Cruise Control
Software Development Document
V.0.2

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"I pledge my honor that I have abided by the Stevens Honor System."

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1. Executive Summary

This project is to develop a cruise control that is used to automatically maintain a car's speed without the user having their foot on the gas pedal. Cruise control is a feature offered in the majority of modern cars to provide user convenience specifically for long drives on highways. Some major features that are needed to make the cruise control work include turning the program on and off, a dashboard display of the speed of the car, buttons to increase and decrease the speed as necessary, and so on. Our goal is to successfully implement these major features with a low chance of failure in order to increase the reliability of our cruise control software and enhance the overall performance of the cruise control system.

2. Introduction

High-Level Customer Need

Cruise control is a highly sought after feature in vehicles that electronically interacts with the engine's management system to maintain its speed. Originally invented to save gas by reducing gas-wasting surges on the accelerator, cruise control provides an opportunity for the driver to rest their foot and safely adjust their positioning, while also helping to prevent speeding tickets on long roads and highways.

Major Features

Our implementation of cruise control needs a number of standard features in order to work properly. The first major feature we need is to take input that will turn cruise control on and off. In addition, cruise control needs to be able to shut off when the user presses the brake and, when the car turns off, the entire program should stop running. We need another input that sets the speed that the cruise control will maintain. To see the speed that we are maintaining we will need a dashboard display of a speedometer that shows the current speed. Input to increase and decrease the set speed of the cruise control will also be implemented so the driver does not have to turn off cruise control and try to get the desired speed by pressing the gas. There will be a logging system that writes data to an excel spreadsheet as soon as cruise control is turned on. It will track any changes in the program such as when it turns on, being set, the current speed, and when it is turned off or deactivates. This will provide a better understanding of how the cruise control program is running and if there is a problem, it will be easier to understand where and why it occurred.

High-Level Reliability

As the reliability of our implementation of cruise control is directly related to the safety of the passengers, it is crucial to develop highly reliable software to give the passengers a sense of security. Ultimately, our goal will be for our implementation to have a success rate of 99.99% for hardware and 99.999% for software of the cruise control. To achieve this goal, we have to make sure that all of the major features mentioned above, such as turning the cruise control on and off, and setting the speed the passenger wants to maintain the vehicle at, should work 99.99% of the time. With our agile development process, we will successfully implement all the features with a low probability of failure and test the reliability of our implementations via series of tests and experiments, to make sure that we have reached our goals.

High-Level Performance

The cruise control system will have to have optimal performance while the car is in motion. Optimal performance means that the vehicle will reach the cruise control speed that is set by the driver as soon as possible. The cruise control will also have to maintain the speed that the driver decided to set by the cruise control button until the driver turns off the engine or turns off the cruise control option. It is important that once the cruise control is turned on, and the speed has been set, that the vehicle does not dip above nor below the speed. A fluctuation of the speed of the car is an indicator of a low-level performance, which should be avoided and be accounted for when implementing the cruise control system in the vehicle.