

“EMBEDDED SMART CAR SECURITY SYSTEM ON FACE CAPTURED AND ULTRASONIC SENSOR USING RASPBERRY PI”

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ABSTRACT: *Embedded Smart Car Security System on Face captured and Ultrasonic sensor using Raspberry Pi is about providing security in terms of driver identification and providing different vehicle control function using raspberry pi. This paper outlines a novel approach for real time face capture for driver identification and accident avoidance. Car security is nothing but providing the security in terms of keyless authentication for the driver using face capture. Raspberry pi is used to achieve this goal. When someone driving the car then face capture system obtain image by one tiny web camera which can be hidden easily in somewhere in the car. Then the captured image is send to the owners email id. Here also added ultrasonic sensor which focuses on building a user friendly device that specializes in detecting intrusions besides doing close range obstacle detection. Automobile safety can be improved by anticipating a crash before it occurs and thereby providing additional time to deploy safety technology. Warning can be like buzzer if the driver is approaching a pothole or any obstruction driver may be warned in advance regarding road entails.*

Keywords: Ultrasonic sensor, obstacle detection, Raspberry Pi

1. INTRODUCTION

In the era of automation different vehicle control functions and driver safety functions has been introduced in modern cars by many companies. But these functions are been brought up only in the luxurious car. Car security and also drivers safety has become very important as there has been a constant rise in accidents. Therefore every car should have a driver safety system which is effective also economically viable. Advanced Vehicle Control and Safety System using face capture strives to achieve that very fundamental aspect of car security and driver safety and also different vehicle control functions which has become a must in today's world. Embedded Smart Car Security System on Face captured and Ultrasonic sensor using Raspberry pi combines both these technologies into single low cost package which is more feasible for the common man. Traffic accidents have been taking thousands of lives each year, outnumbering any deadly diseases or natural disasters. Studies show that about 60% roadway collisions could be avoided if the operator of the vehicle was provided warning at least one-half second prior to a collision.

2. BACKGROUND DETAILS

There are certain technologies that already exist in the area of obstacle detection and face detection. Some of them are mentioned. Each of them deals with the obstacles in a similar way the only differentiation is the sensor and its technique in recognizing the obstacle and action initiated after sensing the obstacle. The following are the different approaches that were implemented in previous attempts of solving obstacle problem. [1]“The pothole patrol: using a mobile sensor network for road surface monitoring” IEEE project published in 2008 focused on building an easily detachable and user-friendly device that specializes in detecting potholes besides doing close range obstacle detection. The device comprised of two systems that is mounted on the front of a vehicle such as baby strollers, carts etc and the other is worn by the user maneuvering the vehicle. The first system looks for an obstacle and sends a signal to the other system wirelessly when detecting an obstacle and the second system warns the user of the obstacle by vibrating and blinking LEDs. Obstacles are detected using two non-contact ultrasonic sensors modules. The pothole detection system is divided into three subsystems. First is sensing subsystem which senses the potholes

encountered by it, about which it did not have the prior information. Second is communication which subsystem handles the information transfer between Wi-Fi Access Point and Mobile Node. Third subsystem is the localization subsystem which analyzes the data received from access point and warns the driver regarding the occurrence of potholes.

[2]Enhancing riding safety and comfort it is necessary to monitor the vehicle status. A safety system for intelligent portable hybrid electric bicycle IEEE paper published in 2011 attempted to develop a safety system for intelligent portable hybrid electric bicycle. The safety system includes two functions (1). Anti –crash warning system, (2).balanced tire pressure monitoring system .those are combined with ultrasonic ranging technology and sensor technology for electric bicycles. All of the messages are communicated through CAN-bus to the microcontroller and the peripheral system.

3. BLOCK DIAGRAM

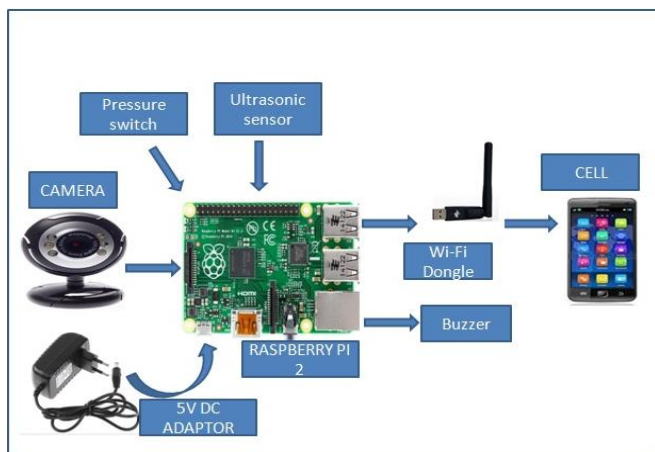


Figure1: block diagram

4. HARDWARE REQUIREMENT

- Raspberry pi 2 model B
- Power supply
- ultrasonic sensor
- Pressure sensor
- Buzzer
- Wi-Fi adapter
- Web camera
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5. SOFTERWARE REQUIREMENT

- Python language

6. RASPBERRU PI 2 MODEL B

The raspberry pi 2 model B is second generation raspberry pi. It has:

- A 900MHz quad core ARM cortex A7 CPU
- 1GB ram
- 4 USB port

- 40 GPIO pins
- Full HDMI port
- Ethernet port
- Combine 3.5mm audio jack and composite video
- Camera interface (CSI)
- Display interface
- Micro SD cart slot
- Video core IV 3D graphics core

Because it has an ARMv7 processor, it can run full range of ARM GNU/ Linux distributions, including snappy Ubuntu core as well as Microsoft windows 10.



Figure 2: Raspberry Pi 2 Module B

7. ULTRASONIC SENSOR

Is a device that converts energy into ultrasound and sound waves above the normal range of human hearing. The ultrasonic sensor system continuously sends signals and monitors any car or other obstacles are in front of car. The distance up to which ultrasonic sensor can work may be up to 4 meter. When any obstacle or vehicle detected by ultrasonic sensor system it will send signal to the raspberry pi. After receiving this signal raspberry pi send a signal to the buzzer so the driver will alert.

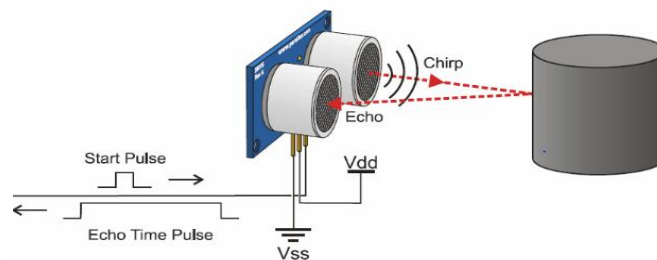


Figure 3: Ultrasonic Sensor

8. WEB CAMERA

A webcam is a video camera that feeds or streams its image in real time to or through a computer to computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there.

9. PRESSURE SENSOR

When a person sit on driver seat then due pressure of driver, pressure sensor active due to this camera get activated.

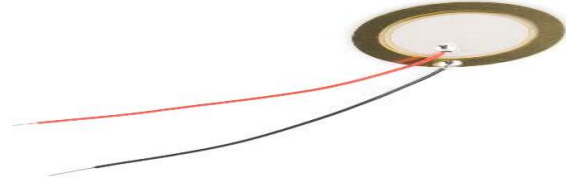


Figure 4: Pressure Sensor

10. BUZZER

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as microwave oven, or game shows. It most commonly consist of a number of switches or sensors connected to the control unit that determines if and which button was pushed or if a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel and sound a warning in the form of a continuous or intermittent buzzing or beeping sound.

11. WI-FI ADAPTER

Wi-Fi is a local area computer networking technology that allows electronic devices to network, mainly using the 2.4 gigahertz (12 cm) UHF.

12. SOFTWARE IMPLEMENTATION

The basic idea of the program is represented in terms of flowchart which can be implemented using any platform.

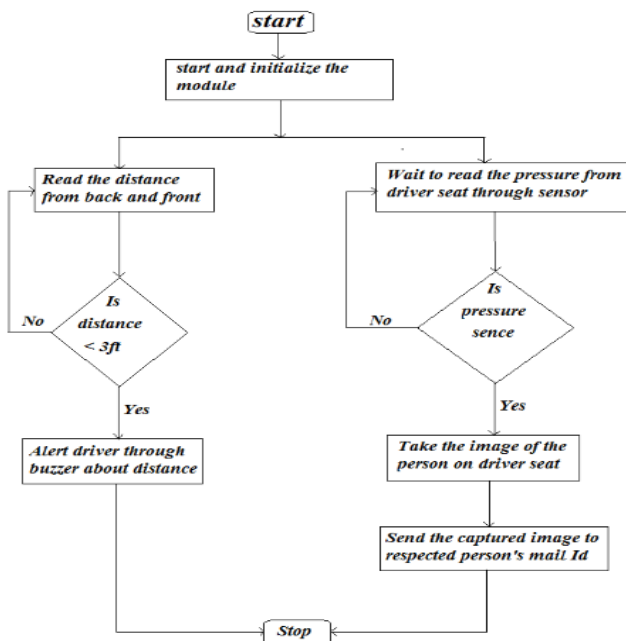


Figure 5: Flow Chart

12. EXPECTED RESULT

1. To develop a safety system that include ultrasonic sensor which detect obstacles and alert the driver by beeping a buzzer
2. To develop the low cost anti-theft system in which when any person sit on driver seat, pressure sensor sense his pressure, due to this camera will activated which capture image of driver and send to the owner email id.

13. FUTURE SCOPE

1. Mobile sensor computing system to monitor and access road surface conditions.
2. Pothole detection warning system using wireless sensor networks.
3. The sensors can be mounted in a V fashion at the front and rear end of the vehicle to detect obstacle in any direction.
4. Instead of email id we can use a new mobile app so that we can see the live video. That app can access by programming in raspberry pi using IP address of raspberry pi in that app.

14. CONCLUSION

Because of the flexibility of embedded system, the embedded smart car security system is extendable for special purposes. The IIC bus interface after widely communication bandwidth with the car control system to change data and information and new functional modules can be easily added to the system to upgrade and enhance it.

This project will help to reduce the complexity and improve security also much cheaper and smarter than traditional ones.

We are confident those in coming years our project if used in proper in efficient direction will become a boon and serve the mankind.

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