International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Index Copernicus Value (2016): 79.57 | Impact Factor (2017): 7.296

Smart Home Automation System using Arduino and IOT

V. Sudharani[1], D. Siva[2], M. Vijaya Raju[3]

[1, 3]Assistant Professor, CBIT, Proddatur, Kadapa, A.P, India

[2]Assosiate Professor, CBIT, Proddatur, Kadapa, A.P, India

Abstract: ***Now-a-days advancement of technology is rapidly increasing and people wants to do tasks in smart way. So people are thinking about quick way of solving Daily life task. This will results a technology which can control over the domestic and industrial applications using IOT. This 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. In this paper we present a home automation. This automation includes controlling of home appliances and also smart controlling of water system .To achieve these things we are using sensors like flux sensor, fire sensor. 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. 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.***

Keywords: 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,Wi-Fi Module, Flame Sensor, Accelerometer, Motor Driver IC, 7805 power supply, Arduino IDE.

3. Block Diagram

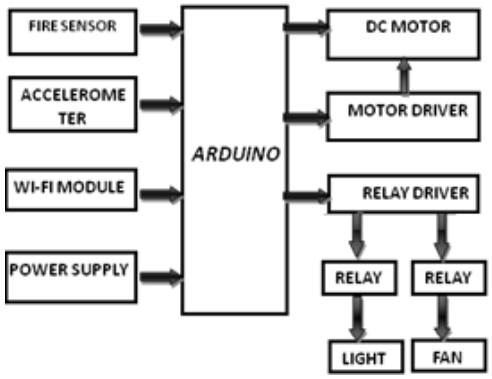

Figure 1: Block Diagram of experiment

4. Specification of Components

4.1 Arduino UNO Board

The **Arduino Uno** is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator,

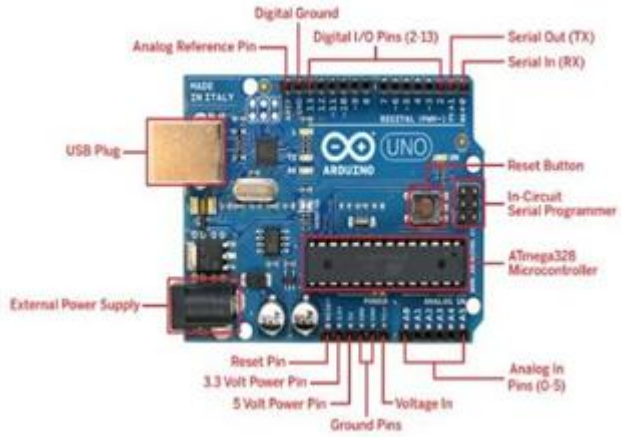

Figure 2: Arduino UNO Board

A USB connection, a power jack, an ICSP header, and a reset button. Arduino is an **open**-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and **turn** it into an output - **activating** a motor, **turning** on an LED.

4.2 5V Relays

One of the most useful things you can do with an Arduino is control higher voltage (120-240V) devices like fans, lights, heaters, and other household appliances. Since the Arduino operates at 5V it can't control these higher voltage devices directly, but you can use a 5V relay

to switch the 120-240V current and use the Arduino to control the relay. 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.

Figure 3: 5v Relay

The Arduino can be programmed to turn on the relay when a certain event occurs, for example when the temperature of a thermistor gets higher than 30° C. Or when the resistance of a photoresistor drops below 400 Ohms. Almost any sensor can be used to trigger the relay to turn on or off.

4.3 Fire Sensor

Figure 4: Fire 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.

4.4 WI-FI Module

The ESP8266 Wi-Fi module is a self-contained SOC with integrated TCP/IP protocol stack that can give any micro controller access to your Wi-Fi network.The ESP 8266 is capable of either hosting an application or offloading of all Wi-Fi networking functions from another application processor.

Figure 5: Wi-Fi module

4.5 Accelero Meter

Accelero meters are the devices that measures 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.

Figure 6: Accelero meter

The structure of the accelerometer sensor has a mass attached to a spring which has fixed outer plates and moves along one direction. So when an acceleration is applied in any of the direction, the capacitance between the plates and the mass will change. The accelerometer sensor will measure this change in capacitance which corresponds to an acceleration value.

4.6 DC Motor

DC motors themselves are very simple; any basic DC Motor will have two leads that can be directly attached to a battery or power supply of sufficient capacity. The side of the motor that is connected to the positive of the power source will determine which way the motor rotates. We will be going a step further than this and using a motor controller called an H-Bridge.

Rather than having to unplug the motor to reverse it, this clever chip allows us to reverse the polarity to the motor using logic level signals from a microcontroller. The motor can be run in each direction on command. The chip does all of the heavy lifting and can be directly connected to the DC motor and the Arduino.

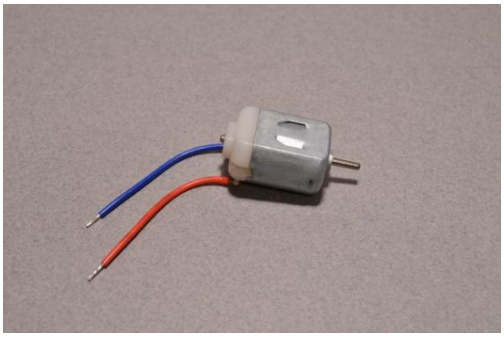

Figure 7: DC Motor

4.7 Motor Driver

Drivers are not used only for motors. They are used for any device that usually draws more than 50-100 mA. **Maximum** current of microcontroller output (typically 10-20mA) is not enough to drive motor coil. Connecting motor directly to microcontroller will damage microcontroller output transistor. **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.

1) Experimental Setup of Home Automation Setup

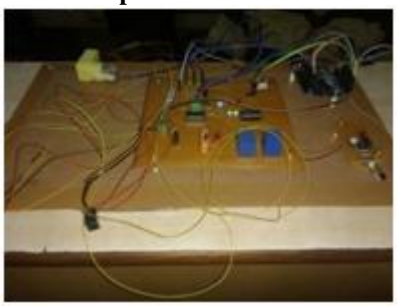

Figure 8: Experimental Setup

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.

5. Conclusion

The IOT facilitates Number of 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.

References

[1] Vinay Sagar K N, Kusuma S M., "Home Automation Using Internet Of Things" IRJET Vol. 2, Issue no.3, Jan. 2015
[2] Vlad Bande, S.Pop, Ciascai loan, Dan Pitica, "Real Time Sensor Acquisition interfacing using MATLAB", IEEE, Dec. 2012.
[3] Kishore P Jadhav, Santosh G Bari, "Hand Gesture Based Switching Using MATLAB", IJIREEICE, Vol.4, May 2016.
[4] Sharmad Pasha, "ThinkSpeak Based Sensing and Monitoring System For IoT with MATLAB Analysis", IJNTR, Vol.2, June 2016.
[5] Angel Deborah S., "Home Automation Systems - A Study", IJCA, Vol. 116, April 2015.
[6] Prof. (Dr.) Khanna SamratVivekanand Omprakash., "WIRELESS HOME SECURITY SYSTEM WITH MOBILE", IJAET, Vol. 2, Dec. 2011.
[7] J.Chandramohan, R.Nagarajan , K.Satheeshkumar , N.Ajithkumar , P.A.Gopinath , S.Ranjithkumar, "Intelligent Smart Home Automation and Security System Using Arduino and Wi-fi", IJECS, Vol.6, March 2017.
[8] Surinder Kaur, Rashmi Singh, Neha Khairwal, Pratyk Jain, "HOME AUTOMATION AND SECURITY SYSTEM", ACII, Vol.3, July 2016.
[9] Jayashri Bangali, Arvind Shaligram, "Design and Implementation of Security Systems for Smart Home based on GSM technology", IJSH, Vol.7, 2013.
[10] M. Wu, T. J. Lu, F. Y. Ling, J. Sun, and H. Y. Du, "Research on the architecture of Internet of Things," in Proc. 3rd ICACTE, 2010.