

## Introduction

The most critical challenge for visually impaired individuals is the discernment and navigation of their surroundings. With this in mind, we propose an initiative called "Third Eye". Patients can use glasses to recognise obstacles in their immediate vicinity.

## Aim of study

To showcase the practical application of the theoretical knowledge acquired during our academic journey in real-life scenarios.

## Research

Some points of research include:

- Human visual system.
- Status, prospects and overview of the existed auxiliary system (Smart cane, Navigating robot, Obstacle detective vest).
- An in-depth exploration of LiDAR.
- Multi-sensor detection and ranging cooperation.

## Design and Planning

The design process involved:

- Selective technology
- Develop project schedule
- Review available resource
- Develop working process
- Model design

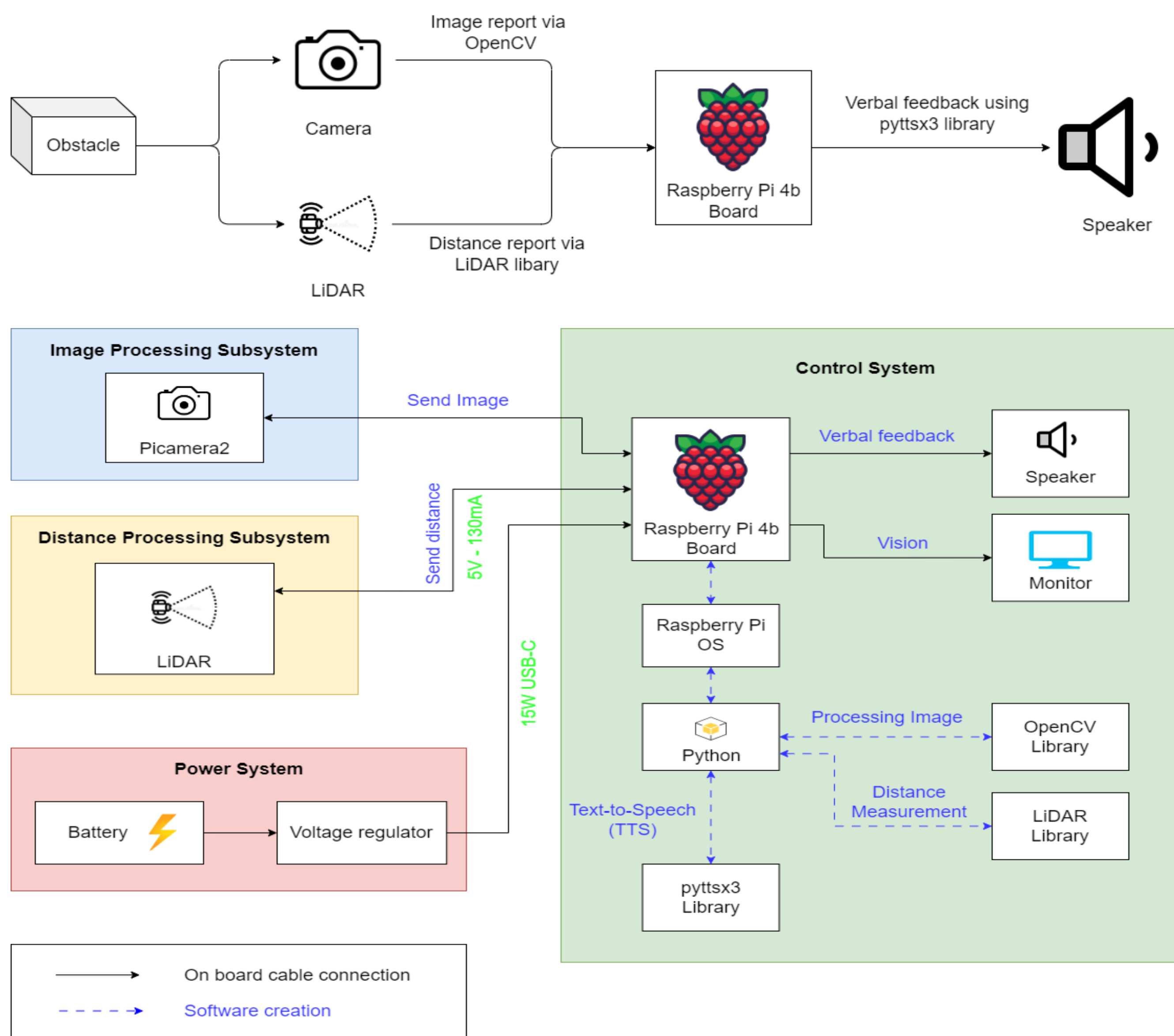
## Controlling Methodology

- Using Raspberry Pi as a main minicomputer
- Selected all software frameworks
- Create a master document updating the works in real-time
- Build simulation model in the FluidSim and SolidWorks
- Test product and trouble shoot

## Safety awareness

Safety is always paramount in the design and running project. The project includes some emergency stops and is also wholly enclosed for the protection of the user

## Visual Working Process



## Result

### Design and Planning:

After researching and reviewing the existing solutions, a concept was developed based on camera and LiDAR. It comprised of the following steps using a Raspberry Pi minicomputer:

- Acquire a picture of the surrounding environment using a camera
- Recognise the type of obstacle such as table, wall, chair, etc.
- Measure the distance between the user and obstacles using a LiDAR
- Warning the user about obstacles and the step distance from them using a speaker

### Control:

- Using Raspberry Pi to control the product
- Code was written in Python
- Simulation is helpful to make coding started parallel with other tasks to provide confidence with quick and safe troubleshooting

## Conclusion

The creation of this project was very beneficial for Visually impaired individuals and was a valuable method of gaining new knowledge. The main aim was to test the running possibility of a "Third Eyes" product. Thus, the project has been successful. Furthermore, it has shown the usefulness of cooperation between multi-sensors and cameras to help the user recognise the surrounding environment.

### Issues Encountered:

- Programming the camera to recognise the obstacles: There are limits in obstacle resources and angle captures, leading to unrecognised objects.
- Real-time updating: Because of some delays between recognising and notification, updating objects is a big bug to solve.