

Computer Vision for Visually Impaired

Project By

Hariharan Venkatramanan

Poornima Eshwara

Overview & Motivation

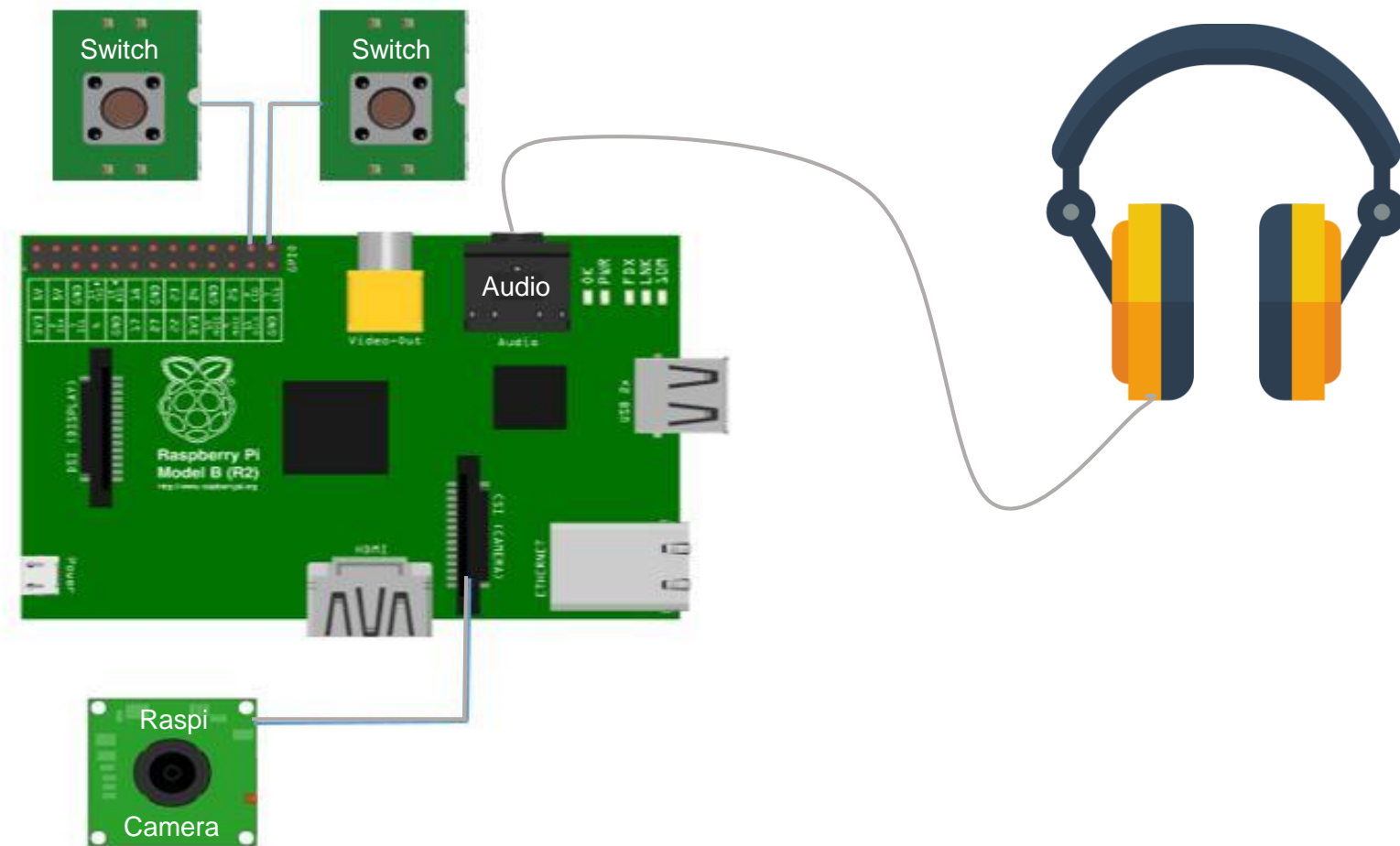
To make a comprehensive report of various parameters involved in implementing Computer Vision using Raspberry pi to aid the visually impaired in indoor navigation by detection of Sign Boards, TEXT, face detection with audio feedback.



Key Features

- Reading boards Detection - EXIT, STAIRS, ELEVATOR, RESTROOM
- Recognizing Faces and returning the count
- Audio output
- Switch controlled operation
 - Mode 1 for Face Recognition
 - Mode 2 for Reading Text

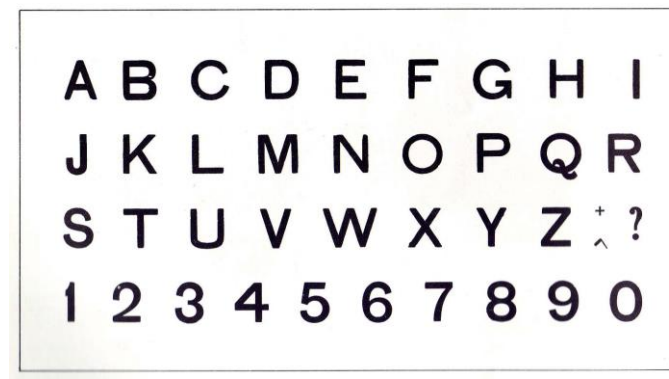
Block Diagram



Text Recognition and Detection Examples



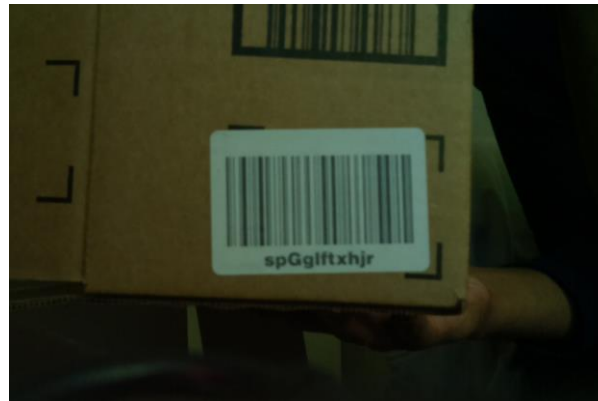
Meet 1110
Tlva"C Suxu»:s'11I.' 1\
Evgluation Kit
inn ».



ABCDEFGHI
JKLMNOPQR
STUVWXYZI?
1234567890

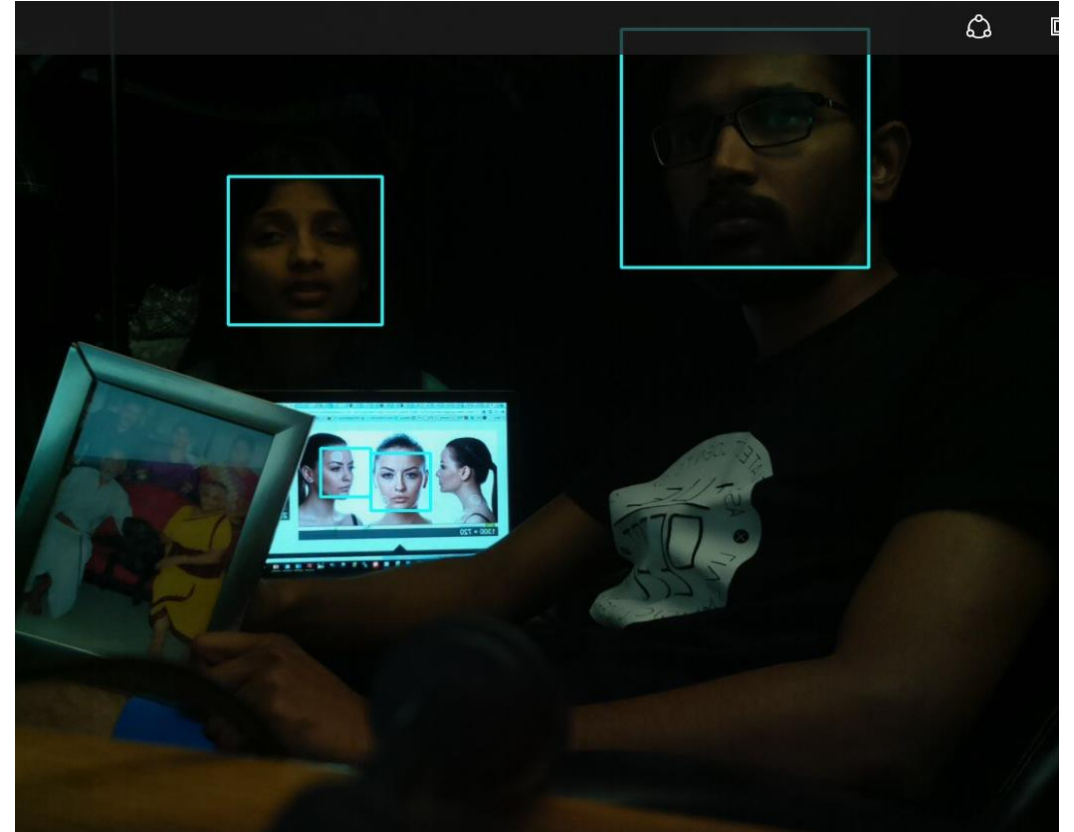
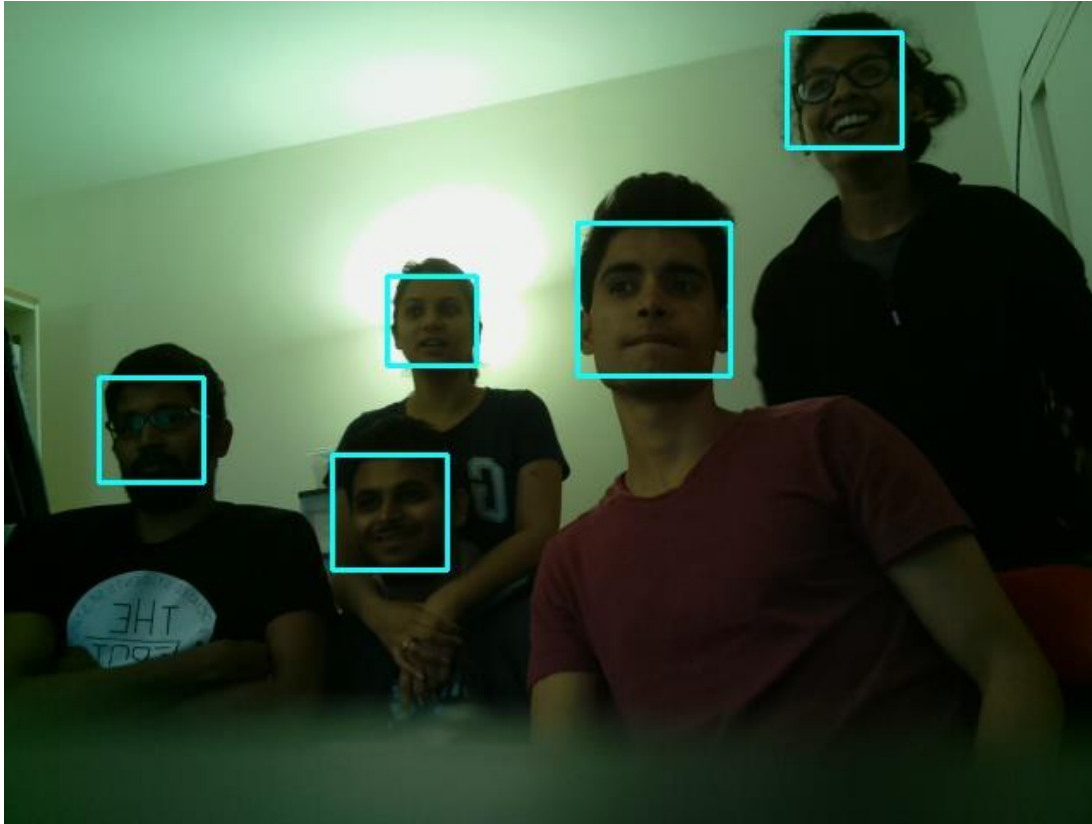


EXIT}



M
spGqHtxmr

Face Recognition Examples



Stages of Image Processing



Original Image



Gray Image



Binary Image

- Image Capture
- Grayscale Conversion
- Binarization /Inverse Binarization
- Use OCR to recognize text and save as .txt file
- Text to speech conversion for audio output

Tabulated Observations

Resolution (pixels)	Response Time (sec)	Accuracy in Face Detection	Accuracy in different Light Conditions		Effects in different conditions	
			Low Light	Ambient Light	Shaky State	Steady State
1280x960	Slow - ~5	+/- 1	Poor	Very Good	Poor	Very Good
640x480	Fair - ~3	+/- 2	Poor	Very Good	Poor	Very Good
320x240	Fast - ~2	80%	Very Poor	Good	Poor	Good
160x120	Instant – ~0	50%	Bad	Moderate	Poor	Moderate

Scope Extension

- Improving Face detection accuracy by feeding training data for side face.
- Possible improvements for low-light conditions
- Door detection/openings (& Glass doors!)
- Processing multiple Sign Boards together
- Distance detection using camera