CHAPTER-1
INTRODUCTION

According to the World Health Organization, there are 285 million people projected to be visually impaired around the globe. There are 50 million people estimated to be blind who are of prolific age and need independent mobility to work or walk outside and be part of the mainstream and do all other daily essential works. There are 12 million people in India with blindness, the greatest number for any country in the world, according to 2011 census data. The earlier used white cane has major issues as subject need to be in close proximity of obstacle and sense the location of the obstacle by the tip of the white can. While sensing obstacle by the white can he could get hit to other obstacles around him. White can give no knowledge of the obstacle nearby. The designed smart walking stick is equipped with different sensors which will alert user about various obstacles coming ahead in his way while walking. Important feature of this walking stick is voice alert system. The user will be notified by voice alert about obstacle, wet surface. This will ease mobility of blind person as he will get attentive after listening voice alerts. Other embedded important features of this smart stick are object detection, water detection. These features of smart walking stick are helpful in guiding elderly and blind.

Visually impaired persons have difficulty to interact and feel their environment. They have little contact with surroundings. Physical movement is a challenge for visually impaired persons, because it can become tricky to distinguish obstacles appearing in front of them, and they are not able to move from one place to another. They depend on their families for mobility and financial support. Their mobility opposes them from interacting with people and social activities. In the past, different systems are designed with limitations without a solid understanding of the nonvisual perception. Researchers have spent the decades to develop an intelligent and smart stick to assist and alert visually impaired persons from obstacles and give information about their location. Over the last decades, research has been conducted for new devices to design a good and reliable system for visually impaired persons to detect obstacles and warn them at danger places. Smart walking stick is specially designed to detect

obstacles which may help the blind to navigate care-free. The audio messages will keep the user alert and considerably reduce accidents. A voice enabled automatic switching is also incorporated to help them in private space as well. This system presents a concept to provide a smart electronic aid for blind people, both in public and private space The proposed system contains the ultrasonic sensor, water sensor, voice play back board and speaker. The Stick measures the distance between the objects and smart walking stick by using an ultrasonic sensor. When any objects or obstacles come in range of an ultrasonic sensor then the head phone tell the name of obstacle which is in front of the stick. The smart walking stick is a simple and purely mechanical device to detect the obstacles on the ground. This device is light in weight and portable. But its range is limited due to its own size. It provides the best travel aid for the person. The blind person can move from one place to another independently without the others help. The main aim of the system is to provide a efficient navigation aid for the blind persons which gives a sense of vision by providing the information about their surroundings and objects around them.

CHAPTER 2
LITERATURE SURVEY

Nowadays, the wearable health monitoring system is the main application of Internet of things

[1] Likewise, lots of wearable devices are designed for visually impaired people. Few systems are discussed here.

[2] In sensor assisted stick for the blind people describes about a wearable equipment which consists of a light weight blind stick and the obstacle detection circuit based on a sensor. It is mainly developed to help the blind person to move alone safely from one place to another and to avoid any obstacles that may be encountered. The device detects the fixed as well as moving objects and thus it may help to avoid accidents. The main component for the working of this system is the infrared sensor which is used to scan a predetermined area around the blind person by emitting-reflecting waves. The reflected signals are received from the objects are used as inputs to the microcontroller and then used for determining the direction and distance of the objects around the blind person. The main objective of this is to provide an application for blind people to detect the obstacles in various directions, detecting pits and manholes on the ground to make free to walk.

[3] In an innovative stick is designed for the visually disabled people for their easy navigation. The blind stick is able to detect the water by integrating with ultrasonic sensor. In this system, the ultrasonic sensors are used to detect obstacles by using ultrasonic waves. By sensing the obstacles, the sensor passes the received data to the microcontroller. The microcontroller processes the data and calculates if the obstacle is close enough to the person. If the obstacle is not close to the microcontroller, the circuit does not do anything. If the obstacle is close enough to the microcontroller, it sends a signal to buzzer. The system also detects water and provides different sounds and alerts the blind person.

[4] In multitasking stick is designed to indicate safe path to visually disable people. The micro-controller based automated hardware allows a blind person to detect obstacles in front of them. The hardware part consists of a micro-controller which was incorporated with an

ultrasonic sensor, voice play back module and additional equipment. The ultrasonic waves are used to detect the obstacles. The temperature sensors are provided to detect the fire or high temperature area. The presence of water is detected using the current sensing principle. The acknowledgement from the sensing obstacle is received through the voice play back module. The system is provided with RF module to find the misplaced stick. These features allow the blind people to move from one place to another independently and easily.

[5] In object detection for Markerless Augmentation using Haar Training deals with providing object recognition algorithms which will help and guide the users of their respective devices by helping them with a better understanding of an unknown device in order to set up its working. Real-Time object detection and recognition of the object using the device's camera. Haar cascade classifier files were created by performing haar training on the object and its ports images, for detection purposes. This work extends Viola Jones Algorithm's rapid object detection framework in two important ways: Firstly, their basic and over-complete set of Haar-like feature is extended by an efficient set of 45° rotated features, which add additional domain-knowledge to the learning framework and which is otherwise hard to learn. These novel features can be computed rapidly at all scales in constant time. Secondly, a new post optimization procedure for a given boosted classifier that improves its performance significantly

[6] The prototype implementation has been applied to several practical applications such as image search, rapid object recognition and augmented reality applications. The project is an android application to ensure better portability.

CHAPTER-3
PROPOSED SYSTEM

The methodology was planned to develop a smart electronic stick having different features which were absent in a conventional stick. Technology enhancement over the conventional method is significant so that blind and elderly people make their lives better by providing them a feeling of safety, security and comfort as much as possible whenever and wherever they are. This methodology aims to help blind and elder users with monitoring their health and daily movement issues. For this we have designed a smart electronic walking stick which helps users to move independently and confidently. The circuit of smart stick consists of ultrasonic sensor which is used for detecting obstacle in front of user

3.1 Block Diagram Overview:

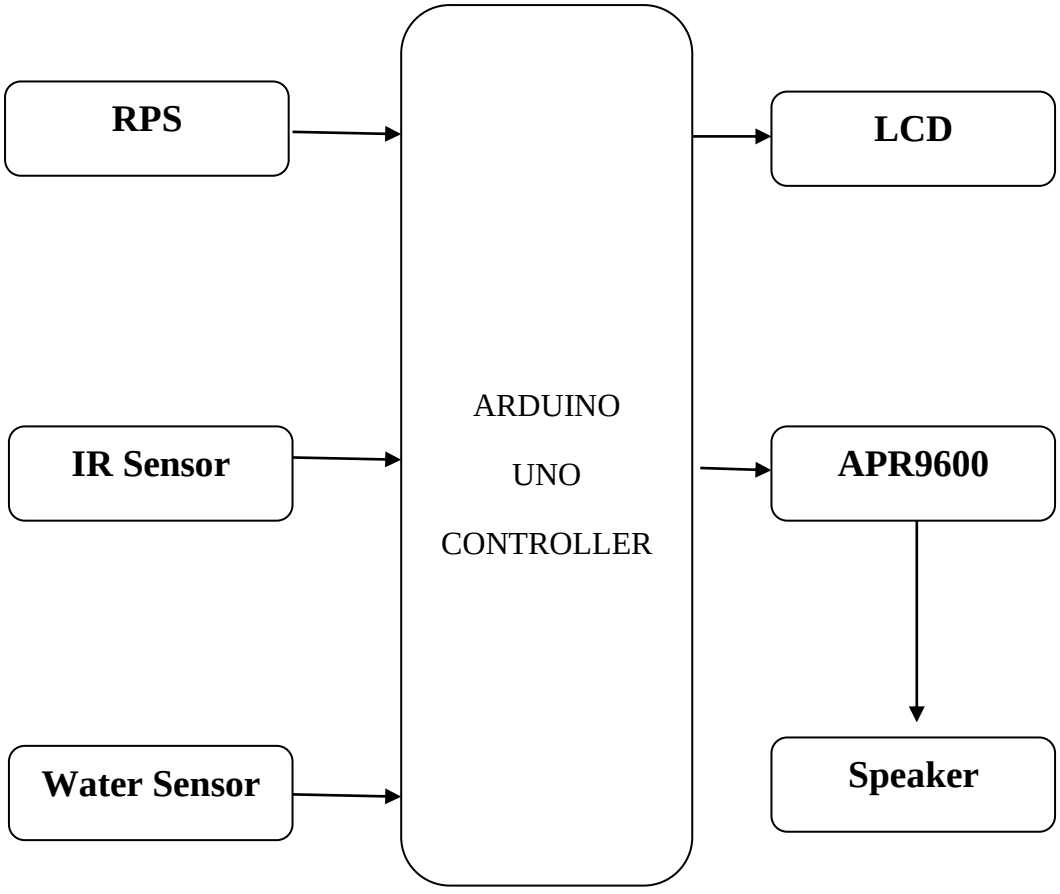


Fig.3.1 Block diagram of arduino controller

3.2 Power Supply:

All digital circuits require regulated power supply. In this article we are going to learn how to get a regulated positive supply from the mains supply.

In order establish the regulated output several processes involve, the block diagram is show below

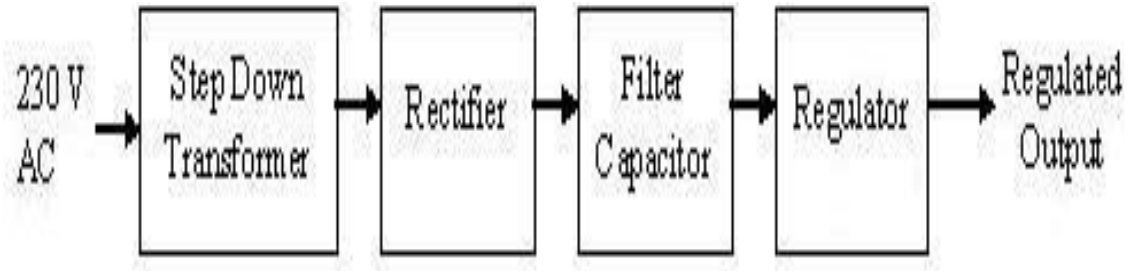
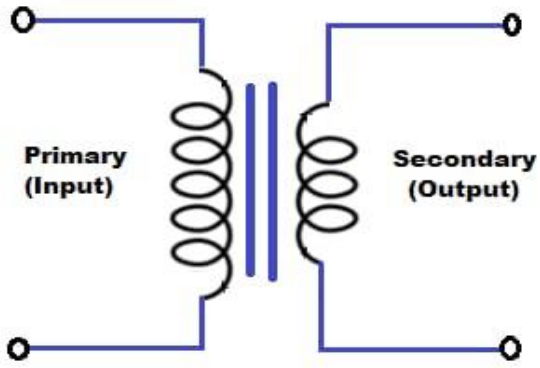


Fig:3.2 Basic block diagram of a fixed regulated power supply.

3.3 Transformer

A transformer consists of two coils also called as “WINDINGS” namely PRIMARY & SECONDARY.



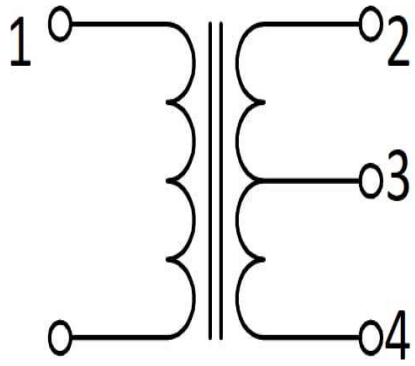


Fig:3.3 (i)Transformer (ii) Center Tapped Transformer

They are linked together through inductively coupled electrical conductors also called as CORE. A changing current in the primary causes a change in the Magnetic Field in the core & this in turn induces an alternating voltage in the secondary coil. If load is applied to the secondary then an alternating current will flow through the load. If we consider an ideal

condition then all the energy from the primary circuit will be transferred to the secondary circuit through the magnetic field.

$$P_{primary} = P_{secondary}$$

So

$$I_p v_p = I_s v_s$$

The secondary voltage of the transformer depends on the number of turns in the Primary as well as in the secondary.

$$V_p/Vs = N_{p/}N_s$$

3.4 Rectifier

A rectifier is a device that converts an AC signal into DC signal. For rectification purpose we use a diode, a diode is a device that allows current to pass only in one direction i.e., when the anode of the diode is positive with respect to the cathode also called as forward biased condition & blocks current in the reversed biased condition.

Rectifier can be classified as follows:

3.4.1Half Wave Rectifier.

This is the simplest type of rectifier as you can see in the diagram a half wave rectifier consists of only one diode. When an AC signal is applied to it during the positive half cycle the diode is forward biased & current flows through it.

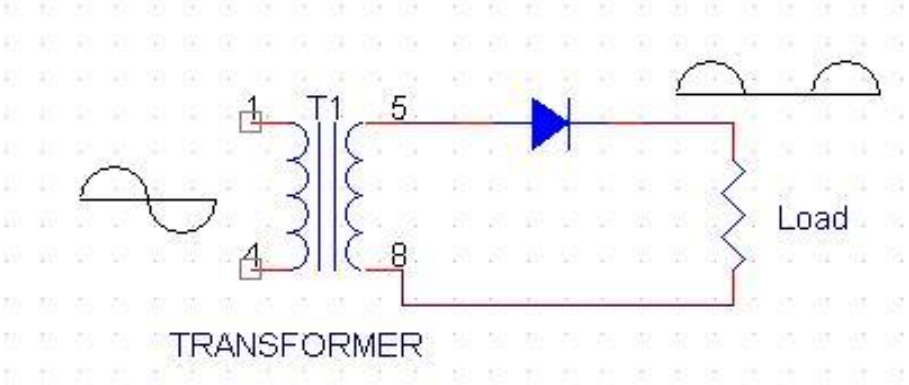


Fig 3.4 Half Rectifier

But during the negative half cycle diode is reverse biased & no current flows through it. Since only one half of the input reaches the output, it is very inefficient to be used in power supplies.

3.4. 2 Full Wave Rectifier

Half wave rectifier is quite simple but it is very inefficient, for greater efficiency we would like to use both the half cycles of the AC signal. This can be achieved by using a center tapped transformer i.e., we would have to double the size of secondary winding & provide connection to the center. So, during the positive half cycle diode D1 conducts & D2 is in reverse biased condition. During the negative half cycle diode D2 conducts & D1 is reverse biased. Thus, we get both the half cycles across the load.

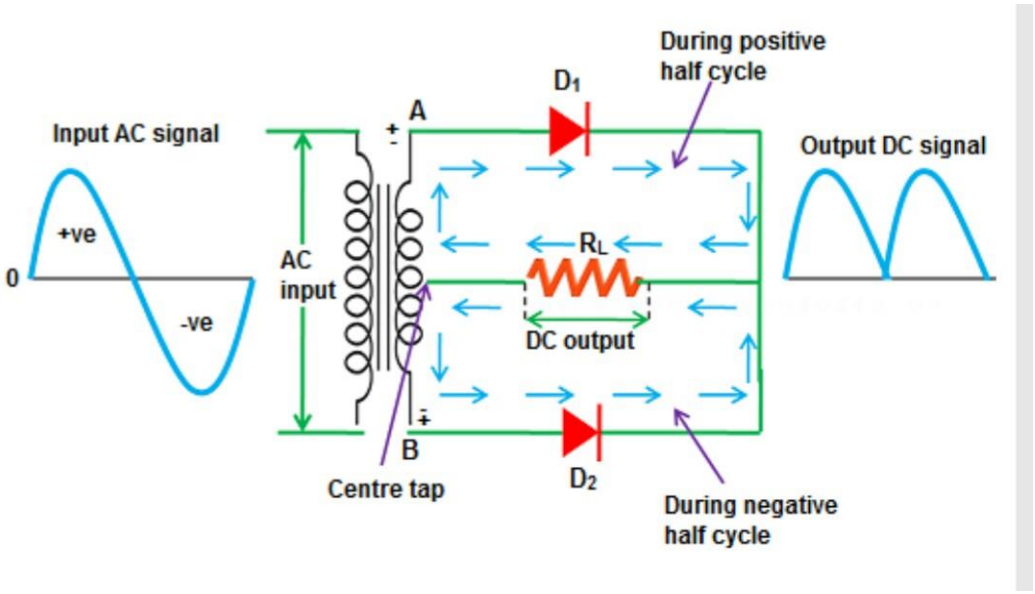


Figure 3.5. Full Wave Rectifier

One of the disadvantages of Full Wave Rectifier design is the necessity of using a center tapped transformer, thus increasing the size & cost of the circuit. This can be avoided by using the Full Wave Bridge Rectifier.

3.4.3 Bridge Rectifier.

Bridge rectifiers as a type of full-wave rectifier that uses four or more diodes in a bridge circuit configuration to efficiently convert alternating (AC) current to a direct (DC)

current. Bridge Rectifiers use four diodes that are arranged cleverly to convert the AC supply voltage to a DC supply voltage. The output signal of such a circuit is always of the same polarity regardless of the polarities of the input AC signal.

Figure 2 depicts the circuit of a bridge rectifier with diodes interlocked in a bridge configuration.

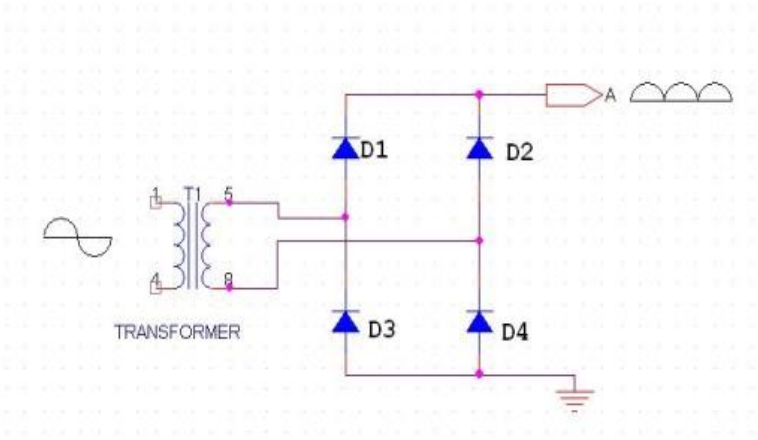


Fig 3.6 Bridge Rectifier

As the name suggests it converts the full wave i.e., both the positive & the negative half cycle into DC thus it is much more efficient than Half Wave Rectifier & that too without using a center tapped transformer thus much more cost effective than Full Wave Rectifier.

Full Bridge Wave Rectifier consists of four diodes namely D1, D2, D3 and D4. During the positive half cycle diodes D1 & D4 conduct whereas in the negative half cycle diodes D2 & D3 conduct thus the diodes keep switching the transformer connections so we get positive half cycles in the output.

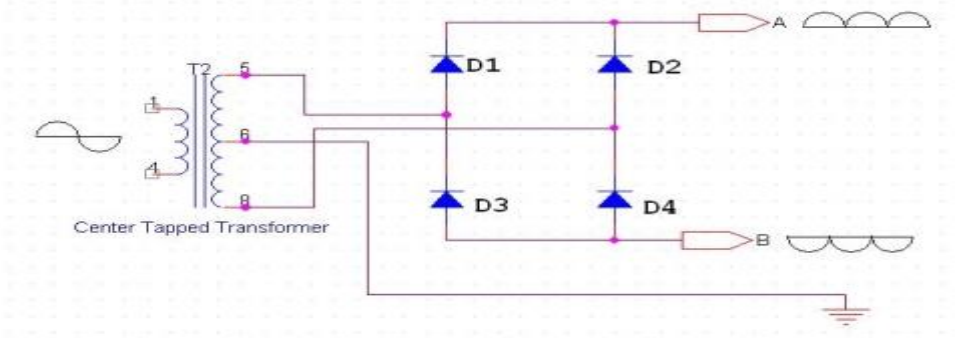


Figure 3.7 Center Tapped Transformer

If we use a center tapped transformer for a bridge rectifier, we can get both positive & negative half cycles which can thus be used for generating fixed positive & fixed negative voltages.

3.5 Filter Capacitor

Even though half wave & full wave rectifier give DC output, none of them provides a constant output voltage. For this we require to smoothen the waveform received from the rectifier. This can be done by using a capacitor at the output of the rectifier this capacitor is also called as “FILTER CAPACITOR” or “SMOOTHING CAPACITOR” or “RESERVOIR CAPACITOR”. Even after using this capacitor a small amount of ripple will remain.

We place the Filter Capacitor at the output of the rectifier the capacitor will charge to the peak voltage during each half cycle then will discharge its stored energy slowly through the load while the rectified voltage drops to zero, thus trying to keep the voltage as constant as possible.

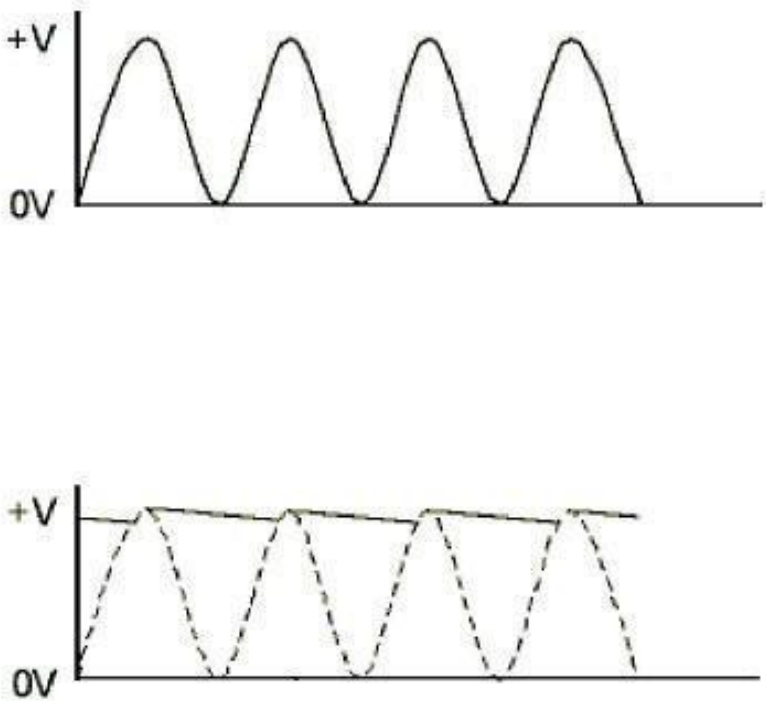


Figure 3.8 Voltage Graph

If we go on increasing the value of the filter capacitor then the Ripple will decrease. But then the costing will increase. The value of the Filter capacitor depends on the current consumed by the circuit, the frequency of the waveform & the accepted ripple.

$$C=Vr/I$$

Where,

Vr = accepted ripple voltage. (Should not be more than 10% of the voltage)

I= current consumed by the circuit in Amperes.

F= frequency of the waveform. A half wave rectifier has only one peak in one cycle so F=25hz

Whereas a full wave rectifier has Two peaks in one cycle so F=100hz.

3.6 Voltage Regulator

A Voltage regulator is a device which converts varying input voltage into a constant regulated output voltage. Voltage regulator can be of two types

1) Linear Voltage Regulator Also called as Resistive Voltage regulator because they dissipate the excessive voltage resistively as heat.

2) Switching Regulators.

They regulate the output voltage by switching the Current ON/OFF very rapidly. Since their output is either ON or OFF it dissipates very low power thus achieving higher efficiency as compared to linear voltage regulators. But they are more complex & generate high noise due to their switching action. For low level of output power switching regulators tend to be costly but for higher output wattage they are much cheaper than linear regulators.

The most commonly available Linear Positive Voltage Regulators are the 78XX series where the XX indicates the output voltage. And 79XX series is for Negative Voltage Regulators.

After filtering the rectifier output the signal is given to a voltage regulator. The maximum input voltage that can be applied at the input is 35V.Normally there is a 2-3 Volts drop across the regulator so the input voltage should be at least 2-3 Volts higher than the output voltage. If the input voltage gets below the Vmin of the regulator due to the ripple

voltage or due to any other reason the voltage regulator will not be able to produce the correct regulated voltage.

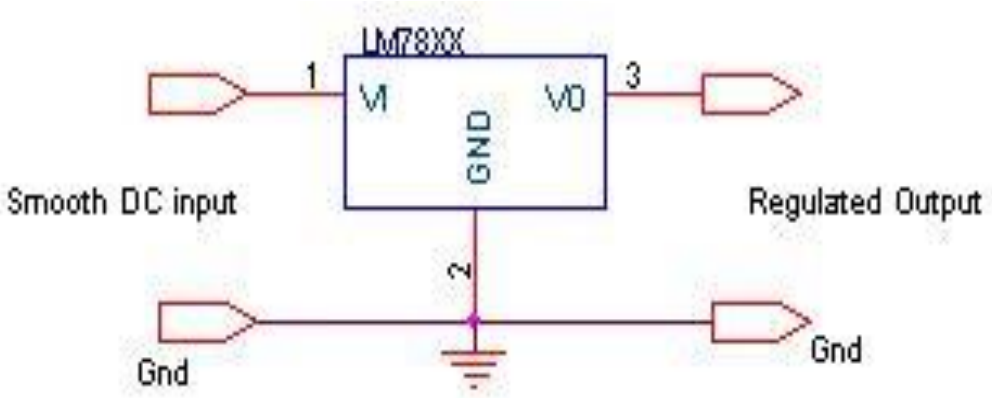


Fig 3.9 Voltage Regulator

Circuit Diagram:

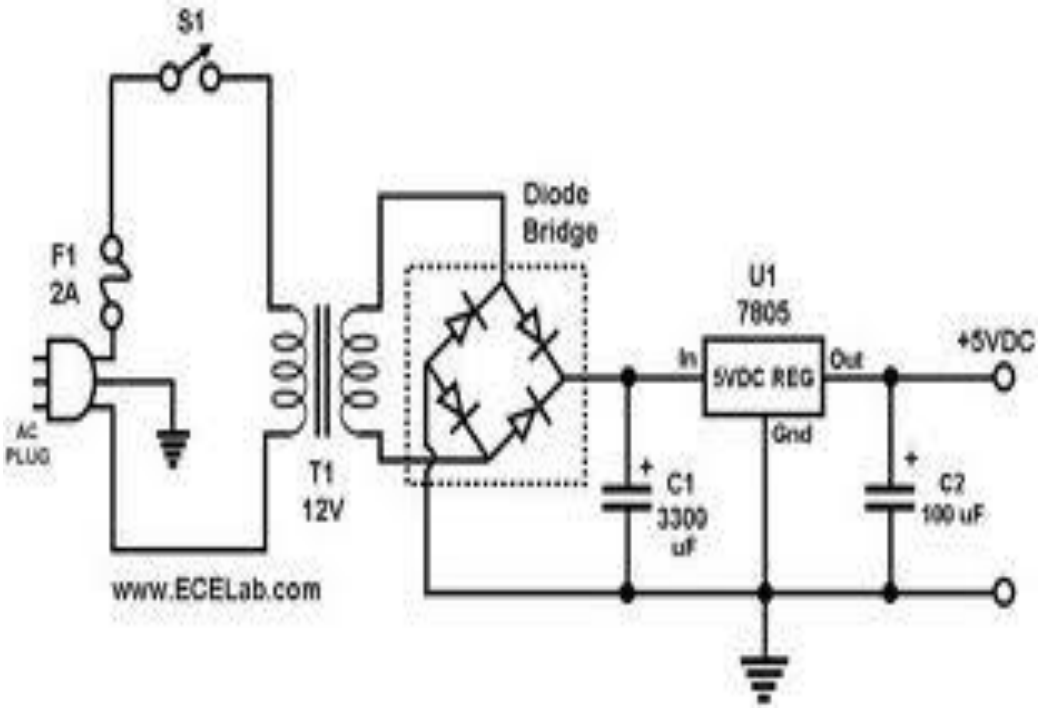


Fig 3.10 Circuit Diagram of Power Supply

3.7 IC 7805:

7805 is an integrated three-terminal positive fixed linear voltage regulator. It supports an input voltage of 10 volts to 35 volts and output voltage of 5 volts. It has a current rating of 1 amp although lower current models are available. Its output voltage is fixed at 5.0V. The 7805 also has a built-in current limiter as a safety feature. 7805 is manufactured by many companies, including National Semiconductors and Fairchild Semiconductors.

The 7805 will automatically reduce output current if it gets too hot. The last two digits represent the voltage; for instance, the 7812 is a 12-volt regulator. The 78xx series of regulators is designed to work in complement with the 79xx series of negative voltage regulators in systems that provide both positive and negative regulated voltages, since the 78xx series can't regulate negative voltages in such a system.

The 7805 & 78 is one of the most common and well-known of the 78xx series regulators, as it's small component count and medium-power regulated 5V make it useful for powering TTL devices.

Table 3.1. Specifications Of IC7805

SPECIFICATIONS	**IC 7805**
V_{out}	5V
V_{ein} - V_{out} Difference	5V - 20V
Operation Ambient Temp	0 - 125°C
Output I_{max}	1A

3.8 IR Sensor

Principle:

An infrared (IR) sensor is an electronic device that measures and detects infrared radiation in its surrounding environment. Infrared radiation was accidentally discovered by an astronomer named William Herchel in 1800. While measuring the temperature of each color of light (separated by a prism), he noticed that the temperature just beyond the red light was highest. IR is invisible to the human eye, as its wavelength is longer than that of visible light (though it is still on the same electromagnetic spectrum). Anything that emits heat (everything that has a temperature above around five degrees Kelvin) gives off infrared radiation

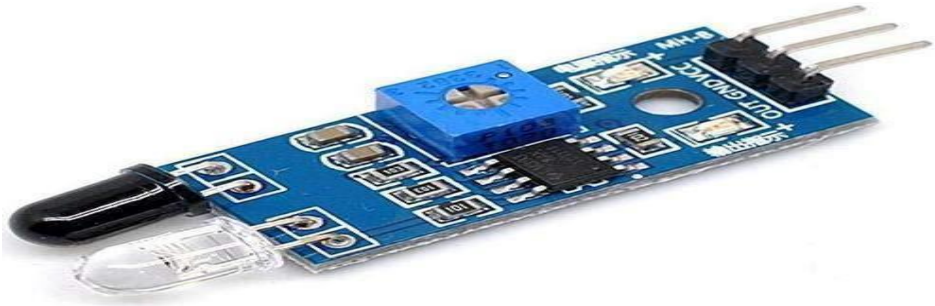


Fig 3.11 IR Sensor

There are two types of infrared sensors: active and passive. Active infrared sensors both emit and detect infrared radiation. Active IR sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver. Active IR sensors act as proximity sensors, and they are commonly used in obstacle detection systems (such as in robots)

3.9 Specification:

- This is IR Proximity Sensor
- It Easy to assemble and use
- This has Onboard detection indication
- The effective distance range of 2cm to 30cm
- This has A preset knob to fine-tune distance range

- If there is an obstacle, the indicator lights on the circuit board.

Operating Voltage – 3V to 5V

Current - 20mA

Frequency - 40 KHz

Max Range – 30cm

Min Range - 2 cm

Small Size - 48mm x 14mm x 8mm height

3.10 Electrical Connection:

The connections for the IR sensor with the Arduino are as follows: Connect the negative wire on the IR sensor to GND on the Arduino. Connect the middle of the IR sensor which is the VCC to 5V on the Arduino. Connect the signal pin on the IR sensor to pin 8 on the Arduino.

3.11 IR Sensor Description

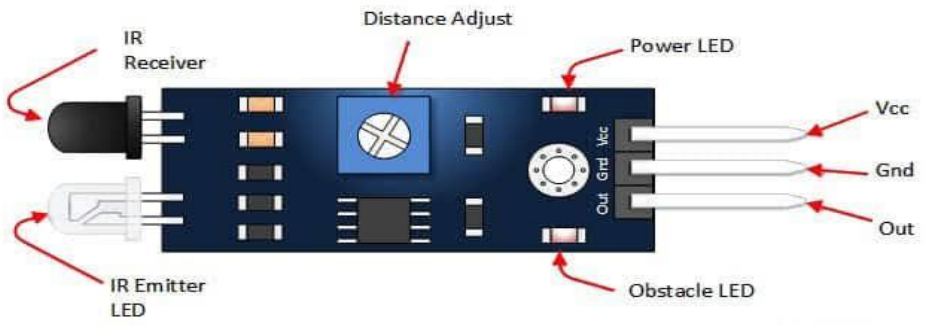


Fig 3.12 IR Sensor Pin Diagram

Connection:

The IR must be mounted above the buggy (e.g., by using a small home-made aluminum bracket (not supplied)). The SRF004 has five solder connections which must be connected via wires to the solder joints on the bottom of the buggy PCB.

1. Pin 1 – Vcc
2. Pin 2 – Gnd

3. Pin 3 – output

3.12 Water Level Sensor Lm 324:

LM324 is a Quad op-amp IC integrated with four op-amps powered by a common power supply. The differential input voltage range can be equal to that of the power supply voltage. Generally, op-amps can perform mathematical operations.

General Description:

The water level sensor is a device that measures the liquid level in a fixed container that is too high or too low. According to the method of measuring the liquid level, it can be divided into two types: contact type and non-contact type.

The LM324 series consists of four independent, high gains; internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage.

Fig3.13. Water Level Sensor LM324

Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits which now can be more easily implemented in single power supply systems. For example, the LM124 series can be directly operated off of the standard

+5V power supply voltage which is used in digital systems and will easily provide the required interface electronics without requiring the additional ±15V power supplies.

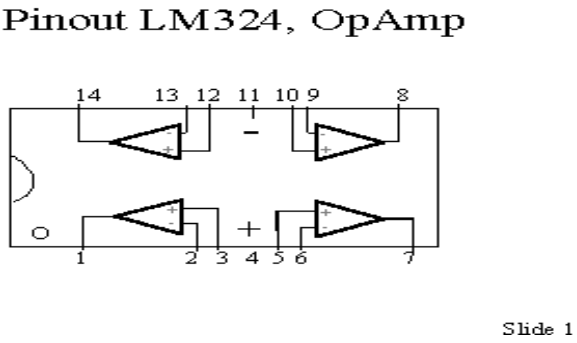


Fig 3.14 Water Sensor

Unique Characteristics

In the linear mode the input common-mode voltage range includes ground and the output voltage can also swing to ground, even though operated from only a single power supply voltage. The unity gain cross frequency is temperature compensated. The input bias current is also temperature compensated

Advantages

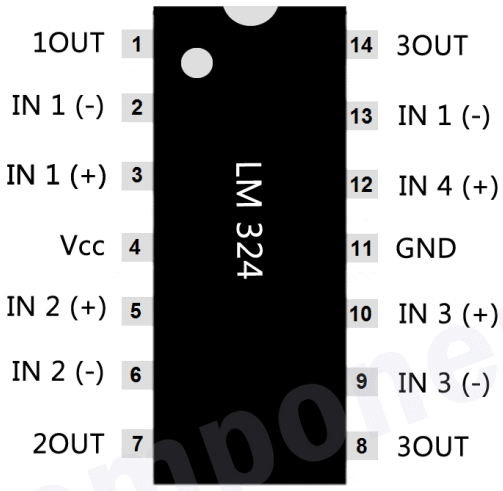
1. Eliminates need for dual supplies
2. Four internally compensated op amps in a single package
3. Allows directly sensing near GND and VOUT also goes to GND
4. Compatible with all forms of logic
5. Power drain suitable for battery operation

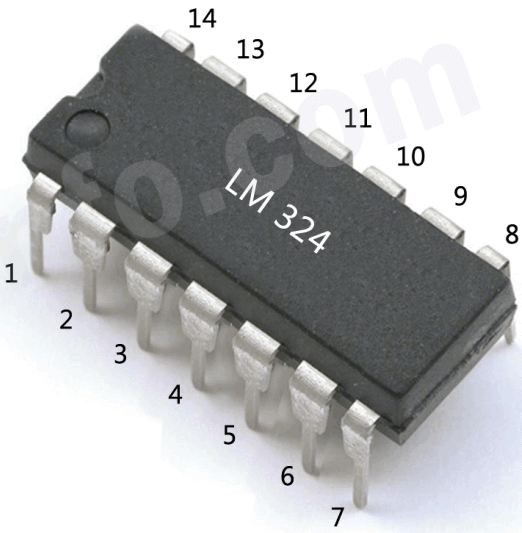
Features

1. Internally frequency compensated for unity gain
2. Large DC voltage gain 100 dB
3. Wide bandwidth (unity gain) 1 MHz (temperature compensated)
4. Wide power supply range: Single supply 3V to 32V or dual supplies ±1.5V to ±16V
5. Very low supply current drain (700 μA)—essentially independent of supply voltage
6. Low input biasing current 45 nA (temperature compensated)
7. Low input offset voltage 2 mV and offset current: 5 nA
8. Input common-mode voltage range includes ground.

9. Differential input voltage range equal to the power supply voltage

10. Large output voltage swing 0V to V+ − 1.5V





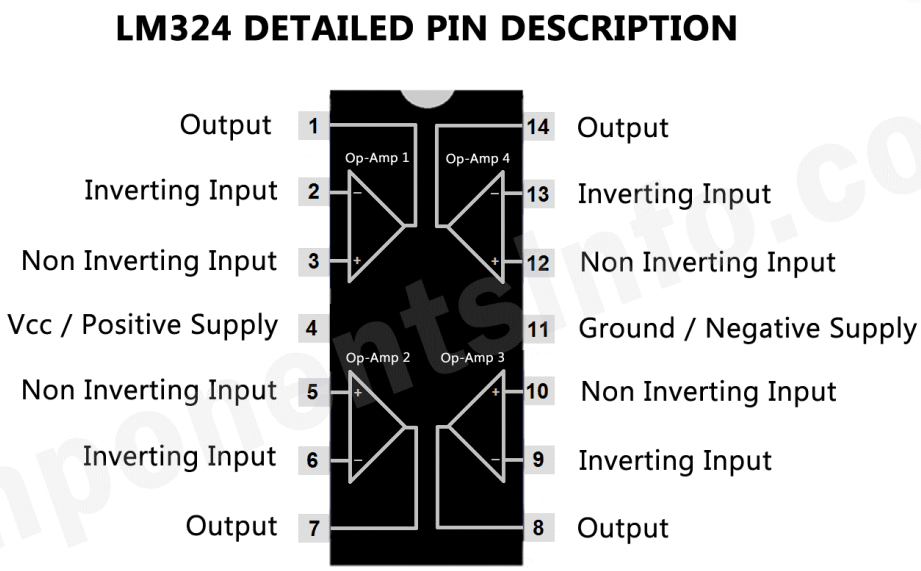


Fig 3.15 Pin Diagram Of Water Sensor

3.13 LM2902 Description:

The LM124LM124/LM224/LM324/LM2902 Low Power Quad Operational Amplifiers series are op amps which operate with only a single power supply voltage, have true-differential inputs, and remain in the linear mode with an input common-mode voltage

of 0 VDC. These amplifiers operate over a wide range of power supply voltage with little change in performance Characteristics. At 25°C amplifier operation is possible down to a minimum supply voltage of 2.3 VDC.

The pinouts of the package have been designed to simplify PC board layouts. Inverting inputs are adjacent to outputs for all of the amplifiers and the outputs have also been placed at the corners of the package (pins 1, 7, 8, and 14). Precautions should be taken to insure that the power supply for the integrated circuit never becomes reversed in polarity or that the unit is not inadvertently installed backwards in a test socket as an unlimited current surge through the resulting forward diode within the IC could cause fusing of the internal conductors and result in a destroyed unit. Large differential input voltages can be easily accommodated and, as input differential voltage protection diodes are not needed, no large input currents result from large differential input voltages. The differential input voltage may be larger than V+ without damaging the device. Protection should be provided to prevent the input voltages from going negative more than −0.3 VDC (at 25°C). An input clamp diode with a resistor to the IC input terminal can be used.

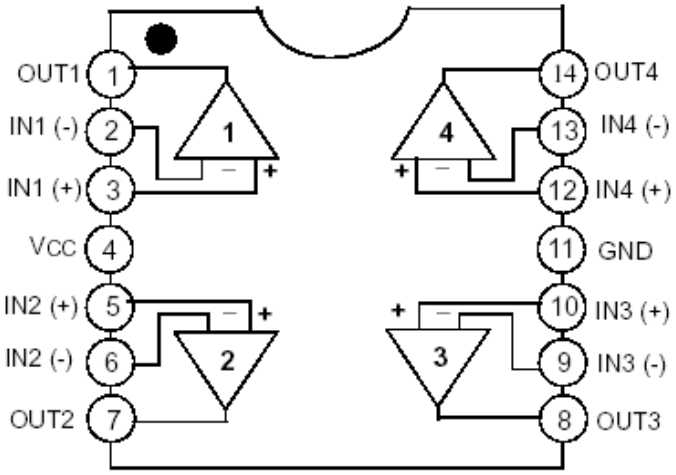


Fig 3.16 OP-amp Pin Diagram

To reduce the power supply drain, the amplifiers have a class an output stage for small signal levels which converts to class B in a large signal mode. This allows the amplifiers to both source and sinks large output currents. Therefore, both NPN and PNP external current boost transistors can be used to extend the power capability of the basic

amplifiers. The output voltage needs to raise approximately 1 diode drop above ground to bias the on-chip vertical PNP transistor for output current sinking applications. For ac applications, where the load is capacitive coupled to the output of the amplifier, a resistor should be used, from the output of the amplifier to ground to increase the class a bias current and prevent crossover distortion. Where the load is directly coupled, as in dc applications, there is no crossover distortion. Capacitive loads which are applied directly to the output of the amplifier reduce the loop stability margin. Values of 50 pF can be accommodated using the worst-case non inverting unity gain connection. Large closed loop gains or resistive isolation should be used if larger load capacitance must be driven by the amplifier.

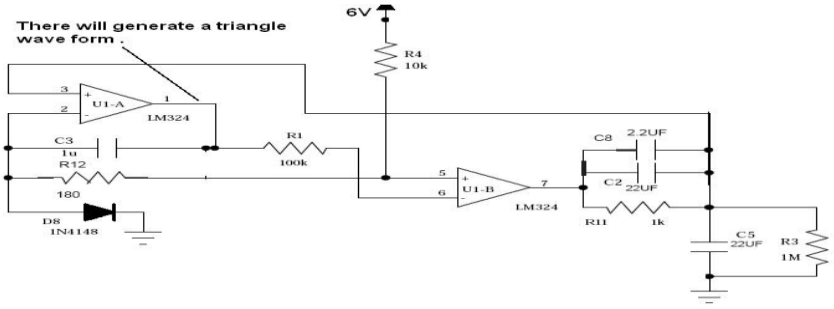


Fig 3.17Circuit Diagram

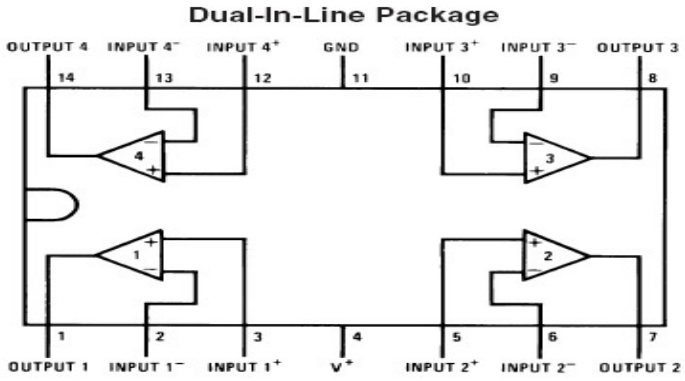


Fig 3.18 Dual-in-line Package Of Water Sensor

3.14 LM124/LM224/LM324/LM2902

The bias network of the LM124 establishes a drain current which is independent of the magnitude of the power supply voltage over the range of from 3 VDC to 30 VDC. Output short circuits either to ground or to the positive power supply should be of short time

duration. Units can be destroyed, not as a result of the short circuit current causing metal fusing, but rather due to the large increase in IC chip dissipation which will cause eventual failure due to excessive junction temperatures. Putting direct short-circuits on more than one amplifier at a time will increase the total IC power dissipation to destructive levels, if not properly protected with external dissipation limiting resistors in series with the output leads of the amplifiers. The larger value of output source current which is available at 25°C provides a larger output current capability at elevated temperatures (see typical performance characteristics) than a standard IC op amp.

The circuits presented in the section on typical applications emphasize operation on only a single power supply voltage. If complementary power supplies are available, all of the standard op amp circuits can be used. In general, introducing a pseudo-ground (a bias voltage reference of V+/2) will allow operation above and below this value in single power supply systems. Many application circuits are shown which take advantage of the wide input common-mode voltage range which includes ground. In most cases, input biasing is not required and input voltages which range to ground can easily be accommodated

CHAPTER-4

ARDUINO CONTROLLER

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.

The name Arduino comes from a bar in Ivrea, Italy, where some of the founders of the project used to meet. The bar was named after Arduin of Ivrea, who was the margrave of the March of Ivrea and King of Italy from 1002 to 1014.

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board

The Arduino hardware and software was designed for artists, designers, hobbyists, hackers, newbies, and anyone interested in creating interactive objects or environments. Arduino can interact with buttons, LEDs, motors, speakers, GPS units, cameras, the internet, and even your smart-phone or your TV! This flexibility combined with the fact that the Arduino software is free, the hardware boards are pretty cheap, and both the software and hardware are easy to learn has led to a large community of users who have contributed code and released instructions for a huge variety of Arduino-based projects.

Fig.4.1. Hardware Image**.**

4.1 History:

The Arduino project was started at the Interaction Design Institute Ivrea (IDII) in Ivrea, Italy. At that time, the students used a Basic Stamp microcontroller at a cost of $50, a considerable expense for many students. In 2003 Hernando Barragán created the development platform Wiring as a Master's thesis project at IDII, under the supervision of Massimo Banzi and Casey Reas. Casey Reas is known for co-creating, with Ben Fry, the Processing development platform. The project goal was to create simple, low cost tools for creating digital projects by non-engineers. The Wiring platform consisted of a printed circuit board (PCB) with an Atmega168 microcontroller, an IDE based on Processing and library functions to easily program the microcontroller. In 2003, Massimo Banzi, with David Mellis, another IDII student, and David Cuartielles, added support for the cheaper Atmega8 microcontroller to Wiring. But instead of continuing the work on Wiring, they forked the project and renamed it Arduino.

The initial Arduino core team consisted of Massimo Banzi, David Cuartielles, Tom Igoe, Gianluca Martino, and David Mellis,[2] but Barragán was not invited to participate.

Following the completion of the Wiring platform, lighter and less expensive versions were distributed in the open-source community.

It was estimated in mid-2011 that over 300,000 official Arduinos had been commercially produced, and in 2013 that 700,000 official boards were in users' hands. In October 2016, Federico Musto, Arduino's former CEO, secured a 50% ownership of the company. In April 2017, Wired reported that Musto had "fabricated his academic record.... On his company's website, personal LinkedIn accounts, and even on Italian business documents, Musto was until recently listed as holding a PhD from the Massachusetts Institute of Technology. In some cases, his biography also claimed an MBA from New York University." Wired reported that neither University had any record of Musto's attendance, and Musto later admitted in an interview with Wired that he had never earned those degrees. Around that same time, Massimo Banzi announced that the Arduino Foundation would be "a new beginning for Arduino." But a year later, the Foundation still hasn't been established, and the state of the project remains unclear. The controversy surrounding Musto continued when, in July 2017, he reportedly pulled many Open source licenses, schematics, and code from the Arduino website, prompting scrutiny and outcry. In October 2017, Arduino announced its partnership with ARM Holdings (ARM). The announcement said, in part, "ARM recognized independence as a core value of Arduino ... without any lock-in with the ARM architecture." Arduino intends to continue to work with all technology vendors and architectures.

4.2 Operation with Pins:

Arduino is open-source hardware. The hardware reference designs are distributed under a Creative Commons Attribution Share-Alike 2.5 license and are available on the Arduino website. Layout and production files for some versions of the hardware are also available.

Although the hardware and software designs are freely available under copyleft licenses, the developers have requested the name Arduino to be exclusive to the official

product and not be used for derived works without permission. The official policy document on use of the Arduino name emphasizes that the project is open to incorporating work by others into the official product. Several Arduino-compatible products commercially released have avoided the project name by using various names ending in –arduino

Most Arduino boards consist of an Atmel 8-bit AVR microcontroller (Atmega8,[24] Atmega168, Atmega328, Atmega1280, Atmega2560) with varying amounts of flash memory, pins, and features. The 32-bit Arduino Due, based on the Atmel SAM3X8E was introduced in 2012. The boards use single or double-row pins or female headers that facilitate connections for programming and incorporation into other circuits. These may connect with add-on modules termed shields. Multiple and possibly stacked shields may be individually addressable via an I²C serial bus. Most boards include a 5 V linear regulator and a 16 MHz crystal oscillator or ceramic resonator. Some designs, such as the Lilypad, run at 8 MHz and dispense with the onboard voltage regulator due to specific form-factor restrictions.

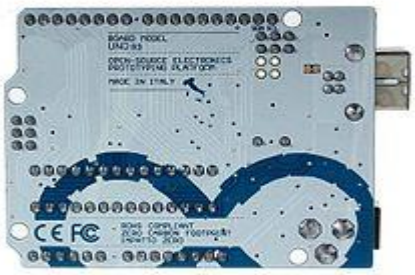


Fig.4.2. Back Side of Module.

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default bootloader of the Arduino UNO is the optiboot bootloader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic (TTL) level signals. Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the

Arduino Mini and the unofficial Boarduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods. When used with traditional microcontroller tools, instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used. The Arduino board exposes most of the microcontroller's I/O pins for use by other circuits. The Diecimila, Duemilanove, and current Uno provide 14 digital I/O pins, six of which can produce pulse-width modulated signals, and six analog inputs, which can also be used as six digital I/O pins. These pins are on the top of the board, via female 0.1-inch (2.54 mm) headers. Several plug-in application shields are also commercially available. The Arduino Nano, and Arduino-compatible Bare Bones Board and Boarduino boards may provide male header pins on the underside of the board that can plug into solderless breadboards.

Many Arduino-compatible and Arduino-derived boards exist. Some are functionally equivalent to an Arduino and can be used interchangeably. Many enhance the basic Arduino by adding output drivers, often for use in school-level education, to simplify making buggies and small robots. Others are electrically equivalent but change the form factor, sometimes retaining compatibility with shields, sometimes not. Some variants use different processors, of varying compatibility.

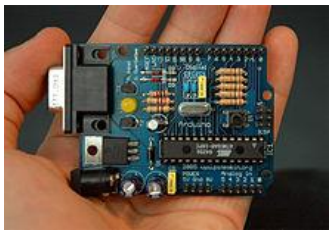


Fig.4.3. Arduino board.

Table 4.1 Arduino pins

1	**Power USB** Arduino board can be powered by using the USB cable from your computer. All you need to do is connect the USB cable to the USB connection (1).
2	**Power (Barrel Jack)** Arduino boards can be powered directly from the AC mains power supply by

	connecting it to the Barrel Jack (2).
3	**Voltage Regulator** The function of the voltage regulator is to control the voltage given to the Arduino board and stabilize the DC voltages used by the processor and other elements.
4	**Crystal Oscillator** The crystal oscillator helps Arduino in dealing with time issues. How does Arduino calculate time? The answer is, by using the crystal oscillator. The number printed on top of the Arduino crystal is 16.000H9H. It tells us that the frequency is 16,000,000 Hertz or 16 MHz.
5,17	**Arduino Reset** You can reset your Arduino board, i.e., start your program from the beginning. You can reset the UNO board in two ways. First, by using the reset button (17) on the board. Second, you can connect an external reset button to the Arduino pin abeled RESET (5).
6,7,8,9	**Pins (3.3, 5, GND, Vin)** • 3.3V (6) – Supply 3.3 output volt • 5V (7) – Supply 5 output volt • Most of the components used with Arduino board works fine with 3.3 volt and 5 volts. • GND (8) (Ground) – There are several GND pins on the Arduino, any of which can be used to ground your circuit. • Vin (9) – This pin also can be used to power the Arduino board from an external power source, like AC mains power supply.

10	**Analog pins** The Arduino UNO board has six analog input pins A0 through A5. These pins can read the signal from an analog sensor like the humidity sensor or temperature sensor and convert it into a digital value that can be read by the microprocessor.
11	**Main microcontroller** Each Arduino board has its own microcontroller (11). You can assume it as the brain of your board. The main IC (integrated circuit) on the Arduino is slightly different from board to board. The microcontrollers are usually of the ATMEL Company. You must know what IC your board has before loading up a new program from the Arduino IDE. This information is available on the top of the IC. For more details about the IC construction and functions, you can refer to the data sheet.
12	**ICSP pin** Mostly, ICSP (12) is an AVR, a tiny programming header for the Arduino consisting of MOSI, MISO, SCK, RESET, VCC, and GND. It is often referred to as an SPI (Serial Peripheral Interface), which could be considered as an "expansion" of the output. Actually, you are slaving the output device to the master of the SPI bus.
13	**Power LED indicator** This LED should light up when you plug your Arduino into a power source to indicate that your board is powered up correctly. If this light does not turn on, then there is something wrong with the connection.
14	**TX and RX LEDs** On your board, you will find two labels: TX (transmit) and RX (receive). They appear in two places on the Arduino UNO board. First, at the digital pins 0 and 1, to indicate the pins responsible for serial communication. Second, the TX and RX led (13). The TX led flashes with different speed while sending the serial data. The

	speed of flashing depends on the baud rate used by the board. RX flashes during the receiving process.
15	**Digital I/O** The Arduino UNO board has 14 digital I/O pins (15) (of which 6 provide PWM (Pulse Width Modulation) output. These pins can be configured to work as input digital pins to read logic values (0 or 1) or as digital output pins to drive different modules like LEDs, relays, etc. The pins labeled "~" can be used to generate PWM.
16	**AREF** AREF stands for Analog Reference. It is sometimes, used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input pins.

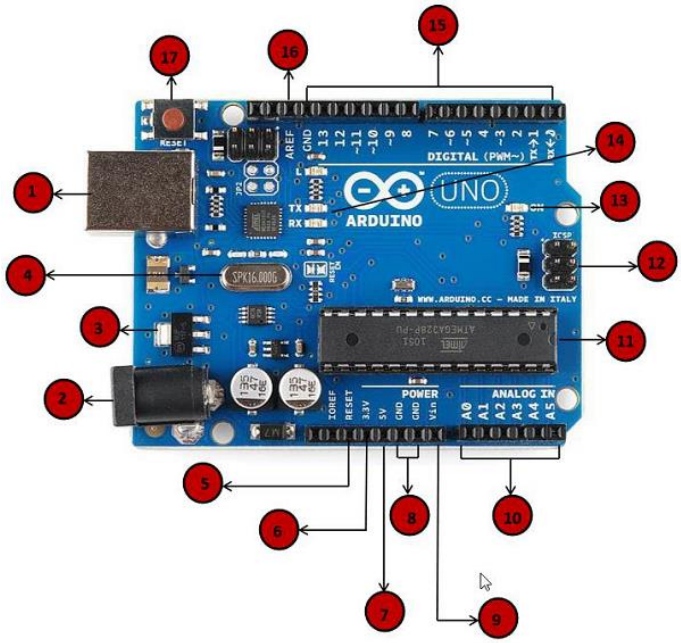


Fig.4.4. Arduino Board Pin Diagram

CHAPTER-5

SOFTWARE EXPLANATION

5.0: Introduction

This project is implemented using following software's:

- Express PCB – for designing circuit
- Arduino IDE compiler - for compilation part
- Proteus 7 (Embedded C) – for simulation part

5.1 The Interface:

When a project is first started you will be greeted with a yellow outline. This yellow outline is the dimension of the PCB. Typically after positioning of parts and traces, move them to their final position and then crop the PCB to the correct size. However, in designing a board with a certain size constraint, crop the PCB to the correct size before starting.

Fig: 5.1 Tool Bar Necessary For The Interface

The select tool: It is fairly obvious what this does. It allows you to move and manipulate parts. When this tool is selected the top toolbar will show buttons to move traces to the top / bottom copper layer, and rotate buttons.

The zoom to selection tool: does just that.

The place pad:

Button allows you to place small soldier pads which are useful for board connections or if a part is not in the part library but the part dimensions are available. When this tool is selected the top toolbar will give you a large selection of round holes, square holes and surface mount pads.

The place component:

Tool allows you to select a component from the top toolbar and then by clicking in the workspace places that component in the orientation chosen using the buttons next to the component list. The components can always be rotated afterwards with the select tool if the orientation is wrong.

The place trace:

Tool allows you to place a solid trace on the board of varying thicknesses. The top toolbar allows you to select the top or bottom layer to place the trace on.

The Insert Corner in trace:

Button does exactly what it says. When this tool is selected, clicking on a trace will insert a corner which can be moved to route around components and other traces.

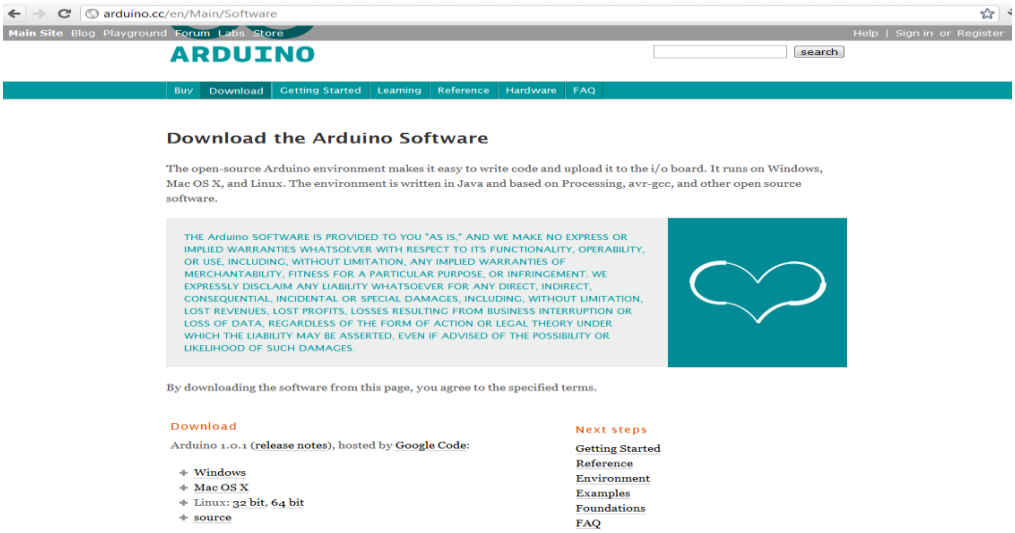
The remove a trace button is not very important since the delete key will achieve the same result.

5.2: Design Considerations

Before starting a project there are several ways to design a PCB and one must be chosen to suit the project's needs. Single sided, or double sided?

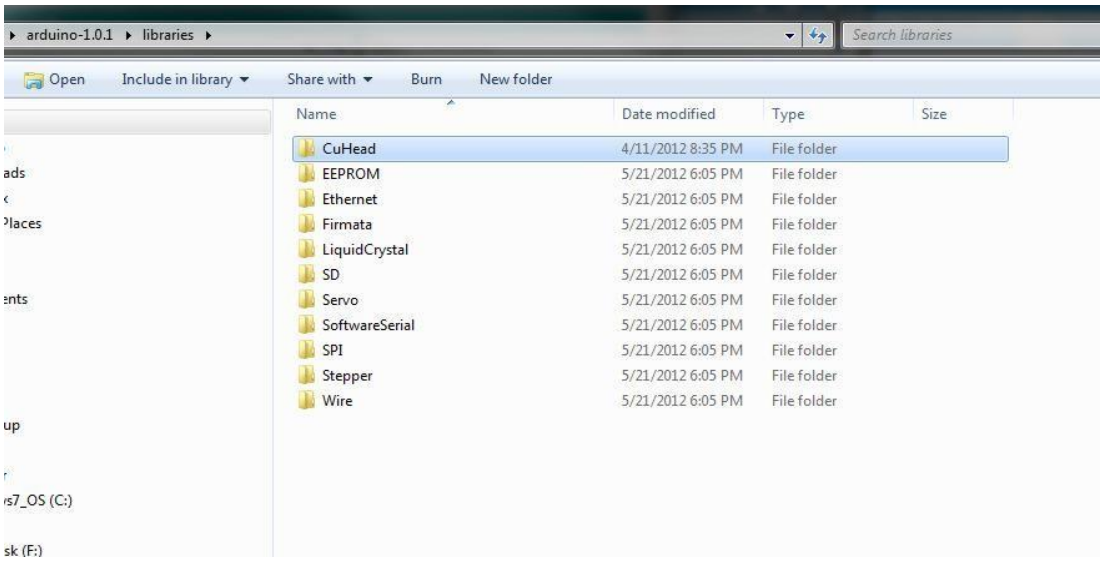
When making a PCB you have the option of making a single sided board, or a double sided board. Single sided boards are cheaper to produce and easier to etch, but much harder to design for large projects. If a lot of parts are being used in a small space it may be difficult to make a single sided board without jumpering over traces with a cable. While there's technically nothing wrong with this, it should be avoided if the signal travelling over the traces is sensitive (e.g. audio signals).

A double sided board is more expensive to produce professionally, more difficult to etch on

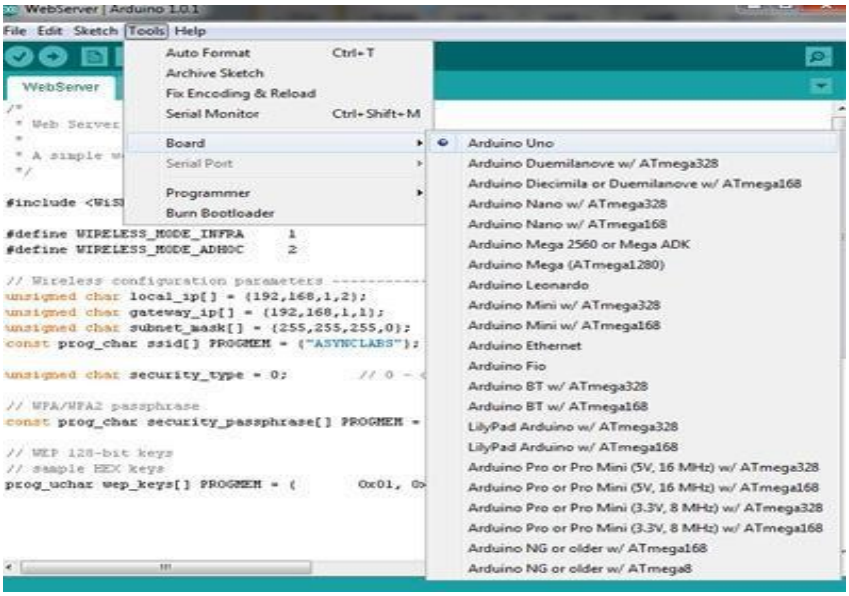


a DIY board, but makes the layout of components a lot smaller and easier. It should be noted that if a trace is running on the top layer, check with the components to make sure you can get to its pins with a soldering iron. Large capacitors, relays, and similar parts which don't have axial leads can NOT have traces on top unless boards are plated professionally.

Step 1: Open the library then we various files displayed over there click on Cuhead

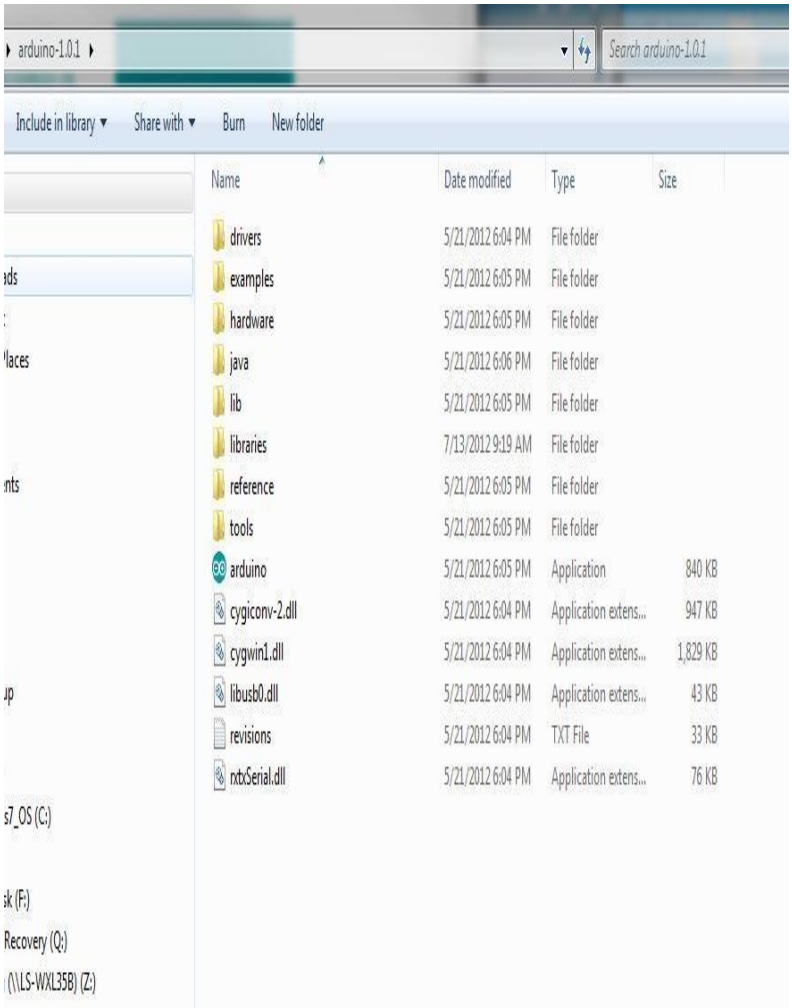


Step:2 In next step download library



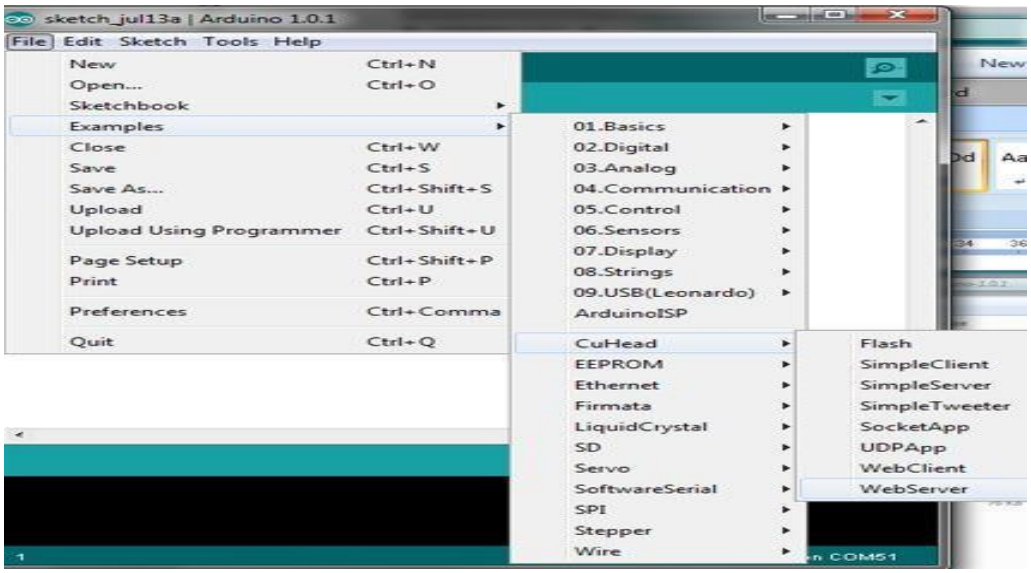
As Arduino doesn’t recognize the directory name, please rename it

Step 3:

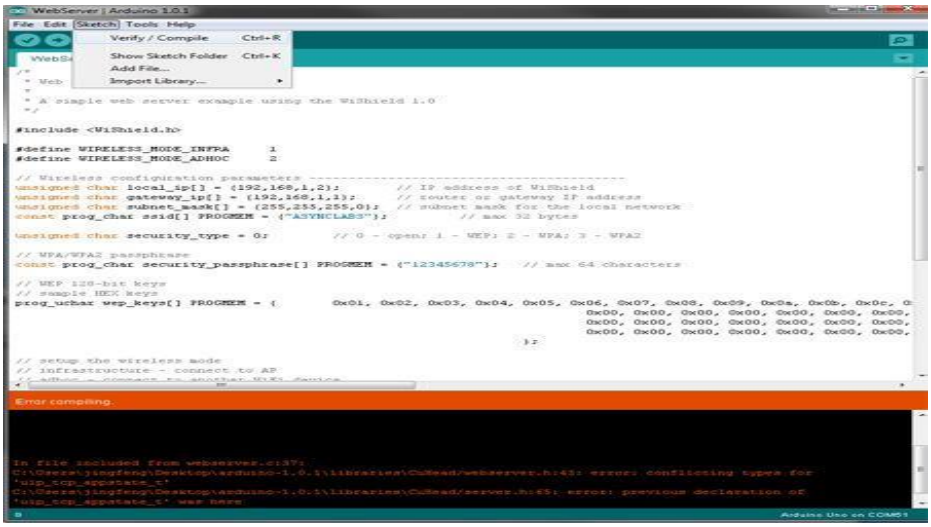


Step 4: Launch Arduino by double click “Arduino” below

One example



Step 5:



CHAPTER-6

EXPLANATION OF RESULT

The system works on based on input devices. The Arduino act as interface for the input and output devices. The system detects the obstacle using IR sensor and water sensor. Based on the obstacle the output LCD will indicate the respective information. The arduino will also activate the APR9600 to generate audio signals. If the object is detected by using the IR sensor, then it will pass the information to the arduino. Then, arduino will activate the APR9600 IC which contains the pre-saved voice message, then it executes the respective voice and we gone here that the object detected. On the other hand, arduino also activate the LCD to display that object is detected on the screen. The below figure gives a picture of IR detection

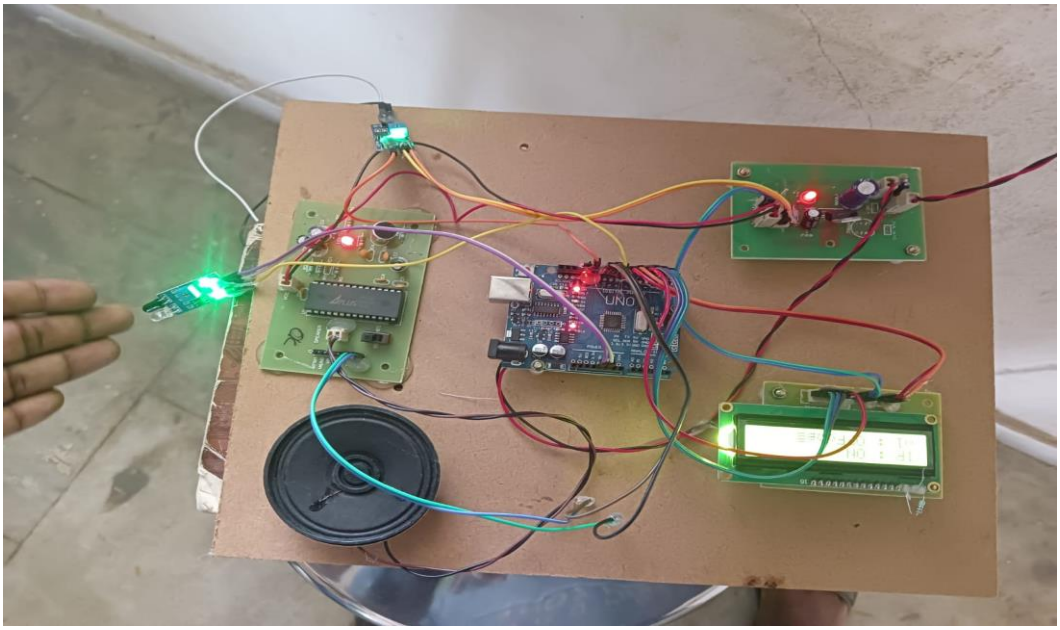


Fig 6.1 Object Detected Infront of IR Sensor

From the above we observe that, when hand comes in front of the IR sensor get and notified the Arduino, we can also observe that LCD showing that object is detected.

On other hand, when water sensor is activated then it will be intimating the Arduino board that water is detected, then Arduino will pass the respective output to the APR9600 to generate the voice that water was detected .we can observe the water sensor detecting the water by below figure

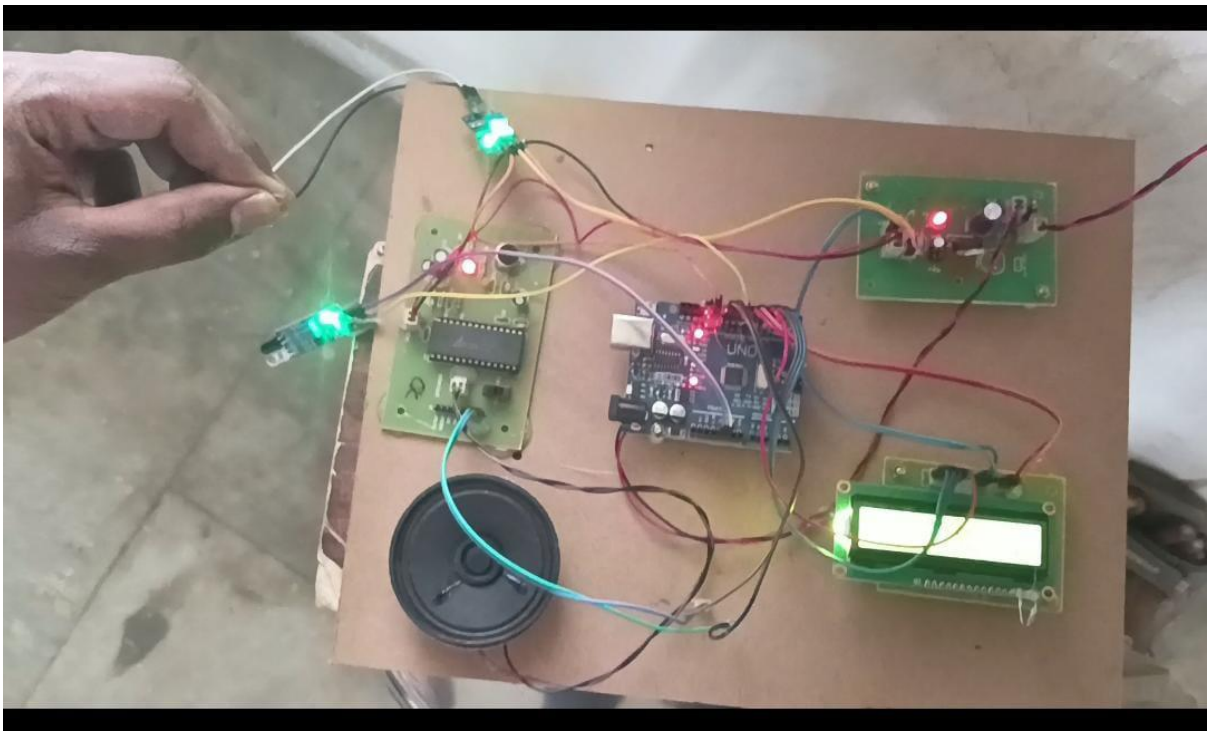


Fig 6.2 Water detected Using Water Sensor

From the above figure we observed the detection of water by implementation of conduction process. we know that water conduct, the two wire were separated by placing the stick between them. When water come contact to stick then it will conduct as the stick edge get wet and conduct. So, when current passes then the water sensor will be activated and pass information to arduino that water was detected.

CHAPTER-7

ADVANTAGES AND LIMITATIONS

7.1Advantages:

1) Highly Sensitive
2) Low cost and Reliable circuit.
3) Works according to the soil condition.
4) Complete elimination of manpower.
5) Can handle heavy loads up to 7A.
6) System can be switched into manual mode when even required.

7.2Limitations:

1) This is applicable for only large farms
2) Limitiation in life span

CHAPTER-8
CONCLUSION AND FUTURE SCOPE

The smart walking stick is more advance, easy to maintain, cheap, durable than conventional one. With the help of smart walking stick blind, elderly people can advance more than 15-20% travel speed, reduce minor collision; do not lose their way, and increase safety and confidence. Blind and elderly users can move confidently without any dependence on other person with the help of this smart stick. The smart walking stick, constructed with at most accuracy, will help the blind people to move from one place to another without others help. This could also be considered a crude way of giving the blind a sense of vision. This stick reduces the dependency of visually impaired people on other family members, friends and guide dogs while walking around. The proposed combination of various working units makes a real-time system that monitors position of the user and provides dual feedback making navigation more safe and secure. The smart stick detects objects or obstacles in front of users and feeds warning back, in the form of voice messages rather than vibration. Also, the incorporation of automatic room equipment switching in the stick will be useful while they are indoor. The advantage of the system lies in the fact that it can prove to be a low-cost solution to millions of blind people worldwide.

It can be further improved to have more decision taking capabilities by employing varied types of sensors and thus could be used for different applications. It aims to solve the problems faced by the blind people in their daily life. The system also takes measures to ensure their safety

Technology created reading machines, talking books, and computers that translate Braille.

➤ Communications technologies were easier to invent and consequently were brought to market

➤ Technologies available for blind navigation are insufficiently developed, adapted, and marketed.

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