

A Review on Home Automation Using Smart Phone

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Abstract- Wireless technologies are becoming more popular around the world and the consumers appreciate this wireless lifestyle. Technology is a never ending process. To be able to design a product using the current technology that will be beneficial to the lives of others is a huge contribution to the community. This paper presents the design and implementation of a low cost but and secure mobile phone based home automation system. The design is based on a stand-alone Arduino BT board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the cell phone and the Arduino BT board is wireless. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Protection can also used in this system so that only authorized user can access this system(like using password on your mobile phone).

Keywords: Smart Home; Automation System; Microcontroller; Wireless Communication; Arduino

I. INTRODUCTION

Recently, technological developments have given huge contribution to improve the quality of human life .This technology can be used to monitor and control the use of electrical energy and electronic devices at home to facilitate the user. Nowadays, Automation technology in controlling electronic devices and electrical energy is one of the major applications. In the our research, the electrical installations for conditions controlling of equipment are still relatively simple which is using (manual) or can be called a control without distance. A few issues involved when designing a home automation system are: it should be measurable so that new devices can easily be integrated into it. It also should user friendly interface so that the device can be easily set up, monitored and controlled. Basically this work completely based on automation to save manpower as well electricity. This system only shows how to solve home automation problems at software level and no hardware aspects were considered. Also to remote control of home appliances such as oven, air conditioner and computer by telephones which offer easy usage has been investigated.

Finally the system should be cost effective in order to justify its application in home automation. In this paper we have introduced design and implementation of a low cost, flexible and wireless solution to the home automation.

II. LITERATURE SURVEY

Bilal Gazal says that 35% of people of age 65+ has some type of disability, so they require any assistant who

complete their important needs and also from the point of view of the economy condition.[1]

R. Piyare refers to wireless lifestyle which gives us relief from “cable chaos”. To control the electronic appliances through the mobile phone and Arduino is more efficient than the using of electric switches because it makes the system cost effective and long lasting to use.[2]

Akbar Satria says that when using electrical equipment for appliances control, then it is very helpful and comfortable for house owners to switch off and on light at any time.[3] Inderpreet Kaur says that home automation replaced the task of human physical work, dangerous environment work (fire, underwater etc.) and also helps those humans who are not capable of performing that task (height, weight, speed).[4]

The mentioned approaches represent the major categories of techniques adopted in practice as well as those proposed in recent researches. However, many variants were continuously suggested with diversified alternatives to solve many technical problems or to improve failure or insufficiency of others. The control by voice, the security authentication for accessing approved by biometric physiology such as fingerprint, hand geometry, iris, and voice recognition; the protection against hackers for web server control way by equipping sophisticated firewalls and installing dedicated antivirus programs are all examples of upgrading.[5]

Apurva Mishra named this system robot because we can access our devices remotely from anywhere. We are using

the mobile phones for this purpose and also using Bluetooth for transmitting and receiving input and outputs.[6]

This paper makes the work easy by using the GUI (Graphical User Interface). Old people can also use this by clicking on the switched on and off button that is displayed on the mobile screen.[7]

The main purpose of Archana N. Shewale¹ is Power line consumption and Renewable Energy based Home Automation.[8]

An automated home can be a very simple grouping of controls, or it can be heavily automated where any appliance that is plugged into electrical power is remotely controlled. Costs mainly include equipment, components, furniture, and custom installation.

III. SPECIFICATIONS

Home automation or domestic robotics is a combination of automation technologies and computer science. High affordability and connectivity through smart phones and tablets has increased the popularity of home automation in recent years. The life quality of the elderly and disabled can be improved by using home automation. Radio frequency (RF) is one of the techniques used in the home automation network to control and monitor home appliances. Home automation consists of electronic programmable controls for home appliances using wired or wireless communication.



Fig. 1 Block Diagram of Automation System

A smart home controller connects the entire house in a home automation system. Fig. 1 shows the Block Diagram of the Home Automation. This acts like a centralized control of household systems, such as sprinkler units and inside temperature monitors. With this centralized control unit, a person does not need to leave the couch to turn on/off home appliances, which is convenient for

users. Home automation is designed to introduce convenience and efficiency to a home. People living with physical handicaps may rely on the features of a home automation system to accomplish tasks that might otherwise be difficult or impossible. Fig. 1 shows the circuit diagram of this work.

Android OS

Android OS is open source based on the Linux kernel with a Java programming interface, designed primarily for touch screen gadgets. The Android phone has been on the market since October 2008. Device manufacturers, wireless carriers and enthusiast developers are allowed to modify and distribute the software under the Apache License. Google Play is Android's primary application store. There were approximately 700,000 applications available for Android in October 2012, developed by a large community of Android application developers. Android architecture consists of several layers. The applications have to be layered in order to access the hardware. Several libraries are available. ARM architecture is the main hardware platform for Android.

Bluetooth Technology

Bluetooth technology is a low-power consumption short-range wireless communications technology and operates in the unlicensed industrial, scientific and research centers and medical (ISM) band at 2.4 GHz to 2.485 GHz. The 2.4 GHz ISM band is available and unlicensed in most countries. Pairing uses two Bluetooth enabled devices known to each other.

Arduino

Arduino is an open source physical computing platform based on a microcontroller board and an integrated development environment to program the board. Arduino acquires several inputs such as switches or sensors and controls several outputs such as lights, motors and others. Arduino software is compatible with the Windows, Macintosh and Linux OSs unlike most microcontroller systems that are limited to Windows.

IV. METHODOLOGY

HARDWARE ARCHITECTURE AND IMPLEMENTATION

Research is divided into two main tasks, namely controlling devices and providing current information.

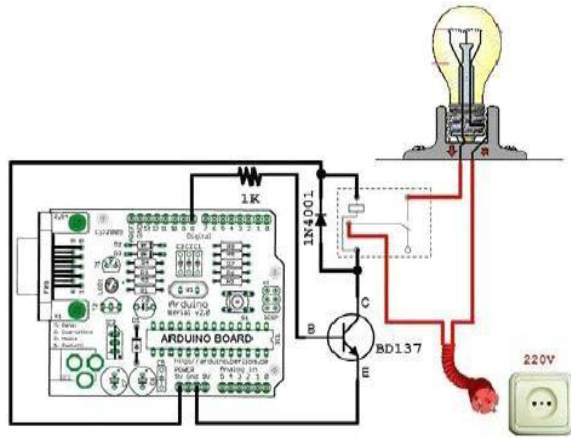


Fig. 2 Circuit diagram of Home Automation

It is shown in Fig. 2 circuit diagram of the system. The controlling and providing information task are conducted by combines the Arduino microcontroller which connected to a router in the house and can be accessed by smart phone using the smart phone internet. The providing information task will helps the user to see the amount of electrical charge used in a media room with a smart phone in daily, weekly, and monthly period in the amount. [3]

This home automation system also consists of two main hardware components: the cell phone and the Arduino BT board. The cell phone hosts the C script which enables the user to access the home appliances and also the control commands for the appliances. This C script communicates with the Arduino BT board and sets up an ad-hoc communication protocol between the two devices, which allows controlling the behavior of the Arduino BT board. Arduino BT is an 8-bit microcontroller board based on the ATmega168 and the Blue giga WT11 Bluetooth module is used. It supports wireless serial communication over Bluetooth. This board has 23 digital input and output ports, 16KB of flash memory, 10-bit analog to digital converter, pulse width modulator and extra hardware resources which makes it suitable for the required task. The Arduino BT board can be programmed wirelessly over the Bluetooth connection using the microcontroller’s high-level interactive C language. [2]

The smart home system is not a new science terminology but it is still away from people’s vision. In fact, the majority of home appliances are somehow automated but the integration of these technologies, the incorporation of automated various appliances in an affordable design, and the ease of deployment due to distant communication provides peace of mind and convenience. These systems are feasible, low-power consumption, secure, efficient, flexible and scalable, cost-saving, characterized by ubiquitous access, and finally supported by easy-to-use familiar interface.[2]

V. RESULTS

Arduino programming is simple for beginners. It is good for students to know how to use it since many applications use Arduino. Table 1 shows the comparison among different devices we can use in place of Arduino.

Table -1: Table shows comparison between different devices

Specification	Arduin o	Raspbe rry Pi	Beagle Bone	PCD uino
Micro Controller	Atmega 328	-	-	-
Operating Voltage	5 V	-	-	Linux + Androi d
Input Voltage(Recom mended)	7-12 V	-	-	-
Input Voltage (Limits)	6-20 V	-	-	-
Analog Input Pins	6	-	-	-
DC Per I/O Pins	40 Ma	-	-	-
DC for 3.3 V Pin	50 Ma	-	-	-
CPU	700 MHz Low Power ARM 1176 JZF Application Processor	700 MHz Low Power ARM 1176 JZ-F Application Processor	TIAM 3359	1GHzA RM Cortex A8
Memory	512 Mb SD RAM	512 Mb SD RAM	512 Mb DD R3	-

USB 2.0	Dual USB Connector	Dual USB Connector	-	-
Ethernet	On Board 10/100 Ethernet RJ45 Jack	On Board 10/100 Ethernet RJ45 Jack	-	-
Video Output	HDMI (rev 1.3 &1.4)	HDMI (rev 1.3 &1.4)	-	-
Audio Output	3.5 mm Jack ,HDMI	3.5 mm Jack ,HDMI	MicroHDMI	-

VI. CONCLUSION

In this paper we have introduced design and implementation of a low cost, flexible and wireless solution to the home automation. The system is secured for access from any user or intruder. The users are expected to acquire pairing password for the Arduino BT and the cell phone to access the home appliances. This adds a protection from unauthorized users. This system can be used as a test bed for any appliances that requires on-off switching applications without any internet connection. The full functionality of the home automation system was tested and the wireless communication between the cell phone and Arduino BT was found to be limited to minimum of 50m in a concreted building and maximum of 100m range was reported to be applicable in an open range.

Smart homes involve different areas of electronics, architecture, computing, and communications. A smart home achieves a complete and total control of unlimited number of appliances. It commands the On/Off order of domestic devices such as fridge, TV, washing, cooking, and cleaning machines, as well as electrical devices as motors, pumps in order to water the houseplants using humidity and soil moisture. It governs the environmental system such as HVAC (Heating, Ventilation, and Air Conditioning), and fans. It also masters the lamps arrangement as switching, dimming lights, and making ambiance for different events. It has the capability to control windows blinds and curtains to maximize natural lighting.

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