IoT Based Fault Detection in Vehicle with Smart Locking

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Abstract- ***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 are displayed on the physical interface using IOT. . The primary objective of this project is to reduce human work. Automation has always been a prime factor for security system. Our aim in the project is to design and implement a security system. System that offers controllability through a hand-held mobile phone by means of IOT.***

Indexed Terms- ***Atmega16, LCD Display 16x2, Pressure Sensor, Temperature Sensor, WiFi Module.***

I. INTRODUCTION

Vehicle monitoring system is an electronic system that monitors the air pressure, engine temperature, Battery 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 Parameter's 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 using IOT.

As the amount of urban vehicle grows rapidly, vehicle theft has become a shared concern for all citizens. Security and safety have always become a necessity for urban population. However, present anti-theft systems lack the tracking and monitoring function. Internet of things (IOT) has been governing the electronics era with cloud services dominating the ever- increasing electronics product segment. Thus, there is a need to develop a system for providing security to the vehicle from problems like theft and towing using IOT for security of automobiles and passengers. Our system proposes a novel security system based on wireless communication and a low cost Wifi module. This paper illustrates a model in which the ESP8266 is used for sending messages. The user can control the engine/ignition and turn it off if needed.

II. HARDWARE REQUIREMENT

A. Atmega16

It is a 40-pin low power 8-bit microcontroller which is developed using CMOS technology and based on AVR architecture. This is the most commonly used AVR microcontroller which belongs to Atmel Mega family. CMOS is an advanced technology which is mainly used for developing integrated circuits. It comes with low power consumption and high noise.

Fig1: - Atmega 16

Atmega16 is an 8-bit controller based on AVR advanced RISC (Reduced Instruction Set Computing) architecture. AVR is family of microcontrollers developed by Atmel in 1996.

It is a single chip computer that comes with CPU, ROM, RAM, EEPROM, Timers, Counters, ADC and four 8-bit ports called PORTA, PORTB, PORTC, PORTD where each port consists of 8 I/O pins.

Atmega16 has built-in registers that are used to make a connection between CPU and external peripherals devices. CPU has no direct connection with external devices. It can take input by reading registers and give output by writing registers.

Atmega16 comes with two 8-bit timers and one 16-bit timer. All these timers can be used as counters when they are optimized to count the external signal

B. LCD Display

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

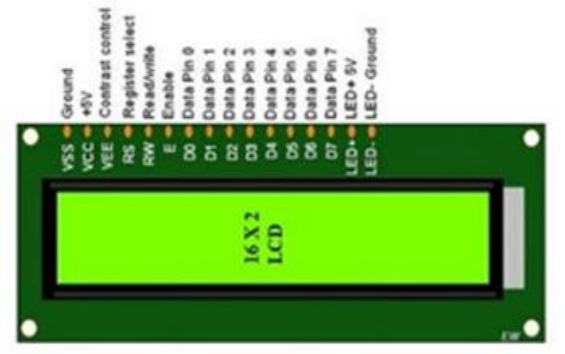


Fig2: - LCD Display

- The operating voltage of this display ranges from 4.7V to 5.3V.
- The display bezel is 72 x 25mm.
- The operating current is 1mA without a backlight.
- PCB size of the module is 80L x 36W x 10H mm.
- HD47780 controller.
- LED color for backlight is green or blue.
- Number of columns – 16.
- Number of rows – 2. units, clearly state the units for each quantity in an equation.

C. Pressure Sensor

Fig.3 Pressure Sensor

HX710B Atmospheric Pressure Sensor Module. This barometric pressure sensor is optimized for altimeters and variometers with an altitude resolution of 10 cm. The sensor module includes a high linearity pressure sensor and an ultra-low power; 24-bit ADC with internal factory calibrated coefficients. It provides a precise digital 24 Bit pressure and temperature value and different operation modes that allow the user to optimize for conversion speed and current consumption.

This HX710B air pressure sensor module uses a high-precision AD sampling chip, adopts a 0-40KPa air pressure sensor, can connect a 2.5mm hose, can detect water level, and other air pressure

D. Temperature Sensor: -

Fig.4 Temperature Sensor

It also possesses the low self-heating and does not cause more than 0.1 °C temperature rise in still air. The operating temperature range is from -55°C to 150°C. The output voltage varies by 10mV in response to every °C rise/fall in ambient temperature, i.e., its scale factor is 0.01V/°C.

It is commonly used as a temperature measurement sensor. It includes thermocouples, platinum resistance, thermal resistance and temperature semiconductor chips, which commonly used in high-temperature measurement thermocouples.

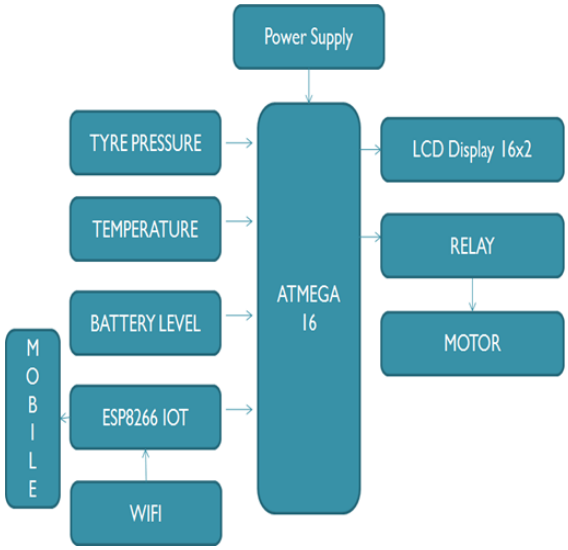
E. WiFi Module:

FIG.5 WiFi Module

The ESP8266 NodeMCU CP2102 board has ESP8266 which is a highly integrated chip designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

ESP8266 has powerful on-board processing and storage capabilities that allow it to be integrated with the sensors and other application-specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, and the entire solution, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 Node MCU development board – a true plug-and-play solution for inexpensive projects using WiFi . The module arrives pre-flashed with NodeMCU firmware so they're ready to go – just install your USB driver (below). ESP-12 Lua Nodemcu WIFI Dev Board Internet Of Things board contains a full ESP8266 WiFi module with all the GPIO broken out, a full USB-serial interface, and a power supply all on the one breadboard-friendly package.

III. BLOCK DIAGRAM

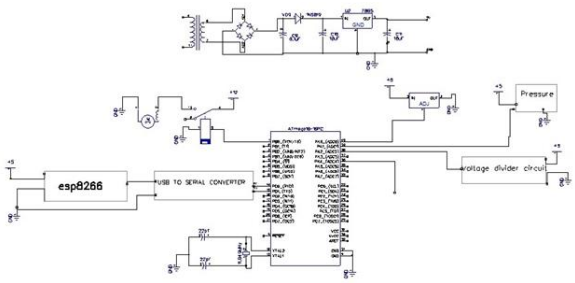


In this vehicle monitoring system we have implemented various parameter i.e., Tyre pressure, Temperature, Battery Level. The output of the parameters are in analog to convert it into digital signal it is connected to microcontroller ADC Port.

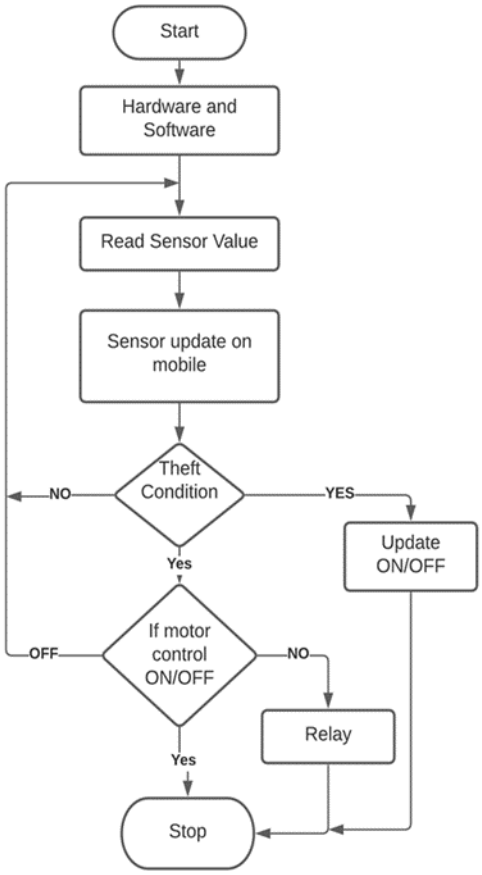
And it will display the result to the user on mobile through iot.

If someone is going to steal the vehicle as the window break or any door opens the theft system will be activated and a alert message is send to the to lock the engine as theft is detected

IV. CIRCUIT DIAGRAM



V. FLOWCHART



VI. ADVANTAGES

- Saves from theft.
- Low cost.
- Informs incase of any issue in engine, battery, and tyre pressure.
- Reduces car failure.
- Increase engine life

CONCLUSION

The concept vehicle fault detection and theft control is not a new one. However, it should widely spread it is important to aim for a system that properly is able to fulfill all the requirements of high-end vehicle to low end models. The system provided 3 detection parameters with 2 add on parameter as per user. This project assures that, if this system is brought into practice, it will reduce the rate vehicle failure and accidents. This system is a small contribution for low end vehicle. But due to human negligence the accidents can happen.

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