

Smart Home Automation and Security System using Arduino and IOT

Siddharth Wadhvani¹, Uday Singh², Prakarsh Singh³, Shraddha Dwivedi⁴

¹²³⁴ Student, Dept. o EC, IMS Engineering College, Ghaziabad, UP, INDIA

Abstract - With the advancement of technology and more dependency of people on smart phone and increasing demands of easy and quick way of solving Daily life task, it has become very important to have a technology which can control over the domestic and industrial applications using IOT. Our paper 'Sensing and controlling the world around using Arduino and IOT' deals with embedded technologies along with internet of things (IOT) using Arduino which employs the embedded block and script programming for Arduino and sensors like flex sensor, accelerometer, flame sensor, magnetic sensor, WI-FI module.

In this paper we present a home automation and home security technique. The sensors will be interface with Arduino. The status of our home appliances will get uploaded to a cloud platform through wireless module. Our system and mobile should be connected over same wireless network. Our sensors will be able to enable or disable the sensors which will be in control of the user. The flex sensor will depend upon the gestures of our fingers to control the appliances. The magnetic sensor will enhance door breaking security. All these data can be seen by user on the cloud platform like THINKSPEAK. This paper will serve as an example of how IOT applications can make our life easier.

Key Words: Arduino, Flex Sensor, Wireless Module, Flame Sensor, Internet of things (IOT), ThinkSpeak

1. INTRODUCTION

Today, the increase in demand of service over the internet necessitated the data collection and exchange in efficient manner. In this sense internet of things (IOT) has promised the ability to provide the efficient data storage and exchange by connecting the physical devices via electronic sensor and internet. The IOT has created the revolution all over the world and fascinatingly it has become integral part of life. Hence, this paper utilizes Arduino fundamentals and some sensor to ease the way we control our homes appliances. This is achieved by interfacing sensors like flex sensor, accelerometer sensor, magnetic sensor, flame sensor with microcontroller based system like Arduino UNO. The values from the sensor change the status of our appliances and the status of appliances can be seen on the cloud platform..

2. Components And Software Used

Arduino UNO, Relays, DC motor, Flex Sensor, Wi-Fi Module, Magnetic Sensor, Flame Sensor, Accelerometer, Motor Driver IC, 7805 power supply, Arduino IDE, LDR (Light Dependent Resistor).

3. Block Diagram

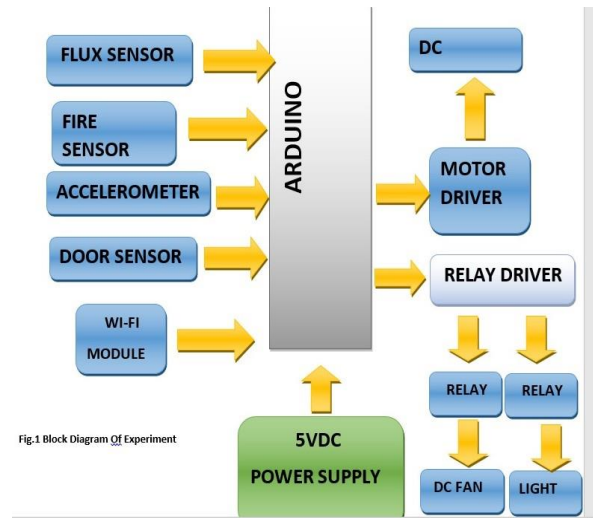


Fig.1 Block Diagram Of Experiment

4. Specification of Components

4.1. Arduino UNO Board

The Arduino expansion was emerged in ITALY to build up low cost hardware for communicating design. This Arduino UNO s an excellent choice for any IOT applications design and, one can expect and carve programs according to the needs. The Arduino UNO board acts as a control unit in this experiment.

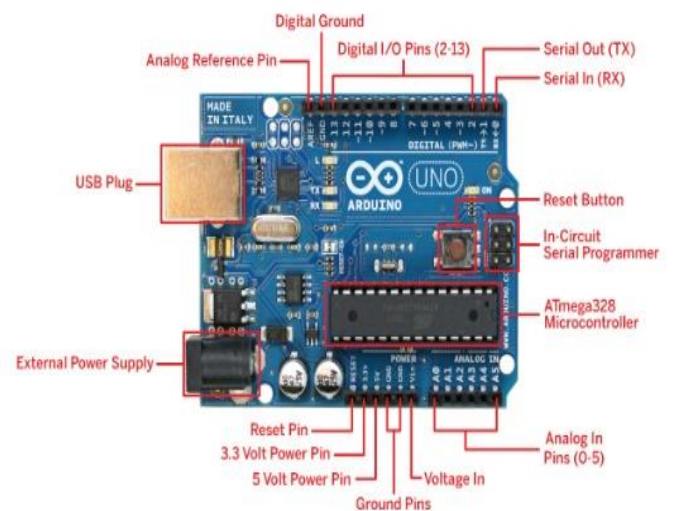


Fig.2 Arduino UNO Board

4.2. 5V Relays

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal.

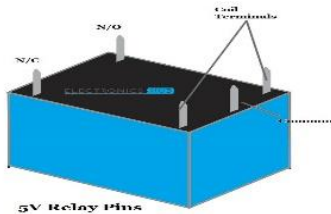


Fig.3 5V Relay

4.3. DC Motor

Geared DC motors can be defined as an extension of DC motor. A geared DC motor has a gear assembly attached to the motor.



Fig.4 Geared DC motor

4.4. FLEX SENSOR

A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. This flex sensor is a variable resistor like no other. The resistance of the flex sensor increases as the body of the component bends. This sensor is used in our experiment to control the lightening of our house to turn it ON or off.

APPLICATION

- Human Machine Interface devices
- Security system



Fig.5 Flex Sensor

4.5. Wi-Fi MODULE

The ESP8266 WiFi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any

microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.



Fig. 6 WI-FI Module

4.6. Reed Relay SENSOR

The reed switch is an electrical switch operated by an applied magnetic field. In this experiment we have used this sensor to provide door breaking security. If the door breaks it will send an alert through buzzer.

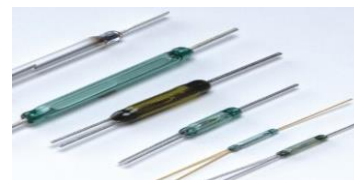


Fig.7 Reed Relay Sensor

4.7. FLAME SENSOR

A flame sensor "senses" a weak DC signal from the AC power sent to the ignitor which via the phenomenon of flame rectification in which the polarity of power sent through a flame is rectified to DC. This sensor is used in our experiment to detect the fire in the house and then send an alert through buzzer.



Fig.8 Flame Sensor

4.8. ACCLEROMETER

Accelerometers are devices that measure acceleration, which is the rate of change of the velocity of an object. They measure in meters per second squared (m/s²) or in G-forces (g). The values are represented in X, Y and Z coordinates. These values are used to control the rotation of motor.



Fig.9 Accelerometer

4.9. Arduino IDE

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. It runs on your computer, used to write and upload computer code to the physical board.

4.10. LDR (LIGHT DEPENDENT RESISTOR)

Light dependent resistors, LDRs or photo resistors are often used in circuits where it is necessary to detect the presence or the level of light. In this experiment we have used LDR to have automatic light control such that when there is brightness light is automatically OFF else it is ON.

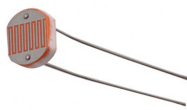


Fig. 11 Light Dependent Resistor (LDR)

5. Experimental Setup of Home Automation Setup

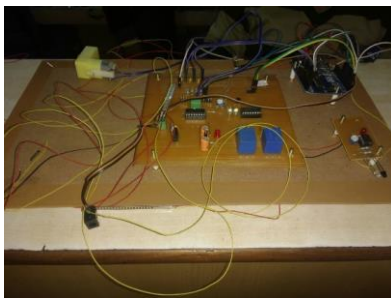


Fig. 12 Experimental Setup

This paper basically consists of three important parts i.e. sensing, monitoring, and controlling system. The first part sensing is done by sensors like flex sensor, accelerometer etc. the monitoring task is done by the cloud platform and the controlling part is done by our microcontroller unit i.e. is Arduino UNO.

The sensors, appliances and Wi-Fi module are interfaced with Arduino UNO. The value of sensors brings a change in the status of our appliances. The flex sensor depends on the gestures of our fingers to control the appliances. The accelerometer controls the opening and closing of door. The magnetic sensor alerts us if the door lock breaks. The flame sensor alerts us if there is fire in the house. The status of our appliances are uploaded on the cloud platform and the user can see the status on his laptop and smartphone as well. The Arduino UNO controls the appliances on the basis of value given by sensors.

6. Conclusion

The IOT facilitates numerous benefits to the society and from our paper we can provide and prove the strength of IOT that is capable to contribute the services for the purpose of building vast no. of applications and help to implement them on the public platform. This design provides moderate and less expensive way of sensing, monitoring and controlling system in the field of domestic and as well as industrial standard to implement IOT.

At a final note, we conclude that IOT leads to become universal in every aspect. This paper will be very beneficial in our normal day to day life and will bring much needed innovation in his fast changing world of technology where people prefer to have control over things using the smartphones which will bring ease to their routine life.

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