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Automated system for office using Arduino and Android

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Abstract - *Today we are living in 21st century where automation is playing important role in human life. Automation of the surrounding environment of a modern human being allows increasing his work efficiency and comfort. In the present times, we can find most of the people clinging to their mobile phones and smart devices throughout the day. Hence with the help of his companion a mobile phone, some official tasks can be accomplished by personifying the use of the mobile phone.*

Office Automation System (OAS) has been designed for mobile phones having Android platform to automate an 8 bit Bluetooth which controls a number of office appliances like lights, fans, bulbs and many more using on/off relay. This paper presents the automated approach of controlling the devices in office that could ease the tasks of using the traditional method of the switch. The most famous and efficient technology for short range wireless communication- Bluetooth is used here to automate the system. The OAS system for Android users is a step towards the ease of the tasks by controlling one to twenty four different appliances in any office environment.

Key Words: Office Automation, Intelligence, Sensor System, Microcontroller, User-friendly Interface.

1. INTRODUCTION

This instructable offers a detailed description and implementation of using an Arduino for office Automation and Efficiency. This paper is designed and intended to make life simpler, make things easier for the elderly and handicapped, and to save energy costs. The idea of an office automation system will definitely improve the working standards in the workplace. The fundamental control system uses a Bluetooth module which gives wireless access to smart phones. The appliances controlled depend on what appliances are plugged into the system. The system design will not remove the existing actuating switches, but rather it will be controlled with a low voltage system technique. This system is designed to control electrical devices throughout the office. The system can also control lights in the office based on the natural light. The lights will also be motion activated meaning that the lights will only be on when people are in the area. The system will be easy to use as well as cost effective. The power for this system will be provided by the mains but in future by renewable energy. The renewable energy that will be used in this system is solar power via solar panels.

A office automation system means to grant the end-users to manage and handle the electric appliances. If we look at different office automation systems over time, they have always tried to provide efficient, convenient, and safe ways for office inhabitants to access their offices. Regardless of the change in user's hope, growing technology, or change of time, the appearance of a office automation system has remained the same. Today most office uses the electronic appliances such as fans, light, air conditioner etc. As the mobile phones are very common to all people nowadays using mobile as the key for controlling the office appliances will enhance the affordability and simplicity of the OAS. Mobile phones with android based operating system are regarded as smart phone. This smart phone has the capability of connecting to most electronics equipment. The android application needed for the operation of OAS is designed in Android platform. To increase the security feature of the android application password protection has been implemented. Arduino has been used as a microcontroller. Bluetooth has been used for the short range efficient connections.

Office automation systems suffer four main challenges; these are poor manageability, inflexibility, difficulty in achieving security and high cost of ownership. The main objectives of this research is to design and implement a office automation system using android that is capable of controlling and automating most of the office appliances through an easy manageable interface. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration.

It also discusses the significance and limitations of smart office components and the various technologies used in office automation. It explains the current trends of smart office research and future challenges that must be overcome to design a feasible smart office.

2. SYSTEM DESIGN AND IMPLEMENTATION

1. Arduino UNO

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of

digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or Breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++.

2. Bluetooth Module (HC-05)

For the communication between mobile phone and microcontroller Bluetooth module (HC-05) is used. HC-05 is low power 1.8 V operation and is easy to use with Bluetooth SPP (serial port protocol). Serial port Bluetooth module have a Bluetooth 2.0+EDR (enhanced data rate), 3Mbps modulation with complete 2.4 GHZ radio transceiver and baseband. Using Bluetooth profile and android platform architecture different type of Bluetooth applications can be developed. Bluetooth module HC-05 provides radio communication between almost all communications enabled devices enabling user with efficient wireless communication on an unlicensed radio spectrum. It typically operates on a frequency of 2.4GHz and has a range of up to 20m to communicate with other devices.

3. Relay Module

A relay is a device that operates on electricity. It has a control and controlled systems. It is mostly used to control circuit automatically. Basically, it is an automatic switch to control using a low-current signal a high-current circuit. Relay is basically an electromagnetic switch which can be turn on and off by an applying the voltage across its contacts. In this project used a 12V 4-channel relay. A relay is usually an electromechanical device that is actuated by an electrical current. The current flowing in one circuit causes the opening or closing of another circuit. Relays are like remote control switches and are used in many applications because of their relative simplicity, long life, and proven high reliability. Relays are used in a wide variety of applications throughout industry, such as in telephone exchanges, digital computers and automation systems. Highly sophisticated relays are utilized to protect electric power systems against trouble and power blackouts as well as to regulate and control the generation and distribution of power.

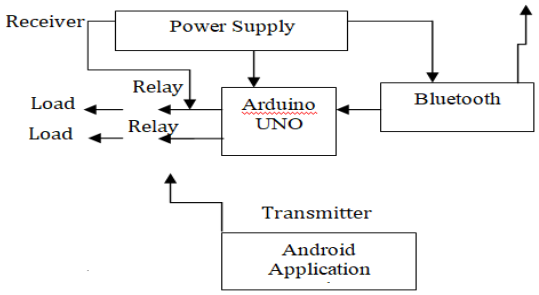

Fig -1: Block Diagram of Automated System

Fig.1 descibes the automated system for office control.The complete system is based on the arduino Uno which control the electric equipment.

3. SOFTWARE IMPLEMENTATION

Android operating system is open source focused around Linux kernel with Java programming interface planned fundamentally for touch screen contraptions. The Android telephone was in the business sector since October 2008. Gadget producers, remote transporters and fan engineers are permitted to adjust and distribute the product under the Apache License. Google Play is Android essential application store. There were roughly 700,000 applications accessible for Android in October 2012 and created by a vast group of Android application designer. Android building design comprises of a few layers as demonstrated in Figure 2. The applications need to go layer by layer to get to the hardware. A few libraries are accessible. ARM architecture is the principle equipment platform for Android.

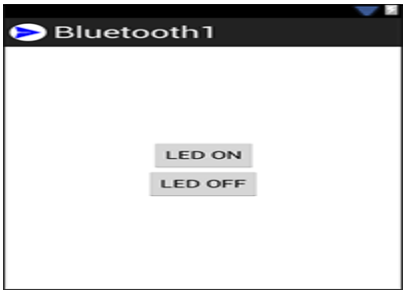

Fig -2: Android System with LED ON & OFF

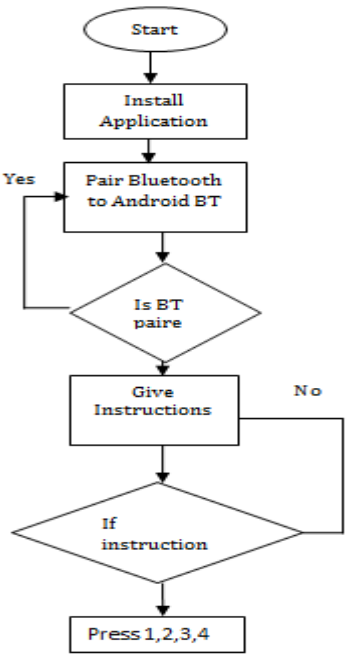

Fig -3: Flowchart

Android is a powerful operating System supporting a large number of applications in Smart Phones. These applications make life more comfortable and advanced for the users. Hardware that support Android are mainly based on ARM architecture platform. Some of the current features and specifications of android are: Android comes with an Android market which is an online software store. It was developed by Google. It allows Android users to select, and download applications developed by third party developers and use them.

The android application allows the user to control devices and monitor conditions in the home using the Bluetooth connection. The android application is efficient, flexible and has a user Friendly Graphic User Interface (GUI). The application has a user authentication page to verify that the authorized user is logged in and has full control of the office appliances. The fig 3 shows the flowchart and description of the flowchart is explained here:

1. Upload the code to the Arduino UNO.
2. Attached the Bluetooth HC-05 module. Upload the code to the Arduino UNO where we have attached the Bluetooth HC-05 module.
3. After Uploading, the Bluetooth module is checked whether the module is working or not.
4. Go to the Bluetooth Settings in your phone and pair your phone with the HC-05 Device.
5. The key is 1234. After successfully pairing, open the Arduino Bluetooth 4CH App and connect with the HC-05 module.
6. If instruction recognized, Press button 1,2,3,4 in arduino Bluetooth 4CH.

The Arduino 5v pin is connected to Vcc, and ground pin is the GND connected to the Arduino ground pin. To send the data from the module to the Arduino TXN pin is used and to receive RX which is pin 1 of Arduino is used.

Table -1: Simulation Table for Appliances

Sr.No	Input	Output
1	Device ON	Bulb ON
2	Device OFF	Bulb OFF
3	Device ON	Fan ON
4	Device OFF	Fan OFF

Simulated results obtained in table 1. When device is turn ON, the connected instrument like bulb or Fan getting ON. When device is OFF, the connected system remains in OFF condition.

4. CONCLUSION

The electrical appliances like fans and lights has been automatically operated using Bluetooth module according to the data sent by the mobile to Arduino through the Bluetooth interface. Thus, we can save the energy and electricity. In this we have controlled only the light and fan. An office automation using android and hand gesture, Controlling the office and electronic gadgets through an Infrared remote control is now in general. But the same controlling tasks can be done easily. Primary motive of proposing the new system of hand gesture remote control is to remove the need to look in to the button remote and to search for a specific key for specific function. This paper proposed a novel system to control office through hand gesture as a remote control device. The future healthcare service provider will consider the smart office powerful method for giving remote social insurance administrations, particularly to the elderly and disabled people. In future office automation will smarter and it would be extended to the large-scale environment. The system as the name indicates, “Office automation” makes the system more flexible and provides attractive user interface compared to other office automation systems. In this system we integrate mobile devices into office automation systems. A novel architecture for a office automation system is proposed using the relatively new communication technologies. The system consists of mainly three components is a bluetooth module, Arduino microcontroller and relay circuits. WI-FI is used as the communication channel between android phone and the Arduino microcontroller. We hide the complexity of the notions involved in the office automation system by including them into a simple, but comprehensive set of related concepts. This simplification is needed to fit as much of the functionality on the limited space offered by a mobile device‟s display. This paper proposes a low cost, secure, ubiquitously accessible, auto-configurable, remotely controlled solution. The approach discussed in the paper is novel and has achieved the target to control home appliances remotely using the WiFi technology to connects system parts, satisfying user needs and requirements. WiFi technology capable solution has proved to be controlled remotely, provide office security and is cost-effective as compared to the previously existing systems.

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