Home Automation using IOT

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Abstract*—*a home automation is a technique which reduces the human efforts by using electronic devices. This system controls the home appliances through android application based on raspberry-pi. A home automation system have a two main components; First one is android app which control by locally as well as remotely and second is Raspberry Pi that has interface to sensors and appliances of an home automation system. It also saves the energy consumed by home appliances.

Keywords —
IoT, Home Automation, Raspberry-pi, Android Application, Sensors.

I. Introduction

IoT means Internet of Things, which connects the devices and things to the internet. The devices is nothing but smart-phones, TV, sensors etc. At the edge of the IOT are the appliances and equipment we use every day. These devices and thing are connected across an infrastructure using ZigBee, raspberry-pi, arduino,Wi-Fi etc to provide bi-directional communications link with relatively long range, low power and a sufficient data rate to aggregate information from many connected devices. Home automation or Smart Homes can be described as introduction of technology within the home environment to provide convenience, comfort, security and energy efficiency to its occupants. Adding intelligence to home environment can provide increased quality of life. Now a day by giving the introduction of the Internet of Things (IOT), the research and implementation of home automation system are getting more popular.

What is Home Automation?

Home/office automation is the control of any or all Electrical gadgets in our home or office, regardless of whether we are there or away. Home/office automation is standout amongst of the most energizing improvements in innovation for the home that has gone along in decades. There are several items accessible today that permit us control over the gadgets automatically, either by remote control or even by voice charge.

Motivation

The motivation of our system is to take care of several home appliances that may normally be hard for those who are literate physically handicapped and old aged people to become self-regulating.

The proposed system is to allow a user with any android enabled device to run downloadable software on any mobile device such as a smart phones or mobiles. This home automation system will allow the user to control or operate a device that is connected to any home appliance with a raspberry-pi. The objective of this application will be to direct a security system with webcam surveillance, door sensor notification and a light control system. Sensors will be connected to the home appliances with raspberry-pi so that they can be monitored and controlled.

II. Literature Review

The automatic control of home appliances (On/Off) with the help of computer and microcontroller (8951).This is a wired system and every appliance must be connected with the help of cables. The other modules which are used in order to accomplish our desired goal are Dallas Timer, Relays, ULN, MAX232, Kiel cross compiler, flash magic and power supply circuit. This paper presents the design and implementation of APPLIANCES CONTROLLING USING PC module. Simply by using this home automation we can save time, money, man power. And also we can have command, security and convenience on controlling appliances [1].

Al-Ali and Al-Rousan obtainable a design and execution of a Java-based automation system during World Wide Web. It had a separate embedded system board integrated into a PC-based server at home [6].

Smart home is not a new term for science society, it is been used from decades. As electronic technologies are advancing, the field of home automation is expanding fast. There were various smart systems have been proposed where the control is via Bluetooth [7], internet etc. A telephone and PIC remote controlled device for controlling the devices.pin check algorithm was used to implement the system where it was with cable network but not wireless communication.

R.Piyare has brought in design and implementation of a low cost, flexible and wireless way out to the home automation [9].

Relevance of the Work

A smart home can be built on wide area by using variety of technology platforms or protocols. Each technology consists, its own language. Each language is used to connect the various devices and give instructions to perform a function. This system consist the automation of the home, housework or household activity.

The smart home system is used for outlying area is nothing but extension of building automation and it involves the control and automation of turn on bulbs, heating, ventilation, air conditioning (HVAC), appliance. In future the market value of the home automation system is over US$10 billion.

III. Proposed Work

In 1970s the introduction of home automation is failed to improve the lifestyles of users for several reasons. Firstly, these system is costly that's why the economical benefits of home automation system is difficult. Secondly, the costs of implementing smart home technology must be depends on their installation and hardware cost.

In this system we will use some sensors like gas detector sensor and temperature sensor which help to create a home as a smart home. We are implementing a scheduling mechanism in this system.

The Raspberry-pi is act as minicomputer and is connected with Wi-Fi. Home Automation System can be accessed from the web browser by using any locally, or remotely from any PC or mobile handheld device connected to the internet with appropriate web browser through server real IP. Wi-Fi technology is used to select the network infrastructure that connects sensors and the servers.

There is a need for home automation system is to be cost effective, flexible and easy to install with many network infrastructures and home appliances. The proposed home automation system has the capabilities to control the Temperature and humidity, Motion detection, Fire and smoke detection, Light level etc.

IV. HW /SW Requirement

S/W Requirement:

1.Raspberry pi operating system
2. PHP
3.Apache 2
4. Wirepin plugins
5. Android Studio
6. Arduino IDE:

H/W Requirement:

1.Raspberry pi
2.Relay
3.Breadboard
4.Connecting Cables
5. RAM- minimum 1GB
6.CPU Speed-minimum 1.7GHz

V. Architecture

The System Architecture of the system is given below :

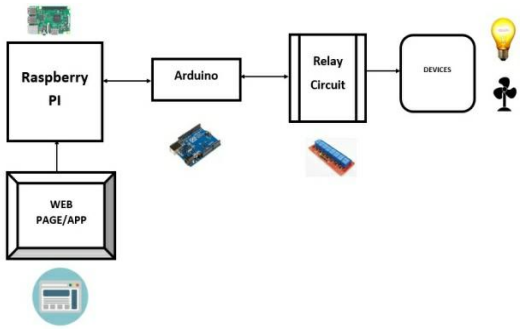

Fig1: System Architecture.

In above system architecture the neighbourhood equipment includes Raspberry Pi and Arduino. Arduino is associated with raspberry-pi and relay. Arduino gathering information and all the home appliances are associated with the relay circuit. Relay is utilized to change over the power supply from low to high. Raspberry Pi goes about as master and the arduinos are go about as slaves. The server interfaces the system with the neighbourhood equipment and mobile smart devices. The last part is the mobile smart device running Android operating system, such as smart advanced mobile phone or tablet, on which the Android application software of the system is introduced to reach and deal with the in home devices by means of the server. The Android application on the mobile smart device likewise gives its users an easy to use graphical interface to effectively control the automated at home appliances.

VI. Experiment Results:

Hardware Implementation

Here, we give 5v power supply to the raspberry-pi. The raspberry-pi is connected to the breadboard through connecting cables for glowing the LED bulb. From above fig. initially the LED is OFF.

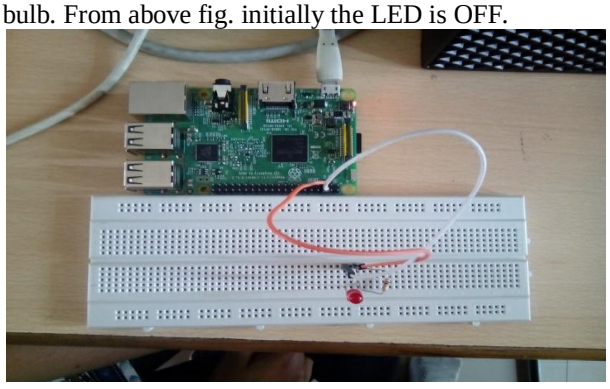

Fig2: LED is OFF in sample module.

Here, we give 5v power supply to the raspberry-pi. The raspberry-pi is connected to the breadboard through connecting cables for glowing the LED bulb. From above fig. status of LED is changed and bulb is glow i.e., ON.

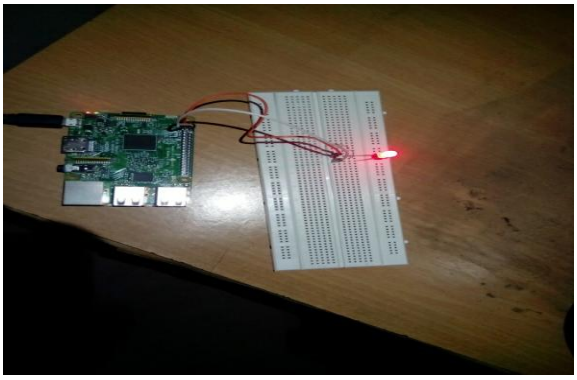

Fig3: LED is ON in sample module.

Fig 5: Home Automation using Raspberry Pi
There are two options:
1. Simple Automation
2. Scheduling for Home Automation

Android GUI:

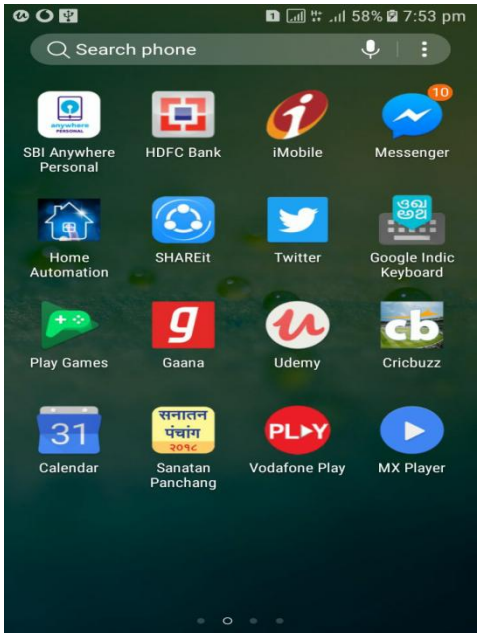

Fig 4 : Click on Home Automation app from Android mobile

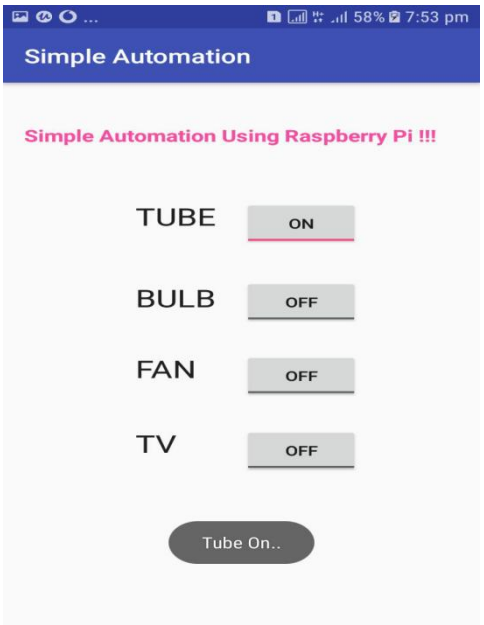

Fig 6: Simple Automation using Raspberry Pi for ON/OFF for Tube, Bulb, Fan, Tv

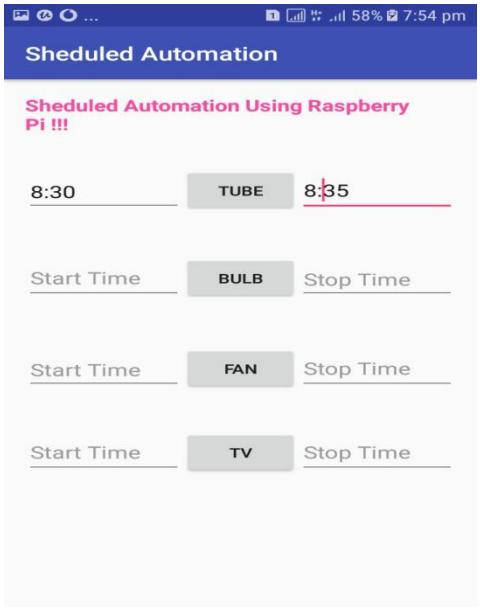

Fig 7: Scheduling for Home Automation using Raspberry Pi

Conclusion

IOT based smart home system will bring more convenience and comfort to people lives. The android based smart home application communicates with the Raspberry pi via an internet. Any android supported device can be used to install the smart home application. Using android application user can control and monitor the smart home environment.

These home automation systems are mandatory because sometimes human can forgot to switch off the appliances when there is no need to use and in this situation, the home automation system is used to reduce the wastage of electricity.

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