ISSN (ONLINE): 2454-9762
ISSN (PRINT): 2454-9762
Available online at www.ijarmate.com

International Journal of Advanced Research in Management, Architecture, Technology and Engineering
(IJARMATE) Vol. 3, Special Issue 13, March 2017

LUBRICATING OIL CONDITION MONITORING AND REMAINING USEFUL LIFE PREDICTION

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Abstract-**This project IOT based fuel level, oil density and vehicle location monitoring system is a very innovative system which will inform the vehicle owner about the level of fuel and location. For this the system uses ultrasonic sensors, GPS receiver and AVR-ATmega8 microcontroller. Ultrasonic sensor is used to sense the fuel level and GPS receiver is used to find the location of vehicle. This information monitoring in web page is built to show the status of vehicle using IOT modem. LCD screen shows the status of the fuel level. Thus this system helps to vehicle owner to know about the fuel. Sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes.**

Most of the Oil storage unit are manually monitored in automobiles. This existing oil-storing systems use a high power-consuming process, is incapable of OSU's structural health monitoring. In this paper, a sensor network based intelligent control is proposed for power economy and efficient oil well health monitoring in engines. The condition of the oil storage tanks can be monitored using sensors like level sensor, temperature sensor and gas sensor. These sensors are fixed inside the oil storage tanks. The sensor output is given to a microcontroller. The monitored information about each oil well is wirelessly transmitted to an administrator located in a remote location. By this method, engine lubricating oil within the transmission range of the wireless sensor network used can be monitored and controlled.

Keywords: Engine lubricant, level monitoring, IOT,

Exhaust elimination, Wireless network.

1.*Introduction*

Sensor networks have drawn much attention for their broad practical applications-investigate specific sensors and sensor networks for air-craft structural health and performance monitoring. A real-time radiological area monitoring sensor network is developed in for emergency response.

In this paper, a sensor network based intelligent system is proposed for lubricating oil level monitoring . The motivation of developing this system is that:

1) lubricating oil level decreases the friction in automobile bearings and it increases the exhaust smoke from tailpipe of the automobile.

2) the existing oil-monitoring systems still adopt manual control.

Existing manual control systems have three evident drawbacks:

1. The automobile users have to frequently check the OIL status and collect its health analysis data. Exhaust smoke is noticed only in the period of servicing automobiles.

2. To overcome these disadvantages of the existing manual control system, a sensor network based automatic control system is proposed for lubricating oil level management and exhaust smoke health monitoring based on wireless sensor networks using *ATmega8 Controller.*

3. Monitoring oil tank: The proposed system consists of one ultrasonic -level sensors.

4. Monitoring temperature of the oil: This system consist of one LM35 temperature sensor.

5. Exhaust smoke monitoring: This proposed system consists of mq5 gas sensor for sake of monitoring the exhaust smoke eliminated from the tailpipe of automobiles.

2. Block diagram:

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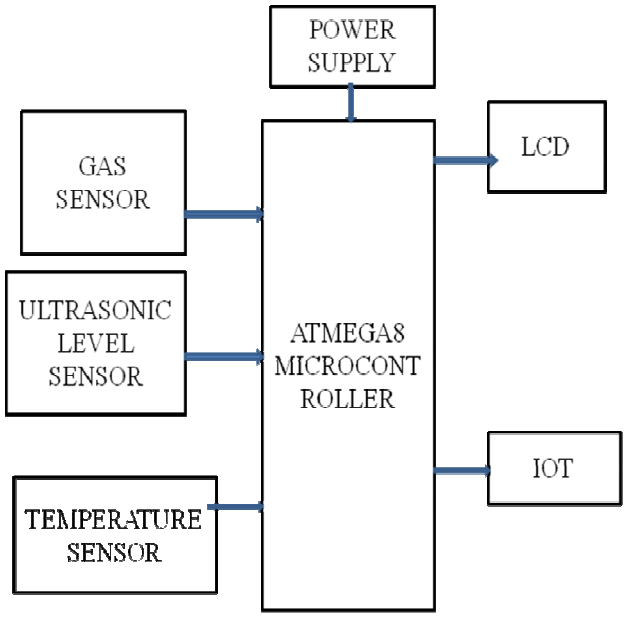

Fig.1.block diagram of entire function

3. System Descriptions

The system consists of the following three modules: a central processing unit (CPU) module, a sensing module, a wireless communication module and a user interface module.

***Sensing Module*:** *It* consists of temperature sensor, level sensor and gas sensor for data sensing from an Oil Pumping Unit. The unit converts all measurements into electrical signals and then transports them into its corresponding control heads.

Ultrasonic sensor

Ultrasonic Sensor is used for Oil level measurement in Oil storage tank. The sensor is fixed at the top of the tank facing the oil stored. The working principle of an ultrasonic sensor is simple and use high-frequency sound waves that are evaluated when the sensor received back the waves. To determine the distance between the robot and object, the sensor measure the elapsed time between sending and receiving the waves. These sensors are ideal for measurement in different environments where measurements cannot be affected by the surface, material, light, dust, or other noises. In robotics, ultrasonic sensors are used in a wide range of applications including here the measurement of distance, presence detection, or detect the position of an object.

HC-SR04 is one of the most popular ultrasonic sensors used in robotics by students and hobbyists to determine the distance from a robot to objects. It is available at a low-price, it is stable and has high accuracy. Working principle is similar to bats or dolphins, and its operation is not affected by sunlight or other noises.

HC-SR04 provides measurement function between 2 and 400 centimeters at a range accuracy of 3 millimeters. The HC-SR04 module hosts the ultrasonic transmitter, the receiver and control circuit. Working Voltage : 5V(DC) ,Working Current : max 15 ma , Working frequency : 40MHZ , Output Signal : 0-5V (Output high when obstacle in range) Sentry Angle : max 15 degree , High-accuracy : .01m , Input trigger signal : 10microseconds TTL impulse , Echo signal : output TTL PWL signal , Size : 45*20*15mm , Distance : 0.02m - 5m.

Fig.2.ultrasonic sensor

Temperature Sensor (LM 35):

Temperature Sensor is fixed inside the oil storage tank. The measurement of temperature is one of the fundamental requirements for environmental control, as well as certain chemical, electrical and mechanical controls. Many different types of temperature sensors are commercially available, and the type of temperature sensor that will be used in any particular application will depend on several factors. For example, cost, space constraints, durability, and accuracy of the temperature sensor are all considerations that typically need to be taken into account. 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.

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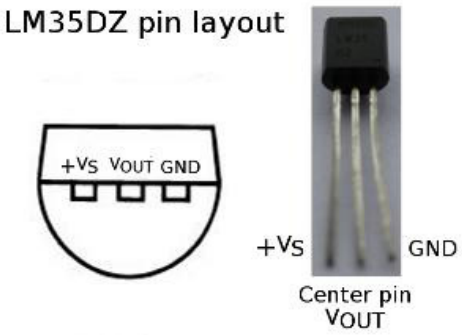

Fig.3.temperature sensor

Fig.5.Atmega8 controller

Gas sensor(MQ5):

This is a simple-to-use liquefied petroleum gas sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-5 can detect gas concentrations anywhere from 200 to 10000ppm.

This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all you need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.High sensitivity to LPG, isobutene, propane. Small sensitivity to alcohol, smoke., Fast response, Stable and long life.

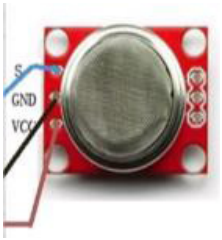

Fig.4.gas sensor

CPU Module:

The CPU in our system is ATmega8 microcontroller. It is a standard AT mega core CPU make suitable for industrial control.

Microcontroller ATmega8:

Operating Voltage 5V , Input Voltage (recommended) 7-12V, Input Voltage (limits) 6-20V , Analog Input Pins 16 , Digital I/O Pins 24(of which 14 provide PWM output) , DC Current per I/O Pin 40 mA , DC Current for 3.3V Pin 50 mA , Flash Memory 256 KB of which 8 KB used by boot loader , SRAM 8 KB, EEPROM 4 KB , Clock Speed 16 MHz .

Wireless Communication Module:

IOT module is used for wireless transmission between third level sensor and intelligent sensor.

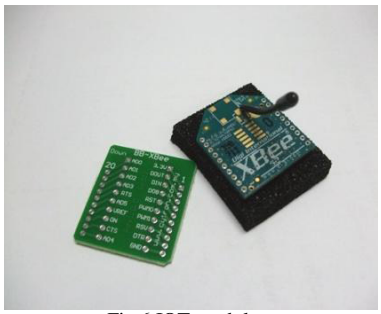

Fig.6.IOT module

IOT Series2. IEEE 802.15.4 standard for wireless communication. Its range is 100-130 meters. It is Reliable and requires lower power for operation. It has a date rate of up to 256kbps. Ideal wireless module for communication between control heads and PC, Cost effective

4. Hardware & Software Requirements:

Hardware Required

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- Microcontroller ATmega8
- Level Sensor (Ultrasonic Sensor)
- Temperature Sensor (LM35)
- Gas Sensor(MQ5)
- IOT series 2 Module
- PC

Software required

- C
- AVR Proteus

5. Flowchart

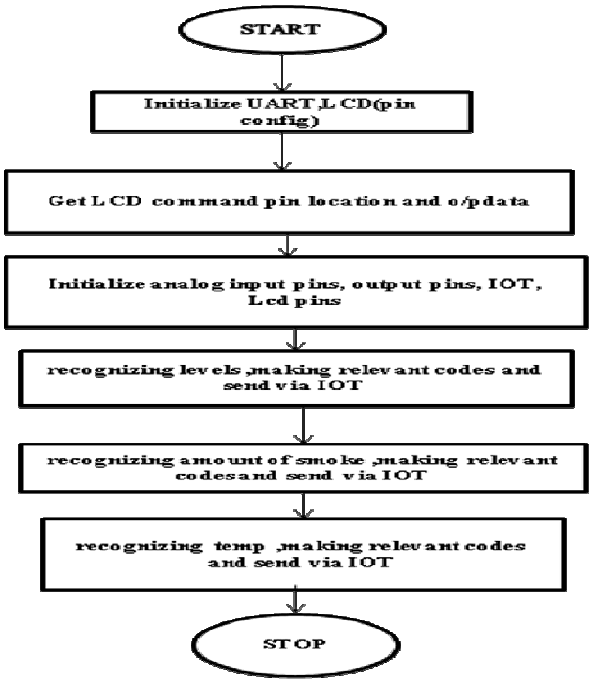

Fig.7.flowchart

6 .Result and Discussion

The level of oil from automobile lubricating oil tank is sensed by the ultrasonic sensor (SRF-04) and the analog signal is being given to the microcontroller. When the trigger is initiated by the controller, echo signals from level sensor is produced which measures the levels of oil.(the transmitting and receiving time of echo signal is mathematically calculated and given to microcontroller for digital output). Meanwhile the contamination of the lubricating oil in storage tank leads to the exhaust smoke which affects the environment as well as automobile efficiency(engine performance).

The exhaust smoke is monitored continuously for better engine performance. The gas sensor(MQ5) is placed at the mouth of the exhaust emission which measures the amount of gas being eliminated. This gas in unit of PPM directs the amount of gas to the user. The another criteria is Temperature , measured for the additional engine oil check(Temperature). If temperature increases the engine will stop abruptly and parts will get damaged. The sensor gives the analog output to the microcontroller and amount of temperature is monitored IOT in digital format.

Oil tank sensor output:

SNO	*TEMPERATURE (Celsius)*	*GAS (ppm)*	*LEVEL (cm)*
1	35.28	260	5
2	24.6	357	7
3	39.4	870	12
4	54.8	997	13
5	76.2	1820	15

This table shows the oil parameters output. These outputs are obtain from temperature level and gas sensors respectively.

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6.Hardware design layout:

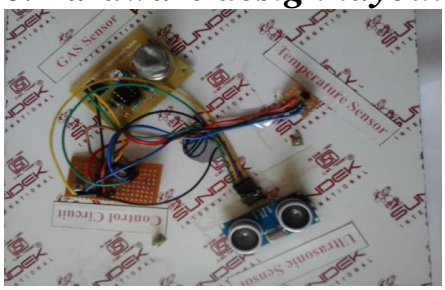

Fig.8.hardware design

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