EXECUTIVE SUMMARY

Compared to other standard road vehicles, motorcycles are much less visible. They are smaller and more likely to be overlooked in traffic. Additionally, the lighting on motorcycles, such as turn signals and brake lights, is compact and located lower than the lighting on other vehicles. Motorcycles also lack new safety features, such as blind spot detection, that are commonplace in modern road vehicles. Some aftermarket parts attempt to address these flaws, but the installation of these parts can be troublesome. Halo Helmet addresses these flaws in a singular, compact package, detailed in Figure 1, by incorporating high visibility turn signals and a blind spot detection system onto the rider's helmet.

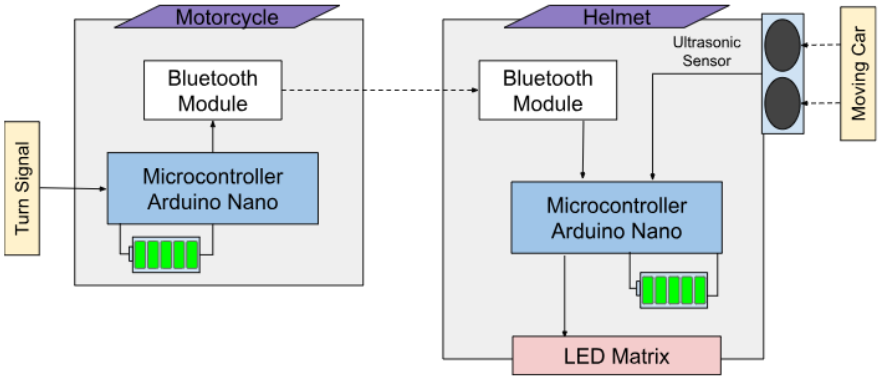

Figure 1. Halo Helmet Component Diagram

The most essential requirements for Halo Helmet production are that the helmet maintains a weight below five pounds, a brightness capable of alerting other drivers on the road, and a battery that lasts longer than 6 hours on a full charge. The constraints core to Halo Helmet are social, environmental, and safety constraints. The device obeys Department of Transportation regulations, is reuseable with many types of helmets, and functions as a safety device that utilizes lights, head protection, and sensors. The standards Halo Helmet complies with are Ingress Protection (IP-X3, the ability of the device to withstand exposure to water), Universal Serial Bus (USB), and modular transmitters (Bluetooth).

For the design team to achieve the standards set for the helmet in the previous paragraph, the team is using small and lightweight components as well as wireless communication to avoid necessitating the rider being connected to the bike via wires. The necessity of communication from the motorcycle stems from the need for the motorcycle's turn and brake signals to be displayed on the rider's helmet for increased visibility. For blind spot detection, ultrasonic sensors alert the motorcyclist to an object in their blind spot. Lightweight microcontrollers (Arduino Nanos) are processing the signal data, as they can easily fit within the helmet without causing discomfort to the rider. The software encodes and parses the data transmitted from the bike's indicators and the ultrasonic blind spot monitors to ensure functionality.

Team 2-Stroke takes pride in offering a product that creates a safer environment for motorcyclists and all roadway participants. While Halo Helmet meets all expectations for the current version of the product, there is still room for improvement. A feature currently being discussed is the option to add voice control. Not only would implementing voice control catch the eye of future users, but it would also expand the versatility of Halo Helmet. Overall, Halo Helmet is inspired by tunnel vision for motorists' safety and always will be.