamic traffic simulation
- Large scale microscopic traffic simulations
- Impact of hybrid and plug-in-electric vehicles on mode choice and transportation system performance
- Integrated Transportation Planning and Operations Applications
- Traveler willingness to pay for toll roads/HOT lanes
- Evacuation planning and emergency management
- Acceleration and braking behaviors of individual drivers
- Car following and lane changing behaviors in traffic models
- Aggressive vs. defensive drivers in the context of eco-driving
- Driver behavior in the environment of co-operative vehicle-highway systems
- Modeling heterogeneous vehicle to vehicle networks including driverless fleets
- Applications in freight transportation modeling

Submission Guidelines, Important dates, and Registration

The submitted abstracts should be between 1,000 words and 2,500 words in length. Authors should submit their contributions electronically in PDF format at:

<http://www.manager.cpe.vt.edu/conferenceDisplay.py?confld=5>

Technical questions regarding abstracts should be directed to:

Dr. Antoine Hobeika, Conference Chair

Email: Hobeika@vt.edu

Phone: 540-231-7407

Submission process and registration questions should be directed to:

Holly Williams

Continuing and Professional Education

Email: hmccall@vt.edu

Phone: 540-231-2188

The important dates for submission are:

Abstract submission is due on : March 8, 2013

Notification of acceptance : May 24, 2013

Final revised submission : August 2, 2013

Please visit the following website to register: <http://www.cpe.vt.edu/abmconf/registration.html>

Proceedings and Publications

All abstracts accepted for the conference will be included in the conference proceedings that will be compiled on a flash drive and be given to all participants at the time of registration.

Authors of selective outstanding abstracts will be asked to submit full papers to be considered for publication in the special issue of Transportation Research: Part C dedicated for this conference. In preparing their final manuscript, invited authors should follow the paper submittal guidelines for the Transportation Research: Part C.

The chief editor of this special issue of Transportation Research-C is Lei Zhang from University of Maryland. The co-editors are: Hesham Rakha from Virginia Tech, Monty Abbas from Virginia Tech, and Eric Miller from University of Toronto.

Conference Organization

I) Conference Chairmen:

Antoine G. Hobeika, Dept. of CEE, Virginia Tech

Hesham Rakha, Dept. of CEE/VTTI, Virginia Tech

II) Organizing Committee

Ihab El-Shawarby, Virginia Tech

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Venky Shankar, Penn State University

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Eric J. Miller, University of Toronto, Canada

Kai Nagel, Technical University of Berlin, Germany

IEEE Intelligence and Security Informatics (ISI) 2013

Call for Papers and Workshop Proposals

June 4-7, 2013, Seattle, WA, USA

THEME: Big Data, Emergent Threats and Decision-Making in Security Informatics

HOST: Pacific Northwest National Laboratory (PNNL)

Conference website: <http://ISIconference2013.org>

Intelligence and Security Informatics (ISI) is an interdisciplinary research field involving researchers in information technologies, computer science, public policy, bioinformatics, and social and behavior studies as well as local, state, and federal law enforcement and intelligence experts, and information technology industry consultants and practitioners to support counter-terrorism and homeland security missions of anticipation, interdiction, prevention, preparedness and response to terrorist acts. The annual IEEE International ISI Conference series was started in 2003. ISI 2013 will feature invited talks by and panels with representatives of government agencies including IARPA, DHS and FBI.

IMPORTANT DATES

Paper submission due date: *Feb 15, 2013*

Notification of acceptance: *Mar 18, 2013*

Due date for workshop proposals: *Feb 18, 2013.*

The ISI 2013 conference program will feature three main topic streams focusing on
Big Data in Security Informatics
Emergent Threats
Decision-Making in Security Informatics.

PAPER SUBMISSION

Submission file formats are PDF and Microsoft Word. Required Word/LaTeX templates (IEEE two-column format) can be found at the conference Web site. Submissions can be long (6,000 words, 6 pages max) or short (3000 words, 3 pages max). Papers in English must be submitted electronically via the conference Web site. The accepted papers from ISI 2013 and its affiliated workshops will be published by the IEEE Press in formal Proceedings. Conference content will be submitted for inclusion into IEEE Xplore as well as other Abstracting and Indexing (A&I) databases. Authors who wish to present a poster and/or demo may submit a 1-page extended abstract, which, if selected, will appear in Proceedings. The selected IEEE ISI 2013 best papers will be invited for contribution to the Springer Security Informatics journal.

Paper submission instructions and template information can be found on the submissions page at <https://www.easychair.org/conferences/?conf=ieeeisi2013>. Submissions may include papers on systems, methodology, test-bed, modeling, evaluation, and policy. Research should be relevant to informatics, organization, or public policy in applications of counter-terrorism or protection of local/national/international security in the physical world or cyberspace.

Best papers awards will be given in three categories:

- Best paper
- Runner-up paper
- Best student paper.

WORKSHOPS

In conjunction with ISI 2013, several workshops will be held on June 4, 2013. Special-topic workshops in any areas of Intelligence and Security Informatics research and practice are welcome. Such events will be an integral part of the ISI-2013 conference program. Proposals in PDF or Microsoft Word not exceeding 3 pages should be emailed to the conference organizing committee at antonio@pnnl.gov by February 18, 2012 and contain the following information.

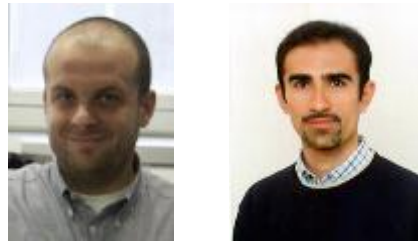
- Title of tutorial/workshop
- Preferred duration (half day vs. full day)
- Brief bios of proposed organizer(s)
- Objectives to be achieved.

GENERAL CO-CHAIRS

Antonio Sanfilippo, PNNL, USA

Anne Kao, Boeing, USA

Michael Gabbay, University of Washington, USA



Conference Calendar

Massimo Bertozzi / Paolo Grisleri

Conference Calendar

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

2013

February 2-3

2nd International Conference on Traffic and Transportation Engineering

Male, Maldives

<http://www.ictte.org>

February 20-21

V2X for Auto Safety and Mobility Europe 2013

Frankfurt, Germany

<http://www.telematicsupdate.com/vehicle-to-vehicle-conference-europe/index.php>

February 21-23

VISIGRAPP Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications

Barcelona, Spain

<http://www.visigrapp.org/>

March 12-14

5th Russian International Congress on Intelligent Transport Systems

Moscow, Russia

<http://expottraffic.com>

March 28-29

International Conference on Transportation Engineering and Management (ICTEM 2013)

International Conference on Sustainable Urban Transport and Environment (ICSUTE 2013)

International Conference on Urban, Regional Planning and Transportation (ICURPT 2013)

Madrid, Spain

Submissions due by: February 20

<https://www.waset.org/conferences/2013/madrid/ictem/>

<https://www.waset.org/conferences/2013/madrid/icsute/>

<https://www.waset.org/conferences/2013/madrid/icurpt/>

April 16-18
SAE 2013 World Congress
Detroit, Michigan, USA
<http://www.sae.org/congress/>

April 22-24
ITS America Annual Meeting and Exposition
Nashville, TN, USA
<http://itswc.confex.com/itswc/AM2013/cfp.cgi>

May 6-10
2013 IEEE International Conference on Robotics and Automation (ICRA 2013)
Karlsruhe - Germany
<http://www.icra2013.org/>

May 27-31
IEEE International Symposium on Industrial Electronics (ISIE 2013)
<http://www.isie2013.org/>

June 2-5
IEEE Vehicular Technology Conference: VTC2013-Spring
Dresden, Germany
<http://www.ieeevtc.org/vtc2013spring/index.php>

June 4-7
9th ITS European Congress
Dublin, Ireland
Submissions due by: January 14
<http://itsineurope.com/its9/>

June 23-26
The 2013 IEEE Intelligent Vehicles Symposium
Submissions due by: January 5
Gold Coast, Australia
<http://www.iv2013.org/>

June 27-28
ICIAP 2013 : International Conference on Image Analysis and Processing
Naples, Italy
Submissions due by: March 31
<http://www.iciap2013-naples.org/>

June 26-28
IFAC Intelligent Autonomous Vehicles Conference IAV'13
Gold Coast, Australia
Submissions due by January 6
<http://www.iav2013.org>

June 23-28
26th IEEE Conference on Computer Vision and Pattern Recognition (CVPR 2013)
Portland OR, USA
<http://www.pamitc.org/cvpr13/>

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

August 24-27
National Rural ITS Conference
St. Cloud, MN, USA
<http://www.nritsconference.org/>

August 28-30
2013 IEEE Multi-Conference on Systems and Control (MSC)
Hyderabad, India
Submissions due by: February 15
<http://msc2013.org>

September 1-4
IEEE Vehicular Technology Conference: VTC2013-Fall
Las Vegas, NV, USA
Submission due by: February 1
<http://www.ieeevtc.org/vtc2013fall/>

September 5-6
ICCARV 2013: International Conference on Control, Automation, Robotics and Vision
Luzern, Switzerland
Submission due by: May 31
<https://www.waset.org/conferences/2013/luzern/iccarv/>

September 6-9
IEEE Intelligent Transportation Systems Conference
Submission due by: March 15
The Hague, The Netherlands
<http://ieee-itsc13.org>

September 25-27
International Conference on Sustainable Automotive Technologies
Ingolstadt, Germany
<http://www.icsat2013.com>

October 14-18
20th World Congress on ITS
Tokyo, Japan
<http://www.itsworldcongress.jp>

November 3-7
IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2013)
Tokyo Big Sight, Tokyo, Japan
<http://www.iros2013.org>

November 9-13
17th IRF World Meeting and Exhibition
Riyadh, Saudi Arabia
Submission due by: April 15
http://irfnews.org/files/pdfs/121016_IRF_bro_H_WEB.pdf

2014

November 20-21, 2014
ICIAP 2014: International Conference on Image Analysis and Processing
Capetown, South Africa
Submissions due by: April 30, 2014
<https://www.waset.org/conferences/2014/capetown/iciap/>

Abstracts of forthcoming papers on IEEE Transactions on ITS

A LEGAL SAFETY CONCEPT FOR HIGHLY AUTOMATED DRIVING ON HIGHWAYS

VANHOLME, BENOIT; GRUYER, DOMINIQUE; LUSETTI, BENOIT; GLASER, SÉBASTIEN; MAMMAR, SAID

This paper discusses driving system design based on traffic rules. This allows fully automated driving in an environment with human drivers, without necessarily changing equipment on other vehicles or infrastructure. It also facilitates cooperation between driving system and host driver during highly automated driving. The concept, referred to as legal safety, is illustrated for highly automated driving on highways with distance keeping, intelligent speed adaptation and lane changing functionalities. Requirements by legal safety on perception and control components are discussed. The paper presents the actual design of a legal safety decision component, which predicts object trajectories and calculates optimal subject trajectories. System implementation on automotive Electronic Control Units (ECUs) and results on vehicle and simulator are discussed.

ON SECURE VANET-BASED AD DISSEMINATION WITH PRAGMATIC COST AND EFFECT CONTROL

LI, ZHENGMING; LIU, CONGYI; CHIGAN, CHUNXIAO

Allowing commercial service providers to promote their businesses, ad dissemination in vehicular ad hoc networks (VANETs) shows great application potentials. In this paper, a VANET-based ambient ad dissemination scheme, VAAD, is proposed to support secure ad disseminations with pragmatic cost and effect control. VAAD provides an incentive-centered architecture for the involved parties to trade off their conflicting requirements regarding ad dissemination. Given realistic advertising effect and cost requirements of a service provider, VAAD adopts a distance-based gradient ad dissemination algorithm to maximize the achievable ad effect by emulating the ad posting patterns in the physical world. To facilitate vehicular nodes' participation in VAAD, efficient, secure and privacy-preserving incentive cash-in is ensured to support financial transactions in VAAD. Thus, with proper cost and effect control, VAAD is a novel and comprehensive solution to secure ad dissemination in VANETs.

CHANGES IN THE CORRELATION BETWEEN EYE AND STEERING MOVEMENTS INDICATE DRIVER DISTRACTION

YEKSHATYAN, LORA; LEE, JOHN

Driver distraction represents an increasingly important contributor to crashes and fatalities. Technology that can detect and mitigate distraction by alerting distracted drivers could play a central role in maintaining safety. Based on either eye measures or driver performance measures, numerous algorithms to detect distraction have been developed. Combining

both eye glance and vehicle data could enhance distraction detection. The goal of this study is to evaluate whether changes in the eye-steering correlation structure can indicate distraction. Drivers performed visual, cognitive, and cognitive/visual tasks while driving in a simulator. The auto and cross correlation of horizontal eye position and steering wheel angle show that eye movements associated with road scanning produce a low eye-steering correlation. However, even this weak correlation is sensitive to distraction: time lead associated with the maximum correlation is sensitive to all three types of distraction and the maximum correlation coefficient is most strongly affected by off-road glances. These results demonstrate that eye-steering correlation statistics can detect distraction and differentiate between types of distraction.

AUGMENTED REALITY EXPERIMENT: DRIVER BEHAVIOR AT UNSIGNALIZED INTERSECTION

HUSSAIN, KHALED; RADWAN, ESSAM; MOUSSA, GHADA

Applying new technologies into traffic engineering studies became an urge with the high cost and risk accommodated with ordinary in-field testing. Augmented reality “AR” is one of those technologies, in which virtual (computer-generated) objects are added to the real scene in a way that the user cannot distinguish between real and virtual objects in the final scene. Adding virtual objects (people, vehicles, hazards, and other objects) to the normal view can provide a safe realistic environment for testing driving performance under different scenarios. This paper presents two systems; AR Vehicle “ARV” and Offline AR Simulator “OARSim” and using them to study left-turn driver behavior at unsignalized intersection for different driver characteristics. Two experiments were performed; one using ARV system installed in a vehicle and one using OARSim system installed in the laboratory. Quantitative measurements of left-turn drivers’ behaviours were recorded. There was no significant gender effect on all measured parameters in both experiments. Older drivers selected larger gaps and used smaller acceleration rates to turn left than younger drivers in both experiments. The conservative driving attitude of older drivers indicates the potential presence of reduced driving ability of elderly. While left-turn times using ARV weren’t significantly affected by drivers’ age, older drivers took longer time to complete the left-turn maneuver than younger drivers using the OARSim. Results from this study supported the feasibility and validity of proposed systems and showed promise for these systems to be used as surrogates to in-field testing for safety and operation aspects of transportation research.

SINGLE TRAIN TRAJECTORY OPTIMISATION

LU, SHAOFENG; HILLMANSEN, STUART; HO, TIN KIN; ROBERTS, CLIVE

An energy-efficient train trajectory describing the motion of a single train can be used as an input to a driver guidance system or to an automatic train control system. The solution for the best trajectory is subject to certain operational, geographic and physical constraints. There are two types of strategies commonly applied to obtain the energy efficient trajectory. One is to allow the train to coast, thus using its available time margin to save energy. The other one is to control the speed dynamically while maintaining the required journey time. This paper proposes a distance based train trajectory searching model, upon which three optimisation algorithms are applied to search for the optimum train speed trajectory. Instead of searching for a detailed complicated control input for the train traction system, this model tries to obtain the speed level at each preset position along the journey. Three commonly adopted algorithms are extensively studied in a comparative style. It is found that the Ant Colony Algorithm (ACO) obtains better balance between stability and the quality of the results, in comparison to Genetic Algorithm (GA). For off-line applications, the additional

computational effort required by Dynamic Programming (DP) is outweighed by the quality of the solution. It is recommended that multiple algorithms should be used to identify the optimum single train trajectory and to improve the robustness of searched results.

RAILROAD TRACK INSPECTION USING COMPUTER VISION

RESENDIZ, ESTHER; HART, JOHN; AHUJA, NARENDRA

Thousands of miles of railroad track must be inspected twice weekly by a human inspector to maintain safety standards. A computer vision system, consisting of field-acquired video and subsequent analysis, could improve the efficiency of the current methods. Such a system is prototyped, and the following challenges are addressed: the detection, segmentation, and defect assessment of track components whose appearance vary across different track and the identification and inspection of special track areas such as track turnouts. An algorithm is developed which utilizes the periodic manner in which track components repeat in an inspection video. Spectral estimation and signal-processing methods are used to provide robust detection of the periodically occurring track components. Results are demonstrated on field-acquired images and video.

INTEGRATED MODEL PREDICTIVE TRAFFIC AND EMISSION CONTROL USING A PIECEWISE-AFFINE APPROACH

GROOT, NOORTJE; DE SCHUTTER, BART; HELLENDOORN, HANS

This paper addresses the computational intractability of traffic control when applying the integrated METANET freeway traffic model and the VT-macro emission model in a model-based predictive control (MPC) framework. In order to facilitate real-time implementation, a piecewise-affine (PWA) approximation of the nonlinear METANET model is proposed. While a direct MPC approach based on the full PWA model is intractable for on-line applications, a conversion to a mixed-logical dynamic (MLD) model description is made instead. The resulting MLD-MPC problem, written as a mixed-integer linear program, can be solved much more efficiently as it does not explicitly state all model equations for each particular region. As a benchmark, the computational efficiency and accuracy of the MLD-MPC approach is tested on a case study including variable speed limits and a metered on-ramp while optimizing the total time spent, as well as taking into account emissions and fuel consumption of the vehicles. The performance is evaluated against the original nonlinear and nonconvex MPC problem and shows an improved computational speed at the cost of some deviation in the cost function values.

A PROBABILISTIC FRAMEWORK FOR DECISION-MAKING IN COLLISION AVOIDANCE SYSTEMS

BRÄNNSTRÖM, MATTIAS; SANDBLOM, FREDRIK; HAMMARSTRAND, LARS

This paper is concerned with the problem of decision-making in systems that assist drivers in avoiding collisions. An important aspect of these systems is not only to assist the driver when needed, but also not to disturb the driver with unnecessary interventions. Aiming at improving both of these properties, a probabilistic framework is presented for jointly

evaluating the driver acceptance of an intervention and the necessity thereof to automatically avoid a collision. The intervention acceptance is modeled as high if it estimated that the driver judges the situation as critical, based on the driver's observations and predictions of the traffic situation. One advantage with the proposed framework is that interventions can be initiated at an earlier stage when the estimated driver acceptance is high. Using a simplified driver model, the framework is applied to a few different types of collision scenarios. The results show that the framework has appealing properties, both with respect to increasing the system benefit and to decreasing the risk of unnecessary interventions.

DEMONSTRATION OF IN-CAR DOPPLER LASER RADAR AT 1.55MM FOR RANGE AND SPEED MEASUREMENT

MAO, XUESONG; INOUE, DAISUKE; MATSUBARA, HIROYUKI; MANABU, KAGAMI

Laser radar provides better spatial resolution than millimeter wave radar due to the high directivity of the laser beam. However, commercial in-car laser radar approximates the target speed by a range differentiation method, which has disadvantages in that it is both time consuming and introduces large errors. In this paper, a new Doppler laser radar scheme for simultaneously measuring the target range and speed for in-car applications is proposed. The scheme includes a new laser radar architecture, a new method for modulating the transmitted signal and a method for calculating the range and speed from the signal returned from the target. The length of the transmitted signal is several microseconds, giving the possibility of realizing a high scan speed for in-car applications. Simulations based on Simulink/Matlab were carried out to validate the proposed scheme. In addition, an experimental demonstration of the simultaneous measurement of range and speed was performed. The moving target in the experiment was a sheet with a high reflection coefficient attached to an electric grinder.

STOCHASTIC APPROACH FOR SHORT-TERM FREEWAY TRAFFIC PREDICTION DURING PEAK PERIODS

QI, YAN; ISHAK, SHERIF

Using a stochastic approach, this study explored and modeled the basic stochastic characteristics of freeway traffic behavior under a wide range of traffic conditions during peak periods and then applied the models to short-term traffic speed prediction. The speed transition probabilities were estimated from real world 30-second speed data over a 6-year period at three different locations along the 38-mile corridor of I-4 in Orlando, Florida. The cumulative negative/positive transition probabilities and expected values were derived from the transition probabilities and fitted using logistic and exponential models, respectively. The expected values associated with the most likely transition of speed were then derived from the fitted models and used for predicting speed. Each predicted speed was also associated with a probability value indicating the chance of observing the occurrence of such transition. The prediction performance was compared for three methods using the Root Mean Square Errors (RMSE). The weighted average method was very close to the higher-probability method in most cases. For the two probabilistic methods, the performance was slightly better for the morning peak periods than the evening peak period or all data combined. While the prediction performance of the probabilistic models was comparable to those of other methods found in the literature, the probabilistic approach based on the higher probability provides estimates of the associated probability with each prediction. This provides a measure of confidence in the predicted values before such information is disseminated to the public by traffic agencies.

RANDOM WALKER MONOCULAR ROAD DETECTION IN ADVERSE CONDITIONS USING AUTOMATED SPATIOTEMPORAL SEED SELECTION

SIOGKAS, GEORGE; DERMATAS, EVANGELOS

A key module of modern Advanced Driver Assistance Systems is the road detector, which has to be robust even in adverse conditions. The ultimate goal of such a system that uses only visual information acquired from a color video camera, is to classify each frame pixel as belonging to the road or not. In this direction, this paper proposes a new fully automatic algorithm which combines both time and spatial information using the efficient Random Walker Algorithm as a segmentation tool. A novel technique for automatic seeds selection is proposed, utilizing features derived from a shadow-resistant optical flow estimator using the c1 channel of the c1c2c3 color space, along with a-priori information and previous frame segmentation results. The proposed system is qualitatively assessed using video sequences in both typical and adverse conditions, including heavy traffic, shadows, tunnels, rain, night, etc. It is also quantitatively compared to previous efforts on a publicly available, manually annotated, on-board video database, providing superior results.

PERFORMANCE-BASED CLASSIFICATION OF OCCUPANT POSTURE TO REDUCE THE RISK OF INJURY IN A COLLISION

UNTAROIU, COSTIN; ADAM, THOMAS

This study investigates numerically the development of an adaptive restraint system based on pre-crash classification of occupant posture. A catalog of restraint laws optimized for nine postures uniformly distributed in posture space is employed. First, the performance of each restraint law is assessed globally by performing crash simulations in a parametric fashion throughout the entire posture space. Then, restraint systems with catalogs (RSC) with various numbers of restraint laws are evaluated in terms of injury cost with respect to a restraint system optimized with respect to a nominal posture (RSN). Parametric and nonparametric supervised classifiers are developed for each catalog and their performances are analyzed. A catalog with the optimized laws of two out-of position postures (central and leaning left) showed high performance in terms of reduced injury cost with respect to optimum performance for two distinct validation sets (25.3%/21.6% with statistical classifiers vs. 26%/23.8% optimum performance). The percent injury reduction increased as the number of classes was increased, but had diminishing returns going from five to nine restraint laws (28%/24.2% with statistical classifiers vs. 30.4%/29.1% optimum reduction). The results of this study indicated that restraint systems with performance-based classes have higher performance than restraint systems with region-based classes. Expanding the number of restraint laws and developing new classification algorithms may further improve the performance of adaptive restraint systems.

POTENTIAL ACCURACY OF TRAFFIC SIGNS' POSITIONS EXTRACTED FROM GOOGLE STREET VIEW

YAN, WAI YEUNG; SHAKER, AHMED; EASA, SAID

This research work demonstrates the potential use of Google Street View (GSV) in engineering measurements. An investigation was conducted to assess the geo-positioning accuracy of traffic signs extracted from GSV. Direct linear

transformation (DLT) model is used to establish the relationship between the GSV image coordinate system and the ground coordinate system with the aid of ground control points (GCPs). The ground coordinates of the traffic sign can be retrieved by using the solved DLT coefficients. It is found that the root mean-squared error (RMS) of the extracted traffic sign's location is less than 1 m in general. By increasing the number of GSV images and GCPs, the RMS error can be further reduced to 0.5 m or less. This preliminary study demonstrates a viable solution to extract the location of traffic signs from GSV.

A GENETIC PROGRAMMING MODEL FOR REAL TIME CRASH PREDICTION ON FREEWAYS

XU, CHENGCHENG; WANG, WEI; LIU, PAN

The study presented in this paper aimed to evaluate the application of genetic programming (GP) model for real time crash prediction on freeways. Traffic data, weather data and crash data used in this study were obtained from the I-880N freeway in California, United States. The random forest (RF) technique was conducted to select the variables affecting crash risk under uncongested and congested traffic conditions. The GP model was developed for each traffic state based on the candidate variables selected by the RF technique. The traffic flow characteristics contributing to crash risk were found to be quite different between congested and uncongested traffic conditions. This study applied the receiver operating characteristic (ROC) curve to evaluate the prediction performance of the developed GP model for each traffic state. The validation results showed that the prediction performance of the GP models were satisfactory. The binary logit model was also developed for each traffic state using the same training dataset. The researchers compared the ROC curve of the GP model and binary logit model for each traffic state. The GP model produced better prediction performance than did the binary logit model for each traffic state. The GP model was found to increase the crash prediction accuracy under uncongested traffic conditions by an average of 8.2%, and to increase the crash prediction accuracy under congested traffic conditions by an average of 4.9%.

ENERGY-EFFICIENT WIRELESS MAC PROTOCOLS FOR RAILWAY MONITORING APPLICATIONS

G M, SHAFIULLAH; SALAHUDDIN, AZAD; ALI, SHAWKAT

Recent advances in wireless sensor networking (WSNs) techniques encouraged interest in the development of vehicle health monitoring (VHM) systems. These have the potential to be used for the monitoring of railway signaling systems and the rail tracks. Energy efficiency is one of the most important design factors for the WSNs as the typical sensors nodes are equipped with limited power batteries. In an earlier research [1], an energy-efficient cluster-based adaptive TDMA MAC protocol, named EA-TDMA, has been developed by the authors for the purpose of communication between the sensors placed in a railway wagon. This paper proposes another new protocol, named E-BMA, which achieves even better energy efficiency for low and medium traffic by minimizing the idle time during the contention period. Besides railway applications, EA-TDMA and E-BMA protocols are suitable for generic wireless data communication purposes. Both analytical and simulation results for the energy consumption of TDMA, EA-TDMA, BMA and E-BMA have been presented in this paper to demonstrate the superiority of EA-TDMA and E-BMA protocols.

DYNAMIC JOURNEYING IN SCHEDULED NETWORKS

HÄME, LAURI; HAKULA, HARRI

We study a dynamic journey planning problem for multimodal transportation networks. The goal is to find a journey, possibly involving transfers between different transport modes, from a given origin to a given destination within a specified time horizon. Transport services are represented as sequences of scheduled legs between nodes in the transportation network. Due to uncertainty in transport services, we assume for each pair of adjacent legs i, j a probability of a successful transfer from i to j . If a transfer between two legs is unsuccessful, the customer needs to reconsider the remaining path to the destination. The problem is modeled as a Markov decision process and the main contribution is a backward induction algorithm that generates an optimal policy for traversing the public transport network in terms of a given objective, for example, reliability, ride time, waiting time, walking time or the number of transfers. A straightforward method for maximizing reliability is also suggested, and the algorithms are tested on real-life Helsinki area public transport data. Computational examples show that with a given input, the proposed algorithms rapidly solve the journeying problem.

HEURISTIC ALGORITHMS FOR CONSTRUCTING TRANSPORTER POOLS IN CONTAINER TERMINALS

NGUYEN, VU DUC; KIM, KAP-HWAN

In port container terminals, containers are transported between vessels and storage blocks by transporters. To improve the utilization of transporters as well as the operational efficiency of container terminals, the pooling strategy is widely applied and transporters in the same pool are shared by a group of quay cranes (QCs). This study compares various strategies for constructing the pools: one pool for each QC, one pool for all the QCs deployed to each vessel, one pool for all the QCs for multiple adjacent vessels, and one pool for all the operating QCs in the terminal. Various heuristic algorithms to construct pools of transporters are suggested and evaluated in terms of the total delay time of QC operation and the total travel distance of transporters. Also, opportunities for dual command cycle operation are analyzed for each of these heuristic rules by using different datasets of QC operations. Various scenarios of QC operation are generated, and the heuristic algorithms are compared in terms of their performance through a simulation study.

WEATHER ADAPTIVE TRAFFIC PREDICTION USING NEURO-WAVELET MODELS

DUNNE, STEPHEN; GHOSH, BIDISHA

Climate change is a prevalent issue facing the world today. Unexpected increase in rainfall intensity and events is one of the major signatures of climate change. Rainfall influences traffic conditions and in turn traffic volume in urban arterials. For improved traffic management under adverse weather conditions, it is important to develop traffic prediction algorithm considering the effect of rainfall. This inclusion is not intuitive as the effect is not immediate and the influence of rainfall on traffic volume is often unrecognizable in a direct correlation analysis between the two time-series datasets; it can only be observed at certain frequency levels. Accordingly, it is useful to employ a multiresolution prediction framework to develop a weather adaptive traffic forecasting algorithm. Discrete Wavelet Transform (DWT) is a well-known multiresolution data analysis methodology. However, DWT imparts time-variance in the transformed signal and makes it unsuitable for further time-series analysis. Therefore, the stationary form of DWT known as Stationary Wavelet

Transform (SWT) has been used in this paper to develop a neuro-wavelet prediction algorithm to forecast hourly traffic flow considering the effect of rainfall. The proposed prediction algorithm has been evaluated at two urban arterial locations in Dublin, Ireland. The study shows that the rainfall data successfully augments the traffic flow data as an exogenous variable in periods of inclement weather, resulting in accurate predictions of future traffic flow at the two chosen locations. The forecasts from the neuro-wavelet model outperform the same from the standard Artificial Neural Network (ANN) model.

AUTOMATED REAL-TIME DETECTION OF POTENTIALLY SUSPICIOUS BEHAVIOR IN PUBLIC TRANSPORT AREAS

ELHAMOD, MOHANNAD; LEVINE, MARTIN

Detection of suspicious activities in public transport areas using video surveillance has attracted an increasing level of attention. In general, automated offline video processing systems have been used for post-event analysis, such as forensics and riot investigations. However, very little has been achieved regarding real-time event recognition. In this paper, we introduce a framework that processes raw video data received from a fixed color camera installed at a particular location, which makes real-time inferences about the observed activities. First, the proposed framework obtains three-dimensional object-level information by detecting and tracking people and luggage in the scene using a real-time blob matching technique. Based on the temporal properties of these blobs, behaviors and events are semantically recognized by employing object and inter-object motion features. A number of types of behavior that are relevant to security in public transport areas have been selected to demonstrate the capabilities of this approach. Examples of these are abandoned and stolen objects, fighting, fainting, and loitering. Using standard public datasets, the experimental results presented here demonstrate the outstanding performance and low computational complexity of this approach. We also discuss the advantages over other approaches in the literature.

ACCURATE EGO-VEHICLE GLOBAL LOCALIZATION AT INTERSECTIONS THROUGH ALIGNMENT OF VISUAL DATA WITH DIGITAL MAP

NEDEVSKI, SERGIU; POPESCU, VOICHITA; DANESCU, RADU; MARITA, TIBERIU; ONIGA, FLORIN

This paper proposes a method for achieving an improved ego-vehicle global localization with respect to an approaching intersection, based on the alignment of visual landmarks perceived by the on-board visual system, with the information from a proposed extended digital map. The visual system relies on a stereovision system that provides a detailed 3D description of the environment, including road landmarks information (lateral lane delimiters, painted traffic signs, curbs, stop-lines), as well as dynamic environment information (other vehicles). An extended digital map is proposed, which enriches the standard map information with a detailed description of the intersection required for current lane identification, landmarks alignment, and ego-vehicle accurate global localization. A novel approach for lane delimiters classification, necessary for the lane identification, is also presented. An original solution for identifying the current lane, combining visual and map information with the help of a Bayesian network is proposed. Extensive experiments have been performed and the results evaluated with a GNSS system of high accuracy (2 cm). The achieved global localization accuracy is of sub-meter level, depending on the performance of the stereovision system.

MODELLING AND DELAY-ANALYSIS OF A RETRANSMISSION-BASED BUNDLE DELIVERY SCHEME FOR INTERMITTENT ROADSIDE COMMUNICATION NETWORKS

KHABBAZ, MAURICE; ALAZEMI, HAMED; ASSI, CHADI

Typical data communication systems are augmented with retransmission mechanisms to recover from packet transmission errors or losses. This letter presents the mathematical analysis pertaining to a novel retransmission-based Bundle Delivery Scheme (BDS) that has the objective of achieving a delay-minimal data delivery in the context of an intermittent roadside communication network. The realization of this objective is challenging whenever network information is completely unavailable. For this reason, the source node is augmented with a Virtual Space that enables it to buffer copies of data bundles for a finite period of time in order to retransmit them to a subset of arriving vehicles. In turn, these vehicles will secure earlier delivery of the retransmitted bundle copies to the destination node. Simulations are conducted in order to verify the validity and accuracy of the presented mathematical analysis as well as to capitalize on the efficiency of BDS. The reported results show that this scheme exhibits a delay improvement of 22.6% to 40% relatively to two existing schemes.

INVESTIGATION ON AN INTEGRATED EVACUATION ROUTE PLANNING METHOD BASED ON REAL-TIME DATA ACQUISITION FOR HIGH-RISE BUILDING FIRE

HAN, ZHUYANG; WENG, WENGUO; ZHAO, QUANLAI; MA, XIN; LIU, QUANYI; HUANG, QUANYI

Evacuation of occupants in high-rise buildings is one of the most important tasks when the building is subjected to a significant level of fire threat. Since the mechanism of fire spread is too complicated for the trapped people to determine the evacuation route, a real-time evacuation route planning method is needed for the rescue and safety management. In this paper, an integrated real-time evacuation route planning method for high-rise building fire is proposed. This method is composed of real-time data acquisition, risk distribution calculation and evacuation route formulation. The real-time data acquisition process is achieved by using the sensor system and wireless data transmission system, the calculation of risk distribution is based on the risk assessment of casualties, and the formulation of evacuation route is based on the fast marching level set method. To demonstrate the presented method, a sample building under an assumed fire is used for numerical investigation and a real building model is used for experimental investigation. The results show that this method can evaluate the fire status and formulate evacuation strategies instantly in high-rise building fire. The risk distribution and the evacuation route of the building fire can be displayed intuitively. This method can be used in practical application and will be an important technical basis for the program development of rescue and evacuation.

NEWLY DEVELOPED SAFETY-CRITICAL COMPUTER SYSTEM FOR CHINA METRO

CHEN, XIANGXIAN; ZHOU, GONGSHUANG; YANG, YI; HUANG, HAI

Applications of advanced electronic technologies have greatly increased the efficiency and performance of safety-critical computer systems. In addition, the architectural flexibility of these systems reduces the types of printed circuit boards they can use, thereby reducing difficulties with maintenance. A newly developed safety-critical computer system is presented in this paper. The system uses some advanced electronic technologies and can be reconfigured to be a triple-modular redundancy system or a dual duplex-modular redundancy system for different applications. The system's

architecture and fail-safe technologies are discussed, and its reliability, availability, maintainability and safety are evaluated based on the Markov method. Based on these evaluations, the safety-critical computer system developed herein demonstrates great potential for rail use.

FREEWAY TRAVEL TIME INFORMATION: DESIGN AND REAL-TIME PERFORMANCE USING SPOT-SPEED METHODS

SORIGUERA, FRANCESC; ROBUSTE, F

This paper shows that the precision of a freeway travel time information system, in a real-time context, is not related solely to the accuracy of the measurement. Immediacy in reporting the information and forecasting capabilities play a role. Therefore, focusing only on the accuracy of the travel time measurement is a myopic approach, which can lead to counterintuitive results. Specifically, it is claimed that using travel times estimated with the traditional spot speed Midpoint algorithm, the performance of the real-time information system is better than by using much more accurate directly measured travel times. Guidelines for an adequate configuration of the common parameters of the system are provided. In addition, real-time context enhancements for travel time estimation methods based on punctual speed measurements are proposed. These are addressed by taking into account an easy and practical implementation. They have been proven to work well in an empirical application on a Spanish Freeway.

IMPROVING ACCURACY OF THE VEHICLE ATTITUDE ESTIMATION FOR LOW-COST INS/GPS INTEGRATION AIDED BY THE GPS-MEASURED COURSE ANGLE

WU, ZONGWEI; YAO, MINLI; MA, HONGGUANG; JIA, WEIMIN

This paper presents a method using the Global Positioning System (GPS)-measured course angle to improve the accuracy of the vehicle attitude estimation for low-cost Inertial Navigation System/GPS (INS/GPS) integration. Observability properties of the error states in the low-cost integration navigation system are analyzed first, indicating the attitude estimation is severely affected by vehicle maneuvers, especially the yaw angle. The pitch and roll angles are strongly observed and hence, the observabilities of these two angles are nearly free of influence caused by vehicle maneuvers and these two angles can be estimated accurately. To improve the yaw angle estimation, we propose a cascaded Kalman filter to deal with the yaw angle separately by the aid of the GPS-measured course angle. Additionally, two switching rules are established to remove the influence caused by the sideslip angle and GPS noises. The experimental results validate the observability analysis of the low-cost INIS/GPS system and show that the proposed attitude estimation method can effectively improve the accuracy of the vehicle attitude estimation, suggesting that this technique is a viable candidate for many control applications in cars.

FLOW BASED FREEWAY TRAVEL TIME ESTIMATION: A COMPARATIVE EVALUATION WITHIN DYNAMIC PATH LOADING

CELIKOGLU, HILMI BERK

The summarized work investigates the performance of a flow model in providing efficient travel time estimation for varying flow patterns of freeway traffic. The model follows a discrete packet based mesoscopic simulation approach that explicitly considers both the anisotropic property of traffic flow in packet state updating and the uniform speed differentiation of vehicle packets at each discrete time step. The measure of travel time is obtained as a link performance resulting from a simplified dynamic network loading process. The spatio-temporal flow propagation on a selected freeway segment is simulated comparatively by incorporating both the proposed model and a linear travel time function based link performance model. Performance of the flow model in travel time estimation is sought considering actual measures obtained by a probe vehicle. The main improvement on estimating travel time process is that the employed model considers traffic mass as a packet in which it can take different speed and acceleration levels on different discrete time intervals and satisfies the anisotropy property by consistently simulating flow propagation within the dynamic network modeling frame. In contrast to the vast data need and computational burden of trajectory based methods, the employed flow based model requires solely the time-varying inflow profiles to estimate spatially and temporally varying travel times by artificially segmenting freeway routes.

PROBABILISTIC LONG-TERM VEHICLE MOTION PREDICTION AND TRACKING IN LARGE ENVIRONMENTS

SHAN, MAO; WORRALL, STEWART; NEBOT, EDUARDO

Vehicle position tracking and prediction over large areas is of significant importance in many industrial applications such as mining operations. In a small area, this can be easily achieved by providing vehicles with a constant communication link to a control centre, and having the vehicles broadcast their position. The problem changes dramatically when vehicles operate within a large environment of potentially hundreds of square kilometres, and in difficult terrain. This paper presents algorithms for long-term vehicle motion prediction and tracking based on a multiple-model approach. It incorporates a probabilistic vehicle model that includes the structure of the environment. The prediction algorithm evaluates the vehicle position using acceleration, speed and timing profiles built for the particular environment, and considers the probability that the vehicle will stop. A limited number of data collection points distributed around the field are used to update the vehicle position estimate when in communication range, and prediction is used at points in between. A particle filter is used to estimate the vehicle position using both positive and negative information (whether or not communication is possible) in the fusion stage. The algorithms presented are validated with experimental results using data collected from a large scale mining operation.

ESTIMATION OF DYNAMIC ORIGIN-DESTINATION MATRICES USING LINEAR ASSIGNMENT MATRIX APPROXIMATIONS

TOLEDO, TOMER; KOLECHKINA, TANYA

This paper presents a general solution scheme for the problem of off-line estimation of dynamic Origin-Destination (OD) demand matrices using traffic counts on some of the network links and historical demand information. The proposed method uses linear approximations of the assignment matrix, which maps the OD demand to link traffic counts. Several iterative algorithms that are based on this scheme are developed. The various algorithms are implemented in a tool that uses the mesoscopic traffic simulation model Mezzo to conduct network loadings. A case study network in Stockholm Sweden is used to test the proposed algorithms and to compare their performance to current state-of-the-art methods. The results demonstrate the applicability of the proposed methodology to efficiently obtain dynamic OD demand estimates for large and complex networks and that, computationally, this methodology outperforms existing methods.

ENHANCING LIGHT BLOB DETECTION FOR INTELLIGENT HEADLIGHT CONTROL USING LANE DETECTION

EUM, SUNGMIN; JUNG, HO GI

In this paper, we propose an enhanced method for detecting light blobs for intelligent headlight control (IHC). The main function of the IHC system is to automatically convert high beam headlights to low beam when vehicles are found in the vicinity. Thus, in order to implement the IHC, it is necessary to detect preceding or oncoming vehicles. Generally, this process of detecting vehicles is done by detecting light blobs in the images. Previous works regarding light blob detection can largely be categorized into two approaches by the image type they use: low exposure images or auto-exposure images. While they each have their own strengths and weaknesses, the proposed method combines them by integrating the use of the partial region of the auto-exposure image confined by the lane detection information and the low-exposure image. Consequently, the proposed method detects headlights at various distances and taillights in near distances using low exposure images, while handling taillights in distant locations by exploiting the confined auto-exposure images. This approach enhances the performance of detecting the distant light blobs while maintaining low false detections.

DERIVING THE UPPER BOUND OF THE NUMBER OF SENSORS REQUIRED TO KNOW ALL LINK FLOWS IN A TRAFFIC NETWORK

CASTILLO, ENRIQUE; CALVIÑO, AIDA; MENÉNDEZ, JOSÉ MARÍA; JIMÉNEZ, MARIA PILAR; RIVAS, ANA

It is demonstrated that the minimum number of sensors required to know all link flows in a traffic network can be determined only if path information is available. However, not all paths need to be enumerated but at most a small subset defining the rank rw of the link-path incidence matrix W . If this rank for a reduced subset of paths is already $m-n$, where m and n are the number of links and non-centroid nodes, respectively, we can conclude that $m-n$ sensors are sufficient. It is also shown that the formulas providing the dependent link flows in terms of the independent link flows can be obtained by the node-based or the path-based approaches, with the same results only when $rw=m-n$. Finally, an algorithm to obtain the small subsets of linearly independent path vectors is given. The methods are illustrated by the parallel network

example in Hu et al. and the Ciudad Real and Cuenca networks, for which the savings in link counts with respect to the m-n bound are larger than 16%. The corresponding savings in path enumeration is larger than 80%.

DEVELOPMENT AND FIELD TRIAL OF A DRIVER ASSISTANCE SYSTEM TO ENCOURAGE ECO-DRIVING IN LIGHT COMMERCIAL VEHICLE FLEETS

VAGG, CHRISTOPHER; BRACE, CHRIS; HARI, DEEPAK; AKEHURST, SAM; POXON, JOHN; ASH, LLOYD

Driver training schemes and eco-driving techniques can reduce fuel consumption by 10% but their effectiveness depends on the willingness of drivers to change their behaviour, and changes may be short lived. On board driver assistance systems have been proposed which encourage driving style improvement. Such systems, when fitted in commercial vehicles, can assume some authority since uneconomical driving styles can be reported to a fleet manager. A driver assistance system has been developed and tried in the field with commercial vehicle drivers. The system aims to reduce fuel consumption by encouraging two behaviours: reduced rates of acceleration, and early upshifting through the gears. Visual feedback is reinforced with audible warnings when the driver makes uneconomical power demands of the engine. Field trials of the system were undertaken in the United Kingdom using 15 light commercial vehicles, driven by their professional drivers from a range of commercial applications. The trials consisted of 2 weeks baseline data collection which drivers were not aware of, followed by 2 weeks of data collection with the system active. During the trials a total of 39 300 km of trip data were collected, which demonstrated fuel savings up to 12% and average fuel savings of 7.6%.

A TOPOLOGY-BASED MODEL FOR RAILWAY TRAIN CONTROL SYSTEMS

WANG, HAIFENG; SCHMID, FELIX; CHEN, LEI; ROBERTS, CLIVE; XU, TIANHUA

An innovative topology-based method for modeling railway train control systems is proposed in this paper. The method addresses the problems of having to rely too much on designers' experience and of incurring excessive cost of validation and verification in the development of railway train control systems. Four topics are discussed in the paper, namely, (i) the definition of basic topological units for modeling railway networks, based on the essential characteristics of these units, (ii) the concept of a train movement authority topological space, (iii) the interpretation of the train control logic as a topological space construct and, (iv) topological space theorems for train control system verification. A case study is also presented where the approach was applied in the simulation model of a typical railway network and the results show good performance, which meets the system requirements.

BOAT: ISOLATION-BASED ON-LINE ANOMALOUS TRAJECTORY DETECTION

CHEN, CHAO; ZHANG, DAQING; CASTRO, PABLO; LI, NAN; SUN, LIN; LI, SHIJIAN; WANG, ZONGHUI

Trajectories obtained from GPS-enabled taxis grant us an opportunity to not only extract meaningful statistics, dynamics and behaviors about certain urban road users, but also to monitor adverse and/or malicious events. In this paper we focus on the problem of detecting anomalous routes by comparing against time-dependent historically "normal" routes. We propose an on-line method that is able to detect anomalous trajectories "on-the-fly", as well as identify which parts of the

trajectory are responsible for its anomalousness. Furthermore, we perform an in-depth analysis on around 438,00 anomalous trajectories which are detected out of trajectories of 7,600 taxis for a month, revealing that most of the anomalous trips are the result of conscious decisions of greedy taxi drivers to commit fraud. We evaluate our proposed iBOAT through extensive experiments on large scale taxi data and it shows that iBOAT achieves state-of-the-art performance, with a remarkable performance of $AUC \geq 0.99$.

EMERGENCY MANAGEMENT OF URBAN RAIL TRANSPORTATION BASED ON PARALLEL SYSTEMS

DONG, HAIRONG; NING, BIN; CHEN, YAO; SUN, XUBIN; WEN, DING; HU, YULING; OUYANG, RENHAI

Integrating artificial systems, computational experiments, and parallel execution (ACP) is an effective approach for modeling, simulating, and intervening real complex systems. Emergency response is an important issue in the operation of urban rail transport systems for ensuring human and property safety. Inspired by the ACP method, this paper introduces a basic framework of parallel control and management (PCM) for emergency response of urban rail transportation systems. The proposed framework is elaborated from three interdependent aspects: points, lines, and networks. Points represent the modeling of railway stations; Lines describe the microscopic characteristics of the railway connections between designated stations; Networks present the macroscopic properties of all the railway connections. Based on the above framework, a series of parallel experiments, which were impossible to be achieved in real systems, can now be conducted in the constructed artificial system. Furthermore, the constructed artificial system can be used to test and develop effective emergency control and management strategies for real rail transport systems. Therefore, this proposed framework will be able to enhance the reliability, security, robustness, and maneuverability of urban rail transport systems in the case of emergency.

INTEGRATING OFF-BOARD CAMERAS AND VEHICLE ON-BOARD LOCALIZATION FOR PEDESTRIAN SAFETY

BORGES, PAULO; ZLOT, ROBERT; TEWS, ASHLEY

Situational awareness for industrial vehicles is crucial to ensure safety of personnel and equipment. While human drivers and onboard sensors are able to detect obstacles and pedestrians within line-of-sight, in complex environments initially occluded or obscured dynamic objects can unpredictably enter the path of a vehicle. We propose a system which integrates a vision-based offboard pedestrian tracking subsystem with an onboard localization and navigation subsystem. This combination enables warnings to be communicated and effectively extends the vehicle controller's field of view to include areas that would otherwise be blind spots. A simple flashing light interface in the vehicle cabin provides a clear and intuitive interface to alert drivers of potential collisions. Alternatively, the system is also be applied to vehicles that have autonomous navigation capabilities, in which case, instead of alert lights, the vehicle is halted or redirected. We implemented and tested the proposed solution on an automated industrial vehicle under autonomous operation and on a human driven vehicle in a full-scale production facility, for a period of four months.

COMPUTATIONAL TRAFFIC EXPERIMENTS BASED ON ARTIFICIAL TRANSPORTATION SYSTEMS: AN APPLICATION OF ACP APPROACH

ZHU, F.; WEN, D. ; CHEN, S.

The Artificial societies, Computational experiments, and Parallel execution (ACP) approach provides us an opportunity to look into new methods that address transportation problems from new perspectives. In this paper, we present our work and results of applying the ACP approach on modeling and analyzing transportation systems, particularly carrying out computational experiments based on artificial transportation systems (ATSs). Two aspects in the modeling process are analyzed. The first is growing an ATS from the bottom up using agent-based technologies. The second is modeling environmental impacts under the principle of "simple is consistent." Finally, three computational experiments are carried out on one specific ATS, i.e., Jinan-ATS, and numerical results are presented to illustrate the applications of our method.

Abstracts of forthcoming papers on IEEE ITS Magazine

COOPERATIVE MULTI-VEHICLE LOCALIZATION USING SPLIT COVARIANCE INTERSECTION FILTER

LI, HAO; NASHASHIBI, FAWZI

Vehicle localization (ground vehicles) is an important task for intelligent vehicle systems and vehicle cooperation may bring benefits for this task. A new cooperative multi-vehicle localization method using split covariance intersection filter is proposed in this paper. In the proposed method, each vehicle maintains an estimate of a decomposed group state and this estimate is shared with neighboring vehicles; the estimate of the decomposed group state is updated with both the sensor data of the ego-vehicle and the estimates sent from other vehicles; the covariance intersection filter which yields consistent estimates even facing unknown degree of inter-estimate correlation has been used for data fusion. A comparative study based simulations demonstrate the effectiveness and the advantage of the proposed cooperative localization method

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