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CONTACTLESS TACHOMETER WITH AUTO CUT OFF

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Abstract - *This paper provides us with a detailed study on how to develop a contactless base tachometer and cutting off a motor automatically using sensors. By this the current running status of a motor can be provided and based on that information one can cut the supply at higher voltages. Nowadays in industries due to failure of power regulation devices sometimes higher voltage surges occur due to which the costly devices are drastically affected , shot circuit often prevails due to which the motors have to be replaced. The solution to these issues was to monitor the speed of the motor ,this circuit can be placed to monitor the running of a motor. The circuit would keep a track of the running speed of motor and would cut off its supply if any situation where the motors would blow up is created. This system can be used anywhere from industries to homes and also from long distances by using a GSM (Global Standards for Mobile Communication) module . The system would send the current running status of motor to anyone residing in any part of world.*

Key Words: ARDUINO UNO, IR SENSOR, LM 317, PHOTODIODE, ROTATION

1.INTRODUCTION

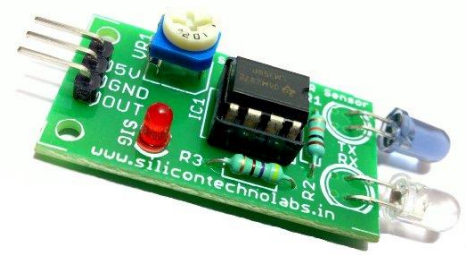
As the world is growing out to the verge to technology the circuits and component structure of devices is rapidly shooting up. Thus the risk of things getting spoilt is directly matching up the pace. There are various instruments available to keep these sophisticated components safe and one such device is the contactless tachometer. A contactless tachometer is a device which uses infrared sensor and a microcontroller like 8056 or arduino to measure up the speed of the running motor and based on a pre set value the cut off circuit present cuts off the supply of the motor when its speed starts to grow above the desired or the recommended value. The speed of the motor grows only and only when the incoming voltage grows and if the voltage gets out a particular range it can damage the motor or the circuit. This type of tachometer can also be installed before any type circuit and a motor or a fan can be used to judge the voltage based the rotational speed of the motor. Thus providing a way to safeguard different types of devices.

In this paper we discussed through various researches what development has been done in the contactless tachometer and auto cutoff System and our proposed work regarding the following paper.

2. SYSTEM ARCHITECTURE

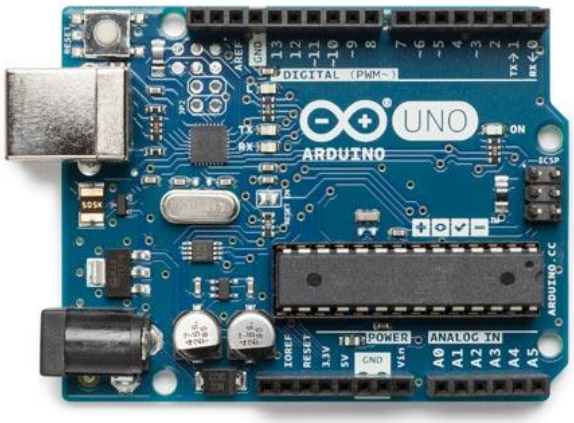
1.1 IR Sensor

It is an electronic device that is used to sense infrared radiations either by generating or detecting infrared radiations. The IR Sensors function by using a certain light sensor to detect a light wavelength in the IR spectrum. By the use of an LED, which produces light at the same wavelength as the sensor detects, we can study the intensity of the received light. At the time when the object is near the sensor, the light from the LED bounces off the object and into the light sensor. This results in increment in energy on a large scale intensity, which we can detect using a threshold.



1.2 Arduino UNO

This embedded system belongs to the family of ATMEL. It consists of a single board that is capable of performing various operations. It is a 8 bit microcontroller with 32kb of flash memory and its pin diagram shows it having 14 digital and 6 analog pins used for various purposes like interfacing. It has a clock speed of 16 MHz.

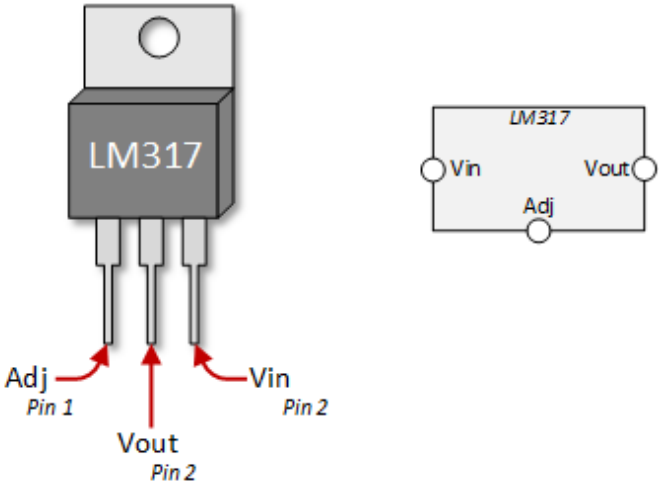


1.3 LCD 16x2

It is known as Liquid Crystal Display. The use of 16x2 characters LCD is of utmost importance. It is used to display the readings obtained of the rpm of the motor as well if the readings are less or more than required.

1.4 Voltage Regulator(IC 317)

This is a voltage regulator IC comprising of 3 terminals Input Output and adjustment and is conceptually an op amp having a high output current.

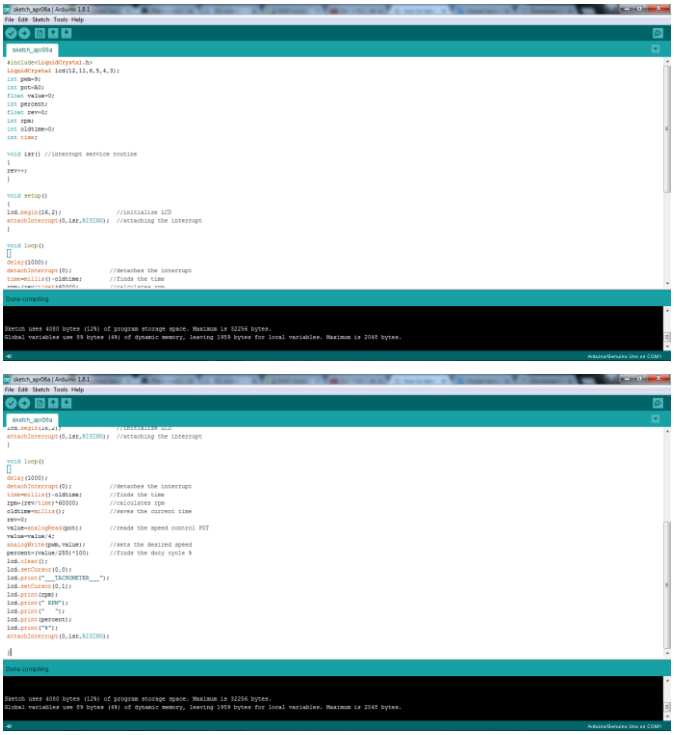


1.4 DC Motor

A DC motor can be termed as a device or a transducer as it basically converts direct current energy into mechanical eneergy. It basically follws the princliple of electromagnetism. Whenever a direct current is passed through it a magnetic field is produced due to which the motor starts to rotate.

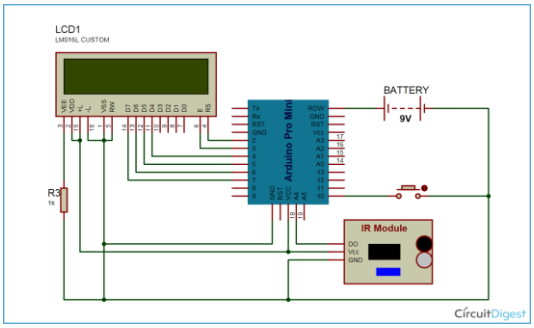
3. SOFTWARE ARCHITECTURE

The software used to program the arduino uno is arduino 1.8.1. The programming is shown in the following figure.



4. WORKING OF THE CIRCUIT

As we all know that microcontroller plays a vital role in every part of electronics industry therefore we also have used arduino uno board which is based on the ATmega 328P microcontroller. The IR sensor present consist of a LED and a photodiode . A motor will rotate in front of the sensor, the light emitted from the LED will get reflected form the wheel and would fall on the photo diode thus the infrared sensor would give out a pulse as a input to the arduino uno. The arduino uno is programmed to take 3 consecutive readings and take out their average . This average of three reading will be displayed to the 16X2 LCD screen. Also the arduino board will be set up to particular value for the speed of the motor , when the motor speed or the revolutions count would succeed the specified value a cut off circuit placed will come into function which is voltage regulator IC (LM371). Thus cutting up the power supply of the motor.



5. RESULT

We have checked the circuit up to the primary level and it is successfully capable to determining the speed of the motor. Whenever any rotating motor is detected within the range of the circuit, the input starts to flow to the arduino board and thus resulting in its speed detection.

Complete circuit is verified and tested.

6. CONCLUSIONS

This paper describes the working of a contactless tachometer with auto cutoff circuit. Whenever any rotating motor or a fan is brought in front and in range of the infrared sensor then it counts the no of rotations or the speed of the motor and if the speed goes over a limit previously set then it cuts off the supply of the motor. This project can be effectively be used in any field ranging from industries to medical.

7. FUTURE SCOPE

The future scope of this project can prove to be a revolution in medical field . The circuit can be made small and can be attached to the human body which would result in detecting of cancer cells. This possibility will rule out the din of cancer from human race as cancer could be easily detected at an early stage.

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