MICHIGAN STATE UNIVERSITY

Project Plan

Mobile Application for XCP Measurement And Calibration

The Capstone Experience

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Fall 2014

From Students…
…to Professionals

Project Overview

- Java library
- Get measurements from vehicle
- Connected via Bluetooth
- Calibrate vehicle specifications
- Integrate into Android testing application

Functional Specifications

- ECU Measurements
  - Allow engineers to get information from ECU
  - Real time output for effective measurements
  - Bluetooth connection allows easy access and on the go information gathering from vehicle
- Calibration and Optimization
  - Improve vehicle performance
  - e.g. stability, engine power and fuel efficiency

Design Specifications

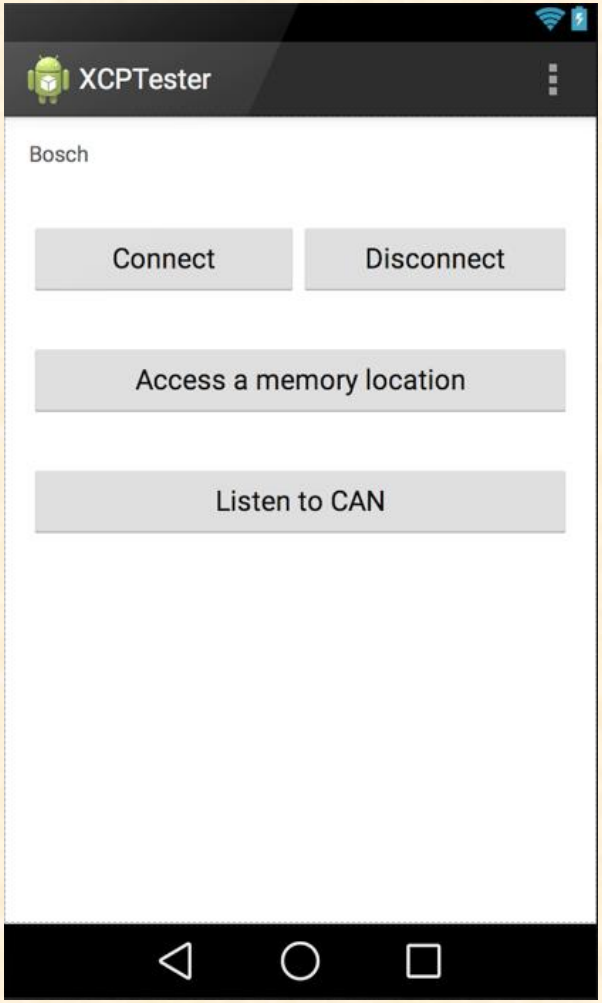
- Front End
  - A simple Android application
  - Connect, disconnect, get measurements, view CAN log, etc.
- Measurements
  - Takes user to new screen
  - Allows them to enter a name and memory address and application returns a value

Design Specifications

- Java Library
  - Integrate with Android application
  - Connect to car via Bluetooth
  - Communicate with ECU through CAN bus and XCP
  - Gather, interpret, and parse information from the ECU

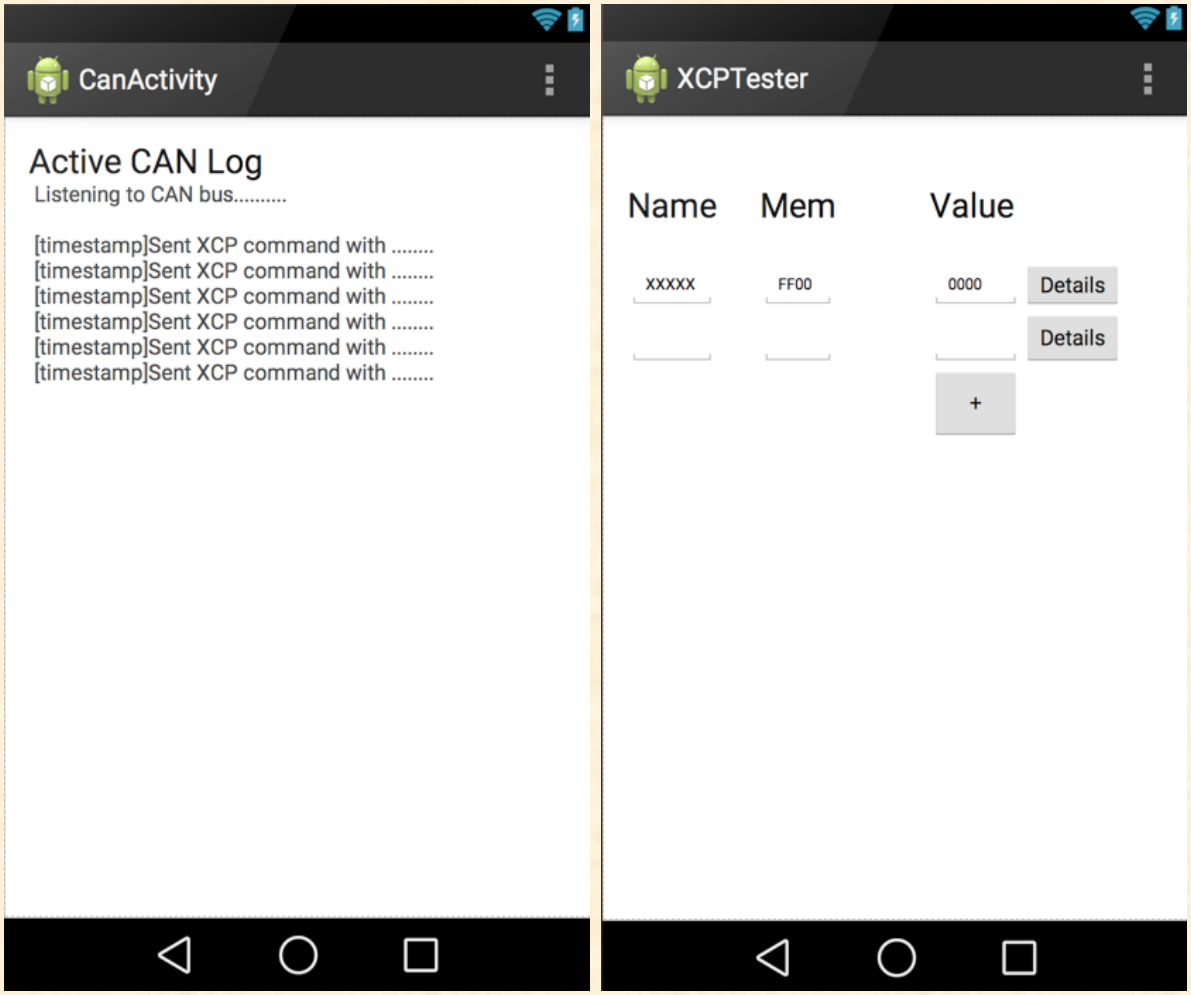
Screen Mockup: Main Screen

- Connect: via Bluetooth to vehicle
- Access a memory location: Get a measurement from a memory location
- Listen to CAN: provide an active log



Screen Mockup: Measurement Log

- Display measurements and active CAN log in an easy to read window



Technical Specifications

- Electronic Control Unit (ECU)
  - Controls the electrical systems and subsystems of a vehicle
  - Multiple ECUs work together

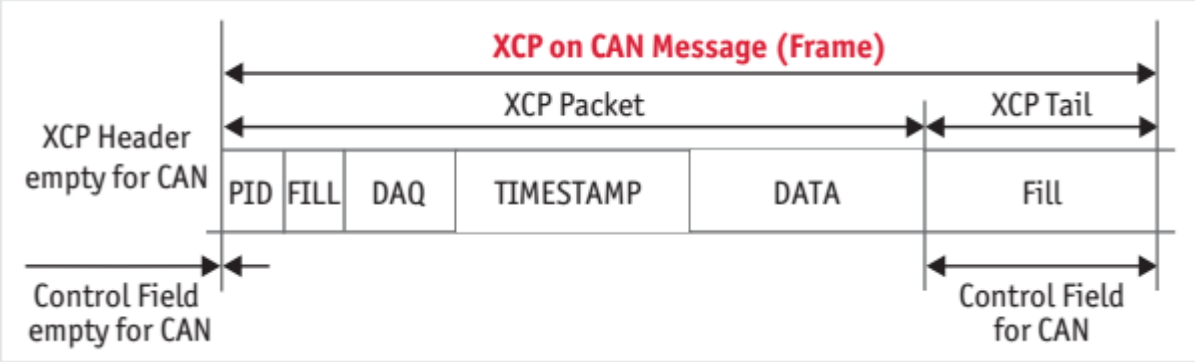
- Electronic stability control (ESC) ECU
  - Used to improve a vehicle's safety
  - Detects and reduces traction loss
  - Mitigate loss of control

Technical Specifications

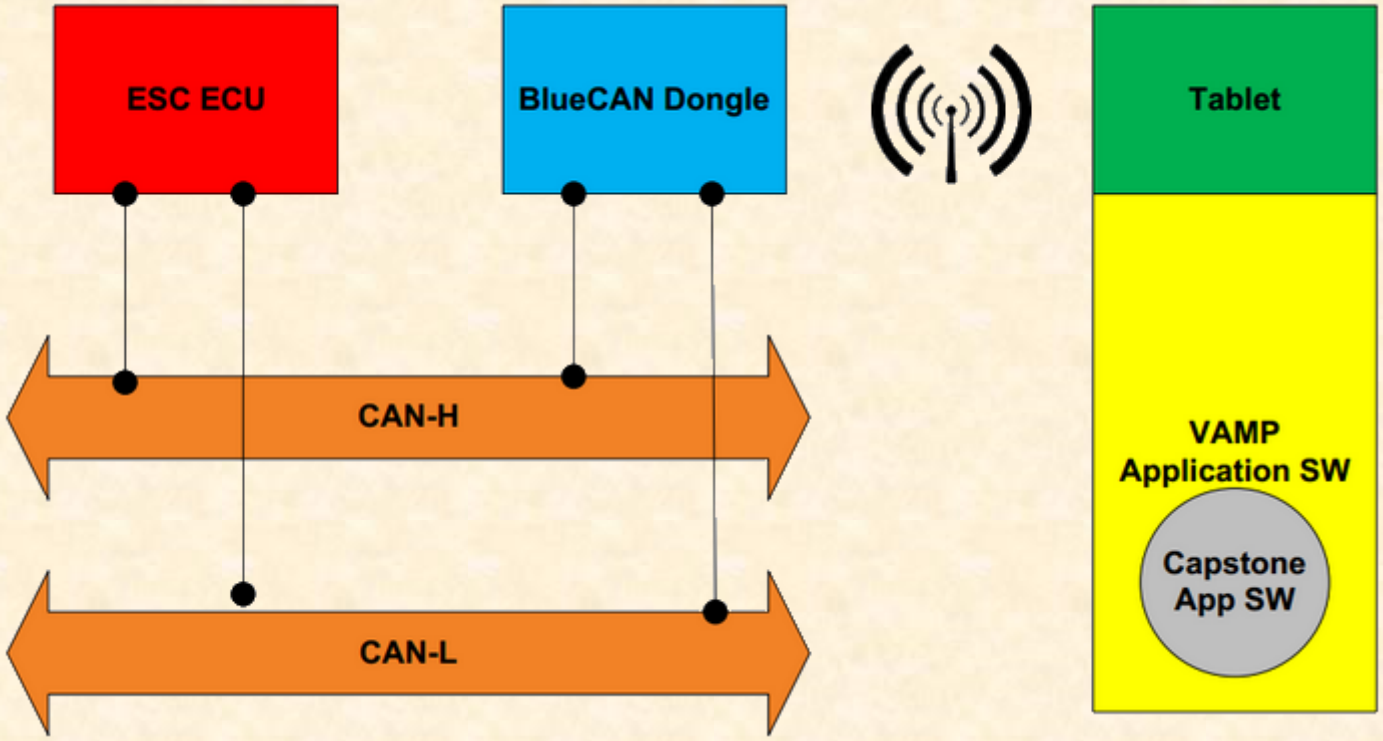
- CAN-H / CAN-L
  - Controller area network
  - Intercommunication between ECU
  - Can be read directly with assistance of hardware

Technical Specifications

- XCP
  - Universal Measurement and Calibration Protocol
  - Reading and writing of the memory contents of ECU



System Architecture



System Components

- Hardware Platforms
  - ECU
  - CAN Bus
  - Bluetooth dongle
- Software Platforms / Technologies
  - Java
  - Android Studio
  - Gradle builds

Testing

- Automated testing
  - Test-driven development using JUnit
- Hardware testing
  - Provided ECU, Bluetooth dongle, CAN bus, and a device to read data from CAN bus

Risks

- Understanding hardware pipeline
  - The CAN bus and ESC ECU are unknown pieces of hardware to everyone on our team
  - We will mitigate this with research. We have several resources that we can take advantage of.

Risks

- Android Development
  - No experience with Android development
  - Mitigate by assigning a team member the task of becoming familiar with Android development

Questions?