

Requirements

Bold = Invariant

Non Functional

1. **The system shall only operate on highways with Path Prediction System enabled**
2. **The system will turn off if the driver is distracted**
 - a. A driver is distracted if:
 - i. Their eyes are not on the road
 - ii. Their head is not in the correct position
3. **The system will turn off if it is unable to handle a situation**
4. **The driver can regain control of the vehicle by:**
 - a. Using the steering wheel
 - b. Braking
 - c. Throttle
 - d. **The HFD system should be disabled when any of these are applied**
5. **If road conditions vary from LiDAR mappings, return control to the driver**
 - a. For example in construction areas
6. **The system should respond to lane and speed changes within 300ms**
7. **If the driver is distracted for more than 5 seconds, warnings begin**
8. Data privacy and security must comply with GDPR
9. There is a series of transition steps to facilitate a hand off between the system and the driver
 - a. Warnings issued to driver
 - b. Vibrations sent to driver
 - c. Aborts Hands Free Mode
 - d. Vehicle comes to stop if necessary

Functional

1. Driver Assist System
 - a. Local storage for LiDAR mappings
 - b. Connection to external cameras, brakes, and sensors
2. Driver Attention System
 - a. Two cameras to verify attentiveness
 - i. Rearview mirror
 - ii. Steering wheel
 - b. AI system to determine if driver is attentive
3. Vehicle Control System
 - a. Central computer for processing
4. Human Machine Interface Subsystem
 - a. Small speaker to sound alerts when driver is not attentive
 - b. Vibration mechanism in drivers seat to send warnings

- c. Notification in dashboard for warnings
 - d. Button on steering wheel to engage HFD mode
- 5. Path Prediction Subsystem
 - a. AI system connected to external cameras and sensors to determine path
 - b. Compares vehicle position to LiDAR mappings to predict direction
- 6. Vehicle Position Subsystem
 - a. Computer to validate vehicle's position using onboard sensors

Questions

1. How does the system "Bring the vehicle to a stop if necessary"
 - a. What is "necessary"
2. How many warnings should be issued to the driver before vibrations are sent
3. What is the maximum/minimum speed the system can be set to
4. What is the budget for this project
 - a. Assuming we start with a functional vehicle
5. What attributes of lane detection and adaptive cruise control already exist in vehicle
 - a. Sensors, automatic steering/braking
6. What laws or guidelines should be followed
7. What systems should remain active in the event that a crash is predicted
8. How loud in decibels should the audio alerts be