CONSTRUCTION AND DESIGN OF WIRELESS TACHOMETER

A Project and Thesis submitted in partial fulfillment of the Requirements for the Award of Degree of Bachelor of Science in Electrical and Electronic Engineering

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November 2018

TO

OUR BELOVED PARENTS

&

HONOURABLE SUPERVISER

Dr. Md. Rezwanul Ahsan

CERTIFICATION

This are to certify that this project and thesis entitled “Construction and design of wireless tachometer system” is done by the consequent students under my forthright convoy and this work has been paddled out by them in the Electrical and Electronic Engineering Department under the Engineering Faculty of Daffodil International University in a partial completeness which is vital for the degree of Bachelor of Science in Electrical and Electronic Engineering. This work had been presented on July 2018.

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LIST OF ABBREVIATIONS

PCB	Printed circuit board
LED	Light emitting diode
LCD	Liquid crystal display
LDR	Light-Dependent Resistor
VCC	Voltage Common Collector
AC	Alternating Current
DC	Direct Current

ACKNOWLEDGEMENT

Firstly we would like to thank the almighty Allah from the core of our hearts. We express our gratitude to our honorable supervisor Assistant Professor Dr. Md. Rezwanul Ahsan, Department of Electrical and Electronic Engineering, DIU for inspiring us with his kind co-operation, sincere guidance and continuous encouragement during the project work. His generosity with his time, knowledge and ideas has helped us to complete this research with freedom. We are also thankful to Professor Dr. Md. Shamsul Alam Head, and all the teachers of Department of Electrical and Electronic Engineering for their help, support and constant encouragement throughout the project work. We are thankful to the authors of the valuable research papers and books which we have used as reference to this project. Apart from that we are also thankful to our friends who shared knowledge, information and helped us by lending some tools and equipment to make this project successful. Finally we would like to thank our parents who have given us tremendous inspirations and supports. Without their metal and financial supports, we would not be able to complete our project.

Summary

For measuring the rotation celerity of a shaft or disc in a motor based device using a technique can be done by a microcontroller predicated tachometer. The technique what is used referred to a processes which is embedded. To identify the rotation of the fan whose haste is being measured, here we have to use which is made of a components which plays the major roll named microcontroller, secondly an alpha-numeric LCD display and an IR sensor. From the fan an infrared system will generate the pulses that means the number of rotation. After that it will be forwarded to a device which is microcontroller and the device will count the pulses very precisely. The reading of the counted pulses are now shown on the LCD display in RPM that is revolution per minute. This digital tachometer is benefitted us because of its cost efficiency. The quickness of a rotating object can be exhibit on the LCD screen. Behind the haste identification technology it accept utilize of IR sensor receiver and transmitter. In sundry solicitations it can also be utilized. The appropriateness of this device goes beyond the limit. At automotive sector, there are thousands of rotations in a minute can be occur which can easily identify by this device very appropriately.

CHAPTER 1

INTRODUCTION

1.1 introduction:

At numerous aspects of commercial and industrial performance, it is routinely compulsory to determine the cyclic speed of different appliances. Such type of determination may be completed in many ways. Generally it is recline on the behavior of the object's mechanism. Tachometer is one of those methods by which anyone can easily measure the number of rotation. A device which can measure the cyclic speed of a shaft or else disc is known as a tachometer. The word tachometer is obtained from two Greek words tacos ("speed") & matron ("measure"). When it operates it follows similar principle of a tachometer beget and it is too verbalize, when without connecting a motor to a resistance or load the time of operating the motor. By a tachometer generator measuring the voltage which is engendered, whatever it is mechanically affixed to it anyone can facilely determine the cyclic speed. A tachometer's operation can be electromagnetic, electrical or optical predicated. Thus revolution-counter is another identity of a tachometer and surprisingly the unit is also as same which is revolution per minute in short RPM.

1.2 Problem Statement:

To design a tachometer device that measures the speed (rpm) of a DC motor. Sensor module: This module will contain sensors that will detect the speed of the motor. Display module: This module will receive data from the sensors and calculate the speed. The speed will be displayed on any displaying unit like LCD.

1.3 Objective:

The main objective of solar base ups system to get more power and how we serve power to our rural are to save energy in this projects we show how to get energy from sun and how to calculate data to our load and battery .The main objects is save power and generated voltage and current .we use ac to dc converter to get dc power to ac power .so we describe our thesis book to how to convert dc to ac power.

1.4 Objective of the project:

Generally, directly emitting the infra-red beam the object sensor using infrared reflection is being performed its work and when the white object surface is encountered by the beam then it will be returned to the phototransistor via reflection. After that the 2N3904 transistor and the phototransistor will begin to lead and across the 470 Ohm resistor it will generate enough voltage to be deliberated by the microcontroller named ATMEGA8a. It is built in a module named Capture Compare Pulse width modulation in short CCP module, as the logical “1” at the input port. When the ebony tire surface is encountered by the infra-red beam, at that time transistor 2N3904 and both of the phototransistor will immediately turn off. Across the resistor 470 Ohm the voltage will drop down to 3.5 volt at logical “0”.

1.5 Scopes:

The main assignment of a tachometer is to measure the number of rotation. It is known as contact-type tachometer when it is in direct contact with the shaft which is being rotating. The above mentioned tachometer is being attached to the electric motor or else other rotating machineries. A magnetic sensor or optical encoder can additionally be connected to the tachometer which will helps to count the RPM of any machineries.

1.6 Methodology:

A digital tachometer could be designed through a several ways, as the main control unit of the scheme here we choose this method. A microcontroller is used for this section. As the detection mechanism of the rotation of any shaft the infrared transmission mechanism is being applied here. For exhibition of any result an alphanumeric LCD screen is being used and for detection of the rotation of the shaft a proximity sensor is used. In this circumstances from the proximity sensor the counted pulses will originate, at that time if any element which is reflected is going in front of it immediately detected. In this way for each and every rotation of the shaft of any machine it will send an output pulse. The microcontroller will be accepted those pulses and start to counted. At the end of the process he result of the rotation will displayed in the alphanumeric LCD screen.

1.7 Organization of the Report:

This project report has six chapters in total. The first chapter describes an idea about our project construction and design of wireless tachometer system, Brief description of the project, problem statement, scopes and methodology. The second chapter about history, block diagram, circuit diagram, list of components. The chapter third about component description, cost analysis of our system. The chapter fourth software analysis & program explanation. The chapter five hardware implementation. Then chapter six describes result & discussion properly. Finally, chapter seven gives the concluding remarks, limitation of our system and suggestion for the future works.

CHAPTER 2

SYSTEM REVIEWS

2.1 Introduction:

The maiden mechanical tachometer was relative in operation to an eccentric governor. German engineer Dietrich Bullhorn is the inventor of first mechanical tachometer; in 1817 he utilized it for measuring the velocity of machines. Early tachometer scheme were predicated on the theory of constable multi vibrator, which hold a quasar static state and a static state. It has been employed to quantify the speed of trucks, locomotives in automobiles, aircrafts, and tractors. The circuit is kept in a static state, which generating no o/p. No matter how, from the ignition system when it receives triggering current pulse, the circuit transitions to the quasar static state for a definite period of time since regressive back to the static state. An unsullied pulse of fine-tuned duration is generated by each ignition pulse which was victualed towards the gauge scheme.

2.2 General Block Diagram:

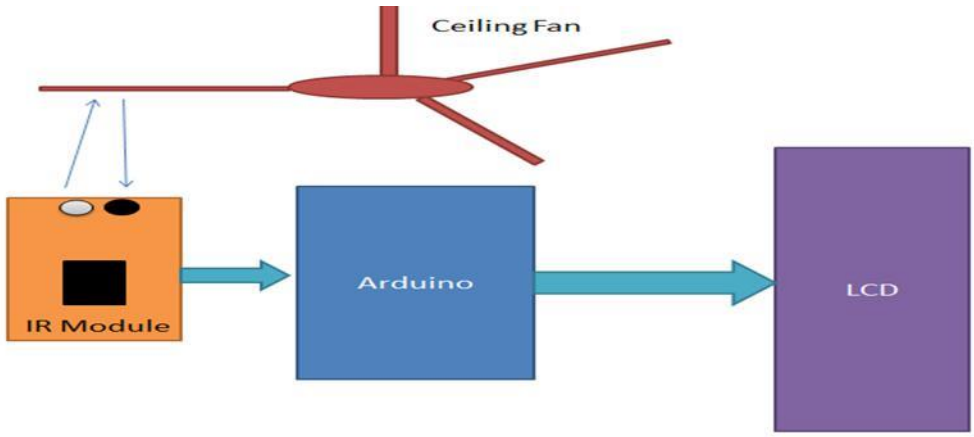


Fig 2.1: General Block Diagram

2.2.1 Description of Block Diagram:

From the above tachometer circuit we can see that, it comprises ATMEGA8a Pro Mini, a buzzer, a LCD screen and IR sensor module. ATMEGA8a controls the whole procedure. The procedure is almost as like as generating pulse by IR sensor module. This is consequent to remonstrate detection, performing calculation of RPM of the shaft and at last sending the result that is RPM value to the alphanumeric LCD screen. For sensing the object IR sensor is used. By an inbuilt potentiometer situated on IR

module, the sensitivity of this module can easily be set. IR sensor module comprises with detector infrared rays called photo diode and an IR transmitter. Infrared rays are transmitted by IR transmitter, when this rays decline on any surface, they reflect back to the receiver and experienced by photo diode. To a comparator the output of photo diode is connected, which assimilate photo diode output with reference voltage given before and outcome is given as o/p to ATMEGA8a. At pin 18 the o/p pin of the IR sensor is directly linked. GND and Vcc are linked to GND and Vcc respectively of ATMEGA8a. With ATMEGA8a in 4-bit mode a 16x2 LCD is connected. At pin 2 control pin RS, RW, GND are linked to ATMEGA8a. At pins 4, 5, 6 and 7 the data pin D4-D7 are linked to ATMEGA8a. In this project a push button is additionally integrated. If we want to count the RPM we need to press the push button to start counting. It take 5 seconds for counting. At pin number 10 of ATMEGA8a this push button is connected with veneration to ground.

2.3 Circuit Diagram:

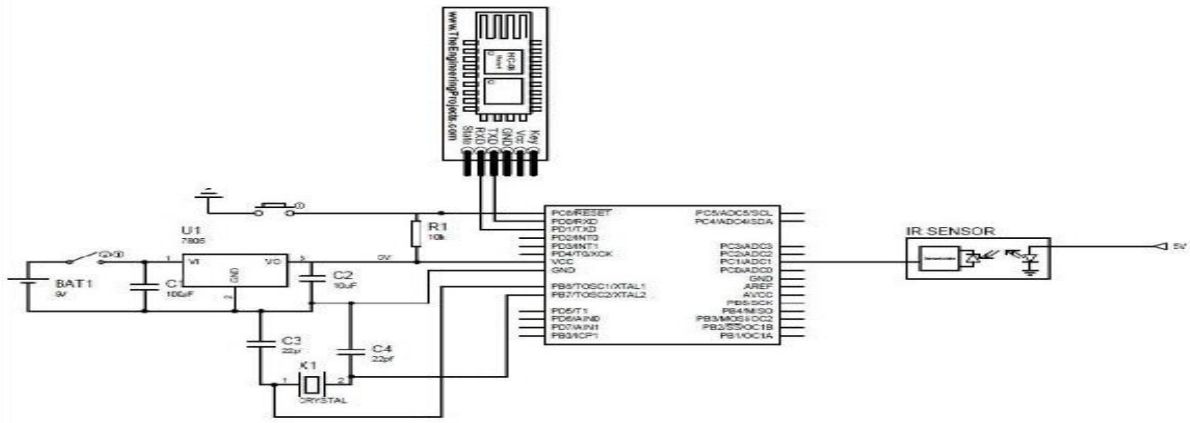


Fig 2.2: Transmit Circuit Diagram

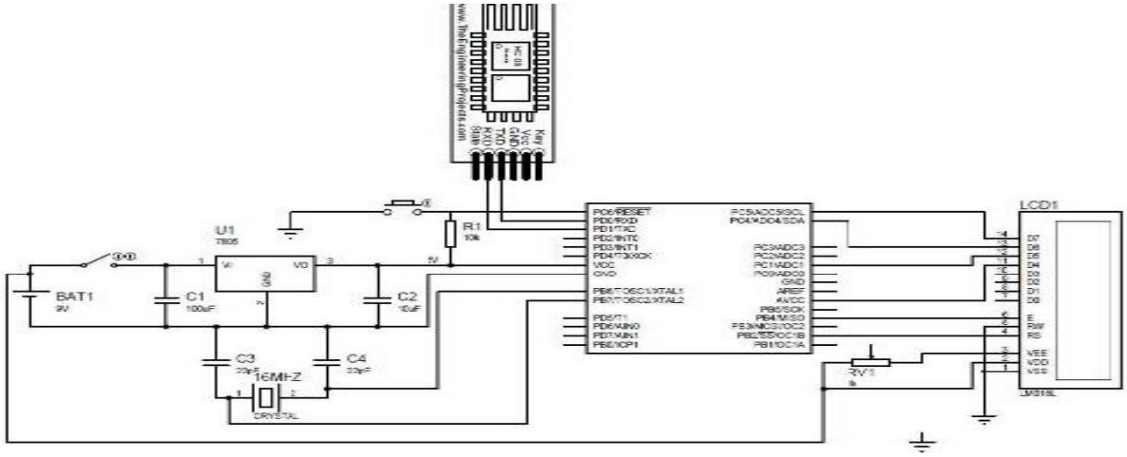


Fig 2.3: Receive Circuit Diagram

2.3.1 Working Process:

An IR LED and IR photo transistor makes the sensor. IR photo transistor responds to only Infrared waves. The other light interferences which generates from the atmosphere evades by the IR phototransistor. IR diode and photo transistor both are adjacently aligned. Through the IR diode the resistor R2 limits the current. On the rotating object a reflective divest is glued which is may be a disc or fan with an IR sensor. A 9V/100mA cooling fan is utilized here by us. The clearance is less than 1 centimeter between the reflective divest and the sensor. At the time of passing of the reflective divest the photo transistor receives the reflected wave which comes from the IR sensor as an IR waves. At that time the photo transistor waits for the reflected IR waves. The conduction of photo transistor is more than before at that time and the voltage across 68K resistor boosts up at that time. The figure which is seen in below is the waveform which we get from the above process result. In a given interval of time the RPM of a shaft can be measured perfectly by counting the upper shoots.

2.3.2 Counting of the revolution per minute:

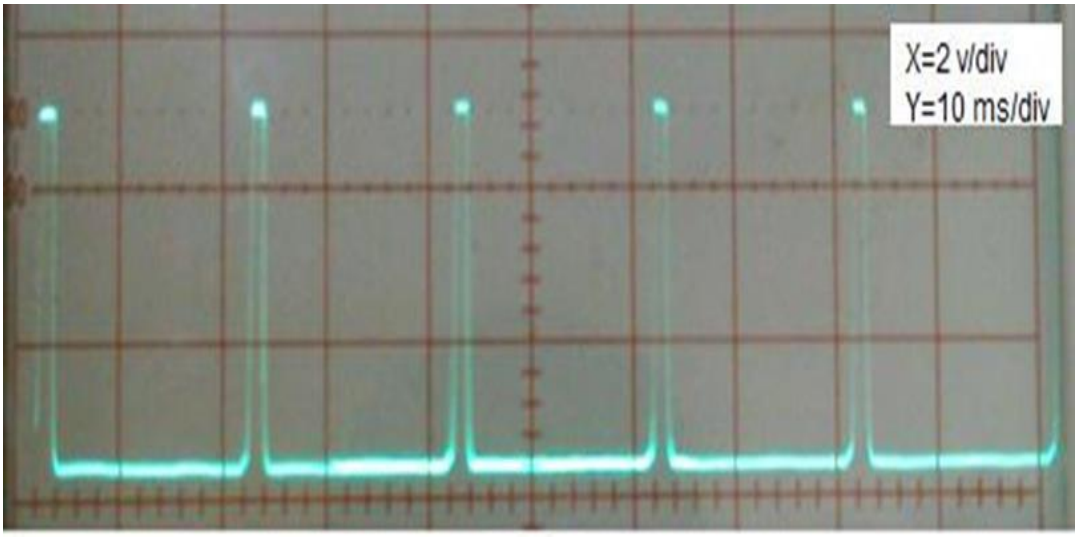


Figure 2.3: Counting RPM

ATMEGA8a is utilized for measuring the RPM and after that showing it on the LCD screen. At digital pin 2 of the ATMEGA8a an emitter of the photo transistor is being attached. An edge triggered which is elevating the ATMEGA8a interrupt is being

configured to it. In the waveform of the emitter shown above there will be an interruption at every upper shoots. The number of interrupts occurred in a given time which is measured by incrementing a variant utilizing the interrupt accommodation routine. The Millis () functions is utilizing to resolute the time which is surpassed at the time of counting cycle.

Since the ATMEGA8a board is switched ON the Millis () function returns the no. of milliseconds passed. During the counting cycle calling the millis () function before and after the counting cycle. The time which is being passed is taking there dissimilation. The RPM of the shaft is 60000.

2.3.3 Regulating the speed of motor:

A potentiometer is comprised in the circuit while utilizing for a dispensation for regulating the motor haste. For driving the motor transistor Q1 is utilized. At PWM pin 9 its base is attached to the ATMEGA8a care of the current enclosing R1resistor. At analog pin A0 of the ATMEGA8a the wiper of the haste control R4 POT is attached. Utilizing the analog reading function the voltage at this pin is transformed into a value between 1023 & 0.

The value is being separated by 4 to competent it into the 0 to 256 limit. Utilizing the analog composed function the value is composed to the PWM pin 9 after that. Utilizing the analog composed function a square wave will be the result. Afreewheeling D1 is the diode and is named to a noise by-pass capacitor. The result in revolution per minute and obligation cycle is exhibited on the LCD. The program which is used to run digital tachometer utilizing ATMEGA8a are attached with the bottom of the book. At digital pin 2 the photo transistor's Emitter is attached with the ATMEGA8a. Therefore in the waveform of the emitter for every upper shoot there will be an interrupt.

2.4 List of Components used in Circuit:

Table 2.1: List of components used in circuit

No	Component Name	Quantity	Used
01	Microcontroller ATMEGA8a	02	Used as a power generating method from sunlight.
02	Push Button	02	Used to save energy.
03	Crystal Oscillator 16 MHz	02	Current to flow in the opposite direction through the panels
04	Crystal Capacitor 22pf	04	To regulate voltage
05	Varo Board	02	Circuit Board
06	IR Sensor	01	To Controlled AC Power Load
07	Battery (9V)	02	To detect temperature
08	Battery connector	02	To Connection
09	Voltage regulator 7805	02	To Controlled amounts of resistance in to electrical circuits
10	Electro light capacitor 100uf	01	Current to flow in the opposite direction through the panels
11	Electro light capacitor 10uf	02	To hold voltage
12	Resistor 10k	02	To controlled amounts of resistance in to electrical circuits
13	LCD display	01	To displayed
14	Blue-tooth module HC-05	02	To communication
15	Switch	02	To switching
16	Potentiometer	01	To regulated voltage

CHAPTER 3
HARDWARE AND
COMPONENT DESCRIPTION

3.1 Introduction:

IR sensor is acting as it is divided its duty into two section. The IR beam is reflected by a white object which is return to the photo transistor. After this a phototransistor and a 2N3904 transistor is perform their duty. They are composed by the Darlington dyad. It will generate enough voltage through the resistor of 470 ohm. Here the logic will be 1.the ebony surface then encountered by the IR beam. After this action both of the phototransistor and 2N3904 transistor will remain turning off. At the same time the voltage through the resistor 470 Ohm will drop down to 3.5 volt which indicates logical “0”.

3.2 Microcontroller ATMEGA8a:

The microcontroller which shows high-performance and low-power consumption is used here. The Microchip is of 8-bit. It is characterized by 512B EEPROM, 1KB SRAM, 23 general purport I/O lines. This has working register of 32 in number. With compare modes there are 3 flexible timers. It interrupts internally and externally. The serial programmable USART. This is also serial interface which a byte oriented two-wire. A 10-bit Analog to Digital converter which has 6-channel. The contrivance operates between 2.7-5.5 volts.By executing potent injuctive authorizations in a single clock cycle, the contrivance gets throughputs moving 1 MIPS per MHz, which balancing consumption of power.

3.3 Push Button:

Incomplete switches are known as push buttons. Several buttons still need to use spring to return to their un-pushed state. Expression for the pushing of a button is pressing, depressing, mashing and punching. The material which are hard conventionally plastic or metal are used to make Buttons. The outward are customarily shaped or flat too lodge the finger of a human, so as to be facilely down casted.

Using:

The "push-button" has been used in push-button telephones, calculators, kitchen gadgets, and sundry other mechanical and electronic schemes. Push buttons can be attached together by a mechanical linkage in manufacturing and commercial applications so that the act of pushing one button sources the other button too be relinquished. In this way, a termination button can "force" a commencement button too be renounced. This method of linkage are employed in simple manual operations in which the machine or process has no electrical circuits for command. In case of facilitate a machine which need to be halting and facile the performance we use red pushbuttons. It can also have extremely colossal heads. Emergency stop buttons are being named after them.

Fig 3.2: Push Button.

3.4 Crystal Oscillator 16 MHz:

A crystal oscillator are an electronic oscillator circuit which dump to utilization the involuntary echo of a trembling crystal of piezoelectric material to provoke an electrical signal with an unequivocal frequency. This frequencies are recurrently preowned to continuation route of time, as in quartz wristwatches, too outfit a unfaltering clock signal for digital integrated circuits, and too moored frequencies for radio transmitters and donees. The maximal ubiquitous type of piezoelectric resonator worned are quartz crystal, so oscillator circuits enthralling them set off kenned as crystal oscillators, but added piezoelectric solidity incorporate polycrystalline ceramics are deployed in kindred circuits. A crystal oscillator, concretely one soothe of quartz crystal, exertion being twisted by an electric field when voltage fruitful too an electrode near or on the crystal.

This possessions are kenned as electrostriction or contrary piezoelectricity. When the field are bemused, quartz - which oscillates in a unambiguous frequency – engenders an electric field as it returns too its embodiment physique, and this can engender a voltage. The result are that a quartz crystal deeds like RLC circuit. Quartz crystals are fabricated for frequencies from a few tens of kilohertz too hundreds of megahertz. More than two billion crystals are fabricated annually [citation needed]. Most are used for patroner contrivances such as wristwatches, clocks, radios, computers, and cellphones. Quartz crystals are furthermore found inside test and quantification equipment, such as counters, signal engenderers, and oscilloscopes.

Fig 3.3: Crystal Oscillator 16 MHz.

3.5 22pf Ceramic Capacitor:

The dielectric characteristics is carried out by the ceramic materials in a ceramic capacitor. The value of these capacitors are also fixed in amount. These capacitors consist of two types of layers. One is metal layer and another one is ceramic layer. Both are acted as the electrodes of the capacitors. They are classified into 2 application classes:

- Using compositions of par electric substances based on “Titanium Dioxide” results in very static & lineal conduct of the capacitance value within a predetermined temperature limit and less losses at large frequencies. But these compositions have a comparatively lower permittivity in order that the capacitance values of these capacitors are comparatively very small.
- Higher capacitance values for ceramic capacitors can be performed by utilizing compositions of ferroelectric materials like “Barium Titan” ate together with individual oxides. Higher permittivity’s are found in these dielectric materials, but at the same time their capacitance value is more or less nonlinear over the temperature limit and losses at high frequencies are also much higher.

These various electrical characteristics of the ceramic capacitors needs to group them into "application classes". The definition of the “Application Classes” appear from the standardization. As of the year 2013, two groups of standards were in use, one comes from “International Electro technical Commission (IEC)” and another one arrives from the now-defunct “Electronic Industries Alliance (EIA)”.Ceramic capacitors, particularly MLCCs (multilayer ceramic capacitors), are the most created and used capacitors in electronic materials. The various ceramic materials which are used for ceramic capacitors, par electric or ferroelectric ceramics, impacts the characteristics of the capacitors of the electrical behavior.

Fig 3.4: Ceramic Capacitor 22pf.

3.6 Varo Board:

In electrical circuit design Varo board is one of the most familiar component. In early 1960s this Varo board is introduced and updated later. IT is a circuit board material which is made of copper strips. The copper is embedded on a board which is insulating bonded.

The Dept. of Electronics of VPE takes the challenge to update it. At the early days the maiden Vero board manufacture of different wiring board which is actually a prototype. The gentile position of 'strip board' and 'Vero board' are now assumed to be as a synonymous. A machine tool dept. known as VPE take the decision to make newly propose this type of Varo board. This boards are generally in the size of 122 mm x 456 mm. For a 2nd action an individual tool which is consists with 63 hardened punch along with number of bits is 1.35 mm in diameter. It is mounted on the base block which was built to repeat-punch a matrix of holes.

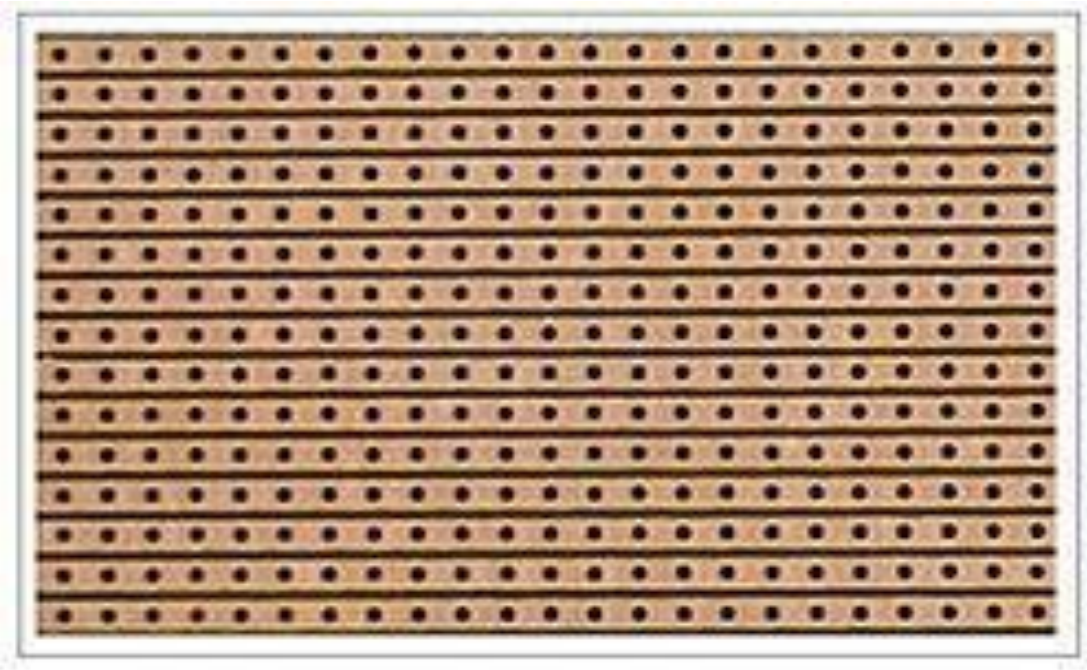


Fig 3.5: Vero Board.

3.7 IR Sensor:

Infrared Impediment Sensor Module has send out IR energy through a built-in IR transmitter which transmit the IR energy. Another component is IR receiver which receives IR energy. If any obstacles appeared in front of the sensor it can be find out by a probes which utilize IR energy to detect. The detection limit can be change according to ones wish by a potentiometer. Even on the day light this sensor has very precise performance.

- Specification in manner
- Operating Voltage during operation: 3.1Volt – 5.1Volt
- Detection limit: 3cm – 40cm (using potentiometer it can be adjustable)
- Rating of consumption of Curren: at 3.33V : ~25 mA

3.7.1 Working Principle of IR Obstacle Sensor:

IR sensor is built in two components. IR LED is one of them and another one is IR Photodiode. They are also called in the name of photo coupler. As verbally expressed afore, transmitter and receiver are the main components which built the IR obstacle sensor. The definition of IR Transmitter is a LED that can emits radiations which is infrared in nature. The human cannot observe IR radiation which is emitted in open eyes. When the transmitter transmits an IR energy or infra-red radiation the IR receiver receives the signal. The receivers are consists in the form of a transistor which is known as phototransistors and light emitting diode known as photo-diodes. IR Photo-diode are performed their work by emitting infra-red radiation to the receiver. IR receiver receives the reflected signal from a obstacle which is emitted by a transmitter.

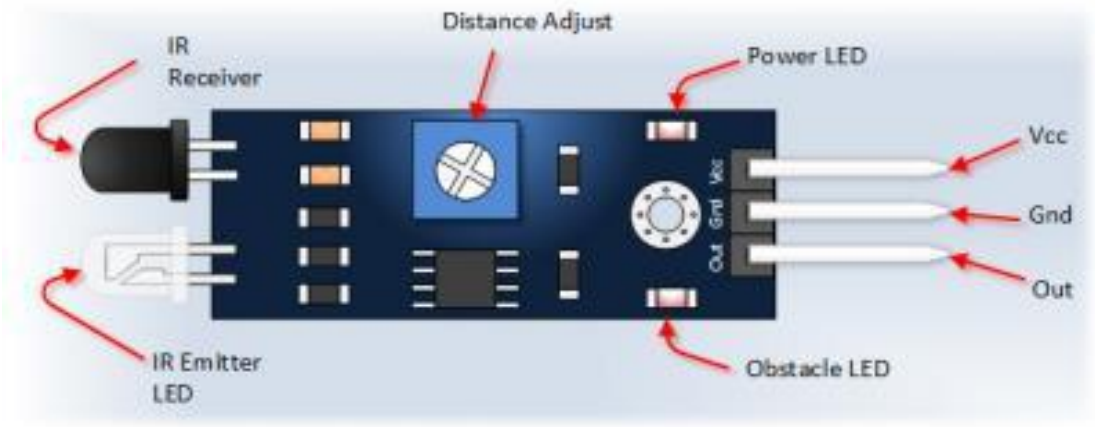


Fig 3.6: IR Sensor.

3.8 Battery (9V):

The 9volt battery, which is a usual size & shape of battery which was inaugurated of the primary transistor made radios. This has polarized snap connector at the head and a rectangular prism shape with perfect edges. This is commonly utilized in clocks, walkie-talkies and a smart device named smoke detectors which detects smoke. This 9-volt battery has a format which is generally obtainable in fundamental alkaline and carbon-zinc chemistry. Also in fundamental lithium iron disulfide. This format which is Mercury-oxide batteries in many years have not been made because of the content named mercury.

Title for this type the formation comprise MN1604 6LR61 or for zinc-carbon NEDA 1604. Most of the 9-volt batteries of alkaline is being manufactured of 6 different 1.5volt LR62 cells covered in a suitable wrapper. This cells are marginally minute than LR9D325 BBBB cells & also can be utilized in their places for several contrivances, although these are 3.5 mm smaller. With six flat cells in a stack Carbon-zinc types are constructed, covered in a moisture-resistant wrapper to avert drying.

Fig 3.7: Battery (9V).

3.9 Voltage regulator 7805:

Voltage provenances cannot able to give fine-tuned output cause the fluctuations in circuits. For acquiring incessant, anchored output, the voltage governor enacted. The integrated circuits which harnessed for dictate of voltage are termed as voltage regulator ICs. Here, we discuss about IC 7805.The voltage regulator IC 7805 are authentically a member of 78xx spate of voltage regulator ICs. It's a fine-tuned linear voltage regulator. XX present in 78xx represents the value of the fine-tuned output voltage that the discrete IC bestows. For 7805 IC, it are +5V DC regulated competence stockpile. This regulator IC likewise integrates a provision for a heat sink. Input voltage of this voltage regulator can up too 35V, and this IC can slack a steadfast 5V for any avail input identically tantamount to 35V which are the threshold restraint.

3.9.1 Working:

The AC energy cache from mains first gets permuted into and lossed DC and then into a unabating regulated DC with the avail circuit.Circuits are unruffled of transformer, bridge rectifier wrought up from diodes, linear voltage regulator 7805 and capacitors. If you discern, working of circuit can be forked into two modules. In first portion, the AC Mains are transmuted into unregulated DC and in the second phase, unregulated DC transmute into supervised 5V DC. Let us commence hash out working with this in mind. Ab initio, a 230V too 12V Step down transformer grasped and its foremost is clamped too mains repository. The secondary of the transformer are affixed too Bridge rectifier (either a dedicated IC or a cumulation of 4 1N4007 Diodes can be used). A 1A fuse sticked betwixt the transformer and the bridge rectifier. This will circumscribe current drawn by circuit too 1A. The amend DC from the bridge rectifier are polished out with avail of 1000µF Capacitor. So, the yield across the 1000µF Capacitor are loosed 12V DC. This are prearranged as stimulation too the 7805 Voltage Regulator IC. 7805 IC then proselytes this too a regulated 5V DC and yield can be attained at its output borders.

3.10 Electrolytic capacitor 100 of 10uf:

The positive plate of an electrolytic capacitor is made of a specified metallic object. This capacitor is polarized. Through iodization this capacitor makes an oxide layer which is insulated. The capacitor ha a dielectric behavior which is acted by the oxide layer. The whole surface of this oxide layer is covered by an electrolyte. This electrolyte is known as the cathode. This electrolytic capacitor has a higher capacitive voltage compared to ceramic capacitor. It is happened because of their enlarged surface area in anode and dielectric oxidative layer. Electrolytic capacitor has 3 types:

- Aluminum Electrolytic Capacitors,
- Niobium Electrolytic Capacitors and
- Tantalum Electrolytic Capacitors.

Low frequency signals are smoothly going through these types of capacitors. These are broadly utilized for decoupling or noise filtering in power supplies. The DC link circuits for variable-frequency drives are also used these type of capacitors. It acts as a storage of energy at a light and different stages of amplifier the signals are coupling by the capacitor. Asymmetrical construction makes these capacitors components behavior as polarized. The terminal of anode and cathode are marked as a plus and minus sign.

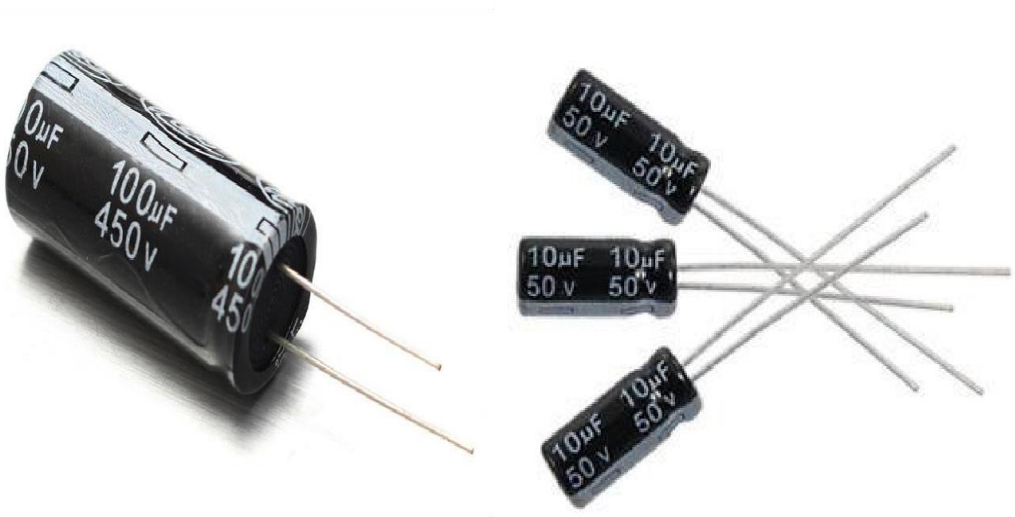


Fig 3.9: Electro light capacitor 100uf& 10uf.

3.11 10k Resistor:

In a circuit there are several elements. Among them resistor is a two terminal electrical component which main objective is to resist the current through it. It works in several ways like it reduce flow of current, signal levels adjustment, voltage division etc. transmission line can also be terminated by using a high power resistor. As well as it also take parts in power distribution or generators test issue like those high power resistors which can able to dissipate heat. There are another types of resistor which is known as variable resistor. They are used to adjust the circuit elements.

Within integrated circuits resistors are withal implemented. Resistor has an electrical function which is designated by its resistance. Within the manufacturing tolerance the nominal value of the resistance falls. The color code helps to find the value of a resistors.

Fig 3.10: Resistor 10k.

3.11.1 Resistor color code:

Early 1920s is the time when the electronic color code was being started to developed by the Radio Manufacturers Association (RMA). After this another association named the Radio Electronics Television Manufacturers Association (RETMA) started to develop the color code. Electronic Industries Coalition (EIA) started developing in 1953. BS 1852 (1974), IS 8186 (1976) and DIN 40825 (1973) is some national standards. The code was adopted by them.

IEC 60062:2016 is the recent international standard for resistor which define codes as marking. This standards define a letter and digit code in integration to the color code respectively for resistors and capacitors. Because of frugally and facilely color bands were utilized. Color blind people are the only drawbacks of color coding system or scheme. Another problem of color coding is overheating. This problem can change the actual color into different due to heat. In these tiny object the advanced modern printing technology can print the number. Instead of a color code, the values of the resistor is marked with printed alphanumeric codes in the surface.

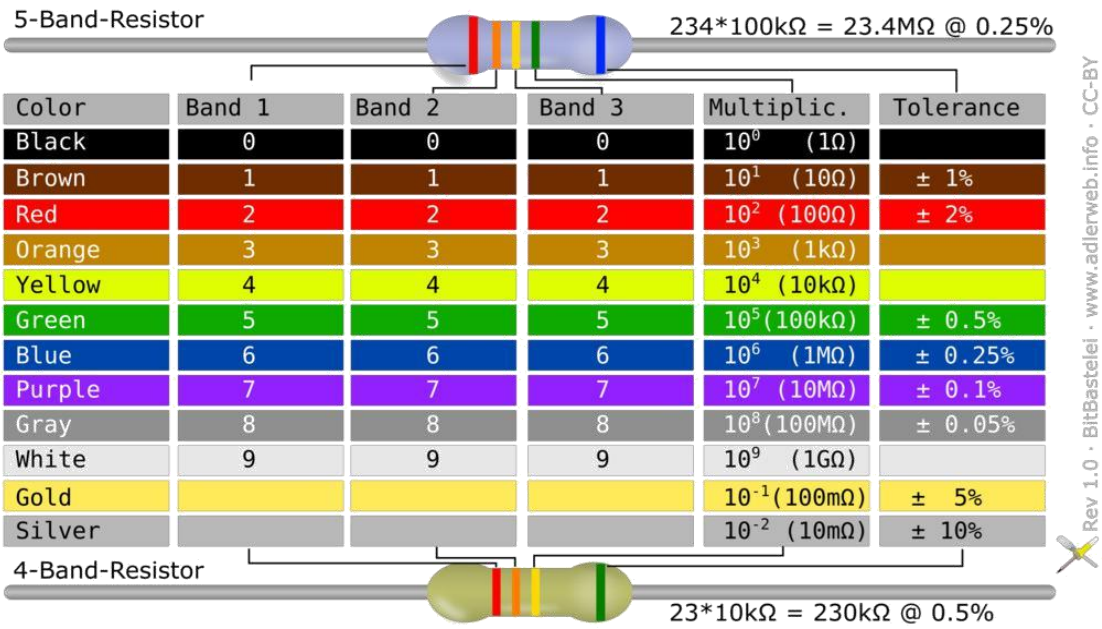


Fig 3.11: Resistor color code.

3.12 LCD Display:

A liquid-crystal exhibit (LCD) are a flat-panel exhibit or other electronically modulated optical contrivance that utilizes the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead utilizing a backlight or reflector too engender images in color or monochrome. LCDs are available too exhibit arbitrary images (as in a general-purport computer exhibit) or fine-tuned images with low information content, which can be exhibited or obnubilated, such as preset words, digits, and seven-segment exhibits, as in a digital clock. They utilize the same rudimental technology, except that arbitrary images are composed of an astronomically immense number of minuscule pixels, while other exhibits have more astronomically immense elements. LCDs are utilized in a wide range of applications including LCD televisions, computer monitors, instrument panels, aircraft cockpit exhibits, and indoor and alfresco signage.

Fig 3.12: LCD Display.

3.13 Blue-tooth module HC-05:

HC-05 module are a facile too utilize Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be utilized in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module are plenarily qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with consummate 2.4GHz radio transceiver and baseband. It utilizes CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).The Bluetooth module HC-05 are a MASTER/SLAVE module. By default the factory setting are SLAVE.

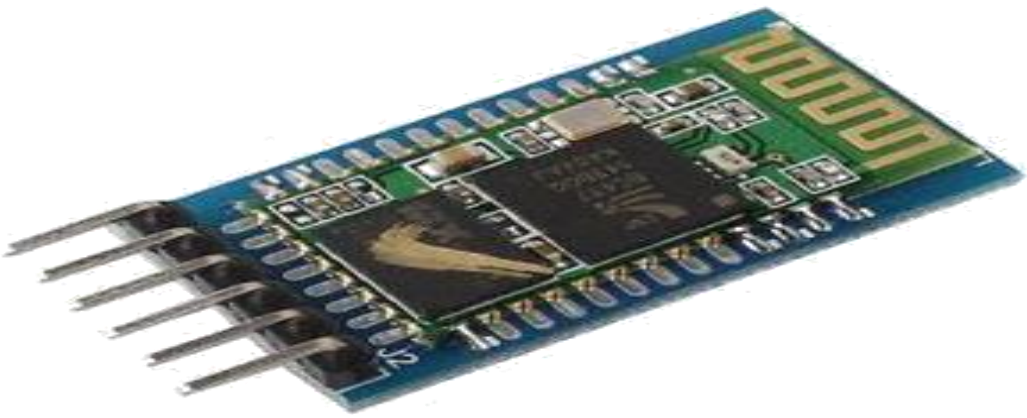


Fig 3.13: Bluetooth module HC-05.

3.14 Switch:

In electrical engineering, a switch are an electrical component that can "make" or "break" an electrical circuit, interrupting the current or diverting it from one conductor too another. The mechanism of a switch abstracts or recuperates the conducting path in a circuit when it are operated. It may be operated manually, for example, a light switch or a keyboard button, may be operated by a moving object such as a door, or may be operated by some sensing element for pressure, temperature or flow. A switch will have one or more sets of contacts, which may operate simultaneously, sequentially, or alternately. Switches in high-powered circuits must operate rapidly to avert destructive arcing, and may include special features too avail in rapidly interrupting a cumbersomely hefty current.

Fig 3.14: Switch.

3.15 Potentiometer 10k:

A potentiometer are a three-terminal resistor with a sliding or rotating contact that compose an adjustable voltage divider. If only two terminals are utilized, one end and the wiper, it acts as a variable resistor or rheostat. Quantifying the instrument called a potentiometer are essentially a voltage divider utilized for quantifying electric potential (voltage); the components are an implementation of the same principle, hence its designation. Potentiometers are commonly used electrical control too, contrivances such as volume controls on audio equipment. Potentiometers operated by a mechanism can be utilized as position transducers, for example, on a joystick. Potentiometers are infrequently utilized too, directly control paramount power (more than a watt), since the potency dissipated in the potentiometer would be too, commensurable the potency in the controlled load. Potentiometers consist of a resistive element, a sliding contact (wiper) that moves along the element, making good electrical contact with one part of it, electrical terminals at each terminus of the element, a mechanism that moves the wiper from one end too, the other and a housing containing the element and wiper. Optically discern drawing. Many inexpensive potentiometers are constructed with a resistive element (B) composed into an arc of a circle conventionally a little less than a full turn and a wiper (100) sliding on this element when rotated, making electrical contact.

Fig 3.15: Potentiometer 10k.

3.16 Cost Analysis:

In this section we will show cost of our project that means cost sheet representation of our project.

3.16.1 Cost Sheet:

Table 3.1: Cost sheet.

No	Component Name	Quantity	Purchase Price (TK)
01	Microcontroller ATMEGA8a	02	200/-
02	Push Button	02	40/-
03	Crystal Oscillator 16 MHz	02	40/-
04	Ceramic Capacitor 22pf	04	20/-
05	Varo Board	02	30/-
06	IR Sensor	01	300/-
07	Battery (9V)	02	100/-
08	Battery connector	02	20/-
09	Voltage regulator 7805	02	20/-
10	Electro light capacitor 100uf	01	10/-
11	Electro light capacitor 10uf	02	20/-
12	Resistor 10k	02	20/-
13	LCD Display	01	250/-
14	Blue-tooth module HC-05	02	1000/-
15	Switch	02	20/-
16	Potentiometer 10k	01	30/-
	Total		= 2120/-

3.17 Conclusion:

Five main Component & some tools are used in this system to makes it .This Project is used to save power and gain voltage. Our all component are very simple & available in our country market.

CHAPTER 4

SOFTWARE ANALYSIS

4.1 Introduction:

Several important topics are discussed in this chapter. Firstly a brief description about the software which is utilized. Here we mention about the program language in which the code is defined. The tools related to the code dumping are also elaborately discussed.

4.2 Description of our Software:

To write code and upload it to the I/O board, the ATMEGA8a environment create it much easier. This code can run on Mac OS X, Windows and Linux. The screen shot of ATMEGA8a 1.6.8 is shown below.

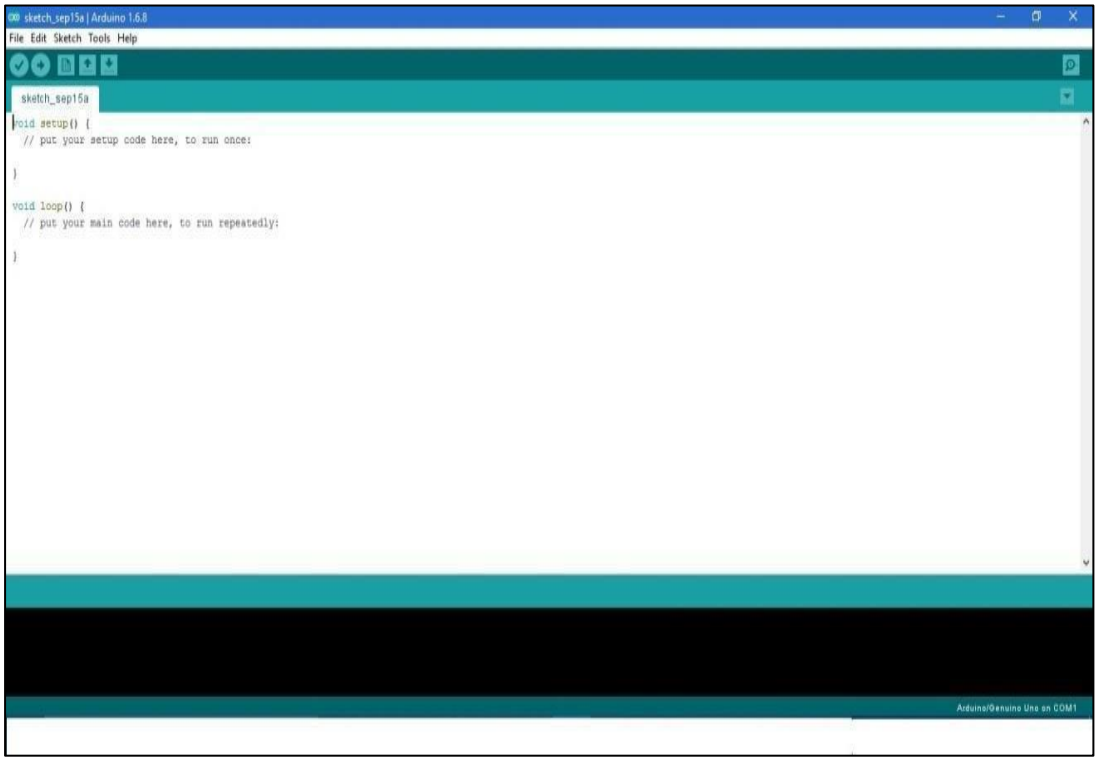
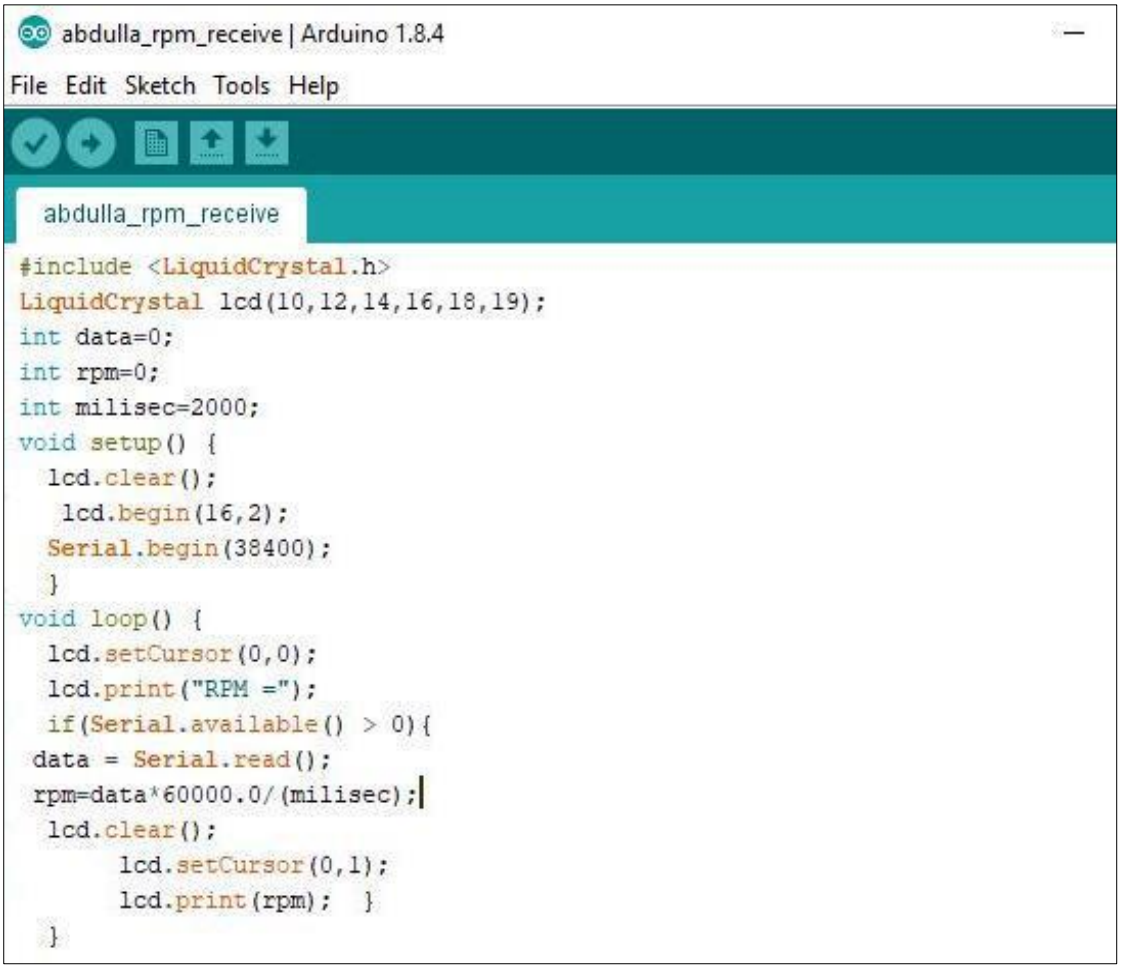


Fig. 4.1: Software Platform

The compiling and uploading of programs to the board can be possible by it with a single click. With several third party tools such as Ion the building on command line is possible if required. On a command-line interface here it is generally not necessary to edit makefilesor run.

With a C/C++ library called "Wiring" which makes many conventional i/p or o/p performances very easily is appeared via the ATMEGA8a IDE. Even if users only need to define two functions to make a program runnable the ATMEGA8a programs are installed in C/C++,

4.3 The compiled window of my code is shown below:



A smart Fire base Data restore system is used by us in this application .Our all design is very simple and it is easy to use for all Customer. It has food menu list and Menu bar. It also has a calculator system. Every food list is very easy to use and all data is store in our data base system. It has also an admin Login Panel. Every order list and table no will be show from there.

4.4 Flow Chart of Diagram

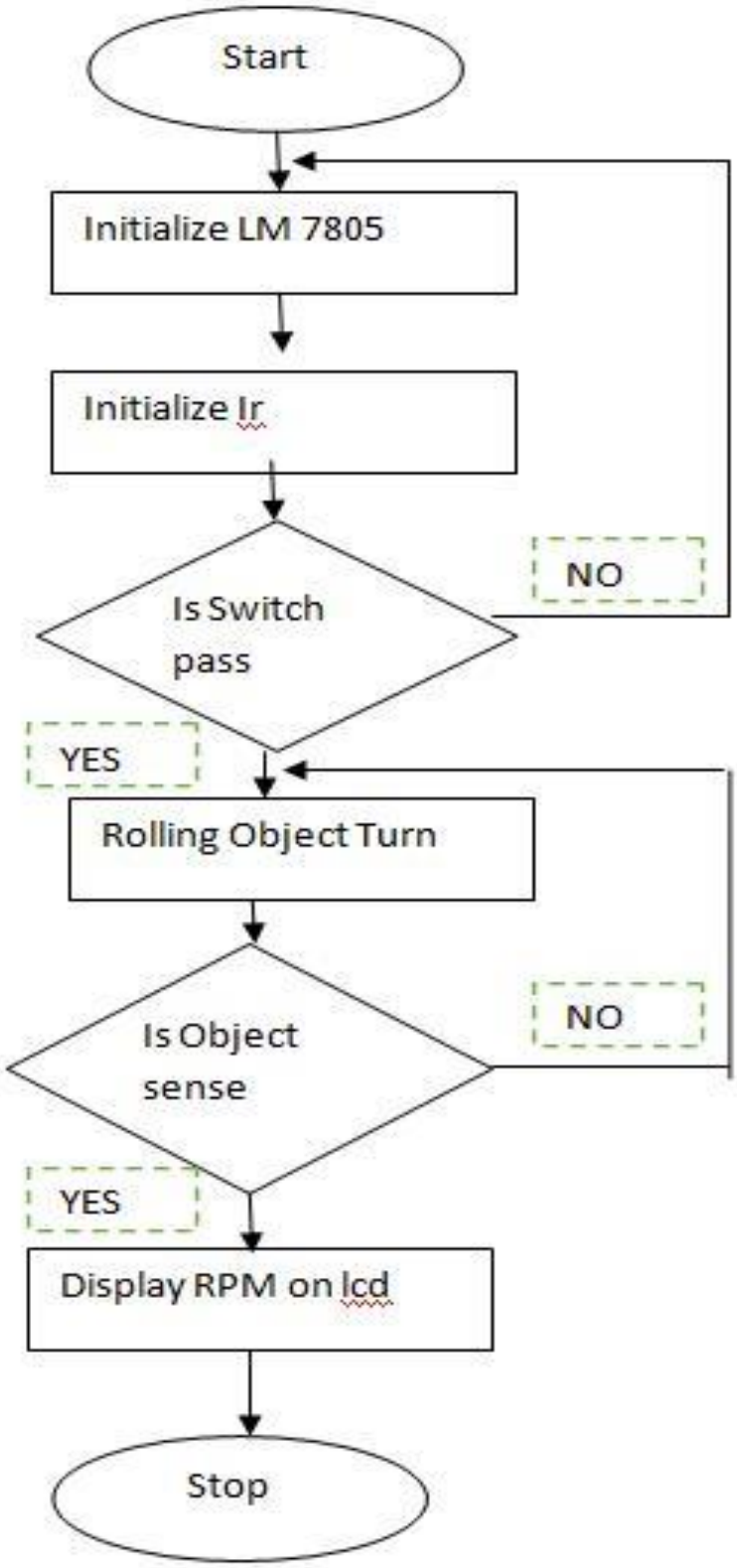


Fig 4.2: Flow Chart of our system.

CHAPTER 5

RESULT AND DISCUSSIONS

The overview of this project is explained which includes the information of the list below:

5.1. Calculate output

5.2. Solar to battery charging data

5.3. Designed instruments output

5.4. Comparison of two output

5.5. Result

5.6. Future Scope

5.1 Calculated output:

Tachometer Formula:

For counting the RPM of a fan, we're utilizing an IR break-beam that counts every interruption which is required to realize that first. The great thing is we realize the first objective, except one thing. The CPU fan has 7 blades which required to realize also. These designates that there are seven interrupts in 1 RPM. If we keep track of the interrupt count, we can ken that 1 full rotation has just occurred after every 7th interruption designates. We can then facilely calculated the full RPM if we keep track of the time which takes for every full cycle. To calculate the RPM we'll utilize the formula visually perceived above in the code. The performance that is how well our ATMEGA8a can keep track of the time between full rotation counts and interrupts will precise our tachometer.

$$Time\ For\ 1\ Rotation = P\ \frac{\mu S}{rotation} \quad , \quad P\ is\ unkown$$

$$RPM = \frac{Rotations}{Minute}$$

$$= 60{,}000{,}000 \frac{\mu S}{minute} \times \left(\frac{1}{P}\right)$$

$$= \frac{60{,}000{,}000}{P} \frac{rotations}{minute}$$

5.2 Tachometer data Output:

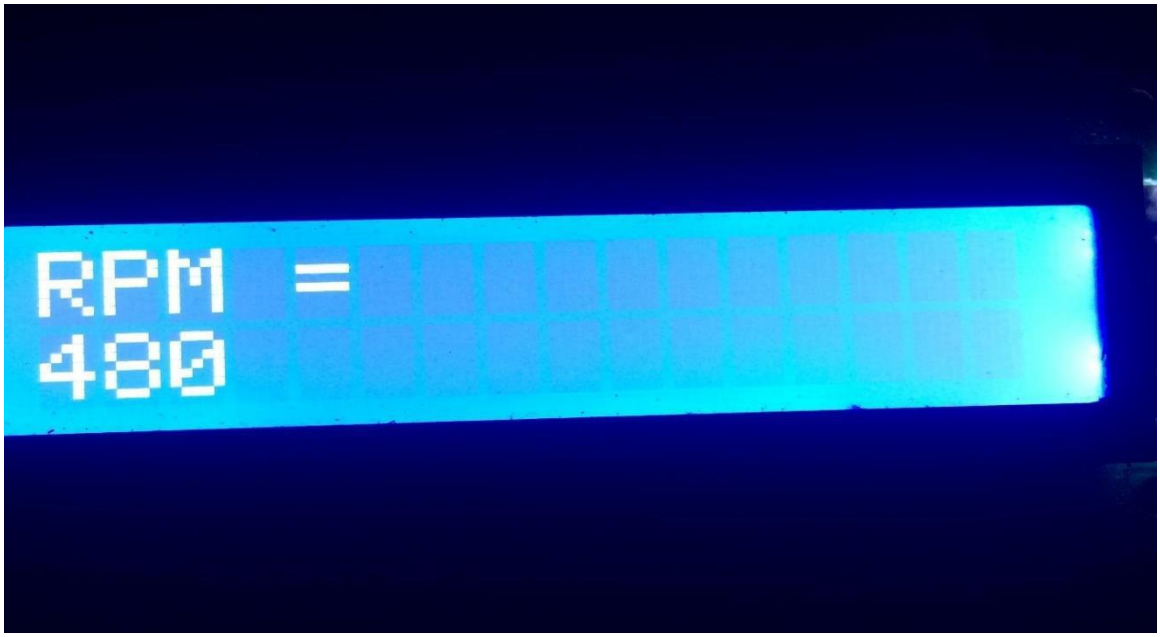


Figure 5.1: Tachometer data Output

5.3 Data output dc motor:

Figure 5.2: Dc motor data Outputs.

5.4 Proposed assembly for the wireless tachometer Transmitter system:

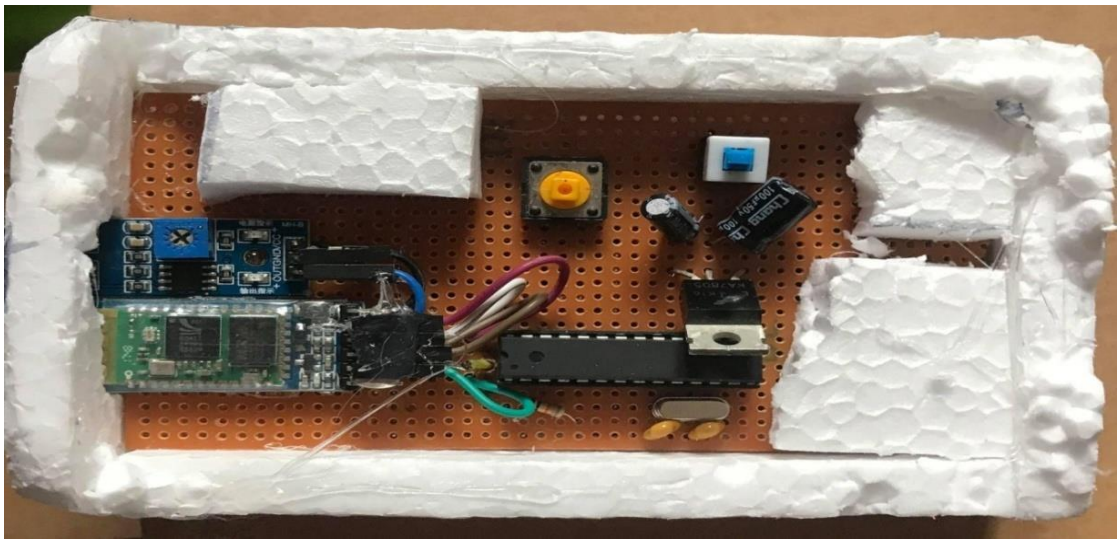


Fig 5.3**:** Proposed assembly for the wireless tachometer system.

5.5 Proposed assembly for the wireless tachometer Receiver system:

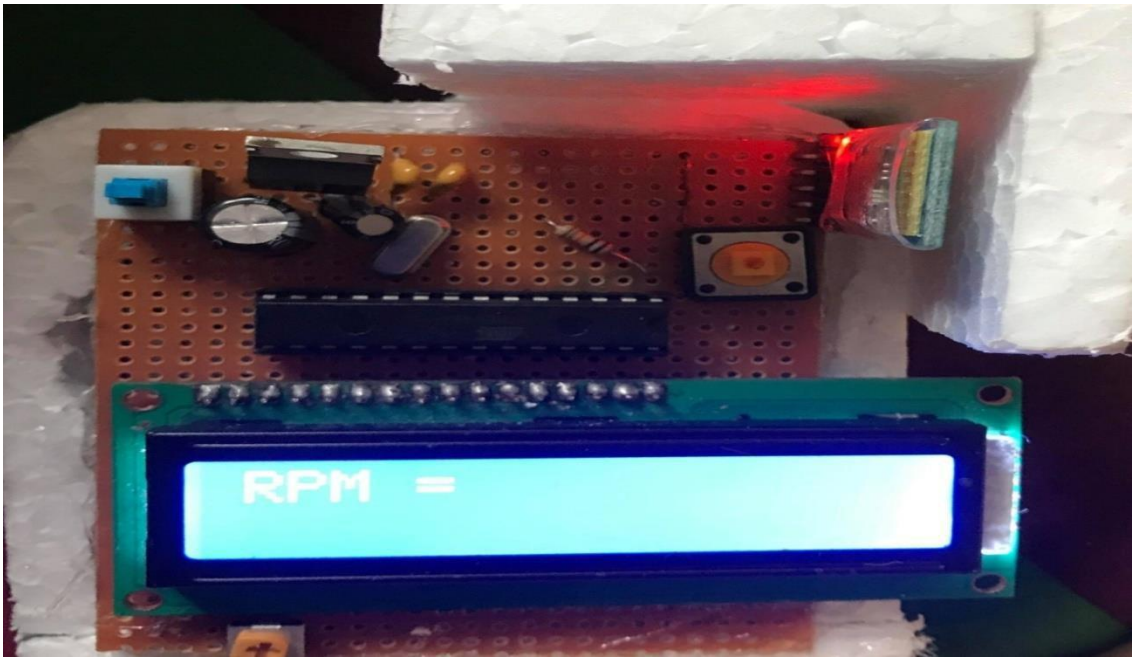


Fig 5.4: wireless tachometer system.

5.6 Result:

For testing issue a motor which is rated 4000 rpm was utilized. A microcontroller based tachometer and a subsisting tachometer both were utilized for 4 readings at different pulse width modulation. These are shown in the chart below. Here we can see that 1.01% is the error of our microcontroller predicated tachometer and 2.43% is the percentage error of the subsisting tachometer.

Table 5.1 Compare between two tachometers:

PWM	RPM measured with existing tachometer	RPM measured with microcontroller based tachometer
14%	490	513
33%	1550	1599
90%	2795	2820
100%	2900	2970

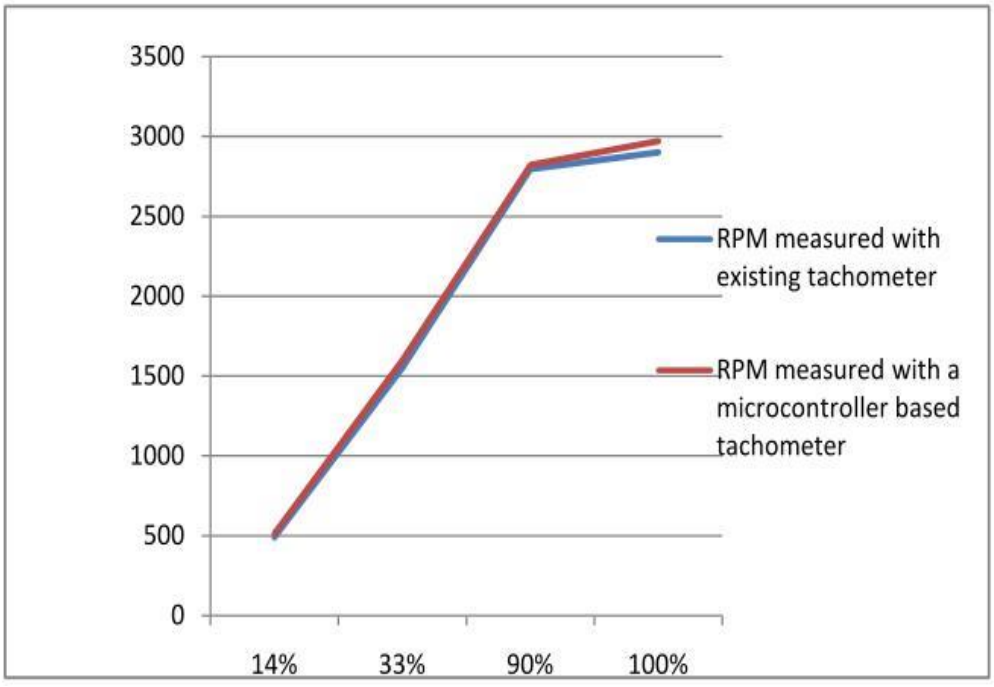


Figure 5.5: The average RPM values attained by designed scheme and standard tachometer.

CHAPTER 6

CONCLUSION

6.1 Conclusion of the project:

A digital tachometer predicated on an infrared light reflection technique has been demonstrated prosperously. Its major advantage are that it doesn't require any physical contact with the rotating shaft too quantify its celerity. This project can be elongated further by integrating data logging feature too it. The IR LED transmits an infrared light towards the rotating disc and the photo detecting diode receives the reflected light beam. This special arrangement of sensors are placed at about an inch away and facing towards the rotating disc. If the surface of the disc are rough and dark, the reflected IR light will be negligible. A scintilla of white paper glued to the rotating disc are just enough to reflect the incident IR light when it passes in front of the sensor, which transpires once per rotation (shown below). If the entire disc surface are effulgent and reflective, utilize a piece of ebony paper instead so that the IR light will be absorbed by this portion once per rotation. In either case, a pulse will be engendered at the output of the signal conditioning circuit for each consummate rotation of the disc. The circuit diagram for the sensor part are shown below.

6.2 Advantages:

A device which is utilize for measuring the rotational speed of the shaft or disc is known as tachometer or revolution counter or the rpm gauge. The digital displays are providing much satisfactory result while the engine or other device usually displays the number of rpm on the calibrated analog dial, but. Tachometer the word which is referred from the Greek (Tacos "speed") and Matron (“measure"). In fact the word tachometer and speedometer are of equal importance:

- A device that measures the speed.

It is an arbitrary combination that one is used for the engine in the automotive industries and the other to the vehicle speed.

6.3 Disadvantages:

The interruption of the emitter/detector circuit which sent elevating edge signals of +5v to the microcontroller is done by a fan. The LCD output of the congruous value from the rpm counter corresponding to the fan’s current speed and it was precise.

The disadvantage of this device is it can’t work on day light because of the so used sensors instead of laser.

6.4 Future Scope:

1. We can count human for this system
2. We can measured any type of rolling device RPM.
3. In Future we can provide batter output for this system.

REFERENCES

[1] 8051 Instruction Set (2002). Available: http://www.silabs.com/MCU. Date Accessed: February, 2015.

[2] A.S.M. Bakibillah, Muhammad Athar Uddin, Shah AhsanulHaque. Design, Implementation & Performance analysis of a low cost Opical Tachometer. IIUC Studies. Vol 7, p 107-116.Dec 2011.

[3] Ibrahim Kamal (2010). "Infra-Red Proximity Sensor" Available: http://www.ikalogic.com. Date Accessed: January, 2015.

[4] LCD Data sheet (2009. Available: http://www.wikipedia.com. Date Accessed: January, 2016.

[5] LM AT89C52 Data Sheet (2010): Available: http://www.atmel.com. Date accessed: January, 2016.

[6] LM555 Data sheet (2015): Available: http://www.datasheetcatalog.com. Date accessed: March, 16 th , 2016.

[7] Md. Masud Rana, Md. Sahabuddin, ShourovMondol, Design and Implementation of a Digital Tachometer, International Journal of Scientific Engineering and Technology. Volume No.5 Issue No.1, pp: 85-88. Jan 2006.

[8] Mehta, V.K. and Mehta Rohit. "Principles of Electronics", 1 st Edition, S. Chand & Company Ltd. India. pp. 443-447. 2010.

[9] Muhammad Izzat Bin Zakariah: "Contactless Tachometer", University Malaysia Pahang, Pp. 19-24. 2010.

[10] Ono Sokki Co,. "Digital Tachometers/Sensors and Peripherals" Available: http:/www.onosokki.co.jp. pp. 12-17. 2007.

[11] Prof. K. Padmanabhan. "Microcontroller-Based Tachometer", College Of Technology, Guindy, Chennai, Pp. 1-4. 2008.

[12] Salice peter, Naveen N.M., Nidheesh M.N., SwethaAnnuJamess, &SerilJooseph. Design Of Contactless Tachometer.international journal of advance research in electrical electronics and instrumentation engineering.(IJAREEIE).Vol 3, Issue 2, Feb 2014.

[13] Theraja, B. L. and Theraja, A. k.. "A Textbook of Electrical Technology", 23 rd Ed., S. Chand & Company Ltd. India. 2002

APPENDIX A

Transmit code

```
intval;
intir=A1;
Long last=0;
int stat;
int stat2=LOW;
int counter=0;
int rpm;
intsens=200;
intmilisec=1000;
void setup()
{Serial.begin(38400);
pinMode(ir,INPUT);}
void loop(){ val=analogRead(ir); if(val<sens)
{ stat=HIGH; } else {
stat=LOW; }
if(stat2!=stat) { counter++; stat2=stat; } if(millis()-last>=milisec)
{ rpm=(counter/2.0);
Serial.write(rpm);
counter=0;
last=millis();
      }
}
```

```
##Receiver code
#include <LiquidCrystal.h>
LiquidCrystallcd(10,12,14,16,18,19);
int data=0;
int rpm=0;
intmilisec=2000;
if(Serial.available() > 0){
data = Serial.read();
rpm=data*60000.0/(milisec);
lcd.clear();
lcd.setCursor(0,1);
lcd.print(rpm);              }

    }
```