Coupled Communications and Autonomy Challenges in Connected Autonomous Vehicles

Raghvendra V. Cowlagi

Alexander M. Wyglinski

Associate Professor Aerospace Engineering Program Professor Dept. Electrical & Computer Engineering

Worcester Polytechnic Institute, Worcester, MA, USA. rvcowlagi, alexw@wpi.edu



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Mini-Workshop Goal

Share perspectives, recognize cross-cutting challenges, and identify potential collaborators.

• Organizers' previous efforts: IEEE VTS-sponsored CAV Summer Schools at WPI in 2016, '17, '18

Discussions

- Cooperative perception and cognition for CAV
- Safety spacing guarantees
- Improving the efficiency of electric vehicle fleets
- Mathematical models of large networks with delays
- Coupled communication and short-term planning

Key Takeaways

• Why communicate (V2V, V2I, or V2X)?

- Mitigate impacts of onboard sensor imperfections
- $\bullet\,$ Ease safety v/s capacity trade-off in transportation
- Enable system-wide efficiency

• Current state-of-the-art

- At least two communication protocols, need for standardization
- Cooperative control / system-level optimization strategies available
- Large-scale mathematical models available

Challenges

- What information to communicate, and to/from whom?
- How to integrate V2X-communicated information with onboard sensor data?
- How to best use V2X comms in a non-cooperate setting, with a mix of autonomous and human-driven vehicles?
- Analysis of costs and benefits of V2X comms. in transportation