

IOT BASED VEHICLE MONITORING SYSTEM.

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ABSTRACT

Vehicle monitoring system is an electronic system that monitors the air pressure, engine temperature, fuel leakage, fuel level of vehicle in real time and alerts the driver as well as server by display and IOT respectively. There are several parameters in vehicle such as drop in tire pressure, un-expected Tire bursting, unexpected tyre puncture, more fuel consumption, sudden fall in fuel level and degradation in engine performance which results in several drawbacks. This paper presents a vehicle monitoring system that reduces number of accidents, improve mileage, braking efficiency, tire inflation, helps in proper handling and maintenance of vehicle. This system is controlled by a microcontroller that is loaded with an intelligent embedded C program. All parameters are displayed on the physical interface i.e. LCD Screen and remote interface using IOT.

Keywords –IOT,TPMS,

I. INTRODUCTION

Vehicle Monitoring plays an important role. Parameters in vehicle if not detected or monitored can cause serious problems during running of vehicle. The proposed paper gives solution by keeping vital considerations in view. The Tire pressure monitoring systems described in referred papers make use of RS232 and Bluetooth which have drawback of limited operating range. This paper proposes an idea of using Internet Of Things which will extend the operating range.

The advantages of idea proposed by this paper are reduction in number of accidents, inconvenience during driving, to increase the durability and life of tires, fuel Mileage, engine performance, fuel level monitoring and to provide proper vehicle handling.

Tire pressure monitoring is divided into two categories:

- Direct TPM
- Indirect TPM

Direct TPMS is to measure the pressure and temperature of the tire directly by using the tire pressure/temperature sensors installed inside the tire.

Indirect TPM is to measure the pressure of tire by calibrating tire parameters into the pressure.

This paper is focus on designing and developing an indirect TPM which measures the tire pressure indirectly using ultrasonic sensor.

In same manner ultrasonic sensor can be used to measure fuel level by calibrating return time of pulse into fuel level

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 paper describes the idea of fuel leakage detection using sensor.

Engine is most important part in vehicle since performance of vehicle is directly determined from engine. Hence performance monitoring of engine becomes critical part in vehicle monitoring. Performance of engine degrades if engine temperature rises above its limit. Apart from this engine temperature monitoring helps to design engine coolant. In this paper engine temperature is measured using temperature sensor.

To extend the operating range of module this paper suggests 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 become 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 sky-rocketing. All of these things are creating a perfect storm for the IOT. Typically, IOT is expected to over advanced connectivity of devices, systems, and services that goes beyond machine-to-machine (M2M) communications and covers a variety of protocols, domains, and applications.

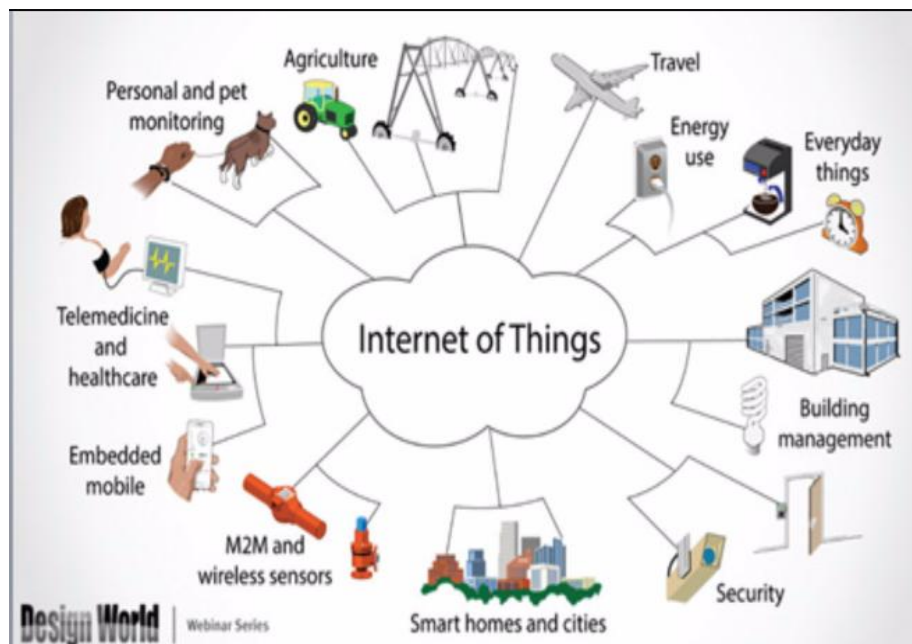


Fig1. Application of IOT

II. LITERATURE SURVEY

In this section we discuss about different methods of monitoring and control. Related to vehicle monitoring, many approaches have been proposed.

In [1], Nouman has design TPMS system user friendly and vehicle friendly. The system was implemented using the available hardware discussed

above. Vehicle testing gave reliable and stable response. Compared to TPMS systems available in market, this system has its own advantages. The transmitting unit's size can be reduced if a pressure transducer is used instead of OMRON sensor which basically is a general purpose sensor. Application Specific Integrated Circuit (ASIC) for the transmitting unit will greatly reduce size. Reduction in size will not affect working of system. And to increase possible no. of systems, the packet size can also be increased. These modifications can be made if this technique is to be launched as a product.

In [2], The intelligent TPMS based on vehicular networking technology was developed in the paper, which is a full tire life-cycle tracking service system and provides a new solution for the tire maintenance. The system transmits the monitoring data to the cloud server via the mobile Internet, and digs out the tire pressure and temperature varying pattern, then feedbacks to the users.

In [4], The microcontroller MSP430F149 is used as CPU and along with that GPS, Fuel level sensor and RS232 is used for tracking vehicle, fuel level and communication respectively.

In [5], The proposed design has unit mounted on stem valve of tire and remains outside the tire it can measure wide range of the pressure. The system has used on board RF receiver along with LCD and keypad for user interface.

The [6], paper presents a real time traffic monitoring system to solve the problem of real time traffic controlling and monitoring. The proposed system provides a new way of traffic control by the better utilization of resources. The traffic administration department can use this real time traffic monitoring information to detect the dangerous situations on the road and thereby react by imposing immediate actions. On the whole IoT will play an important role in traffic monitoring by improving the efficiency of traffic safety and travelling costs.

The [7] article presents a kind of scheme of direct TPMS, introduces the principle of the system. The communication can greatly improved through carefully choosing the RF module. The transmission module has the low power property. The wireless signal transmission is solved by adopting FSK, Manchester coding and CRC checkout. The testing results indicate that the system meets the needs of the real application well. Researches show TPMS has a bright prospect.

The [8], paper has developed and implemented a novel traffic system that is capable of monitoring and managing urban traffic. This system is tested with various conditions and is proved to be scalable. The additional vehicle spotting feature makes this system different from the other implementation. The incorporation of IoT into the system makes this as a blend of standard and advanced technologies. Vehicle owners can track their vehicle from anywhere in the world. The system developed in this paper proves to be reliable and cost-effective.

In [9], The main task of our study is trying through the study of driver's driving behavior and in coordinating with the information provided from the pre-warning system to decelerate the vehicle speed prior to the happening of accident and if accident happens to reduce the damage to the least level.

This patent [10], The invention comprises two major aspects: sharing the receiver function with another vehicle operation to economize on initial expense as well as upon power requirements; and assigning an identification code to each transmitter, establishing a record of the tire position of each transmitter and updating the record when tires are rotated, so that pressure data can be related to a specific tire position.

Design specifications are as mentioned in the following table

Table1: Design specification

Sr.No.	Measured parameters	Sensor	Range
1.	Tire Pressure	Ultrasonic Sensor	2cm to 2m
2.	Fuel Level	Ultrasonic Sensor	2cm to 2m
3.	Fuel Leakage	MQ5	200 to 1000ppm
4.	Engine Temperature	LM35	-55 to 150°C

A. Block Diagram

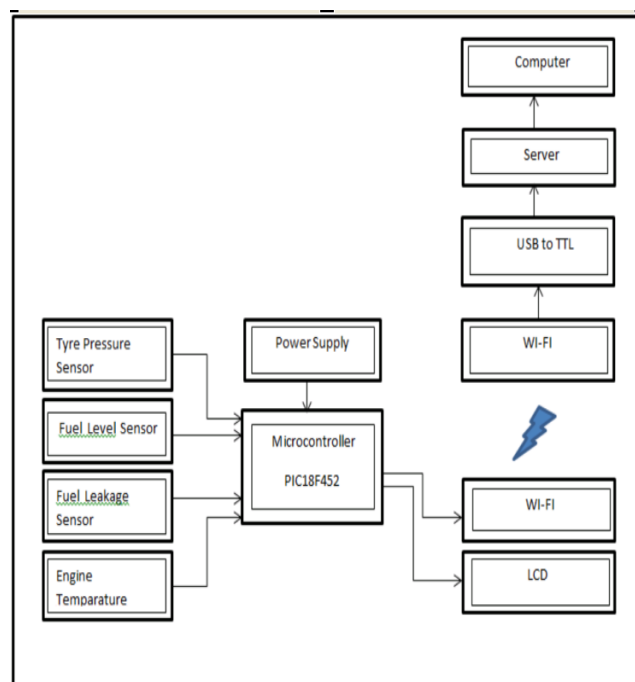


Fig2. Block Diagram

• Microcontroller

Microcontroller is a small computer on a single integrated circuit having various functions and memory. Microcontroller are designed for small or dedicated application. We are using PIC18f452 controller. PIC 18F is 8 bit controller. It is having various features like Analog to Digital converter ,Timers , Two CCP model, Programmable Brown out Reset.

The transmitter emits a 8 bursts of an directional 40KHz ultrasonic wave when triggered and starts a timer. Ultrasonic pulses travel outward until they encounter an object, The object causes the wave to be reflected back towards the unit. The ultrasonic receiver would detect the reflected wave and stop the stop timer. And according to the timer, fuel level or pressure can be calibrated.

• Temperature Sensor

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

• Fuel Leakage Sensor

The Grove-Gas Sensor (MQ5) module is useful for gas leakage detection. It is suitable due to its high sensitivity and fast response time, measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using the potentiometer.

B. Software Description :

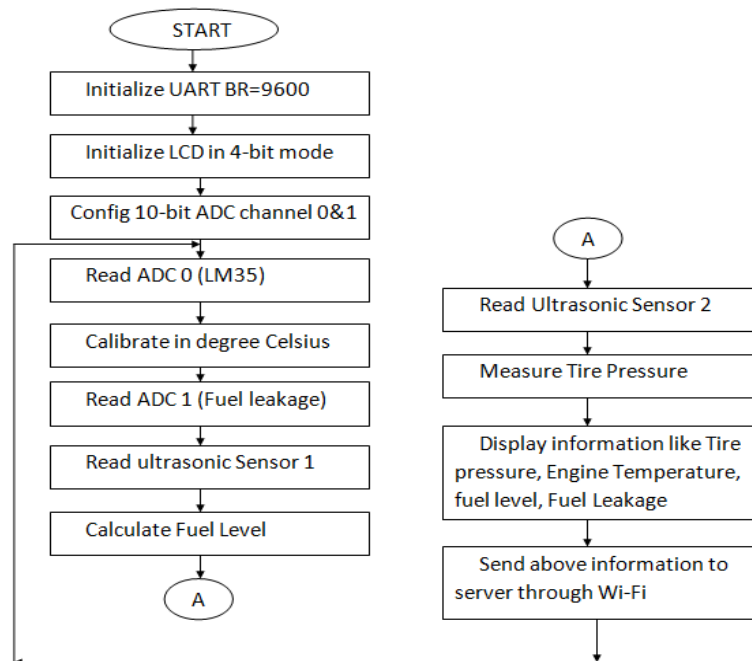


Fig3. Flow Chart

IV. RESULTS

The project gives readings of all the sensor to microcontroller module mounted on vehicle and then all these readings are transmitted to monitoring computer via Wi-Fi module. All these readings are then calibrated in respected unit and displayed (as shown in fig). System takes response time=1.10 sec.

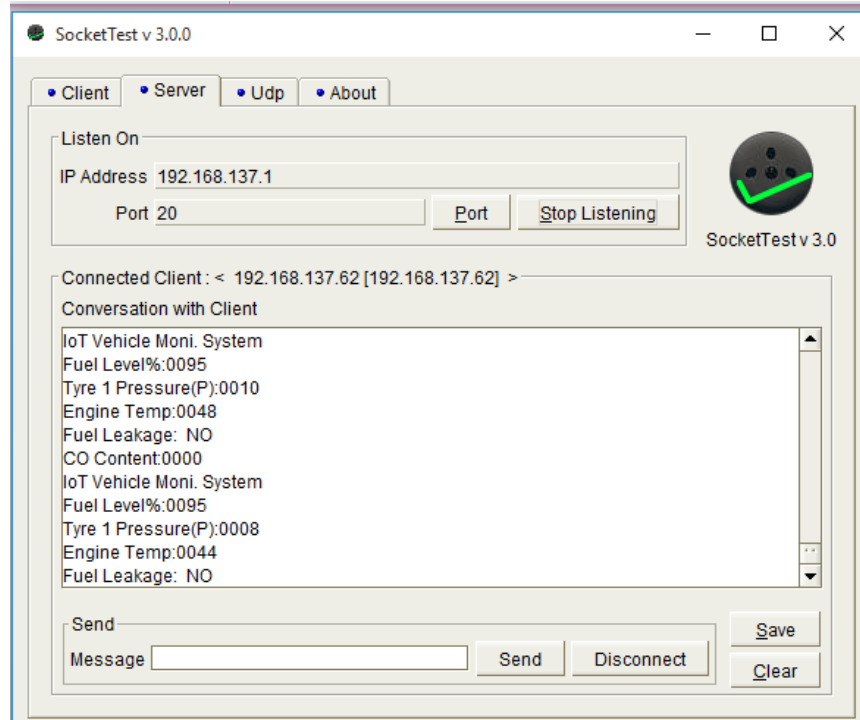


Fig4. Result

V. CONCLUSION

The designed system is implemented successfully to monitor various vehicle parameters by using suitable sensors and the parameters are displayed to user using LCD as interfacing device. The parameters displayed are also transmitted to computer using IOT providing advanced connectivity from machine to man.

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