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On Board Diagnostics and Monitoring of Two-Wheeler Vehicle

Manisha S[1], Sahana K[2], Reshma R[3], Prof G DIVYA[4]
[1]*ECE Department NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY Bangalore INDIA*
[2]*ECE Department NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY Bangalore INDIA*
[3]*ECE Department NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY Bangalore INDIA*
[4]*ECE Department ,Assistant Professor NITTE MEENAKSHI INSTITUTE OF TECHNOLOGY Bangalore INDIA*

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ABSTRACT: Two wheeler vehicles are the most versatile and convenient form of transport in present life style. The advancements in this area has a great need. The faults in different parts of vehicle is hard for the driver to detect when he is on-wheels. The defect in any part of the vehicle may lead to major failure of the vehicle and may even cause accidents in some scenario. Regular information about the conditions of the vehicle parts helps in better maintenance of the vehicle. The proposed idea serves the above purpose. This system is known as OBD (On board diagnostics) which displays the condition of different parts on board and in case of major defect found nearby service station is suggested. This system helps the driver to diagnose the faults on-wheels and take precautions once he is alarmed. This help the driver to be safe and maintain the vehicle in good condition.

KEYWORDS: *On Board Diagnostics(OBD), GPS,GSM, Cloud, MQ2 Smoke sensor, ESP2866 WIFI.*

I. INTRODUCTION

In today's rapidly paced world media constantly discusses automation of vehicle, fuel economy, location monitoring, green house effects, etc. For this objective, the proposed system provides the driver with the status of the vehicle instantly which increases the efficiency of the vehicle and drivers comfort. The device utilizes the On-Board Diagnostics (OBD) standard that is implemented in the vehicle is explained in paper [1]. When any system non-compliance is detected OBD generates fault codes which is fetched by tolls available and informs it to engineers. This paper informs about new indigenously developed OBD scanning tool which provides complete access to engineers, good flexibility. The OBD is an intelligent system where different types of the sensors are integrated into the vital areas of the vehicle that monitor the performance and report the system.. This system consists of tracking and locating the vehicle using GPS [3]. This paper [3] proposes an efficient positioning method for vehicles on road in urban places and is known that by integrating different sensors the positioning availability can be improved dramatically in deep urban environment. It communicates the co-ordinates via EMAIL using onboard GSM module, smoke emission can be detected using a smoke sensor. Raspberry Pi is used which operates in the same way as a standard PC, requiring a keyboard for command entry, a display unit and a power supply. The unit is powered via the micro USB connector. Internet connectivity may be via an Ethernet/LAN cable or via an USB dongle as Wi-Fi connectivity. Node MC is an open-source electronics platform based on easy-to-use hardware and software. This project uses two node MC where one acts as server to which the smoke semsor and pressure sensors[2] are connected. [2]This paper analyses and designs the wireless communication based on the CRC (Cyclic Redundancy Check) algorithm, hence real-time pressure can be system and indicate the dangerous signs. And the other Node MC is the client which send the collected data serially to the controller These two communicate through wifi. And also stores the status of the vehicle in the cloud [4] This paper results in real-time status surveillance of the vehicle.. A 3.5G wireless network, and cloud computing technologies are integrated with this proposed system with OBD-II. The cloud computing server is used for transmitting the information through 3.5G wireless network for fault analysis. When any differences are found, the sensors trigger a warning light on the vehicle's dashboard, hinting the area need to be repaired or addressed off the bat . Presently, all types of the passenger cars, light and medium duty vehicles and also vehicle rental services have OBD system integrated for high emission, lesser economy, low-performance indication, and hundreds of small issues.

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II. THE PROPOSED SYSTEM

TRANSMITTER:

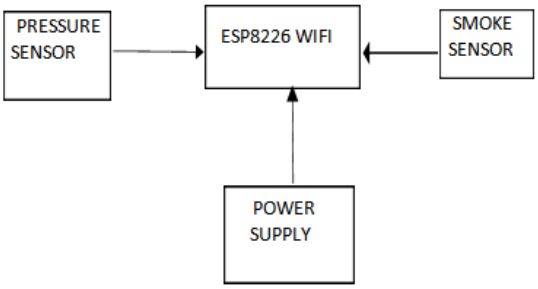

Figure 3.1 Block Diagram of transmitter part

RECEIVER:

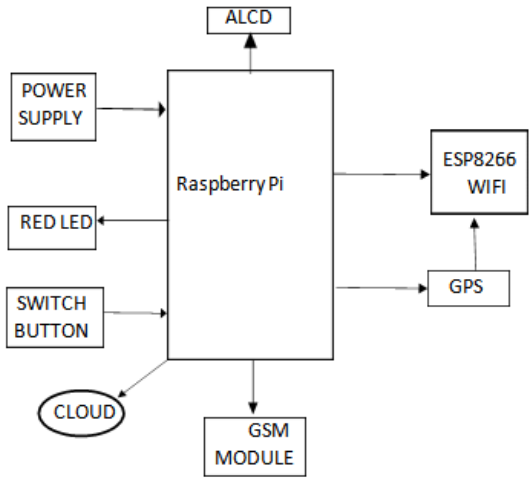

Figure 3.2 Block Diagram of receiver part

This system consists of a smoke sensor, pressure sensor, GPS, Cloud, Load cell and two Node MC for wireless communication and Raspberry pi controller. The aim of the module is to monitor the status of the vehicle based on OBD. The sensors continuously senses and sends to data to the raspberry pi controller through the two ESP8266 node MC which communicates through internet. One of the ESP8266 node MC is used as transmitter which is connected to the smoke, pressure sensors and the other one acts as receiver which is serially connected to the controller. The GPS is connected to the receiver ESP8266 node MC. The power supply [5V] for the controller is given by the laptop, the USB port connection from the laptop itself will act as a power supply device for the controller. The GPS the position of the vehicle can be monitored any time using a GPS module. The location which is obtained from the GPS is sent to ESP8266 node MCU which is later transmitted to the raspberry Pi controller using I2C serial transmission protocol. The GSM module which is connected to the raspberry Pi controller is used to send message to the GSM Mobile, the message contains the data about the GPS and the change in the sensor values. The switch button is used as a toggle switch, when the switch button is pressed the location is sent to the cloud and the mobile

III. RESULTS AND DISCUSSION

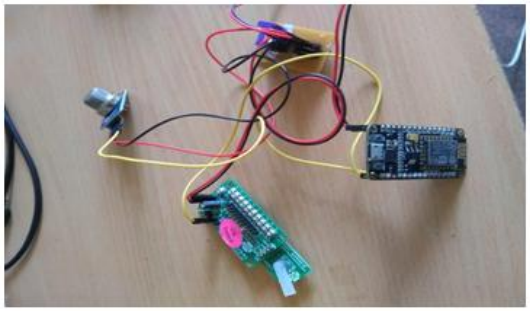

Figure 1.1 Pressure and Smoke sensor are connected to Node MC

The circuitry consists of a Wi-Fi module which consists of a node MCU connected to pressure and smoke sensor. 5v power supply is given to node MCU thus the required power for the sensor to start is given. As soon as the sensor starts functioning, they start evaluating the parameters and collect the data and send it to the client node MCU. This node MCU evaluates the data and if the values collected from the sensor exceeds the pollution limits as specified from the pollution control board of India the client node MCU sends the data to server node MCU through Wi-Fi.The smoke sensor used here is MQ2 sensor which requires 5v power supply which is given form the client node MCU.When the pollutant consisting of CO (butant/agarbatti smoke) the resistance of the material increases and conductivity is more. The variation in the voltage is used to generate Analog values, which is sent to client node MCU.The pressure sensor requires 5v power supply which is given from the client node MCU. The pressure measured can be ranging from 250mbar to 1000mbar. . The variation in the pressure is sent as analog electrical signals to the client node MCU.

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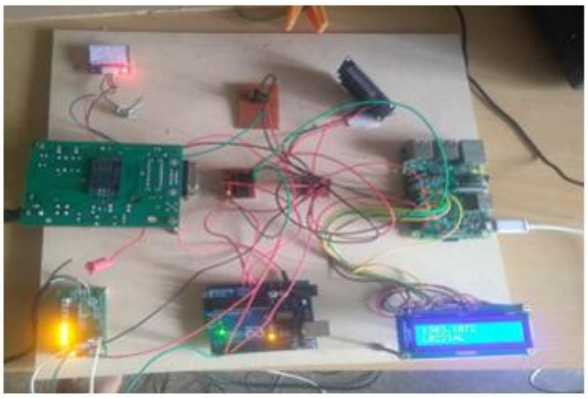

Figure 1.2 The view of Raspberry pi connected to the receiver node MCU, GPS.

The server node MCU receives the data and sends it to raspberry pi. The server node MCU intern connected to GPS. The 5v power supply is given to raspberry pi hence the required power for the sensor to function is derived from the raspberry pi. Using 8051 Microcontroller Conversion of SPI to UART o/p and 8-bit O/p. Easy to Interface with 8-bit Microcontrollers.GPS is connected to the node MCU which acts as transmitter to the raspberry pi. GPS-634R" is a highly integrated smart GPS module with a ceramic GPS patch antenna. The antenna is connected to the module via an LNA. The module is with 51 channel acquisition engine and 14 channel track engines, which be capable of receiving signals from up to 65 GPS satellites and transferring them into the precise position and timing information that can be read over either UART port or RS232 serial port.Raspberry pi receives the data. When the received data exceeds the pollution limits a warning message is sent to the drivers phone through GSM module connected serially to the raspberry pi.

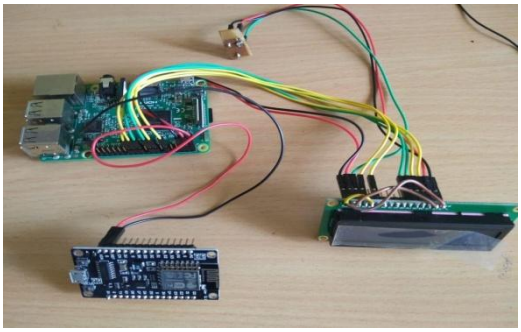

Figure 1.3 ALCD interfaced to Raspberry Pi

A liquid crystal display (ALCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals (LCs). LCs does not emit light directly. Consist of a liquid crystal display, an array of tiny segments (called pixels) and to present the information that can be manipulated. In general, LCDs uses very low power than the cathode-ray tube (CRT) counterparts. Many LCDs are ruminative, means that they use only atmosphere light to illuminate the display.Makesurethat5VandGNDlinesareproperlyconnectedotherwiseyoumayendupindamagingparallel port.

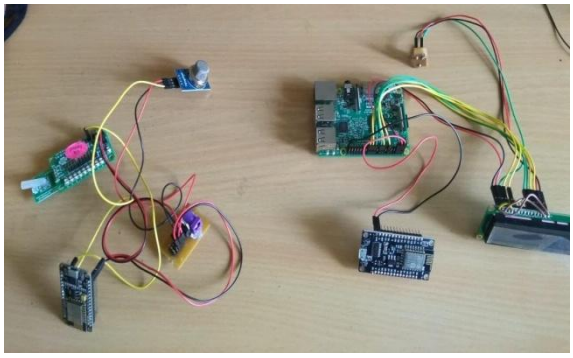

Figure 1.4 Overall View of the project

The GSM used here is SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM300 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4. The SIM interface supports the functionality of the GSM Phase 1 specification and also supports the functionality of the new GSM Phase 2+ specification for FAST 64 kbps SIM (intended for use with a SIM application Tool-kit). Both 1.8V and 3.0V SIM Cards are supported. AT Command is used to get information in SIM card. The SIM interface is powered from an internal regulator in the module having nominal voltage 2.8V. All pins reset as outputs driving low.

The power supply used in the project is an AC to DC adaptor has been used to get DC input for the mother board. In mother board, we have developed a 5V regulator circuit, which is needed for microcontroller as supply voltage. IR transmitters are also connected to 5V supply, so that they always transmit high signal. LM7805 is used for 5V regulated supply.

The proposed project is easy to enterprise and was completed successfully and satisfactorily. we have conducted block wise verification of all the blocks individually as a result we could easily interface the components to setup the final project. On Board Diagnostics (OBD) is a very important

aspect for the automobile industries and is of great importance. The use of OBD in motor vehicles will help the drivers in many ways like self diagnosingthe vehicle alone to some extent. With the integration of smart technology at a cost efficient rate with the worthy outcome, we can improve the current standards of transportation system.

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