**DEOR**

# **Description**

Visually impaired Individuals, find it extremely difficult to travel and navigate. This is especially true due to the sheer number of physicals obstacles that they face on their path. Not being able to detect the obstacles could lead to colliding with them, which could cause an enormous amount of physical harm. Without the helping of an aiding device most individuals, unfortunately, would not feel safe navigating indoors or outdoors.

A White cane is a device used by individuals who are visually impaired to navigate and detect obstacles when walking. It also acts to indicate that the user’s condition to onlookers. This means that the people around them can be more considerate and understanding.

Although a white cane is very useful to detect obstacles, and texture of the surface to an extent, it could not be a substitute for good vision. So, it lacks in giving the user accessibility to many of the everyday tasks, which a person with good vision could do intuitively. One such example would be finding an object in a room and to be able to navigate to that object. The ability to do such tasks easily, is in many ways, essential as it is part of our everyday life.

I intend to enhance the functionality of the white cane and so transforming it to a smart cane. In addition to fulfilling all the tasks of a convention white cane, the smart cane will give its users ease of accessibility to many everyday tasks. The principal task that I want the cane to assist with is to locate desired objects indoors and help the user navigate to it. I would also like the smart cane to have multiple other functionalities, which will be mentioned in the Objectives section.

The conventional cane will be transformed into a smart cane using several sensors such as cameras and accelerometers.

# **Objectives**

# **Primary**

1. The smart cane should be able to detect a specified Object (such as a mug), which is clearly visible in good lighting, using the camera attached to the smart cane
2. The smart cane should be able to roughly calculate the distance from the smart cane to the detected object
3. The smart cane should be able to take inputs from the user which can then be translated to commands
4. With the aid speaker on the smart cane, the user will be able to navigate to the desired Object
5. Conduct an evaluation of the performance of the prototype

# **Secondary**

1. To be able to detect an object of specified colour among same objects of different colours in good lighting and distance
2. The smart cane can help the user reach the desired object even in a cluttered room
3. To be able to capture a picture or video of an object of interest using the smart cane
4. To be able to have the functionality to have short text (such as labels) read out by the smart cane
5. The Accelerometer and Gyroscope is used to make object detection more robust, especially when the cane is moving

# **Tertiary**

1. Using verbal commands instead of using gyroscope and accelerometer

# **Ethics**

Preliminary Ethics self-assessment form has been completed. As there were no test subjects used (evaluation will be done on myself and the supervisor) this was deemed sufficient to meet the ethics standards. There will not be any user study done, as most of the evaluation will be focused on performance not usability.

# **Resources**

The resources I would require completing the project would be a white cane, a camera, accelerometer, gyroscope, speaker, microphone, and a Raspberry Pi. These will be provided by the supervisor, and I also be able to use my personal laptop as well as the lab machines.

The exact resolution of the camera is unknown just now, but it will be able to capture pictures of appropriate resolution so it can be processed and analysed to achieve the objectives.