



# **HOME AUTOMATIC CONTACTLESS SWITCH FOR THE SMART HOME AND THE PANDEMIC SITUATION**

*Supervised By*

**Mrs. Kirithika Devi S, AP/Physics**

*Presented By*

**M.BalaSakthivel, R. Mariyappan, M. Sathish Kumar, J. Karthik**

*- 1st Year ECE Students*

*Builders Engineering College, Nathakadaiyur*

## **ABSTRACT**

Our imminent world needs wiser control on all the electrical and electronic applications. The proposed concepts within the paper are going to be very useful in achieving this. Current technologies incorporate distinct style of automation technologies like Bluetooth based, Wi-Fi based, voice recognition based etc. Additionally, to the currently possible technologies within the field of automation had gesture based automation has taken a dump in the instant markets. It has created new desire for implementing automation system base their gesture to modify on/off electrical appliances. There are many automation systems with different features and facilities. All the house automation systems are accustomed control home appliances through an overseas control. During this project, an automation system is intended which might be controlled by gestures.

**Keywords :** *Gesture, Automation, Sensors, Control, Smart switch*

## **1. Introduction**

In our increased technological advanced world, switches require updating with current times. To avoid the risk of contracting COVID-19, it has become important to not touch surfaces of buttons and keys that have been frequently used by other people. This calls for a need to innovate the switching technology for replacing a hand operated switch, with an automatic contactless switch.

Social distancing, online meetings and minimal contact have become the new norm and the world has only just about digested this as the new reality. Saying 'no' to meeting in person, pulling your hand away when someone extends to shake it as a greeting would've seemed extremely impolite seven months ago. The world has gone through some rough changes and everyone's life has changes in one way or the other. Break-ins and crimes during these troubling times have been on the rise in parts of the world where the daily wage workers have been hard-hit.

The new COVID-19 lifestyle for keeping buildings and surroundings clean. With this change in everyone's lifestyle, people have become more aware and precautious to not contribute to the pandemic's spread (we hope you have too!).



## The Problem with Frequently Touched Surfaces

The American Centers for Disease Control and Prevention (CDC) has published a guideline detailing how to clean and disinfect your households

The understanding is that the coronavirus and other viruses/germs can live on surfaces for a few hours or days, but the exact duration is debated and varies based on the environment and surroundings. Still, the consensus is that keeping surfaces clean is required.

A few of the areas highlighted by the CDC's guideline - light switches, doorknobs, electronics. We don't realize it, but these are surfaces touched ever so frequently by the members of the household, visitors, domestic help. Another key area are elevators and the plethora of buttons on them that get touched by visitors coming from all over the place - a dangerous and potential source of infections.

Interaction with these areas that can be avoided entirely with home automation and contactless solutions.

## **2. Where Home Automation Solutions Help**

### **2.1 Lighting Controls**

Turning lights on and off is a daily and routine task that can be automated or at the bare minimum made contactless. With the help of Toyama's Smart Lighting Controls, you can control your home in a myriad of ways.

### **2.2 IR Remote**

We have also kept in mind that there are people such as the elderly that prefer to stay away from technology. This is for them to have their own personal remote to add convenience as well as keep them from touching lighting controls.

## **3. Gates & Garage Doors**

While driving into your home, you may need to open your gate or garage door - which naturally lies outside your house. Gates are frequently touched by delivery personnel, visitors, domestic help, etc. Add smart gate openers to be able to open/close with a voice command or an app command. This allows you to stay put in your car while also keeping your hands free from touching potentially contaminated surfaces.

## **4. Motion Sensors & Door Contact Sensors**

Motion sensors can be installed and armed to detect unwanted and undesired movement. You would want to keep your house safe and secure by arming these sensors automatically by scheduling them. This would give anyone complete peace of mind while asleep at night, or away from home knowing that even the slightest of unwanted movement triggers an immediate alert. Door contact sensors can be used for a lot of different purposes including energy saving purposes, but a door contact sensor also allows you to check if all the main doors of the house are closed before leaving the house or going to bed.

## **5. Where Contactless Solutions Help**

There are contactless solutions that can be (and have increasingly been) implemented to prevent contamination of surfaces. One of the most common surfaces that are interacted with by all sorts of people round the clock are elevators and elevator buttons. They're crucial to get from one floor to the other if the building is large or for



physically challenged individuals. And it's just convenient to not take the stairs. The workarounds people have been coming up with are using toothpicks and other disposables, using the buttons as it is (yikes!) or just not using the elevator at all.

Home automation has varying perceptions in markets around the world. To some markets, it's still a luxury. To other markets, it's an essential for the adults to keep an eye on their homes while they are out earning a livelihood. Right now, both markets are noticing the importance of home automation to achieve what was just discussed earlier - social distancing, minimal contact and maintaining security.

When someone's at the door, you need to physically go and open the mechanically operated lock. When someone rings the bell, they're touching the surface of the switch - they have no choice. When you're away, you need to keep an eye on your home owing to the rise in crimes.

So today, we will design a no-touch switch that works entirely on hand gestures. Our smart contactless switch includes a sensor that is capable of detecting hand movements and translates them into commands for controlling lights, fans and various home appliances.

Let's start designing the smart switch by shopping for the following components.

### Coding

First, we need to install the required library in the Arduino IDE. Go to Select the Library Manager Search APDS9960 Install Adafruit APDS9960

COMPONENTNAME	QUANTITY	DESCRIPTION	COST APPROXIMATELY IN INDIAN RUPEE
Arduino Micro/Nano/Mini	1	Programming	300
Apds9960	1	Color sensor	300
Relay	1	2 channel Relay	200
Wires	--	For connection	30
		<b>Total cost</b>	<b>830</b>

After installing the library, add it into the code and then define the pin number for light and fan control. Next, create a setup function where you can initialise the sensor and set the pin mode output for light and fan control.

### Code

```
#include "Adafruit_APDS9960.h"  
Adafruit_APDS9960 pds;  
int light = 8;  
int fan pin = 9;
```

### Setup function

```
void setup ()  
{
```



```
Serial. Begin (115200);
  if(!apds.begin() )
  {
Serial.println("failed to initialize device! Please check your wiring.");
  }
  else Serial.println("Device initialized!");
pinMode(light, 0);
pinMode(fan, 0);
  //gesture mode will be entered once proximity mode senses something close
apds.enableProximity(true);
apds.enableGesture(true);
  }
```

Then create a loop function to update the sensor readings and use your hand gestures as an input to control the pin. Also create a few if conditions for specifying the commands based on the type of hand gestures (up, down, left and right).

Up : Lights ON

Down : Lights OFF

Left : Fans ON

Right : Fans OFF

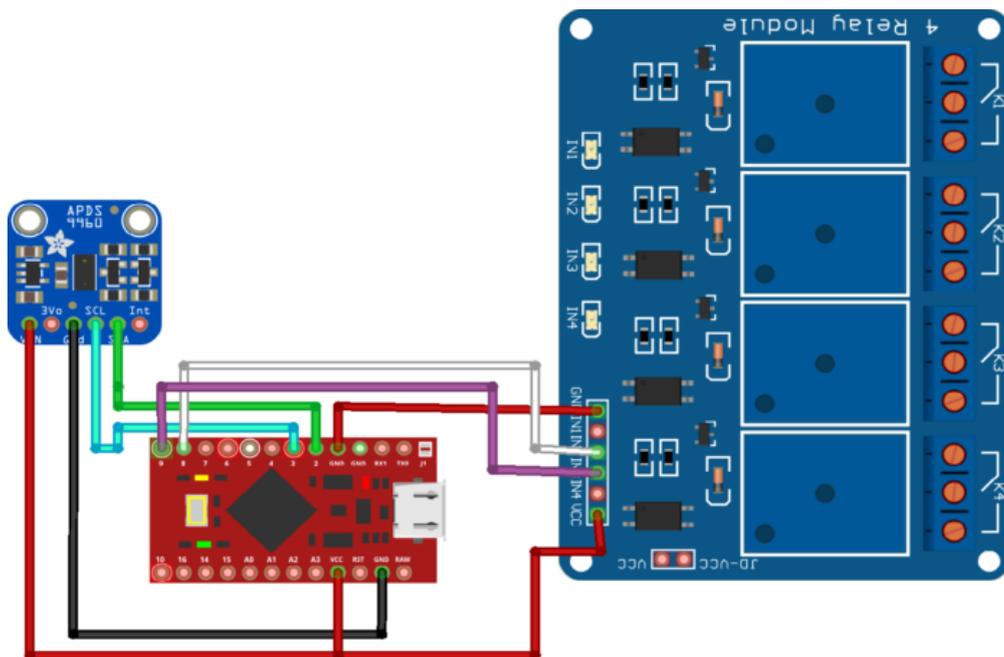
### **Loop function**

```
void loop ()
{
  uint8_t gesture = apds.readGesture ();
  if (gesture == APDS9960_DOWN)
  {
Serial.println("v");
digitalWrite(light, 0);
  }
  if(gesture == APDS9960_UP)
  {
Serial.println("^");
digitalWrite(light, 1);
  }
```

```
    }  
    if (gesture == APDS9960_LEFT)  
{  
Serial.println("<");  
digitalWrite(fan, 0);  
    }  
if(gesture == APDS9960_RIGHT)  
{  
Serial.println(">");  
digitalWrite(fan, 1);  
    }  
}
```

### Connection

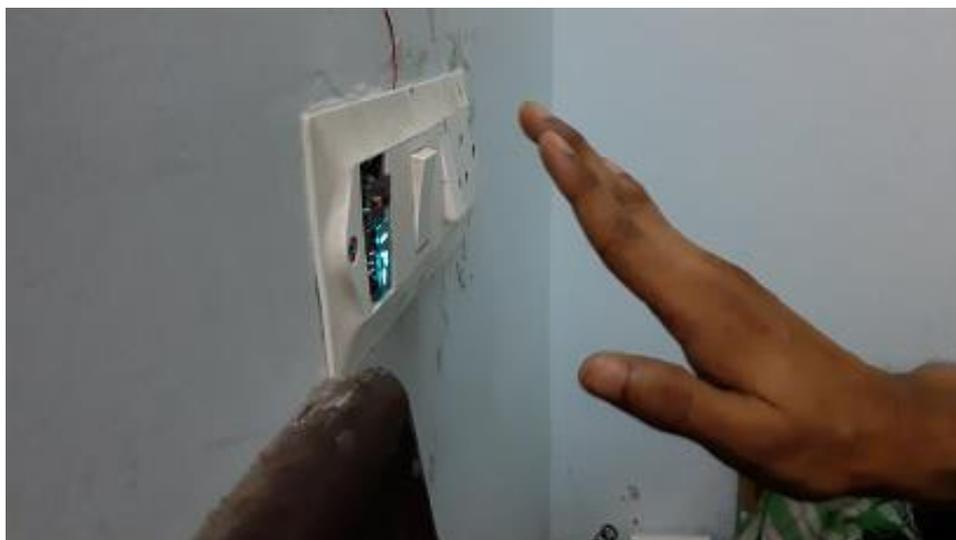
Now upload the code to Arduino and connect the components as described in the circuit diagram. Then connect the AC wire with the common pin of relay module to control the lights and fans.



### **Connection for Automatic Contactless Switch for Smart Home Connection inside board**

#### **6. Testing for the Contactless Switch**

Now power the device and relay. When you will move your hand in an upward direction, the relay will be move and lights will switch ON. Similarly, a hand gesture in downward direction will switch OFF the lights.





## **7. Conclusion**

In this research, we defined the main proposes and objectives of our work and provided research about Smart Homes, we realize that the number of devices used in a household is increasing, and in the next few years we may have hundreds of devices accessible per person. We discussed how hard it is today to transform our life into a smart, internet-connected life. Transforming a home into smart home can benefit us in many different ways. Smart homes can reduce energy usage up to 30% percent for normal users and can be a nice and comfortable place for elderly and disabled people. However, for mass production the system requires more research in many areas including AI. In our project, we implemented a small set of AI code into the system, which resulted in a large benefit and reduced energy consumption.

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