

# IoT Based Smart Health Monitoring of Vehicle

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**Abstract**— Automobile has become unerasable to the functioning of people in everyday life. Besides the advent of technology has also increased the traffic hazards and the road accidents. Every year, about 300,000 people meet road accidents, 60% of accidents happen due to lack of health monitoring of vehicle. Hence there is a need of intelligent health monitoring system. The Vehicle health monitoring system is a total alert and risk management solution. The GSM & GPS technology is used to protect and monitor the moveable object virtually. In case of accident, a sensor situated on the vehicle will detect it automatically and then sends the alert message with the help of GSM modem and it also includes the location with the help of GPS. The failure cause of this technology is, sometimes the GPS and GSM are not accurate due to some obstacles to the signal. The proposed system of the technology presents an automatic vehicle accident detection system using GPS and GSM modems with the help of MEMS sensor, which can detect the accident whenever any vehicle collides with another vehicle or object. The accident is detected with the help of MEMS sensor. The angle in which the car has rolled off is indicated through the message using GSM and GPS modems. The system can be mounted with the control system of the vehicle and it also provides to monitor parameters such as temperature, fuel level sensor, gas detection alcohol in IOT. The proposed design demonstrates the feasibility of real time tracking of vehicles and enhanced customizability, global accessibility and economical in contrast with existing designs and quantified comparisons to existing systems. In future this system can be

**extended to fully automatic and can work of other parameters of vehicle like brake friction.**

**Keywords**—IoT, GSM, GPS, MEMS, Temperature, Oil flow, Gas, Smoke, Accident Prevention.

## I. INTRODUCTION

In last decade, we observe due to the driver monitoring fault 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 the vehicle also storing and updating its database of certain situations.

In the proposed system, the design and development of a vehicle monitoring system especially useful for mining appliances in real-time has been reported. The system principally monitors vehicle monitoring parameters. The novelty of this system is the implementation of vehicles internal and external parameter in different ways. The developed system is a low-cost and flexible in operation. Prices of fuel are rising day by day and hence, fuel leakage is not at all affordable and the fuel consumption in vehicle needs to be monitor so that the expenses could be reduced. The another important factor to be consider is that fuel is non-renewable energy source, so to save naturally available energy sources is our duty and fuel leakage monitoring is one of the way to save this energy sources. This project describes the idea of fuel leakage detection using sensor. To extend the operating range of module this project used the to use Internet Of Things (IOT).

Internet of Things (IOT) is the internetworking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. Broadband Internet is becoming more widely available, the cost of connecting is decreasing, more devices are being created with Wi-Fi capabilities and sensors built into them, technology costs are going down, and smart phone penetration is skyrocketing. All of these things are creating a perfect storm for the IOT. Typically, IOT is expected to offer advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications.

## II. RELATED WORK

In the literature, we found several, we found several vehicle health monitoring systems but with different approach and proposed system.

Salama.A.Moustafa, has proposed a ACFDA system which has an agent based inference engine and works on forward chaining algorithm. Consequently, the agent-based inference engine maps a user's inputs with rules and their corresponding data including facts, texts, audio, and images. It works on the three categories of pre-assigned car failure diagnosis data as explained before. The agents implement seven inferencing tasks to direct the engine. The movement state addresses problems that may occur during a car's movement. The corresponding failures of the movement state are related to the fuel system, oil pressure, water temperature, or wiring problems.

Norharyati Harum, has proposed a vehicle detection and tracking system that is used by many companies and individuals to track a vehicle by using many ways like GPS that operates using satellites or by using the approach which depends on the mobile signal towers. It is used to determine vehicle's location by using different methods like GPS which is operating via ground-based stations and satellites or by using signal towers to get the latitude and longitude to represent them on maps. The internet of things may provide good results in

our work by working on a mixture of software and hardware, which is in the overall interest of the project. The role of IoT is for tracking and monitoring and due to the great advantages that provide when working with its components.

Mohammed Abdul hakim Al-Absi, has proposed a system called Performance Analysis for City, Highway, and Rural Area in Vehicle-to-Vehicle Network in which the information about the vehicle such as speed, acceleration, coordination, and the next coordination, etc. is contained in packets. The Vehicular ad hoc networks are vigorously changing the packet needs to be sent regularly.

Paolo Buono, has proposed A Visual Analytic Approach to Analyse Highway Vehicular Traffic. This proposes a method for data analysis to automatically detect relevant hypotheses, a data mining technique to extract relevant information and a visualization technique. Traffic flow analysis is a challenging and complex task, due to the massive population. Visual Analytics tools reduce and improve the search by representing a large amount of data in a small space through smart visualizations.

## DISADVANTAGES

- Lack of accuracy
- Lack of intelligence in detection systems
- Static Datasets for tracking and monitoring

## III. PROPOSED SYSTEM

The objective of the project is to notify the user about the excessive heating of engine, blockage in fuel pipe, gas leakage, and also controls the smoke. MEMS technology is used to balance the vehicle in the plane.

This project uses GPS to track the location of the vehicle and GSM to send the message to the prescribed numbers. There will be an indicating unit which displays in LCD. A buzzer is used to alert the user. The constant values are given to the system before itself. So when there is any change in the system, values are shown through the display and also sent as message. The proposed system consists

of Arduino UNO, level sensor, temperature sensor, gas sensor, MEMS, GPS, GSM, IOT, LCD, buzzer. This system is fully automated. That is the values of the sensor detected will be uploaded to the IOT once it is detected.

This system is highly reliable and secure. If the gas sensor sense the smoke and alcohol the sensed values will be uploaded to the cloud through the Arduino. Thus, the message is passed to the user mobile with the help of GSM. The buzzer alarm also will be operated if the sensors are detected once. Thus, as per the diagram if any sensor senses, the values will be given to the IOT and the action measure is taken according to the code written in that.

**ADVANTAGES**

- Pre accident detection
- Tracking of collision
- Intelligent system
- High security

**IV. PROJECT DESCRIPTION**

Vehicles needs repair after a certain interval of time and if are not repaired at fixed intervals it can lead to loss of life of the person driving the vehicle or travelling on it. The objective of the project is to notify the owner about the excessive heating of the engine or the blockage in fuel pipe.

- The objective of the project is to notify the user about the excessive heating of engine, blockage in fuel pipe, gas leakage, and also monitors the smoke control.
- MEMS technology is used to balance the vehicle in the plane.
- This project uses GPS to track the location of the vehicle and GSM to send the message to the prescribed numbers.

- There will be an indicating unit which displays in LCD. A buzzer is used to alert the user.
- The constant values are given to the system before itself .so when there is any change in the system, values are shown through the display and also sent as message.

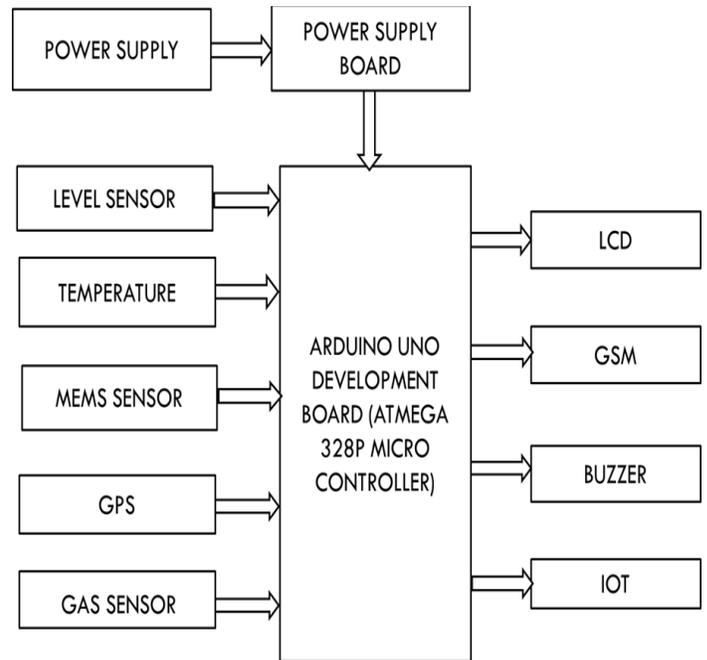


Fig.BLOCK DIAGRAM

**V. SYSTEM REQUIREMENT**

**A. HARDWARE REQUIREMENTS**

**AURDINO UNO:**The Arduino Uno is a microcontroller board grounded on the ATmega328 (datasheet). It comprises of 14 digital input/output pins (out of which 6 can be utilized as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a input device for USB connectivity, a power jack, an header ICSP, microcontroller and a reset button. Its designs comprises of assistances that supports the microcontroller in every possible way.





Fig.5.GSM board

**GPS:**The GPS module receives a timestamp from each of the visible satellites, along with data on where in the sky each one is located (among other pieces of data). From this information, the GPS receiver now knows the distance to each satellite in longitude and latitude components. If the GPS receiver's antenna can see satellites, it can accurately calculate its position and time. This is also called a lock or fix methodology. The location accuracy is anywhere from 100 to 10 meters for most equipment.



Fig.6.GPS

**LCD:** A **liquid-crystal display (LCD)** is a flat panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as present words, digits, and seven-segment displays, as in a digital clock.

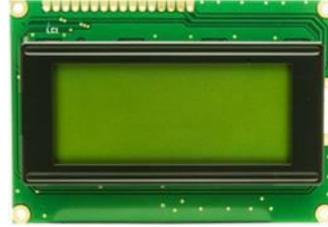


Fig.7.LCD Display

**IoT MODULE:** The Internet of Things is a system of interrelated computing devices, mechanical and digital machines, objects or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.



Fig.8.IoT Module

#### SOFTWARE REQUIREMENTS:

- **Arduino IDE.**
- **Embedded C(Language Used).**

**Arduino IDE:** Arduino is an open-source prototyping platform based on easy-to-use hardware and software. The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuino hardware to upload programs and communicate with them. Programs written using Arduino Software (IDE) are called sketches. These sketches are written in the text editor and are saved with the file extension ino. The editor has features for cutting/pasting and for searching/replacing text. The message area gives feedback while saving and exporting and also displays errors. The console displays text output by

the Arduino Software (IDE), including complete error messages and other information. The bottom right-hand corner of the window displays the configured board and serial port. The toolbar buttons allow you to verify and upload programs, create, open, and save sketches, and open the serial monitor.

**Embedded C :** Embedded C programming plays a key role in performing specific function by the processor. In day-to-day life we used many electronic devices such as mobile phone, washing machine, digital camera, etc. These all device working is based on microcontroller that are programmed by embedded C. Most consumers are familiar with application software that provide functionality on a computer. Embedded software however is often less visible, but no less complicated. Unlike application software, embedded software has fixed hardware requirements and capabilities, and addition of third-party hardware or software is strictly controlled.

Embedded software needs to include all needed device drivers at manufacturing time, and the device drivers are written for the specific hardware. The software is highly dependent on the CPU and specific chips chosen. Most embedded software engineers have at least a passing knowledge of reading schematics, and reading data sheets for components to determine usage of registers and communication system. Conversion between decimal, hexadecimal and binary is useful as well as using bit manipulation.

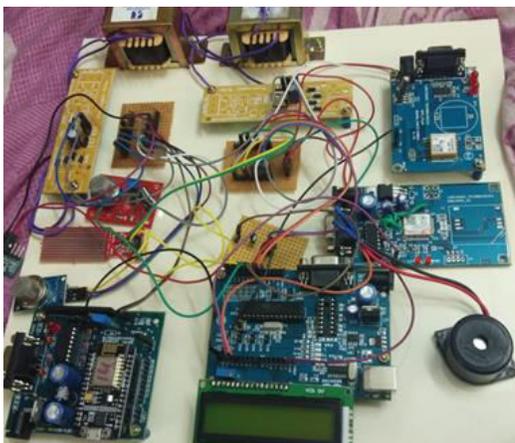


Fig.10.smart health monitoring of vehicle

## VI. RESULTS

- The heat of engine is measured using the temperature sensor. If the value increases the threshold of 25 degrees, an alert is viewed in LCD and buzzer rings.

```
COM4
*****
Mems value = 357
Tank Level = 24
#*Lat =
Longi =
Temp Value = 35.00
*CGas Value = 808
Alcohol Value = 188
Mems Value = 357
Tank Level = 24
#*Lat =
Longi =
Temp Value = 35.00
*CGas Value = 807
Alcohol Value = 188
Mems Value = 358
Tank Level = 24
*****
```

- The fuel level is measured using the flow sensor and if there is any leakage and loss in fuel, the buzzer rings and alert is viewed in LCD.
- The gas levels and smoke is controlled using gas sensors.

```
COM4
*****
CGas value = 752
Alcohol Value = 179
Mems Value = 295
Tank Level = 17
#*Lat =
Longi =
Temp Value = 36.50
*CGas Value = 752
Alcohol Value = 166
Mems Value = 319
Tank Level = 18
#*Lat =
Longi =
Temp Value = 37.00
*CGas Value = 756
Alcohol Value = 158
Mems Value = 310
Tank Level = 19
*****
```

- The MEMS checks the position of the vehicle in its plane and if there is any disturbance, the alert is sent as accident

detected and the location is tracked by the GPS and sent as SMS through GSM.

## VII. CONCLUSION AND FUTURE ENHANCEMENT

In this project we have tried to make a simple health Monitoring of vehicle using IoT, based on the Flow sensor, Temperature Sensor, Gas sensor, MEMS using Atmega 328P NodeMCU-12E. For given system security provided by using HTTP Protocol by storing the data in the cloud. The high precision Flow sensor provides analog reading and temperature sensor provides digital reading to send the data to the cloud. By this solution we are providing fuel level monitoring, Engine's heat health etc is monitored. The gas sensor helps in detecting smoke and control the gas capacities. The MEMS is the oscillating sensor which is used in detecting the plane vertices and help in accident detection. The GPS and GSM helps in tracking the accident and informing it to the prescribed number. The system takes advantage of wireless technology in providing powerful management transportation engine. The use of GSM and GPS technologies allows the system to track vehicle and provides the most up-to-date information about ongoing trips. Preliminary prototype has been designed and tested in house. 'This system finds its application in real time traffic surveillance. It could be used as a valuable tool for real time traveller information, congestion monitoring, and system evaluation. Further development and testing are under process to integrate the system and test it in real transportation system.

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