DESIGN AND IMPLIMENTATION OF NAVIGATING DEVICE FOR BLIND PEOPLE BY USING RASPBERRY PI

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***Abstract*: This project aims at designing and developing Navigating device for Blind people by using Raspberry pi. Blind people frequently have a harder time familiarizing themselves with new indoor environments. as well as specific points if interest on each route, in order to be able to both use them as a point of reference and as a possible destination. However, this burden of having to build a conceptual map can be potentially alleviated by using a Raspberry Pi to track the location and the movement of the visually blind people. The design and implementation of a Raspberry Pi navigational guide that uses a combination of GPS readings with a Raspberry Pi device to learn and navigate unknown indoor environments.The project "a blind navigation system using raspberry pi" has been successfully designed and tested. it is proposed by using QT software on C++ Processor for identifying the places and mainly intended for visually impaired persons as they are facing many problems in everyday life as everything is encoded visually. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.**

Index Terms—**Camera, Headset Output Device**

I .INTRODUCTION

A. Background

There are approximately 38 millions of people across the world wide mainly in developing countries who are blind and visually impaired, over 15 million are from India. Blind persons most of the time are withdrawn from the society because they feel that people and the society are prejudiced and they may not be welcomed most of the time .There mark able achievement, which is the outcome of persistent struggle and hard work between "Anne Sullivan" – the teacher and "Helen Keller "-the blind student resulted in are evolutionary method of learning and communication, which ultimately culminated in the development of Braille language. Blind person do not need path, but required path, so as to mingle in the society and be independent for their routine chores (activity).Hence blind people need an assistive device that will allow blind user to navigate freely and this requirement has become crucial. Most of the blind people depend on other individuals, white cane or guide dogs to travel freely. Currently, there are several visual information that helps visually impaired people to move in a right way (e.g. takes a right direction, take left, move forward, move backward and avoid obstacles,) but they all limit the freedom of the user. Walking securely and unhesitatingly with no human help within urban environment is a troublesome undertaking for visually impaired and blind individuals. The fundamental goal is to give an ease or financially savvy approach that will permit visually impaired individuals to explore freely or independently in the outdoor environment. Based on this real context or condition we focused the work on developing assisting technologies that may help blind individuals bringing them back to the society. Our main objective is to make a compact, self-sufficient system that will permit these blind people to travel through an environment .This voice based route navigation system can provide solution to this problem. This System is based on embedded system and provides navigation instructions to the user by giving audio instructions through speaker which is connected to raspberry pi using a USB jack.

B. *Motivation*

In order to improve the quality of life for visual impaired or blind people, in this work we focused on developing new technologies to help these persons to access the outdoor environment in particular such as Banks, hospitals, post office, and other public utility. Therefore this work intends to play a special role in this field providing as much information as possible for visually impaired or blind people, which allows them to take a comfortable navigation. To build a prototype we focused on users and their interests,

this work aims to build a system to assist people with disabilities. The system intends to help them in providing the information. In this system we are going to detect an obstacle using ultrasonic sensor. Obstacle detection sensor acts as the heart of the system.

C.Problem statement

Outdoor navigation is becoming a harder task for blind and visually impaired people in the increasingly complex urban world. Advances in technology are causing the blind to fall behind, sometimes even putting their lives at risk. Technology available for navigation of the blind is not sufficiently accessible some devices rely heavily on infrastructural requirements.

I. BLOCK DIAGRAM

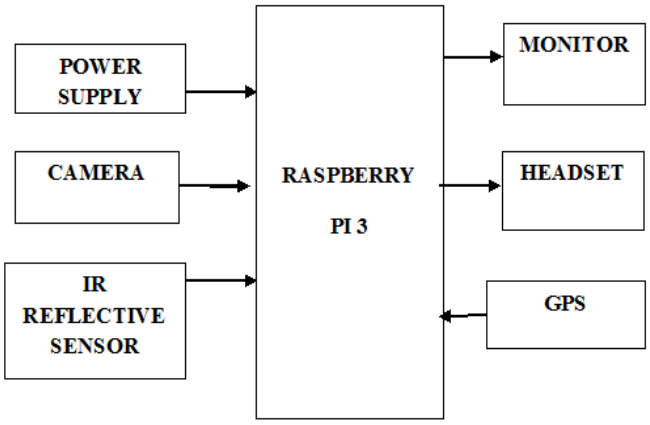

Figure1. Basic block diagram

The above fig.1 shows the block diagram[5] of the system prototype where the Raspberry pi is interfaced with all the blocks.

A. Power Supply: The Pi is powered by a USB Micro power supply (like most standard mobile phone chargers). You'll need a good-quality power supply that can supply at least 2A at 5V for the Model 3B, or 700mA at 5V for the earlier, lower powered models.

Low current (~700mA) power supplies will work for basic usage, but are likely to cause the Pi to reboot if it draws too much power.

B. Camera Module: Logitech® Webcam C170. The easy way to start video calling and send photos (5MP). With simple plug-and-play setup, you'll be making video calls in exceptional VGA resolution in no time on Logitech Vide HD. You can take and send beautiful, high-resolution photos at up to 5MP (software enhanced), too. It can easily interface with the Raspberry pi 3.

A built-in noise-reducing mike helps loved ones hear you clearly on calls. You can also record lively, colorful videos in XVGA (1024 x 768) resolution and share them with friends, family and the world. Also, the universal clip makes it easy to use with your desktop or laptop.

C. GPS modem: A GPS modem is used to get the signals and receive the signals from the satellites. In this project, GPS modem get the signals from the satellites and those are given to the Raspberry pi. The signals may be in the form of the coordinates; these are represented in form of the latitudes, longitudes and altitudes.

D. Monitor: This section makes use of monitor to display / prompt for necessary information.

E. Headset Audio: We can also display the output on LCD display but our aim is to develop the device which is especially useful for visually impaired persons. So, In order to communicate with them an audio output device plays an important role. Which will act as, a control surface, human interface device (HID) which allows the user to control a digital audio or other digital audio application. Generally, this will contain one or more controls that can be assigned to the software, allowing control of the software. As digital audio software is complex and which will play any number of functions in the audio chain.

The control surface connects to the host computer via many different interfaces. MIDI was the first major interface created for this purpose, although many devices now use USB, firmware, Ethernet or proprietary interfaces.

F. IR Reflective Sensor: Infrared Reflective Sensor is used to detect the presence of an object within a specific range. The sensor consists of an IR LED and a photo sensor pair. The light emitted by the IR LED gets reflected by any object placed in front of the sensor and this reflection is detected by the photo sensor. Any white (or lighter) colored surface reflects more than black (or darker) colored surface.

When the reflected light is detected, it produces Digital HIGH (or Binary **1**) output on the **SIG** pin. The on-board LED indicator will also glow. If no reflection is detected or if the object is too far from the sensor, the output on the SIG pin stays at Digital LOW (Binary **0**). The phototransistor. There is a potentiometer which can be used to adjust the gain of the amplifier that is sensitivity of detection. on-board LED indicator will be off as well. The detectable range of this sensor is 1 meter. In this project we required 1m range of sensor because that is the maximum range. If it needed we can use more than 1m range of sensor according to our requirement. The module incorporates a Rail-to-Rail Operational Amplifier to amplify the output of phototransistor. There is a potentiometer which can be used to adjust the gain of the amplifier that is sensitivity of detection

G. Raspberry pi 3: Raspberry pi board has its own operating system is known as Raspbian which is Linux based operating system and compatible with raspberry pi board. The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications. The Model B+'s FOUR built-in USB ports provide enough connectivity for a mouse,

keyboard, or anything else that the R-Pi needs. Raspberry pi-3 model B+ ARMv11 quad core processor it is used as interface with all building blocks.

II. SCHEMATIC DIAGRAM

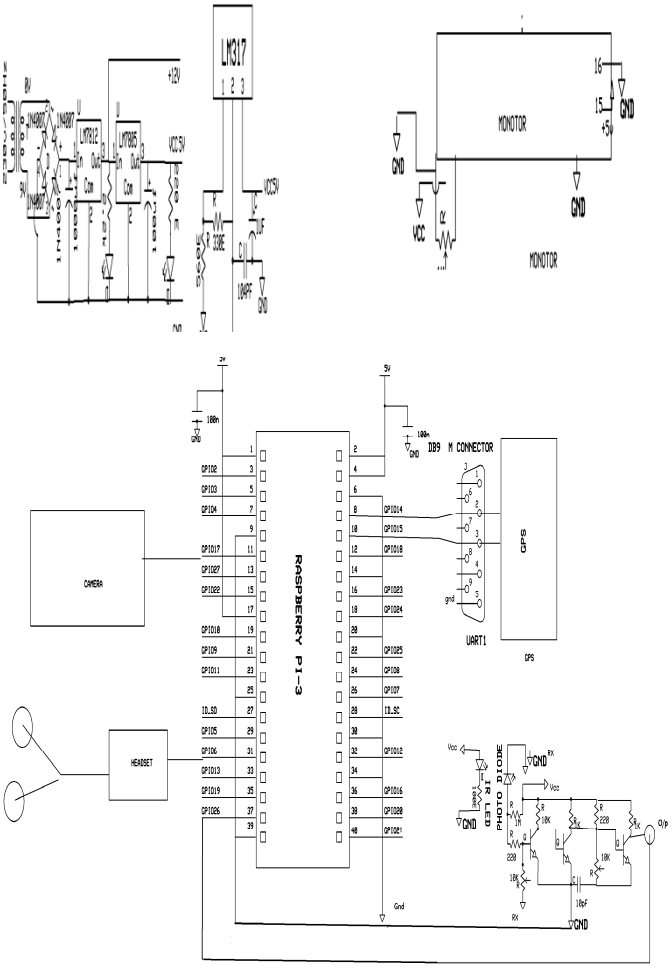

Figure2. Schematic diagram of navigation system

III. FLOWCHART

C++ language is as programming language and simulated using the QT software. The flow of software excution is as shown in fig 3.

Testing Qt Creator is integrated to several external native debuggers: GNU Symbolic Debugger (GDB), Microsoft Console Debugger (CDB), and internal JavaScript debugger. In the Debug mode, you can inspect the state of your application while debugging. Qt Creator is integrated to the Qt Test and Google C++ Testing frameworks for unit testing applications and libraries.

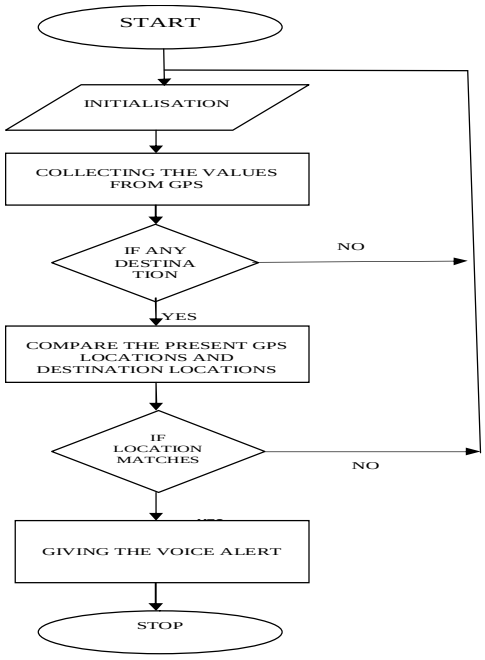

Figure3. Flowchart for navigation system

The above figure shows the flow of execution when, We switch on the Raspberry pi controller board then it will initialize with all the devices. The Raspberry pi board can take the latitude & longitude values from the GPS. The GPS system can be matches with the present location and any destination location. If the destination values can be matches with the present GPS values it will give the voice alert. If the destination values does not match with the GPS values it will go back and reinstall the device.

IV.RESULT

The project “Design and implementation of navigating device for blind people by using Raspberry pi” is designed so that obstacles can be detected then it gives voice alert to the blind person. camera captures the destination images and it gives the location (audio output) to blind person through the headset device.

Figure4. Connections overview

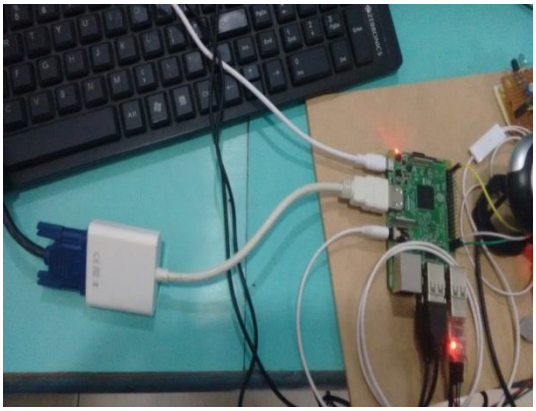

Figure5. HDMI connection

The project prototype is as below; when the system is normally moving then to indicate it text is displayed on LCD as "CVR COLLEGE" as in fig.6.

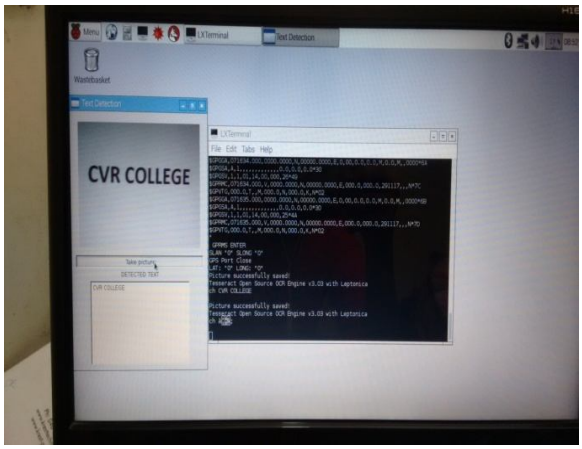

Figure6. System prototype in message format 1

The project prototype is as below; when the system is normally moving then to indicate it text is displayed on LCD as "AP29AZ9944" as in fig.7.

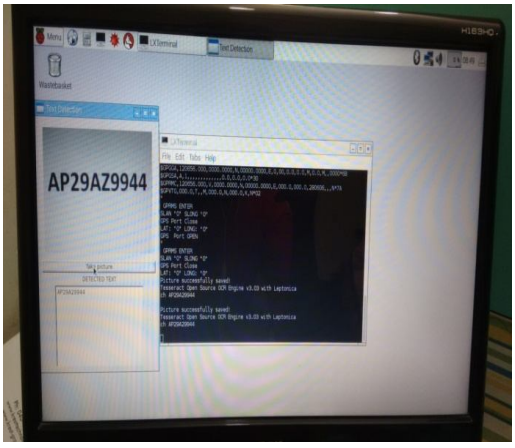

Figure7. System prototype in number format

The project prototype is as below; when the system is normally moving then to indicate it text is displayed on LCD as "BRAILE" as in fig.8.

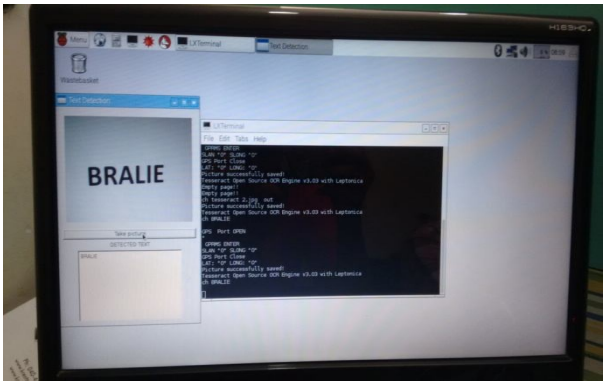

Figure8. System prototype in message format 2

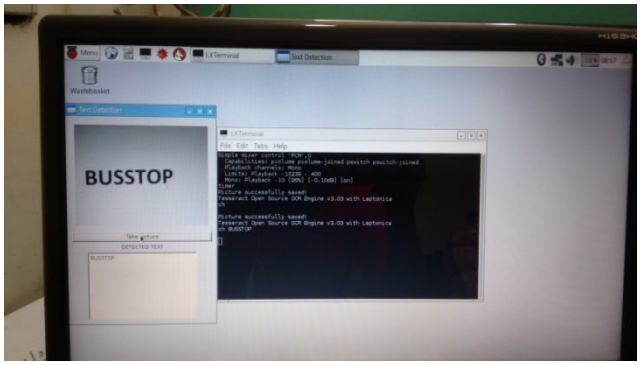

Figure9. system prototype in message format 3

V. FUTURESCOPE

This project can be extended by adding the feature of detecting and recognizing more types of indoor objects and icons on signage. This project can also be extended by using high-resolution cameras and Bluetooth earphones can also be used for a clear and noise-free output to assist blind persons to become independent.

VI. CONCLUSION

The project "A blind navigation system using raspberry pi**"** has been successfully designed and tested. it is proposed by using QT software on C++ Processor for identifying the places and mainly intended for visually impaired persons as they are facing many problems in everyday life as everything is encoded visually integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.

Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

VII. REFERENCES

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