



# **PROJECT SUBMISSION REPORT**

**Course Title: Electronic Shop Practice**

**Course No: EEE-242**

**Project Name: Arduino color sorter using  
conveyor belt**

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## **Objectives:**

The objectives of this project is to sort different colors using conveyor belt.

## **Description:**

In this project, we have tried to sort different types of colors. And for doing so, we have used conveyor belt. We will add two motors to it and there will be voltage source which will help to run the motor. And therefore conveyor belt will operate or revolve. We give balls or materials of different colors in the conveyor belt and there will be a color sensor placed on the conveyor belt. The color sensor on the belt will detect different colors and it will help to differentiate colors.

## **Components:**

1. Conveyor Belt
2. Servo motor
3. DC Motor
4. Color sensor
5. Arduino
6. Breadboard
7. Connecting wires
8. Battery

## **Components description:**

### **1. Conveyor Belt:**

Conveyor belts are a continuous loop of material that are driven by a system of pulleys or drives to carry

goods. They are used in a variety of material handing applications, including food and beverage processing, manufacturing, mining, packaging, and power transmission.



Fig. 1

## 2. **Arduino UNO:**

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.



Fig.2.

### 3. DC power supply /Battery

A DC power supply is one that supplies a constant DC voltage to its load. Depending on its design, a DC power supply may be powered from a DC source or from an AC source such as the power mains. A battery is an electrochemical cell (or enclosed and protected material) that can be charged electrically to provide a static potential for power or released electrical charge when needed. A battery generally consists of an anode, a cathode, and an electrolyte.



Fig.3

### 4. DC Motor

DC motor is one type of motor that uses the DC current to convert electrical energy into mechanical energy. When the electric current passes through a coil in a magnetic field, a magnetic force will be

generated, which produces a torque in the DC motor.



Fig. 4

#### 5. **Servo SG90 :**

Most of the hobby Servo motors operates from 4.8V to 6.5V, the higher the voltage higher the torque we can achieve, but most commonly they are operated at +5V. Almost all hobby servo motors can rotate only from  $0^{\circ}$  to  $180^{\circ}$  due to their gear arrangement so make sure your project can live with the half circle if no, you can prefer for a  $0^{\circ}$  to  $360^{\circ}$  motor or modify the motor to make a full circle. The gears in the motors are easily subjected to wear and tear, so if your application requires stronger and long running motors you can go with metal gears or just stick with normal plastic gear.

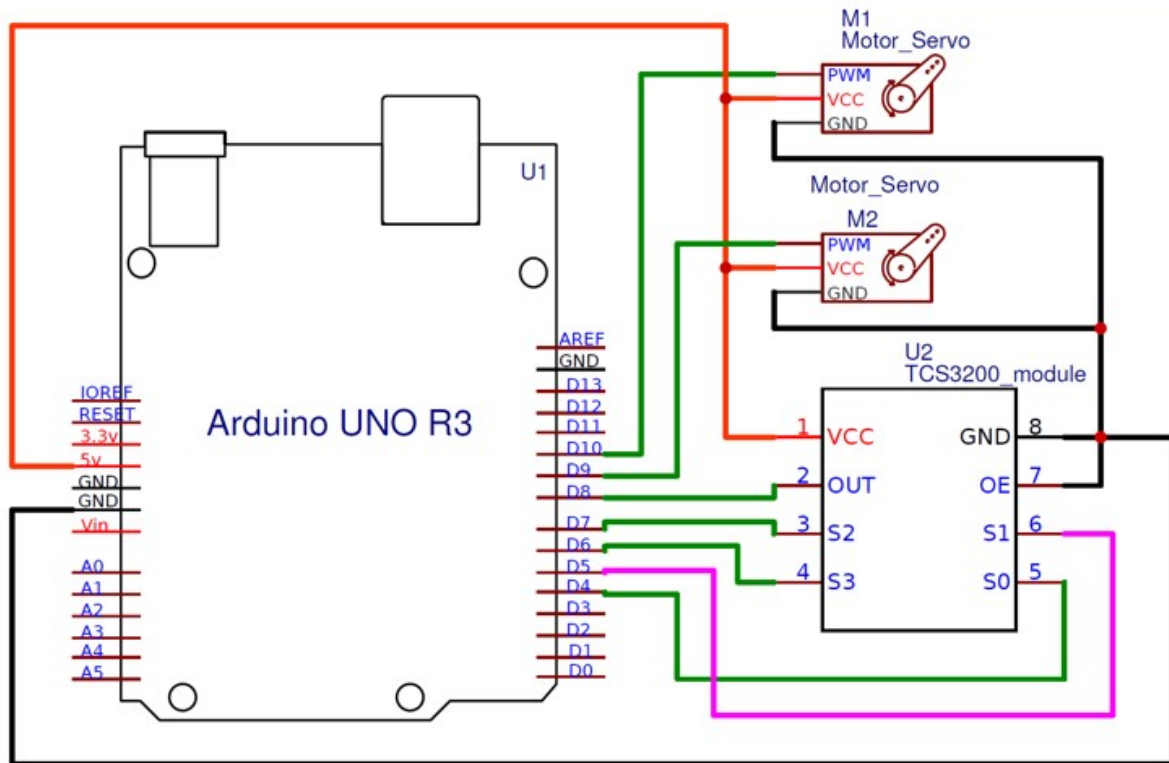


Fig.5

Construction of the setup:

1. First of all we set a conveyor belt up. For doing so, we have used card board as a support.
2. And then we added a motor with it. Which will help the belt to rotate.
3. A battery is added to the structure.
4. The circuit is constructed on the breadboard. And then the circuit is added.

Block diagram:



Source Code:

```
#include <Servo.h>
Servo pickServo;
Servo dropServo;

#define S0 4
#define S1 5
#define S2 7
#define S3 6
#define sensorOut 8
int frequency = 0;
int color=0;

int detectColor() {
```

```
// activating red photodiodes to read
digitalWrite(S2, LOW);
digitalWrite(S3, LOW);
frequency = pulseIn(sensorOut, LOW);
int R = frequency;
Serial.print("Red = ");
Serial.print(frequency);//printing RED color frequency
Serial.print("  ");
delay(50);
```

```
// activating blue photodiodes to read
digitalWrite(S2, LOW);
digitalWrite(S3, HIGH);
frequency = pulseIn(sensorOut, LOW);
int B = frequency;
Serial.print("Blue = ");
Serial.print(frequency);
Serial.println("  ");
```

```
// activating green photodiodes to read
digitalWrite(S2, HIGH);
digitalWrite(S3, HIGH);
// Reading the output frequency
frequency = pulseIn(sensorOut, LOW);
int G = frequency;
Serial.print("Green = ");
Serial.print(frequency);
Serial.print("  ");
delay(50);
```

```
delay(50);
```

```
//Readings are different for different setup
```



//change the readings according your project and readings detected

```
if(R<22 & R>20 & G<29 & G>27){
    color = 1; // Red
    Serial.print("Detected Color is = ");
    Serial.println("RED");
}
if(G<25 & G>22 & B<22 & B>19){
    color = 2; // Orange
    Serial.println("Orange ");
}
if(R<21 & R>20 & G<28 & G>25){
    color = 3; // Green
    Serial.print("Detected Color is = ");
    Serial.println("GREEN");
}
if(R<38 & R>24 & G<44 & G>30){
    color = 4; // Yellow
    Serial.print("Detected Color is = ");
    Serial.println("YELLOW");
}
if (G<29 & G>27 & B<22 & B>19){
    color = 5; // Blue
    Serial.print("Detected Color is = ");
    Serial.println("BLUE");
}
return color;
}
```

```
void setup() {
    pinMode(S0, OUTPUT);
    pinMode(S1, OUTPUT);
    pinMode(S2, OUTPUT);
    pinMode(S3, OUTPUT);
}
```

```
pinMode(sensorOut, INPUT);

//frequency- scaling to 20% selected
digitalWrite(S0, LOW);
digitalWrite(S1, HIGH);

pickServo.attach(9);
dropServo.attach(10);

Serial.begin(9600);
}

void loop() {
  //initial position of servo motor
  pickServo.write(115);
  delay(600);

  for(int i = 115; i > 65; i--) {
    pickServo.write(i);
    delay(2);
  }
  delay(500);
  //read color values by calling function. save the values
  for conclusion in variable
  color = detectColor();
  delay(1000);

  switch (color) {
    case 1:
      dropServo.write(50);

      break;

    case 2:
```

```
dropServo.write(80);  
break;  
  
case 3:  
dropServo.write(110);  
break;  
  
case 4:  
dropServo.write(140);  
break;  
  
case 5:  
dropServo.write(170);  
break;  
  
case 0:  
break;  
}  
delay(500);  
  
for(int i = 65; i > 29; i--) {  
    pickServo.write(i);  
    delay(2);  
}  
delay(300);  
  
for(int i = 29; i < 115; i++) {  
    pickServo.write(i);  
    delay(2);  
}  
color=0;  
}
```

## **Working principle:**

The Arduino UNO and the motor driver is getting 12V DC supply from the 3 cell battery. Arduino is getting supply from its Vin pin and the motor driver is from its 12V input pin. From the motor driver the motor is getting the supply and rotating the conveyor belt. We will give some objects of different colors. And there is a color sensor. It will detect the color and let the objects to be sorted.

## **Cost Estimation:**

1. Conveyor Belt – 300/-
2. Servo motor – 400/-
3. DC Motor – 400/-
4. Color sensor – 800/-
5. Arduino UNO - 420/-
6. Breadboard -200/-
7. Connecting wires – 20/-
8. Battery – 90/-

Total- 2630/-

## **Applications of Color Sorter:**

1. Serves as an agriculture machinery for grain or other solid seed sorting.
2. It is a high accuracy sorting machine whose the industrial lens can detect 0.01 square mm impurities in agriculture application.

Github link: