INTRODUCTION

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A big challenge in the cities is solid waste management. "Swatch Bharat Abhiyan" Prime Minister Mr. Narendra Modi's ambitious project to make India clean country aims to teach citizens to reduce and even to clean their own waste. India generates about 60 million tonnes of crash every year.10 million tonnes garbage is generated in just metropolitan cities like Delhi, Mumbai, Chennai, etc. This project will give us efficient way to keep our environment clean and green.

In this proposed system there are multiple dust bins are located throughout the city, this dust bins are provided with low cost embedded devices. Global system for mobile communication is the latest tread used now a days can be used for our project. Sensors are placed above the dust bin. It will detect whether the garbage is at low, middle or highest level.

The main control unit consist of ardunio it will receive the output signal of sensor, process it and according to that it will send the message to office user. Along with detection of depth of garbage simultaneously it will detect presence flame or smoke. The work consists of an experimental approach towards waste management and finding analternative to conventional materials in flexible pavements
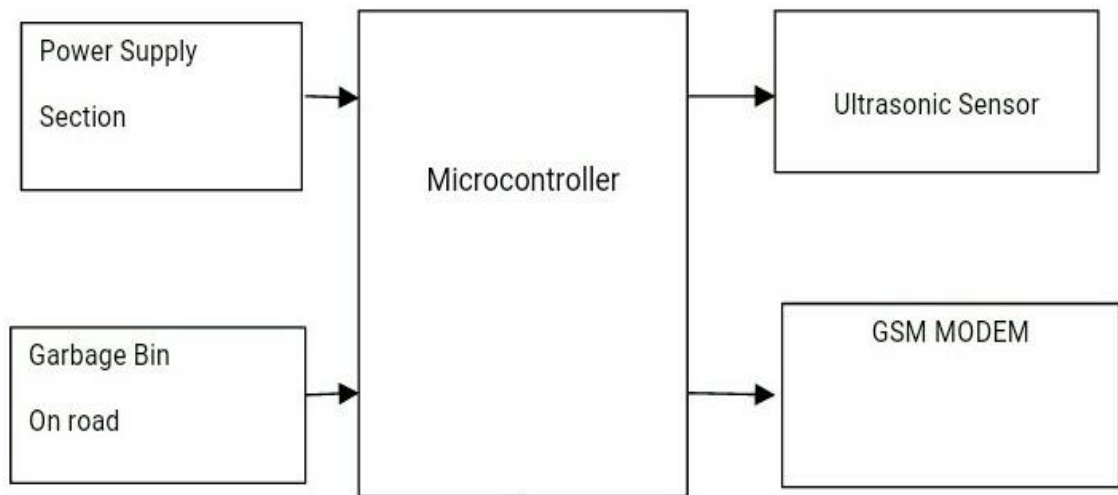
Block Diagram

Block Diagram:-

Fig 1.1. Block Diagram of Garbage Bin Detection.

Block Diagram Description:-

POWER SUPPLY:-

A power supply is an electronic device that supplies electric energy to an electrical load.

The primary function of a power supply is to convert one form of electrical energy to another. Every power supply must obtain the energy it supplies to its load, as well as any energy it consume while performing that task, form an energy source.

Depending on its design, a power supply may obtain energy from various types of energy, including electrical energy transmission system energy storage device such as a batteries and fuel cells.

ULTRASONIC SENSOR:-

An Ultrasonic sensor is a device that can measure the distance to an object by using sound waves. It measure distance by sending out a sound wave at a specific frequency .Listening for that sound wave to bounce back.

Ultrasonic sensor are based on the measurement of the properties of acoustic waves with frequencies above the human audible range often at roughly 40khz.

The typically operate by generating a high frequency pulse of sound, and then receiving and evaluating the properties of the echo pulse.

Ultrasound is waves with frequencies higher than the upper audible limit of human hearing.

Ultrasound is used in many different fields.

Ultrasonic devices operate with frequencies from 20 khz up to several gigahertz.

LCD (LIQUID CRYSTAL DISPLAY):-
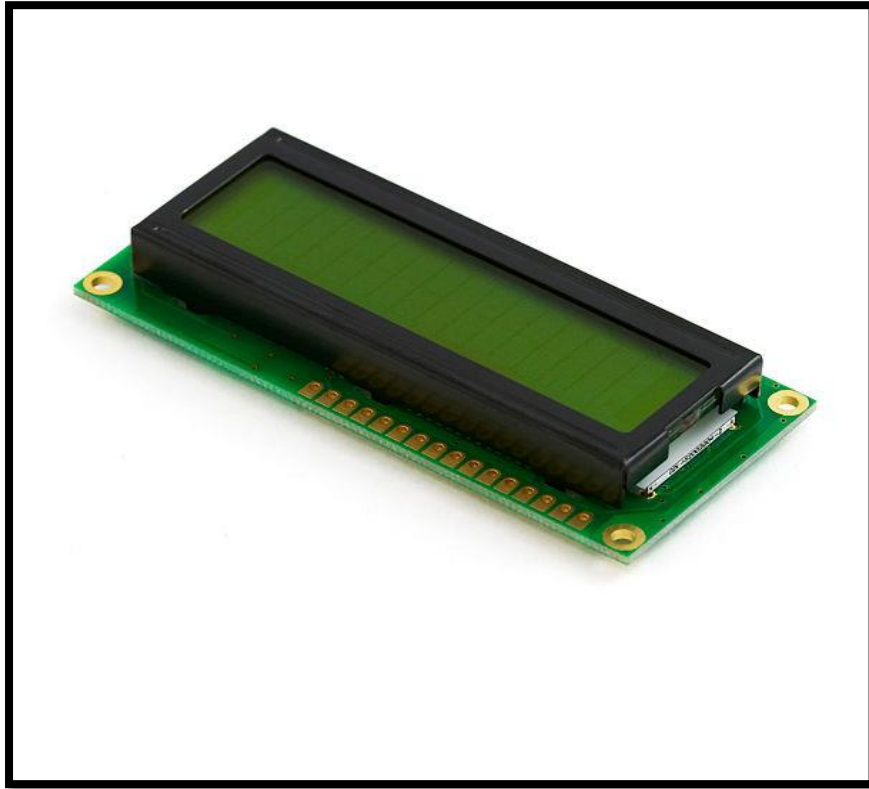
A liquid crystal display is a flat panel display or other electronically modulated optical devices that uses the light modulating properties of liquid crystals. Liquid crystal do not emit light directly, instead using backlight or reflector to produce image in color or monochrome. LCDs allow displays to be much thinner than cathode ray tube (CRT) technology. LCD is composed of several layers which include two polarized panel filters and electrodes.

GSM (Global system for Mobile):-

Fig. for Global System

GSM is a standard developed by the European Telecommunication Standards Institute to describe the protocols for second generation digital cellular network used by mobiles phones, first deployed in Finland in December.

GSM is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access and is most widely used of the three digital wireless telephony technologies.

It uses the extremely popular SIM300 GSM module. It provide the industry standard serial RS232 interface for easy connection to computer and other devices. It provides serial TTL interface for easy and direct interface to microcontroller.

The modem consist of all the required external circuitry required to start experimenting with the SIM300 module like the power regulation, external antenna, SIM Holder, etc.

WORKING

WORKING:-

The sensors would replace in the common garbage bin sited on the public places. When the garbage reaches the level of 4cm then that signal will be given to ATMEG328 controller. The controller will gives signal to the driver of garbage collection truck as to which garbage bin is completely filled and desires urgent attention. If the garbage bin is empty by the garbage collector then LCD display, display "THANK YOU ". If the garbage bin is still full then after a 1min it send a message to the Area Head. If the garbage bin is empty then it send a "THANK YOU" message to the Area Head. If the garbage bin is still full then after a 1min it send a message to the Municipality Authority." ATMEG328 will give indication by sending SMS using GSM technology. Whenever the garbage bin is full information can be send to the concerned authority to clean the bin.

Pin Diagram
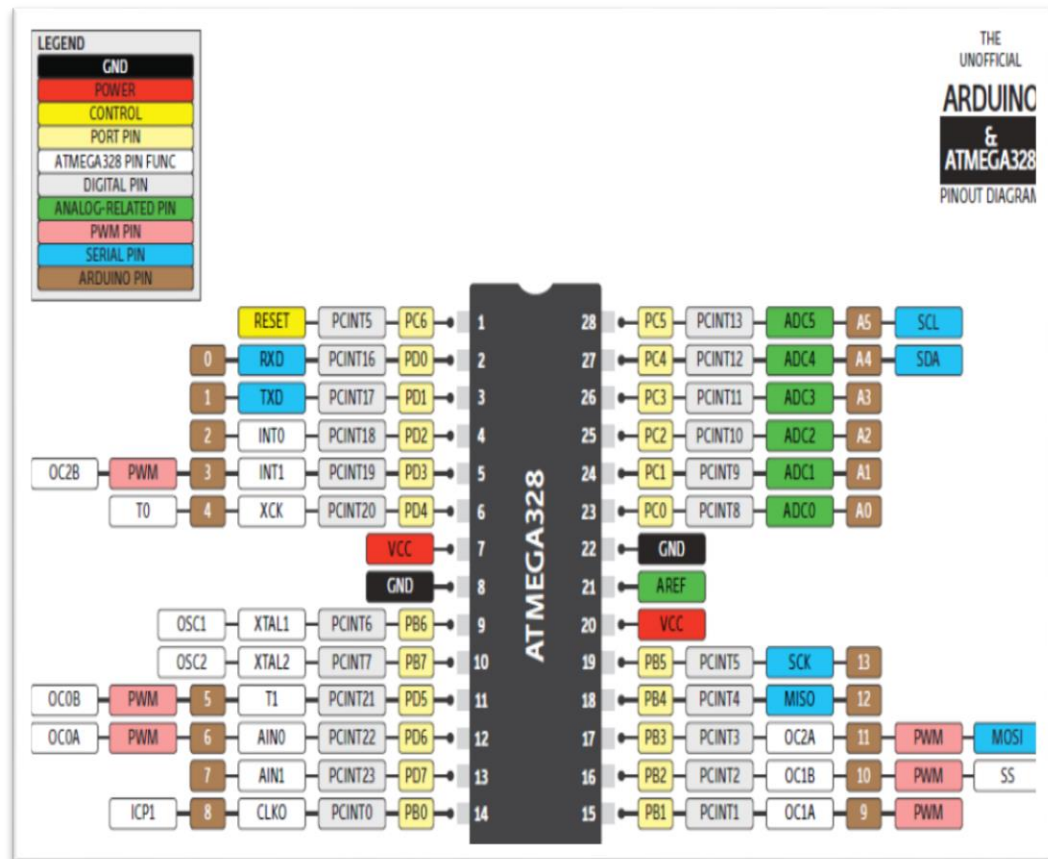
Pin Diagram of Atmega IC 328:-

Fig.2.1Pin Diagram of Atmega IC 328:-

Vcc:-

Digital supply voltage.

GND:-

Ground.

PortB (PB-7:0)XTAL1/XTAL2/OSC1/OSC2

PortB is an 8-bit is a bidirectional I/O port with pull up resistor(selected for each bit).As a inputs, port B pin that are externally pulled low will source current if the pull up resistors are activated. The port B pins are tri-stated when reset condition becomes active, even if the clock is not running.

Depending upon the clock selection fuse settings,PB6 can be use as input to the inverting oscillator amplifier and input to the internal clock operating circuit.

Depending on the clock selection fuse settings,PB7 can be used as output from inverting oscillator amplifier.

If the Internal calibrated RC Oscillator is used as chip clock source,PB(7:6)is used as TOSc(2:1)input for the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is set.

Port C:-

Port C is 8-bit bidirectional I/O port with pull up resistor(selected for each bit).As inputs, Port C pins that are externally pulled low will source current if the pull up resistor are activated. The port C pins are tri-stated when a reset condition becomes active, even if the clock is not running.

AVcc:-

AVcc is the supply voltage pin for the A/D Converter., PC(3:0), and PE (3:2).It should be externally connected to the Vcc, even if the ADC is not used. If the ADC is used, it should be connected to Vcc through a low pass filter. Note that PC(6:4)is use digital supply voltage, Vcc.

AREF:-

AREF is the analog reference pin for the A/D converter.

Circuit Components:-

- Aurdino Circuit.
- Liquid Crystal Display(LCD).
- GSM Modem
- Ultrasonic Sensor.
- Voltage Divider Circuit.

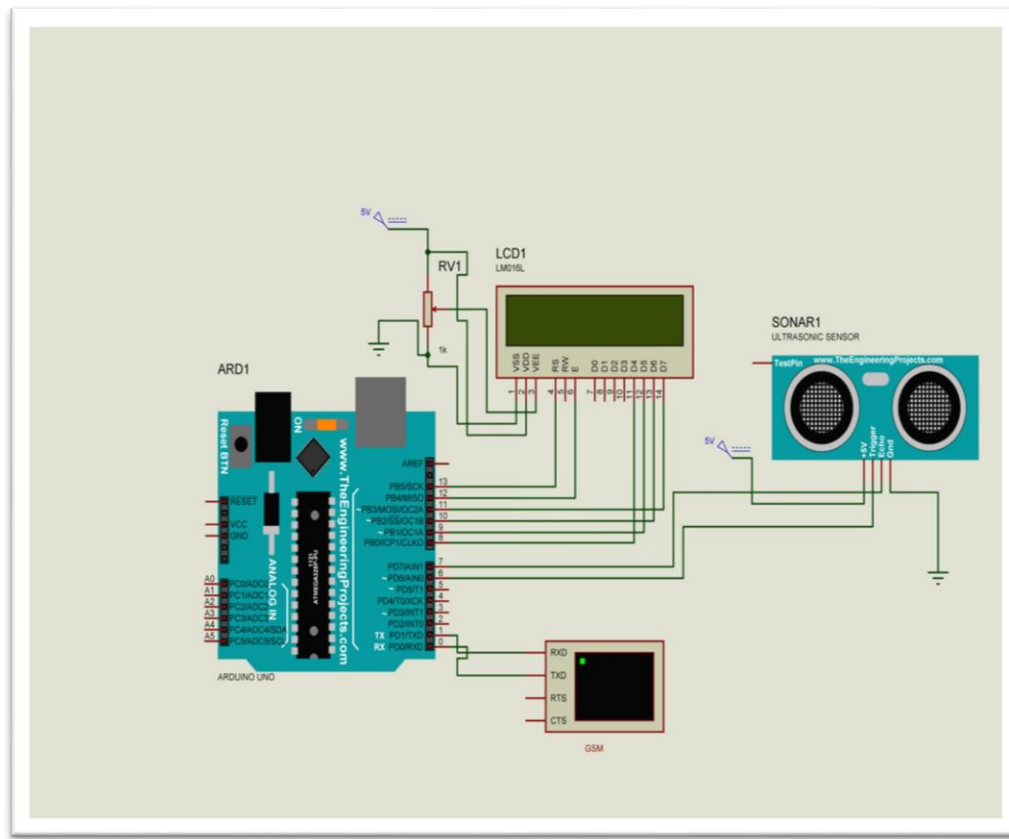# Circuit Diagram

Circuit Diagram Of Garbage Bin Detection:-

Fig 3.1.Circuit Diagram of System.

Circuit Diagram Description:-

Above fig. shows the main cricket diagram in which the pin connection are defined. The TXD pin of GSM is connected to RXD pin of ATMEGA328 and RXD pin of GSM is connected to the TXD pin of ATMEGA328 microcontroller. The Trigger and Echo pin of ultrasonic sensor is connected to the digital pin 9 and 10.

The 9V DC power is converted into 5V by using voltage regulator 7805 which is required for the operation of microcontroller and other components. The ultrasonic sensors placed over the bins to detect the garbage level and compare it with the garbage bins depth and send the signal to the ATMEGA328 microcontroller through the programing microcontroller continuously detect the garbage level and send the massages to the desired authority through the GSM. According to operation LCD Display the massages.

Software Details:-

Program:-

```
#include <LiquidCrystal.h>

// initialize the library with the numbers of the interface pins
LiquidCrystal lcd(3, 4, 5, 6, 7, 8);
const int Echo1 = 9;
const int Trig1 = 10;
long duration1, inches1, cm1;
void setup() {
  Serial.begin(9600);
  // put your setup code here, to run once:
 lcd.begin(16, 2);
 pinMode(Trig1, OUTPUT);
 pinMode(Echo1, INPUT);
 lcd.setCursor(0,0);
 // Print a message to the LCD.
 lcd.print("  Garbage bin  ");
 lcd.setCursor(0,1);
 lcd.print("  Detection    ");
 delay(100);
}

void loop() {
  again:lcd.setCursor(0,0);
 lcd.print("Go Clean...    ");
  lcd.setCursor(0,1);
 lcd.print("    ...Go Green");
 reading();
 // put your main code here, to run repeatedly:
if(cm1<=4){
 lcd.setCursor(0,0);
 lcd.print("Msg Send to...  ");
```

```
   lcd.setCursor(0,1);
 lcd.print("Garbage Collector");
  Serial.println("AT+CMGF=1");    //select text mode
   delay(10);
   Serial.println("AT+CMGS=\"9145173255\"");  // enter receipent number
   Serial.println();
   Serial.println("Garbage Bin of Location AMT/GADGENAGAR/498 is
Full.Immideately report to the location");
   Serial.write(26);
   delay(5000);
  }


if(cm1<=4){
for(int i=0;i<50;i++){
  lcd.setCursor(0,0);
  lcd.print("Getting Status  ");
  lcd.setCursor(0,1);
  lcd.print("of Garbage Bin 1");
  delay(100);
  reading();
  if(cm1==8){
    lcd.setCursor(0,0);
  lcd.print("   Thank You   ");
   lcd.setCursor(0,1);
  lcd.print("Garbage Collector");
  delay(5000);
 goto again;}
  }}
  if(cm1<=4){
lcd.setCursor(0,0);
  lcd.print("Msg Send to...  ");
   lcd.setCursor(0,1);
  lcd.print("Area Head       ");
   Serial.println("AT+CMGF=1");    //select text mode
```

```
    delay(10);
    Serial.println("AT+CMGS=\"7264844492\"");  // enter receipent number
    Serial.println();
    Serial.println("Garbage Bin of Location AMT/GADGENAGAR/498 is
Full.Garbage Colletor does not respond in time.");
    Serial.write(26);
delay(5000);
  for(int i=0;i<50;i++){
  lcd.setCursor(0,0);
  lcd.print("Getting Status  ");
  lcd.setCursor(0,1);
  lcd.print("of Garbage Bin 2");
  delay(100);
  reading();
  if(cm1==8){goto again;}
  }}
if(cm1<=4){
  lcd.setCursor(0,0);
  lcd.print("Msg Send to...  ");
   lcd.setCursor(0,1);
  lcd.print("MNC Authority    ");
   Serial.println("AT+CMGF=1");    //select text mode
   delay(10);
   Serial.println("AT+CMGS=\"8552986360\"");  // enter receipent number
   Serial.println();
   Serial.println("Garbage Bin of Location AMT/GADGENAGAR/498 was
full and is not operated by Garbage Collector and Area Head Till Date.Kindly
look into the matter for immediate action");
   Serial.write(26);
   while(cm1!=8){reading();}
   goto again;
}
}
```

```
void reading(){
 digitalWrite(Trig1 ,LOW);
 delayMicroseconds(2);
 digitalWrite(Trig1, HIGH);
 delayMicroseconds(5);
 digitalWrite(Trig1, LOW);


 // The same pin is used to read the signal from the PING))): a HIGH
 // pulse whose duration is the time (in microseconds) from the sending
 // of the ping to the reception of its echo off of an object.


 duration1 = pulseIn(Echo1, HIGH);


 // convert the time into a distance
 inches1 = microsecondsToInches(duration1);
 cm1 = microsecondsToCentimeters(duration1);


 Serial.print(inches1);
 Serial.print("in, ");
 Serial.print(cm1);
 Serial.print("cm");
 Serial.println("-----------US1");
// Serial.println();
 delay(500);
 }
long microsecondsToInches(long microseconds)
{
 // According to Parallax's datasheet for the PING))), there are
 // 73.746 microseconds per inch (i.e. sound travels at 1130 feet per
 // second).  This gives the distance travelled by the ping, outbound
 // and return, so we divide by 2 to get the distance of the obstacle.
 // See: http://www.parallax.com/dl/docs/prod/acc/28015-PING-v1.3.pdf
 return microseconds / 74 / 2;
}
```

```
long microsecondsToCentimeters(float microseconds)

{
  // The speed of sound is 340 m/s or 29 microseconds per centimeter.
  // The ping travels out and back, so to find the distance of the
  // object we take half of the distance travelled.
  return microseconds / 29 / 2;
}
```
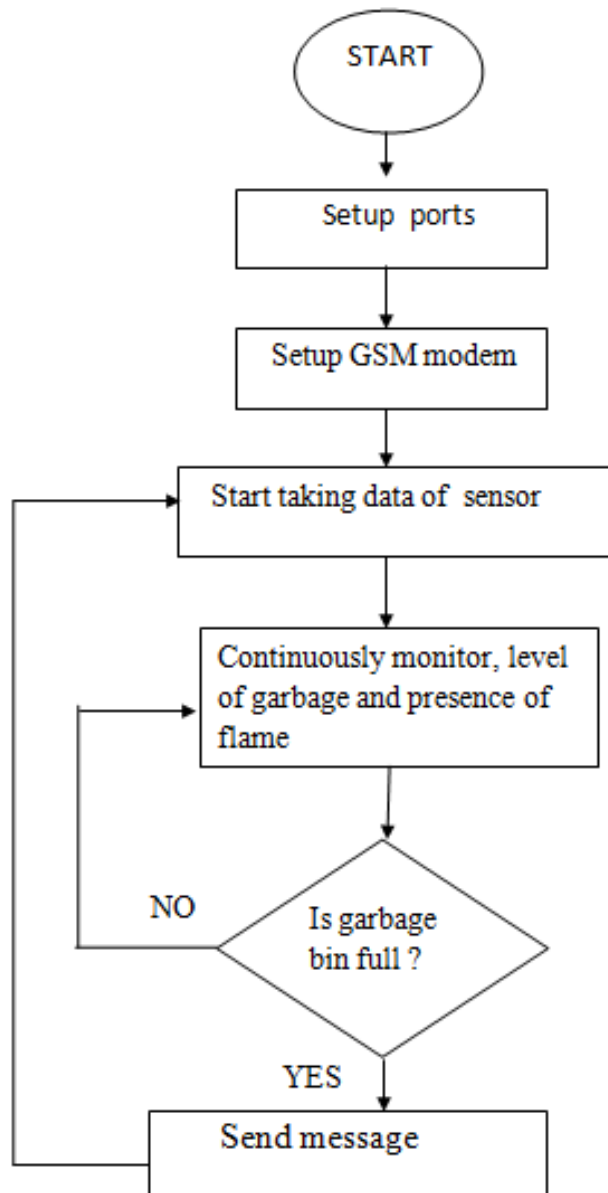
- Flowchart:-


Fig.4.1. Flowchart

Hardware details

Hardware details:-

PCB Designing Procedure:-

The PCB design will be a natural and easy of the extension of the design process. But for many others the process of designing and laying out a PCB can be a very daunting task .There are even very experienced circuit designers who know very little about PCB design, and such leave it up to the "expert" specialist PCB designers. Many Companies even have their own dedicated PCB design departments.

PCB was basically designed as interconnection method suitable for mass production. This scheme is reduced with size and weight of equipment and also help to reduced the wiring errors.PCB design is a very essential to make product that are reliable competitive in market.

PCB Preparation:-
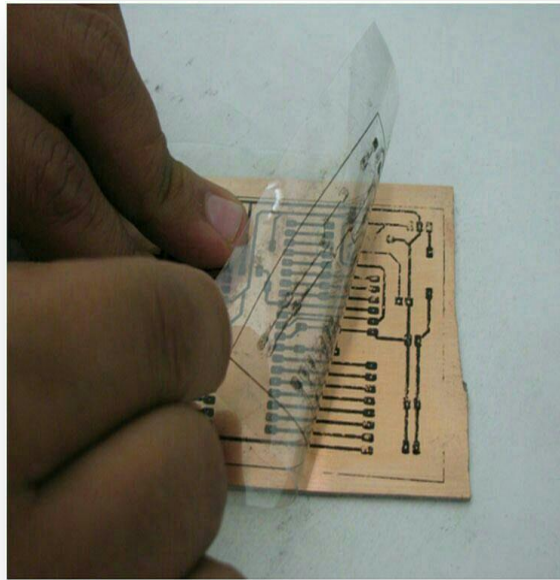
Fig.5.1 For PCB Preparation

The several boards of the same design are to be made of a complicated layout ; therefore it is worth considering photographic methods. There several ways of transferring a layout into copper laminated board photographically, the clean copper laminated board is then coated with a positive photo resist such as fetlock according to the manufacturer's instruction, and the master artwork is placed in contact with the resist and exposed to light.

The exposed part is then placed in a developer path. The board is the washed and each normal wave negative photo resist are also available, this are used and then unexposed portion of resist are developed away of course negative photo resist in tail the use of negative master, that is black background with transparent area of track pattern. This must be produced by making a contact point of the positive master on the photographic film.

Etching:-

Fig5.2 .For Etching

Etching is the traditionally process of using strong acid or mordant to cut into the unprotected parts of metal surface to create a design in the metal. In the modern manufacturing, other chemical may be used on other types of material. As a method of print making, it is, along with engraving, the most important technique for old master prints, and remains in wide use today.

In a number of modern variants such as microfabrication etching and photochemical milling it is a crucial technique in much modern technology including circuit board. In traditional pure etching, a metal plate is covered with waxy ground which is resistant to acid

Etching has often been combined with other incised technique such as engraving.
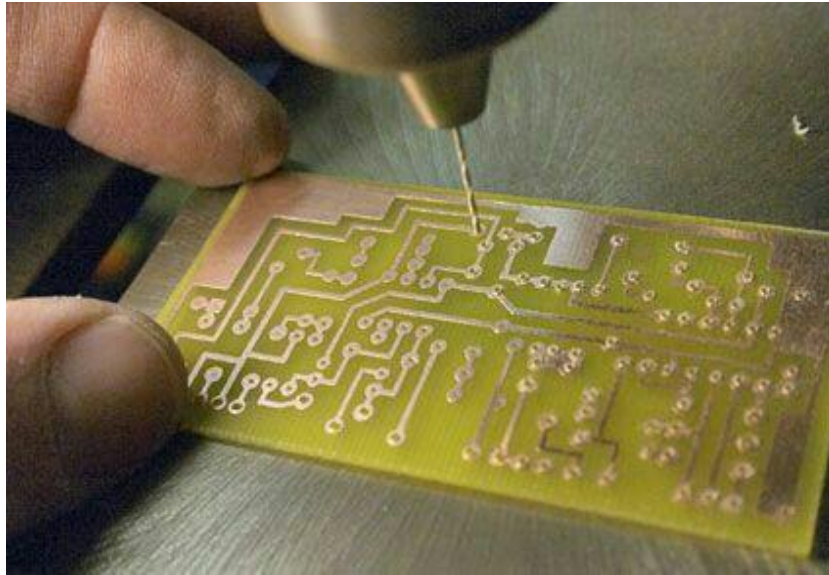
DRILLING:-

Fig 5.3 .For Drilling

Drilling is a cutting process that uses a drill built to a hole of circular cross-section in solid material. The drill built is actually a rotary cutting too, often multipoint. The bit is press against the workpiece and rotated at rates from hundreds to thousands of revolution per minute is forces the cutting edge against the work piece, cutting of chips from the hole as it is drilled.

Drilling may affected by mechanical properties of the work piece by creating low residual stresses around the hole opening and a very thin layer of highly stressed and disturbed material on the newly formed surface. This causes   the work piece susceptible to corrosion and crack propogation at the stress the circuit. A finish operation may be done to avoid these detrimental condition.

MOUNTING:-
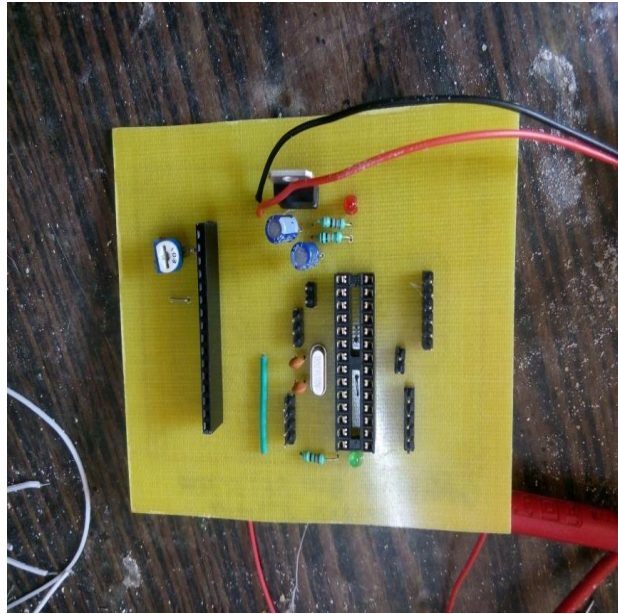
Fig.5.4. For Mounting

Mounting of component goes along way in enhancing reliability of PCB special provision should be for holding a large component. Noisy component should be properly shielded. The mounting of all component has to confirm to accept practices. Smaller component do not need special provision. The solder joint provides mechanical fixation. Bigger and heavier components are adequately secured with clamps or clips and suitable space has to be provided in the layout. A guideline to avoid mechanical over tracking of solder joint is maximum of ten a load per solder joint in a board without plated through holes for a reliable and easy assembly.

Good component placement will make layout job easier and give the best electrical performance.

SOLDERING:-
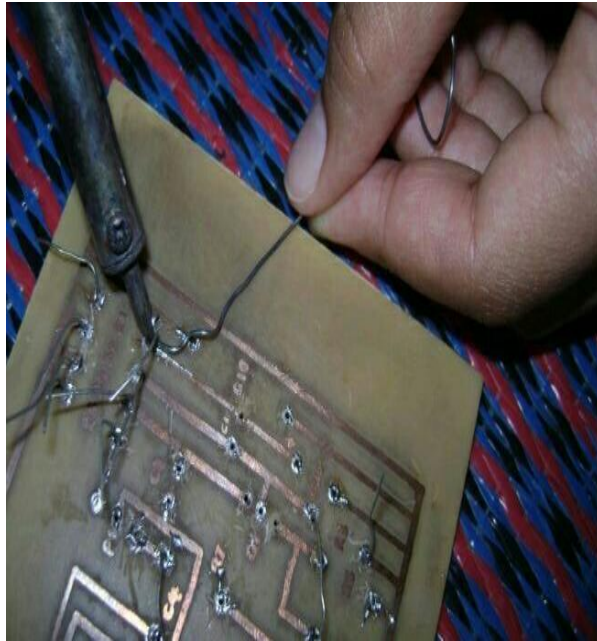
Fig 5.5. For Soldering

For making reliable electrical connections between component and track lead and copper track soldering is essential .For electric soldering wire of lead or tin is used. This alloy wire melts at relatively low temperature that is about 200 degree Celsius .For this purpose soldering iron is used .It forms a molecular bond with the component track.

TESTING OF COMPONENTS :-

Fig.5.6. For Component Testing

When the PCB ready, there are way to find the causes of the problem. Circuit testing is often the first diagnostics performed on an electrical devices that has stop working. A quick and relatively easy test to run, circuit testing can be performed with simple tools such as multimeter. One can also used a more complex tools such as the in Circuit Test.

Circuit testing determine whether electrical current can travel through a circuit. Resistance, measured in Ohms, is the measure of the resistance in a circuit. A measure of 0 ohms means there is no resistance. Current flows freely with no obstacles. If the reading is infinite ohms means there may be a unintended break in the connection.

The multimeter is a common tool used in circuit testing. Multimeters have two probes and either a digital or analog display. This simple is used to determine whether electrical current is travelling from one end of circuit to another. If a current reaches its destination, the multimeter will register that there are 0 ohms because there is no break in the circuit, or no resistance. If current can not pass through, the device will register that there are infinite Ohms which means that the electrical current is not travelling from one end to the other.

Advantages:-

- Waste level detection inside the dustbin.

- Avoid the overflow of Dustbin.

- Transmit the information wirelessly to concern.

- It also Aims at creating a clean as well as green.

- Real time information on the fill level of the dustbin.

- Deployment of dustbin based on the actual needs.

- Cost Reduction and resource optimization.

- Improves Environment quality

    -Fewer smells

    -Cleaner cities

- Intelligent management of the services in the city.

- Effective usage of dustbins.

Limitations:-

- Time consuming and less effective: trucks go and empty containers whether they are full or not.
- High costs.
- Garbage segregation is a major concern today.
- Unhygienic Environment and look of the city.
- Bad smell spreads and may cause illness to human beings.
- More traffic and Noise.
- The smart Garbage analyzer must be customised according to garage bin.

Application:-

- This system is used in Government sector
- This system is used in various public sector like Railway station, Bus stop, colleges, mall, multiplexer, shopkeepers, Garden, etc.

FUTURE ENHANCEMENT:-

Smart dustbin help us to reduce the pollution .Many times garbage dustbin is overflow and many animals like dog or rat entered inside or near the dustbin .This creates a bad scene .Also some birds are also trying to take out garbage from dustbin .This project can avoid such situation .And the message can be sent directly to the cleaning vehicle instead of contractor's office

Conclusion:-

By implementing this project we can able to monitor the level of garbage in the dust bins placed at public places, according to that we can collect garbage of particular which will avoid overflow conditions and helps to reduce pollution as well as different hazards of health. This system will reduce the wastage of fuel by reducing number of trips of garbage collection vehicle. Hence intelligent garbage monitoring system will makes the garbage collection more efficient.

Reference's:-

WWW.ELECTRONICSFORYOU.COM

WWW.AIDUINO.COM

WWW.TIMESOFINDIA.COM

WWW.DOWNTOEARTH.COM

WWW.ROYALGREEENWICH.GOV.UK