A Smart Black Box System Using Raspberry Pi

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Abstract- In present days we can see that every single person may come across with accidents and this is one of the critical situations to face. Among those few people can survive and few people may lose their lives this occurs due to lack of information .This project presents an intelligent method to collect the accident and safety information using a wide spread black box system. This project will provide an optimum solution to this drawback. According to this project when a vehicle met with an accident immediately the vehicle number and person's contact number will be sent to police control room or to a rescue team. So, the police person can immediately trace the location from where the message has arrived. Then after conforming the location necessary action will be taken. In second application, uncertain situations like many of vehicle that has centre locking system. Such as door locking system faces many problems due to automatic locking system. At that situation there is no way to open the lock. Our project will provide a suitable solution for this situation. This can be done by using wireless or GSM Technology.

Here, the Webpage also used to display the pictures taken when an accident took place. The values noted by the sensors like MEMS and ULTRASONIC are also displayed on webpage. This helps the Authorized to know the accident occurrence in detailed. So, the investigation also gets easy to know well about the incident.

Keywords- *Sensors, Raspberry pi3, Python, GPS module, Webcam, GSM module.*

I. INTRODUCTION

In present situation any accident occurs the information about an accident is needed to find out the cause of the accident. In this case the investigators should know about the accident at that time the Black box is more useful.Then the investigators should easily know about the accident. In case of any accident occurs immediately location and message should be sent to the ambulance and rescue team. Then they should easily know about the accident.The information about the accident is gathered from Black box. It can store information about the vehicle and surrounding images also.Previously it can be used in Helicopters and Airplanes. Now we are trying to implement it in our own vehicles. If any accident occurs then message will send to the provided mobile numbers. Various sensors are used to build the black box in order to find the speed of the vehicle, pressure and angle detection. If angle of vehicle will be changed then the sensor will detect the accident immediately motor will stop.It continuously records the information like speed of the vehicle, sensor values surrounding images and stores in the internal memory. Various sensors are used to build the black box in order to find the speed of the vehicle, pressure and angle detection. If angle of vehicle will be changed then the sensor will detect the accident immediately motor will stop.

II. EXISTING METHOD

The black box already exists in aircraft systems such as Airplanes and helicopters. It can be more useful if any accident or crash occurs. At that time it can record the whole data about the incident. So that it can helpful at the time of investigation. The GSM module can immediately send the SMS to the provided mobile numbers. The GPS is used to know the location of the incident. It can record the voiceand capture the images by using camera.

III. PROPOSED SYSTEM

In this project the Black Box is trying to implement in vehicles. The vehicles should have Black Box system so, that when an accident occurs the information should be stored in that system. The sensors can detect the accidents and sometimes it should avoid the accidents. In this we are using IOT functionality then by using internet also we can able to share the data.

IV. HARDWARE SYSTEM

Figure shows block diagram of A Smart Black Box System using Raspberry pi.

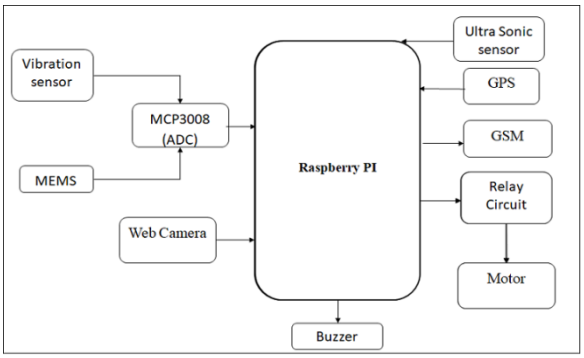

Fig.1: Project Block diagram

The proposed system has Sensors, GPS, GSM, Web camera and DC motor. Initially the motor will start whenever the accident occurs then automatically motor will stop. Any of the sensors will detects it. The entire sensor hasactive functionalities. The information about accident should bestored in Black box system. At the time of investigation the investigators can easily know about the accident and message will be send to the provided mobile numbers. The message has link of active functionalities. The location where the accident occurred then by using that easily know about the place where the accident occurs. The camera will capture surrounding images and it will display in the webpage and sensor values are also displayed in it. In this we have webpage in that we are displaying images and sensor values. If any accident occurs sensor will detect it and it can send the latitude and longitude values.

V. METHODOLOGY

Raspberry Pi: The Raspberry Pi 3 model B has specifically built with the Broadcom BCM2837System-On-Chip(SoC) includes four high performance ARM Cortex-A53 process cores running at1.2GHz with32Kb Level one and 512Kb Level a pair of cache memory, a Video CoreIV graphics processor, and is connected to a 1GB LPDDR2 memory module on the rear of theboard. It additionally options 40-pins general purpose input-output (GPIO) and improvedproperty with Bluetooth Low Energy (BLE) and BCM43143 Wi-Fi on board.It also has an upgraded power management source of 5V USB power supply up to 2.5 Amps.Currently, Raspberry Pi 3 Model B is best of Raspberry Pi computers. The system processing is huge with 1.2GHz clock speed and 1GB RAM Raspberry Pi can perform all advancedprocesses. According to the connection wise, the board should be capable of sending data toand from the board rapidly. A new dual band Wi-Fi supports for 2.4GHz and 5GHz802.11b/g/n/ac which is also promises double throughout the 802.11b/g/n/ac Wi-Fi on theRaspberry Pi 3 Model B. With the addition of Gigabit Ethernet over USB 2.0, the wired Ethernet performance is alsoboosted, with an extreme throughput of about 300Mb.

Fig.2: Raspberry Pi 3 Model B

GPS: The Worldwide Situating Framework (GPS) includes three fragments:

1. The space segment (every practical satellite)
2. The control portion (all ground stations engaged with the checking of the framework ace control station, Screen stations, and ground control stations)
3. The client portion (all polite and military GPS clients).

The below figure shows that GPS Module.

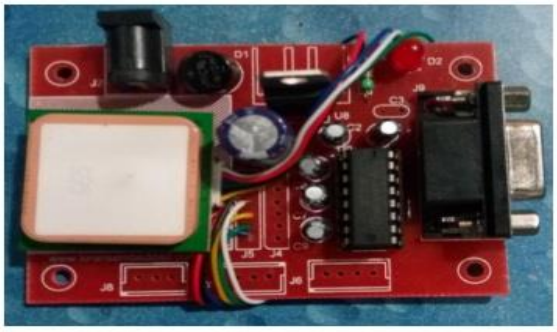

Fig.3: GPS Module

GPS Was produced by the U.S. Bureau of Resistance (DOD) and should be utilize both by regular people and military Work force. Their circles are slanted at 55° to the equator, guaranteeing that no less than 4 satellites are in radio correspondence with any position on the planet.

GSM Module:

The below figure shows that GSM module.

Features:

1. Quad Band GSM/GPRS : 900 / 1800 megahertz
2. inbuilt RS232 to TTL or vice versa Logic convertor (MAX232) Configurable baud
3. SMA (Subminiature version A) connexion with GSML sort Antenna
4. inbuilt SIM (Subscriber Identity Module) Card holder
5. inbuilt Network standing semiconductor diode
6. intrinsic Powerful communications protocol / scientific discipline (Transfer management Protocol / net Protocol) stack for
7. internet knowledge transfer through GPRS (General Packet Radio Service)

Audio Interface Connectors (Audio in and Audio out)

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- Most standing and dominant pins are on the market
- traditional Operation Temperature : -20 °C to +55 °CInput Voltage : 5V to 12V DC
- LDB9 connection (Serial Port) provided for simple interfacing
- Input Voltage : 5V to 12V DC
- LDB9 connexion (Serial Port) provided for simple interfacing

Sensors: In this system we are using three types of sensors. Those are MEMS, Vibration and Ultrasonic sensors. These sensors will have individual functionalities. If any accident occurs at that time if any angle changes that will be detected by MEMS sensor. After detection of accident the latitude and longitude values should be send through SMS. If suddenly any force applied on Vibration sensor then it can be detect the accident. If the distance between two vehicles is less than the minimum distance then the Ultrasonic sensor will detect it. If any of the sensors is detected then immediately motor will be stop.

FLOWCHART

The below figure shows flow chart of the project.

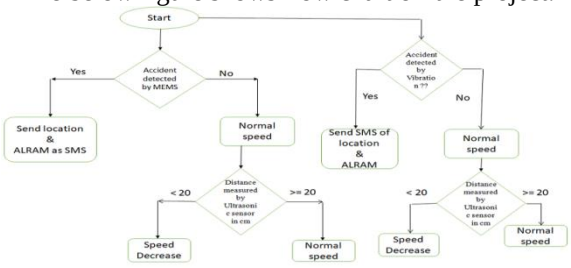

Fig.4: Flowchart

VI. CONCLUSION AND FUTURE SCOPE

In this project we proposed safety information gathering system by using A Smart Black Box System. Presently it is applicable in Aircrafts. Now we are implementing it in our own vehicles. We are using sensor for finding accident and IOT functionality for sending GPS link through SMS. So, that if an accident occurs then immediately SMS will send with the link of location to provided mobile numbers.We can present the surrounding images and sensor values in webpage. . So, that it can be more helpful while the time of investigation.

VII. RESULTS

The Black box system has a technology that it can store the information when an accident happens. It can store the information that sensor values, surrounding images and speed of the vehicle. This can be useful at the time of investigation so, that the investigators can easily know about the accident. The connection of hardware, output and displaying of sensor values can be shown in below figure

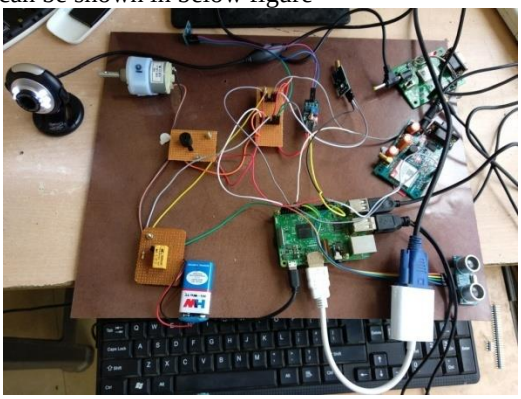

Fig.5: Hardware connection

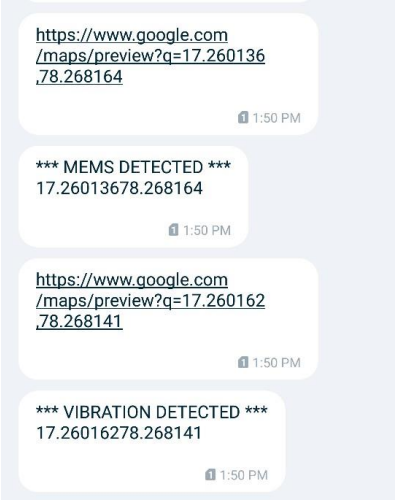

Fig.6: Output

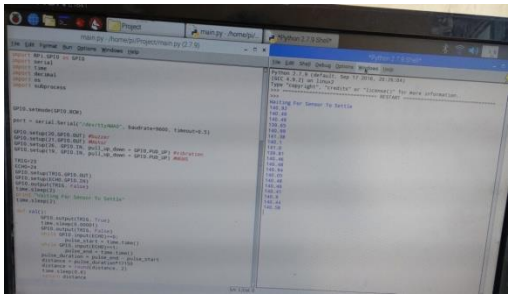

Fig.7: Displaying of sensor values

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