Software Design Specification

for

Autonomous Vehicle System: IntelliDrive

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1 System Description

IntelliDrive is a software system designed to keep the driver, passengers, and others on the road safe. Our system will utilize lane and object detection, road stability, and real-time data gathering through the use of a variety of cameras, sensors and other similar components. In the event of an emergency, the system will send signals via satellite to the nearest rescue center. This feature also detects obstacles in the car's path and sends that information to the vehicle's computer to adjust road stability.

However, there are limits to our system that we do intend to expand upon in the future. For the time being, our AVS does not provide complete self-driving functionality, and users will be expected to handle a variety of aspects when operating the vehicle; the user is responsible for reacting to traffic signs, making turns, merging/exiting freeways, as well as accelerating or braking.

2 Software Architecture Overview

2.1 Architectural Diagram of all Major Components

2.2 UML Class Diagram

2.3 Description of Classes

IntelliDrive (Main)

- Contains method toggling of autonomous driving mode, calls classes such as object detection, lane detection, camera/sensors, and navigation system

Navigation System

- Contains methods for retrieving current location, determining efficient route

Vehicle

- Contains information regarding the vehicle’s make, model, and registered IntelliDrive account

Lane detection

- Calls cameras and sensors
- Contains methods for processing information from the cameras and sensors, as well as methods for determining shape of lane

Object detection

- Calls cameras and sensors
- Calls Satellite class for information on set route

Camera/Sensors

- Provides information used for lane and object detection

- Contains methods for reading/processing information about scanned areas or images

Emergency

- Calls Navigation System to update route info and notify of accidents/obstacles
- Contains methods for determining accidents, system failures, and notifying authorities

2.4 Description of Attributes

IntelliDrive (Main)

- intellidriveMode - a boolean attribute that would determine whether or not the autonomous driving mode is on

Navigation System

- destinationLocation - the address of desired destination
- currentLocation - the address/coordinates that indicate the vehicle's current location
- routeInfo - the route that the vehicle will take to reach the destinationLocation
- trafficInfo - provides information on current/expected traffic status

Vehicle

- vehicleMake and vehicleModel - provides basic information regarding the make and model of the vehicle
- intellidriveID - the registered ID for the IntelliDrive user's vehicle

Lane Detection

- sensorInput - receives information from the sensors
- cameraInput - receives information from the camera
- laneMeasurements - information regarding size and shape of the lane

Object Detection

- sensorInput - receives information from the sensors
- cameraInput - receives information from the camera
- obstaclePresent - boolean that indicates whether there is an object in the road

Camera/Sensors

- sensorInfo - information regarding what the sensors have detected
- imageInfo - information regarding what the cameras have detected

Emergency

- eCategory - information regarding type of emergency (i.e. accident, system failure, etc)

- eLocationTime - information regarding the location of the accident/failure, as well as timestamp

2.5 Description of Operations

3 Development plan and timeline

3.1 Partitioning of tasks

3.2 Team member responsibilities