

Portable Camera Based Assistive Text and Product Label Reading from Hand-Held Objects for Blind People Using Raspberry Pi

Dr.Saminathan V¹, Kaliswaran R², Prithivanan P³, Venkatesh Pm⁴

Associate Professor¹, Stydents^{2,3,4}Karpagam College of Engineering – Coimbatore-641032

ABSTRACT:

This project involves designingObstacles detection and text reading aid for blind people using Raspberry Pi 3, ultrasonic sensor etc. Raspberry Pi 3 is the controller used in this device. The obstacle is detected by the ultrasonic sensor and the distance is sent to the blind user as audio output. GPS is used to find the exact location of the person in terms of longitude and latitude, this information is sent to the care taker through e-mail. The caretaker can use the latitude and longitude to find the address on Google Maps. Camera is used to identify the obstacle or object ahead and the output is send to the blind user in audio form. The camera also identifies objects with words on them, using image processing these images are converted to text and using Tesseract the text is converted into audio, thus giving the audio output to the blind about what is written on the object. The buzzer goes ON to identify the stick location. A threshold value for distance between the user and the stick is set, when the distance is less than the threshold value, the buzzer sound increases.

Keywords:Raspberry pi, Ultrasonic sensor, Camera, GPS, MEMS sensor

1. INTRODUCTION:

From the World health Organization thirty nine individuals are blind everywhere in the global. To conquer this situation we designed Obstacles detection and text reading for the blind using Raspberry pi. Now-a-days ,the cameras, computers, computer visions are upgraded gradually. Through our idea blind people can live independently without the help of caretakers. Ultrasonic sensor detect can detect the object and intimate them through wired or wireless audio output.so they can know the object in front of them. If the blind people go for out may have chances of causing accidents. So we kept the GPS tracker .It is used to locate the exact location of the person and this information is sent to the caretaker through mail.

1.2 BLOCK DIAGRAM

This Block diagram represents the implementation of the System.The blocks are interconnected with each other that explains about our idea of the project. Figure 1.2 shows.

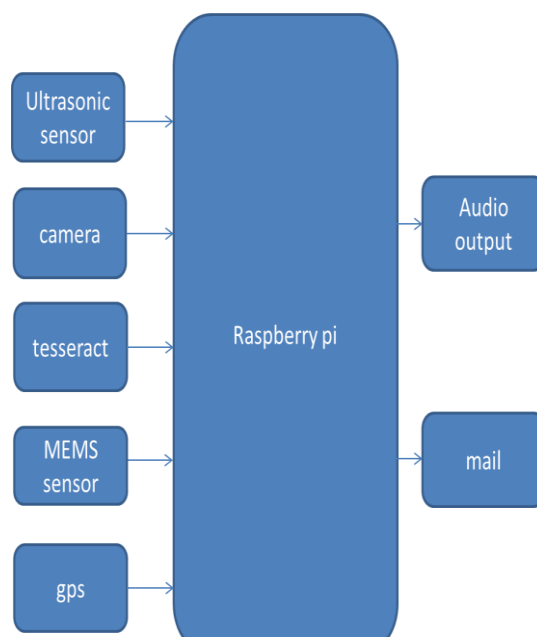


FIGURE 1.2 BLOCK DIAGRAM

1.3 RASPBERRY PI:

Raspberry pi a computer that fits in the palm of your hand with a price tag as low the idea was born in 2006 and the first commercial unit was launched in 2012. and since then its evolved into one of the best selling computers in the world its named raspberry because computer companies like to name themselves Raspberry from fruit name and pi from python language together makes raspberry pi. So you can buy this pi for low price and almost use it as fully functional computer by running several version of linux operating system. Later when the geeks found about Rpi, they start doing all sought of cool projects with it and the rest is history. Rpi becomes a massive success. It has build in ram and CPU in this Broadcom chip set. It has four USB port , Ethernet, up to 4GB of memory , Quad-core processor can support dual monitors, built in Wifi and Bluetooth. GPIO Pins (General Purpose Input/Output). This pins concerned as electrical signals you can control the electrical signals from operating systems, for example turning ON and OFF led light , motors, buttons, switches, radio signals, audio signals and even Lcd display. It has audio output (3.5mm transducer jack).

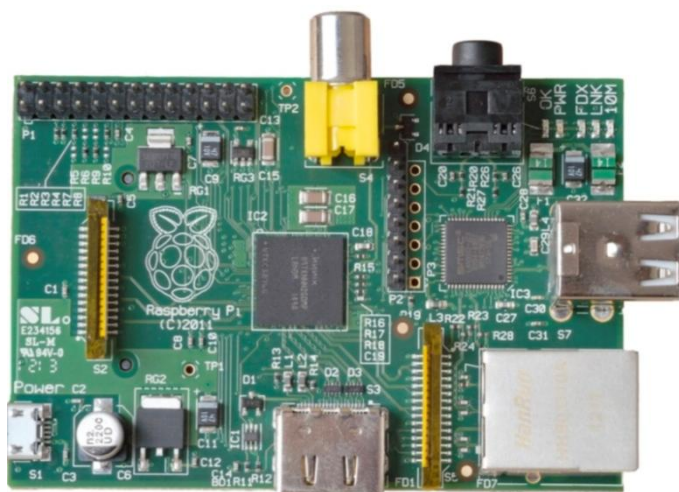


FIGURE 1.3 RASPBERRY PI

1.4 ULTRASONIC MODULE:

Ultrasonic transducer is a device that converts electrical energy into high frequency sound waves as well as converting sound back into electrical energy . In automotive applications we typically refer to piezoelectric transducers as sensors the crystals used in piezo devices change size and shape when current is applied since piezoelectric materials also generate electrical currents when forces apply to them they can also work as ultrasonic receivers. ultrasonic sensors can detect targets and alert the driver immediately sensors can be designed to produce a digital output for detecting the movement of objects or with an analog output proportional to the object distance ultrasonic sensors convert ultra sound waves to electrical signal or vice versa those that both transmit and receive may also called ultrasound transceivers distance between this object and the sensor is calculated by using speed is equal to distance travelled by time taken. So distance is given by speed into time. Vcc pins is used to power the ultrasonic sensor given with 5V. to calculate the actual distance between the sensor and the object we have to divide this product by two because the same path will be travelled by the ultrasonic waves twice so to calculate the actual distance we are dividing this by two the output of this echo pin is the time duration in ms. So we have to convert the speed which is in sec to ms .the generation of the ultrasonic waves in this sensor there will be a vibrator which is oscillating at very high frequencies and these oscillations gave rise to ultrasonic waves.



FIGURE 1.4 ULTRASONIC SENSOR

1.5 CAMERA:

The camera will continuously capture the obstacles and generate the digital format of the image. These generated binary format will compare with the pre-stored images in our database and get the name of the obstacle or object in front of the camera.

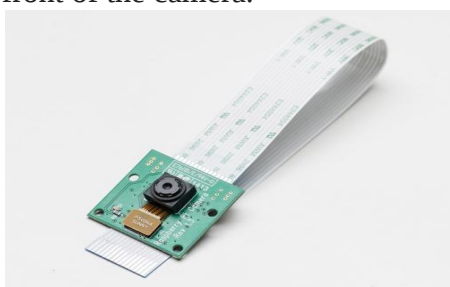


FIGURE 1.5 CAMERA

1.6 GPS:

GPS used to determine the geographical position of the system. In this project we used to track the person's present location and monitor it by the guides. So that, the blind person can stay away from the accidents.



FIGURE 1.6 GPS

1.7 MEMS SENSOR:

Vehicles and modern consumer electronics are unthinkable without acceleration sensors. The sensors detect a vehicle impact as well as the smallest movements of smartphones or wearables. The acceleration sensor is made up of a signal processing chip and a micro mechanical comb-like structure. These are made up of capacitors. The distance between the micro structure determines its capacity. The blue part of this structure is movable. Depending on acceleration or deceleration, they change their position relative to each other. By the integrated electronics, the resulting change in capacitance is detected, converted into a measured value, and output as a voltage signal.

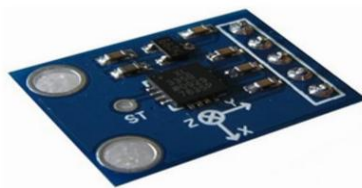


FIGURE 1.7 MEMS SENSOR

1.8 WORKING

In this project, we are using ultrasonic sensor to detect distance of the object. After detecting by sensor, the camera will capture the image and send it to the Raspberry pi. Both sensors are analog devices. We need to connect sensors to the Raspberry pi. It accepts only digital signal. So we are using ADC board to convert the analog into digital signal. Controller takes in the form of binary values. Then we get an audio output through wired or wireless device. And then Accelerometer MEMS sensor is used. It has the ability to sense the vibration. If the person falls down due to the high vibration, the mail is automatically sent to the guide. When the vibration is high immediately the camera captures the present place and intimates the guide. Additionally, we keep GPS tracker to find the person's present place.



FIGURE 1.8 COMPONENTS CONNECTED WITH RASBERRY PI

1.9 LABEL READING

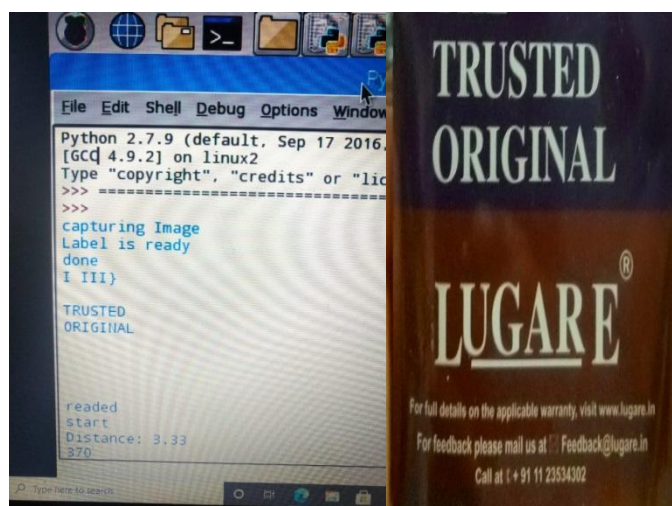


FIGURE 1.9 LABEL READING

1.10 OBJECT DETECTION

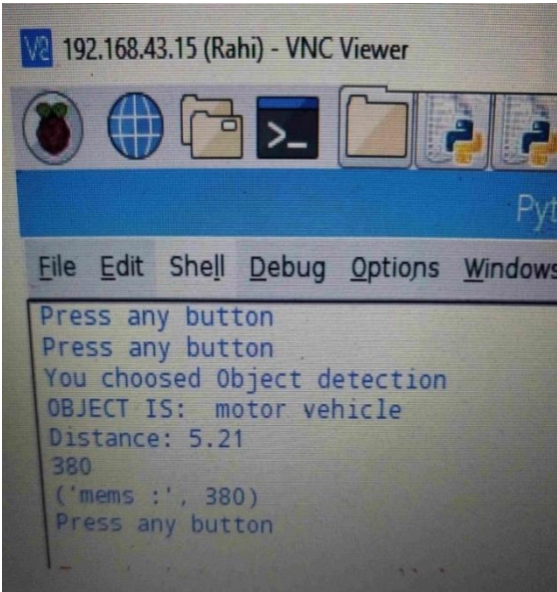


FIGURE 1.10 OBJECT DETECTION

1.11 EMERGENCY EMAIL PROCESSING

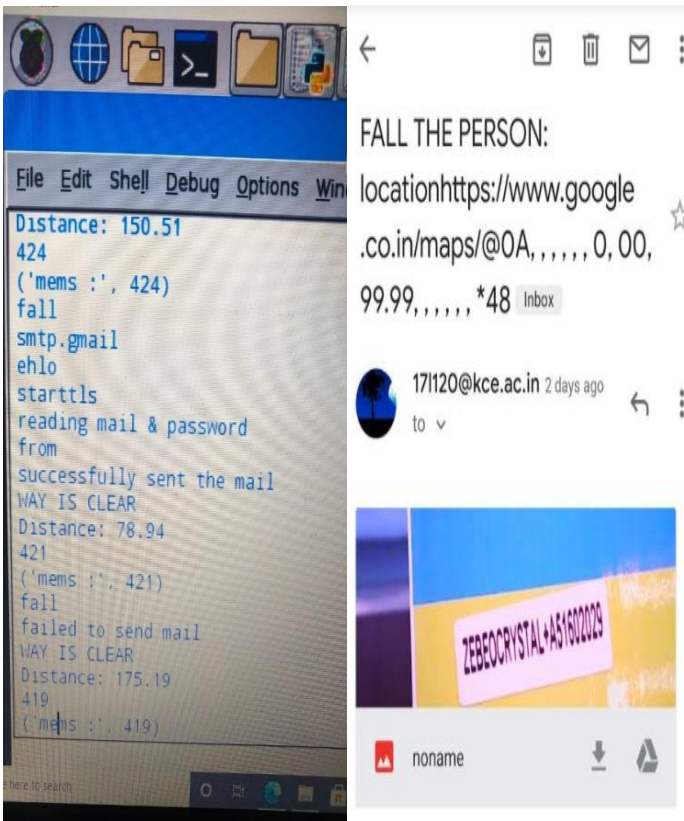


FIGURE 1.11 EMERGENCY MAIL PROCESSING

CONCLUSION:

In this project ,we proposed an safe and useful smart system for the visually challenged people.This device can used in schools and colleges .This can be used as the application of artificial

Intelligence.our intention is blind people want to live their life independently.In future,we will upgrade our technology gradually.

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