



Welcome to ACP50 Committee on Traffic Flow Theory and Characteristics

August 17, 2020



Introductions Members/Friends

Introductions Members/Friends



Agenda



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- | | |
|-------------------------------------|----------------------|
| ▪ Welcome and Call to Order | S. Ahn |
| ▪ Introductions – Members & Friends | All Attendees |
| ▪ Review and Approval of Minutes | S. Ahn |
| ▪ TRB Report | R. Bertini |
| ▪ FHWA Programs & Activities | J. Sturrock/R. James |
| ▪ Chair Report | S. Ahn |
| ▪ TFTC Subcommittee Reports | |
| ▪ Liaison with other Committees | All Attendees |
| ▪ Announcements and Future Meetings | All Attendees |
| ▪ Adjourn | |
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TRB Report



- Robert Bertini

- TRB restructuring
 - Merging with Safety section
 - AHB45 → ACP50

- TRB Annual Meeting in January 2021
 - Paper review process
 - Virtual platform



U.S. DOT/FHWA Report



- Jim Sturrock
 - Rachel James
-



Chair Report



- We are now **ACP50** Committee on Traffic Flow Theory and Characteristics
 - No CFPs and TRB-wide award nominations due to restructuring
 - Submitted two workshop proposals (SimSub and CATSub)
 - 106 papers received (45% reduction)
 - 1 session (90 min) + virtual poster sessions
 - Special Session for TRB Centennial in 2021 (100th Annual Meeting)
 - Volunteers: Christine Buisson, Ludovic Leclercq, Hani Mahmassani, Alex Skabardonis, Raphael Stern, Alireza Talebpour, Dan Work
-



Chair Report

Special Session (90 mins):

Celebrating TRB Centennial: Past, Present, and Future Traffic Flow

- **Interactive Session: Simulation Experiments with a Ring Road**
 - Past: human-driven vehicles with no automation
 - Present: human-driven vehicles + ACC vehicles
 - Future: connected automated vehicles

- **Experiment Format**
 - Car-following (and lane-change) parameters from audience
 - Random selection of parameters from the distributions
 - Run simulation
 - Observe and discuss emerging traffic phenomena
 - Stop-and-go disturbance emergence and growth
 - Traffic hysteresis
 - Reduction in discharge rate



Chair Report

Special Session (90 mins):

Celebrating TRB Centennial: Past, Present, and Future Traffic Flow

- **Panel Discussion**

- Form a group of young scholars (PhD students), a group of mid-career scholars, a group of established scholars (in September-October)
- Solicit and develop questions (in October-November)
- Each group develop responses (December/January)
- Present (January)

- **Timeline**

- Final plan to TRB by September/October
- Session detail before the meeting by January



Agenda



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Subcommittees



1. **Joint Subcommittee on Traffic Simulation Models** Hadi
2. Crowd Flow Dynamics, Modeling and Management Sarvi
3. Connected Automated Traffic Flow Hamdar
4. Research Problem Statements Gayah
5. Paper Review Ahn
6. Awards Leclercq
7. Mid-Year Meetings Ahn/Daamen
8. Outreach and Diversity Hamdar
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Joint Traffic Simulation (SimSub) Subcommittee Report

Presented by

Mohammed Hadi, Ph.D., PE
Florida International University

Committee on Traffic Flow Theory and Characteristics
(ACP50) Summer Meeting

August 2020

TRB Standing Committee on Traffic Simulation ACP80

- Focus on the development, validation/calibration, application, and understanding and utilization of traffic simulation in support of the transportation system analysis and decision-making processes
- Concerned with the use of different spatial and temporal levels of highway traffic simulation for the estimation and prediction of various performance metrics
- Considers the availability of data from multiple sources, impacts of emerging vehicle technologies and traffic management systems, and the interactions of general vehicular traffic with various modes of transportation including but not limited to heavy vehicles, transit vehicles, bicyclists, and pedestrians.

Relationship with the Committee on Traffic Flow Theory and Characteristics (ACP50)

- The development of highway traffic flow algorithms, which is a main focus of the Committee on Traffic Flow and Characteristics (ACP50) are considered as an important input to the development of macroscopic, mesoscopic, and microscopic traffic simulation models. Thus, the two committees will complement each other.

Workshop on Traffic Simulation and CAV Modeling

Days	Agenda – Sessions	
11/16/20	Introduction and first panel: Traffic Simulation – Past, Present, and Future	
	Elements in Emerging Vehicle Analysis, Modeling, and Simulation	Simulating Alternative Mobility Options
	Interactive Session: National and State Guidance – Lessons Learned and Gap Identification	
11/17/20	Workshop merging Concepts in Calibration and Validation of Traffic Simulation Models – Moderator: David Hale	
	Cooperative Driving Automation and Associated Applications I	Infrastructure Support Simulation
	Breakout Sessions: CAV, Calibration/Validation, Multi-Modal/Emerging Mobility, Simulation to Support Decisions, Others.	
	Advancement in Modeling Emerging Technologies – Vendor Presentations	
11/18/20	Cooperative Driving Automation and Associated Applications II	Multi-Resolution and Agent-Based Modeling
	Effects of CV-Based Applications on Performance:	Multimodal Modeling
	Briefings and Committee Meetings	





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Crowd Flow Dynamics, Modeling and Management



- PED conference was scheduled in Spring 2020 in Melbourne
 - Postponed to 2021 because of the COVID-19 pandemic
 - Publishing some of the submitted papers for Ped 2020 in an online journal since some of the authors would like to publish them this year and not wait for 2021
 - No special call for papers in TRB this year due to restructuring but would like to have one next year
-



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Midyear Annual Report

ACP50(3) Subcommittee: Traffic Flow Modeling for Connected and Automated Vehicles

(Connected and Automated Traffic Flow
Subcommittee)

ACP50 Midyear Meeting

Zoom Meeting

August, 2020



Traffic Flow Modeling for Connected and Automated Vehicles – ACP50 (3)



Transportation Research Board Annual Meeting Events (January 2021):

a. **No Call for Papers:**

b. **Workshop** proposal submitted (waiting for feedback):

Title: From Traffic Flow Modeling of Connected and Automated Vehicles to Transportation Guidelines, Policies and Specifications: Lessons Learned and Opportunities Missed.

Description: Connected and Automated Vehicles (CAVs) have been developed and deployed by car manufacturers and technology companies. However, transportation decision makers have limited understanding of the CAV impacts on the mobility, safety and security of roadway networks. The objective of this workshop is to translate the findings of different CAV studies into recommendations for decision makers formulating the policies for developing, testing, deploying and using CAVs in real-world environments.





Breakout Session at Automated Vehicle Symposium 2020



Danjue Chen
Samer Hamdar

July 28, 2020



Breakout Session: AI for AV Control and Traffic Operations: Challenges and Opportunities



Breakout Session Overview

- ❑ **AVS 2020 Breakout Session Title: AI for AV Control and Traffic Operations: Challenges and Opportunities**
 - *Tuesday, July 28*
 - *Theme: to identify the opportunities and challenges associated with AI applications in AV control and traffic operations*

- ❑ **TRB Sponsor/Partner Committees :**
 - *AHB45 (ACP50) Traffic Flow Theory and Characteristics Committee and AED50 Artificial Intelligence and Advanced Computing Applications Committee and*



Breakout Session: AI for AV Control and Traffic Operations: Challenges and Opportunities



Breakout Session Overview

□ Organizers

- *Danjue Chen, Assistant Professor, University of Massachusetts, Lowell*
- *Mecit Cetin, Professor, Old Dominion University*
- *Mehdi Hashemipour, Data Scientist, US Department of Transportation*
- *Mo Zhao, Research Scientist, Virginia Transportation Research Council*
- *Mohamed H. Zaki, Assistant Professor, University of Central Florida*
- *Pan Lu, Associate Professor, North Dakota State University*
- *Samer Hamdar, Associate Professor, George Washington University*
- *Simeon Calvert, Research Fellow, Delft University of Technology*
- *Steven Mattingly, Professor, University of Texas at Arlington*
- *Xiaopeng Li, Associate Professor, University of South Florida*
- *Xiaoyu (Sky) Guo, PhD Student, Texas A&M University – College Station*
- *Yuanchang Xie, Associate Professor, University of Massachusetts Lowell*



Breakout Session: AI for AV Control and Traffic Operations: Challenges and Opportunities



Highlights

- 6 Speakers**
- Total attendees: 80-90**
- Format: pre-recorded video + 2-hr live presentation/discussion**

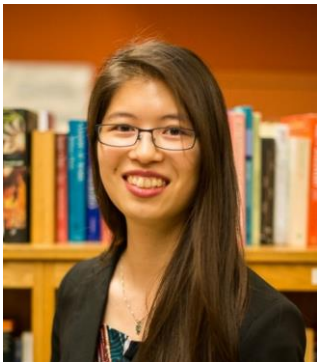


Breakout Session: AI for AV Control and Traffic Operations: Challenges and Opportunities



6 Speakers

Cathy Wu - Prof from MIT
“Mixed Autonomy Traffic: A Reinforcement Learning Perspective”



David A. Abbink- Prof from TUDelft
“The value of good old-fashioned parametric models for AV control”



Jorge Laval- Prof from GaTech
“Machine Learning Methods Beware: There is Nothing to Learn about Congested Urban Networks”





Breakout Session: AI for AV Control and Traffic Operations: Challenges and Opportunities



6 Speakers

Peng Hao - Researcher from UC Riverside
“Deep Learning Based Eco-Driving for Connected and Automated Vehicles”



Shai Shalev-Shwartz- CTO from Mobileye
“On the Challenges of Building a Camera-only, Complete, Self-Driving System”



Terry Yang - Prof from Univ. Utah
“Traffic State Estimation with Physics Regularized Machine Learning: A New Insight into Machine Learning Applications in Traffic Flow Modeling”





Key Findings and Lessons Learned

- *Supervised learning can have great potential for AV control and traffic operations. Particularly, our domain expertise can be used to design the problems, choose the proper AI or ML techniques, evaluate the performance of the methods, and interpret the results.*
- *Safety has been the upmost important factor in AV regulations and product developments. However, there needs to be a balance between safety and other aspects (e.g., congestion, energy consumption, fairness). Currently, safety remains the primary concern of the AV industry, which may expand their focuses to address other aspects in 5-10 years.*



Outcomes & Research Needs Statements

- *It is important to develop regulations/policies to guide AVs and AI technologies (e.g., those related to safety and ethics) development. This is a challenging but very rewarding task.*
- *Two questions were raised regarding the role of data: (1) how much data is needed to evaluate the performance of a model? and (2) how much data is needed/enough for learning? The first question has been well studied. Although it is generally agreed that for learning the more data the better, the “enough” part of the second question has not been well addressed. Overall, more data collection and sharing efforts are needed.*
- *More collaborations are needed among government, academia, the AV industry, etc. For example, if researchers do not understand how AVs function, they will find difficulties in thoroughly evaluating AVs’ impacts? Similarly, AI experts and transportation engineers should work closely to better address practical needs.*



Traffic Flow Modeling for Connected and Automated Vehicles – ACP50 (3)



New Name and Mission Application:

Connected and Automated Traffic Flow

Subcommittee (CATSub)

Mission:

The subcommittee's mission is to understand and predict the interactions between traffic flow characteristics with the future control and sensing algorithms for improved Connected and Automated Traffic Systems. Such interactions will help facilitate more efficient “macroscopic” as well as “microscopic” operations of such systems. Most critical for us is to interface with the vehicle/technology developers and industry partners and to discuss and assess the benefits and potential consequences associated with our future connected and autonomous traffic. Such interface is essential especially since traffic flow theory models will continue playing a major role in the control of future traffic flow and since the industry along with the Federal/local Governments will lead the efforts in deploying the corresponding traffic operational solutions on our surface transportation network.



New Website Being Updated



Traffic Flow Modeling for Connected and Automated Vehicles – ACP50 (3)



Upcoming Special Issue: Frontiers in Future in Transportation

Proposal submitted

Transportation Systems Modeling Section: Changes in Transportation Systems in the Era of Artificial Intelligence and Robotics: From Vehicle Technology to Traffic Management

Guest Editors:

Samer H. Hamdar (GW)

Xiaopeng Li (USF)

David Kang (FAU)

Xiangeng Yang (University of Utah)



Centennial CAV Survey Paper Structure (based on TRB 2020 Workshop) – Special Submission Ready for Contributions



Traffic Flow Modeling for Connected and Automated Vehicles – ACP50 (3)



- Special Thanks to:

- Sue Ahn
- Mark Brackstone
- Danjue Chen
- Kita Jang
- Seungmo Kang
- Michael Levin
- Xiaopeng Li
- Stephen Mattingly
- Alireza Talebpour
- Meng Wang
- Simeon Calvert



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Special Calls for Papers

- 106 papers

Annual Meeting	2021	2020	2019	2018	2017
Papers received	106	194	196	194	207
Presentation only	59	93	80	64	67
	56%	48%	41%	33%	32%
Publication only	0	0	0	4	1
	0%	0%	0%	2%	0%
Present and publish	46	101	116	126	139
	44%	52%	59%	65%	67%



Review Timeline

Dates	Process	Review Outcome
Aug 1	Papers due	
Aug 18	Review Assignment	Please 'accept/decline' review invitations!
Sept 15	Reviews due	
Oct 1-15	1st round decision	Presentation: Accept, Reject Publication: Reject or Moved to Editorial Review

Review process after moved to editorial review

- Assigned to an Associate Editor and then a Handling Editor
- A handling editor may invite additional reviewers or make a decision (accept, revise, reject)
- No firm deadline



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Award Categories

- TRB
 - D. Grant Mickle Award
 - Fred Burggraf Award

 - Operation Section
 - Best 1st Young Author Paper Award (Cunard Award)

 - ACP50 TFTC
 - Greenshields Prize
 - Best Paper on Traffic Flow Theory
 - Best Reviewer Award (Nominated and Selected by the Review Coordinators)
-



TFTC Awards

- Award subcommittee (for the papers presented in January 2020):
 - Rob Bertini
 - Jiwon Kim
 - Ludovic Leclercq
 - Monica Menendez
- Awards considered:
 - D. Grant Mickle Award (nomination made but cancelled)
 - Fred Burggraf Award (nomination made but cancelled)
 - Cunard Award (nomination made)
 - Best Paper on Traffic Flow Theory
 - **Estimation of the change in cumulative flow over probe trajectories using detector data** (by Paul van Erp; Victor Knoop; Erik-Sander Smits; Chris Tampere; Serge Hoogendoorn)
 - Greenshields Prize
 - **Lane detection and lane changing phenomena identification with data from a swarm of drones** (by Emmanouil Barmponakis; Guillaume M. Sauvin; Nikolaos Geroliminis)



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Mid-Year Meetings

- Midyear meeting 2020 → **Cancelled**
 - Amsterdam, The Netherlands
 - August 17-19, 2020

 - Midyear meeting 2021
 - ISTTT 24, Beijing, China
 - July 24-26, 2021

 - Midyear meeting 2022
 - Amsterdam, The Netherlands (?)
 - Should vote during the annual meeting in 2021
-



Mid-Year Meetings

- 2022 Amsterdam, the Netherlands (?)
- 2021 ISTTT Beijing, China
- **2020 Amsterdam, the Netherlands → Cancelled**
- 2019 ISTTT Lausanne, Switzerland
- 2018 Woods Hole, Massachusetts
- 2017 ISTTT Chicago
- 2016 Sydney, Australia
- 2015 ISTTT Kobe, Japan
- 2014 Portland, Oregon, USA, Symposium Celebrating 50 Years of TFT
- 2013 ISTTT, Noordwijk, the Netherlands
- 2012 Joint Summer Meeting with HCQS Committee, Fort Lauderdale, Florida
- 2011 ISTTT Berkeley (one hour w/SimSub)
- 2010 Does Traffic Data Support Traffic Models? Annecy, France
- 2009 ISTTT Hong Kong, China (lunch table)
- 2008 Greenshields Symposium, Woods Hole, Massachusetts
- 2007 ISTTT London, UK (in pub)



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Reports

Outreach and Diversity Subcommittee

ACP50 Meeting
August 2020



Outreach and Diversity Subcommittee

- Continuation of Activities

- Monthly Newsletter (<http://tftcnews.blogspot.com/>):
 - We have had 8 Volumes so far thanks to Samer
 - We published 6 issues this year
 - Webinars
 - Jorge has taken the lead
 - We have had several high-quality presentation
 - YouTube Channel (<https://www.youtube.com/user/AHB45/feed>)
 - We did not conduct any additional interviews.
 - Hopefully, we will continue starting 2021.
-



Outreach and Diversity Subcommittee

- Continuation of Activities

- Social Media Content:

- Please consider following us on twitter @TFTC_TRB

- Journal Club

- We had the first round

- Social behavior for autonomous vehicles by Wilko Schwarting, Alyssa Pierson , Javier Alonso-Mora , Sertac Karaman , and Daniela Rus

- We plan to share the meeting notes from the second round

- Please monitor your emails and twitter. We will start the second round today.
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Liaison with Other Committees

- ACP40 Highway Capacity Quality of Service Committee
J. Sturrock/Others?

 - ACP80 Traffic Simulation Committee
M. Hadi?

 - Others?
 - ACP15 Intelligent Transportation Systems
 - ACP20 Standing Committee on Freeway Operations
 - ACP30 Vehicle-Highway Automation
 - AEP40 Transportation Network Modeling
-



Announcements and Future Meetings



- Workshop on Traffic Simulation and CAV Modeling, November 16-18, 2020 (Sponsored by ACP80 Traffic Simulation Committee)

 - ISTTT24, July 24-26, 2021, Beijing, China
-



New Business



- 2020 Workshop Proposals
 - Special Session for TRB Centennial
 - Final plan to TRB by October
-



Adjourn



See you virtually in January!
