

Home Automation using Android

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Abstract - Automation has become the key for smart homes, Implementation of such a system leads to energy conservation and also provides the user with a comfortable and convenient way to control their home appliances. Automation can also be employed to help disabled people with their daily tasks. This paper presents such a system which uses sensors to automate our home appliances. A connection to this system can be established via Bluetooth using applications developed with the Android operating system. Automation was done to reduce industrial accidents as and when people are get exposed to dangerous situations by the help of automation, we can have more effective and efficient product development, With the help of the automation, we can reduce manual labor and reduce the accidents associated with the high voltage devices. This project was developed to create simple but reliable and in expensive home automation model with the help of mobile phone. As the mobile phone has become irreplaceable, the mobile phone is used to control the appliances. With the help of mobile phone, home automation is done easily. A complete but a simple automation model using mobile phone is done in this project.

Keywords – Home Automation, Android, Bluetooth, Mobile Phone.

I. INTRODUCTION

The idea of home automation has been around from the past decade, but due to cost constraints its application n has been limited. The term Home Automation has been defined as “the introduction of technology”. With the home to enhance the quality of life of its occupants, through the provision of different services such as remote connectivity, energy conservation and Security [4]. According to U.S Department of energy households in the United States consumed 21.54% of overall energy consumption during 2011[3]. This statistical evidence motivates us to develop an Autonomous system which could reduce energy consumption without sacrificing user experience and convenience. The user should be able to operate the system with minimal computer knowledge. In this paper we design a home automation system that is low cost yet brings Interoperability and scalability of the system. This means that the system uses sensors to determine the ambient light, temperature and other physical factors to smartly control home appliances, it can also be easily expanded with no major changes to the core, which results in lower power consumption and hence more savings. The system is wireless and uses Bluetooth technology with its globally available 2.4 Ghz frequencies offering connectivity up to 100 meters at a speed of up to 3Mbps depending on the Bluetooth device class. [1] In Addition, a Bluetooth master device is able to connect up to 7 devices in a “Piconet”.

II. PROBLEM DEFINITION

The area of automation is very advanced in the industry and, like most of the automotive industry plants; the bottling plant has an automated assembly line. However, automation has not yet penetrated homes, especially in India. Everyday life with the becomes easier when automation is used at home. A simple application of the Home Automation is to transfer water from an underground water tank to the above ground water tank by measuring the water level in both tanks [2]. This process makes it easier whenever the user has to invest in to fill the tank and also helps save water. Also, it has become accustomed to using smartphones and tablets every day and can actually do most of his PC work for. So, decision to create the low-cost embedded system that allows you to automate your entire home using your smart phone. This system allows user to remotely access and control all of her sub systems in her home shows Fig 1.

III. DESIGN AND IMPLEMENTATION

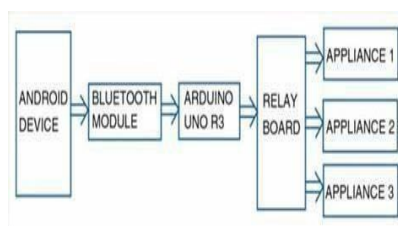


Fig 1. Circuit diagram

Automation has become the key for smart homes, Implementation of such a system leads to energy conservation and also provides the user with a comfortable and convenient way to control their home appliances. Automation can also be employed to help disabled people with their daily tasks [5]. This paper presents such a system which uses sensors to automate our home appliances. The circuit diagram is as shown above in Fig.1 Connection to this system can be made over Bluetooth using the designed application on Android OS. Automation is widely used to reduce the man power and saving money and time. The home automation will help us to do the work which we have to do [6]. It is time saving and avoids repetitive works. The quality and improvement in design can also be done. Errors done by human can be reduced by the automation. The safety in the industrial area can be taken care with the help of automation. As mobile phones have become very important in our life, the use of mobile phone is very important in the project. This project has been used to automate the house fully using a mobile phone [7]. Though it is used for three appliances in the project, it can be extended to any number of appliances. We can make effective more with the help of many models altogether by using it parallelly. The whole paper is done to get full automation of a home with the help of a mobile phone alone without any external help. The mobile phone is placed in center and automation is done in appliances.

IV. HARDWARE REQUIREMENTS

Arduino uno

In this project, Arduino Uno is used. The heart of the project is this one. The working of the system is fully based on this board. Fourteen pins which are digital can be used as input or output. It has six pins which are analog, a crystal oscillator which is of 16Mhz, a reset button, a USB connection, ICSP header and a power jack.

Module HC-05

It is a blue tooth terminal which is widely used for android application. It has 3.3 V regulators. It is widely used in serial communication, For the working of this, we have android PDAs which is used to communicate with the help of terminal. The data that can be transmitted or received can have hex or string from the blue tooth connected. The receiver side of this module needs to be interfaced with the micro controller which will be programmed to store as well as to show in the LCD screen. The two-way wireless, full duplex.

Functionality is possible with the help of this module. This module just like the blue tooth module is used for transmitting data wirelessly from transmitter side to receiver side. The two operating modes of this module are the Data mode in which it can send and receive data from other Bluetooth device sand the other is the AT Command mode where the default device settings can be changed. We can operate the device in either of these two modes.

Relay Mode

It is an electrical switch which can be controlled by Arduino. The metal contacts which are there in relay mode should not touch each other. It has an internal switch which connect these contacts which will thereby complete the circuit and thereby allowing current to flow. Relay circuits are used when we need to connect our Arduino to higher voltage circuits. It cannot be used as like any other switch to switch on and off led as it can cause mechanical wear tear.

Jumper Wires

A jump wire is a wire or group of them in a cord with a connector or pin attached to a stranded 22AWG jump wire with a fixed end. Individual jumper wires are attached by inserting" end connectors "into slots provided on the bread board.

Bulb

A bulb is made up of a positive and a negative terminal embedded inside glass, with a tungsten filament that joins the two. When electricity is supplied to the terminals, the flow of electrons heats up the thin filament in between.

V. SOFTWARE REQUIREMENTS

Arduino ide

Arduino ide is open-source software which is free and is used to upload a code to the Arduino board. We can also see the output of this code for analysis. We can use either serial monitor or serial plotter to get the output. We can use any operating software for compilation of the code. We can use it for debugging, editing and compiling the output [8]. The user friendly has so many built-in functions which makes it effective and widely used one. The Arduino software (IDE) is compatible with different operating systems (Windows, Linux, Mac OSX), and supports the programming languages (C/C++). It is used by the beginners as well as experts for writing the code and to see the result.

Arduino automation

It allows to control devices using your Arduino board (and similar boards) via Bluetooth or WIFI. BT Terminal is a terminal app with UART serial communication protocol that transmits & receives data wirelessly through Bluetooth connections. The app used for Robotics Communication, Configuring Bluetooth Modules (using AT Commands) and Home Automation.

VI. CIRCUIT DIAGRAM

There is wireless communication between the mobile and the central controller, and wired communication between the controller and the systems in the house. Some instructions to the device are done by a central microcontroller, others by the central controller itself without the phone's conscience. On the user's side, there is his Android-enabled mobile phone that communicates with the central controller. Wireless communication in the form of Bluetooth is used to transmit signals to the central control unit [9]. To successfully establish communication, the mobile phone must be paired with the Bluetooth module and send the signal serially to the module. This wireless communication occurs serially over Bluetooth in the form of sending characters in byte format that are received and stored in the memory of the Bluetooth module [10]. On the receiver side, the module communicates serially with the microcontroller board. The Bluetooth module serially delivers the output in the byte format of the characters received on the input. These characters are validated by the controller's code, and based on the logic written in the code, the controller performs a series of operations. Controllers are connected to various systems that give instructions.

VII. RESULT

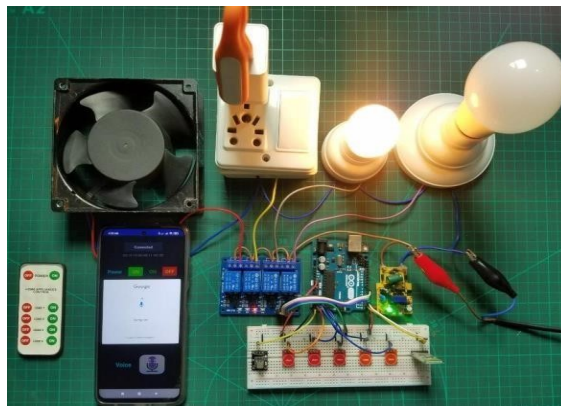


Fig 2. Result of the circuit

The design and implementation of the smart home automation controller using Bluetooth for Android mobile phone has been discussed. The purpose of this is to use mobile phone's inbuilt Bluetooth, Bluetooth serial module for automation of Home Appliances. The different hardware and software section of our system is described. The android application software has been designed using Eclipse and Android Studio software is used to write and burn the C program into microcontroller. The application shows Fig 2 and Fig 3.



Fig 3. Smart home automation controller using Bluetooth for Android mobile

Program is tested on various Android mobile phones which are quite satisfactory and responses received from the community in general are encouraging.

Application of Home Automation is available for: Saving resources such as water, electricity and fuel through optimal use by various feedback systems. Reduced effort and time, Enhanced home security with 24-hour monitoring, Great help for people with physical disabilities.

VIII. CONCLUSION

Home Automation is one of the recent innovations. It will provide a flexibility and attraction to the users. When other automation systems are compared, this technique of using mobile phones make this automotive circuit more flexibility.

The center part of this system is the mobile phone. The mobile phone is integrated in such a way that it can access mobile devices. Architecture of home automation is completely changed with the help of new technologies using communication. This new architecture makes use of Bluetooth module, relay circuit and Arduino microcontroller. The bridge between Android phone and microcontroller is taken care by the WIFI. A comprehensive related concept in a simple manner is considered by hiding the complexity of home automation is done. This is required and essential as the display of mobile is small and we need to accommodate many data at a stretch in a simple manner. This paper proposes a cost-effective secure solution. It provides accessibility and remote-controlled solution. The Wi-Fi technology used makes the idea novel and can be used to control the home appliances with the help of Wi-Fi. Though many alternate solutions are already available and many projects have been done, the Wi-Fi used technology makes it cost effective and can be used to control appliances more securely and effectively. The result of this made us to understand that required goals and objectives of this project is fulfilled. The architecture of system with the design and the prototype used were discussed. The prototype was made to show the basic working of the circuit. The results howled better result and can be implemented properly.

VIII. CONCLUSION AND FUTURE ENHANCEMENT

The future of home automation is vast and beyond the words. We know each and every day technology keeps on updating. Every day, new technology comes into existence whether it is related to security, communication, medical services, entertainment. As we go more further more and more appliances will come into existence. We will be able to move beyond a further application which is far better than today's condition. It will provide more flexibility. Attractive advantage so fusing home automation are driving force among people and can make people more. The computers can be used for mining the data automatically and with the help of this data; home environment can be changed accordingly and can be wisely used for the better future. The future of home automation is beyond in words as far as the medical field is concerned. The elderly and disabled people movement and health care can be taken care with the help of this home automation system without their movement. With the advancement of IOT and intelligent sensor, a more and wide application can be done. The next generation application Pert which can be used wisely for better security of our home and appliances with the help of phone.

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