Workshop on Control for Networked Transportation Systems (CNTS)

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Expertise: control, hybrid systems, formal methods, V&V, dynamics-based data analysis
Challenges & opportunities

• How to evaluate autonomy for safety? How to define safety? Would the current road-testing methods scale, are they safe?
  • Correctness (safety) at different layers
    • algorithm, implementation, execution
  • Correctness (safety) at different scales
    • micro-scale (at the vehicle level) guarantees to macro-scale guarantees
• Benefits/impact vs penetration levels
• Heterogenous sensory data
  • Offline data: learning enabled control
  • Online data: high-volume of data at run-time – perception in-the-loop
    → ability to predict ahead (effects on safety, fuel-efficiency); context-awareness as opposed to robustness, non-traditional uncertainty models
Mcity & Open CAV

Mcity: A 32-Acre Outdoor Lab

Mcity is the world’s first full-scale simulator urban environment, designed expressly for testing the performance and safety of connected, automated, and autonomous vehicles under controlled and realistic road conditions. It is a 32-acre outdoor laboratory for advanced mobility systems that includes:

- Urban and suburban streets, including various lane configurations and conditions (pedestrian crossings, bike lanes, ADA ramps, street lights, parallel and diagonal parking, and a bus stop).
- Instrumentation throughout, including a control network to collect data about traffic activity using wireless, fiber optics, UHF, and a highly accurate real-time kinematic positioning system.

Other features include:

- **Straight gravel roadway with a railhead crossing.**
- **Traffic circle,** a smaller version of a roundabout that is common in Europe and some older cities in the U.S.
- **Signalized intersections** in common configurations, with raised medians, wood and metal poles, and pedestrian crossings.
- **Trunk line road,** a rural roadway with a fully developed rural crossing, guard rail, and temporary and permanent pavement markings.
- **Brick paver road** simulated with stamped concrete.
- **Underpass,** simulated by a tunnel that blocks vehicles from wireless and satellite signals.
- **Roundabout,** an increasingly common approach to intersection design intended to improve safety.

Open test area that can be configured for a wide range of scenarios, including parking lots and novel intersection geometries.