

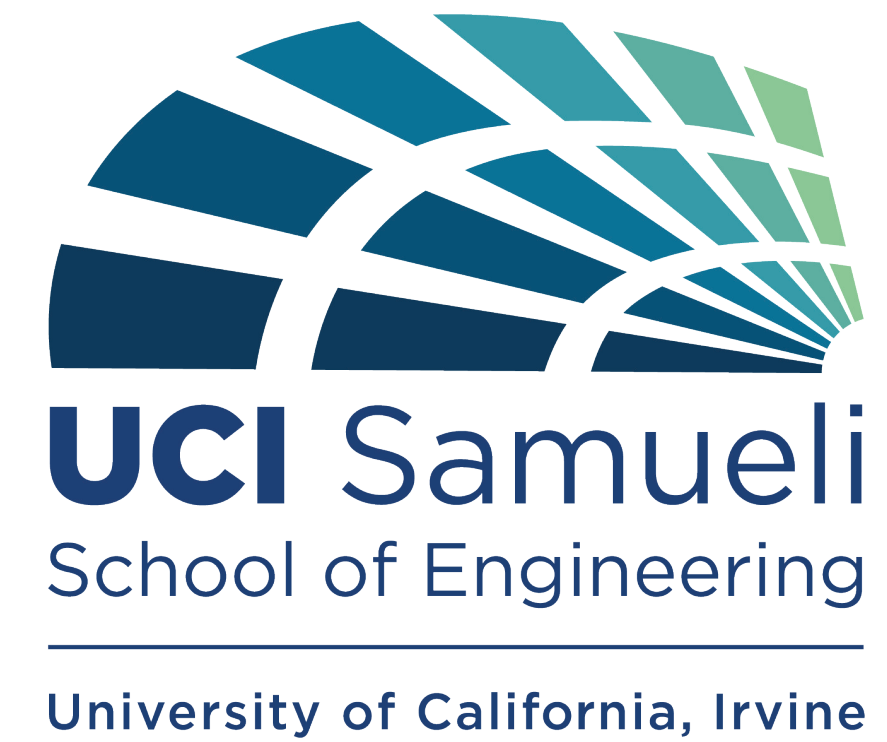


# EchoSense: Personal Surrounding Safety Detection

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## Introduction

In recent years, the number of bikers on the road has steadily increased. With more bikers on the road, the possibility of biker accidents increases as well. Some of these accidents are attributed to biker inattentiveness or due to reckless drivers. We aim to build a device to alert cyclists of approaching vehicles so they have time to react.

## Goal

To create a mountable system to use LIDAR to sense approaching vehicles and warn the rider using bluetooth.

The system consists of the following:

- A light detection and ranging (LIDAR) sensor
- A microcontroller
- An app for a mobile device

## Materials

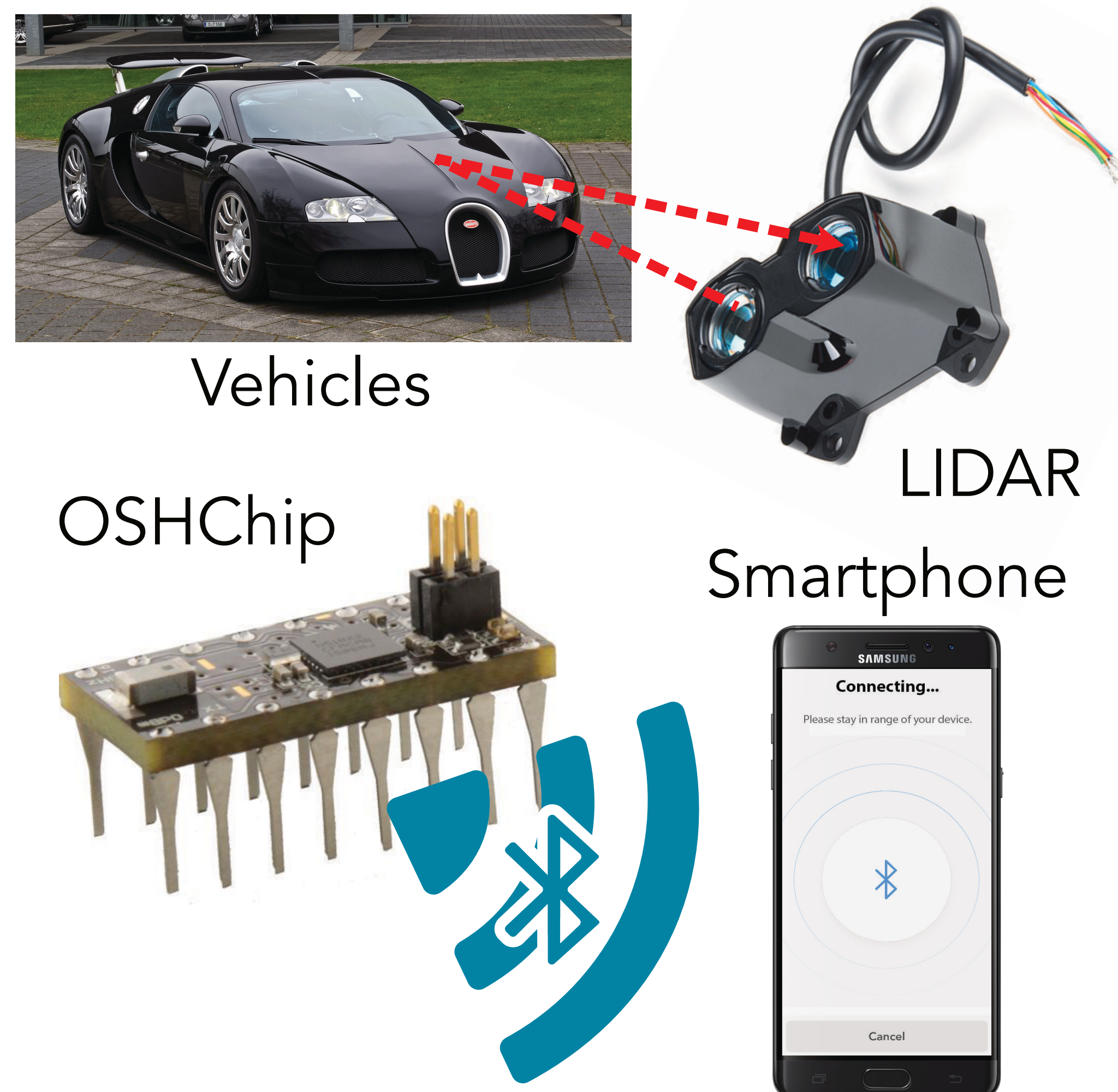
### Hardware

- OSHChip
- LIDAR Sensor
- Slipping
- Gear Motor
- Battery
- Voltage Regulators

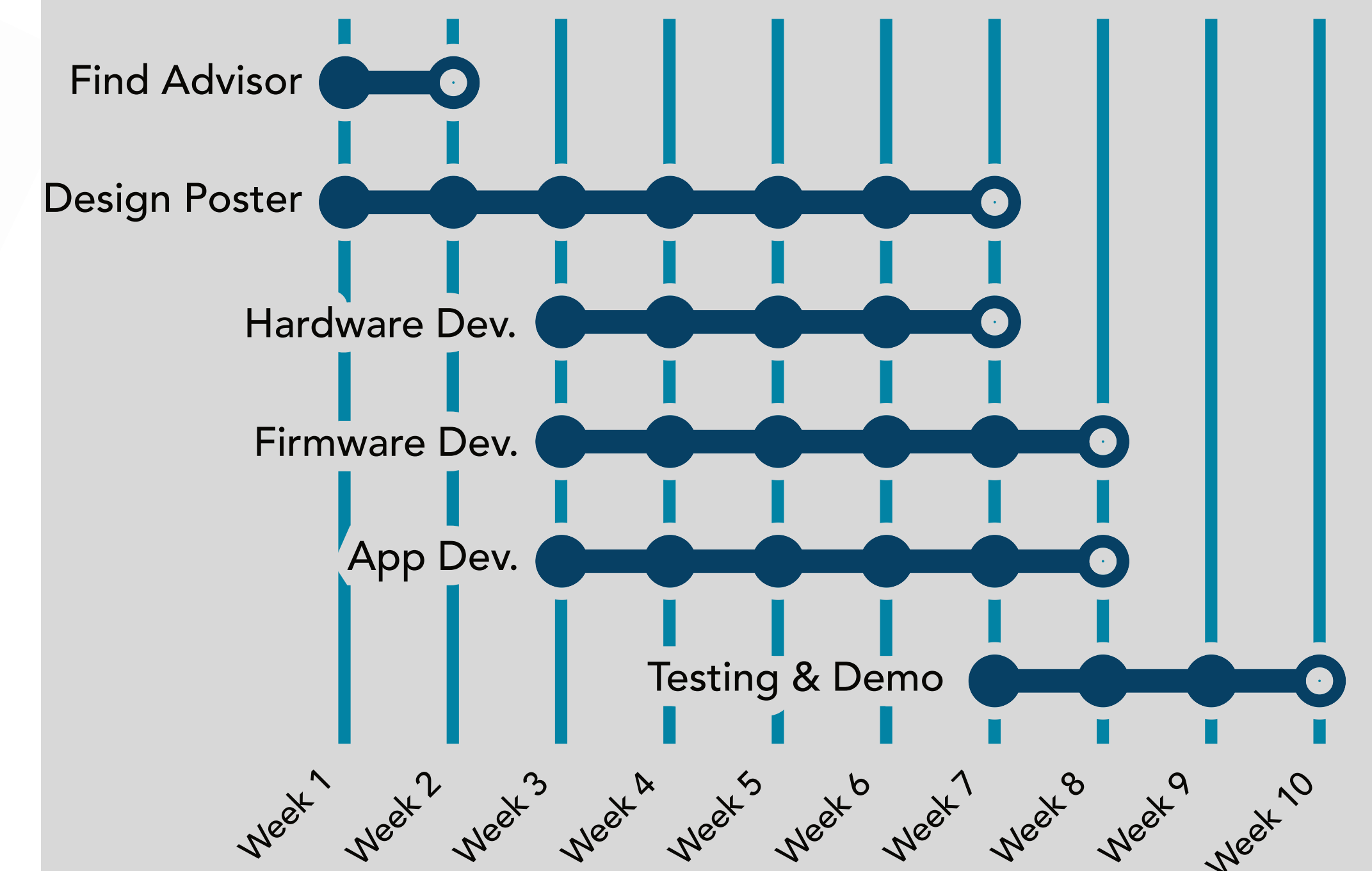
### Software

- Firmware written in C++ using the mbedOS framework
- Android app to interface with EchoSense over Bluetooth LE

## System Architecture



## Milestones



### Future Development:

- Add a rotating platform to sense a 2D area
- More refined vehicle detection algorithm

## Challenges

- Third party LIDAR library did not work and needed to be modified.
- Voltage regulator failed destroying other components.
- Android simulator does not work with Bluetooth, requiring testing on-device.

## References

- [1] Steve I, "Bicycle Accidents in the United States People Powered Movement", People Powered Movement, 2019. [Online]. Available: <https://www.peoplepoweredmovement.org/bicycle-accidents-in-the-united-states/>. [Accessed: Nov 6 2019].
- [2] L. Watson and M. Cameron, "Bicycle and Motor Vehicle Crash Characteristics", Monash University Accident Research Centre, Melbourne, Australia, 2019.