CENTER FOR CONNECTED AND AUTOMATED TRANSPORTATION

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2021 International Symposium on Transportation Data and Modelling

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DISCLAIMER

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Technical Report Documentation Page

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16. Abstract This project partially sponsored the organization of the 2021 International Symposium on Transportation Data and Modeling (ISTDM 2021), which aims to gather transportation researchers and practitioners across the globe for exploring the frontiers of big data, modeling and simulation to advance transportation research to support the connected, cooperative and automated mobility. Due to the COVID-19 pandemic, the conference was held virtually June 21-24, 2021. Its program consisted of 8 keynote talks, and 104 regular or lightning talks. It attracted more than 1,100 registrations, and the accumulated number of attendees was more than 2960.		
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Chapter 1

Introduction

This project partially sponsored the organization of the 2021 International Symposium on Transportation Data and Modeling (ISTDM 2021), which aims to gather transportation researchers and practitioners across the globe for exploring the frontiers of big data, modeling and simulation to advance transportation research to support the connected, cooperative and automated mobility. With a greater focus on emerging technologies, ISTDM 2021 rebrands the two long-standing transportation symposia: International Symposium of Transport Simulation (ISTS), and the International Workshop on Traffic Data Collection and its Standardization (IWTDCS).

1.1 Topics

ISTDM 2021 covers the following topics:

A. Data

- Business analytics
  - Machine learning applications
  - Innovative data collection and processing
  - Data fusion
- Data management and quality
- Data-informed decision making

B. Modelling AND Simulation

- Demand modeling
- Travel behaviors
- Transportation network modeling
- Traffic flow theory and operations
- Traffic safety
- Pedestrian modelling and simulation
- Urban logistics/freight transportation
- Environmental impacts and air quality

C. Emerging Mobility Trends

- Connected vehicles
- Vehicle infrastructure integration
- Implication of automated vehicles

  - Operations with mixed traffic
  - Electrification
  - Shared mobility
  - Emerging mobility services

1.2 Important Dates

ISTDM 2021 was organized as per the following timeline:

- October 1, 2020 Abstract Submission START
- December 1, 2020 Abstract Submission DUE
- February 15, 2021 Notification of Acceptance
- May 1, 2021 Registration Opens to the public
- June 21-24, 2021 Conference

1.3 Keynote Speakers

- Dr. Kay Axhausen, Professor, ETH Zürich
- Dr. Alexandre Bayen, Professor, University of California, Berkeley
- Dr. Chandra Bhat, Professor, University of Texas, Austin
- Dr. Nikolas Geroliminis, Associate Professor, École Polytechnique Fédérale de Lausanne
- Dr. Fengmin Gong, Vice President, InfoSec Strategy at Didi Chuxing and Head of DiDi Labs
- Dr. Henry Liu, Professor, University of Michigan
- Dr. Hani Mahmassani, Professor, Northwestern University
- Dr. Hai Yang, Chair Professor, Hong Kong University of Science and Technology

1.4 Organizing Committee

- Dr. Yafeng Yin, Chair of Organizing Committee, Professor, Department of Civil and Environmental Engineering, University of Michigan
- Dr. Neda Masoud, Co-chair of Organizing Committee, Assistant Professor, Department of Civil and Environmental Engineering, University of Michigan
- Dr. Xiaopeng (Shaw) Li, Associate professor, Civil and Environmental Engineering, University of South Florida
- Dr. Qi Luo, Assistant Professor, Industrial Engineering, Clemson University
- Dr. Gábor Orosz, Associate Professor, Department of Mechanical Engineering, University of Michigan
- Dr. Carolina Osorio, Associate Professor, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology
- Dr. Zhen (Sean) Qian, Associate Professor, Department of Civil and Environmental Engineering, Carnegie Mellon University

- Dr. Samitha Samaranayake, Assistant Professor, Department of Civil and Environmental Engineering, Cornell University
- Dr. Ali Shirazi, Assistant Professor, Department of Civil and Environmental Engineering, University of Maine
- Dr. Ziqi Song, Assistant Professor, Department of Civil and Environmental Engineering, Utah State University
- Dr. Zhengtian Xu, Assistant Professor, Department of Civil and Environmental Engineering, George Washington University
- Dr. Ali Zockaie, Assistant Professor, Department of Civil and Environmental Engineering, Michigan State University

1.5 Local Organizing Committee

- Dr. Yafeng Yin, Chair of Organizing Committee, Professor, Department of Civil and Environmental Engineering, University of Michigan
- Dr. Neda Masoud, Co-chair of Organizing Committee, Assistant Professor, Department of Civil and Environmental Engineering, University of Michigan
- Dr. Gábor Orosz, Associate Professor, Department of Mechanical Engineering, University of Michigan
- Dr. Tian Mi, Postdoctoral Research Fellow, Department of Civil and Environmental Engineering, University of Michigan
- Dr. Sina Bahrami, Postdoctoral Research Fellow, Department of Civil and Environmental Engineering, University of Michigan
- Dr. Xiaotong Sun, Postdoctoral Research Fellow, Department of Civil and Environmental Engineering, University of Michigan
- Guoyang Qin, PhD Candidate, Department of Traffic Engineering, Tongji University

1.6 ISTDM Steering Committee

- Dr. Jaume Barceló, Professor, Department of Statistics and Operations Research, Universitat Politècnica de Catalunya
- Dr. Edward Chung, Professor, Department of Electrical Engineering, Hong Kong Polytechnic University
- Dr. Nour-Eddin El Faouzi, Professor, School of Civil Engineering and Sustainable Development, University of Lyon
- Dr. Masao Kuwahara, Professor, Graduate School of Information Sciences, Tohoku University
- Dr. Hani Mahmassani, Professor, Department of Civil and Environmental Engineering, Northwestern University
- Dr. Majid Sarvi, Professor, Department of Infrastructure Engineering, The University of Melbourne
- Dr. Alexander Skabardonis, Professor, Department of Civil and Environmental Engineering, University of California, Berkeley
- Dr. Yafeng Yin, Professor, Department of Civil and Environmental Engineering, University of Michigan

1.7 International Scientific Committee

- Dr. Yasuo Asakura (Tokyo Institute of Technology, Japan)
- Dr. Kay Axhausen (ETH Zürich, Switzerland)
- Dr. Jaume Barceló (Technical University of Catalonia, Spain)
- Dr. Alexandre Bayen (University of California, Berkeley, United States)
- Dr. Michael Bell (University of Sydney, Australia)
- Dr. Chandra Bhat (University of Texas, Austin, United States)
- Dr. Stephen Boyles (University of Texas, Austin, United States)
- Dr. Joseph Chow (New York University, United States)
- Dr. Edward Chung (Hong Kong Polytechnic University, Hong Kong)
- Dr. Nour-Eddin El Faouzi (ENTPE, France)
- Dr. Ziyou Gao (Beijing Jiaotong University, China)
- Dr. Nikolas Geroliminis (EPFL, Switzerland)
- Dr. Haijun Huang (Beihang University, China)
- Dr. Wenlong Jin (University of California, Irvine, United States)
- Dr. Masao Kuwahara (Tohoku University, Japan)
- Dr. William Lam (Hong Kong Polytechnic University, Hong Kong)
- Dr. Jorge Laval (Georgia Institute of Technology, United States)
- Dr. Seungjae Lee (University of Seoul, South Korea)
- Dr. Henry Liu (University of Michigan, United States)
- Dr. Ronghui Liu (University of Leeds, United Kingdom)
- Dr. Hong Lo (Hong Kong University of Science and Technology, Hong Kong)
- Dr. Hani Mahmassani (Northwestern University, United States)
- Dr. Eric J. Miller (University of Toronto, Canada)
- Dr. Yu (Marco) Nie (Northwestern University, United States)
- Dr. Yanfeng Ouyang (University of Illinois at Urbana–Champaign, United States)
- Dr. Kaan Özbay (New York University, United States)
- Dr. Markos Papageorgiou (Technology University of Crete, Greece)
- Dr. Srinivas Peeta (Georgia Institute of Technology, United States)
- Dr. Bin Ran (University of Wisconsin, United States)
- Dr. Stephen Ritchie (University of California, Irvine, United States)
- Dr. Majid Sarvi (University of Melbourne, Australia)
- Dr. James Sayer (University of Michigan Transportation Research Institute, United States)

- Dr. Amer Shalaby (University of Toronto, Canada)
- Dr. Yasuhiro Shiomi (Ritsumeikan University, Japan)
- Dr. Alexander Skabardonis (University of California, Berkeley, United States)
- Dr. Agachai Sumalee (Hong Kong Polytechnic University, Hong Kong)
- Dr. Lijun Sun (McGill University, Canada)
- Dr. S. Travis Waller (University of New South Wales, Australia)
- Dr. Yinhai Wang (University of Washington, United States)
- Dr. S.C. Wong (University of Hong Kong, Hong Kong)
- Dr. Hai Yang (Hong Kong University of Science and Technology, Hong Kong)
- Dr. Toshio Yoshii (Ehime University, Japan)
- Dr. Lei Zhang (University of Maryland, United States)

1.8 Other Information

- Website: https://limos.engin.umich.edu/istdm2021

Chapter 2

Registration Information

2.1 Author Registration

Due to the Covid-19 pandemic, the 2021 International Symposium on Transportation Data and Modelling (ISTDM) was held virtually on Zoom during June 21-24, 2021.

To finalize the program, the authors were required to make a formal registration. The registration was free for all authors. The registration started on March 5, 2021, and ended on April 10, 2021. Every submission must have at least the presenter registered before the deadline, otherwise the submission would not be included in the final program.

2.2 Public Registration

The public registration started on May 1, 2021. The registration was free for all attendees.

2.3 Registration Numbers

By 8 am of June 21, 2021 (EDT), 1,100 attendees coming from 456 cities in 58 countries/regions registered to the conference.

Chapter 3

Conference Program

The conference lasted for four days. There were 8 invited talks and 104 regular and lightning talks in total. The program was designed to facilitate attendees from different time zones, and events took place in the morning (9:00 am - 12:30 pm EST). Each day started a keynote session (50 minutes), followed by 6 parallel sessions (80 minutes, including 4 regular sessions and 2 lightning sessions), and then ended by another keynote session (50 minutes).

The details of the presentations in the keynote sessions are listed below, and the program is attached in the Appendix.

3.1 Keynote Sessions

- Keynote Session 1
  - Title: Smart Mobility Management in the Era of Smart Transportation
  - Speaker: Hai Yang
  - Abstract: The current revolutions of sharing, automation and electrification are reshaping the way we travel, with broad implications for future mobility management. While much uncertainty remains about how these disruptive technologies would exactly impact demand for future mobility and enhancement of transportation supply, it is clear that Innovative demand management is equally important as smart supply technology development in solving worsening traffic problems in big cities. In this talk, I will discuss the opportunities and challenges of smart mobility management in the era of smart transportation. Innovative ways of travel demand management are described, including tradable travel credit scheme for road congestion mitigation, revenue-preserving and Pareto-improving strategies for peak-hour transit demand management congestion, and a novel reward scheme integrated with surge pricing in a ride-sourcing market.
- Keynote Session 2
  - Title: Operational Strategies for Urban Air Mobility and 4D System Fundamental Diagrams
  - Speaker: Hani Mahmassani
  - Abstract: We take urban mobility to the next level by considering shared mobility services offered through automated electric vertical take-off and landing (eVTOL) vehicles (“flying taxis”), enabled by new generation of eVTOL aircraft. We present various concepts for service operations at urban/regional levels, along with algorithms adapted for the real-time operation of shared air mobility fleets. We also examine the congestability of urban air space through a microscopic simulation and illustrate the emergence of system fundamental diagram (for properly defined averages taken over four-dimensional space) comparable in shape to urban road traffic networks.

- Keynote Session 3
  - Title: On the Inefficiency and Management of Ride-Sourcing Services towards Urban Congestion
  - Speaker: Nikolas Geroliminis
  - Abstract: Human mobility in congested city centers is a complex dynamical system with high density of population, many transport modes to compete for limited available space and many operators that try to efficiently manage different parts of this system. New emerging modes of transportation, such as ride-hailing and on-demand services create additional opportunities, but also more complexity. Little is known about to what degree its operations can interfere in traffic conditions, while replacing other transportation modes, or when a large number of idle vehicles is cruising for passengers. We experimentally analyze the efficiency of TNCs using taxi trip data from a Chinese megacity and an agent-based simulation with a trip-based MFD model for determining the speed. We investigate the effect of expanding fleet sizes for TNCs, passengers' inclination towards sharing rides, and strategies to alleviate urban congestion. We observe that, although a larger fleet size reduces waiting time, it also intensifies congestion, which, in turn, prolongs the total travel time. Such congestion effect is so significant that it is nearly insensitive to passengers' willingness to share and flexible supply. Finally, parking management strategies can prevent idle vehicles from cruising without assigned passengers, mitigating the negative impacts of ride-sourcing over congestion, and improving the service quality. We are also developing different type of control strategies, such as relocation of empty vehicles, parking management and pricing incentives to alleviate the negative effects.
- Keynote Session 4
  - Title: Lagrangian Control at Large and Local Scales in Mixed Autonomy Traffic Flow
  - Speaker: Alexandre Bayen
  - Abstract: This talk investigates Lagrangian (mobile) control of traffic flow at local scale (vehicular level). The question of how self-driving vehicles will change traffic flow patterns is investigated. We describe approaches based on deep reinforcement learning presented in the context of enabling mixed-autonomy mobility. The talk explores the gradual and complex integration of automated vehicles into the existing traffic system. We present the potential impact of a small fraction of automated vehicles on low-level traffic flow dynamics, using novel techniques in model-free deep reinforcement learning, in which the automated vehicles act as mobile (Lagrangian) controllers to traffic flow. Illustrative examples will be presented in the context of a new open-source computational platform called FLOW, which integrates state of the art microsimulation tools with deep-RL libraries on AWS EC2. Interesting behavior of mixed autonomy traffic will be revealed in the context of emergent behavior of traffic: https://flow-project.github.io/
- Keynote Session 5
  - Title: Intelligent Driving Intelligence Test for Autonomous Vehicles with Naturalistic and Adversarial Driving Environment
  - Speaker: Henry Liu
  - Abstract: Driving intelligence tests are critical to the development and deployment of autonomous vehicles. The prevailing approach tests autonomous vehicles in life-like simulations of the naturalistic driving environment. However, due to the high dimensionality of the environment and the rareness of safety-critical events, hundreds of millions of miles would be required to demonstrate the safety performance of autonomous vehicles, which is severely inefficient. We discover that sparse but adversarial adjustments to the naturalistic driving environment, resulting in the naturalistic and adversarial driving environment, can

significantly reduce the required test miles without loss of evaluation unbiasedness. By training the background vehicles to learn when to execute what adversarial maneuver, the proposed environment becomes an intelligent environment for driving intelligence testing. We demonstrate the effectiveness of the proposed environment in a highway-driving simulation. Comparing with the naturalistic driving environment, the proposed environment can accelerate the evaluation process by multiple orders of magnitude.

- Keynote Session 6
  - Title: Better Journeys For All Through Impact, Innovation & Responsibility
  - Speaker: Fengmin Gong
  - Abstract: Data science and AI are at the core of the "fourth industrial resolution". While the science and technology community are diligently pushing the frontier for the benefits of humanity, some fear the negative impact of the same. The crust of the matter is that, Data science and AI are powerful tools with huge potential, HOW we harness this power is the most critical factor to success or disaster. In this talk, I will share three main guiding principles — impact, innovation, and responsibility, which should help us to do the right things the right way in applying AI. DiDi has been at the forefront in transforming transportation through AI. To illustrate these principles, I will use some examples in reinforcement learning for optimization, NLP for safe rides, and use-case driven simulation for AV.
- Keynote Session 7
  - Title: Thinking about the Long-Term Impacts of the Pandemic
  - Speaker: Kay Axhausen
  - Abstract: The pandemic has accelerated a number of trends with a big impact on the transport system: working from home and e-commerce. The presentation will outline the behavioural changes observed in the last year using a substantial Swiss GPS tracking panel. Based on these changes it will discuss, if these are enough to address the dilemma of transport planning between accessibility improvements and induced demand, especially given our duty to reduce GHG emissions.
- Keynote Session 8
  - Title: What Can We Learn about Travel and Safety Implications from Partially Automated Vehicle Use?
  - Speaker: Chandra Bhat
  - Abstract: Investigating the potential activity-travel behavior impacts of fully autonomous vehicles (designated as Level 5 automation on the Society of Automotive Engineers or SAE scale) can only be undertaken today through stated preference or SP surveys (that is, asking individuals how they may change their mobility patterns in a hypothetical environment with a Level 5 vehicle). But individuals may not be in a position to provide appropriate responses when thrust into a hypothetical environment that is difficult to conjure up. In this regard, SAE Level 1 features (such as adaptive cruise control or parking assist features) are in most new vehicles today, while many higher-end vehicles today also achieve Level 2 automation (such as vehicles with adaptive cruise control, hands-free lane changing, and self-parking). The availability and use of these vehicles today, albeit with lower levels of automation, can provide important and reliable insights on how travel patterns may change with advancing technology. In this paper, we propose to examine potential mobility changes due to technology features that exist today in vehicles. Importantly, while some earlier studies have examined consumer acceptance of existing vehicle technology, we go beyond consumer acceptance to also examine how individuals with and without automation features in their vehicles differ in their annual vehicle miles of travel (VMT). Potential implications for roadway safety due to VMT changes are also discussed.

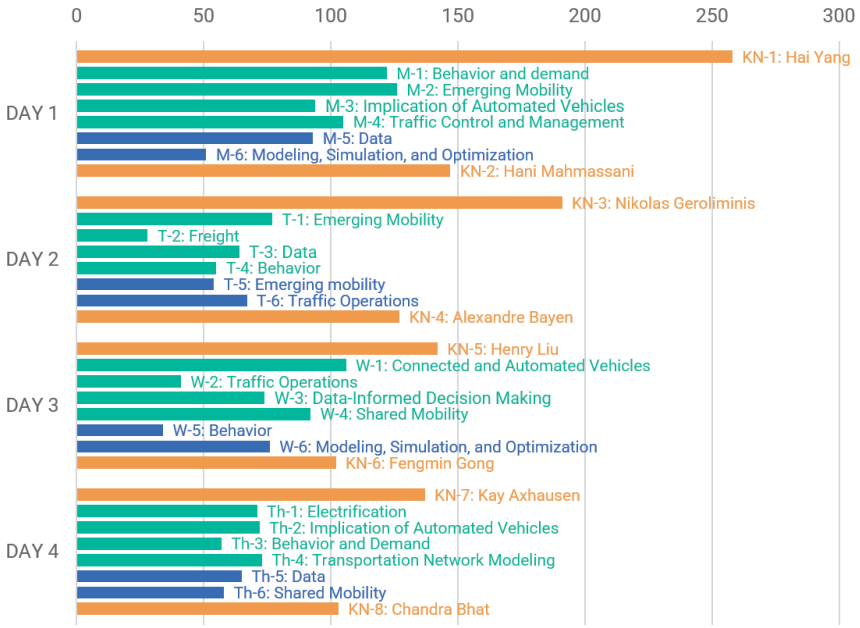
Chapter 4

Impacts

4.1 Attendance Information

The number of attendees to each session is shown in Figure. 4.1 and Table. 4.1.

Figure 4.1: Numbers of Attendees



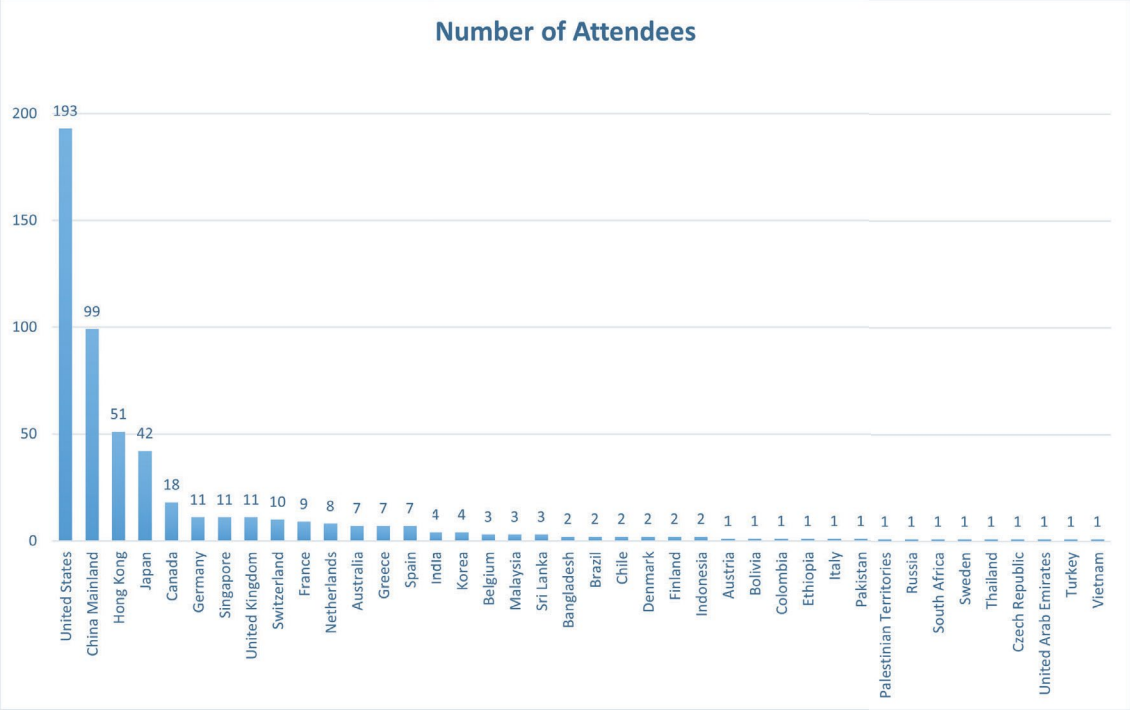
	Keynote 1	M-1	M-2	M-3	M-4	M-5	M-6	Keynote 2
Number of attendees	258	122	126	94	105	93	51	147
	Keynote 3	T-1	T-2	T-3	T-4	T-5	T-6	Keynote 4
Number of attendees	191	77	28	64	55	54	67	127
	Keynote 5	W-1	W-2	W-3	W-4	W-5	W-6	Keynote 6
Number of attendees	142	106	41	74	92	34	76	102
	Keynote 7	Th-1	Th-2	Th-3	Th-4	Th-5	Th-6	Keynote 8
Number of attendees	137	71	72	57	73	65	58	101

Table 4.1: Numbers of Attendees

4.2 Country/Region Information

The country/region information of attendees who participated in the 8 Keynote Sessions is shown in Figure. 4.2.

Figure 4.2: Countries/Regions of the Attendees in the Keynote Sessions



4.3 Output

Links to all the presentations (including 8 Keynote presentations and 104 Regular/Lightning presentations) are listed as follows:

- Keynote Speech Pages (8)
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-1-hai-yang/
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-2-hani-mahmassani/
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-3-nikolas-geroliminis/
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-4-alexandre-bayen/
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-5-henry-liu/
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-6-fengmin-gong/
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-7-kay-axhausen/
  - https://limos.engin.umich.edu/istdm2021/session/keynote-session-8-chandra-bhat/

- Presentation Pages (104)
  - https://limos.engin.umich.edu/istdm2021/session/m-1-regular-session-behavior-and-demand-abolfazl-kouros-mohammadian/
  - https://limos.engin.umich.edu/istdm2021/session/m-1-regular-session-behavior-and-demand-eric-miller/
  - https://limos.engin.umich.edu/istdm2021/session/m-1-regular-session-behavior-and-demand-milos-balac/
  - https://limos.engin.umich.edu/istdm2021/session/m-1-regular-session-behavior-and-demand-wataru-nakanishi/
  - https://limos.engin.umich.edu/istdm2021/session/m-2-regular-session-emerging-mobility-bangyang-wei-2/
  - https://limos.engin.umich.edu/istdm2021/session/m-2-regular-session-emerging-mobility-francisco-calderon-2/
  - https://limos.engin.umich.edu/istdm2021/session/m-2-regular-session-emerging-mobility-xiaohui-liu-2/
  - https://limos.engin.umich.edu/istdm2021/session/m-2-regular-session-emerging-mobility-zhengfei-zheng-2/
  - https://limos.engin.umich.edu/istdm2021/session/m-3-regular-session-implication-of-automated-vehicles-carol-flannagan/
  - https://limos.engin.umich.edu/istdm2021/session/m-3-regular-session-implication-of-automated-vehicles-fatemeh-fakhrmoosavi/
  - https://limos.engin.umich.edu/istdm2021/session/m-3-regular-session-implication-of-automated-vehicles-qida-su/
  - https://limos.engin.umich.edu/istdm2021/session/m-3-regular-session-implication-of-automated-vehicles-zhaocai-liu/
  - https://limos.engin.umich.edu/istdm2021/session/m-4-regular-session-traffic-control-and-management-michael-levin/
  - https://limos.engin.umich.edu/istdm2021/session/m-4-regular-session-traffic-control-and-management-monika-filipovska/
  - https://limos.engin.umich.edu/istdm2021/session/m-4-regular-session-traffic-control-and-management-qiong-tian/
  - https://limos.engin.umich.edu/istdm2021/session/m-4-regular-session-traffic-control-and-management-toru-seo/
  - https://limos.engin.umich.edu/istdm2021/session/m-5-lightning-session-data-celso-fernando/
  - https://limos.engin.umich.edu/istdm2021/session/m-5-lightning-session-data-jintao-ke/
  - https://limos.engin.umich.edu/istdm2021/session/m-5-lightning-session-data-xavier-ros-roca/
  - https://limos.engin.umich.edu/istdm2021/session/m-5-lightning-session-data-yohan-chang/
  - https://limos.engin.umich.edu/istdm2021/session/m-5-lightning-session-data-yosuke-kawasaki/
  - https://limos.engin.umich.edu/istdm2021/session/m-6-lightning-session-modeling-simulation-and-optimization-chen-yang/
  - https://limos.engin.umich.edu/istdm2021/session/m-6-lightning-session-modeling-simulation-and-optimization-jie-yang/

- https://limos.engin.umich.edu/istdm2021/session/m-6-lightning-session-modeling-simulation-and-optimization-marcel-kleiber/
- https://limos.engin.umich.edu/istdm2021/session/m-6-lightning-session-modeling-simulation-and-optimization-yineng-wang/
- https://limos.engin.umich.edu/istdm2021/session/t-1-regular-session-emerging-mobility-amirmahdi-tafreshian-2/
- https://limos.engin.umich.edu/istdm2021/session/t-1-regular-session-emerging-mobility-kenan-zhang-2/
- https://limos.engin.umich.edu/istdm2021/session/t-1-regular-session-emerging-mobility-min-xu-2/
- https://limos.engin.umich.edu/istdm2021/session/t-1-regular-session-emerging-mobility-yingyan-lou-2/
- https://limos.engin.umich.edu/istdm2021/session/t-2-regular-session-freight-guoqing-zhang-2/
- https://limos.engin.umich.edu/istdm2021/session/t-2-regular-session-freight-mausam-duggal-2/
- https://limos.engin.umich.edu/istdm2021/session/t-2-regular-session-freight-sudheer-ballare-2/
- https://limos.engin.umich.edu/istdm2021/session/t-2-regular-session-freight-tanvir-ahamed-2/
- https://limos.engin.umich.edu/istdm2021/session/t-3-regular-session-data-ang-li-2/
- https://limos.engin.umich.edu/istdm2021/session/t-3-regular-session-data-di-yang-2/
- https://limos.engin.umich.edu/istdm2021/session/t-3-regular-session-data-xiangyang-guan-2/
- https://limos.engin.umich.edu/istdm2021/session/t-3-regular-session-data-zijian-hu-2/
- https://limos.engin.umich.edu/istdm2021/session/t-4-regular-session-behavior-hebert-azevedo-sa-2/
- https://limos.engin.umich.edu/istdm2021/session/t-4-regular-session-behavior-mingyou-ma/
- https://limos.engin.umich.edu/istdm2021/session/t-4-regular-session-behavior-ragavendran-gopalakrishnan/
- https://limos.engin.umich.edu/istdm2021/session/t-4-regular-session-behavior-zhengtian-xu/
- https://limos.engin.umich.edu/istdm2021/session/t-5-lightning-session-emerging-mobility-aurore-sallard-2/
- https://limos.engin.umich.edu/istdm2021/session/t-5-lightning-session-emerging-mobility-evangelos-mintsis-2/
- https://limos.engin.umich.edu/istdm2021/session/t-5-lightning-session-emerging-mobility-huimin-yan-2/
- https://limos.engin.umich.edu/istdm2021/session/t-5-lightning-session-emerging-mobility-qianwen-li-2/
- https://limos.engin.umich.edu/istdm2021/session/t-5-lightning-session-emerging-mobility-rafaqat-ali-2/

- https://limos.engin.umich.edu/istdm2021/session/t-6-lightning-session-traffic-operations-lukas-vacek/
- https://limos.engin.umich.edu/istdm2021/session/t-6-lightning-session-traffic-operations-md-abu-sayed/
- https://limos.engin.umich.edu/istdm2021/session/t-6-lightning-session-traffic-operations-monika-filipovska/
- https://limos.engin.umich.edu/istdm2021/session/t-6-lightning-session-traffic-operations-rongsheng-chen/
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- https://limos.engin.umich.edu/istdm2021/session/t-6-lightning-session-traffic-operations-zhanguo-song/
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- https://limos.engin.umich.edu/istdm2021/session/w-1-regular-session-connected-and-automated-vehicles-xiaopeng-li/
- https://limos.engin.umich.edu/istdm2021/session/w-1-regular-session-connected-and-automated-vehicles-yingyan-lou/
- https://limos.engin.umich.edu/istdm2021/session/w-2-regular-session-traffic-operations-ali-zockaie/
- https://limos.engin.umich.edu/istdm2021/session/w-2-regular-session-traffic-operations-daniel-bramich/
- https://limos.engin.umich.edu/istdm2021/session/w-2-regular-session-traffic-operations-david-hale/
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- https://limos.engin.umich.edu/istdm2021/session/w-3-regular-session-data-informed-decision-making-matthew-daus/
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- https://limos.engin.umich.edu/istdm2021/session/w-3-regular-session-data-informed-decision-making-yiyang-wang/
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- https://limos.engin.umich.edu/istdm2021/session/w-4-regular-session-shared-mobility-nicholas-caros/
- https://limos.engin.umich.edu/istdm2021/session/w-4-regular-session-shared-mobility-xiaolin-cai/
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- https://limos.engin.umich.edu/istdm2021/session/w-5-lightning-session-behavior-xiangyang-guan-2/
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- https://limos.engin.umich.edu/istdm2021/session/w-6-lightning-session-modeling-simulation-and-optimization-md-mintu-miah/
- https://limos.engin.umich.edu/istdm2021/session/w-6-lightning-session-modeling-simulation-and-optimization-mohammad-miralinaghi/
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- https://limos.engin.umich.edu/istdm2021/session/w-6-lightning-session-modeling-simulation-and-optimization-zhixiong-luo/
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- https://limos.engin.umich.edu/istdm2021/session/th-1-regular-session-electrification-lili-du/
- https://limos.engin.umich.edu/istdm2021/session/th-1-regular-session-electrification-mohammadreza-kavianipour/
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- https://limos.engin.umich.edu/istdm2021/session/th-3-regular-session-behavior-and-demand-wenwen-zhang/
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- https://limos.engin.umich.edu/istdm2021/session/th-4-regular-session-transportation-network-modeling-noriko-kaneko/
- https://limos.engin.umich.edu/istdm2021/session/th-4-regular-session-transportation-network-modeling-timothy-tay/

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- https://limos.engin.umich.edu/istdm2021/session/th-5-lightning-session-data-zahra-eftekhar/
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- https://limos.engin.umich.edu/istdm2021/session/th-6-lightning-session-shared-mobility-irene-martinez/
- https://limos.engin.umich.edu/istdm2021/session/th-6-lightning-session-shared-mobility-matthew-dean/
- https://limos.engin.umich.edu/istdm2021/session/th-6-lightning-session-shared-mobility-xiaotong-guo/
- https://limos.engin.umich.edu/istdm2021/session/th-6-lightning-session-shared-mobility-yunhai-gong/

Chapter 5

Appendix: Program

DAY 1/4 **ISTDM 2021 CONFERENCE PROGRAM** (Going Virtual June 21-24, 2021)

ISTDM 2021

0 June 21, Monday

8:45 -9:00	Opening Ceremony					
9:00 -9:50	Keynote Session 1: Smart Mobility Management in the Era of Smart Transportation					
	Host	Yafeng Yin, Neda Masoud				
	Speaker	Hai Yang				
9:50 -10:00	Break					
10:00 -11:20	M-1: Regular Session	M-2: Regular Session	M-3: Regular Session	M-4: Regular Session	M-5: Lightning Session	M-6: Lightning Session
	Behavior and demand	Emerging Mobility	Implication of Automated Vehicles	Traffic Control and Management	Data	Modeling, Simulation, and Optimization
Chair	Carolina Osorio carolina.osorio@hec.ca	Zhengtian Xu zhengtian@email.gwu.edu	Gabor Orosz orosz@umich.edu	Samitha Samaranayake samitha@cornell.edu	Qi Luo qiluo.email@gmail.com	Ali Shirazi shirazi@maine.edu
Host	Sina Bahrami sinab@umich.edu	Alex Sundt asundt@umich.edu	Minghao Shen mhshen@umich.edu	Tara Radvand tararad@umich.edu	Yiyang Wang yiyangw@umich.edu	Amir Tafreshian atafresh@umich.edu
10:00 -10:20	28[Milos Balac](Dynamic Demand Estimation for Single-Ride AMoD and Fleet Size Optimization for Pooled AMoD across the Globe)	6[Francisco Calderon](On the Generality of Emerging Mobility Services' Operational Processes)	164[Qida Su](On the Build-Operate-Transfer Projects of Automated Roadways)	8[Michael Levin](Max-Pressure Signal Control with Cyclical Phase Structure)	30[Yohan Chang](SynTIS: Synthetic Traveler Information in Smart City)	20[Marcel Kleiber](Simulating Traffic Dynamics Subject To Perceptional Errors)
10:20 -10:40	107[Eric Miller](A Tour-Based Transit Station Auto Access-Egress Model)	94[Xiaohui Liu](A Data-Driven Approach to Manage the Curbside Ride-Hailing Pick-ups and Drop-offs)	67[Fatemeh Fakhrmoosavi](Incorporating a Mixed Fleet of Autonomous, Connected, and Human-Driven Vehicles into a Mesoscopic Simulation Tool Considering Network Capacity Variations with Heterogeneous Drivers)	19[Toru Seo](Evaluation of Large-Scale Complete Vehicle Trajectories Dataset on Two Kilometers Highway Segment for One Hour Duration: Zen Traffic Data)	10[Yosuke Kawasaki](Analysis of Features of the Routes Using Probe Trajectory Data)	39[Jie Yang](Mechanism Design for Stochastic Dynamic Parking Resource Allocation)
10:40 -11:00	97[Abolfazl (Kouros) Mohammadian](Complexity of Travel-Based Multitasking and Its Association to Latent Lifestyles)	64[Bangyang Wei](Temporal Capacity Allocation and Tolling Schemes for Morning Commute with Carpooling)	122[Zhaocai Liu](Network User Equilibrium Problems with Infrastructure-Enabled Autonomy)	105[Qiong Tian](Traffic Light Control Strategy Based on Macroscopic Fundamental Diagram)	37[Jintao Ke](Origin-Destination Demand Prediction Via Spatial-Temporal Multi-Graph CNN)	65[Yineng Wang](Online Operation Strategies for Automated Multistory Parking Facilities)
11:00 -11:20	15[Wataru Nakanishi](Application of Eigenvector Spatial Filtering to Travel Destination Choice Model: A Case Study of Municipality-Size Choice in Hokkaido Island, Japan)	47[Zhengfei Zheng](The Critical Passenger Mass for Achieving a Societally Beneficial Ride-Splitting Program)	113[Carol Flannagan](Urban Taxi vs Non-taxi Crashes: Implications for Automated Vehicles in the Rideshare Environment)	127[Monika Filipovska](A Priori and Adaptive Reliable Routing in Stochastic Dynamic Networks with Correlations)	80[Xavier Ros-Roca](A Data Driven Approach to Dynamic Origin-Destination Matrix Estimation)	79[Chen Yang](Simulation-Based Comparisons of Signalized and Signal-free Intersection Controls under Connected and Automated Environments)
					116[Celso Fernando](A Factor Extraction Method using Deep Learning Technique on Traffic Accident Risk)	
11:20 -11:30	Break					
11:30 -12:20	Keynote Session 2: Operational Strategies for Urban Air Mobility and 4D System Fundamental Diagrams					
	Host	Ali Zockaie				
	Speaker	Hani Mahmassani				

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- Last updated: June 15, 2021.

DAY 2/4 **ISTDM 2021 CONFERENCE PROGRAM** (Going Virtual June 21-24, 2021)

ISTDM 2021

0 **June 22, Tuesday**

9:00 -9:50	**KEYNOTE SESSION 3: On the Inefficiency and Management of Ride-Sourcing Services towards Urban Congestion**					
	Host	Sean Qian				
	Speaker	Nikolas Geroliminis				
9:50 -10:00	**BREAK**					
10:00 -11:20	**T-1: REGULAR SESSION** Emerging Mobility	**T-2: REGULAR SESSION** Freight	**T-3: REGULAR SESSION** Data	**T-4: REGULAR SESSION** Behavior	**T-5: LIGHTNING SESSION** Emerging mobility	**T-6: LIGHTNING SESSION** Traffic Operations
Chair Host	Neda Masoud nmasoud@umich.edu Ethan Zhang shuruiz@umich.edu	Ali Zockaie zockaiea@egr.msu.edu Anil Alan anilalan@umich.edu	Ali Shirazi shirazi@maine.edu Yiyang Wang yiyangw@umich.edu	Sina Bahrami sinab@umich.edu Tian Mi tianm@umich.edu	Ziqi Song ziqi.song@usu.edu Xunbi Ji xunbij@umich.edu	Qi Luo qiluo.email@gmail.com Daniel Vignon dvignon@umich.edu
10:00 -10:20	18[Yingyan Lou](Congestion Mitigation for Planned Special Event: Smart Parking, Ride-Sharing Drop-off Locations and Network Configuration)	170[Tanvir Ahamed](Deep Reinforcement Learning for Crowdsourced Urban Delivery: System States Characterization, Heuristics-guided Action Choice, and Rule-Interposing Integration)	156[Zijian Hu](Self-Calibration of Traffic Surveillance Camera Systems for Traffic Density Estimation on Urban Roads)	46[Mingyou Ma](Quantifying Day-to-Day Evolution of Choice Patterns in Public Transit System with Smart Transit Card Data)	27[Aurore Sallard](Modeling Ride-Hailing Use in Megacities: Evidence from São Paulo)	52[Zhanguo Song](Short-Term Traffic Flow Uncertainty Prediction Using an Improved Grey Prediction Model under Different Time Intervals)
10:20 -10:40	32[Amirmahdi Tafreshian](Proactive Vehicle Dispatching in Large-Scale Ride-Sourcing Systems)	51[Sudheer Ballare](A Many-to-Many Vehicle Routing Problem with Split Loads)	81[Ang Li](Within-Day Prediction of Path Travel Times with Use of Multi-Source of Traffic Data)	118[Hebert Azevedo-Sa](Using Trust in Automation to Enhance Driver-(Semi)Autonomous Vehicle Interaction and Improve Team Performance)	178[Qianwen Li](Autonomous Vehicle Identification Based on Car-Following Data)	109[Rongsheng Chen](Traffic Assignment Analysis of Traffic Networks with Max-Pressure Control)
10:40 -11:00	141[Kenan Zhang](A General Spatiotemporal Equilibrium Model of Ride-Hail Market)	99[Mausam Duggal](Unknown to Known: Predicting Truck GPS Commodity Using Machine Learning)	85[Di Yang](Exploring the Possibility of Outlier Detection Using Functional Data Analysis for Proactive Safety Management)	86[Ragavendran Gopalakrishnan](Behavioral Models of Users in Ride-Sharing)	76[Huimin Yan](Coordinated Space-Time Trajectory Planning and Cyclic Control in Automated Vehicle Zones)	90[Rui Okuhara](Effect of Traffic Accident on Arterial Road Network)
11:00 -11:20	161[Min Xu](Addressing the Fleet Sizing Problem for Shared-and-Autonomous-Mobility Services)	89[Guoqing Zhang](An Integrated Location-Inventory Model for the Healthcare Supply Network under Stochastic Demands)	154[Xiangyang Guan](Correcting Biases in Using Emerging Big Data for Mobility Research: A Likelihood-Based Approach)	138[Zhengtian Xu](Understanding Ride-Sourcing Drivers' Customer-Search Behavior)	59[Rafaqat Ali](A Multimodal Traveling Itinerary Problem in a Time Dependent Multimodal Transportation Network for a Fixed Sequence of Nodes with Time Windows)	150[Lukáš Vacek](Discontinuous Galerkin Method for Macroscopic Traffic Flow Models on Networks using Numerical Fluxes at Junctions)
					106[Evangelos Mintsis](Management of Connected and Automated Vehicle Disengagements in the proximity of Work Zones)	120[Md Abu Sayed](Predict Short-Term Traffic Flow with Prediction Error from Traffic Sensor Data Using Deep Learning)
						166[Monika Filipovska](Computation and Estimation of Path Travel Time Variability with Sparse Vehicle Trajectory Data)
11:20 -11:30	**BREAK**					
11:30- 12:20	**KEYNOTE SESSION 4: Lagrangian Control at Large and Local Scales in Mixed Autonomy Traffic Flow**					
	Host	Gabor Orosz				
	Speaker	Alexandre Bayen				

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DAY 3/4 **ISTDM 2021 CONFERENCE PROGRAM** (Going Virtual June 21-24, 2021)

ISTDM 2021

0 **June 23, Wednesday**

9:00 -9:50	**KEYNOTE SESSION 5: Intelligent Driving Intelligence Test for Autonomous Vehicles with Naturalistic and Adversarial Driving Environment**					
	Host	Carolina Osorio				
	Speaker	Henry Liu				
9:50 -10:00	**BREAK**					
10:00 -11:20	**W-1: REGULAR SESSION** Connected and Automated Vehicles	**W-2: REGULAR SESSION** Traffic Operations	**W-3: REGULAR SESSION** Data-Informed Decision Making	**W-4: REGULAR SESSION** Shared Mobility	**W-5: LIGHTNING SESSION** Behavior	**W-6: LIGHTNING SESSION** Modeling, Simulation, and Optimization
Chair Host	Xiaopeng Li xiaopengli@usf.edu Hao Wang haowangm@umich.edu	Ali Zockaie zockaiea@egr.msu.edu Tara Radvand tararad@umich.edu	Xiaotong Sun xtsun@umich.edu Amir Tafreshian atafresh@umich.edu	Sean Qian seanqian@cmu.edu Zhichen Liu zhichliu@umich.edu	Ali Shirazi shirazi@maine.edu Mojtaba Abdolmaleki mojtabaa@umich.edu	Ziqi Song ziqi.song@usu.edu Tianming Liu tianmliu@umich.edu
10:00 -10:20	57[Yingyan Lou](How Small Can Headways Be in Platoons of Connected Autonomous Vehicles?)	43[David Hale](A Methodology for Trajectory-Based Calibration of Microsimulation Models)	11[Shogo Umeda](Risk Evaluation of Anomaly Event Occurrence Using Probe Vehicle Data)	48[Jintao Ke](Online Optimization and Offline Learning for On-Demand Matching in Ride-Sourcing Services)	50[Jingxing Wang](Neighborhood Level Impacts in Human Travel Patterns: Findings from the Closure of Alaskan Way Viaduct)	71[Zhixiong Luo](Joint Deployment of Low Emission Zones and Electric Vehicle Charging Stations)
10:20 -10:40	23[Tamas Molnar](On-Board Prediction Via V2X Connectivity)	69[Ali Zockaie](Investigating Weather Impacts on Network-Wide Traffic Flow Relationships)	82[Jiqian Dong](Lane-Change Decisions of Connected Autonomous Vehicles Using Spatially-Weighted Information and Deep Reinforcement Learning)	173[Ester Lorente](An Agent-based Simulation Model for Intermodal Assignment of Public Transport and Ride Pooling Services)	88[Hui Shen](Travel Mode Choice of Young People with Differentiated E-Hailing Ride Services: A Case Study in Nanjing China)	83[Ahmed Alshurafa](Exploring and Modeling Truck Tours and Their Associated Stop Locations: Towards a Micro-Simulation Approach)
10:40 -11:00	111[Xiaopeng Li](Vehicle Trajectory Optimization at a Signalized Intersection in Mixed Traffic: Model and Field Experiments)	153[Daniel Bramich](FitFun: Improved noise models for Fundamental Diagrams)	68[Matthew Daus](Big Data Transportation Data Access & Privacy in a Multi-Modal Autonomous & Connected World)	144[Xiaolin Cai](Modeling and Simulation of Potential Use-Cases for Shared Mobility Services in the City of Ann Arbor)	93[Ehsan Rahimi](Analyzing the Adoption and Usage Frequency of Shared E-Scooters: A Zero-Inflated Ordered Probit Modelling Approach)	168[Md Mintu Miah](Challenges and Opportunities of Emerging Data Sources to Estimate Network-Wide Bike Counts)
11:00 -11:20	75[Jiaqi Ma](DTEM: Dynamic Traffic Environment Mapping for Connected and Automated Traffic Control)		140[Yiyang Wang](Real-Time Sensor Anomaly Detection and Recovery in Connected Automated Vehicle Sensors)	155[Nicholas Caros](Leveraging Destination Flexibility to Increase Ridesharing Participation: An Integrated Model and Case Study)	95[Bartosz Bursa](Modelling Tourist On-Site Mode Choice Decisions during Vacation Stays)	114[Mohammad Miralinaghi](On the Optimization of Electric Charging Infrastructure to Address Vehicular Emissions)
					169[Xiangyang Guan](A Novel State-Transition Model for Real-Time Forecasting of Evacuation Demand)	74[Yi Guo](Signalized Corridor Management with Trajectory Prediction and Optimization under Mixed-Autonomy Traffic Environment)
11:20 -11:30	**BREAK**					
11:30 -12:20	**KEYNOTE SESSION 6: Better Journeys for All Through Impact, Innovation & Responsibility**					
	Host	Xiaopeng Li				
	Speaker	Fengmin Gong				

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DAY 4/4 **ISTDM 2021 CONFERENCE PROGRAM** (Going Virtual June 21-24, 2021)

ISTDM 2021

0 June 24, Thursday

9:00 -9:50	**KEYNOTE SESSION 7: Thinking about the Long-Term Impacts of the Pandemic**					
	Host	Samitha Samaranayake				
	Speaker	Kay Axhausen				
9:50 -10:00	**BREAK**					
10:00 -11:20	**TH-1: REGULAR SESSION**	**TH-2: REGULAR SESSION**	**TH-3: REGULAR SESSION**	**TH-4: REGULAR SESSION**	**TH-5: LIGHTNING SESSION**	**TH-6: LIGHTNING SESSION**
	Electrification	Implication of Automated Vehicles	Behavior and Demand	Transportation Network Modeling	Data	Shared Mobility
Chair	Ziqi Song ziqi.song@usu.edu	Ali Zockaie zockaiea@egr.msu.edu	Zhengtian Xu zhengtian@email.gwu.edu	Sean Qian seanqian@cmu.edu	Ali Shirazi shirazi@maine.edu	Qi Luo qiluo.email@gmail.com
Host	Zhichen Liu zhichliu@umich.edu	Sanghoon Oh osh@umich.edu	Amir Tafreshian atafresh@umich.edu	Tianming Liu tianmliu@umich.edu	Daniel Vignon dvignon@umich.edu	Mojtaba Abdolmaleki mojtabaa@umich.edu
10:00 -10:20	**180[Lili Du]**(A Commercial Charging-as-a-Service Platform for Emerging Mobile EV to EV Charging Service)	**143[Tony** (Yoon-Dong) **Lee]**(Developing and Simulating Pedestrian-Related Corner Case Scenarios for Autonomous Vehicles Testing)	**103[Wenwen Zhang]**(Machine Learning Based Microsimulation Approach for the Spatial Distributions of Automated Vehicle Preferences)	**24[Noriko Kaneko]**(Optimal Congestion Tolling Problem under the Markovian Traffic Equilibrium)	**60[Walid Fourati]**(Estimating Fundamental Diagrams of Signalized Links from Aggregated Trajectories) **158[Mengxin Wang]**(Urban Courier: Operational Innovation and Data-Driven Coverage-and-Pricing) **159[Zahra Eftekhar]**(Kernel-based Approach to Reconstruct Travel Diaries from GSM Records) **87[Hui Shen]**(Preliminary Investigation of Crowd-shipping with Real-world Data: A Case Study of Atlanta, GA) **45[Ke Zhang]**(A Multi-Agent Reinforcement Learning Framework for Multiple Vehicle Routing Problems with Soft Time Windows) **125[Takahiro Tsubota]**(Deep Learning Model for Predicting Traffic Accident Risk on an Expressway)	**40[Yunhai Gong]**(Exploring the Impact of Urban Built Environment on Land Use Diversity under Shared Autonomous Vehicles and Road Pricing) **101[Irene Martinez]**(Trip Length Distribution of TNC Trips: Based on Empirical Data in Chicago) **165[Matthew Dean]**(Synergies between Repositioning and Charging Strategies for Shared Autonomous Electric Vehicle (SAEV) Fleets) **148[Xiaotong Guo]**(Robust Matching-Integrated Vehicle Rebalancing in Ride-hailing System with Uncertain Demand) **171[Hao Guo]**(Optimal Assignment and Relocation of Shared Autonomous Vehicles Considering Mode Choices)
10:20 -10:40	**152[Eleftheria Kontou]**(Alternative Fuel Vehicles Evacuation Planning: Modeling and Numerical Experiments)	**121[Suresh Kumaar Jayaraman]**(Automated Vehicle Behavior Design for Pedestrian Interactions at Unsignalized Crosswalks)	**147[Shenhao Wang]**(Theory-Based Residual Neural Networks: A Synergy of Discrete Choice Models and Deep Neural Networks)	**55[Timothy Tay]**(A Gaussian Process Approach for High-Dimensional Simulation-Based Transportation Optimization)		
10:40 -11:00	**66[Mohammadreza Kavianipour]**(Charging Infrastructure Planning in Urban Networks Considering Detour and Queuing Delay)	**29[Xiangdong Chen]**(Rhythmic Control at Intersection: Concept and Properties)	**174[Reza Ansari]**(Propagation Prediction in Urban Road Network During Accident)	**123[Daisik Nam]**(A Model for System Optimum Dynamic Traffic Assignment with Minimum-Envy Allocations)		
11:00 -11:20	**49[Xindi Tang]**(Online Operations of Automated Electric Taxi Fleets: An Advisor-student Reinforcement Learning Framework)	**98[Andres Ladino]**(System Level Impacts of V2I-Based Speed Control Strategies: The SCOOP@F Project Deployment Scenarios)	**7[Can Li]**(Probabilistic Public Transport Demand Estimation with Graph Convolution Neural Network)	**163[Tingting Xie]**(Heterogeneous Information Provision on Traffic Networks with Competitive or Cooperative Information Providers)		
11:20 -11:30	**BREAK**					
11:30 -12:20	**KEYNOTE SESSION 8: What Can We Learn about Travel and Safety Implications from Partially Automated Vehicle Use?**					
	Host	Yafeng Yin, Neda Masoud				
	Speaker	Chandra Bhat				

- **Times are displayed in time zone** Visit https://limos.engin.umich.edu/istdm2021/schedule/ for viewing details of keynote speeches, presenters' extended abstract PDFs, and more.
- Regular Sessions and Lightning Sessions will run parallel to each other spanning from 10:00 to 11:20. There will be four 20-min presentations in each Regular Session and five to six presentations in each Lightning Session.
- Last updated: June 15, 2021.