

ABSTRACT

The progress of technology to make man's life easy has reached an unfathomable scale. Yet, there hasn't been significant change in the lives of the visually challenged. Despite the availability of the requisite potential and resources to build an aid for the visually impaired, the parochial nature of the field discourages the developers. This project discusses an innovative-assistive technology that promotes the visually impaired to live with greater comfort and confidence. In this research, we focus on building a wearable device that is light in weight, compact and portable.

The wearable is a Raspberry Pi powered device with additional circuitry to facilitate camera, voice and GPS functionalities. The technology described herein is a consolidation of features that include object detection, identifying a friend and a text reader. In furtherance to this research, an advanced model can unlock several other features like GPS navigator, Geofence and building a volunteer community for the blind. The concept of "quality of life" for the visually challenged, through technological means, is explored and their relevance as a practical implementation is assessed.

Keywords: Assistance for Visually Challenged · Object Detection · Face Detection · Face Recognition · Geofence · Volunteer Community for blind · Electronic Wearable ·

LIST OF FIGURES

Figure Number	Description	Page Number
1.1	Block Diagram of the Proposed System	5
3.1	Raspberry Pi Zero W	8
3.2.	Pi Camera	14
3.3.	UBlox NEO-6M GPS Module	16
3.4.	Bluetooth Headphones	18
4.1.	Raspberry Pi Zero W and Pi Camera Interfacing	20
4.2.	Raspberry Pi Zero W and GPS Module Connection Circuit	20
4.3.	GPS Output in the Command Prompt	22
5.1.	Example Image for Object Detection	28
5.2.	PubNub Admin Dashboard	32
5.3.	Container Widget	35
5.4.	Grid View Widget	35
5.5.	List View Widget	35
5.6.	Stack Widget	35
5.7.	Card Widget	36
5.8.	List Tile Widget	36
6.1.	Image to Text Conversion Example	46
7.1.	Geofence User Interface	59
8.1.	Initial Screen	64
8.2.	User makes new request	64
8.3.	After request completion	64
8.4.	Home Screen of Community App	69
8.5.	Social Credit Points Screen	69
8.6.	Account Details and Settings Screen	69
9.1.	3D Printing the Wearable	70

9.2.	Version 1 - Front View	71
9.3.	Version 1 - Right View	71
9.4.	Version 1 - Left View	71
9.5.	Version 1 - Panorama View	71
9.6.	Version 2 - Front View	72
9.7.	Version 2 - Left View	72
9.8.	Version 2 - Right View	73
9.9.	Version 2 - Panorama View	73
9.10.	Version 3 - Front View	74
9.11.	Version 3 - Left View	74
9.12.	Version 3 - Right View	74
9.13.	Version 3 - Panorama View	74
11.1.	Front View	80
11.2.	Left View	80
11.3.	Right View	80
11.4.	Isometric View	81
11.5.	Person wearing the device	81
11.6.	Device Idle State	81
11.7.	Input Image clicked for Object Detection	82
11.8.	Result for Object Detection	82
11.9.	Input Image clicked for Know Your Friend	83
11.10.	Result for Know Your Friend	83
11.11.	Input Image clicked for Image to Text	84
11.12.	Result for Image to Text	84
11.13.	Applying Geofence Location and Radius	85
11.14.	Location fetched within Geofence Boundary	85
11.15.	Location fetched outside Geofence Boundary	86
11.16.	Geofence Breach Notification sent to Guardian	86