Overview of Traffic Jam Assist (TJA2)
Software Engineering CSE435
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Project Overview

• The TJA system adds functionality to the adaptive cruise control (ACC) of a vehicle. On top of the standard ACC functionalities, it allows the vehicle to slow down to a stop and start proceeding forward again based on the distance of the vehicle in front of it.

• Motivation for project
  – Addresses stress that drivers experience in during traffic jams
  – Improves safety of vehicle while on limited access highways
Overview of Features

• The system is controlled by numerous physical buttons within the driver's reach to ensure the safety of the driver.

• The activation and deactivation of the TJA system are highly dependent on the position information provided by GPS.

• The entire system contains a great number of sensors that will be used in various aspects.
Example of the first feature

- On the dashboard, there must be an on and an off button that engages or disengages the system accordingly.

- The steering wheel must have resume/pause and cancel buttons that engage and disengage the TJA accordingly.
Example of the second feature

• The system requires a functional GPS to detect if it’s on a limited access highway.

• If the GPS loses signal or detects that the vehicle has left a limited access highway for more than three seconds, TJA will deactivate.
Example of the third feature

• The vehicle will be equipped with sensors that can detect data used to calculate the closing rate between obstacles in front of the vehicle.

• The steering wheel will have a capacitive touch sensor that can detect whether the driver is touching it.
Domain Research

• Investigated
  – ACC
  – Slip-Detection
  – Steering-Wheel sensors

• Needed to apply domain knowledge on topic of driving aid systems

• Project Constraints
  – External sensor system and internal sensor system
  – Entire TJA and ACC must be functioning properly
  – Minimal lag
Part II: Model-based View of System

Component I: On-Board Computer

Figure 1: Class Diagram for On-Board Computer
Component II : TJA System

Figure 2: Class Diagram for TJA System
Part III: Demonstration

- Python
- Tkinter
- Can be found on Team website under Publicly Accessible Links

Figure 4: Example of Prototype
Scenario 1: Pausing And Resuming The System

- Pause causes system to deactivate
- Resume causes system to reactivate
- Maintains parameters

Figure 5: System Before Buttons are Pressed
Figure 6: System After Pause Pressed
Figure 7: System After Resume Pressed
Scenario 2: Cancel

- Works similarly to pause
- Forgets parameters

Figure 8: System Before Cancel Pressed

Figure 9: System After Cancel Pressed
Scenario 3: Distance Selection

Figure 10: System Before any Buttons Are Pressed

Figure 11: System After -D Is Pressed

Figure 12: System After +D Is Pressed
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