

Work Hour Measurement System for Tractor

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Abstract - Design of work hour measurement system is specially developed for the tractor. In old tractor there is meter to calculate working hour period of the tractor. This is normally based on the engine working period. There is direct connection between engine and that meter, but sometimes the owner of the tractor misbehave with the connection and it is difficult to calculate the exact working period of the tractor. In this project we have try to solve the problem. We have proposed a system based on arduino kit, vibration sensor and GSM modem.

Key Words: Vibration sensor, GSM modem, arduino board.

1. INTRODUCTION :

In India so many peoples use tractors for farming purpose. To better utilisation of tractor engine servicing of engine in particular time period is more important.

Normally the warranty of tractor is in working hour of engine. The vendor will provide the service to tractor up to the warranty period. After warranty period it's not vendor responsibility to service that tractor, so it is very important to calculate the exact working period of the tractor.

In this project we approach a new system to calculate working period. In our project use vibration sensor which sense the vibration of tractor, when tractor is in working condition. Sensor will provide the small amount of voltage at the output. Using the AT mega 328 we calculate the working period and display on the LCD.

GSM is nothing but global system for mobile communication. We use GSM model for alerting the owner and vendor also. GSM send the message to owner for servicing the tractor. The duration of message is after the half working period. The vender got the message when the warranty period is expiring. So it is very helpful to vender and owner to maintain the record for the tractor.

1.1 RELATED work:

We are working on a project which calculate working period of tractor. We choose this project because it becomes headache to vendor when the owner misbehave with the meter. Calculating the working period using vibration sensor and sending the message using GSM is the advance features in this project.

1. Amplifying circuit:

Here IC 555 based astable multivibrator is used as amplifier. It directly drives a LED. At the output of vibration sensor we get voltage in mV. So that its required to amplify that voltage. At the output of amplifier circuit 3-3.5v.

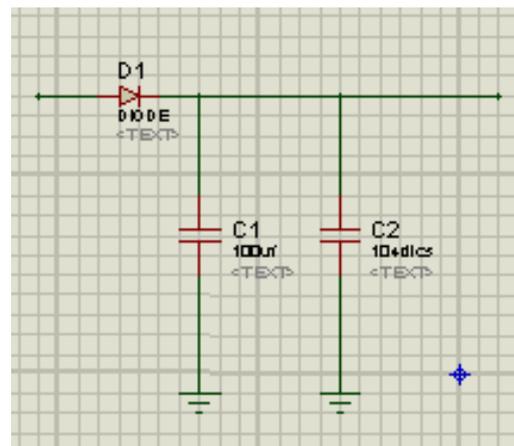


Fig-1: The circuit diagram of amplifier circuit.

2. Proposed algorithm:

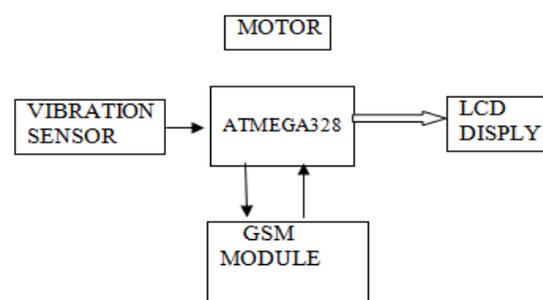


Fig-2:Block diagram of proposed system.

The overall functioning of the System is explained through the block diagram shown in figure. It represents the general order and hierarchy of various

working blocks of the project. When mechanical vibration is applied to piezo-electric plate, it will generate electric pulse. Motor will provide a mechanical vibration to the sensor. At the end of vibration sensor we get voltage in mV. Here amplify the voltage using amplifier circuit. IC AT mega 328 is used to calculate pulses generated by arduino. LCD is used to display calculated working period.

Some time vibration sensor got mechanical vibration by external event. To deal with this problem we provide extra features in programming. Pulses from arduino is greater than 100 then counting start in second. If the pulses less than 100 then it will wait for the pulses and so on.

(pulses > 100 = start counting,
Pulses < 100 = waiting for pulses).

GSM 900 module is used for communication purpose. It will send the message to vendor at the end of per day. The contain of message is working period of tractor per day. After the half warranty period it will send the message to owner for servicing purpose. When warranty period is expired it alert to owner and vendor also by sending the message.

2.1 PIEZOELECTRIC VIBRATION SENSOR:

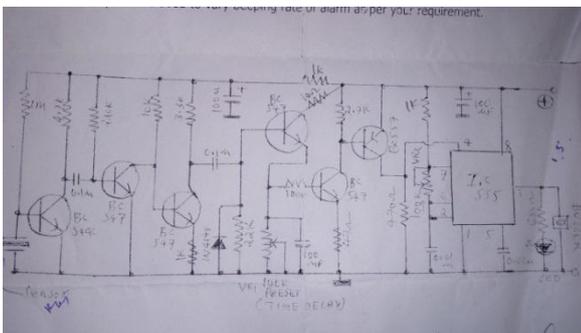


Fig-3: The circuit diagram of amplifier circuit.

At the output of vibration sensor we get the output in mv. So to amplify purpose we add the amplifier circuit. At the end we get the amplified voltage in 3 to 3.5v. The circuit above shows the output of piezoelectric vibration sensor. Wherea piezo is connected to the digital multimeter as per the polarities. As we provide the vibration to sensor the changes in pressure, acceleration and temperature it converted into electric energy, the output of piezo it comes around 3.4v. Vibration sensor is ultra thin and

lightweight. No contacts: therefore, no noise and highly reliable. Low power consumption for voltage type.

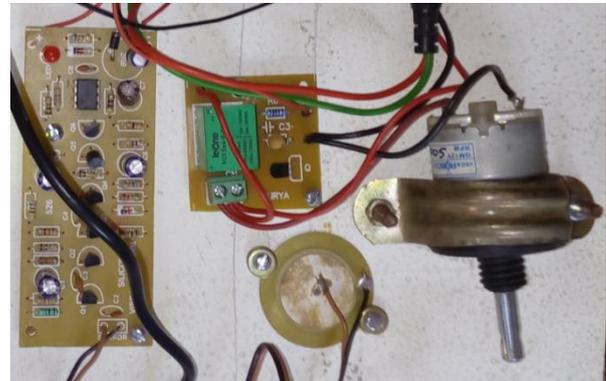


Fig-4:The circuit above shows the diagram of piezo vibration sensor o\p.

2.2 GSM SIM 900:

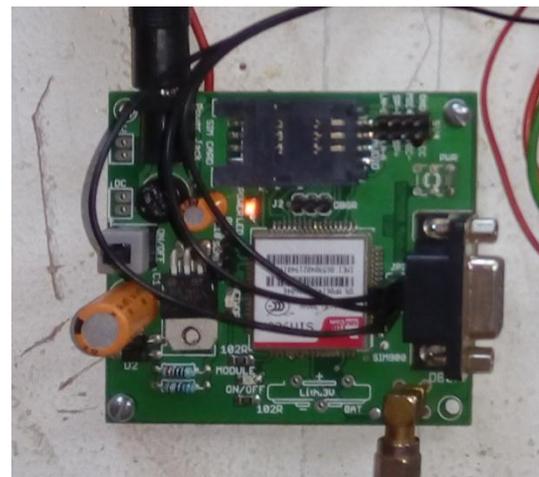


Fig-5: GSM module

GSM module is used for communication purpose. It sends the message to vendor and owner also. It helpful to maintain a record.

2.3 Arduino Uno:

We use the arduino uno microcontroller board, Which is based on ATmega 328. It has 14 digital input/output pins (of which 6 can be used as PWM output), 6 Analog inputs.

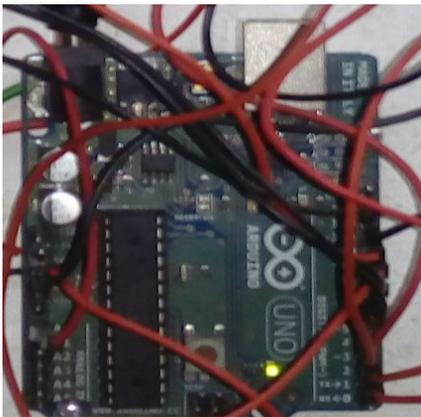


Fig-6:Arduino uno

A0 pin on arduino get the supply around 5v from vibration sensor. The presence of supply denote there is a vibration at the input of vibration sensor. When supply in between 3.5-5v arduino send the continuous pulses to microcontroller. Microcontroller ATmega 328 calculate this pulses and displayed on LCD.

2.4 Interfacing LCD to arduino:

Here we use the 16*2 LCD for displaying purpose. Below table shows the interfacing pinout between LCD and microcontroller ATmega 328.

Table -1:

PIN NO. 1(Vss)= Ground
PIN NO. 2(Vcc)=+5v
PIN NO. 3(Vee)=contrast voltage
PIN NO. 4(Rs)=arduino pin no. 12
PIN NO. 5(R/W)=Ground
PIN NO. 6(Enable)=arduino pin no. 11
PIN NO. 7 to 10(Not Used)
PIN NO. 11=Arduino pin no. 5
PIN NO. 12=Arduino pin no. 4
PIN NO. 13=Arduino pin no. 3
PIN NO. 14=Arduino pin no. 2
PIN NO. 15(LED+)=+5v
PIN NO. 16(LED-)=Ground

2.5 THEROTICAL CALCULATION :

Pulse calculation-

Pulses > 100 = counting starts

Pulses < 100 = counting waits for pulses

Counting is in:

Hours : Minutes : Seconds.

3. CONCLUSIONS:

The system we have developed which successfully calculated working period of tractor in hours, minutes and seconds. Complexity of maintaining record for each tractor is become easy. this system successfully alert the owner and vendor by sending the message using GSM system and Owner will service his tractor before the warranty period.

4. REFERENCES

1. <http://www.piezo.com/tech3faq.html>
2. <http://www.murata.com/>
3. www.atmel.com