

## **AN IOT BASED SMART VEHICLE USING MULTIPLE CONCEPTS**

Mathagi.Esthare Rani<sup>1</sup>, Dr. B. Durga prasad<sup>2</sup>, Syed Amjad<sup>3</sup>

<sup>1</sup>Dept of Mechanical Engineering, JNTUA College of Engineering, JNTU, Ananthapuramu, Andhra Pradesh, INDIA

<sup>2</sup>Professor, Department of Mechanical Engineering, Jawaharlal Nehru Technological University, Anantapur,  
Ananthapuramu, Andhra Pradesh.

<sup>3</sup>Design Engineer, Siemens COE, JNTU Ananthapuramu.

**Abstract:** *Technology in automotive stream is being developed very much nowadays but still accidents and thefts are happening in our society because of some drawbacks in the existing technology. We overcome these drawbacks and that is the theme of our project “SMART SAFETY”, we use the “CARTRONIC SYSTEMS” in this project. It is based on the principle of ECU’S SYSTEMS (Electronic control units) through “ULTRASONIC SIGNALS”.*

**Keywords:** *Arduino Uno board, Raspberry pi3, Ultrasonic sensors, GPS Module, Potentiometer, Gear Motor, Keys.*

### **I. INTRODUCTION :**

Nowadays the traffic is heavy on roads and no one can follow that rules. In that reasons accidents will be occurred. Road accidents can be prevented by the improving quality of the road and safer vehicles. The avoidance of accidents that will normally occur on highways and the heavy traffic areas. Out of all the greatest achievements of the history, Automobile industry is probably the one which has most significantly changed human life. Recently some researches were carried out on the wireless **NETWORK** communications, **GPS** and **ULTRASONIC SIGNALS** implements. All these efforts were informative in nature, which give only signals to the driver by producing some buzzer/sound/alarm, but finally the action will be taken by the driver. We develop a device which will automatically actuate the safety switches on stipulated time before unusual situation. We get information from the vehicle with the intelligent sensors on machine for smart interaction and the main things are **INTERNET** and **GPS** connections. In case the vehicle is stolen we get warning alerts and the current location of the vehicle. This application works with smart gadgets to increase our safety.

### **II. MULTIPLE CONCEPTS :**

In this project we implement these multiple concepts:

- Fuel and oil monitoring (level floating)
- Ignition control (On and off)
- Over speed control (60-70 k mph) limits
- Vehicle theft tracking through GSM
- Distance alert (front and back side) through ultrasonic based signals

We update these accessories in the vehicle and work/operate through a smart phone with internet and get message alerts and alarms. The title of this project “AN IOT BASED SMART VEHICLE USING MULTIPLE CONCEPTS”

### **III. LITERATURE SURVEY :**

After analyzing the requirements of the task to be performed, the next step is to analyze the problem and understand its context. The first activity in the phase is studying the existing systems and other is to understand the requirements and domain of the new system. Both the activities are equally important, but the first activity serves as a basis of giving the functional specifications and then successful design of the proposed system. Understanding the properties and requirements of a new system is more difficult and requires creative thinking and understanding the existing running system is also difficult, improper understanding of the present system can lead diversion from solution. The proposed system design is with the considerations of the following research paper analysis.

**1. “IGNITION BASED ON FINGERPRINT RECOGNITION”** by Sarthak Sharma, IJSRMS Journal in May 2014:  
In this paper the basic focus is on the replacement of the keys with the biometric fingerprints based lock systems in the vehicles because fingerprints are oldest and most widely used form of biometric identification and also provide a robust security mechanism for various security domains. Their prototype consists of fingerprint software module used to store the database of the valid users, a hardware unit for interfacing and the ignition system module to ignite the vehicle. Database of the valid users is stored in the module. Now when a person tries to operate the vehicle then the CPU matches the fingerprint of the person with the stored database if the match result is successful then the engine ignition gets started otherwise it doesn't. External devices (hardware) can be controlled through the PC parallel port. The parallel port is a

simple and inexpensive tool for building computer controlled devices and projects. It is often used in computer programming.

2. “AUTOMATIC OVER SPEED CONTROLLING OF VECHICLE” by Amar Narayana, IJCRD Journal in May 2016:

Gummarekula Sattibabu proposed a system that describes the advancement in the processor technology and microcontrollers, which has opened a new system designed to prevent the accidents caused due to the negligence of drivers on seeing traffic signals alongside of the road and other anomalies on the road. So, to intimate the driver about the zones and to automatically maintain the speed, it is accomplished by means RF technology. The main objective is to design an Electronic Display Controller meant to control vehicle’s speed and to monitor the zones, which runs on an embedded systems and can be custom designed to fit into a vehicle’s dashboard to display information on the screen. This system if adopted by some state, it can effectively reduce the number of road accidents caused by speeding vehicles that lose control at speed breakers or by driver’s negligence towards traffic signals. This paper presents a new design to control the speed of the automobiles at remote places for fixed time.

3. “VECHICLE MONITORING AND TRACKING SYSTEM USING GPS AND GSM TECHNOLOGIES” by B. Hari Kumar, IRJET Journal in April 2016.

4. “DISTANCE BASED ACCIDENT AVOIDANCE SYSTEM USING ARDUINO UNO” by M. Prabha, IRJET Journal in October 2015.

#### IV. COMPONENTS EXPLANATION :

- Arduino Uno Board
- Raspberry pi3
- GPS Module
- Ultrasonic Sensors
- Potentio Meter ( Oil level )
- Potentio Meter ( Fuel level )
- Potentio Meter ( Speed Control )
- Switch ( Ignition Key )
- Switch ( security Key )
- Gear motor
- Flow Sensors
- Toy car
- Sewing machine pedal

#### V. BLOCK DIAGRAM :

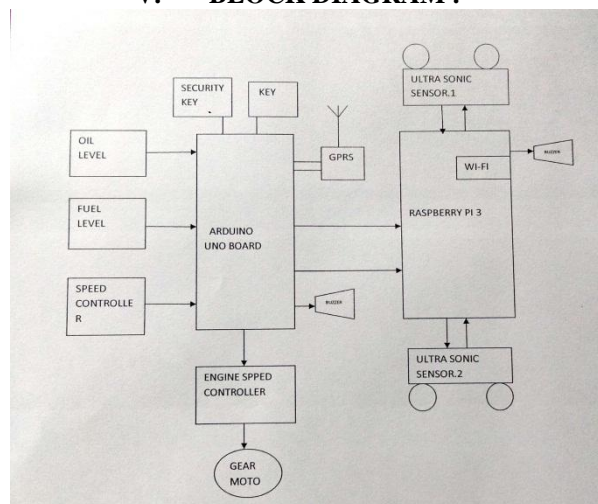


Fig.1 Block diagram

#### VI. WORKING PROCESS :

The 3 potentiometers are connected to the Analog inputs of the A0, A1 and A2 at corresponding pins of the Arduino board. A0 pin is to check the Oil level, whereas A1 pin is to control the speed of the vehicle and A2 pin is to check the fuel level of the vehicle.

One ON/OFF switch (SW1) is interfaced to one of the digital inputs of the Arduino board and this switch acts as a main key of the vehicle. When the switch (SW1) is high i.e. main key of the vehicle is ON the vehicle is in Start Condition. To show this, one of the Gear motors is connected to the PWM pin of the Arduino board. If SW1 pin is HIGH, the motor gets started and if SW1 pin is LOW, the motor gets OFF.

Another ON/OFF switch (SW2) is interfaced to one of the digital inputs of the Arduino board and this switch acts as a security key. The main concept of the security key is to check condition of the Fuel theft and also to counterfeit the vehicle theft.

#### Fuel Theft Condition:

When the security key is HIGH i.e. vehicle is in OFF condition i.e. SW1 switch is in LOW, the A0 pin of the Arduino gets changed during this condition which will treat as a vehicle theft condition and the same is sent to the Ubidots cloud through Raspberry Pi. In Ubidots cloud the theft condition message will be sent to the Telegram APP to the owner of the Vehicle.

#### Vehicle Theft Condition:

The same security key is HIGH and vehicle is ON condition i.e. motor gets started. When the Vehicle is in start condition, the message will be sent immediately to the owner of the vehicle to say that vehicle is in danger condition (theft condition) and take action immediately. When the owner received this message through Telegram APP he/she can login his/her Ubidots cloud account and can trace the vehicle position through their Ubidots account and stop the vehicle by pressing ON/OFF switch widget. Like this way the owner can counterfeit the vehicle theft condition.

By tracing vehicle the GPS module gets connected to the Arduino board through software serial. It will send the latitude and longitude of the place to the Ubidots cloud. In Ubidots cloud has a map widget, which shows the current location by receiving the lat's and long's.

Two Ultrasonic sensors are connected to the GPIO pins of the Raspberry Pi board to measure the distances. One sensor is connected to front portion of the vehicle to measure the front distance and another one is connected to rear portion to measure the rear distance. Any obstacle within the stipulated distance gets detected and the driver is informed through a sound buzzer.

#### Speed control condition:

The proposed system is mainly designed in order to avoid accidents and to alert the driver about the speed limits for safe travel. Controlling the vehicle's speed automatically in real time is very difficult. So in order to avoid those difficulties instead of controlling the vehicle speed automatically alerting to the driver about the speed limits.

## VII. SOFTWARE DECLARATION :

The proposed system is implemented for development environment with Arduino IDE and Python 3 IDLE tools and languages to support every level and develop for the professional applications.

We can generate embedded applications virtually for every process applications.

#### Software Details:

- Development environment
  - i. Arduino IDE
  - ii. Python 3 IDLE
- Programming languages
  - i. C++
  - ii. Python
- IOT cloud
  - i. UBIDOTS CLOUD Account
  - ii. RASPBERRY PI UBIDOTS Library.

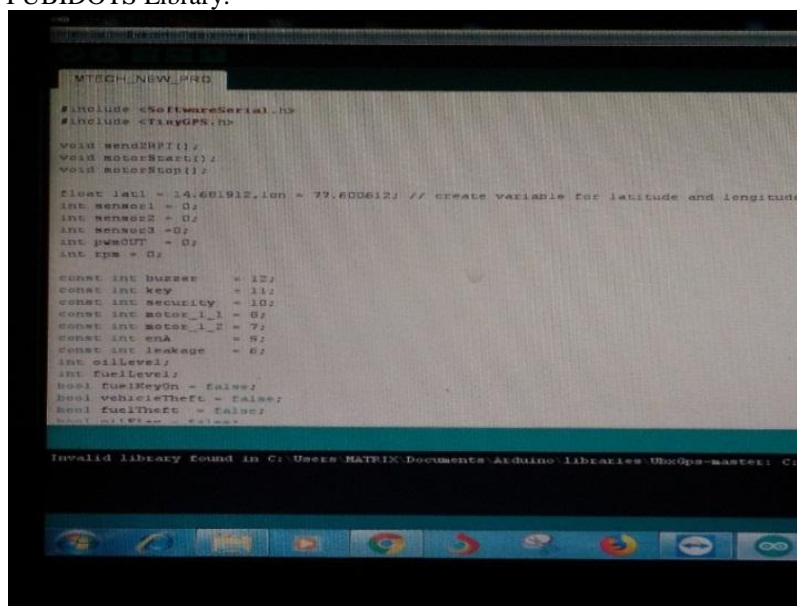


Fig.2 software programming

### VIII. ADVANTAGES & DIS ADVANTAGES :

#### Advantages:

- SMS technology is easy to use and learn and can be accessed easily when needed.
- GSM network is control from any where in the world if cellular coverage is available.
- SMS based remote monitoring and computer control systems.
- An internet based system through mobiles.

#### Disadvantages:

- If cellular coverage is not available.
- If any disturbance is occurred in wiring board.
- If any wiring will be mismatched attached it will not work.
- If there is no INTERNET / Wi-Fi and GPS are not in range, it will not work.

### IX. RESULT & DISCUSSION :

The module is successfully developed and tested in the institute with toy car on environmental conditions. The ultrasonic sensors are able to measure the distance up to 30 feet as 30 cm and if the distance is below 30cm either at front or back side of the vehicle, the excitation circuit gets started. Working control, fuel and oil floating monitoring are also successfully developed. Vehicle theft tracking and ignition ON & OFF are also developed in this project. The results are accurate with a minor tolerance value.

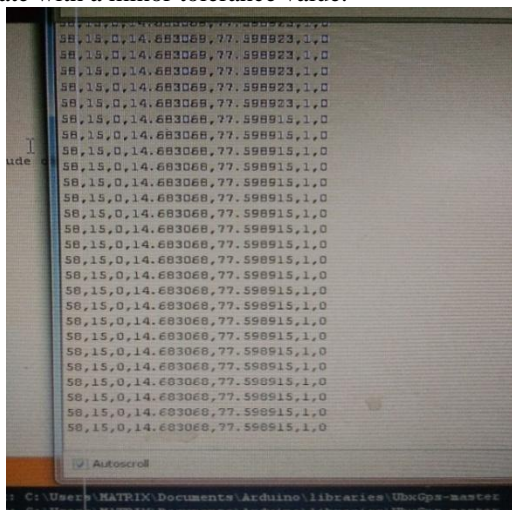


Fig: 3 Result parameters

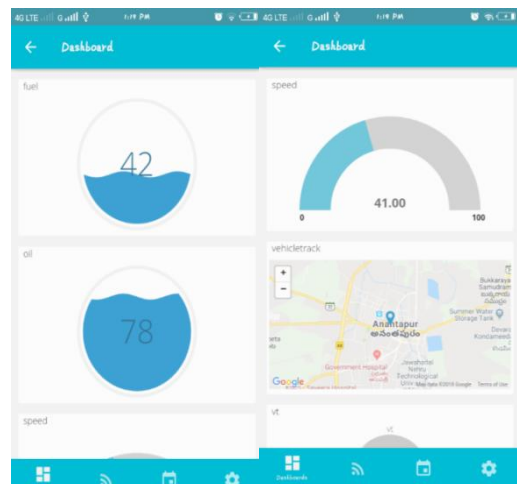


Fig: 4 Results of Floating levels and location

### X. CONCLUSION & FUTURE SCOPE :

The system is mainly designed in order to control the accidents, vehicle thefting, alerting the speed limits and distance alerts to the driver. This project is to succeed in alerting the driver about the implementation concepts. If any difficulties are come the alerting are seen by the driver. Therefore we developed a prototype of “AN IOT BASED SMART VECHICLE USING MULTIPLE CONCEPTS”.

Future Scope of this project is to control the accidents and vehicle thefting by mapping the theft vehicle through the gprs. There are many projects are over come to control the accidents and it has lot of methods for smart safety. Thus the result is simulated and achieved by Arduino IDE and Python 3 IDLE software’s.

### XI. FINAL PROTOTYPE PROJECT



Fig: 5 prototype kit

**XII. REFERENCES:**

- [1] GummarekulaSattibabu and Satyanarayan Kona “Automatic Vehicle Speed Control With Wireless In-Vehicle Road Sign Delivery System Using ARM 7 “International Journal Of Technology Enhancements And Emerging Engineering Research, Volume 2, Issue 8 ISSN 237-4289(2014).
- [2] Swati S Sarowar and Seema M Shende “ Over speed Vehicular Monitoring and Control by using Zigbee” Dept. of Electronics & Telecom, SYCET, Aurangabad, India. Accepted 30 June 2015, Available online 03 July 2015, Vol. 5, no.4 (Aug 2015).
- [3] J, L. Crowley, “ World Modeling and Position Estimation for a Mobile Robot using Ultrasonic Ranging,” Proc. IEEE Int. Conf. Robotics and Automation, pp. 674-680, 1989.
- [4] H. Choset, K. Nagatani, and N.A. Lazar, “The Arc Traversal Medain Algorithm: a Geometric Approach to increase Ultrasonic Azimuth Accuracy,” IEEE Trans Robotics and Automation, Vol. 19, no. 3, pp. 523-522, 2003.
- [5] Bari Harshal Sunil, “ Household Security System Based on Ultrasonic Sensor Technology with SMS Notification,” published under European Journal of Academic Essays 1(4): 6-9, 2014 ISSN: 2183-1904.
- [6] <http://auto.hostuffworks.com/ignitionsystem.htm>, “How Automobile Ignition Systems Work”
- [7] [http:// www.biometricinfo.org/fingerprintrecognition.htm](http://www.biometricinfo.org/fingerprintrecognition.htm), “Biometrics Information Resource”
- [8] [http:// www.crimtrac.gov.au/fingerprintanalysis.htm](http://www.crimtrac.gov.au/fingerprintanalysis.htm), “ Fingerprint Analysis – The Basics”
- [9] R.K. Singh , “Crime in India 2011- Statistics”, for National Crime Records Bureau 2011
- [10] <http://www.gogle/Ebedtronics>.