

# Design and Development of Vehicular Monitoring, Tracking and Accident Identification System using Raspberry Pi

Mulakalapalli Parvathi Devi  
M.Tech - Embedded system  
Raghu Engineering College  
Vishakhapatnam

Mr. N. Markandeya Gupta  
Associate Professor M.Tech  
Raghu Engineering College  
Vishakhapatnam

**Abstract**— In the proposed system Design and development of Vehicular monitoring, tracking and Accident Identification system using RASPBERRY PI is presented. here 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, and position on real time basis. This information are collected by the RASPBERRY PI by using different modules like Sensors and GPS, 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. Here we are using the GSM and internet connectivity to dispatch the information to monitoring station.

**Keywords:-** RASPBERRY PI, GPS, GSM, Wireless monitoring station, Sensors.

## I. INTRODUCTION

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.

In last decade, we observe the drivers fatigue driving and vehicle theft activity which causes social real time problem like accidents and many more hazards conditions. We daily see or read such type of activities which are raising the question of our safety and security in both public and private sectors. So there is a need of real time monitoring and tracking the vehicle also storing and updating its database of

certain situations. In the urban areas, human help is somewhat difficult in providing the database of tracked vehicle. In the proposed system, the system provides a fully automated tracking and monitoring of the vehicle which helpful for their owners, and also it provides accurate arrival time of the vehicle at particular location or stop. And hence using accuracy in time, in case of school bus children can spend more time in studying, sleeping, or relaxing rather than waiting for a delayed bus. Spending less time waiting for a bus improves comfortable and effective time management of the student as well [4]. In order to reduce man power and saving of money, here the system provides easy tracking solution using Embedded Linux Board. The proposed system get tracking information of the vehicle like vehicle number (Unique ID), location, Date, Time and store into the database of Raspberry Pi. The system also provides vehicular safety mechanism with the help of temperature sensor and gas leakage sensor. Hence in the case of raising the temperature inside the vehicle due to some reason or leakage of the LPG gas inside the vehicle, the alert message get send to the driver as well as vehicle owner. For tracking the vehicle uses GPS module. the GSM/GPRS module is used which transmit the updated vehicle database to the server and user access the database using web page in Smartphone [3]. That shows the real time vehicle location in the Smartphone. Thus, users will be able to continuously monitor a moving vehicle on demand using the Smartphone and determine the estimated distance and time for the vehicle to arrive at a given destination.

## A. Related work

N.Watthanawisuth, T.Lomasand and A.Tuantranont proposed wireless vehicle tracking system using the MEMS accelerometer, GSM, and GPS for monitoring accidental vehicles. Designed system can detect accident as small or high from the accelerometer and GPS. After which short message service information will sent via GSM network. The second one detects the change of driver's physiological characteristics such as brain waves, heart rate and pulse rate. In spite of the good accuracy it causes annoyance to the driver as some additional devices must be attached to the driver's body. The Third one detects the fatigue of a driver irrespective of their facial features, Accelerometer sensor is fixed on vehicle, steering abrupt movements are monitored and also the threshold limits of acceleration are compared. If the values exceed the threshold, warning message is

displayed on the LCD and audio prompts are generated to warn the driver. In this method drowsiness and rash driving is also detected. An accelerometer measures speed variations of anything that it's mounted on it.

The tri-axis accelerometers measures acceleration in three directions perpendicular to each other. The Micro Electro Mechanical Sensor (MEMS) is a high sensitive sensor which is capable of detecting the tilt is used to detect the extreme right and extreme left turns to detect the accident. In India so many traffic accidents are reported and there are no means to monitor or control the speed of vehicles running on road. The proposed system is effective in detection of rash driving and accidents location and is also use to control the vehicle speed. If the driving is reckless the designed system will detect the vibrations from the vehicle and then automatically control the vehicles speed thus keeping people in safe mode and reducing accidents. Some peoples will participate in the races on the road and suddenly at some turning position they may get confused and it may turn into an accident. This system simply identifies and then passes the information to some predefined numbers thus saving human lives within short time.

## II. PROPOSED SYSTEM

The proposed System is the system which track vehicle current location using global positioning system (GPS). This product gives the live updates of accidental vehicle with their location details. The system also monitor the vehicle internal security by gas, temperature and humidity sensors as well as driver alcoholic status using alcoholic sensor and the system also provides the vehicle security and control through gsm. Tracking System is working same as follows. When the accident will occurred, then the system will direct send the accident alert message along with location details of the accidental vehicle to emergency dispatch sever further it will send that alert message to the nearby ambulance so that it will go to that location. By using system like this we can decrease the mortality rate which is lead by accident.

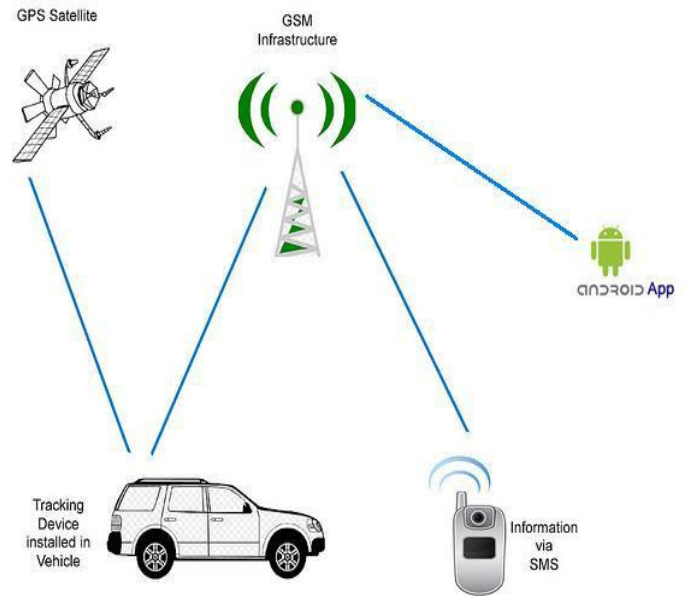


Fig 1: Block Diagram of Proposed

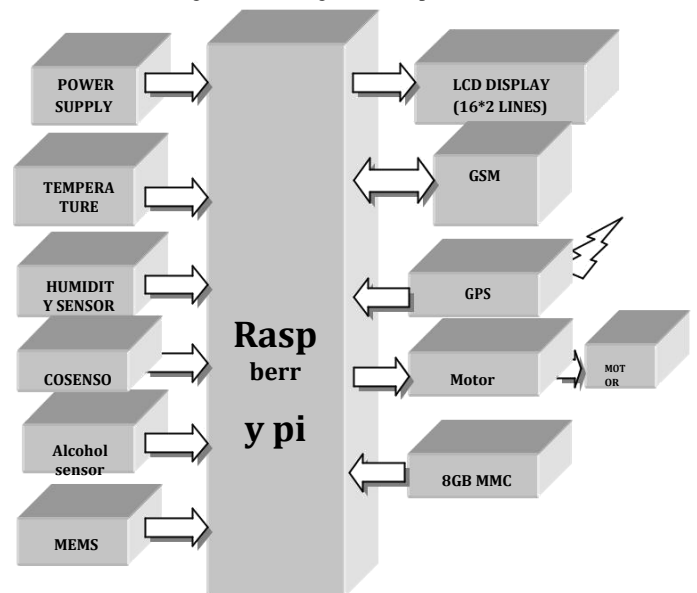


Fig2.vehicular section

### a. Raspberry Pi Processor:

Figure2 shows complete hard ware setup for Driver safety system. In this proposed driver safety system used Raspberry Pi is a credit card sized single board computer developed in UK by the Raspberry Pi foundation. This Raspberry Pi has a Broadcom BCM2835 system on chip, which includes an sARM1176JZF-S 700 MHz processor, video core IV GPU, and originally shipped with 512 megabytes of RAM. It used only SD card for booting and longtime storage.

**Monitoring Section:**



Fig 3: Monitoring/controlling section

This system is a prototype model of Accident Alert and Vehicle Tracking System using GSM and GPS modem and Raspberry Pi working will be made in the following steps:

- [1] A MEMS Accelerometer, CO, Temperature sensors will first sense the occurrence of an accident and give its output to the Raspberry pi.
- [2] Then the Raspberry pi will reads the The GPS which detects the latitude and longitudinal position of a vehicle.
- [3] The latitudes and longitude position of the vehicle is sent as message through the GSM.
- [4] Whenever an accident has occurred the position is detected and a message has been sent to the pre-saved static IP address also.
- [5] The system also responds with vehicle details for the request from authorized person at time.
- [6] along with accident identification the system also provides vehicle control and tracking option through GSM network. [7]and the system also monitor the vehicle internal parameters like temperature, humidity, smoke and also driver alcoholic status. And it alerts the driver on crossing of threshold values.



Fig 4. Raspberry pi model 3

**b. GSM:**



Fig 5: GSM module

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common

European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

**c. LM35 (Temperature sensor)**



Fig 6:LM35 temperature sensor

**Features**

- Calibrated Directly in Celsius (Centigrade)
- Linear + 10-mV/°C Scale Factor
- 0.5°C Ensured Accuracy (at 25°C)
- Rated for Full -55°C to 150°C Range
- Suitable for Remote Applications
- Low-Cost Due to Wafer-Level Trimming
- Operates from 4 V to 30 V
- Less than 60-µA Current Drain
- Low Self-Heating, 0.08°C in Still Air
- Non-Linearity Only ±¼°C Typical
- Low-Impedance Output, 0.1 Ω for 1-mA
- Load d. Smoke detector



Fig 7: MQ-2 Gas sensor



Features

- Semi-conductive smoke sensor
- High sensitivity and wide detection range
- Fast response and recovery
- Good steadiness and long service life
- Used for Detecting: Combustible gas such as LPG, butane, methane, alcohol, propane, hydrogen, etc and smoke

e. MEM Sensor

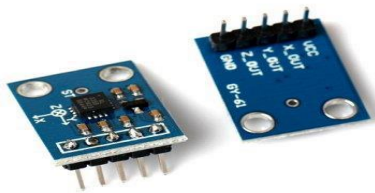


Fig 8: Accelerometer Module

Features and Benefits

- 3-axis sensing
- Small, low-profile package
- 4 mm × 4 mm × 1.45 mm LFCSP
- Low power - 350  $\mu$ A (typical)
- Single-supply operation 1.8 V to 3.6 V
- 10,000 g shock survival
- Excellent temperature stability
- BW adjustment with a single capacitor per axis
- RoHS/WEEE lead-free compliant

III. RESULTS

The proposed system was fully developed and tested to demonstrate its feasibility and effectiveness. The screenshots of the smart home app developed has been presented in Figure bellow.

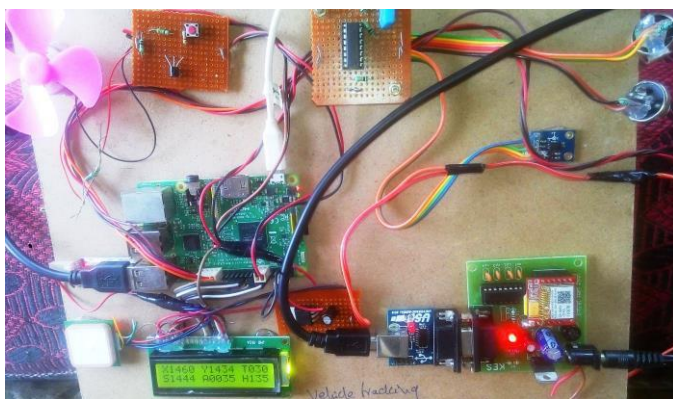


Fig 9: Testing system initially with all sensors

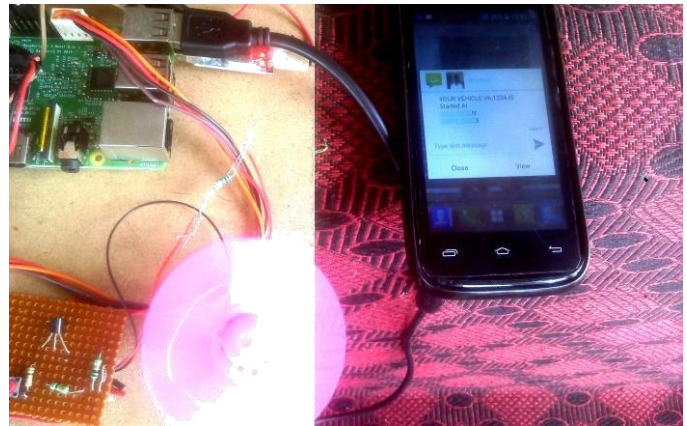


Fig 10: Sending SMS to authorized persons when engine started



Fig 11: Sending SMS to authorized person when accident occurred.

IV. CONCLUSION AND FUTURE SCOPE

The aim of the paper is to give an overview of vehicle tracking and vehicle accident detection system. This Vehicle accident detection system can track geographical information automatically and sends an alert SMS regarding accident. Experimental work has been carried out carefully. The result shows that higher sensitivity and accuracy. This system is verified to be highly beneficial for the automotive industry.

Further the system will be implemented by adding a camera module to capture images when accident occurs and also unauthorised access and send them to authorised person and also to police.

V. ACKNOWLEDGMENTS

We would like to thanks Raghu Engineering College for assisting us to design the prototype and making it reliable.

## VI. REFERENCES

- [1] Prashant A. Shinde, Y. B. Mane, Pandurang H. Tarange; "Real time vehicle monitoring and tracking system based on Embedded linux board and android application", Circuit, Power and Computing Technologies (ICCPCT), 2015 International Conference
- [2] Kumar, R.; Kumar, H., "Availability and handling of data received through GPS device: In tracking a vehicle," Advance Computing Conference (IACC), 2014 IEEE International, vol., no., pp.245, 249, 21- 22 Feb. 2014.
- [3] R. Ramani, S. Valarmathy, Dr. N. Suthanthira Vanitha, S. Selvaraju, M. Thirupathi, R. Thangam, Vehicle Tracking and Locking System Based on GSM and GPS. I.J. Intelligent Systems and Applications, 2013, 09.
- [4] Kunal Maurya, Mandeep Singh, Neelu Jain, "Real Time Vehicle Tracking System using GSM and GPS Technology- an Anti-theft Tracking System," International Journal of Electronics and Computer Science Engineering. ISSN 2277- 1956/V1N3- 1103-1107.
- [5] V. Ramya, B. Palaniappan, K. Karthick, "Embedded Controller for Vehicle In-Front Obstacle Detection and Cabin Safety Alert System", International Journal of Computer
- [6] Science & Information Technology (IJCSIT) Vol 4, No 2, April 2012.

## BIOGRAPHIES



Miss. M. PARVATHI DEVI is working as intern in Akrivia Automation Pvt Ltd. She is pursuing her Masters in Embedded systems from Raghu Engineering College, JNTU- Kakinada. She obtained her Bachelor's degree from Vignana's Institute of Engg for women JNTU Kakinada. Her research interest includes automation in embedded system.



Mr. N. MARKANDEYA GUPTA is currently working as associate professor in the Department of Electronics and communication Engineering at Raghu Engineering College. His key area of research is Communication and Embedded-System