

An Overview of Home Automation

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Abstract— In this paper, we are going to discuss about what is home automation and how does it work? In the era of advanced technology, there is huge consumption of energy and resources due to which there is a great demand of conservation of energy. As we know one cannot operate the appliances from remote locations. Therefore, it is necessary to bring a technology that can help to operate appliances from remote location in order to conserve energy in a smart way. A user can use android or web application to command these systems. Communication methods such as GSM, Bluetooth, Zigbee. Wi-Fi can be used by the systems. This paper is going to summarize the conservation of energy via home automation technology and methodologies used behind it.

Keywords— Home Automation, Mobile Application, Remote Access Systems, Embedded Systems, Electrical and Electronic Devices.

I. INTRODUCTION

Electrical and Electronic environment consist of appliances such as fans, television, air conditioners, lightning system, heaters, motors etc. A remotely accessible environment can be used in which every appliance can be accessed remotely and supervised using Android application and Web application. The communication mode which is used to command these devices are explained in this paper.

II. HOME AUTOMATION

Home automation, also known as domestics, is a technology which is creating automation for home and can be called a smart home. With the help of home automation, one can get the access to control devices at their home from a mobile device or Bluetooth devices anywhere in the world up to a particular range. It may also include alarm systems and access control systems. When connected with internet, IOT (Internet Of Things) plays an important role in home automation. Home Automation will help in conservation of energy by allowing the control of home appliances from remote locations.

III. COMPONENTS OF SMART HOME

A. RASPBERRY PI

The Raspberry Pi is an arrangement of single board computers whose size is similar to that of a credit card. It was developed in United Kingdom by the foundation of Raspberry Pi with the motive to promote the learning of computer science [2]. In order, to teach people about computers and making things through it, they developed free resources. Its inception began in 2006. On 19 February 2012, two models were announced:

I. Model A

II. Model B

It is similar to low-cost minicomputers. We can connect television and even monitor of Personal Computer to Raspberry Pi. Also, mouse and keyboard can get easily connected to Raspberry Pi. CPU speed ranges from 700MHz – 1.2GHz for the Pi3. It has its own Operating System and there are different programming languages supported by Raspberry Pi like Python, C++, SQL and HTSQL.

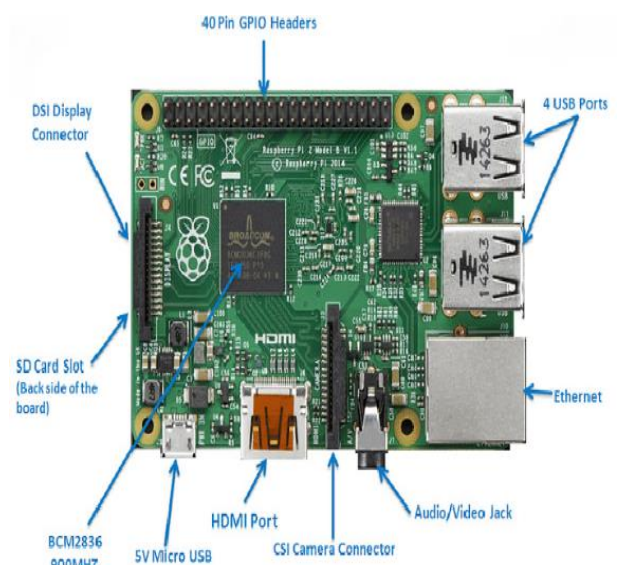


Figure 1: Board of Raspberry Pi

B. RELAY & RELAY DRIVER CIRCUIT

Relay is similar to electromagnetic switch and it can allow switching from one circuit to another circuit when they are not connected. We have to use a low voltage circuit to turn ON and OFF. In such cases, Relay is used for its operation which demands high voltage. Relay is divided into two parts:

- Input
- Output

Side with input part is just a coil, used to generate magnetic field when voltage of small input is given to it. There are three contactors in Relay: Normally closed (NC), Normally Opened (NO) & Common (COM). Proper combination of these contactors results in turning ON or OFF of the electrical appliances.

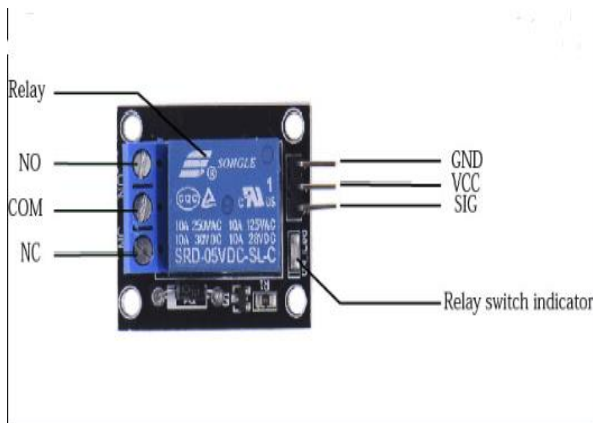


Figure 2: Relay Module

C. Mobile Devices

Small computing devices are mobile devices. Its size is small enough that it can be held and operated in hands. It has its own operating systems. Mobile devices are mobile in nature i.e. it can be moved from one place to another [1]. Examples for such devices can be Smart Phones, Laptops, Tablets and so on.



Figure 3: Mobile Devices

IV. METHODOLOGIES

➤ Hardware Implementation

We have gone through the given block diagram to make the system hardware. The block diagram given in the fig.4 can be divided into two parts:

- Server Side
- Client or User Side

Raspberry Pi is used totally for the server-side installation. Raspberry Pi uses LAMP (Linux, Apache, MySQL, PHP). There are two PHP files, created on Raspberry Pi and stored on the server. Raspberry Pi consists of 40 GPIO pins. For controlling the home appliances, these pins are used. GPIO pins of the Raspberry Pi are connected to Relay via Relay Driver Circuitry. 3.3V output is provided by GPIO pins. With the help of Relay Driver Circuitry, we can drive Relay at minimum 6V voltage. All appliances of the home are to be connected to the Relay.

Client side is similar to user side. Raspberry Pi can be accessed through the Internet by using mobile devices.

Once the user gets connected to the network through their mobile device and later if he puts the IP address of the Raspberry Pi in the browser of mobile device, we can see the webpage used to control home appliances in each room.

These web pages contain UI. UI simply displays the home appliances present in every room along with the number of rooms. Buttons are provided so as to switch the state of home appliances present in every room. The control of number of home appliances takes place concurrently.

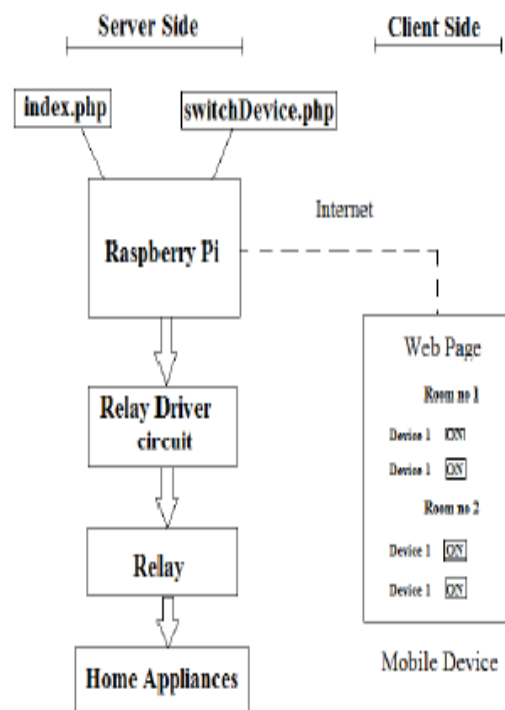


Figure 4: System's Block Diagram

➤ Software Implementation

PHP language is used in the programming. Two PHP files are created:

- Index.php
- SwitchDevice.php

These two files are being saved on the local LAMP server used by the Raspberry Pi. For the developing of the web page and for creating the UI present on the web page, Dreamweaver software is used.

v. IMPLEMENTATION OF SMART HOME TECHNOLOGY

The main constituents of a smart home are:

1) Automation:

It refers to providing the ability to a device such that it has scheduled events beforehand and performs the certain

activities at a particular time on a daily basis. For example, as soon as your alarms triggers in the morning, the lights gets automatically switched on.

2) **Remote Control:**

Home automation makes the use of monitoring apps which can be accessed using smartphones. These apps provide the current working state of the devices and can also alert by sending notifications , mail or text messages in case of any threat.

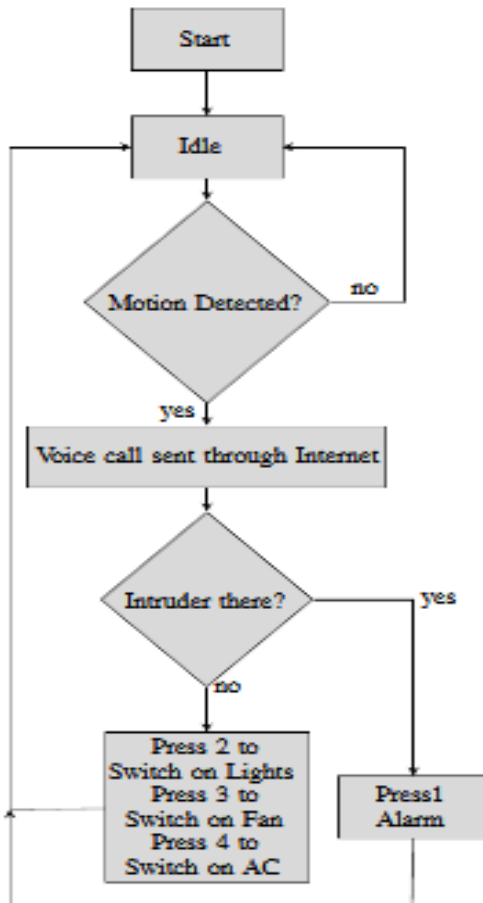


Figure 5. Flowchart of Home Automation

vi. **EXAMPLES OF SMART HOME TECHNOLOGY**

- Smart TVs which can get connected to Internet to access content through mobile devices, such as videos or music.
- Smart lighting systems like Hue from Philips Lighting Holding that adjust lighting according to the number of occupants in a room.
- Smart locks which can sense residents when they are around and keep the door open for them. Users can grant or deny access for other people.
- Pet care systems which are automated and can be connected with feeders for timely feeding to the pets when the owner is not around.

- The watering of plants and lawns at time.
- Smart thermostats which control room temperature by monitoring weather conditions.

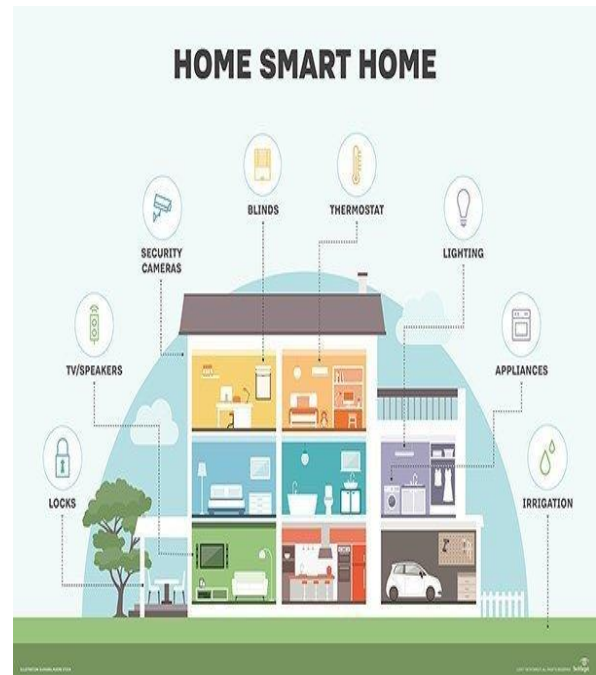


Figure 6. Examples of Smart Home

VII. **CONCLUSION**

The technology is changing rapidly with time and is becoming more and more advanced with the passing years. The IOT is contributing to almost all of the latest technologies and it is speculated that even a small bit of dust will be monitored to serve for us using this amazing concept in the coming generation. Home automation provided people with a very cozy life and also it provides convenience for the physically challenged or old people. Therefore, in this paper, we studied about how energy can be conserved at great extent with the help of Smart Home technology and making life worth living.

REFERENCES

1. Kalyani Pampattiwar, Mit Lakhani, Rinisha Marar, Rhea Menon " International Journal of Current Engineering and Technology ", P-ISSN 2347 – 5161, Vol.7, No.3 ,June 2017.
2. Prof B.P Kulkarni, Aniket V Joshi, Shubham Suryawanshi, Vaibhav V Jadhav, Akshaykumar T Dhamange " International Journal of Innovative Studies in Sciences and Engineering Technology", ISSN 2455-4863, Vol. 7, Volume: 3 Issue: 4 | April 2017