Worldwide, many people are visually impaired; that is, unable to have their eyesight corrected by glasses or contact lenses. While public spaces sometimes have accessibility features to assist with this difficulty (for example, a crosswalk signal that makes a chirping sound to alert pedestrians that it is safe to cross), these assistive features are by no means universal and are not always well-maintained. An alternative solution is for visually impaired individuals to provide their own accessibility aids, like a white cane or guide dog. While these have proven useful in many respects, these tools also have limitations and issues. Our team notes that some of these limitations are especially important in a world that is becoming increasingly technical. For example, guide dogs cannot read street signs or use color as a cue.

Here, the tech industry can provide unique solutions which are more feature-rich and less cumbersome than older methods. In researching this question, we found many existing tools. Equipment such as eSight glasses or MyEye 2 offer an impressive selection of utilities. These tools typically involve a wearable camera affixed to glasses which can connect to a smartphone using wireless technology. All this convenience comes at a price, however: smart assistive eyewear typically costs multiple thousands of dollars, which is oppressively steep for many people. A deeper problem is that these devices require the user to have some sight, making them less helpful for people who are nearly or completely blind.

Our proposed solution is designed to be cheap and widely available: a smartphone app. The app's interface will be well-integrated with pre-existing accessibility features built into major mobile operating systems. For instance, both iOS and Android have screen reader capabilities. For users who can see the screen, the interface will be clean with large symbols and lettering. Users can interact with the app using voice commands, or by directly interacting with the screen. Thus, we do not anticipate the platform to be a barrier for more severe levels of visual impairment.

The functionality of the app is meant to cover safety and utility, areas that existing solutions have not focused as much on. Specifically, our app will use the phone's GPS to guide the user along a route (similar to how a guide dog would). It will also use the phone camera to provide information on possible obstacles along the route, as well as to identify information sources such as street signs to the user. All this information will be relayed using voice cues from the smartphone, and the user will be able to customize which ones they want to hear so that our app can be usable for anyone, regardless of their personal situation. Factors such as variation in phone position or camera quality make this task a difficult one.

To deal with this, our app will employ machine learning. In a nutshell, machine learning is a process in which a computer is trained to put labels on pieces of data (such as photos or text); it "learns" to categorize things. Now that huge repositories of photos are publicly available online, machine learning is a state-of-the-art solution for image recognition. Modern smartphones are incredibly powerful, and we intend to take full advantage of this. Certain types of machine learning algorithms are excellent at identifying objects in an image. Our team will be training one to find street signs in an image so that the user can receive information about their surroundings that is relevant for their personal safety. Further machine learning solutions will be employed to find important objects in images (such as traffic lights). Thanks to publicly available datasets, we will not need to spend valuable time and resources to personally gather relevant images. Initial investment in our project will go directly to development of the app.