If you are visually impaired, there may be times when you need to navigate the world on your own. We are developing a mobile application to help people navigate on foot safely in potentially hazardous everyday environments. Our application is composed of a direction-giving service built on Google Maps, but overhauled to add features and improved usability for the visually impaired.

With this application, the user can verbally request gps on-foot directions. The user holds up the phone camera to face in front of them while walking, and the app detects objects seen by the camera, such as cars, cross-walks, street signs, roads, bikes, etc and speaks them out loud to the user. Additionally, if a street sign is detected, like a stop sign, railroad crossing sign, construction warning sign, etc, the app can identify the type of sign it sees. With these functionalities, this application can help a visually impaired person more safely walk from point A to point B.

A practical example of this application can be seen in the case of a blind user crossing a road. Crossing a road is dangerous and can be scary for a blind user - it can be hard to discern the proper place and timing to cross. The application helps alleviate uncertainties by notifying the user when a crosswalk is seen by the camera. With the aid of this application, the user can gain a complete understanding of his surroundings before stepping onto the street. Moreover, if the blind user is concerned about oncoming low-sound vehicles, he can effectively "look both ways" before crossing the road by facing his camera left and right.

The problem of a computer program accurately identifying objects in the real world using a camera feed is a difficult technical challenge that may not have been feasible just a few years ago. In order for the application to detect and identify objects seen in the camera, we make use of a powerful technology called machine learning. Machine learning is a sub-area of artificial intelligence that involves computer programs using data to improve automatically through experience. For example, a machine learning application can become good at classifying cats versus dogs after being given thousands of pictures of cats and dogs to learn with.

Utilizing machine learning requires access to large amounts of data, and it can be difficult to find or create the necessary data for a machine learning task. We 'teach' our application by repeatedly exposing it to volumes of images so that it can become accurate at detecting objects in the novel, real-world context. We will approach the challenge of gathering sufficient data by experimenting with relevant datasets that are publicly available for use from databases like ImageNet or data-hosting websites like Kaggle.com.

Compared to similar applications and products directed towards a target audience with sight problems, our application has characteristics that give it an independent purpose. Products like the MyEye2 electronic glasses are more cumbersome and require additional hardware beside a cell phone. Additionally, our application requires minimal cell connection for gps navigation, while other mobile applications like Be My Eyes heavily require internet or cell reception to accomplish what our application does with machine learning.

Altogether, our application does more than just visual machine learning. The machine learning functionalities are integrated with speech recognition technology and map navigation, which pre-exist as reliable software. With our team of software engineers, we can combine these features into a user-friendly, convenient mobile application. The end result is a powerful assistive application that simulates the job of a seeing eye dog for the visually impaired.