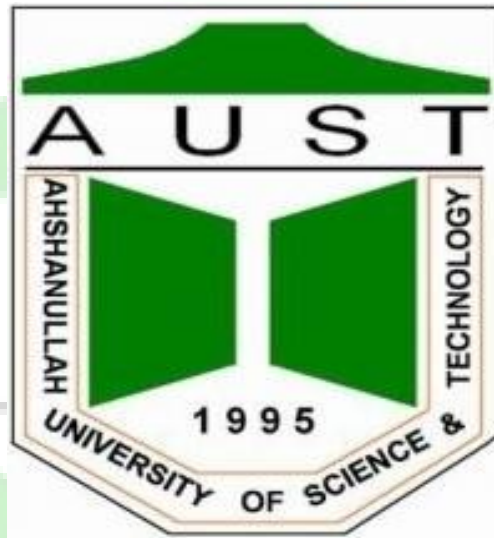# Ahsanullah University of Science & Technology

PROJECT REPORT

PROJECT NAME: ENERGY EFFICIENCY ESCALATOR

SUBMITTED BY

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Course Name: Micro-processor Unit Lab

Course No : EEE- 3210

Group No : 01

INTRODUCTION:

An Escalator is a commonly used device for carrying people in a huge building or in a shopping mall from one floor to another. Usually an escalator runs all the day even if it is carrying people or not which consumes a huge amount of electric power.
In our project we aimed to build an escalator which will be automatically activated when it will sense the presence of people.

EQUIPMENTS AND COMPONENTS:

1. Arduino Uno R3

2. PIR Motion Sensor

3. 6 volt DC Gear Motor

4. 2N222A Transistor

5. Breadboard

6. Jumper Wires

7. 9 volt battery for Arduino and 6 volt battery for motor

8. LCD

WORKING PRINCIPLE:

when someone comes in front of the escalator the PIR motion sensor detects motion and gets HIGH . It sends signal to Arduino's digital pin number 9 . Then the gear motor assigned with the escalator starts rotating for 5 seconds. We can increase the rotating time in the code and the motor will run for more times. Then it stops. In the mean time while its running , if someone comes in front of the escalator , it will continue rotating for another 5 seconds. While no motion is detected , the escalator remain stationary and it does not run.
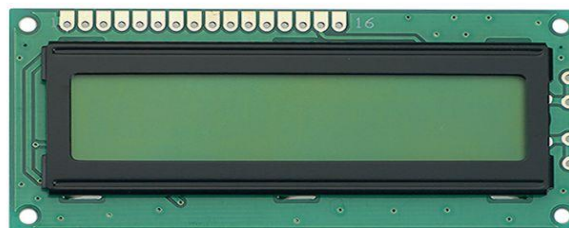
SOME IMPORTANT VISUAL PARTS:

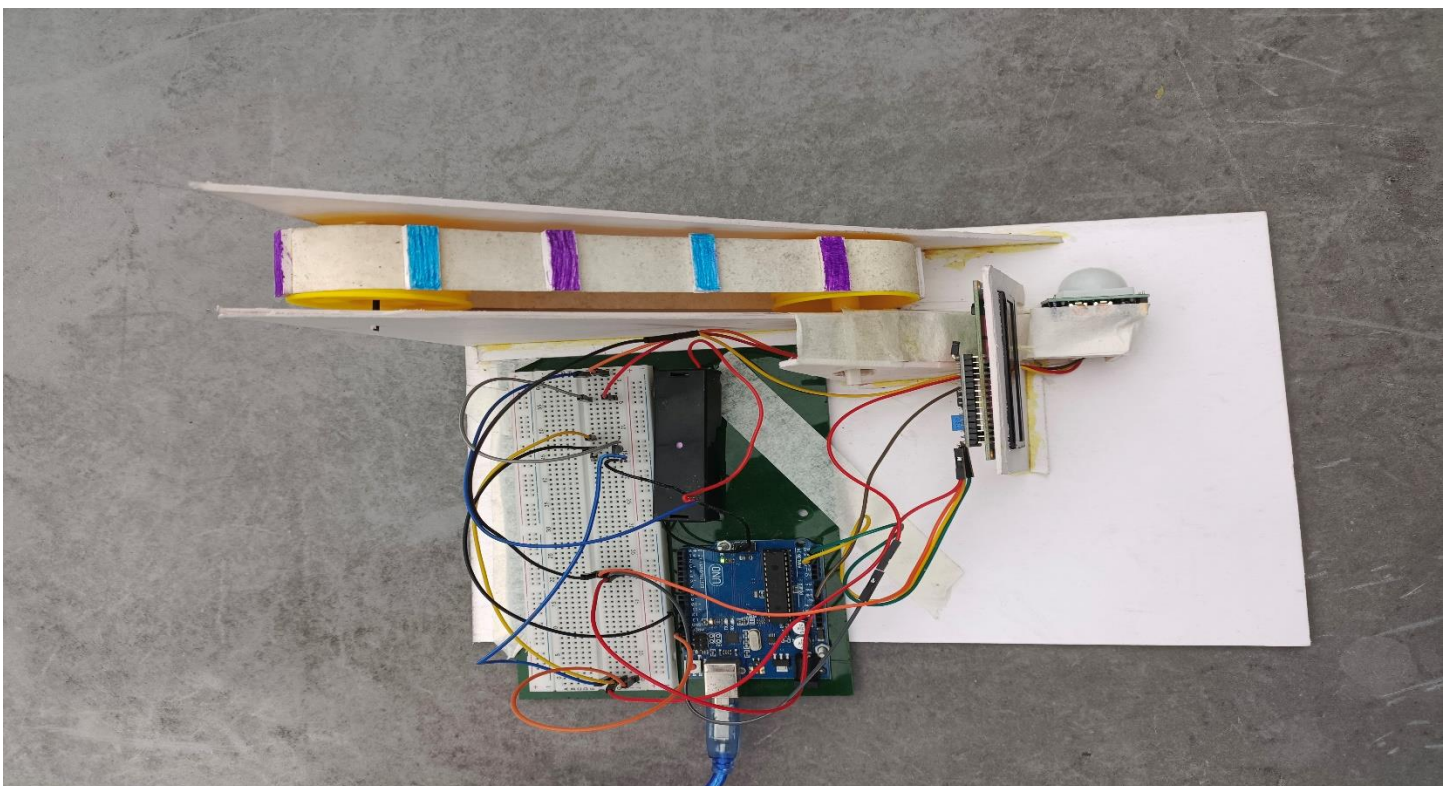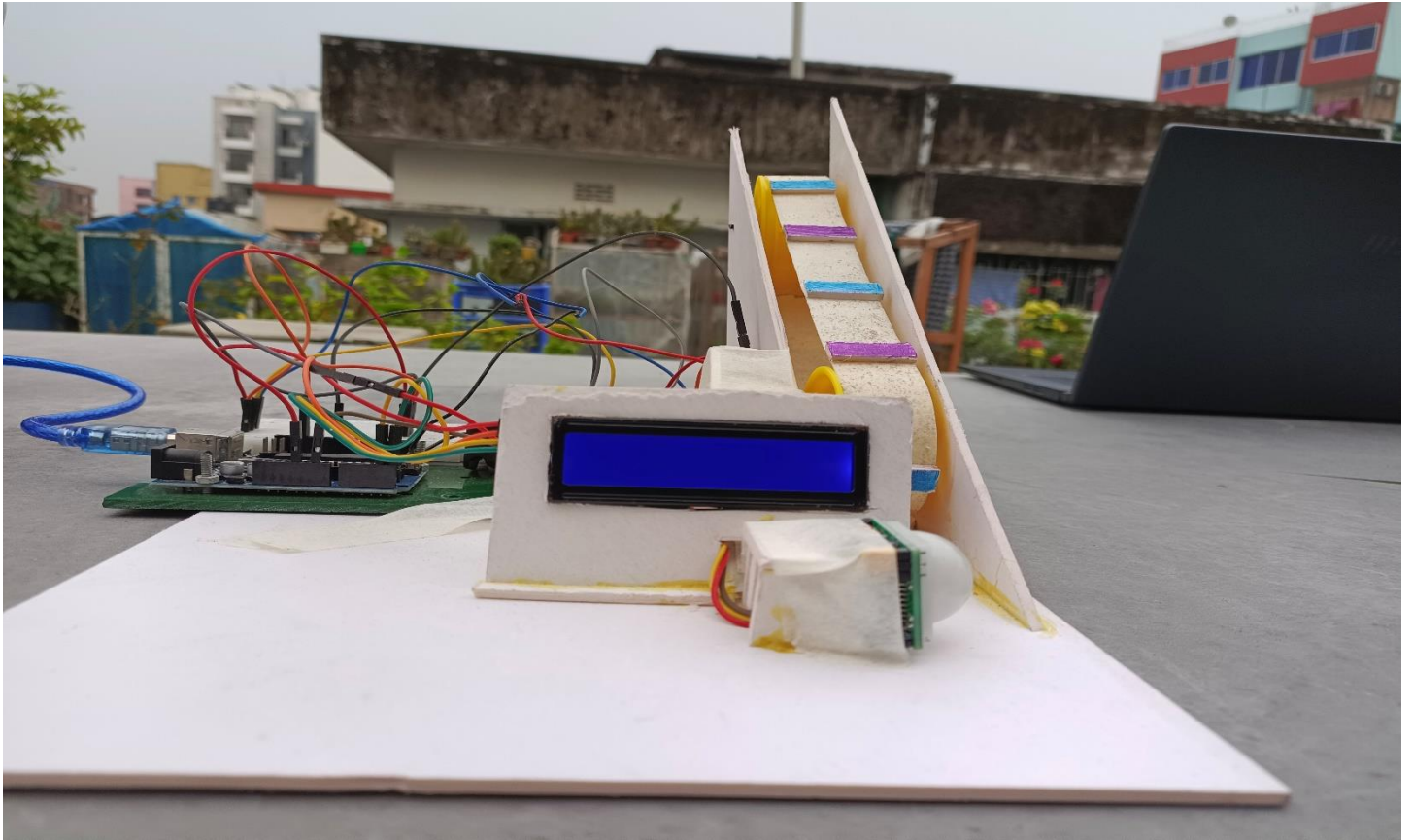Arduino Uno R3
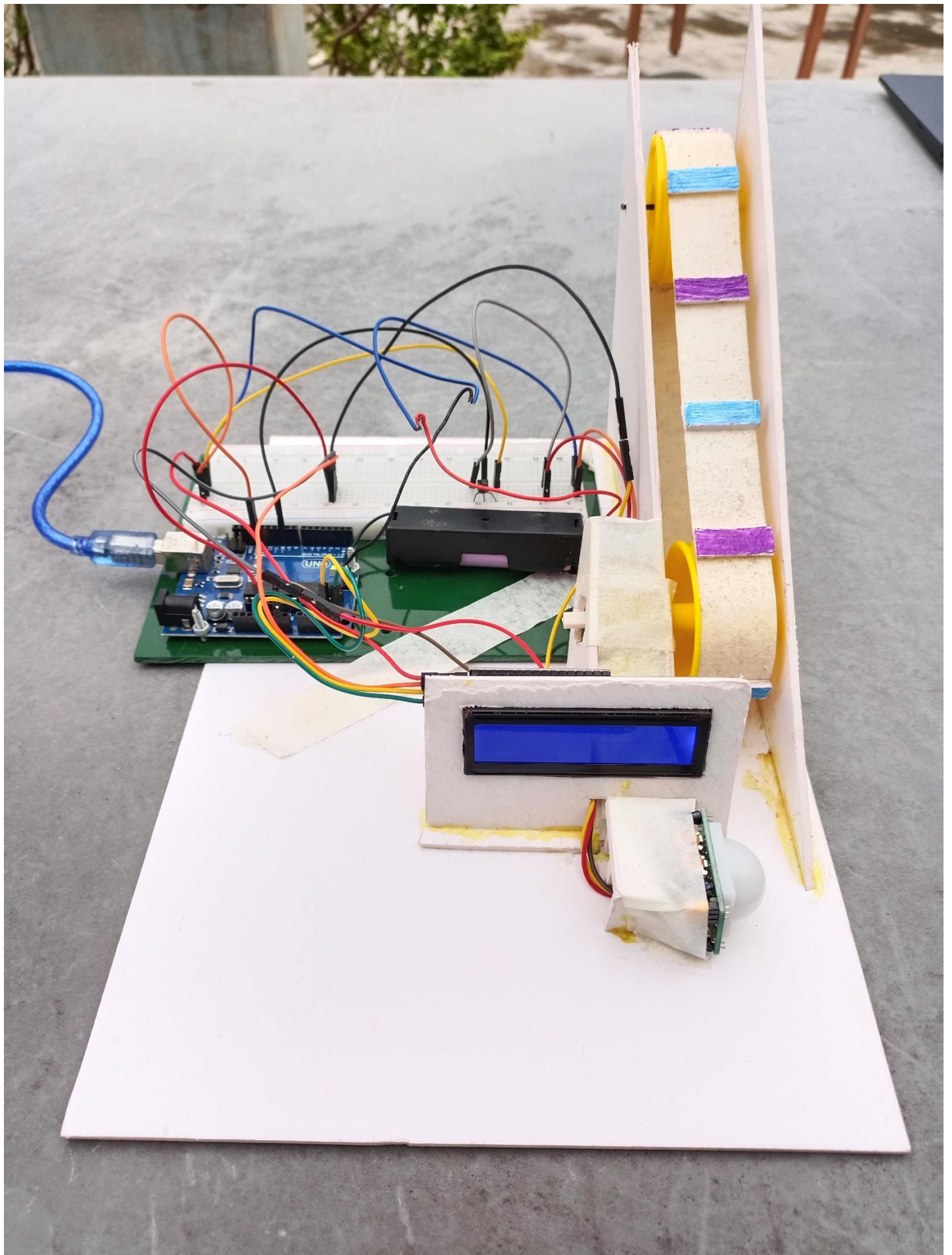
PIR Motion Sensor

6 volt DC Gear Motor

2N222A Transistor

LCD

FINAL CONDITION

CIRCUIT DIAGRAM

Q2
2N2222A

Gear Motor

6V

AREF

PB5/SCK
PB4/MISO
~PB3/MOSI/OC2A
~ PB2/SS/OC1B
~PB1/OC1A
PB0/ICP1/CLKO
PD7/AIN1
~PD6/AIN0
~PD5/T1
PD4/T0/XCK
~PD3/INT1
PD2/INT0
TX PD1/TXD
RX PD0/RXD

13 12 11 10 9 8 7 6 5 4 3 2 1 0

DIGITAL (~PWM)

ATMEGA328P-PU

microcontrolandos.blogspot.com

ANALOG IN

RESET

PC0/ADC0
PC1/ADC1
PC2/ADC2
PC3/ADC3
PC4/ADC4/SDA
PC5/ADC5/SCL

A0 A1 A2 A3 A4 A5

Arduino Uno R3

5 v

out

−   +

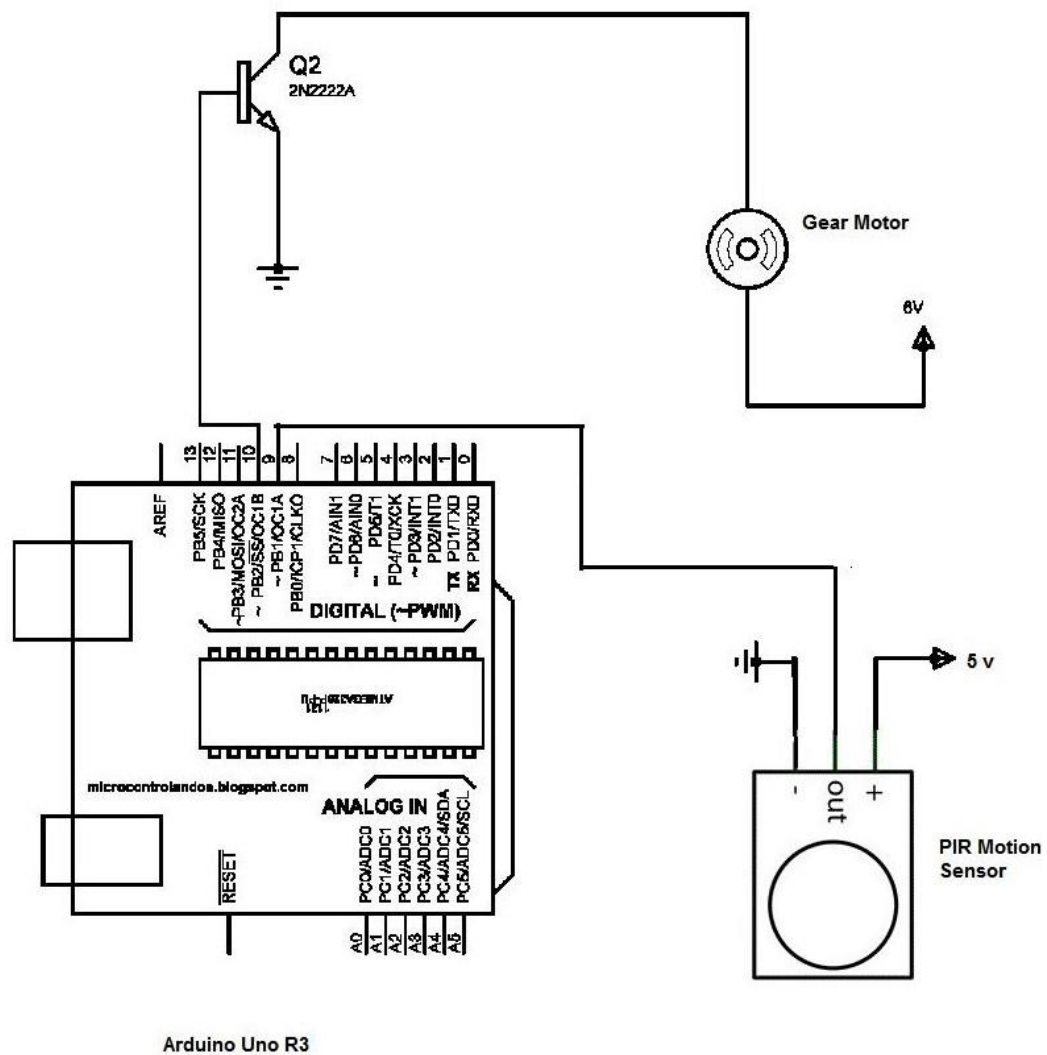PIR Motion
Sensor

CODE:

```cpp
#include<LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27, 16, 2);

int pirPin = 9;
int motorPin = 10;
void setup ()
{

  Serial.begin(9600);
  lcd.init();
  lcd.backlight();

  pinMode(pirPin, INPUT);
  pinMode(motorPin, OUTPUT);
}

void loop()
{
  if (digitalRead(pirPin) == HIGH)
  {
    lcd.setCursor(2, 0);
    lcd.print("Escalator Starts.");
    delay(1000);

    digitalWrite(motorPin, HIGH);
    delay (5000);
  }

  else
  {
    lcd.setCursor(8, 0);
    lcd.print("STOP");
    delay(100);
    lcd.clear();
    digitalWrite(motorPin, LOW);
  }
  delay(200);
  lcd.clear();
}
```

TROUBLESHOOTING

The PIR motion sensor we used was not that much of good quality . The sensor lags a few moments to sense the motion and run the motor. We faced some problems powering up the Arduino. Though the motor was a 6 volt DC Gear motor but we needed near 7 volt to run the motor properly with staircases of the escalator. The staircase we built for our escalator was not mechanically perfect so during running the motor jammed sometimes. Also the speed controlling of the motor was very difficult for us.

OPPORTUNITIES,APPLICATIONS,FURTHERIMPROVEMENTS

In this modern day still most of the shopping malls use the old fashioned escalator which runs all through the day without stopping. This is a huge loss of electricity in a poor country like us. So to make energy efficient escalator we can use this device with a relay switch to work with the real life escalator. This will save a great amount of electric energy.

In future we can add a laser triggered circuit with this one to measure the height so that the escalator runs when only people step in to the escalator; not any animals or anything rather than human .

Contributions:

Mohsin Islam Rifat (Id:190105046):

I work on build in project structure, code section and circuit connection. I do myself Arduino code for this project.

Md.Rahatin Rahman Niloy (Id:190105045) , Anika Tahsin Afia (Id:190105047), Rudro Raihan (Id: 190105048), A.K.M. Aktaruzzaman Shuvo (Id: 190105050), Mahir Labib Hossain (Id: 180105108) :

We all work on design & build in project structure.