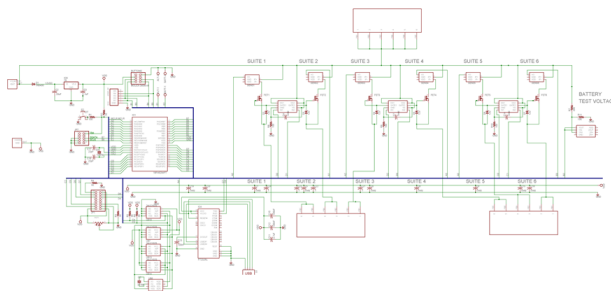


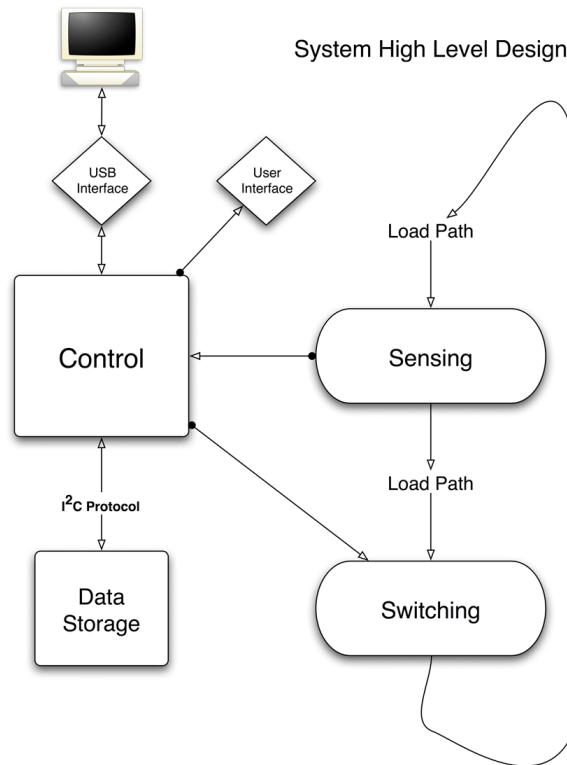
**Problem:** A typical law enforcement vehicle has been retrofitted with several electronic devices that make police work possible such as a video camera, GPS, 2-way radio, laptop computer, and the much feared printer (for tickets). These devices are all powered from a single 12-volt automotive battery, and a small error in their operation or installation can result in a deep discharge. A deep discharge greatly reduces the battery's service lifetime and leaves the officer in a tough spot. He is unable to start his vehicle or operate vital electronic devices, putting the safety of the officer and the public at risk.

**2007/2008 Progress:**

- Smaller footprint
- USB interface
- Large data storage
- Data output to readable Microsoft Excel format
- More robust battery & alternator current sensors
- Refined software



A Schematic of the Team5-0ii APMS



Our "Test Rig," Donated by SBPD

**Solution:** Our system intelligently manages the power distribution to electronic devices in a law enforcement vehicle. The system employs current and voltage sensors to determine whether the vehicle is on or off and how much charge is left in the battery. The system's utility is most easily described by its response to the following problem scenarios:

**Scenario 1:** The vehicle is off, but the computer power port was improperly installed and continues to draw current. If the vehicle is not turned on soon, the battery may be deep discharged.

**Response:** Our system does not sense any current being produced by the alternator and determines that the car is off. It senses the current drawn by the computer power port and determines that this must be an error since the car is off. The system cuts power to the port, saving the battery from a deep discharge.

**Scenario 2:** A police officer performs a routine traffic stop. She turns the car off but leaves all auxiliary electronic devices on. She believes the driver is intoxicated and performs the necessary examination until an altercation develops. Before the altercation is resolved, her battery is deep discharged, and the camera loses power. A lawsuit is brought against the department over the stop at a later date, and the department has no video evidence to support its defense.

**Response:** After she stops her car, our system does not sense any current being produced by the alternator and determines that the car is off. After more current is drawn from the battery, our system determines that the battery's state-of-charge is low. The system cuts power to all unnecessary electronic devices in order to prolong the operating life of vital devices such as the video camera.

**Scenario 3:** An police car's battery is deep discharged even with our system installed and neither the officer nor the department's tech support knows why.

**Response:** The officer connects our system to his laptop computer via a USB port. He opens Microsoft Excel and data describing the state and current draw of all electronic systems is automatically imported. The officer and tech support determine that the vehicle has a faulty alternator that must be replaced. They can even see the date and time of failure.