Slide 1: Vehicle Hardware/Software Interface

The PATH CACC installation on a given vehicle comprises a PC-104 computer running the realtime operating system QNX 7.0 and four subsystems:

1. Several CAN interfaces to the car and a Panda CAN device for capturing and modifying ACC messages.
2. A DSRC or C-V2X radio for sending and receiving Basic Safety Messages to and from other CAVs and the RSU
3. An HMI interface that can run on a Windows or Linux PC
4. An RTK GPS device for precise geolocation

The PC-104 computer that is running QNX 7.0 contains a control algorithm and four software interfaces corresponding to the hardware subsystems. Interprocess communication is done using native QNX messaging and a memory server called db\_slv that is registered with QNX.

Slide 2: Software Interface

The control algorithm and interfaces of slide 1 are broken out into the corresponding programs. The control algorithm is argonne\_cacc, the hardware drivers in black transduce and encode data from the CAN buses, C-V2X radio, GPS, and HMI, and the database clients in blue convert raw data into physical units for use by argonne\_cacc.

Slide 3: Intersection and Signal Controller Hardware Interface

Depiction of the RSU and signal controller inside the roadside cabinet. In the old setup at UC Berkeley there was a wireless modem that connected with the UC backhaul and then to the Windows computer running Aimsun.

Slide 4: Human-Machine Interface

Screenshot of the HMI. The five actuators/indicators in the upper left corner are for requesting different control modes; the current control mode is displayed in blue. The plots in the lower left corner give the speed of the ego vehicle and other vehicles. The sliders in the upper right corner are for setting the cruise speed, time gap and performance factor. The time gap control in the right middle allows the driver to select one of five time gaps; the bars indicate the current time gap. The plots in the lower left corner give the requested and actual time gap to the preceding vehicle.