International Journal of Advance Research in Science and Engineering Volume No.07, Issue No.05, May 2018 www.ijarse.com

IoT Based Implementation of Smart Home Automation and Security System Using Raspberry Pi

Prof Amruta Nikam, Rajdeep Malakar, Kajal Kumari, Akriti Ranjan

Assistant Proffesor at Dr. D.Y. Patil Institute of Engg, Mgmt & Research, Akurdi, Pune, India UG Students, Dept. of E&TC, at Dr. D.Y. Patil Institute of Engg, Mgmt & Research, Akurdi, Pune,

India

ABSTRACT

Home automation is being accepted nowadays because of its uncountable benefits. Home automation is usually carried out by remote control or local networking. This project focuses on designing a application which will be very simple and easy for home automation as well as a security system on Raspberry Pi. The codes of the same is generated in python environment which is by default programming environment of Raspberry Pi. LED's are used as an indication for the switching action. Home automation system can also be implemented on Raspberry Pi which includes a smart doorbell, locking system, automated lighting system, temperature & humidity controller which turns on fan or air conditioner automatically or increases the speed of the fan automatically under the given conditions. The later part of the project focuses on the security system which includes gas and smoke detectors which will work in case of a gas leakage and fire respectively. In case of a gas leak or fire, windows of the house will be opened automatically and also an alert message will be sent through SMS to the user. The doors, windows, lights, fans and other household appliances will also be controlled from any point of the world by the user through cloud services or android applications. Python codes are required for interfacing each senses and a prototype of smart home can be developed.

KEYWORDS: Raspberry Pi, Python, Sensor, Interface..

I.INTRODUCTION

Basically home automation refers to the working of information technology and computer in order to have an access on home appliances as well as monitor them. The applications ranges from simple remote control of lighting system to much intricate microcontroller and networks including various stages of automation and intelligences. There are several kinds of advantages in home automation such as ease of use, energy proficiency and safer major which results better standard of life. The demand of security system and network permitted home automation is swelling in past few years because of advantages like comfort ability, ease of use, clarity and highly economical. Besides having a quick increase in the field of internet, there is still a lot more potential for remote controlling and supervising such devices from anywhere in the world using the concept of IoT. In

International Journal of Advance Research in Science and Engineering Volume No.07, Issue No.05, May 2018 www.ijarse.com

1975, the XIO industry standard was introduced for communication between electronic devices. It is one of the historic standard recognised from the author's point of view, providing restricted authority over household devices through the power lines.

II.RASPBERRY PI

The raspberry pi is basically a micro computer which is capable of doing almost everything that our normal PCs and laptops can do. It was invented in United Kingdom few years ago by Raspberry Pi foundation, in order to give basic knowledge about computer science in schools and colleges. It has been popular since the launch of its first model i.e. raspberry pi 1. It became popular due to its ease of use. Basically it consists of a HDMI port, a SD card port, Ethernet port, Wifi, 4 USB ports, and also a camera. It was used for applications such as robotics and embedded applications. General peripherals like mouse and keyboard are actually not included with the raspberry pi unlike PCs. It has to be bought separately and installed. However some official and unofficial bundles include some accessories.

III. SETTING UP THE RASPBERRY PI

Unlike other computers the raspberry pi does not have an OS pre-installed in it. So to make it work, first we have to install the operating system. The things that we are going to need are : Raspberry Pi(any model), card reader, 8 GB Micro SD card, HDMI to VGA converter, monitor & USB cable. First we have to enter the SD card into the card reader & then connect the card reader to our PC. Then we will open up any internet browser and go to www.raspberry.org from where we can download the "Raspbian" operating system. There is other operating systems which we can install but we will stick on to Raspbian because it was developed exclusively for raspberry pi. We will be downloading the Raspbian Jessie by a torrent client. In addition to this we will need to download some softwares which we will need to decompress the OS, create a image file and also to write onto the SD card. First we will have to download 7zip to decompress the OS downloaded. Then we need to download a software called WIN32 DISK IMAGER which creates a image file and also writes the OS on the SD card. First we have to extract the downloaded OS in a folder by which a image file will be created. Then we have to open up win 32 disk imager and choose the image file and also specify the device where we want to write the image file. In this case we are writing into the microSD card. After we are finished writing the image file into your SD card, we will see that our untitled SD is renamed "boot" automatically which contains all the files of the operating system. Now the SD card is ready to be installed into the raspberry pi. After inserting the SD card we can boot or power on the raspberry pi using the USB cable. Then we have to connect the HDMI port to the monitor. We also have to connect the keyboard and the mouse into 2 USB ports. Booting up for the first time takes some time. After booting up, first thing we need to do is configure the raspberry pi. For that we need to open up terminal, and run the command sudo raspi-config. It will open up a screen where we need to configure all things like time, etc. After the configuration is done, it will reboot. And then, the raspberry pi is ready to run.



IV.BLOCK DIAGRAM AND ARCHITECTURE OF THE SYSTEM



V.PROJECT OBJECTIVES

• Designing a basic automated home using Raspberry Pi. (Making the home appliances and devices absolutely automatic.)

Device;

- Controlling household appliances and devices from anywhere through cloud by implementing the concept of IoT.
- The system will also be able to control the home appliances with respect to change in temperature or humidity.
- Providing a 24 hour monitoring and security alert system.(A 24x7 monitoring and security alert system by the use of sensors and also sending notifications to the user through SMS.)
- Providing an automatic door locking and unlocking system.
- Designing an automatic security system in case of any accident.

International Journal of Advance Research in Science and Engineering Volume No.07, Issue No.05, May 2018 www.ijarse.com

VI. SIMULATION CIRCUIT



VII. INTERFACING OF SENSORS

We are using various sensors in our project like DHT 11, MQ6, LDR etc. The main components which are responsible for the automation, are these sensors. These sensors are going to work for the entire time, and if there is any change in the physical parameters like light intensity, temperature, or there is a gas leakage, the sensors are going to send the signal directly to the raspberry pi. After receiving the signal, the raspberry pi will do the needful, or it will implement the operation which is given in the codes.

The DHT 11 is a temperature sensor. It gives back the sensed temperature to the raspberry pi. If the temperature somehow goes above 28 C, the raspberry pi will automatically turn on the living room or bedroom fan. However, we can turn it off any time we wish manually by switching on/off in the web page which we have designed using HTML and JAVASCRIPT.

Next is the LDR or Light dependent Resistor. A **photoresistor** (or **light-dependent resistor**, **LDR**, or **photoconductive cell**) is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words, it exhibits photoconductivity. A photoresistor can be applied in light-sensitive detector circuits, and light-activated and dark-activated switching circuits.

A photoresistor is made of a high resistance semiconductor. In the dark, a photoresistor can have a resistance as high as several mega ohms (M Ω), while in the light, a photoresistor can have a resistance as low as a few hundred ohms. If incident light on a photoresistor exceeds a certain frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electrons (and their hole partners) conduct electricity, thereby lowering resistance. The resistance range and sensitivity of a photoresistor can substantially differ among dissimilar devices. Moreover, unique photoresistors may react substantially differently to photons within certain wavelength bands. Like before , as soon as the

International Journal of Advance Research in Science and Engineering Volume No.07, Issue No.05, May 2018 WWW.ijarse.com

Raspberry Pi gets the signal from the LDR, it will automatically turn on the living room light. We can also manually turn it off with the help of the web page.

We are also using a MQ6 sensor. This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm.

This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance. The drive circuit is very simple; all we need to do is power the heater coil with 5V, add a load resistance, and connect the output to an ADC.

Similarly after getting the signal from the MQ6 sensor, the raspberry pi will turn on the exhaust fan of the kitchen. It will also send a notification to the user that a gas leakage has taken palace.

VIII. DESIGNING OF THE WEB PAGE

It is also one of the most important part of our project. Designing of the web page is done with clubbing html and javascript with python. The webpage is designed to have 6 buttons. 1. Living room light . 2. Living room fan. 3. Bedroom Light. 4. Bedroom fan. 5. Kitchen light . 6. Exhaust fan. As stated in the previous section, the appliances like light and fan will turn on automatically depending on the input from the sensors as well as we can also turn them on/off manually by these buttons on the web page.

IX. CONCLUSION

In this highly developing era, where directly or indirectly, everything is dependent on computation and information technology, Raspberry Pi proves to be a smart, economic and efficient platform for implementing the home automation. This provides a basic application of home automation using Raspberry Pi which can be easily implemented and used efficiently. The code provided is generic and flexible in a user friendly manner and can be extended for any future applications like power control, surveillance, easily. Moreover, this technique is better than other home automation methods in several ways. For example, in home automation through DTMF, the call tariff is a huge disadvantage, which is not the case in proposed method. Also, in Web server based home automation, the design of web server and the space required is eliminated by this method, because it simply uses the already existing web server provided by G-mail.

REFERENCES

- Improving Smart Home Security: Integratings Logical Sensing Into Smart Home.(Arun Cyril Jose and Reza Malakian, Senior Member, IEEE)
- [2] The Implementation of Smart Electronic Locking System Based on Z-Wave and Internet. (Ching-Chaun Wei, Dept. of Info. & Comm. Engg. CYUT Taichung, Taiwan) (Yan-Ming Chen, Dept. of Info. & Comm.

International Journal of Advance Research in Science and Engineering Volume No.07, Issue No.05, May 2018 www.ijarse.com

Engg. CYUT Taichung, Taiwan) (Chao-Chieh Chang, Dept. of Info. & Comm. Engg. CYUT Taichung, Taiwan) (Chi-Han Yu, Dept. of Info. & Comm. Engg. CYUT Taichung, Taiwan)

- [3] IoT-based Home Automation System for People with Disabilities. (MohdHelmyAbdWahab Embedded Computing Research Group Faculty of Electrical and Electronic Engineering UniversitiTun Hussein Onn Malaysia P.O. Box 101, Pt. Raja, BatuPahat, *helmy@uthm.edu.my)
- [4] Home Automation and Monitoring System Using Raspberry Pi and Android. (1Prof. Vaidya Bhaumik, 2Prof. Niteen B Patel, 3 Vardhman Modi 1 Assistant Professor, 2 Associate Professor, 3Student 1 Electronics and Communication Department, 1 SCET, Surat, India).
- [5] Smart Home Automation: A Literature Review. (1. Vaishnavi S. Gunge, Walchand Institute of Technology, Solapur. 2. Pratibha S. Yalagi, Walchand Institute of Technology, Solapur.