



CAREER: Multi-Resolution Model and Context-Aware Information Networking for Cooperative Vehicle Efficiency and Safety Systems

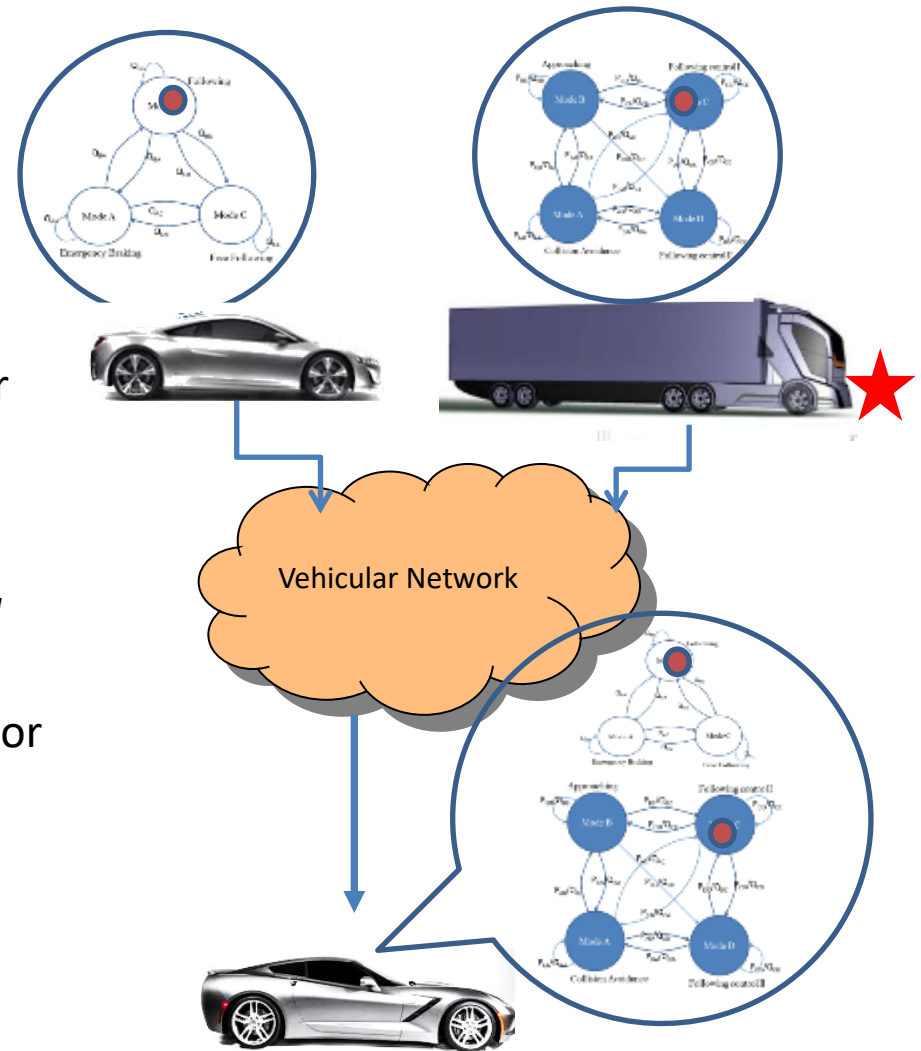
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Description

Large scale deployment of Connected and Automated Vehicles (CAVs) will require addressing scalability issues, in particular for rich situational awareness.

Goals of This Project:

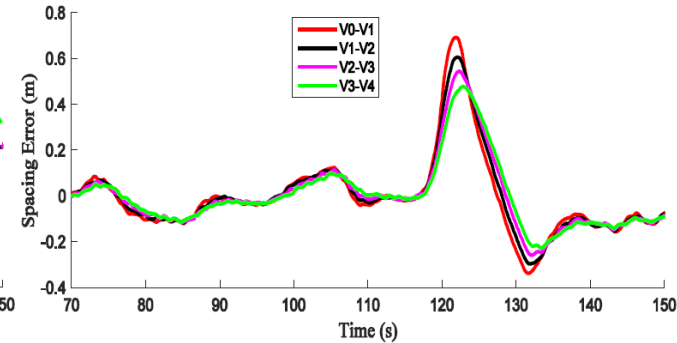
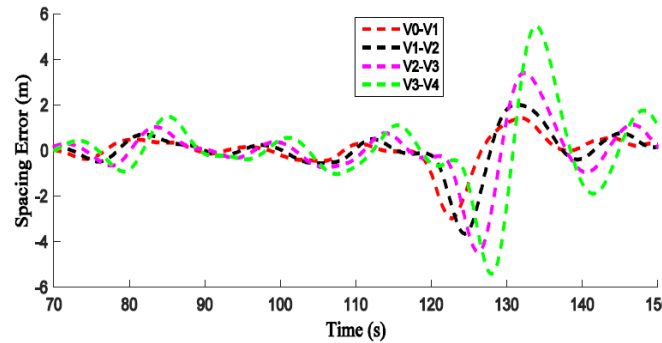
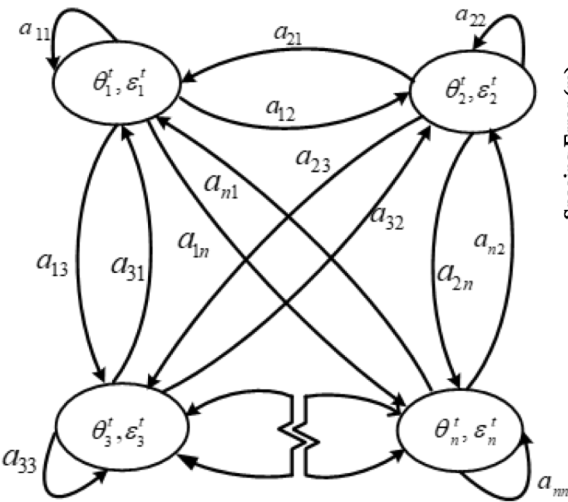
- Transform *data communication* to **model communication (MC)**, allowing modeled situational awareness => complex behavior prediction
- Develop (hybrid systems) approaches for modeling dynamics of mixed human-automated driving systems
- Develop networking methods for modeled-view propagation.



Vehicles learn their dynamical models, then exchange these models and model updates periodically; receivers construct a model-based view of their surrounding

Findings

- *Model Communication* (MC) for vehicle tracking: reducing average rate requirement by an order of 2 over our industry adopted solution (SAE J2945/1)
- Developed a stochastic hybrid system modeling framework (HMM+ARX or GP based) with variable number of modes to describe vehicle dynamic => vehicles could be modeled in <20 modes
- Developed an MC based MPC controller for cooperative adaptive cruise control => inter-vehicle spacing error reduced by an order of magnitude



November 2018, CPS PI meeting