Software Requirements Specification

Prepared by: Daud Abdinasir

September 23rd, 2024

1. Introduction & Overview

The purpose of this document is to introduce a self-driving vehicle software that still keeps the driver in control. This groundbreaking software signals that the pursuit of increasing the convenience and safety of drivers across the country is of the utmost pertinence. The system will allow for the user to enjoy the ride with self drive while still giving them control to do actions such as braking, taking turns, merging lanes and more, mixing the machine with the human touch. This autonomous driving system will open up doors for increased productivity for autonomous trucks and delivery vehicles, reduce overall environmental impact of road transportation, reduce traffic congestion, and increase driver and pedestrian safety by eliminating unsafe driving practices. This document will go over the essential user requirements such as the needs of the user, as well as assumptions and the requirements for the system.

2. User Requirements

2.1. User Needs

The system should allow users to seamlessly switch some self drive to manual drive when they perform actions like braking, signaling to switch lanes, or turning at an intersection. The system should allow the user to take the most efficient route when inputting their destination into the GPS. The system should alert the user when manual drive will be needed during the ride, to ensure user and vehicle safety. The system

2.2. Assumptions and Restraints

The system will only be implemented in four wheel drive vehicles. The vehicle's 360 view will be handled by cameras, sensors, and similar devices that will be placed on the front, back and sides of the car which will allow it to safely navigate the road. The user will have to have a valid driver's license and will be required to take a course on how to use the vehicle and what to do in emergency situations. Some restraints are limited availability for disabled users due to having to be able to fully pass a driving test.

3. System Requirements

3.1. Functional Requirements

Capabilities of the Autonomous Driving System:
- Stay on the specified road and preserve lane integrity.
- Adapt your speed to the road's features, such as bends and curves.
- Utilizing sensor data, identify and react to barriers (such as other cars, people, and animals).

Parts:
- Lane Detection Module: Identifies and maintains lane boundaries using camera and sensor data.
- The speed control module integrates with the car's systems to change the speed in response to situations that are identified.
- The obstacle detection module analyzes information from sensors and cameras to recognize and respond to impediments.

States:
- In autonomous mode, the system runs on its own while the user keeps an eye on the surroundings.
- In manual mode, the driver has complete control over the car when performing certain tasks (such braking and turning).

- Allow users to manually engage the vehicle's controls for steering, braking, and changing lanes with the User Control Interface capabilities.
- Give immediate input on the status of the car and any system alerts.
- Parts:
- Control Panel Interface: A touchscreen interface that allows users to view system status and access controls.
- Alert System: Notifications that let the user know when something needs to be controlled manually or when a possible risk is seen.
- States:
- In an active state, the user is interacting with the control panel.
- Standby State: The user is not interacting with the controls while the system is operating autonomously.
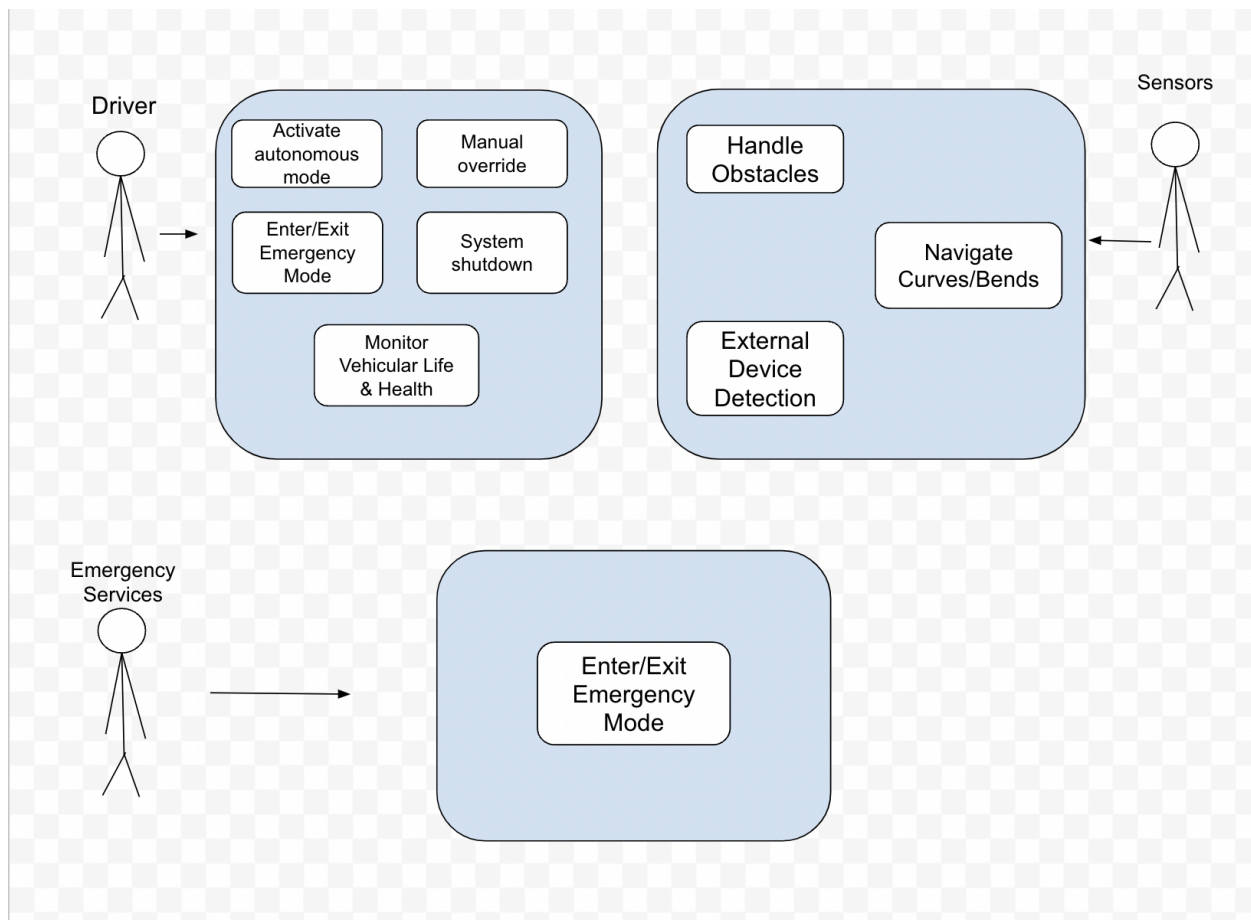
3.2. Non-Functional Requirements

- Safety and Reliability: User safety must be the top priority, and the system must function precisely and dependably.
- Adaptability: The system must be able to adjust to a range of driving circumstances, such as varied weather patterns and types of roads.
- Performance: To guarantee seamless functioning while driving, the system must process data in real-time with the least amount of latency.
- Usability: The interface needs to be accessible and easy to use, supporting a variety of driving skills.
- Scalability: The system design needs to be scalable in order to be implemented on all of the fleet's four-wheel vehicles.