A Review of Automobile Engine Problems & It's Monitoring System

Rishabh M. Upadhyay[1] Hardik N. Mewada[2]

[2]Assistant Professor

[1,2] Department of Electronics & Communication Engineering
[1,2] Parul Institute of Engineering & Technology, Limda, Vadodara, India

Abstract— in today's fast life people don't have time and in that if u find your car having breakdown, what will u do at that time!!! How will you feel when your car priory tells u that this thing is going to happen!!! This is all what my innovative idea about "A Review of Automobile Engine Problems & its monitoring system" is going to get helpful. With the help of different sensors I am going to detect different parts of an engine. And that data from the sensors will pass on to embedded system. That data will get compared with the preloaded data. If data matched then ok and if not then will show a precautionary Signal on the screen and this is how the user get to know about the problem occurred in an engine.

Key words: FOUR STROKE ENGINE, PIC16f877, ULN2003A, MQ-6, LM35, GPIB.

I. INTRODUCTION

In this paper I will try to reduce the number of breakdowns and casualty takes place because of those faults by applying Electronics on it.

For this I had visited different garages, discussed the major breakdowns and according to that tried to find out different hardware tools which are applicable to those faults to resolve them. A car engine is also known as an internal combustion engine, and is designed to use small, controlled explosions to create the power necessary to move the vehicle.

All car engines are designed to use a four stroke combustion cycle. The four strokes are the intake, compression, combustion and exhaust. These strokes are repeated in quick succession to generate power. All parts of the combustion cycle take place within an enclosed car engine.

A small controlled explosion forces the piston, or "arms," of the engine to move. When the energy from the explosion is almost worn out, another explosion occurs, forcing the pistons to move again. This recurring cycle generates the power needed.
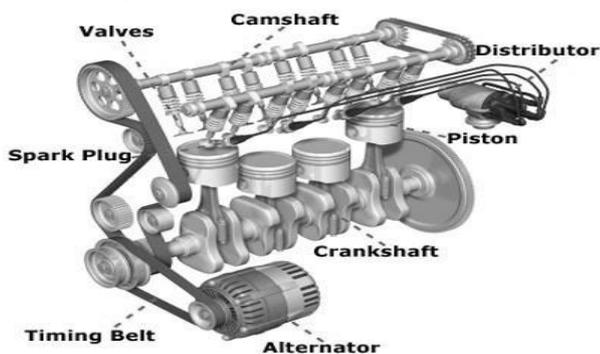

Fig. 1: Structure of an Engine [1]

The speed of the cycle determines the speed of the vehicle. When the driver increases the amount of gas going to the engine, the engine pistons increase their movement. This faster pace results in an increase in the speed of the combustion cycle. [8]

II. MAJOR PROBLEMS IN AN ENGINE & IT'S SOLUTION

A. Fuel Pump Check

As blood is essential for a human being to work similarly fuel is the only source to run a machine. And for that supply from tank to engine fuel pump is required. If user finds any problem in ignition or jerks while driving then there is a problem in fuel pump.

B. Radiator Temp & Leakage

Radiator is a device which contains distills water to keep the engine cool. If it gets fail then the engine picks up the heat and due to that the head gas kit gets fail. A best mechanic finds this problem through the (CO_2) black smoke which exhaust from the silencer and the sound of knocking comes from the engine.

LM35 temperature sensors for measuring the temperature of Engine as well as Radiator. Because both are equally connected to each other.

C. Crankshaft Sensor for Timing Belt Monitoring

Crank position sensor is an electronics device used in an internal combustion engine to monitor the position of crankshaft. ECU use the information transmitted by this to control the ignition timing & fuel injection timing. Earlier distributor has to manually mark the timing point of timing belt. So with the help of this we can resolve the problem of miss alignment of timing belt and the crankshaft.

D. Ignition Timing

Defines at what point in the engine cycle the sparkplug should fire for each cylinder. Modern systems allow for individual trim on each cylinder for per-cylinder optimization of the ignition timing.

For this we will apply Oxygen sensor to measure the proper fuel supply to the spark plug.

With the help of Tachometer first of all we will measure the normal Rpm of the belt and then at three different tensions we will have the three different values. And that will be displayed on screen. This is how we can measure the timing.

E. Check Spark Plug

As mentioned above through spark plug only the ignition takes place in an engine. In four stroke engine there are spark plugs through which ignition takes place during the

process of compression and combustion. If any spark plug gets fail there comes a problem in working of piston.

Fig. 2: Location of timing belt sensor [2]

F. *Variable cam timing*

Allows for control variable intake and exhaust cams (VVT), mapping the exact advance/retard curve positioning the camshafts for maximum benefit at all load/rpm positions in the map. This functionality is often used to optimize power output at high load/rpms, and to maximize fuel efficiency and emissions as lower loads/rpms.

This problem will get resolved with the help of Rpm meter on the screen.

G. *Water temperature correction*

Allows for additional fuel to be added when the engine is cold, such as in a winter cold-start scenario or when the engine is dangerously hot, to allow for additional cylinder cooling.

For this we will add Water level sensor and that will be shown in the display. [9]

III. HARDWARE MODEL & IT'S INTERFACING

Here in this section I have tried to make my research work easier by creating this Block Diagram. Here in this Block Diagram we can see the interfacing of Different sensors which are attached at their specific location in a vehicle to the Main Control Unit Circuit having PIC Microcontroller.

There is preloaded Data in that unit which will be measured with the receiving Data. If the received data is as per the preloaded data then no result will be there on the display but if it's not like the same, then we can see a precautionary warning on the Display (LCD).

According to this Block Diagram, I have tried to implement on this on GPIB, Connected two LM35 temperature sensors for measuring the temperature of Engine as well as Radiator because both are equally

connected to each other. Then in parallel to that connected Oil measuring sensor which will measure the Oil and will precut the user if it gets less. Similarly, connected Pizzo vibration sensor, Techo Generator for the RPM reading, MQ6 the Fuel leakage sensor etc. Also used RTC for timing and Capacitor for removal of noise.
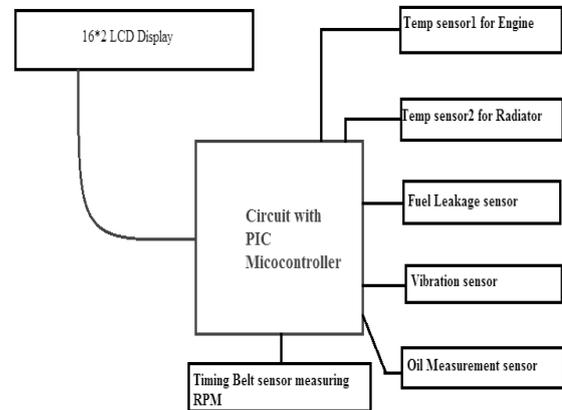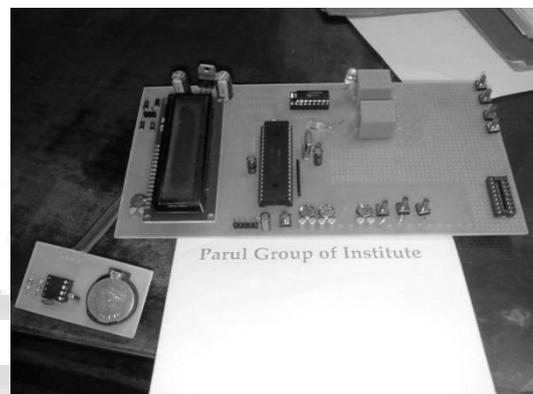

Fig. 3: Block Diagram for Interfacing

Fig. 4: Implemented Hardware

This is how I have molded LCD, microcontroller, ULN2003A, LM35, RTC, Capacitors, Switches etc on the PCB.

IV. SOFTWARE & PROGRAMMING

For this my programming is continue in C and compilation is done in KEIL Compiler. Still the Compilation of the programmer is going on.

V. CONCLUSION

With this Idea mentioned in this following paper, we are trying to detect & display the major problems occurs in a car so that no more wastage of time will be taken and can save the major casualty before it occurs. After all:

Nothing is much more precious than the HUMAN LIFE.

Because both, the time & the life are precious. Once if it passes away then it never comes again.

ACKNOWLEDGMENT

different ways. Let me try to remember a few. To those I am sure to miss out, my sincerest apologies.

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REFERENCES

[1] http://www.carbibles.com/fuel_engine_bible.html
[2] http://jaw.iinet.net.au/cars/4runner/timingbelt.html
[3] www.engineersgarage.com/picimicrocontroller/projects/adc-circuits
[4] http://en.wikipedia.org/wiki/Internalcombustion_engine
[5] http://www.engineersgarage.com/electroniccomponents/lm35-sensor-datasheet
[6] http://www.pentairthermal.com/Images/GB-TraceTekFuelLeakDetectionNAM-SB-H58474_tcm432-26467.pdf
[7] http://embedded-lab.com/blog/?p=379
[8] IC Engines by M.L.Mathur.
[9] Workshop book from Maruti Udhyog Pvt. Ltd.