Innovative Gadget for visually Impaired.

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Abstract – Path Finder: guide system for blind navigation is an innovation with the help of the multiple research areas like computer science, electronics engineering and health science which is most beneficial equipment for the visually impaired people to navigate confidently by detecting the nearby obstacles using the help of ultrasonic waves and notify it with voice. The raspberry board is worn like a device. This will be equipped with ultrasonic sensors, consisting of module. Using the sensor, visually impaired can detect the objects around them and can travel easily. When the sensor detects any objects it will notify the user by the voice. Thus this device will be of a great use for the visually impaired and help them travel different places effortlessly.

Keywords: - Virtual blind road, obstacle avoiding, route following, wearable navigation device.

I. INTRODUCTION

Blindness, low vision, visual impairment and vision loss have dramatic impacts on individuals experiencing such disabilities. These carry with them physiological, psychological, social, and economic outcomes, hence impacting the quality of life and depriving such individuals from performing many of the Activities of Daily Living (ADL), the most crucial of which is navigation and mobility. Blindness is a qualitative term that describes the clinical condition whereby individuals have no light perception as a result of total vision loss.

Blindness also refers to those who have so little vision that they have to rely predominantly on other senses as vision substitution skills. On the other hand, visual impairments is a qualitative term used when the condition of vision loss is characterized by a loss of visual functions at the organ level, such as the loss of visual acuity or the loss of visual field.

The objective of this project Path Finder: guide system for blind navigation is to design a product which is very much useful to those people who are visually impaired and those who often have to rely on others. Path Finder: guide system for blind navigation project is an innovation which helps the visually impaired people to move around and go from one place to another with speed and confidence by knowing the nearby obstacles using the help of the wearable band which produces the ultrasonic waves which notify them with voice. It allows the user those who are visually impaired to walk freely by detecting the obstacles.

Self-navigating at an environment is major difficulty which is faced by the visually impaired individuals.
Besides that, while they travel around or walking at a crowded area, it may pose great difficulty. We always notice that blind people's uses blind canes which have certain limitations such as distant objects, pot-holes, above knee obstacles etc. Currently there are variously of sensor equipped canes in India built they are very costly and unaffordable by the common people.

II. LITERATURE REVIEW

There are many technologies are used in path finder system. There are listed below with some short description of each technique.

GPS:

Global positioning system uses longitude and latitude calculations for find out the position of object. Since it uses geospatial satellites signals, to calculate the positional difference from satellite; the accuracy is quite in the range of 100m to 300m.For the person who is walking on the road can receive these signals, but for indoor it is very hard to receive the same. Also the accuracy required is not achievable; hence it is a void solution for blind person to use for navigating device. [2-6]

RFID information grid:

RFID is radio frequency identification device. It holds unique information such as number or symbol or text etc. It is passive device which is energized by interrogators emf field. To form an information grid the RFID tags are arranged in such a way that it could describe the longitudinal and attitudinal position. The searching device enquires about the positional information and sends it to server by sms. The server holds database with relational description of local position for reference send by sms. It search in database for same and broadcast it on FM which could be heard by the enquirer's device. The big issue To Design RFID Based Cognition Device for Assistance to Blind and Visually Challenged Personal for Indoor Use in system is that the sms sending and delivering time. Again the air calls traffic congestions. The personal device may work properly but server failure detection case cannot be solved. Hence addressed solution is more of problems than the solution. [7, 9]

Mobile Platform Devices:

Mobility is one of the main problems encountered by the blind in their life. Overtime, blind and visually impaired people have used some methods and devices such as the long white cane and guide dog, to aid in mobility and to increase safe and independent travel .Due to the development of modern technologies, many different types of devices are now known as electronic travel aids. Among these aids are sonic pathfinder, Mowat Sensor and Guide cane which are called clear path indicators or obstacle detectors since the blind can only know whether there is an obstacle in the path ahead. These devices are used to search for obstacle in front of the blind person, and they operate in a manner similar to a flashlight, which has very narrow directivity. Sonic-sensor since it has wide directivity enabling it to search for several obstacles at the same time [10, 11].

S.Gangwar (2013) designed a smart stick for blind which can give early warning of an obstacle using Infrared (IR) sensors. After identifying the obstacles, the stick alerts the visually impaired people using vibration signals. However the smart stick focused only for obstacle detection but it is not assisting for emergency purposes needed by the blind. And also the IR sensors are not enough because it can detect only the nearest obstacle in short distance.[14]

S.Chew (2012) proposed the smart white cane, called Blind spot that combines GPS technology, social networking and ultra- sonic sensors to help visually impaired people to navigate public spaces. The GPS detects the location of the obstacle and alerts the blind to avoid them hitting the obstacle using ultra-sonic sensors. But GPS did not show the efficiency in tracing the location of the obstacles since ultra-sonic tells the distance of the obstacle.

Benjamin et.al (2014) had developed a smart stick using laser sensors to detect the obstacles and down curbs. Obstacle detection was signalized by a high pitch BEEP using a microphone. The design of the laser cane is very simple and intuitive. The stick can only detect obstacle, but cannot provide cognitive and psychological support. There exists only beep sound that triggers any obstacle and there is no any assistance to direct them.

In the end, there are passive technologies using MEMS (Micro Electrical Mechanical Systems) sensors to determine the displacement and orientation of the user from the decoded values of acceleration, rotation, magnetic field and pressure. Digital accelerometers, gyroscopes, magnetometers, compasses, barometers, thermometers (temperature compensation) have been used to do that. The simplest such devices as pedometers, which count steps and based on the number of steps and the average step length, they can determine the distance traveled, but they cannot determine the information about direction.

III. PROPOSED SYSTEM

Analysis and Review

Raspberry
The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python.

Figure 4.1: Raspberry Pi

Ultrasonic Module

Ultrasonic Module is devices that use electrical mechanical energy transformation to measure distance from the sensor to the target object. Ultrasonic waves are longitudinal mechanical waves which travel as a sequence of compressions and rarefactions along the direction of wave propagation through the medium. Apart from distance measurement, they are also used in ultrasonic material testing (to detect cracks, air bubbles, and other flaws in the products), Object detection, position detection, ultrasonic mouse, etc.

Figure 4.2: Ultrasonic Module

Voice Device

This device sends voice information from Arduino microcontroller when object is detected. So blind person listen that voice information and recognize obstacle information.

Power Supply

Input the controller board is given by 12V dc adaptor. This 12V is used to drive the relays. A regulator
IC 7805 is used to regulate voltage to +5V which are needed for powering the controller and other device used on the board.
The design is based on a special wearable device based on the raspberry board which can be worn like a cloth for blinds or a band. This device is equipped with five ultrasonic sensors, consisting of different modules which are connected to the body.

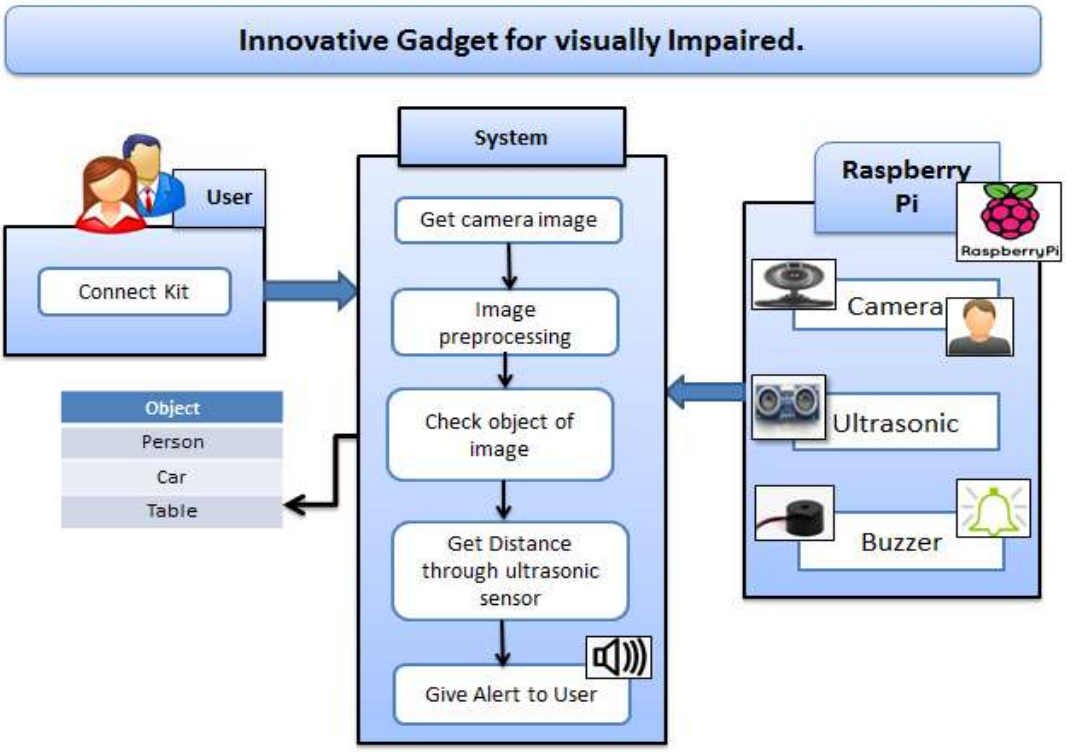

Figure: - System Architecture.

With the use of these ultrasonic sensors in the device and by wearing it on the body, the blind can detect the objects in a different dimensional view around them and can easily travel anywhere by detecting the obstacles. When the ultrasonic sensor detects obstacle the device will notify the user through voice or sound beeps.

The features of the Path Finder: guide system for blind navigation will help the visually impaired people in many ways. By wearing this device, they can fully avoid the use of the white cane and such other devices. This device will help the blind to navigate without holding a stick which is a bit annoying for them. They can wear the device as a band or like a cloth and it can function very accurately and they only need a very little training to use it as it is quite simple, efficient and easy to operate and wear.

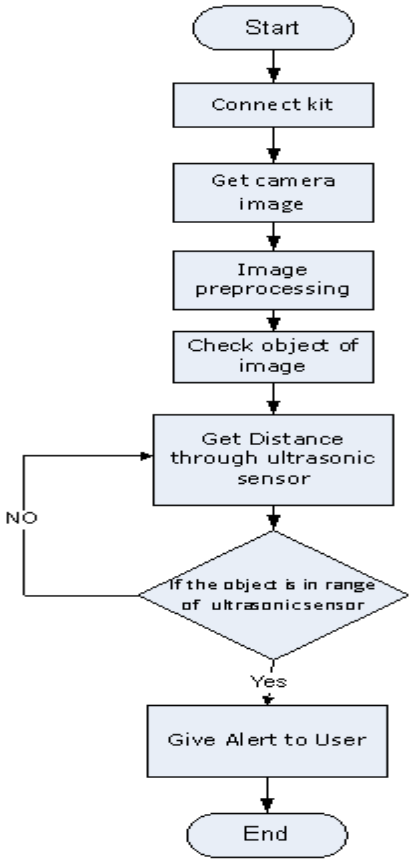

Figure: - System Flow

V. RESULT AND DISCUSSION

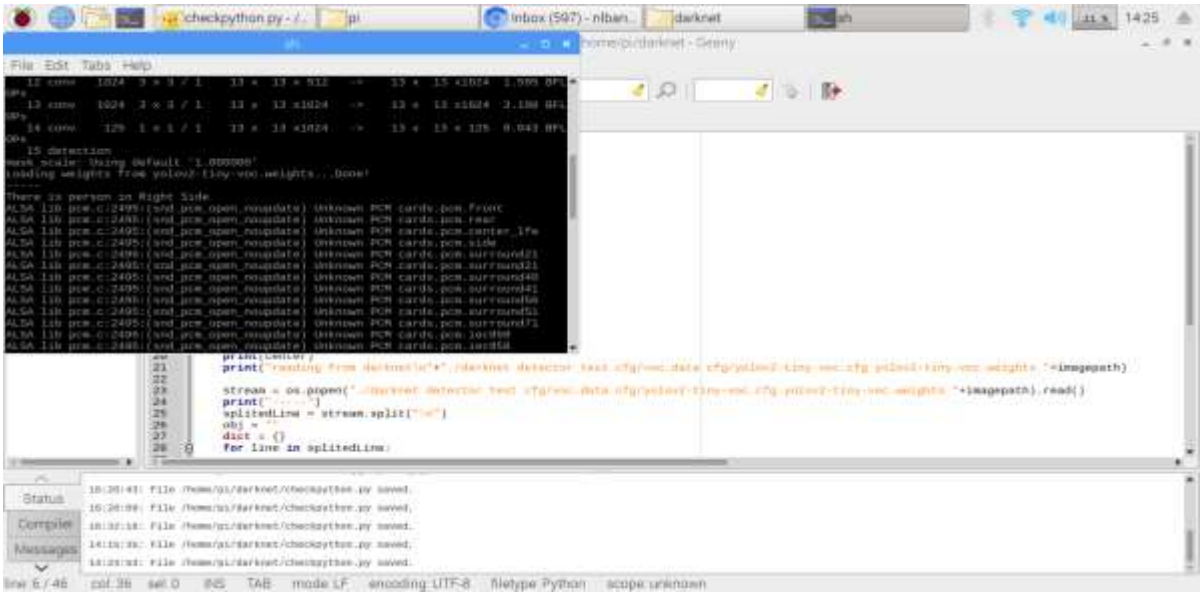

Figure: - Implementation Code

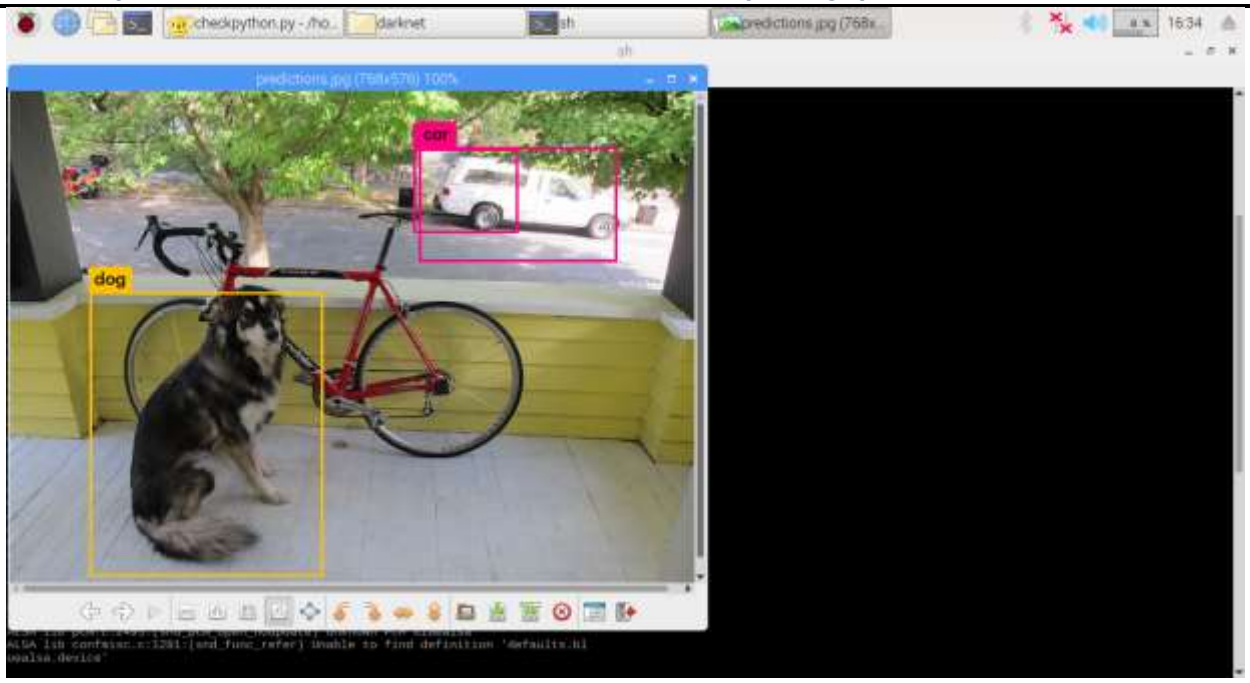

Figure: - Object Detection

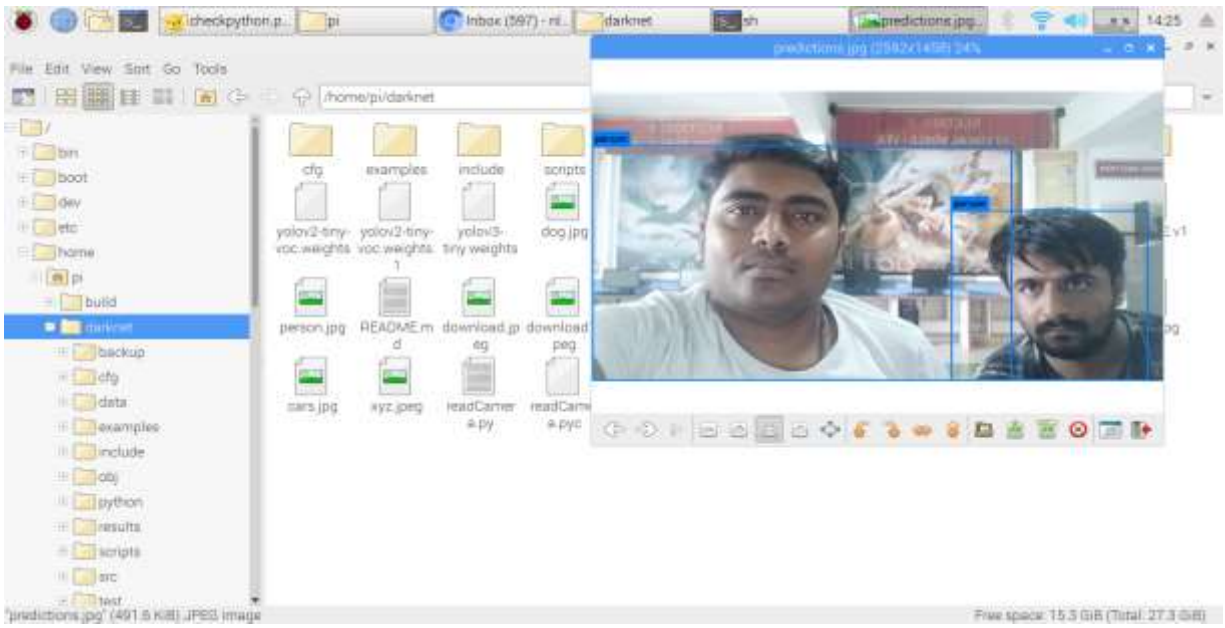

Figure: - Person Detection

VI. CONCLUSION

This project proposed the design and architecture of a new concept of raspberry based Virtual Eye for the blind people. It is a simple, beneficial, easy to carry and efficient to handle system with some amazing properties. The key advantage of the proposed work is to provide productive assistant and support for the blind and visually impaired persons. It is able to scan and detect the obstacles in the areas like left, right, and in front of the blind person regardless of its height or depth. With the proposed architecture, if constructed with at most accuracy, the blind will be able to move from one place to another without others help. This system will be unique and more systematic in its capability in specifying the source and distance of the objects, and it is safe and easy to use by the impaired people.

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