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SIMULATION OF ARTIFICIAL EYE USING RASPBERRY PI

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ABSTRACT

It is difficult for visually impaired people to pass their day-to-day life without the sense of vision. To help them in that aspect we brought the idea to make their stick smarter by interfacing the walking stick. In this project we used some smart functions to improve the performance of the walking stick. We tried to implement multiple functions like object detection, text recognition, location access (GPS), obstacle alert and all the outputs are spoken out by text to speech converter. As an improvement from previous projects, we included the latest version of Raspberry Pi which is Raspberry pi 4 to increase speed of the device and IR sensor for better obstacle detection.

I. INTRODUCTION

Perception includes the five senses: All the primary senses i.e., sense of Touch, sense of Sound, sense of Sight, sense of Smell and finally the sense of Taste. Perception is a collection of senses providing the ability to detect the changes in positions and movements. It also involves the processes required to process the information, such as recognizing the face of a person or detecting a familiar sound. It helps us relate things and recognize objects and patterns. Since visually impaired people cannot use the visual sense for perfect perception which can make it difficult to perform their daily life activities. To overcome the lack of visual sense they can use the other senses like sound and touch for better perception.

This project aims to develop a complete portable aid raspberry pi for visually impaired people and deals with problems in their daily life efficiently. The system is interfaced with IR sensor, GPS, Buzzer, Camara, Raspberry Pi

II. EXISTING SYSTEM

Over the last decade, there are many new emerging technologies that have been developed for the aid of visually impaired people. But there are a lot of limitations and restrictions on those inventions. All these existing systems cannot satisfy the exact needs of visually impaired people to overcome the limitations and get a better version of the existing inventions.

III. PROPOSED SYSTEM

This project deals with the more affordable and effective way of obstacle detection, object recognition and text recognition along with location access. Hardware components that are required for the construction of this project are:

- Raspberry Pi 4
- IR sensor
- Camera
- Headphones
- GPS
- Power supply
- Push Buttons

1. Raspberry pi

The Raspberry pi is a low-cost small sized computer that plugs into a computer monitor or TV and uses a standard keyboard and mouse. It can be interfaced with different electronic devices to perform a specific activity.

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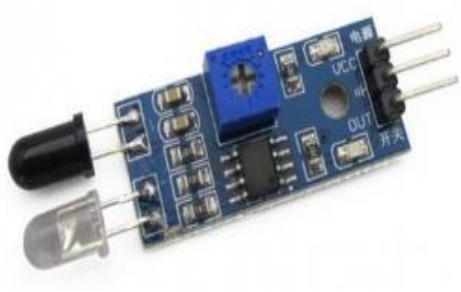
2. IR sensor

Infrared sensors emit and detect infrared radiation. An IR sensors have two parts one is a light emitting diode and other is a receiver. When an object comes close to the sensor, the infrared light from the LED reflects from the object and is detected by the receiver. Distance will be measured based on the strength of the reflected signal.



3. Camera

The Pi camera is a portable and light weight camera which supports raspberry pi. It communicates with raspberry pi using MIPI camera serial interface protocol. The pi camera sensor has 5-megapixel resolution in still capture mode. It can capture resolutions up to 1080p at 30 frames per second in video mode.

4. Headphones:

Wired headphones are used to derive output. Headphones are the simplest audio output device that can be used in raspberry pi application as it have inbuilt 3.5mm audio jack.

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5. GPS Module

The Global Positioning System (GPS) is used by people to find location or to navigate to particular destination in a more efficient way. A GPS module contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies.

6. Power supply

In order to operate raspberry pi we need a 5 volts and 3 amps over USB Type-C for continuous power supply.

IV. SOFTWARES USED

1. PYTHON

Python is an interpreted, object-oriented high-level programming language. Python is used in building websites and software. It is simple and easy to use, portable and well known for its code reusability and possibly less code length.

2. OpenCV

OpenCV is a python open-source library, used for computer vision in Artificial intelligence,Machine Learning,face recognition,etc. It supports many programming languages like c++,java,python etc. It can identify objects,faces or even and handwriting of a human by processing the image or video.

3. TensorFlow

TensorFlow is an open source platform for machine learning applications which includes a special feature of image recognition, and these images are stored as a separate dataset for training purpose.

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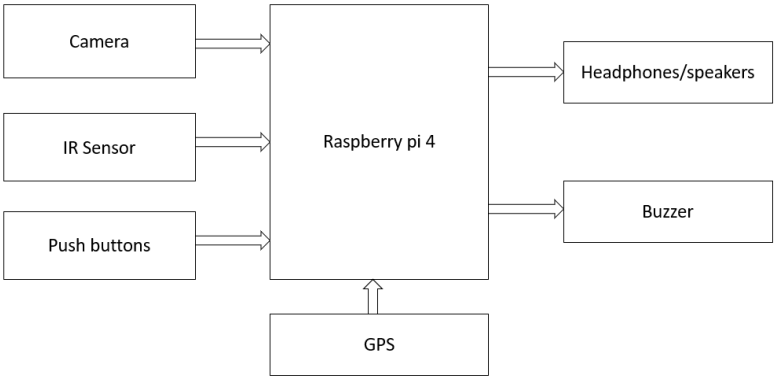
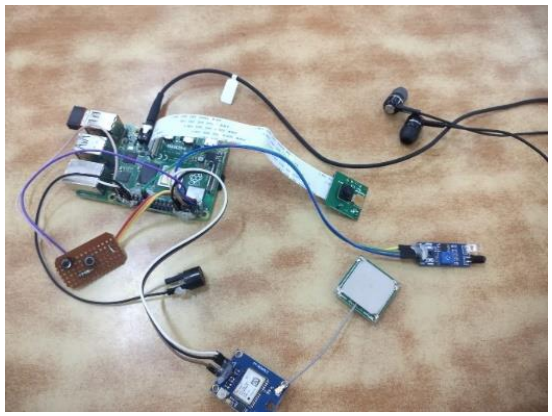
V. BLOCK DIAGRAM

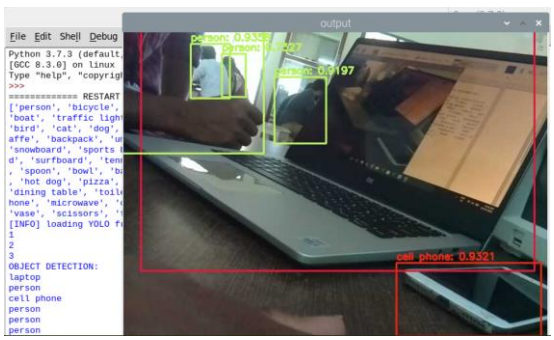


VI. WORKING

When push button is pressed camera captures the images and these images are compared with the pre build images of OpenCV software. OpenCV software contains libraries of different object images like TensorFlow. If both the images are similar in shape and structure then it predicts the name of image by using YOLO algorithm and prints it in the console. For text recognition, when push button is long pressed then camera will capture continuous images are taken as input to Raspberry pi which has supporting software called Tesseract for optical character recognition (OCR). This software performs some digital image processing methods like converting colour image to black and white image and edge detection to extract the letters from the image and compare with the pre fetched characters which were prebuild in the software and print recognized text in the console. GPS gives the location of the device which will also be printed in the console. All the outputs printed in the console are spoken out by using headphones by Text to speech converter. Obstacle detection is done by IR sensor in this project, IR sensor detects the presence of obstacle and alerts the user by a buzzer sound

VII. RESULTS





VIII. CONCLUSION

This device will help visually impaired people to navigate and carry on with their daily life activities with more confidence and comfort. It can make them feel less independent on others.

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IX. FUTURE SCOPE

In Future, Face detection could be added with this device. We can use sophisticated cameras for easy processing of images.

X. REFERENCES

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