

CS 797/ ISA 797: Research Issues in Connected and Automated Vehicles

But I would cover the following topics and ask the students to do a prototype/ simulation kind of study for the course (no exams or home works). Here are the topics I plan to cover.

Topic 1: Intra-vehicular:

1. Automobile internals basics
2. Road geometries including elevation and super elevations.
3. Controllers inside automobiles, with an emphasis on stability and safety.
4. Cyber security and networking inside vehicles (including CAN and Vehicular Ethernet connectivity)
5. Systems in commercial and /or specialized heavy vehicles (such as anchored vehicles cranes etc.)

Topic 2: Inter-vehicular and vehicle-roadside device communications:

1. Proposed DSRC standard for V2X broadcasts
2. SCMS architecture for pseudonyms, certificates and their processing during runs
3. Roadside devices and guiding automated vehicles in connected roadsides
4. Misbehavior detection and remedies
5. Mixed traffic scenarios with automated and human driven systems and potential driver assistance systems to navigate in such traffic.

Topic 3: Roadside infrastructure

1. Intersection management
2. Detecting pedestrians
3. sensor based issues (LIDARS, Cameras, Sonars, RADARS and Thermal cameras) and their usage in vehicle guidance and driver assistance.

Additional Topics: (Guest Lectures)

1. Human factors issues in V2X
2. Crash worthiness, safety assurances for automated vehicles.
3. Use of vision research in V2X
4. Growth and Roles of New Digital and Shared Mobility in the Smart Cities of Tomorrow.

Some simulators we will use during the class: Sumo, Chrono etc.