

Automatic Detection and Notification of Potholes and Humps on Road and To Measure Pressure of the Tire of the Vehicle Using Raspberry Pi

A. Santha Priya, S. Saranya, P. Uma Maheshwari, Dr. N. Sathish Kumar, N. Geraldine Sherley

Department of Electronics and Communication Engineering, Sri Ramakrishna Engineering College, Coimbatore, Tamilnadu, India

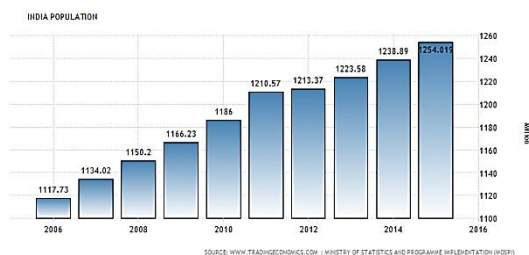
ABSTRACT

The main problem in developing countries is the maintenance of the road. The maintenance includes the potholes and humps on the road which is the major cause of the road accidents. Another main reason for road accidents is the decrease in the pressure level of the tyre. This paper deals with the detection and notification of potholes and humps on roads and to measure the pressure of the tyre using raspberry pi as the controller. The ultrasonic sensor is used to detect the potholes on roads, it is detected based on the difference in the time duration of the signal transmitted and received. The pressure sensor is used to measure the pressure of the tyre and if the pressure level comes below the indicated level then it is notified through the buzzer. And the presence of the pothole is notified to the government officials automatically through cloud network. This project is designed to reduce the road accidents.

Keywords: Iris Recognition, Visual Cryptography, Segmentation, Localisation, Visual Cryptography, Log Gaber Wavelet

I. INTRODUCTION

India is the most populated country in the world, does not have proper maintenance of the road, over 95% of the people uses road transportation. Due to this peak usage of road transports, there are many possibilities of potholes on roads, which become the reason for several life drinking accidents.



The potholes occur due to heavy rain or due to the heavy vehicles on the road. These potholes become the main reason for the road accidents. On major most of the accidents are due to the potholes and the decrease in the pressure of the tyre.



The decrease in pressure of the tyre is due to the movement of the vehicle as the vehicle moves it exerts a high pressure outside it and a low pressure is developed inside it. As a result the vehicle loses its balance and leads to accidents. So, to avoid the accidents this paper gives a proper solution.





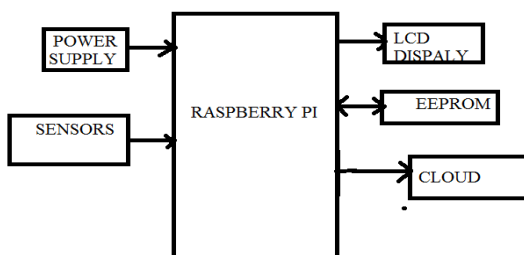
II. METHODS AND MATERIAL

A. Proposed Work

The architecture of the proposed system. It consists of a raspberry pi, sensors-pressure sensor and ultrasonic sensor, a power supply, a flash memory and a cloud network. The raspberry pi is the heart of the system which controls and monitors the functions of other devices. It has a flash memory which is used to store the data, such as the normal level of the road and threshold pressure value. Power supply is used to boot all the other components. We have used two types of sensors an ultrasonic sensor and a pressure sensor. The ultrasonic sensor is used to detect the potholes and humps on the road. It has four pins a power supply pin, a ground pin, a trigger pin and an echo pin. Echo pin is the input for the sensor; the trigger pin is the output.

As soon as a signal is transmitted from the sensor (trigger), it travels and hits the target and gets reflected back. The reflected back signal is the input to the sensor (echo),the pothole is detected in accordance with the time duration taken by the signal.

Block Diagram:



Raspberry PI 2(MODEL -B):

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, It is capable of doing everything you would expect a desktop computer to do, from browsing the internet and playing high definition video, to making spreadsheets, word-processing and playing games.

The Raspberry Pi 2 model B is the second generation raspberry pi. It is replacing the original Raspberry Pi 1 Model B+. it has 900MHz quad- core ARM cortex A7 CPU and 1GB RAM. It also has 4 USB ports, 40 GPIO Pins, full HDMI port, camera and display interface, micro SD card slot.



B. Sensors

Ultrasonic Sensors HC-SR04: The HC-SR04 is an active ultrasonic sensor and contains a transmitter and a receiver. It is used to measure distance at which, objects are placed in front of it. The ultrasonic sensor transmits high frequency sound waves and waits for the reflected wave to hit the receiver. The distance is calculated based on the time taken by the ultrasonic pulse to travel a particular distance. There are different types of ultrasonic sensors with different transmission ranges and angles of detection. The HC-SR04 sensor work at a frequency of 40 KHz and can measure distances of the objects in the range 2 to 400 cm with a 15° angle of detection.

Pressure Sensors MPXM2053: This pressure sensor is a silicon photoresistive which provides accurate and linear output voltage which is directly proportional to the applied pressure. It has a diaphragm made of monolithic silicon with a strain gauge. This chip is trimmed with laser for precise span of the sensor.This sensor also has offset calibration and compensation of temperature.The temperature is compensated over 0°C to +85°C.It is a ratiometric to supply the voltage to sensors. This sensor has a gauge ported and non ported options.



ADC 0808: This analog-digital converter is an 8-bit ADC and 8- channel multiplexer and microprocessor. This data acquisition component is a monolithic CMOS device. In this successive approximation method is used for the conversion technique. This 8 channel multiplexer is directly accessed to 8 analog signals. It has a high impedance chopper stabilized comparator. This converter is highly featured with 256R voltage divider with analog switch tree and Successive approximation register .It eliminates the zero and full scale adjustments.



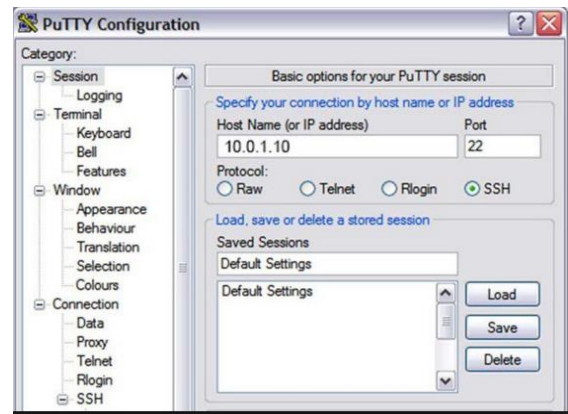
Software Requirements:

In our project the Raspberry Pi is interfaced with computer monitor by using the 5v power cable. Through this line, we operate the kit with the following softwares. They are divided into categories as listed below

- Putty
- WinSCP
- Tesseract OCR
- OpenCV.

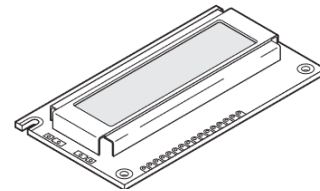
A. Putty

Putty is a secluded and unwrapped-source mortal emulator, serial comfort network file transfer application. It backs up a variety of network protocols, together with SCP, SSH, Telnet, and raw socket connection. It can link up to a serial port. The “Putty” has no determinate meaning. Putty was formerly printed for Microsoft Windows, but it has been ported to various other operating systems.

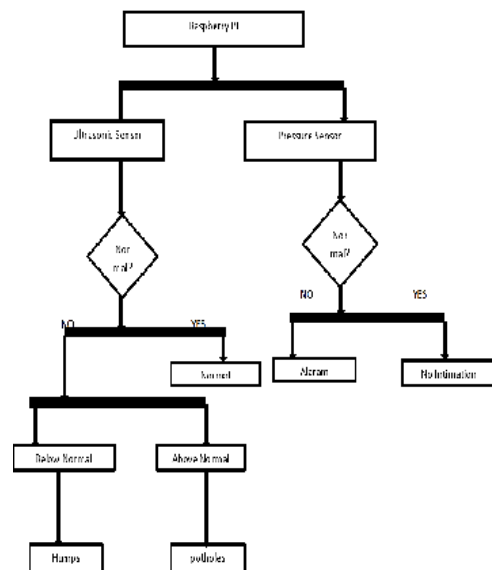


LCD Display:

Alphanumeric displays are used in a wide range of applications, including palmtop computers, word processors, photocopiers, point of sale terminals, medical instruments, cellular phones, etc. The 16 x 2 intelligent alphanumeric dot matrix displays is capable of displaying 224 different characters and symbols. A full list of the characters and symbols is printed on pages 7/8 (note these symbols can vary between brand of LCD used). This booklet provides all the technical specifications for connecting the unit, which requires a single power supply (+5V).



Project Overview:

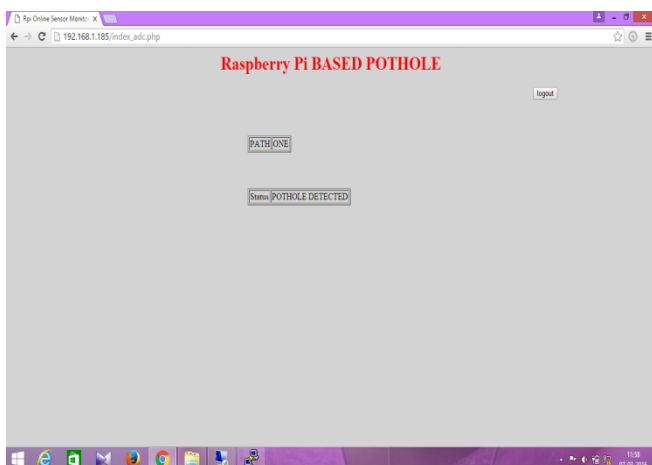


In our work we have used raspberry pi, which is the fastest controller with higher amount of memory compared with other controllers. The ultrasonic sensor is used to measure the distance between the target and the source if the distance is in normal condition then there is no presence of potholes. It is measured by the time duration taken by the signal to reach target and reach back if the time taken to reach back is higher than the usual time pothole is detected and if it is lesser than the usual time hump is detected and the message is delivered through the internet.

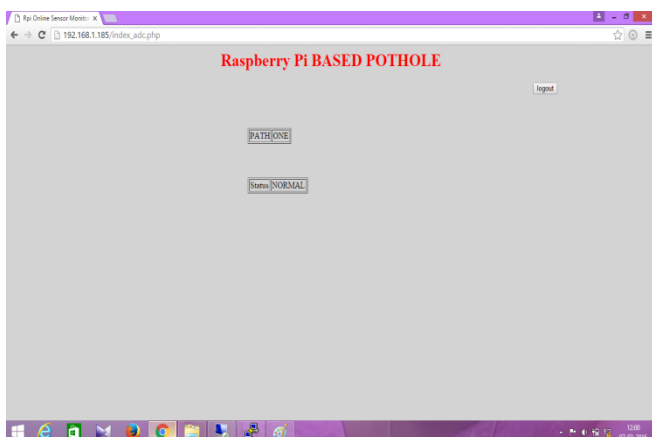
The pressure sensor is used to measure the pressure of the tyre. A threshold value is set if it reaches the below the threshold value a notification is made through an alarm.

III. RESULTS AND DISCUSSION

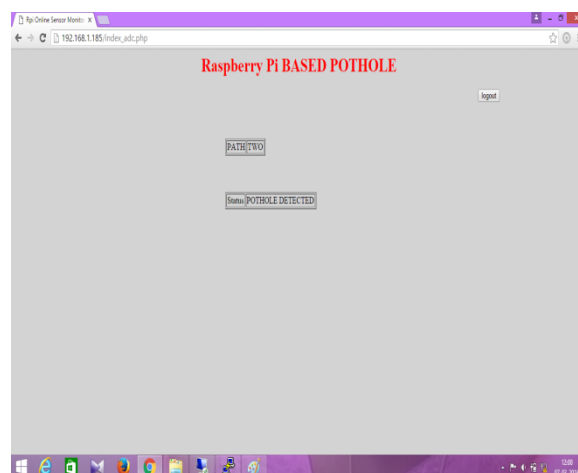
Experimental Result:



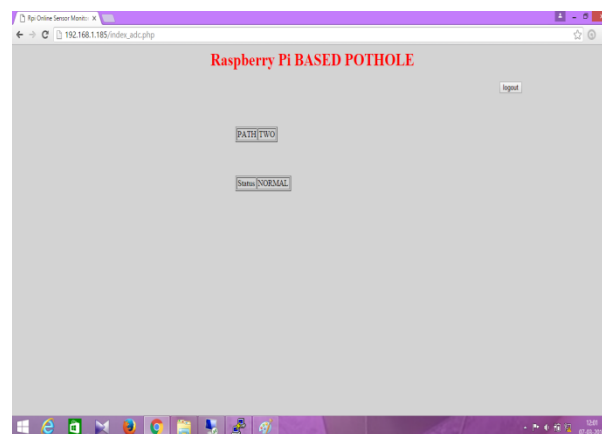
On selecting path 1 the condition of the road is displayed on the screen .The above figure portrays the presence of the pothole.



The above figure represents the normal condition of the road while selecting path 1.



On selecting path 2, the above figure describes the detection of potholes.



The above figure describes the normal condition of the road on selecting path 2.

The application of this work is to measure the pressure level of the tyre. The pressure level is indicated when it reaches below the threshold value through an alarm.

IV. CONCLUSION AND FUTURE SCOPE

The model proposed in this paper overcomes two major problems that concern the people the most and which leads to frequent accidents; the automatic detection of the potholes and humps and the pressure level of the tyre. The proposed work is more economical as it uses a low cost ultrasonic sensor and a pressure sensor. This model also works when potholes are filled with water and gives the message to net.

This work brings out the best solution for the above problems as the message is delivered on the net, it brings to the notice of the government officials as a result, they can maintain the roads properly and accidents due to the decrease in the pressure of the tyre can also be reduced.

V. REFERENCES

- [1] Rajeshwari Madli, Santosh Hebbar, Praveenraj Pattar, and Varaprasad Golla, "Automatic detection and notification of potholes and humps on roads to aid drivers", IEEE SENSORS JOURNAL, VOL.15,NO.8,Aug,2015.
- [2] Sagar Vaidya, Prathamesh Shingvi, Kamalesh Wankhede, Akshay Sharma, "People as Sensors for Smart City", International Journal of Computer Applications (0975 – 8887) Volume 116 – No. 18, April 2015
- [3] Fatjon Seraj, Berend Jan van der Zwaag, Arta Dilo, Tamara Luarasi, and Paul Havinga, "RoADS: A road pavement monitoring system for anomaly detection using smart phones".
- [4] Yu-chin Tai, Cheng-wei Chan, Jane Yung-jen Hsu, "Automatic Road Anomaly Detection Using Smart Mobile Device".
- [5] Jules White, Chris Thompson, Hamilton Turner, Brian Dougherty, and Douglas C. Schmidt, "WreckWatch: Automatic Traffic Accident Detection and Notification with Smartphones".
- [6] F.Li and P.Xiong, "Practical secure communication for integrating wireless sensor networks into the internet of things", IEEE Sensors J., VOL.13,NO.10,pp.3677-3684,Oct,2013.
- [7] R.Sundar,S.Hebbar,V.Golla, "Implementing intelligent traffic control system for congestion control, ambulance clearance, and stolen vehicle detection", IEEE Sensors J, VOL.15,NO.2,pp.1109-1113, Feb, 2015.