Scalable Cruise Control
Software Engineering CSE 435
Michigan State University
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SCALECC1 Team members:

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Customer: Eric Winder, Ford Motor Company
Instructor: Dr. Betty H.C. Cheng*

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• SCALECC manages three modular semi-autonomous cruise control systems
• Both cruise controls and AEB read sensor data and make throttle / brake requests as required
Project Overview

• Motivation:
  • Improve safety & reduce collisions
  • Improve driver experience
  • Provide extendable system
Overview of Features

- Cruise control management modules
- Throttle/Braking control of vehicle
- Modular software to implement later features
- Packable included features
  - Automatic Emergency brakes (AEB)
  - Follow distance management (FDM)
Domain Research

• Researched current adaptive cruise control systems
• Implemented most common button control schemes and adaptive cruise functionality
• Project Constraints
  • AEB is always functional while the vehicle is on
  • The software will take action (throttle / brake requests) based on module priority
Part II: Model-based View of System

- Sequence Diagram
  - Electronic Control Unit initiates and manages the three modular autonomous systems

- Class Diagram
  - Electronic Control Unit connects all system components
  - Authentication
Sequence Diagram

Camera
sendData(vehicleData)

Radar
sendData(vehicleData)

ECU
activateSystem()
checkStatus(vehicleData)
accelerationRequest
[accelerationRequest == 0]
checkStatus(vehicleData)
accelerationRequest
[accelerationRequest == 0]
checkStatus(vehicleData)
accelerationRequest
[accelerationRequest != 0]
AccelerationControlRequest (accelerationRequest)

Authenticator
activateSystem()

Automatic Emergency Brake (AEB)

Follow Distance Management (FDM)

Simple Cruise Control (SCC)

Vehicle Acceleration Control System
endRequest
Part III: Demonstration

Steering Wheel Buttons

Cruise  Follow  Set +  Set -  Cancel

Cruise Control Status

(Settings: None, Regular Cruise Enabled, Follow Distance Management Cruise Enabled)

Cruise Control Set Speed

25 MPH

Follow Distance Management Setting

(Settings: Disabled, Short, Medium, Long, Extra-Long)

Diagram
Prototype

http://www.cse.msu.edu/~cse435/Projects/F2016/Groups/SCALECC1/web/prototype.html
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