EXECUTIVE SUMMARY

The SafeStep solves the problem of monitoring the physical safety of elders or people facing cognitive disorders. This target audience faces a shortage of personnel in the home caretaker industry by monitoring the safety of the user from environmental factors. The SafeStep solves this shortage by being a compact, affordable product that takes the burden off of already strained caretakers. This system allows for constant monitoring of the user while being introduced as a wearable shoe that do not degrade the quality of life for the user. It solves the problem of having to remember to put on certain monitoring devices; the shoes are designed for daily use. Figure 1. illustrates the SafeStep's features.

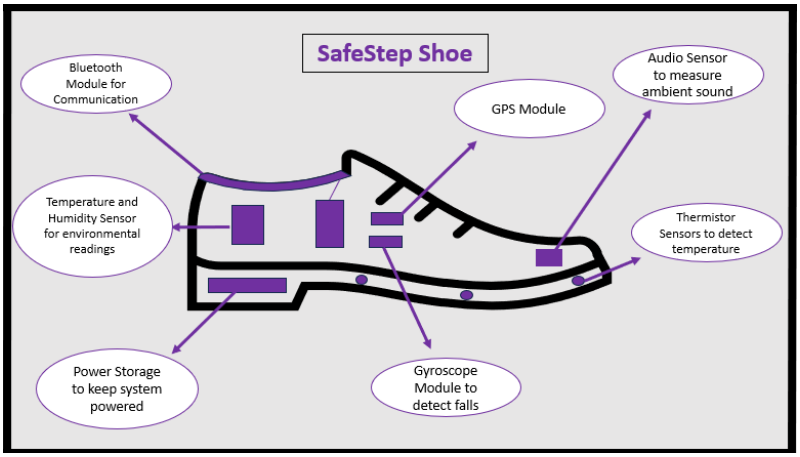

Figure 1. A Conceptual Overview of the SafeStep and Placement of Components

The core requirements, constraints, and standards of the product have all been tailored for the safety of the user. The shoe is required to alert the caretaker of the user falling via smartphone notifications. The shoe will also feature sensors that cover temperature, GPS, and sound to monitor the environment of the user. The use of GPS in the shoe allows for the caretaker to know the location of the user through the smartphone app. The shoe adheres to IEEE standards of dust and water protection to allow for the safety of the user and the electronics of the system.

The core approach was to create a product that does not interfere with the quality of life of the wearer while providing optimal safety and risk detection. The sensors for monitoring the wearer's environment cover a wide range of environmental risks such as temperature and noise, while being compact enough for comfort and wearability. The microprocessor Teensy 4.1 was chosen due to its small size, processing power, open-source libraries, and number of pins to integrate with sensors. The battery provides the product with a lifespan of 24 hours so that it does not interfere with daily activities and maximizes safety from electrical hazards. The software used in the product is simple and open source, allowing for seamless integration and communication between components using Bluetooth and hardwired connections.

The design can be improved by methods of recharging the shoe from kinetic motion such as piezoelectric discs. The shoes can be custom-designed to make component integration easier compared to an already existing shoe. The design could include more, or different, sensors based on the application, allowing for an easy interchange of sensors depending upon the needs of the user. This product has limitless possibilities when it comes to different applications as the design allows for compact monitoring of environments such as a freezing cold day or a user accidentally walking towards the road or freeway.