# Executive Summary

Vehicle accidents cause significant damage to one’s health, and finances. One factor contributing to such accidents arises from users being unaware of obstacles in their blind spot. As a result, lane changing becomes a dangerous maneuver. To account for this issue, we are prototyping a system that will warn users of obstacles present, or approaching their vehicle’s blind spot, as well as preventing them from making unsafe lane changes.

The design is intended to be used on a scaled down remote controlled vehicle. It consists of four main modules: obstacle detection, output, automation, and a remote graphical user interface (GUI). The obstacle detection module uses two sensors, and a microcontroller to identify obstacles present or approaching the user vehicle’s blind spot. The microcontroller calculates the obstacle’s position, relative speed, and the amount of time required for it to reach the blind spot (if not already present) using the sensor’s distance values, and the trigger rate. Finally, the automation module allows the microcontroller to assume control of the user vehicle. The purpose of this module is to prevent collisions by locking the steering of the user vehicle towards the obstacle. The GUI allows remote operation of the system for demonstration and verification. It plots the microcontroller’s calculations in real-time in addition to mirroring the onboard Light Emitting Diode (LED), and Liquid Crystal Display (LCD). It also allows for full remote control over the speed, and direction of the user vehicle.

Module level, as well as system level tests was run to verify the design. Based on these tests, the system meets the initially set requirements. It successfully determines the danger associated with a possible lane change, and warns the user accordingly. If necessary, it activates the steering lock to prevent a collision.

Future iterations of the design can be improved by replacing the current sensors with more advanced alternatives, as many of the system’s shortcomings stem from the noise on the sensor data. This issue was compensated with an averaging algorithm, but the system’s response time was compromised as a result. The automation module can also be improved by introducing counter-steering mechanisms as opposed to steering-locks.