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RASPBERRY PI BASED VEHICLE TRACKING AND SECURITY SYSTEM FOR REAL TIME APPLICATIONS

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ABSTRACT: Design of Vehicular monitoring and tracking system using RASPBERRY PI is proposed. The vehicular module is used to track, monitor, and surveillance and finds the accident spot and intimate to the monitoring station.

The proposed design provides information regarding vehicle Identity, speed, and position on real time basis. This information are collected by the RASPBERRY PI by using different module and dispatch it to the monitoring station where it stores the information in database and display it on graphical user interface (GUI) that is user friendly. GUI is built on Microsoft Visual Studio 2010. This design provides information in real time using μ C/OS-II

I. INTRODUCTION

Thousands of automobiles are lost each year in the state and thousands of automobiles are also recovered by the Police from when they catch the culprits or even when the culprits leave the vehicles they have stolen after they have used them.

The usual problem with the recovered vehicles reaching the actual owners is that the vehicle need not be found in the same jurisdiction as one in which the complaint was launched. So, when a vehicle is recovered, usually the Police try to trace out the actual owner of the vehicle from the RTO based on the license and chassis number. But this is a lengthy and time consuming process for the RTO to trace out the actual owners from the records and inform back to the Police stations. Because of these delays, vehicles that are recovered all long time to actually reach their owners. Despite the various technologies that have been introduced in recent years to detect car thefts and tracking it, It was reported that as many as cars were stolen yearly in the world. According to NCIC, in 2006, 1,192,809 motor vehicles were reported stolen, the losses were 7.9\$ billion. Several security and tracking systems are designed

to assist corporations with large number of vehicles and several usage purposes. A fleet management system can minimize the cost and effort of employees to finish road assignments within a minimal time. [1][2]This project

consists of a android based remote vehicle disengaging system will provide effective, real time vehicle location, mapping and reporting this information value and add by improving the level of service provided. A vehicle tracking system will inform where your vehicle is and where it has been, how long it has been. The system uses geographic position and time information from the [8] Global Positioning Satellites. The system has an "On-Board Module" which resides in the vehicle to be tracked and a "Base Station" that monitors data from the various vehicles. In today's world as the population increases day by day the numbers of vehicles also increases on the roads and highways. This result in more accident that interns leads to the traffic jams and public get help instantaneously. This module provides information about the accident to the hospital and police station. As a result sudden help level of supervision and management for cargo transport vehicles, especially trucks carrying coal it is important to develop transport vehicles remote monitoring module [2].A server computer at the (remote) monitoring station, that is continuously waiting for data from the system, should record the actions of the vehicle into a database. This contains the information regarding Vehicle velocity, position, identity and temperature in two fashions. The information given to monitoring station is in continuous manner and when the accident occurs. The development of vehicular design brings public many convenience in life but also brings many problems at the same time, for example, traffic congestion, difficulty in monitoring dispersive vehicle, theft and other series of problems[4].We are intended to made this monitoring wireless using RASPBERRY PI hardware platform ported with real time operating system μ /OS-Vehicle is the primary spot where security begins. In nowadays, auto logo robberies are expanding. In India, logo of vehicle is stolen at regular intervals a disturbing insights. Henceforth we must need vehicles to furnish with the most recent pattern of advancements and measures to make it a safe from criminal. The security framework has been improved in all fields in the general public. Car security has likewise accomplished numerous fast changes, yet the expenses of all the security redesigns are so high and it is not moderate for all the vehicle proprietors. This venture is meant to give the best security answer for auto logo at reasonable expense. Here, we make an endeavor to add to a framework in light of raspberry pi-2 innovation. In proposed framework we show an answer on the best way to secure the auto logo. With this framework when somebody is attempting to take the auto logo it alarms the auto proprietor when he is at closest separation and in addition when he is far from the auto. The framework consequently alarms the auto proprietor and gives abnormal state security. The Raspberry Pi 2 model B is the second era Raspberry Pi. It supplanted the first Raspberry Pi 1 Model B+ in February 2015. Raspberry pi is a Visa estimated PC .It works very nearly as a PC. It offers more adaptability for learners than the leaner (Pi 1) Model A+, which is more helpful for implanted ventures and tasks which require low power

II. LITERATURE REVIEW

1. Finger Vein Recognition Based Driver Authentication and Alertness System Using GSM. In this paper author suggested that with the assistance of biometric framework we can secure our car. We need to begin the motor by squeezing their finger in the biometric framework. There are two conceivable outcomes that finger vein match or neglect to coordinate. In the event that the finger vein is match vehicles begin working appropriately. On the off chance that it neglects to match it cautions the auto proprietor by sending the message through GSM system. This framework additionally alarms about the driver liquor admission and sleepiness. This framework depends on the Raspberry pi innovation.

2. Smart Surveillance Monitoring System Using Raspberry PI and PIR Sensor. In this paper author recommended that keen observation using so as to check framework is actualized Raspberry pi and PIR sensor. There is infrared sensor to identify the vicinity of number of persons in the room. Camera is naturally turned on when the vicinity of individual is distinguished. At that point the data is caught and sends it to the advanced mobile phone of approved individual through 3G Dongle.

3. Smart Automobile Security System Using Lab view. This paper manages the outline of the framework, which will give the arrangement on the best way to secure the vehicle with GSM innovation. The framework is utilized to control the outlet of the fuel injector by method for electronic solenoid valve, which will be controlled by the microcontroller through the driver circuit. The secret key is given to the approved individual of the vehicle. The shut solenoid opens and the vehicle begins unless and until secret word will coordinate. In the event that it neglects to coordinate, the framework will send message to the approved individual by means of GSM modem. A caution is likewise joined to the framework. LABVIEW stage can reproduce the framework.

4. Ignition Alert Anti-Theft Security System for Motorbikes with Remote Control. In this paper author recommended that when somebody is attempting to take the motorbike it will stop the ignition of vehicle and caution the proprietor with alert. It is exceptionally troublesome for the criminal to take the vehicle by utilizing this gadget. Sensors are set on the vehicular body. It will stop the ignition of the vehicle when somebody touches it and when any one is attempting to touches for more than 3 times. Unless and until we deactivate the gadget with remote the ignition of vehicle won't begin.

5. Intelligent Anti-Theft and Tracking System for Automobiles. In this paper author proposed a productive car security framework is executed for hostile to robbery utilizing an installed framework involved with a Global Positioning System (GPS) and a Global System of Mobile (GSM). By utilizing Google Earth, The customer connects through this framework with vehicles and decides their present areas and status. The position of focused vehicles can be followed by client on Google Earth.

6. Microcontroller Based Anti-theft Security System Using GSM Networks with Text Message as Feedback. This paper proposed a framework with Dual Tone Multi Frequency (DTMF) and a GSM to screen and shield an auto. Sensors are set at the auto entryways and boot. The framework gets initiated when any individual is attempting to robbery through auto entryways or boot. At that point it consequently grounds the auto by disengaging the ignition key supply from the auto battery. Additionally send the ready message to the auto proprietor and also begins up an alert.

7. GSM Based Car Security System. In this paper author suggested that the point of this framework is to attempt to spare the auto in light of GSM innovation. when somebody attempt to take your auto it cautions the auto proprietor with alert and also send the ready message to the auto proprietor through GSM system. 8. Real Time Vehicle Tracking System using GSM and GPS Technology- An Anti-theft Tracking System. This paper gives the two route correspondence between the approve individual and introduced framework. More elevated amount of auto security components is given by this framework. At the point when interruption is recognized this framework will send the notice message to the auto proprietor. When the auto proprietor gets the message he has power to control any auto highlight through his PDA. This framework is additionally ready to distinguish the area of the auto by utilizing GSM situating idea.

9. The Design of Mobile Control Car Security System. This paper gives the two way communication between the authorize person and installed system. Higher level of car security features is provided by this system. When intrusion is detected this system will send the warning message to the car owner. As soon as the car owner receives the message he has authority to control any car feature through his smart phone. This system is also able to detect the location of the car by using GSM positioning concept.

10. Embedded Automobile Engine Locking System, Using GSM Technology. In this paper author suggested that anybody can keep the robbery of car by utilizing GSM innovation. This framework is introduced in the motor of vehicles with the GSM modem which is likewise associated with the microcontroller. On the off chance that any individual needs to begin the vehicle then he needs to sort the secret word. At the point when the secret word coordinates then and at exactly that point ignition of the vehicle will begin. On the off chance that the secret key

neglects to match up to the tree trials then framework will starts the siren and it will send the message to the auto proprietor through GSM system.

III. THE HARDWARE SYSTEM

Micro controller: This section forms the control unit of the whole project. This section basically consists of a Microcontroller with its associated circuitry like Crystal with capacitors, Reset circuitry, Pull up resistors (if needed) and so on. The Microcontroller forms the heart of the project because it controls the devices being interfaced and communicates with the devices according to the program being written.

III. RASPBERRY PI The Broadcom SoC used in the Raspberry Pi is equivalent to a chip used in an old smart phone (Android or iPhone). While operating at 700 MHz by default, the Raspberry Pi provides a real world performance roughly equivalent to the 0.041 GFLOPS On the CPU level the performance is similar to a 300 MHz Pentium II of 1997-1999. The GPU provides 1 Gpixel/s or 1.5 of graphics processing or 24 GFLOPS of general purpose computing performance. The graphics capabilities of the Raspberry Pi are roughly equivalent to the level of performance of the Xbox of 2001. The Raspberry Pi chip, operating at 700 MHz by default, will not become hot enough to need a heat sink or special cooling. The SoC is stacked underneath the RAM chip, so only its edge is visible. On the older beta model B boards, 128 MB was allocated by default to the GPU, leaving 128 MB for the CPU. On the first 256 MB release model B (and Model A), three different splits were possible. The default split was 192 MB (CPU RAM), which should be sufficient for standalone 1080p video decoding, or for simple 3D, but probably not for both together. 224 MB was for Linux only, with just a 1080p frame buffer, and was likely to fail for any video or 3D. 128 MB was for heavy 3D, possibly also with video decoding (e.g. XBMC).

GSM MODEM SECTION: This section consists of a GSM modem. The modem will communicate with microcontroller using serial communication. The modem is interfaced to microcontroller using MAX 232, a serial driver.

EEPROM: This section acts as a backend database for the project. This section is realized using an EEPROM integrated circuit chip.

THERMISTOR: Thermistors are a temperature sensing devise. It is used to sense the temperature. In this project by depends on the value of temperature the exhaust fan will run.

GPS MODEM: A GPS modem is used to get the signals and receive the signals from the satellites. In this project, GPS modem get the signals from the satellites and those are given to the microcontroller. The signals may be in the form of the coordinates; these are represented in form of the latitudes, longitudes and altitudes. Position (longitude, latitude) identity and temperature to the monitoring station and to the user/owners mobile that should help them to get medical help if accident or the theft. We are intended to make this monitoring wireless using RASPBERRY PI hardware platform. In today's world accidental deaths are increasing day by day in all most all accidents the death caused due to lack of treatments in time, because of not getting information to the nearest hospitals and police station immediately due to the present existing method of calling any person to the hospital and police station

SHOCK SENSOR: Pressure sensor is used to convert pressure as physical Quantity into electrical impulses. The pressure sensor used here is piezoelectric sensor.

GAS SENSOR: A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.

The Software System Raspian Os

The Raspberry Pi primarily uses Linux kernel-based operating systems. The ARM11 chip at the heart of the Pi is based on version 6 of the ARM. The current releases of several popular versions of Linux, including Ubuntu. will not run on the ARM11. It is not possible to run Windows on the Raspberry Pi. Raspbian (recommended) – Maintained independently of the Foundation; based on the ARM hard-float (armhf) Debian 7 'Wheezy' architecture

port originally designed for ARMv7 and later processors (with Jazelle RCT/ThumbEE, VFPv3, and NEON SIMD extensions), compiled for the more limited ARMv6 instruction set of the Raspberry Pi. A minimum size of 4 GB SD card is required. There is a Pi Store for exchanging programs. Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi. The initial build of over 35,000 Raspbian packages, optimized for best performance on the Raspberry Pi, was completed in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible

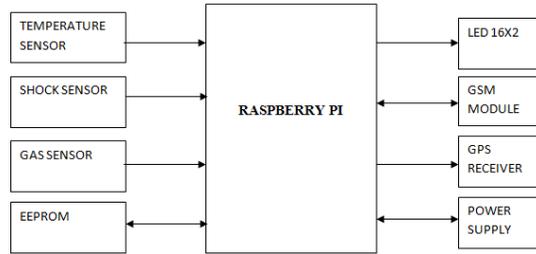


Fig1: Design Of Proposed Hardware System

Gps Module:

Global Position System (GPS) is a space-based satellite navigation that provides location and time information in all weather conditions, anywhere on or near the Earth. The GPS receiver tracks 51 satellites simultaneously. The module is mounted on the PCB along with the 3.3V low drop voltage regulator, transmit, receive and power indication LEDs, Schmitt trigger based buffer for 5V to 3.3V logic level conversion. This GPS receiver gives data output in standard National marine electronics association (NMEA) format. The GPS receiver gives -157dBm.

Shock Sensor:

A piezoelectric sensor is a device that uses the piezoelectric effect, to measure changes in pressure, acceleration, strain or force by converting them to an electrical charge. Based on piezoelectric technology various physical quantities can be measured; the most common are pressure and acceleration. For pressure sensors, a thin membrane and a massive base is used, ensuring that an applied pressure specifically loads the elements in one direction. For accelerometers, a seismic mass is attached to the crystal elements. When the accelerometer experiences a motion, the invariant seismic mass loads the elements according to Newton's second law of motion. The main difference in the working principle between these two cases is the way forces are applied to the sensing elements. In a pressure sensor a thin membrane is used to transfer the force to the elements, while in accelerometers the forces are applied by an attached seismic mass. Sensors often tend to be sensitive to more than one physical quantity.

Pressure sensors show false signal when they are exposed to vibrations. Sophisticated pressure sensors therefore use acceleration compensation elements in addition to the pressure sensing elements. By carefully matching those elements, the acceleration signal (released from the compensation element) is subtracted from the combined signal of pressure and acceleration to derive the true pressure information. Vibration sensors can also be used to harvest otherwise wasted energy from mechanical vibrations. This is accomplished by using piezoelectric materials to convert mechanical strain into usable electrical energy.

Gas Sensor:

Gas detectors measure and indicate the concentration of certain gases in an air via different technologies. Typically employed to prevent toxic exposure and fire, gas detectors are often battery operated devices used for safety purposes.

They are manufactured as portable or stationary (fixed) units and work by signifying high levels of gases through a series of audible or visible indicators, such as alarms, lights or a combination of signals. While many of the older, standard gas detector units were originally fabricated to detect one gas, modern multifunctional or multi-gas devices are capable of detecting several gases at once. Some detectors may be utilized as individual units to monitor small workspace areas, or units can be combined or linked together to create a protection system.

IV. FLOWCHART OF THE PROPOSED SYSTEM

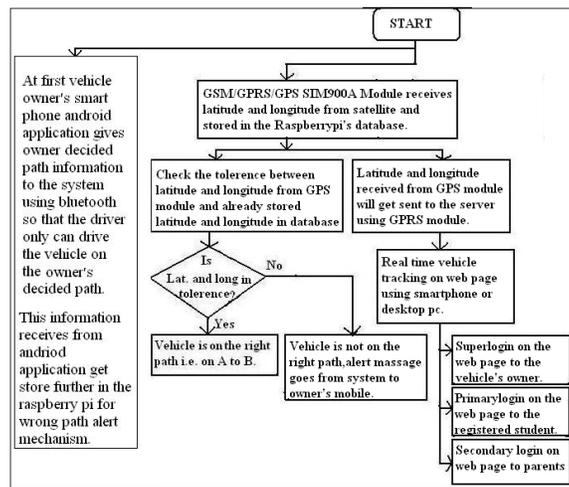


Fig.2. Flowchart 1 of proposed system

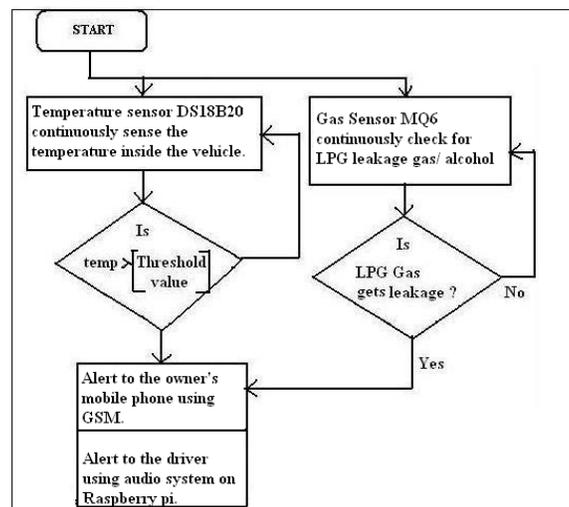


Fig. 3 . Flowchart 2 of proposed system

V. CONCLUSION

The proposed system hence made good use of Smartphone technology by providing safety and secure traveling to the traveler using wrong path alert mechanism. The proposed system plays an important role in real time tracking and monitoring of vehicle by updating vehicle real time information on the server side after certain interval of time in order to monitored vehicle continuously. Whenever driver drives vehicle on the wrong path or in case of vehicle's accident situation occurs, the proposed system provides the vehicle's current location, speed to the vehicle owner's mobile.

Hence this benefits to track the vehicle as early as possible. Student's safety mechanism also gets provided using temperature and LPG gas leakage sensors. In this certain situations, as per student's safety concern, the proposed system also gives alert message on student parents mobile so that parents also know about their children's safety.

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