Mathematical Challenges and Opportunities for Autonomous Vehicles

Thursday October 1, 2020

8:00–10:00 *Group 6: Using AVs to improve traffic flow*

9:40–10:00 *Tea Time*

10:00–10:20 *Junior Seminar Series Introductions*

10:30–10:50 **Juan Carlos Martinez Mori** (Cornell University)
On the Request-Trip-Vehicle Assignment Problem

Friday October 2, 2020

8:00–10:00 *Group 5: How to combine large-scale traffic flow simulation/models with vehicle-specific AV challenges?*

10:00–12:00 *Group 7: Cooperation between AVs and connected road infrastructures or other AVs*

Monday October 5, 2020

8:00 *WORKSHOP I (Oct 5-9)*

Monday October 12, 2020

8:00–10:00 *Group 2: How to correctly model the macroscopic consequences of vehicle automation and connectivity?*

10:00–12:00 *Group 3: Data: Opportunity to get your hands dirty*

Tuesday October 13, 2020

8:00–9:00 *Group 1: What level of safety is needed for machine learning solutions for AVs, and Perception and machine learning for AVs*

9:40–10:00 *Tea Time*

10:00–10:20 **Ronan Keane** (Cornell University)
Differentiable Traffic Simulators

10:30–10:50 **Juan Carlos Martinez Mori** (Cornell University)
On the Request-Trip-Vehicle Assignment Problem

Wednesday October 14, 2020

8:00–10:00 *Group 4: AVs and public transit and Real-time AV Fleet Management*

Thursday October 15, 2020

8:00–10:00 *Group 6: Using AVs to improve traffic flow*

9:40–10:00 *Tea Time*

10:00–10:20 **Monika Filipovska** (Northwestern University)
Travel Time Reliability Modeling and Optimization in Stochastic Dynamic Networks

Friday October 16, 2020

8:00–10:00 *Group 5: How to combine large-scale traffic flow simulation/models with vehicle-specific AV challenges?*

10:00–12:00 *Group 7: Cooperation between AVs and connected road infrastructures or other AVs*

Monday October 19, 2020

8:00–10:00 *Group 2: How to correctly model the macroscopic consequences of vehicle automation and connectivity?*

10:00–12:00 *Group 3: Data: Opportunity to get your hands dirty*

Tuesday October 20, 2020

8:00–9:00 *Group 1: What level of safety is needed for machine learning solutions for AVs, and Perception and machine learning for AVs*

9:40–10:00 *Tea Time*

10:00–10:20 **Yanbing Wang** (Vanderbilt University)
Model Identifiability Problem - Applications on Car Following Dynamics

10:30–10:50 **George Gunter** (Vanderbilt University)
Challenges of Microsimulation Calibration with Traffic Waves using Aggregate Measurements

(Wednesday schedule continued on next page)

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Wednesday October 21, 2020

8:00–10:00 *Group 4: AVs and public transit and Real-time AV Fleet Management*

Thursday October 22, 2020

8:00–10:00 *Group 6: Using AVs to improve traffic flow*

9:40–10:00 *Tea Time*

10:00–10:50 *Seminar Series*

Friday October 23, 2020

8:00–10:00 *Group 5: How to combine large-scale traffic flow simulation/models with vehicle-specific AV challenges?*

10:00–12:00 *Group 7: Cooperation between AVs and connected road infrastructures or other AVs*

Monday October 26, 2020

8:00 *WORKSHOP II (Oct 26-30)*

Monday November 2, 2020

8:00–10:00 *Group 2: How to correctly model the macroscopic consequences of vehicle automation and connectivity?*

10:00–12:00 *Group 3: Data: Opportunity to get your hands dirty*

Tuesday November 3, 2020

8:00–9:00 *Group 1: What level of safety is needed for machine learning solutions for AVs, and Perception and machine learning for AVs*

9:40–10:00 *Tea Time*

10:00–10:20 **Mingfeng Shang** (University of Minnesota, Twin Cities)
Impacts of commercially available adaptive cruise control vehicles on highway stability and throughput

Wednesday November 4, 2020

8:00–10:00 *Group 4: AVs and public transit and Real-time AV Fleet Management*

Thursday November 5, 2020

9:40–10:00 *Tea Time*

10:00–10:20 **Felisia Angela Chiarello** (Politecnico di Torino)
Multiscale control of generic second order traffic models by driver-assist vehicles.

Friday November 6, 2020

9:00–11:00 *Group 5: How to combine large-scale traffic flow simulation/models with vehicle-specific AV challenges?*

10:00–12:00 *Group 7: Cooperation between AVs and connected road infrastructures or other AVs*

Monday November 9, 2020

8:00–10:00 *Group 2: How to correctly model the macroscopic consequences of vehicle automation and connectivity?*

10:00–12:00 *Group 3: Data: Opportunity to get your hands dirty*

Tuesday November 10, 2020

8:00–10:00 *Group 1: What level of safety is needed for machine learning solutions for AVs, and Perception and machine learning for AVs*

9:40–10:00 *Tea Time*

10:00–10:20 **Rahul Bhadani** (University of Arizona)
Strym: A data-analytic tool for downstream analysis of CAN-Bus data from stock vehicles

Wednesday November 11, 2020

8:00 *IPAM CLOSED/ACTIVITIES OPTIONAL (Veterans Day)*

8:00–10:00 *Group 4: AVs and public transit and Real-time AV Fleet Management*

Thursday November 12, 2020

9:40–10:00 *Tea Time*

10:00–10:20 **Tanushree Roy** (Pennsylvania State University)
Resilient Transportation Systems in Smart Cities

Friday November 13, 2020

9:00–11:00 *Group 5: How to combine large-scale traffic flow simulation/models with vehicle-specific AV challenges?*

10:00–12:00 *Group 7: Cooperation between AVs and connected road infrastructures or other AVs*

Monday November 16, 2020

8:00 *WORKSHOP III (Nov 16-20)*

Monday November 23, 2020

8:00–10:00 *Group 2: How to correctly model the macroscopic consequences of vehicle automation and connectivity?*

10:00–12:00 *Group 3: Data: Opportunity to get your hands dirty*

2:00–3:00 **Benjamin Seibold** (Temple University)
PUBLIC LECTURE: The Frustrating Beauty of Traffic Waves - And How Automated Vehicles Can Prevent Them

Tuesday November 24, 2020

8:00–9:00 *Group 1: What level of safety is needed for machine learning solutions for AVs, and Perception and machine learning for AVs*

9:40–10:00 *Tea Time*

Wednesday November 25, 2020

8:00–10:00 *Group 4: AVs and public transit and Real-time AV Fleet Management*

Thursday November 26, 2020

8:00 *IPAM CLOSED/ACTIVITIES OPTIONAL (Thanksgiving)*

Friday November 27, 2020

8:00 *IPAM CLOSED/ACTIVITIES OPTIONAL (Thanksgiving)*

9:00–11:00 *Group 5: How to combine large-scale traffic flow simulation/models with vehicle-specific AV challenges?*

10:00–12:00 *Group 7: Cooperation between AVs and connected road infrastructures or other AVs*

Monday November 30, 2020

8:00 *WORKSHOP IV (Nov 30-Dec 4)*

Monday December 7, 2020

8:00–10:00 *Group 2: How to correctly model the macroscopic consequences of vehicle automation and connectivity?*

10:00–12:00 *Group 3: Data: Opportunity to get your hands dirty*

Tuesday December 8, 2020

8:00–9:00 *Group 1: What level of safety is needed for machine learning solutions for AVs, and Perception and machine learning for AVs*

9:40–10:00 *Tea Time*

10:00–10:20 **Gioele Zardini** (ETH Zurich)
Co-Design to Enable User-Friendly Tools to Assess the Impact of Future Mobility Solutions

10:30–10:50 **Rabie Ramadan** (Temple University)
Structural Properties of the Stability of Jamitons

Wednesday December 9, 2020

8:00–10:00 *Group 4: AVs and public transit and Real-time AV Fleet Management*

Thursday December 10, 2020

9:40–10:00 *Tea Time*

10:00–10:20 **Lin Huang** (University of California, Riverside (UC Riverside))
Towards Safer Autonomous Driving via Virtual Reality

Friday December 11, 2020

9:00–11:00 *Group 5: How to combine large-scale traffic flow simulation/models with vehicle-specific AV challenges?*

10:00–12:00 *Group 7: Cooperation between AVs and connected road infrastructures or other AVs*

Sunday December 13, 2020

8:00 *Autonomous Vehicles Culminating Retreat (Dec 13-18)*