

# Gesture Controlled Switch for Home Automation

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## ABSTRACT

Fully automatic systems for home automation are used everywhere now a days. In this paper, a fully automatic switch is built which can be controlled by hand gesture. The wireless switching method tries to overcome the frequent short circuit problems by eliminating the need for touching a switch to turn it on and turn it off. The gesture-controlled switch uses an ultrasonic sensor which senses the hand gestures to turn on and turn off the home appliances like light, fan, television, fridge etc.

**Keywords** -Gesture, home automation, ultrasonic sensor

## 1. INTRODUCTION

There is a rapid growth in home automation system as it provides comfort to the people. The home automation system can be used to control large number of home appliances. Several devices like tablet, laptop, mobile phone etc. can be used to remotely control and manage home appliances using wireless communication techniques from anywhere around the world [1]. The wireless communication techniques may include Bluetooth, GSM, ZigBee, Wi-Fi, to name a few. In addition to providing comfort to the elderly and disabled people, home automation also helps in conserving energy as it can be used to remotely access and control home appliances [2].

There are several literatures available for home automation. In [3], the authors have proposed a home automation system using image processing, raspberry pi and python. an image processing based. They have used both hardware and software components to build the project. The hardware design consisted of raspberry pi, Passive Infra-red sensor (PIR motion sensor), IR temperature sensor, a webcam, solenoid door lock and relay switch. The software design consisted of image processing, android studio, firebase and video calling. The motion sensor detects the motion and analyzes the face by image processing techniques. If the face is recognized, then the door gets opened and if the face is not recognized then an automatic video calling is initiated with the user to know who is near the door.

The authors achieved an accuracy of 100% in face detection and 80% in face recognition.

The authors in [4] have developed a home automation system using Internet of Things (IoT). The appliances that the user wants to control remotely are connected to the Arduino circuit. The Arduino circuit in turn is connected to NodeMCU Wi-Fi module. This allows the user to control the appliances from anywhere wirelessly. The wireless module is connected to the Firebase real-time database to receive the triggering signals. The authors used a real time database for sending signals over the internet.

In [5], the authors have proposed a home automation system based on IoT and pattern recognition. The authors used several sensors that measures temperature and humidity, motion, light, etc. Pattern analysis have been performed on the stored data from the sensors to analyze the on time and off time of the appliances so that the appliances can be switched on/off as and when needed. Arduino is connected to several sensors and appliances using relay. The user gets a notification once the threshold limit of minimum intensity or minimum temperature is exceeded. The wi-fi module provides internet connectivity to the system with integrated TCP/IP protocol stack.

The authors in [6] has developed a smart home automation system using android application. There are two units in this system: home unit and control unit. The home unit consists of the mobile with android

applications. The control unit consists of the wi-fi module, power supply, microcontroller, several relays to control appliances like bulb, fan etc. Also, the unit consists of motor driver ICs to drive the motor which in turn manages the curtains and windows. The signal is sent to the wi-fi module by the mobile with the help of android application. The received signal of the wi-fi module is given to the Arduino board. The relay board and the wi-fi is connected to the Arduino board. The Arduino board controls the relays for switching on/off the appliances. Table 1 presents the described existing literatures in tabular form.

## 2. PROPOSED METHOD

The block diagram and the flowchart for the proposed method is shown in Fig. 1 and Fig. 2 respectively.

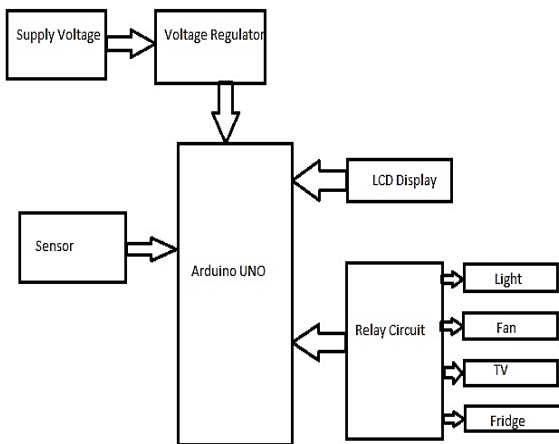


Fig. 1. Block diagram of the proposed method

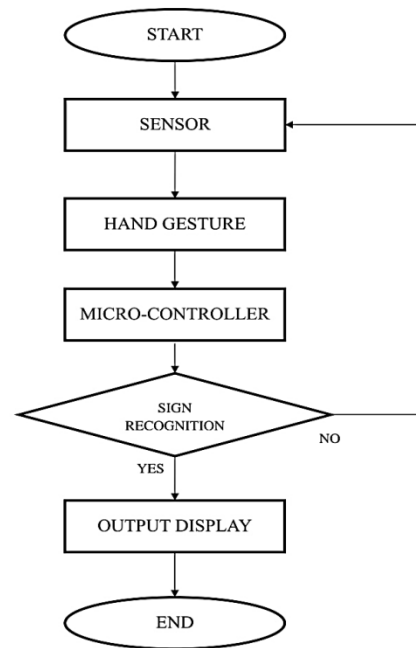


Fig 2. Flowchart of the proposed method

The project is built on Arduino UNO. It has an ultrasonic sensor, an LCD display and a relay circuit to drive appliances on/off. The relay acts as a switch. Once the power is supplied to the Arduino it loads the libraries. Initially, the appliances are switched off. The LCD displays the list of appliances that can be switched on/ off. The user can move their finger to the left or to the right over the gesture module to swipe the appliances. On hovering the finger downwards/upwards, the selected appliance is switched on/off by sending logic HIGH/LOW at the respective Arduino pins.

## 3. EXPERIMENTAL RESULTS & DISCUSSION

The hardware model of the proposed method is shown in Fig 3. In the model, a bulb is shown that can be switched on/ off using hand gesture. The power is supplied to the Arduino board through the laptop. A comparison of the proposed method with some of the previous existing literature is presented in Table 1.

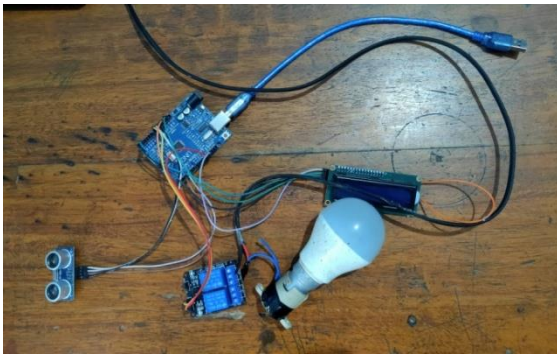


Fig 3. Hardware model of the proposed method

Table 1. Existing literature on home automation

SI No.	Paper	Technique used
1	[3]	Image processing based, Raspberry-Pi and Python
2	[4]	IoT, Arduino
3	[5]	IOT, pattern recognition.
4	[6]	Android application, Arduino.
5	Proposed	Hand gesture, Arduino

#### 4. CONCLUSION

Here, a simple hand gesture-based home automation system is proposed. The system uses an ultrasonic sensor, Arduino, LCD display and relay switch to turn on & off the home appliances. The advantage of this

system is that it consumes very less power. The model works by detecting the motion of fingers. The model is tested with many appliances and it has been observed that the model works efficiently and effectively in switching the appliances.

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