© 2016 IJSRST | Volume 2 | Issue 6 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
Themed Section: Science and Technology

Controlling and Monitoring Home Appliances Using Android Smart Phone

Shruti Daund[1], Pooja Jagtap[2], Rohini Chaudhari[3], Pradnya Joshi[4], Prof. T. Ravikumar[5]

Department of Computer Engineering, Savitribai Phule Pune University, Kopargaon, Maharashtra, India

ABSTRACT

In this paper we have proposed a novel system for smart homes, where the home appliances like light and fan can be remotely controlled and monitored using a smart phone. The concept of Internet of things (IoT) comes into picture. The main objective of this system is energy saving through use of low power consumption protocols like zigbee. There is also a provision for smoke and fire detection. In case of fire, the user gets notified of it through a text message on his registered mobile number so that he can take further action. In this system only authenticated users can control the appliances through smart phone. The current status of light and fan i.e ON/OFF is also notified to the user. A user friendly android app interface is provided for notifying the user the status of the appliances and the user can give command for switching ON/OFF the appliances. The hardware used which actually controls the appliances is Raspberry pi. An Internet gateway provides ease of communication between the hardware and the android app. Here the brightness or the dimness of the light can also be controlled by using the concept of duty cycle.

Keywords: Raspberry pi, Smart Homes, IoT, Android app.

I. INTRODUCTION

IoT is an emerging technology of this era and soon it will become an integral part of our society. The concept of smart systems plays a crucial role in implementation of Internet of things. IoT basically consists of internetworking of physical devices, vehicles and other things or items embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. Monitoring and controlling appliances, things, items, electronic devices is a key application of IoT. In 21st century where there is an increasing need for smart or automated systems or devices to save money and time, home automation system proves beneficial for this purpose. In the concept of smart homes the user need not be present physically to control and monitor the appliances, this can be done from any remote location through a portable device having user friendly interface. There are a wide variety of technology platforms, or protocols, on which a smart home can be built. Each one is, essentially, its own language. Each language speaks to the various connected devices and instructs them to perform a function. This automation technique involves wired as well as wireless connections. Detecting fire and notifying it to user ensures the safety of home even when no one is present there. By notifying user the instance of fire, the user can take appropriate action and also the safety of the valuables of the user which may get damaged due to fire, can be ensured. IPv6 is more beneficial to IoT as it provides a self-configuration mechanism, the nodes automate their addresses further reducing deployment costs.

II. METHODS AND MATERIAL

Home automation is a step towards what is referred to as “Internet of things” in which everything has an assigned IP address, and can be monitored and accessed remotely. The first and most obvious beneficiaries of this approach are “smart” devices and appliances that can be connected to a local area network, via Ethernet or Wi-Fi. As home automation system is to be used by a large number of people, building an open source and reliable cost effective system is the main goal. Power saving is

also one of the main objective. For achieving the goal of open source system we are using open source operating systems like Raspbian OS.

III. RESULT AND DISCUSSION

For carrying out various operations on the appliances we are making use of Raspberry pi which includes an ARM compatible central processing unit and an on chip graphics processing unit. It uses Raspbian OS, a debian based Linux distribution. Raspi-config command is used for configuration of Raspberry pi. We can enter into raspi desktop using "startx" command.

A. Interfacing of sensors with Raspberry pi

In this system we are making use of IR sensor camera which is used for detection of light. It can measure the heat of an object as well as detects the motion. With the help of IR sensor the current status of light (ON/OFF) can be detected.

PIR sensor is used for detecting motion. It is used for detecting humans when they enter [1].

Smoke and fire detection sensor is used for sensing fire and smoke emitting out from a fireplace. It consists of a light dependent resistor which gets sensed when fire breaks out.

All the information from the sensors is given to Raspberry pi. The Raspberry pi is then responsible for switching ON/OFF lights and fan. There is a wired connection between light, fan and Raspberry pi.
The system architecture is shown in figure 1.

B. Android application

The android application provides a user friendly interface to control light and fan. The information about the fire instance is also notified through this interface. A java APK file is to be installed in the smart phone to use this application. There are separate switch ON and switch OFF buttons to control light and fan. It also has feature to control the brightness of lights through the use of duty cycle. To have an access to this application, the user first of all has to login into the system. If the user is new to the system then registration has to be done. Only registered and valid users are allowed to access these appliances.

C. Wi-Fi Router configuration

For communication between these various units Wi-Fi is used. The Wi-Fi should be configured with a certain address and user commands will be directing through Wi-Fi unit [1].

D. Implementation Details

First of all, booting of the operating system is to be done. There should be proper interfacing of the sensors with Raspberry pi. The GPIO (general purpose input/output) is used to interface the various sensors to Raspberry pi. The programming language used for the front end is java and for back end is python. For interfacing IR sensor with Raspberry pi it needs to be connected to 5V and connecting the data pin of IR sensor to Pin-18 of Raspberry pi [3].

The following commands are to be used in order:
sudo apt-get update
sudo apt-get upgrade
sudo rpi-update
sudo reboot
After reboot, type the following command to install LIRC:
Sudo apt-get install lirc
Open the /etc/modules file:
Sudo nano /etc/modules
And add these lines at the end to make LIRC start up on boot and set the IR sensor pin to Pin-18 and IR LED pin to Pin-17.
lirc_rpi gpio_in_pin=18
gpio_out_pin=17

After the configuration, python program code is used to instruct the various sensors the way they should work. Sensors collect data and send it to Raspberry pi. The data is processed by Raspberry pi and the information is sent to the android application. The user sends signal to switch ON/OFF the light or fan and this signal is received by the Raspberry pi to further process it. After this the user command of switching ON/OFF of appliances is done by Raspberry pi.

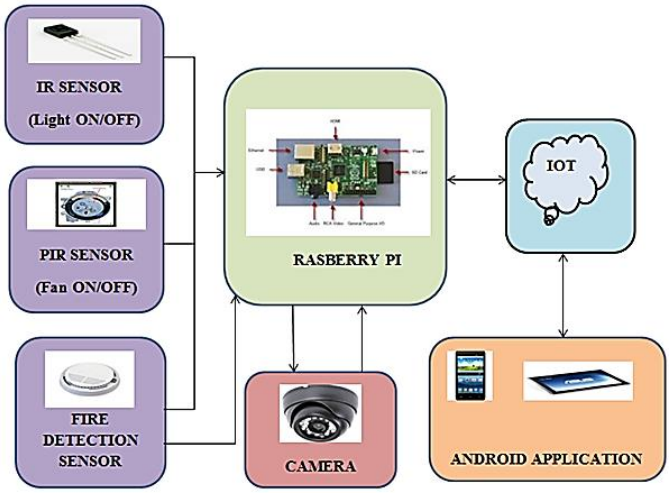

Figure 1. Architecture of Smart Home Automation System

IV. CONCLUSION

The system proposed in this paper is cost- effective and easy to use as low cost hardware and open source software is used. It comes under the category of real time system where appliances are controlled using real time algorithms. It is the implementation of IoT in true sense. A smart environment is created where physical presence of humans at the site or homes is not necessary for operating the appliances. The system also proves beneficial for saving exhaustible sources of energy, as electricity is generated using these non-renewable sources of energy. As many times people forget to switch OFF lights and fans when they are not present. Showing the current state of appliances (ON/OFF) to users and giving them flexibility to operate them remotely saves energy as well as allows them to monitor their home safety. This system can be further extended to include other home appliances like refrigerator, Air conditioning, oven, washing machine etc. Temperature of room can also be controlled. It will be more useful to senior citizens.

V. REFERENCES

[1] Pavithra.D, "IoT based Monitoring and Control System for Home Automation," Chennai

[2] "IoT-based Monitoring System u sing Tri-level Context Making Model for Smart Home Services" Byeongkwan Kang, Sunghoi Park, Student Member, IEEE, Tacklim Lee, and Sehyun Park.

[3] "Security Architecture of the Internet of Things Oriented to Perceptual Layer" Weizhe Zhang1*, Baosheng Qu**

[4] "Using Raspberry Pi and GSM Survey on Home Automation" by Shrikrushna Khedkar Department of Electronic and Telecommunication.

[5] "Towards the Implementation of IoT for Environmental Condition Monitoring in Homes" Sean Dieter Tebje Kelly, Nagender Kumar Suryadevara, and Subhas Chandra Mukhopadhyay, Fellow, IEEE.