



Welcome to ACP50 Committee on Traffic Flow Theory and Characteristics

January 7, 2021



Housekeeping

- Please sign in through google sheet (in chat box)!
 - Code of conduct (in chat box)
 - Please mute yourself when not speaking
 - Will skip self-introduction; Please introduce yourself when you speak

 - TRB support staff
 - Helper: Wissam Kontar
-



Agenda



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



Review and Approve Minutes

- January 13, 2020
 - Thanks to Ludovic for preparing the minutes!



- August 17, 2020
 - Thanks to Anupam and Wissam for preparing the minutes!
 - Available on the TFTC website
 - To vote during the next mid-year meeting
-



Chair Report



Subcommittee Meetings

Day	Description
Tuesday, January 05	Simulation Subcommittee, ACP80(1), Joint Subcommittee of ACP80, ACP50
12:00 PM	Christopher Melson, Louisiana Department of Transportation and Development, presiding
01:30 PM ET	John Shaw, Iowa State University, presiding Operations and Traffic Management More Details
Wednesday, January 06	Crowd Flow Dynamics, Modeling, and Management Subcommittee, ACP50(1)
10:00 AM	Serge Hoogendoorn, Technische Universiteit Delft, presiding
11:30 AM ET	Shae Talley, JUB Engineers, Inc., presiding Operations and Traffic Management More Details



Chair Report



Subcommittee Meetings

Day	Description
Friday, January 8	Event (Not available in the TRB online program)
10:00 AM	Connected and Automated Traffic Flow Subcommittee (CAT-Flow), ACP(2)
11:30 AM ET	Samer Hamdar, George Washington University, presiding Operations and Traffic Management Join Zoom Meeting https://gwu-edu.zoom.us/j/92987911474?pwd=V0VFMVJQclhic0ZHQ2Z5MmRvRnI1UT09 Meeting ID: 929 8791 1474 Passcode: 699057 One tap mobile +16465588656,,92987911474# US (New York) +13017158592,,92987911474# US (Washington D.C)



Chair Report



Workshop

Day	Description
Thursday, January 21	Workshop 1015
2:00 PM	1015 - From Traffic Flow Modeling of Connected and Automated Vehicles to Transportation Guidelines, Policies and Specifications: Lessons Learned and Opportunities Missed
05:00 PM ET	Samer Hamdar, George Washington University, presiding Operations and Traffic Management <u>More Details</u>



Chair Report



Lectern Session

Day	Description
Wednesday, January 27	Event 1281
1:00 PM	1281 - Advances in Traffic Flow Theory 2021
02:30 PM ET	Soyoung Ahn, University of Wisconsin, Madison, presiding Operations and Traffic Management <u>More Details</u>



Chair Report

Poster Sessions

Day	Description
Monday, January 25	Event 1061
10:00 AM	1061 - Traffic Flow Theory and Characteristics, Part 1: Emerging Trends in Traffic Flow Theory: Connected and Automated Vehicles and Data-driven Methods (Part 2, Session 1101; Part 3, Session 1352)
11:30 AM ET	Operations and Traffic Management More Details
Monday, January 25	Event 1100
1:00 PM	1100 - Traffic Flow Theory and Characteristics, Part 2: Recent Advances for Network Modeling and Control for Multimodal Systems (Part 1, Session 1061; Part 3, Session 1352)
02:30 PM ET	Operations and Traffic Management More Details
Thursday, January 28	Event 1352
10:00 AM	1352 - Traffic Flow Theory and Characteristics, Part 3: General (Part 1, Session 1061; Part 2, Session 1101)
11:30 AM ET	Operations and Traffic Management More Details



TRB Centennial



- TRB Centennial website:
<http://www.trb.org/Centennial/Celebration.aspx>
 - Centennial Papers are featured on the Centennial website.
 - <https://trbcentennial.nationalacademies.org/centennial-papers/operations-and-preservation>
-



TRB Centennial Celebration

Special Session for TRB Centennial

- Originally targeted for the 100th Annual Meeting (target for 2022?)

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
 - **Panel Discussion**
 - **Volunteers:** Sue Ahn, Christine Buisson, Samer Hamdar, Hani Mahmassani, Ludovic Leclercq, Alireza Talebpour, Alex Skabardonis, Raphael Stern, Dan Work
-



TRB Report



- Rich Cunard
 - Robert Bertini
-



U.S. DOT/FHWA Report



- Jim Sturrock
 - Rachel James
-



Membership

- Chair rotation in 2021 (April)
 - Ludovic Leclercq nominated as the next chair



- Member rotation in 2022 (double check)
-



Monograph of TFT

- Inclusion of Traffic Modeling for Connected and Automated Vehicles



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Subcommittees



1. **Crowd Flow Dynamics, Modeling and Management ACP50(1)** Daamen
2. Connected Automated Vehicles ACP50(2) Hamdar
3. Joint Subcommittee on Traffic Simulations ACP80(1) Melson
4. Research Problem Statements Gayah
5. Paper Review Ahn
6. Awards Menendez/Leclercq
7. Mid-Year Meetings Ahn
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 - TFTC Webinar Aghamohammadi/Laval
 - Committee Website Bertini/Zockaie/Aghamohammadi



Crowd Sub ACP50(1)

- A crowd symposium has been postponed to 2021
- A special call for papers is being considered in 2021



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Annual Report



ACP50(2) Subcommittee: Connected and Automated Traffic Flow (CAT-Flow) Subcommittee

ACP50 Annual Meeting

Transportation Research Board 2021 Annual Meeting

Remote (Zoom) Meeting

January, 2021





Connected and Automated Traffic Flow (CAT-Flow) Subcommittee – ACP50 (2)

TRB Annual Meeting Events (January 2021) → Ideas for 2022:

a. Subcommittee Meeting:

Date: Friday, January 8, 10 AM – 11:30 AM)

b. No Call for Papers (16 CAV papers handled): 6 accepted; 3 lectern (standard session/workshop invitation); 4 poster; 2 re-review for publication consideration)

Event: 1061: Traffic Flow Theory and Characteristics, Part 1: Emerging Trends in Traffic Flow Theory: Connected and Automated Vehicles and Data-driven

Date: Monday, January 25, 10 AM – 11:30 AM)

c. Workshop:

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

Event 1015: From Traffic Flow Modeling of Connected and Automated Vehicles to Transportation Guidelines, Policies and Specifications: Lessons Learned and Opportunities Missed

Date: Thursday January 21, 2:00 PM – 5:00 PM





AVS 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*



Connected and Automated Traffic Flow (CAT-Flow) Subcommittee – ACP50 (2)

New Name and Mission Application: CAT-Flow

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



Connected and Automated Traffic Flow (CAT-Flow) Subcommittee – ACP50 (2)

Undergoing Special Issue: Frontiers in Future in Transportation

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)

<https://www.frontiersin.org/research-topics/16026/changes-in-transportation-systems-in-the-era-of-artificial-intelligence-and-robotics-from-vehicle-te>



Centennial CAV Survey Paper Structure (based on TRB 2020 Workshop)



Connected and Automated Traffic Flow (CAT-Flow) Subcommittee – ACP50 (2)

- 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

(Possible Membership Rotation)



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Joint Simulation Subcommittee ACP80(1)

Sponsor Committees:

ACP50: Traffic Flow Theory and Characteristics

ACP80: Traffic Simulation

Co-Chairs:

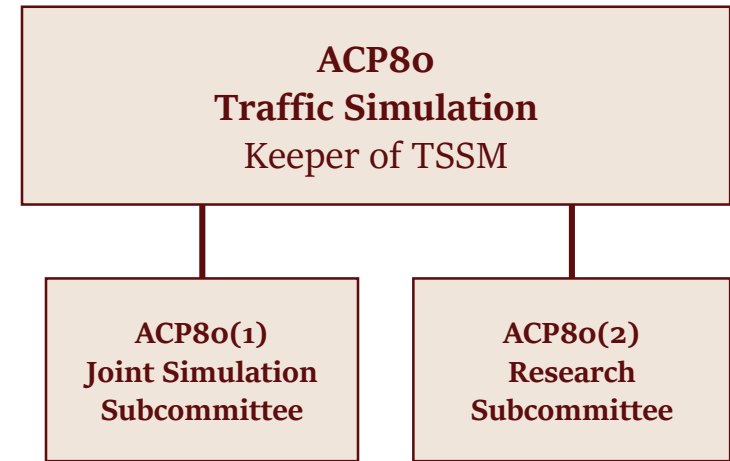
Chris Melson (LTRC)

John Shaw (InTrans)

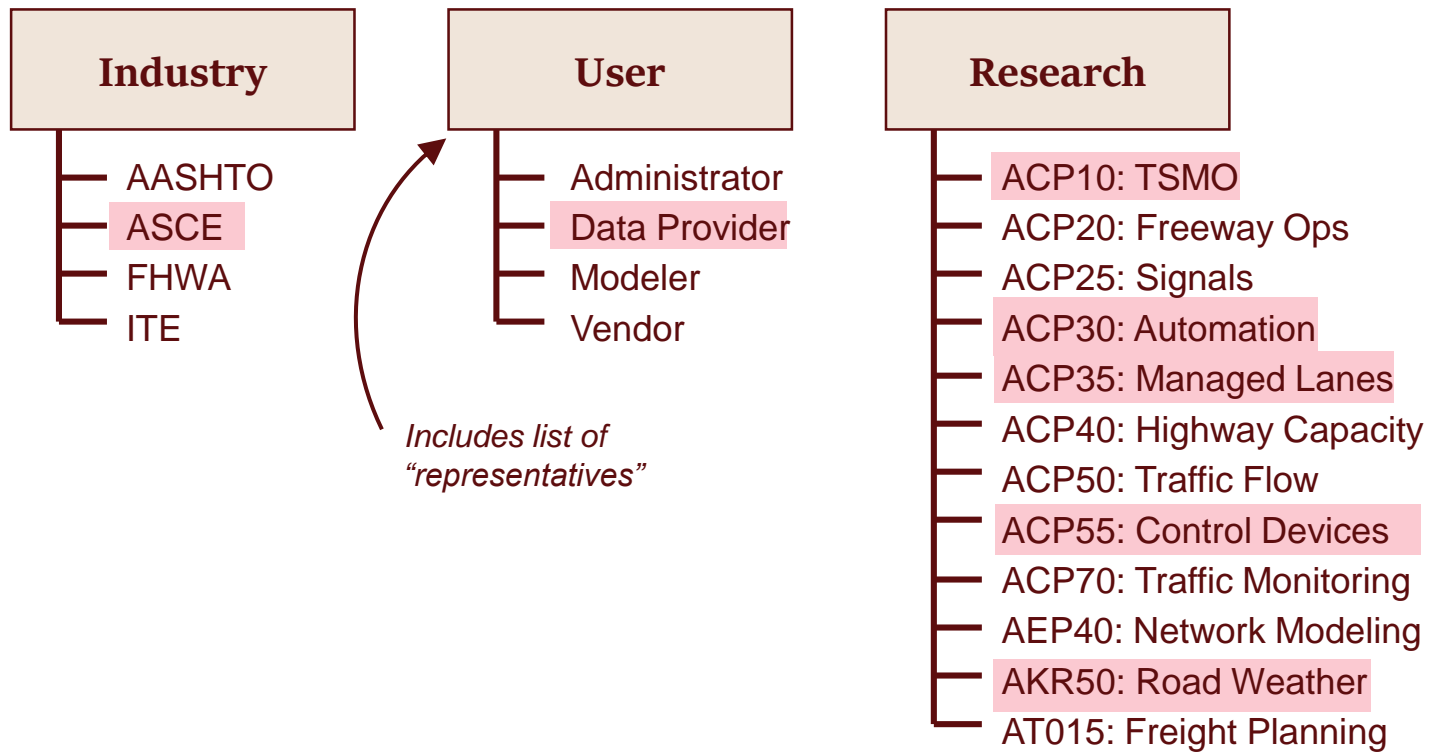


Anticipated Role

- Collecting and identifying user needs
 - Gather feedback on research products
- Recommending actions to address user needs
- Provide forum and information exchange
 - Coordinate and foster joint opportunities
- Maintain comprehensive liaison structure



Liaison Structure



Contact Info



[Chris Melson](#)
Program Manager
LTRC
cmelson1@lsu.edu



[John Shaw](#)
Researcher
InTrans
jwshaw@iastate.edu



<http://trbsimsub.uta.edu/>



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Goals as CRC

- Identify research needs
 - Develop research needs statements
 - Seek funding sources
 - Submit RNSs to funding programs
 - Share information about research needs and research in progress
 - Develop/maintain research portfolios
-



Research Needs Statements

- Identify and explain research need that can eventually be turned into a project (e.g., NCHRP)
- Due Nov 1 annually
- Can be written by anyone
- Must be submitted and supported by:
 - State highway safety office
 - Governors highway safety association executive board member
 - NHSTA
 - The more, the better
- Reviewed for AASHTO committee on Research and Innovation
- If selected, results in NCHRP project!
- Would love to have help from volunteers to develop these!!!
 - Email Vikash if interested in helping



Research Needs Statements

- Submitted one RNS this year jointly with SimSub
 - Title: Simulating Mixed Heterogeneous Traffic Flows for Better Assessment of Heavy Vehicles
 - TFTC contributing members: Samer Hamdar, Danjue Chen, Vikash Gayah
 - Supported by: Virginia and Wisconsin DOTs, supported by North Carolina, California, Florida DOTs
-



NCHRP Synthesis topics

- Documents current practice for specific highway topic
 - If selected:
 - Results in funded project of \$45K to review of specific area
 - Can lead to future NCHRP project
 - Due February 17, 2021
 - Can be written and submitted by anyone
 - Would love to have help from volunteers to develop these!!!
 - Email Vikash if interested in helping
-



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Paper Review & Sessions

Many thanks to subcommittee members, authors and reviewers!





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)



Paper Review Statistics

Annual Meeting	2021	2020	2019	2018	2017	2016	2015	2014
Papers Received	109	194	196	194	207	173	201	195
Percent increase	-44%	-1%	1%	-6%	20%	-14%	4%	13%
Presentation only	61	93	80	64	67	54	48	32
Publication only	0	0	0	4	1	2	4	3
Present and publish	48	101	116	126	139	117	149	160
Submitted Presentation	109	194	196	190	206	171	197	192
Lectern Sessions	1	5	5	5	6	6	6	5
Lectern Papers	4	25	25	25	30	31	27	23
Poster Sessions	4	5	5	4	4	3	2	2
Poster Papers	61	86	84	84	84	71	80	84
Subtotal	65	111	109	109	114	102	107	107
Percent Accepted	60%	57%	56%	57%	55%	60%	54%	56%
Rejected	44	83	87	81	92	70	90	85



Paper Review Statistics

Annual Meeting	2021	2020	2019	2018	2017	2016	2015	2014
Submitted Publication	48	101	116	129	140	119	152	163
Editorial Review	15	32						
Actual Acceptance Rate		?	20%	20%	16%	20%		
Rejected	33	69	93	95	105	81	105	95



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Some insights

We are currently working on the 2021 award season!

- 5 awards are discussed within the committee
- Previously, the paper had to be submitted (and accepted) for publication to qualify for any award. However, we are revisiting this requirement given the changes to TRR.
- Please mention your status (Msc., PhD student,...) on the front page! Also mention if the paper is eligible for the Burggraf award!
- Many of the papers submitted for publication in TRR have a young author as the first author (they in theory qualify for the Cunard award)
- Award subcommittee: Rob Bertini, Jiwon Kim, Ludovic Leclercq, Monica Menendez



D. Grant Mickle Award

- Established 1976
 - Outstanding paper published in the field of operation, safety, and maintenance of transportation facilities.
 - Honors fifth executive director, later 33rd Executive Committee Chair
 - We nominated a paper this year, but then the nomination was cancelled due to all the ongoing TRB/TRR changes.
-



Fred Burggraf Award

- Established 1966
- Stimulate and encourage young researchers
- Recognition of excellence in transportation research by researchers 35 years of age or younger whose papers have been published under the sponsorship of any Division A Standing Group
- Accompanied by a cash prize
- Honors TRB director from 1951-1964

- We nominated a paper this year, but then the nomination was cancelled due to all the ongoing TRB/TRR changes.



Cunard Award

- Stimulate and encourage young researchers
- Best 1st Young Author Paper in the area of Operations (first author 35 years of age or younger)
- The paper nominated this year won (again) the Cunard Award!



20-03535: Categorizing Merging and Diverging Strategies of Truck Drivers at Motorway Ramps and Weaving Sections using Trajectory Dataset

by Salil Sharma, Maaïke Snelder, Lóránt Tavasszy, Hans van Lint

 TRANSPORTATION RESEARCH BOARD

2020 Young First Author Best Paper Award Operations Section

Presented to

Salil Sharma, Technische Universiteit Delft

Maaïke Snelder, Lóránt Tavasszy, and

Hans van Lint, Technische Universiteit Delft

For the Paper

*Categorizing Merging and Diverging Strategies of Truck Drivers at
Motorway Ramps and Weaving Sections using a Trajectory Dataset*

Sue Ahn

*Soyoung (Sue) Ahn, Chair
TRB Traffic Flow Theory and
Characteristics Committee*

Awarded January 2021

*The National Academies of
SCIENCES • ENGINEERING • MEDICINE*

Richard A. Cunard

*Richard A. Cunard
TRB Staff Representative*



Greenshields Prize

- Recognizes the use of empirical data for understanding traffic phenomena
- Award is given within the Traffic Flow Theory committee

**20-01415: Lane detection and lane changing phenomena
identification with data from a swarm of drones**
*by Emmanouil Barmounakis, Guillaume M. Sauvin, Nikolaos
Geroliminis*

2020 Greenshields Prize Citation

Presented to

*Emmanouil Barmounakis, Guillaume M. Sauvin,
and Nikolaos Geroliminis*

Ecole Polytechnique Federale de Lausanne

For the Paper

*Lane Detection and Lane Changing Phenomena
Identification with Data from a Swarm of Drones*

Sue Ahn

*Soyoung (Sue) Ahn, Chair
TRB Traffic Flow Theory and
Characteristics Committee*

Awarded January 2021

*The National Academies of
SCIENCES • ENGINEERING • MEDICINE*

Richard A. Cunard

*Richard A. Cunard
TRB Staff Representative*



Best Paper on Traffic Flow Theory

- Recognizes theoretical papers with significant methodological contributions
- Award is given within the Traffic Flow Theory committee

20-04375: 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

TRB TRANSPORTATION RESEARCH BOARD

2020 Best Theoretical Paper on Traffic Flow Theory

Presented to

*Paul van Erp, Victor Knoop, Serge Hoogendoorn,
Technische Universiteit Delft;*

*Erik-Sander Smits, Arane Adviseurs in Verkeer en
Vervoer, and Chris Tampere, Katholieke Universiteit Leuven*

For the Paper

*Lane Detection and Lane Changing Phenomena
Identification with Data from a Swarm of Drones*

Sue Ahn

*Soyoung (Sue) Ahn, Chair
TRB Traffic Flow Theory and
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Awarded January 2021

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Richard A. Cunard

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Mid-Year Meetings

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



Mid-Year Meetings

- Midyear meeting 2020 (Postponed)
 - Amsterdam, The Netherlands, August 17-19, 2020

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

 - Midyear meeting 2022
 - Amsterdam, The Netherlands, August (?)

 - Start thinking about 2024!
-



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Midyear Annual Report



ACP50 Outreach and Diversity Subcommittee:

ACP50 Meeting
Zoom Meeting
August, 2020



Outreach and Diversity Subcommittee

- Newsletter (<http://tftcnews.blogspot.com/>): 12 issues with each issue corresponding to one month (student volunteer: Mr. Mohaiminul Haque) – New Issues Incoming
- YouTube Channel (<https://www.youtube.com/user/AHB45/feed>) (Alireza Talebpour)
- Facebook Page
- Twitter
- ISTTT Webinar (Jorge Laval)
- ACP50 Journal Club (Alireza Talebour)

New: ACP50 Integrating Channel: www.trafficflowchannel.org (under construction – Samer Hamdar & Mohaiminul Haque)



Outreach and Diversity Subcommittee



Tuesday, August 11, 2020

AHB45 Newsletter July 2020

- Special Thanks to:
 - Sue Ahn
 - Robert Bertini
 - Samer Hamdar
 - Mohaiminul Haque
 - Jorge Laval
 - Meead Saberi
 - Alireza Talebpour(All TFT website/facebook page/twitter/newsletter/webinar contributors and readers)

Transportation Research Board
Traffic Flow Theory and Characteristics
Committee—AHB 45

Newsletter

Volume 8, Issue 7
July 2020

EVENTS/ANNOUNCEMENTS

Covid-19 Pandemic Resources

The entire world is now focusing on Covid-19 Pandemic. We are living in a very difficult time. The virus has surprised almost all sectors of our societies. Our thoughts are for those who are affected by the virus. We are grateful to the public health professionals and other professionals who are helping us to fight against this invisible enemy. To learn about the symptoms of the virus and play your part in this fight, please visit [CDC Covid-19 Webpage](#).

Frontiers in Future Transportation is now open for submissions

Frontiers in Future Transportation is now open for submissions. The journal is accepting papers on various topics of transportation engineering including Connected Mobility and Automation, Freight Transport and Logistics, Transportation Emissions Transportation Systems Modeling etc. For more information about the research topics and submission guideline please visit the [website](#).

[More Details](#)

TRAFFIC IN THE MEDIA

Will Covid-19 make urban cycling more inclusive?
Christine Ro
BBC, July 29, 2020

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

frontiers
in Future Transportation



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Webinars

(Jorge A. Laval)

- TFTC Webinars reinitiated in 2020: 8 webinars
- Announcements posted on TFTC Friends and Webinars Google Groups, TFTC website and TFTC LinkedIn page
- Video recordings uploaded to TFTC YouTube channel
- More webinars are scheduled for 2021 starting in February

jorge.laval@ce.gatech.edu

rafegh@gatech.edu



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Website Update

(Robert Bertini, Ali Zockaie, Rafegh Aghamohammadi, Ehsan Kamjoo)

- Keeping the website updated/ updated AHB45 to ACP50
- Added URL: tftc-trb.org available for the committee till 2030
- Started TFTC LinkedIn page



www.tftc-trb.org



www.linkedin.com/company/tftc-trb

Website Update

(Robert Bertini, Ali Zockaie, Rafegh Aghamohammadi, Ehsan Kamjoo)

- Updated list of publications for ISTTT and TFTC (Google sheets)
- Awards page will be updated and categorized
- Promoting Google group to receive emails from committee



TFT Friends Google Group



TFT Webinars Google Group



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- New Business All Attendees
- Adjourn All Attendees



Liaison with Other Committees

- Young Members Council
E. Gonzales

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

 - Traffic Simulations Committee (ACP80)
M. Hadi
-



Agenda



- Welcome and Call to Order S. Ahn
- Introductions – Members & Friends All Attendees
- Review and Approval of Minutes S. Ahn
- Chair Report S. Ahn
- TRB Report R. Cunard/R. Bertini
- FHWA Programs & Activities J. Sturrock/R. James
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International Liaison

- Frontiers in Future Transportation: Ludovic Leclercq
- NCHRP 03-137 Project: Kaan Ozbay

NCHRP 03-137 Algorithms to Convert Basic Safety Messages into Traffic Measures

TRB 2021: Traffic Flow Theory and Characteristics (ACP50)

Presented by Kaan Ozbay

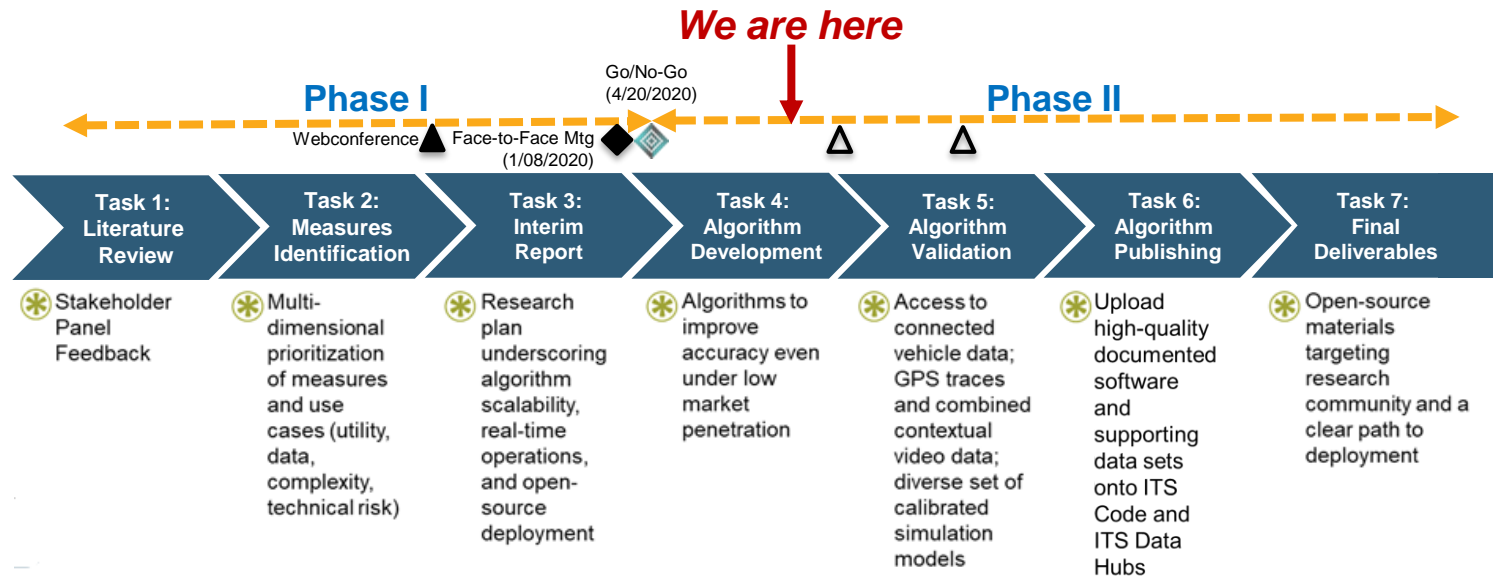
**Project PI: Meenakshy Vasudevan, Noblis
Co-PI: Kaan Ozbay, C2SMART NYU**



For the best of reasons

Project Overview

- Project Objectives:
 - Develop and validate algorithms that will use BSM data to estimate selected traffic measures (performance monitoring, traffic control, traveler information)
- Period of Performance: 1 August 2019 – 30 September 2021 (26 months)



High Priority Safety and Mobility Measures

Safety Measure	Definition
Hard Braking	Hard braking is defined to occur when a vehicle's longitudinal deceleration is greater than a certain pre-determined threshold.
Deceleration Rate to Avoid Collision (DRAC)	DRAC is defined as the minimum deceleration rate required by the following vehicle to come to a timely stop (or match the leading vehicle's speed) and hence to avoid a crash.
Time-To-Collision with Disturbance (TTCD)	TTCD is defined as the time to collision modified by imposing a hypothetical deceleration to the leading vehicle.

Mobility Measure	Definition
Travel Time	Average travel time is defined as the average time necessary to traverse a route between any two points of interest for trips that start within a specific time interval (Vasudevan <i>et al.</i> , 2016).
Space Mean Speed	Space Mean Speed is defined as the average speed of vehicles traversing pre-specified segments (e.g., 500 ft) in a specific time interval (Turner et al., 1998). It is calculated by dividing the length of the segment by the average travel time.
Queue Length	A vehicle is in a queue when it is either stopped or traveling at a speed less than 10 ft/s (3 m/s) and is approaching another queued vehicle at headway of less than 20 ft (6 m) (Dowling 2007).
Mean Time to Detect and Verify Incidents	Mean Time to Detect and Verify Incidents is defined as the average time to detect the presence of incidents on a roadway (Hadi et al. 2017).

Assumptions

GENERAL ASSUMPTIONS

- Calibrated simulation models are used to represent real-world conditions
- Basic Safety Messages are emulated using simulated vehicle trajectories and Trajectory Conversion Algorithm (TCA 2.3)
- Privacy protocols modeled in study will follow SAE J2735 standards
- Cost of RSE deployment is not part of the assessment
- Equipment failure rates are not part of the assessment

DECELERATION RATE TO AVOID COLLISION (DRAC)

- For both the off-line and on-line modes, vehicles are paired within 50 feet from each other
- For the on-line mode, vehicles are assumed to travel along the directions corresponding to the headings at the current timestamp in the future
- Rear-end conflicts are selected with relative angle at the conflict points less than 30°

TIME TO COLLISION WITH DISTURBANCE (TTCD)

- For the off-line mode, vehicles are paired within 50 feet from each other
- Hypothetical disturbance can be both acceleration and deceleration
- Hypothetical disturbance is assumed to implement on both the leading vehicle and the following vehicle

Safety Measures – Algorithm Development Approach

DATA

BSM converted from simulated vehicle trajectories extracted on a freeway segment along Interstate 78 in New Jersey and one intersection along Flatbush Avenue in Brooklyn, NY.

Algorithm Development			
Algorithm	Hard Braking	DRAC	TTCD
Mode	Off-line & on-line	Off-line & on-line	Off-line

Algorithm Testing			
Determine optimal thresholds	Maximizing the correlation coefficient with crash data		
Determine the minimum required market penetration rate (MPR) level	Method 1: Based on similarity measured by event counts Method 2: Based on similarity measured by spatial hotspots distribution		
Calibrate the hypothetical disturbance using field data	NA	NA	Based on drone-collected vehicle trajectories
Determine the minimum number of Monte Carlo (MC) simulation runs	NA	NA	Based on convergence diagram
Conduct sensitivity analysis on the disturbance distribution	NA	NA	By adding spread to the calibrated hypothetical disturbance distribution

Challenges

Overall Challenges

- Developing route and segment-level metrics from anonymized vehicle message-level data

Safety Measure Challenges

- Crash data are needed to determine the optimal threshold for all three safety measures
- Field observed vehicle trajectories are needed to calibrate the distribution of the hypothetical disturbance for TTCD
- The calculation of the DRAC and TTCD values requires vehicle pairs that may be limited by low market penetration rate levels

Key Contributions and Next Steps

Key Contributions

- Developed novel algorithms to convert BSM into three high-priority safety measures for off-line modes and hard braking and DRAC for on-line mode. No current off-the-shelf software exists to compute DRAC and TTCD
- Improved the original TTCD algorithm by 1) imposing the disturbance to both the leading and the following vehicles; 2) expanding the disturbance to include both the deceleration and acceleration rate; 3) including lane-change and crossing types of conflicts
- Developed a method to explore the optimal threshold that overcomes the limitation of arbitrary selection of thresholds
- Developed two statistical approaches to determine the minimum MPR level required for safety analysis
- Calibrated the distribution of the hypothetical disturbance using field-collected vehicle trajectory data from drones and traffic cameras
- Conducted sensitivity analysis on the disturbance distribution to investigate the impact of the disturbance distribution on the identified risk

Next Steps

- Validate algorithms for prioritized measures using field or simulated data
- Publish well-documented, tested and validated algorithms as open source
- Prepare and publish cleansed data and metadata



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Announcements and Future Meetings



- Automated Vehicles Symposium 2021, TBD
 - ISTTT24, July 24-26, 2021, Beijing, China
 - The 11th Triennial Symposium on Transportation Analysis, Mauritius island, 20-24 June 2022
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New Business

- 2021 Annual Meeting Call for Papers (Due in May)
 - 2021 Workshop Proposals (Due in June)
 - Triennial Strategic Plan
 - Special TFTC Session in 2022 ?
 - Revise Monograph on Traffic Flow Theory?
-



Parting Thoughts...



Adjourn



Please don't forget to sign in!
