

# Gesture Recognition Based Contactless Switch Using IOT

Mr.P.ManiMohan<sup>1</sup>,D.Rambabu<sup>2</sup>, T.SasankSai<sup>3</sup>,G.Sravani<sup>4</sup>, S.Sushvanth Reddy<sup>5</sup>

(Associate. Prof , ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India)<sup>1</sup>  
(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India )<sup>2</sup>  
(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India )<sup>3</sup>  
(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India )<sup>4</sup>  
(B.Tech. IV Year Student, ECE Dept, Siddartha institute of science and Technology, Puttur, A.P, India )<sup>5</sup>  
(Email.id:- chowdaryrambabu18@gmail.com)

\*\*\*\*\*

## Abstract:

Today with expanded mechanical progressions, switches require refreshing with current events. To stay away from the danger of contracting the Coronavirus, it has gotten imperative to not touch surfaces of catches and keys that have been regularly utilized by others. This requires a need to advance the exchanging innovation for supplanting a handworked switch, with a contact-less switch. So today, we will plan a no-contact switch that works available signals. Our keen contactless switch incorporates a sensor that is equipped for recognizing hand developments and interprets them into orders for controlling lights, fans, and different home machines. Our main idea is to build a feasible device for wireless switching, this will eliminate the touching of a switch so people can use it very easily.

**Keywords**— Ambient light and RGB colour sensing, gesture recognition, ADC, Web page, virus on surfaces, IoT.

\*\*\*\*\*

## I.INTRODUCTION

To stay away from the danger of contracting Coronavirus, it is significant not to contact surfaces including switches, door handles, and keys that have been as often as possible utilized by others. This undertaking is for a contactless switch that works with hand signals. The savvy switch incorporates a sensor that can identify hand developments and make an interpretation of

them into orders for controlling lights, fans, and different other home machines.

As of late the extension for motions has been expanded for collaboration with shopper gadgets and cell phones. Conventional home mechanization frameworks are not reasonable for maturing populaces or cripple people. While motion-based mechanization gives a benefit to

those individuals who are incapable of effectively playing out the everyday exercises. The goal of the proposed framework is to make a framework that can handle home apparatuses utilizing any of the two allocated strategies: - 1. Motion-based 2. Online.

Infections can be affected by factors like temperature and moistness. As per the Communities for Infectious prevention and Anticipation (CDC), most corona-viruses Trusted Source get by for a more limited time frame at higher temperatures and mugginess levels. For example, in one perception from the Lancet article, SARS-CoV-2 stayed truly stable when hatched at 4°C Celsius (about 39°F). Nonetheless, it was quickly inactivated when hatched at 70°C (158°F).

The strength of SARS-CoV-2 on fabric was additionally tried in the Lancet article Trusted Source referenced before. It was tracked down that feasible infection couldn't be recuperated from material following 2 days. As a rule, it's likely not important to wash your garments after each time you go out. Notwithstanding, on the off chance that you've been not able to keep up an appropriate actual separation from others, or if somebody has spited or wheezed close to you, it's asmart thought to wash your garments. An examination in Arising Irresistible Infections evaluated which surfaces in an emergency clinic were positive for SARS-CoV-2. A high number of positives were found from floor tests. A big part of the examples

from the shoes of ICU laborers likewise tried positive.

## II LITERATURE SURVEY

In 2016 Depak has introduced an approach called “gesture controlled robot”, where the hand of the user is equipped with accelerometer which detects the tilt of the hand so that respective data will be sent to controller then it will control the appliances this approach will be used by physically handicapped, but it will not work effectively for the problem addressed by us.[1]

In 2018 Dr. Michel et, proposed a model based on an IR sensor and microcontroller. The approach uses an IR sensor which detects the proximity of any hand places close to it, then it detects and performs switching operation. In this case, the IR sensor may fail to detect black color objects and also this model will fail to detect the hand in low light. We cannot use too many switches by using this model.[2]

In 2016 krishna Kumar proposed a model for disabled people using DTMF technology. But this kind of approach won't work effectively in the problem addressed, where the remote has to be touched by many people. Nowadays, the web need to wound up a typical interface that countless contraptions use to set up will improve the regular daily existence of various people. Web helpers, us toget the speedy outcome for a tremendous number of issues able to interface beginning with any of the far off spots typical interface that countless contraptions use to set up

will improve the regular daily existence of various people. Web helpers, us to get the speedy outcome for a tremendous number of issues able to interface beginning with any of the far off spots which contributes with general cost decline moreover impressiveness use.[3]

In 2017 P. N. Arathi proposed a model named gesture based home automation. Where the hand gesture sign are captured by camera module and the processed with MATLAB algorithms. Practically common people cannot remember the sign of different switches this approach will not work effectively in public applications.[4]

Internet of Things became popular tool in embedded system projects. An approach using IoT blink application has been proposed by Kumar mandula in 2015. in that model he used an application which is used y user to control different connected to the IoT cloud. But in this approach user need to install an application but in public places people have no time to spare for installing applications so feasibility in the model very less.[5]

Jabbar et al. (2016) proposed a smart home system focuses on the utilization of the IBoard Adriano microcontroller and the XBee with the interface through Android smartphone application. The IBoard is a different Adriano board which have many features like Ethernet port, XBee socket interface, Micro SD socket and an ATMEGA32. Moreover, it works as web server connects the system to the network through Ethernet by the router and it allows a

user to control the house appliances through an Android application. Android platform access by IP address and it consists of on/off button for switches and status declaration in addition to the automatic button for electronic work[6].

Azni et al. (2016) presented a wireless home automation system using Wi-Fi. The end user can control and monitor the home devices by using a web server or android application. It uses Restful Application Programming Interface (API) framework and other functions to use Hypertext Transfer Protocol (HTTP) request to control the General-purpose input/output (GPIO) of Raspberry PI. This system used to turn on/off the electrical appliances of home wirelessly through a Wi-Fi connection.[7]

Home automation may make depicted as a presentation for development association in the home climate which gives straightforwardness which is safer with its inhabitants. Towards using the advancement of the web for Things, those assessments Besides execution about home motorization have additional Normal.

### **III. EXISTING SYSTEM**

Previously we have to turn ON and turn OFF the switch manually. Now a days we are facing severe problems because of carons. It will spread easily wherever we contact with the appliances. To avoid this situation we are implementing the proposed method.

### **IV. PROPOSED SYSTEM**

Our principle in this approach is quite simple, but we feel most complex projects also have very small solutions. So we have used this sort of guideline. This project can be explained in form of stages. First, the detection process will be done where gesture detection will happen. Before the detection it checks for proximity values whether an object comes near it if any object comes to it then it starts detection. After detection it starts the recognition process after this it will extract values from the experiment. Those values will be validated by the controller and it will perform the final task i.e, execution. We are using a sensor that is capable of doing multiple tasks in our project. Anyhow the main component in our project component in our project is the controller.

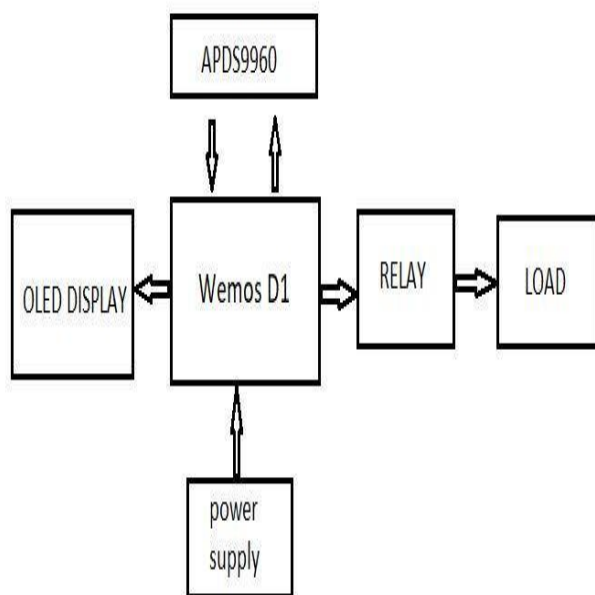


Fig 1. Block diagram of proposed system

**.Block Diagram Description**

**1. Gesture Control:**

Gesture control is a sort of interpreting method UI that permits PCs to catch and monitor human motions as orders. The overall meaning of signal acceptance is the ability of a PC to detect motions and execute commands respective on those motions. Major applications use this idea through, X-box, and virtual video games, for example, "Simply Dance" and "Kinect Sports. In order to check how signal acceptance functions work, it is important to see how "motion" is specified. In its most broad sense, the word motion can be used to any non-verbal event that is proposed to convey a particular message. In the context of signal acceptance, a motion is specified as any actual movement, large or small, that can be recorded by a movement sensor.

**2. Relay:**

A relay is an electromagnetic switch that is used to turn on and turn off a circuit by a low power signal, or where several circuits must be controlled by one signal. Most of the high end industrial application devices have relays for their effective working. Relays are simple switches which are operated both electrically and mechanically.

**3. Arduino Uno:**

Arduino Uno comes with an ability of interfacing with other other Arduino boards, microcontrollers and computer. The Atmega328 placed on the board provides serial communication using pins like Rx and Tx

**4. ATMEGA328 Microcontroller:**

Arduino Uno comes with USB interface i.e USB port is added on the board to develop serial communication with the computer. Atmega328 microcontroller is placed on the board that comes with a number of features like timers, counters, interrupts, PWM, CPU, I/O pins and based on a 16MHz clock that helps in producing more frequency and number of instructions per cycle.

#### **5. Node MCU:**

NodeMCU comes with a number of GPIO Pins. Following figure shows the Pinout of the board

## **V. IMPLEMENTATION**

In the initial stage user's finger needs to be placed close to the sensor to activate the sensor. We have written the code like that, it first checks the proximity then the actual function of the sensor will be activated. The person needs to move the finger, just by spacing about diagram.

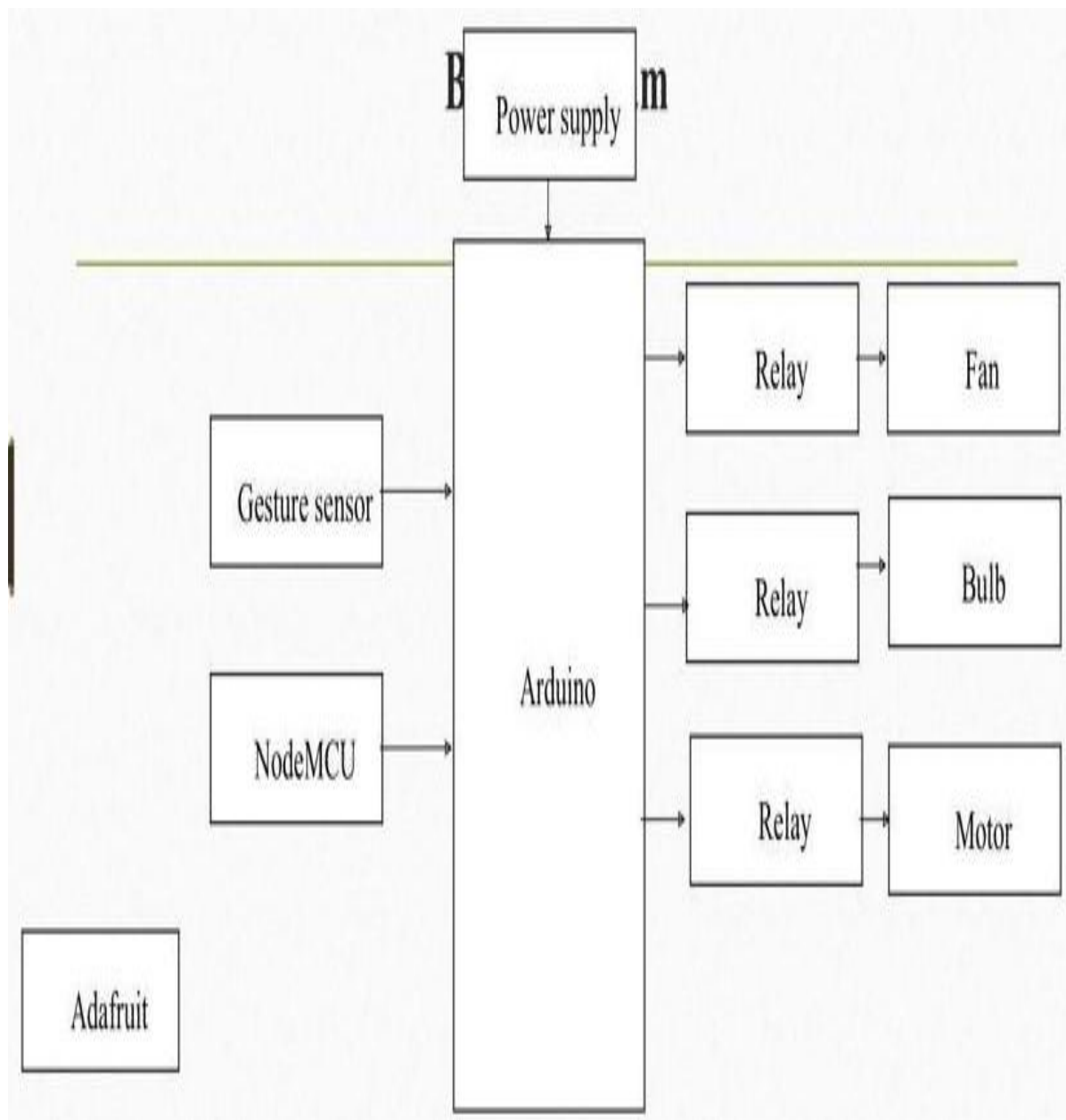


Fig 2. Block diagram of gesture recognition based contactless switch using IOT

The sensor will detect the finger and movement of the finger then recognizes the direction of movement then the data is sent to the controlling unit. We are using an Wemos D1 board as our controlling unit, when the data is received from the sensor it executes the commands loaded into it. Wemos D1 and

sensor will be connected through the I2C communication protocol. The serial data pin and serial clock pins of both components are to be connected to build good communication between the two components. According to the data received from the sensor, the particular digital pin will make high by Wemo. message

will be displayed on OLED to make the user acknowledged. The sensitivity of the sensor it adjusted earlier to detect the hand movement and also has predefined functions to perform the task.

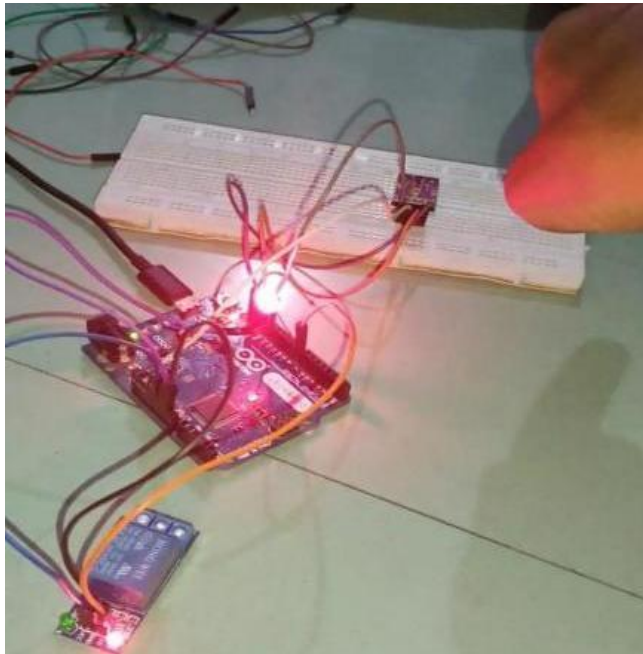


Figure.3 Working with sensor

As we have mentioned this project consists of two methods one is offline method people can use their hand, another is using IoT where the user can control the switch using his mobile phone. The link to the web page is shown on the switchboard user can directly scan the QR code on it and it will open a web page then he can directly control the switches and the status of the

Available at [www.ijred.com](http://www.ijred.com)

switch is displayed on the web page which will be easy for the user to use. There is no need of installing any application or software for this as the application we addressed is in public places so the user doesn't have time to install and operate the switch so we have used a web page that can be accessed by everyone with ease.

The proximity detection gives distance between two objects or distance between the sensor and object by the help of photodiode detection from reflected IR rays (which are emitted by the source). The distance measure is done by emitting rays towards free space, when these rays meets any objects then they will reflect back and which are detected by some photodiodes in case of APDS9960 it has four diode detectors which convert the photons into electrical energy. By calculating the total time travel of the emitted rays then the distance will be divided by 2 to get the actual distance from object



Fig. 4 APDS9960 sensor.

$$T_{PROX\_RESULT} = T_{INIT} + T_{CNVT} + P_{PULSE} \times T_{ACC}$$

$$T_{TOTAL\_LED\_ON} = P_{PULSE} \times T_{LED\_ON}$$

$$T_{TOTAL\_LED\_OFF} = T_{PROX\_RESULT} - T_{TOTAL\_LED\_ON}$$

$$Distance = (T_{total} \times \text{Speed of light})/2$$

FlowChart

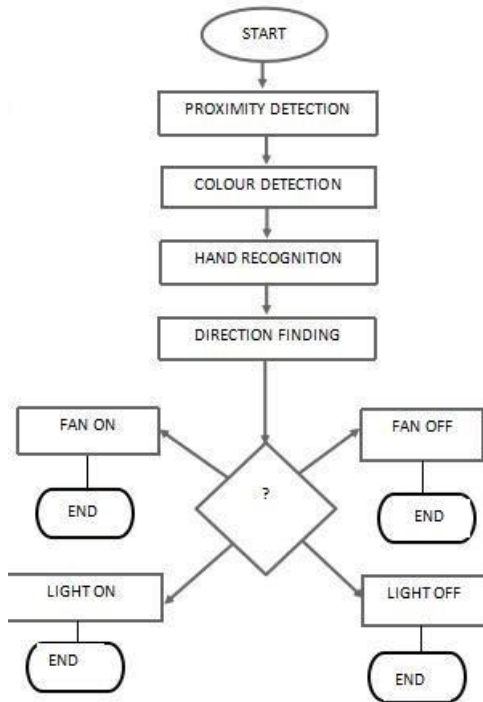


Fig. 5 Flow chart of the contactless switch

#### IV. CODING

```

#define S3 7
#define sensorOut 8
#define gas 3
#define buzzer 9

```

```

#define red A2
#define yellow A3
#define green A4 #define pirPin 12
int calibrationTime = 30; long
unsigned int lowIn; long unsigned
int pause = 5000; boolean lockLow
= true; boolean takeLowTime; int
PIRValue = 0;
// Stores frequency read by the photodiodes
int R = 0; int Y =
0; int G = 0;
String str1;

void setup() {

  Serial.begin(9600);
  pinMode(limitSwitch,INPUT);
  pinMode(gas,INPUT);
  pinMode(pirPin, INPUT);
  pinMode(buzzer, OUTPUT);
  pinMode(S0, OUTPUT);
  pinMode(S1, OUTPUT);
  pinMode(S2, OUTPUT);
  pinMode(S3, OUTPUT);
  pinMode(red, OUTPUT);
  pinMode(yellow, OUTPUT);
  pinMode(green, OUTPUT);
  pinMode(sensorOut, INPUT);
  pinMode(trigPin, OUTPUT);
  pinMode(echoPin,INPUT);
  digitalWrite(S0,HIGH);
  digitalWrite(S1,LOW);

```



```
digitalWrite(red,LOW);
digitalWrite(yellow,LOW);
digitalWrite(green,LOW);
digitalWrite(buzzer,LOW);
}
```

```
void loop() {
digitalWrite(buzzer,LOW);
int
gas_val=digitalRead(
gas); //
Serial.println("GAS")
; //
Serial.println(gas_val
); delay(1000);
str1= "@" +
String(gas_val);
Serial.println(str1);
delay(2000);
if(gas_val==0){
digitalWrite(buzzer,HIGH);
}
int val = digitalRead(limitSwitch);
//
Serial.println("limitSw
itch"); //
Serial.println(val);
delay(1000); str1=
"$" + String(val);
```

```
Serial.println(str1);
delay(2000); if( val
==1){
Serial.println( "(1) Target Hit!" );
digitalWrite(buzzer,HIGH);
}
temp_adc_val =
analogRead(lm35_pin);
temp_val = (temp_adc_val *
4.88); temp_val =
(temp_val/10); //
Serial.println("Temperature =
");
// Serial.println(temp_val);
// Serial.println(" Degree
Celsius\n"); delay(1000);
str1= "*" +
String(temp_val);
Serial.println(str1);
delay(2000); if(temp_val
> 50){
digitalWrite(buzzer,HIGH);
}
digitalWrite(trigPin,
LOW); delay(200);
digitalWrite(trigPin,
HIGH); delay(500);
digitalWrite(trigPin,LOW);
```

```

duration = pulseIn(echoPin,
HIGH);      distance =
duration* 0.034 / 2; //
Serial.println("Distance: ");
//
Serial.println(distanc
e);          //
Serial.println("cm");
delay(2000);  str1=
"% "        +
String(distance);
Serial.println(str1);
delay(2000);

    if          (distance<15){
digitalWrite(buzzer,HIGH);
delay(1500);
    }
    int
pir_val=digitalRead(pirPin);
//  Serial.println("value"); //
Serial.println(pir_val);
delay(1000);  str1= "#" +
String(pir_val);
Serial.println(str1);
delay(2000);
if(pir_val==0) {

//      Serial.println("Motion detected.");

delay(50);
}  else{

```

```

//      Serial.println("Motion ended.");
delay(50);
    }
    digitalWrite(S2,LOW);
digitalWrite(S3,LOW); R =
pulseIn(sensorOut, LOW);
//  Serial.print("R = "); //
Serial.print(R); delay(100);
digitalWrite(S2,HIGH);
digitalWrite(S3,HIGH); G
= pulseIn(sensorOut, LOW);
//  Serial.print(" G = "); //
Serial.print(G); delay(100);
digitalWrite(S2,LOW);
digitalWrite(S3,HIGH);; Y
= pulseIn(sensorOut, LOW);
//  Serial.print(" Y =
");          //
Serial.println(Y);
delay(100);
if(R >= 30 && R <= 100 && G >=80 &&
G<=200
&& Y >= 70 && Y<=120)
{
//      Serial.println("Red colour
detected");
digitalWrite(red,HIGH);
digitalWrite(yellow,LOW);
digitalWrite(green,LOW);
delay(1000);
}

```

## VI. CONCLUSION

We hereby infer that, this technique is convenient in exchanging gadgets with motion control. Present improvement in sensor management is inclining toward expanding flexibility in sensor architecture. The more reliable and feasible and low power consumption devices has huge demand. The main purpose of this project is to develop an feasible model to detect the motion of the finger and based on the motion performing the switching actions of the electrical and electronics appliances. To improve the feasibility of this model, the web page is working by which the user can utilize the model with ease. Notwithstanding, from the view of source to the end user, the sensor working currently seems less complexity even with its improved functionality and internal complications.

This approach is very simple and effective which will make people's life more comfortable. Everyone can use this model and they can easily understand the approach. The eventual outcome can be work at a moderate cost. Working of this model is tested with multiple times, we can confidently conclude that our model working is same as we mentioned earlier i.e desired to work.

```
else if(R >= 140 && R <= 240 && G >=100
&&
G<=190 && Y >= 110 && Y<=170)
{
// Serial.println("Green colour
detected"); digitalWrite(red,LOW);
digitalWrite(yellow,LOW);
digitalWrite(green,HIGH);
delay(1000);
}
else if(R >= 50 && R <= 120 && G >=40 &&
G<=100 && Y >= 20 && Y<=100)
{
// Serial.println("Blue colour
detected");
digitalWrite(red,LOW);
digitalWrite(yellow,HIGH);
digitalWrite(green,LOW);
delay(1000); } else
{
// Serial.println("No colour
detected");
digitalWrite(red,LOW);
digitalWrite(yellow,LOW);
digitalWrite(green,LOW);
delay(100);
}
}
```

This approach is very simple and effective which will make people's life more comfortable. Everyone can use this model and they can easily understand the approach. The eventual outcome can be work at a moderate cost.

Working of this model is tested with multiple times, we can confidently conclude that our model working is same as we mentioned earlier i.e desired to work.

## VII. FUTURE SCOPE

Many researchers are working on technologies like deep learning, Image Processing, MATLAB, neural network to build the best model for gesture recognition. In future, many applications will be developed with gesture control. In our approach, we can integrate multiple apds9960 chips in a single module so that we can use the single module for many switches.

This feature will eliminate the drawback of the switch limit. Complications in image processing have been reduced with python programming. The fate of IoT is practically limitless because of advances in innovation and purchasers want to incorporate gadgets, for example, PDAs with family machines. A Systems management and availability protocol have made it

possible to connect individuals and machines at every state.

## References

- 1.Liu, T., Guo, H., and Wang, Y., "A new approach for color-based object recognition with the fusion of color models", Congress on Image and Signal Processing Conference, Sanya-China, vol. 3, pp. 456-460, May 2008.
- 2.Deepak, B & Soubagya Nayak & Jalumuru Nalin, (2016), "Development of Gesture Controlled Robot Using 3-Axis Accelerometer", Journal of Control & Instrumentation. 7. 23-34.
- 3.Avago Technologies, "APDS-9930 Digital Proximity and Ambient Light Sensor Data Sheet", 2015.
- 4.[ieee-sensors.org/myosa/rgb-and-gesture-sensor/sharviele](http://ieee-sensors.org/myosa/rgb-and-gesture-sensor/sharviele)  
[electronics.com/product/apds9960-rgb-gesture-sensor-detection-i2c-breakoumodule-for-arduino](http://electronics.com/product/apds9960-rgb-gesture-sensor-detection-i2c-breakoumodule-for-arduino).
- 5.[circuitdigest.com/microcontroller-projects/gesture-basedcontactless-elevator-using-arduino-and-apds9960-sensor](http://circuitdigest.com/microcontroller-projects/gesture-basedcontactless-elevator-using-arduino-and-apds9960-sensor).

6. Setia, Archika & Mittal, Surbhi & Nigam, Padmini & Singh, Shalini & Gangwar, Surendra (2015), "Hand Gesture Recognition Based Robot Using Accelerometer Sensor", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering.

7. Sushma, Depak & Karan, Sangharsh & Saraswat, Deepak & Das, Bharnab & Kumar, Vibhuti & Channi, Harpreet Kaur.(2017). Modeling and Designing of Gesture Control Robot. 10.13140/RG.2.2.11044.37763.

8. R Krishna Kumar, Meghan, lohith et, "wireless switch using DTMF technology", Congress on Image and Signal Processing Conference, Sanya-China, vol. 3, pp. 456-460, May 2011.

9. Deepak, Amit, Harsha, Praveen Kumar," Ambient light detection " 2015.

10. P. N. Arathi, S. Arthika, S. Ponmithra, K. Srinivasan, V. Rukkumani,"Gesture based home automation".2017.