In a world built to accommodate those who are neurotypical and able-bodied, the limiting factors for those who have certain disabilities - such as low or non-sightedness - are strikingly apparent outside of spaces that are specifically made to be accessible for them. While things like braille menus and signs are becoming more commonplace, there are still few accessible solutions for people who are non-sighted to be able to navigate an urban world autonomously. We aim to design a tool using current technologies to offer a new means of understanding the environment to those people so they can live their lives with less limiting factors. To that end, my associates and I have taken on the responsibility of designing a product that we hope will be part of redefining the paradigm of accessibility devices as we know it.

The working title for this project is Project Digital Orientation Guide (D.O.G.), and in summation, we are building an Android application that uses a GPS in conjunction with image classification models that are able to recognize objects from images to simulate the functions of a seeing eye dog. Through this, we will be able to teach a program to recognize and decipher common visual street signs and cues, much like a seeing eye dog would, and translate those commands into audible cues that the user can easily make sense of. This project will include object detection and collision detection modules that will use a phone camera to recognize objects in the area, a communications module to relay information to the user, and mobile application to run everything together, as well as provide extra safety checks via GPS tracking to ensure that the safety of the user is not being compromised.

The biggest portion of the project will consist of the first two modules we've mentioned: object and collision detection. At a high level, we will be developing an algorithm that can detect basic objects like cars, crosswalks, road blocks, and street signs, and send that information to the communications protocol so it can be relayed to the user. The object detection portion of our application will be dedicated to detecting things like traffic lights, stop signs, crosswalks, and pedestrian walking signs. In summation, this module will be in charge of processing information. Our collision detection, however, will be responsible for detecting things such as objects obstructing the path in front of the user, manholes, cars, and other objects that can physically obstruct the user. In both cases, the names and relative positions of these objects will be recorded and sent to the communications protocol.

The next cornerstone of our project will be developing a communication system that will be able to recognize basic commands from the user, and be able to read out information sent from the object collision and detection modules. This will most noticeably be in charge of text-to-speech interactions, but it will also be in charge of accepting and processing basic commands that the user prompts, such as repeating information, inputting an address to the GPS, asking to check for specific objects, etc. This module handles most of the user interface related to the application.

Finally, the entire brain of our operation, our Android based mobile application. The application is in charge of hosting our software and integrating the mobile device's hardware with the commands that are requested by the other modules - being the camera for object detection and the microphone and speakers for communications. The application will also feature a GPS service that will serve as a double-check to make sure that the input generated by the object detection module make sense for the geographical coordinates of the user, i.e. if the user is near an intersection, the application should be detecting a traffic light or stop sign.

Our vision is to create an affordable, safe, and effective means of making the world a more even playing field. We hope that this new means of perceiving the environment will instill

a new confidence in our users to be able to navigate the world independently. With all of the advanced technologies our product utilizes, it undoubtedly has the potential to be something great, but more importantly, it's going to be making a difference in the world. Since we often underestimate the power of having options available to us in the market, even if this product unexpectedly falls into obscurity, we will have at least given a new option to those who already have very little to choose from.