Smart Home Automation Technique using IoT

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ABSTRACT

The designed module presents a system, which is-designed to aid, and it provides support to carry out the needs of illness and ancient people in home. It gives the design of Home Automation System (HAS) with wireless system and inexpensive. It provides the smart home notion, which is in sequence to boost the level of wealth at home. The switch mode (ON/OFF) is used to control the home appliances. This controls system device wireless technology to provide remote access from smart phone. The design consists of existing electrical switches and it provides safety control on the switches with low voltage operating method. The system controls the electrical appliance and devices in home with low cost design, user-friendly interface and easy way of installation.

Keywords : Home Automation System, IoT, GPIO, Raspberry Pi, ARM, SUN, SoC

I. INTRODUCTION

Home Automation System represents chance to create new fields in engineering and computing. It provides centralized control of Lamp, Geyser, Kitchen Light and other systems. This project provides the design of home automation and security system using Raspberry Pi[4]. It provides the features of minicomputer with General Purpose Input/output (GPIO) pins where other components and devices can be connected. GPIO registers of Raspberry Pi are used for output purposes. The android running O.S in any phone connected to a network can access the status of home appliances via an application.

Here in this project we are using **IoT** [10] because it is used for connecting every day devices such as Smart phones to the internet where we are connected to each other and communicating between things and people. By using IoT things are connected any place with anything at anytime and anyone using internet and network connecting any services. It is required household items with benefits such as low cost and it is able to ease the life of inhabitance.

1.1 Scope

The project mainly focuses on designing a prototype to control the appliances wirelessly using an application which provides the feature of switch mode (ON/OFF) and the application will run on android device. It can be further used in wide range of areas.

1.2 OBJECTIVES

Design of Smart home automation, should be able to control the home appliances effectively. The home appliances are fully controlled through an android application.

II. LITERATURE SURVEY

Amul Jadhav [7] developed an application in a universal XML format which can be easily ported to any other mobile devices rather than targeting a single platform. Each of these system has their own unique features and on comparison to one another lacks some advancement. Our designed system has application layer prototype.

N. Sriskanthan [8] explained the model for home automation using Bluetooth via PC. But unfortunately the system lacks to support mobile technology. Today we are living in 21st century where automation is playing

important role in human life. Home automation allows us to control household appliances like light, door, fan, AC etc. It also provides home security and emergency system to be activated.

Vamsikrishna, Patchava and Sonti Dinesh Kumar [9] explained about Raspberry Pi controlled SMS-Update-Notification (SUN) system. Raspberry Pi is a credit card sized single board computer with ARM 11 microprocessor. Short Message Service (SMS) is one of the cheapest and best ways for sending a message from mobile.

III. PROPOSED SYSTEM

The proposed system is to provide the information about the smart home. The android OS provides the flexibility of using the open source.

➢ Switch Mode

It uses the radio buttons to control the home appliances and later it sends status to the switch. Smartphone and Raspberry Pi both are connected over a common network. WIFI adapter connects Raspberry Pi to the network which in turn maintains the server. It consists of GPIO pins that are connected to the relay.

IV. SYSTEM REQUIREMENTS

It consists of the devices, which are required for the designing purpose. It can be mainly divided into two types:

i. Hardware Requirements
Raspberry-Pi kit, Relay board, Jumper Wires, breadboard, Ultra SanDisk Micro SDHC card.

ii. Software Requirements
JAVA, Xml, Python, Raspbian.

iii. Functional Requirement
It mainly depends upon the software being developed. Functional requirements of the proposed system are :-
 1) The application receives the status from radio buttons. 2) System will provide the option to have a control over home appliances.
Non-Functional requirements often specify some criteria to judge the operation of the system. They are divided into two main categories
 1) Usability

2) Scalability.

• Usability

Usability is the ease of use and learnability of a human-made object such as a tool or device. In software engineering, usability is the degree to which specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use.

• Scalability

There will be no change in functionality even there is increase in the number of users of the application.
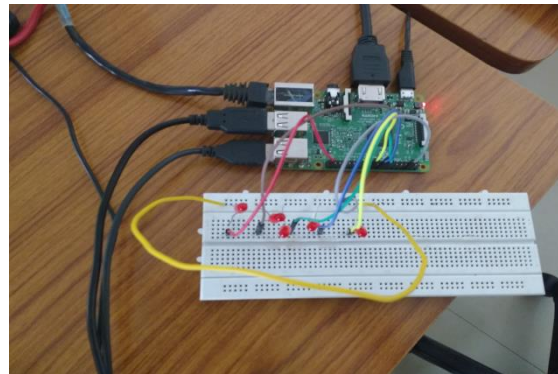

FIGURE 1. Experimental setup.

We are using Raspberry pi [4] instead of Aurdino Board because it uses the advanced reduced instruction set computing machine (ARM) technology. It is used because which reduces cost, heat and power consumption. CPU implemented energy effective multi core as System-On-Chip (SoC). It weighs 50gram and it operates on 5V, 700mA power rating. Here we have used Raspberry pi B+ board that is the latest version among them and it runs on ARM11 processor. It has SD card slot which is used foe booting operating systems like Raspbian etc. It has 4 USB ports such as Mouse, Keyboard, HDMI port and LAN connection. Raspberry pi it is not just limited to single use it can be used for many other applications.
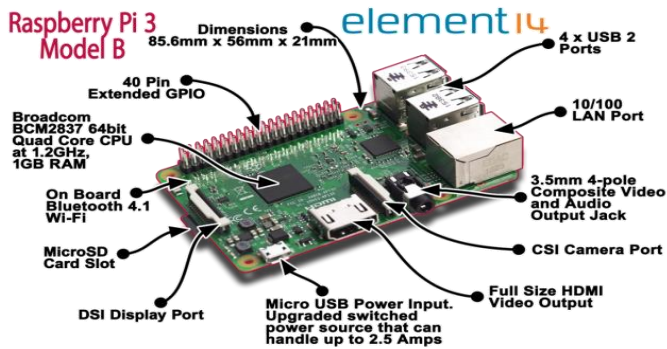
Figure 2. Raspberry pi B+ Board.

Raspberry Pi accesses the CPU by showing inputs and outputs. The production board has 40 pin expansion header arranged in 2*20 strip. Rpi board can be used without the use of additional hardware and can perform tasks simultaneously. Loading of SD card is done in RPi board. Code is dumped in Rpi board, using the jumper wires, breadboard and RPi board is connected. In turn, the RPi board is connected to the computer by the usage of HDMI port, so that the dumped code in RPi board is displayed in computer using command prompt. Hence, the status of home gadgets is displayed.
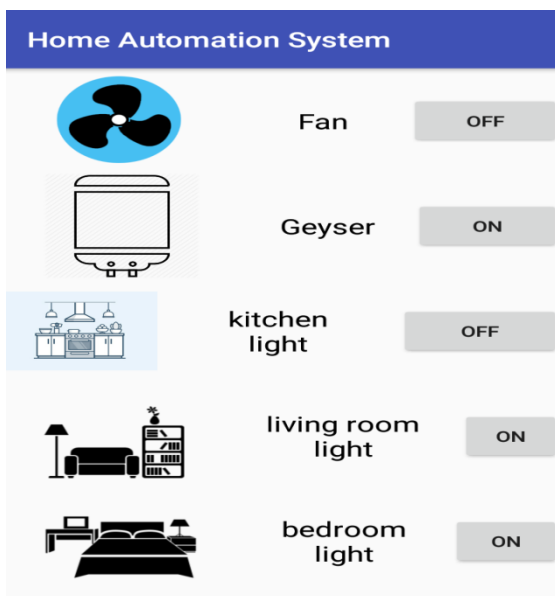

Figure 3. Android Application Status.

JAVA provides a system for developing application software and deploying across platform computing environment.

PYTHON [1] is an object oriented language it incorporates very high level dynamic data types and classes. It is extensible in C or C++. It can be usable as an extension language for the applications that need a programmable interface. It is a high level general purpose programming language which can be applied to different classes of problems.

RASPBIAN is a free operating system based on Debian optimized for Raspberry pi hardware. It comes with more than 35000 packages that are pre-combined software bundled in format for easy installation on Raspberry pi.

Android based mobile application is developed by using Android Studio (Ver-1.5) that provides complete development environment for developing any mobile application which includes tools for compilation, verification and debugging. Android application consists of two activities:-

* A screen showing application Home page.
* Second screen it consists of 5 icons corresponding to various electrical appliances such as Fan, Geyser, Kitchen Light, Living room Light and Bedroom Light. Status of these appliances is indicated by using LED (Light Emitting Diode).

V. APPLICATIONS OF USING Raspberry Pi-3

* It has the control over household appliances.
* It significantly reduces the risk of fire and saves energy.
* Efficiency and inexpensive.
* Performs more than one task simultaneously.

VI. CONCLUSION

In proposed system we developed an application to control the home appliances from any place any time. As we have discussed lot of home automation systems are there in which the most efficient in concern to faster interaction to control the house held devices such as Fan, Geyser etc by using Raspberry Pi Kit , Android platform and java. All the tools that are used to implemented the proposed as less expensive, less power consumption and easily configured. Switch mode will receive the commands from the user and it will be analyzed by the application over the internet.

The proposed prototype can be expanded to many other programs. It can be expandable for Large scale applications such as controlling the appliances in computer laboratories and Malls. In addition, it can be expandable for the automatic operations of the appliances.

VII. REFERENCES

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