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ANDROID BASED HOME AUTOMATION USING ARDUINO-UNO

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ABSTRACT:

This paper presents the implementation of home automation system with low cost and remote control. Automating the surrounding not only helps the humans even more to the handicapped/disabled, and the elderly people but also increases the work efficiency and makes life comfortable. This paper presents the automation of the devices present in the home with the help of android phones and Bluetooth technology. Thus replacing the concept of using the traditional switching methods.

1. INTRODUCTION:

Home automation commonly referred to as "smart home"," intelligent home" is the computerization of home, housework or household action. Home automation may incorporate a control unit for controlling of lighting, HVAC (Warming, Ventilation and Aerating and Cooling), machines and different frameworks, to give enhanced accommodation, solace, better energy saving, productivity and saving. Home automation offers a futuristic way of life in which an individual gets to control his entire house using smartphone, from turning on T.V to locking/unlocking doors; it also offers an efficient use of energy.

From recent years technology has been growing rapidly and at a fast rate. Due to the advancement of wireless technology, there are several different types of connections are available like GSM, Wi-Fi, Zigbee and Bluetooth. Each connection has its own advantages and applications .With the capabilities that Bluetooth has, it has been chosen to be implemented in the design i.e. it has a frequency of 2.4GHz and can link devices within the range of 10to 100 meters at a speed of 3Mbps depending on the Bluetooth used.

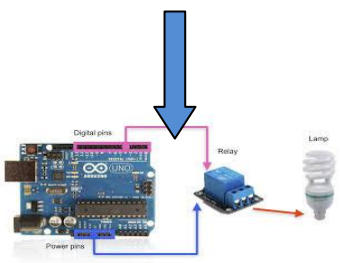
2. LITERATURE SURVEY:

Rajeev Piyare *et.al* [9] proposed a low cost and flexible home control and monitoring system using an embedded micro-web server, with IP connectivity for accessing and controlling devices and Appliances remotely using Android based Smart phone app. R.A.Ramlee proposed the home automation using Bluetooth and PIC microcontroller. Sharon panth presented the system for controlling the appliances using the Bluetooth technology and microcontroller based relay circuit with serial Bluetooth Module, which is able to communicate with the home appliances. N. Sriskanthan explained the model for home automation using Bluetooth via PC. But unfortunately the system lacks to support mobile technology. Muhammad Izhar Ramli designed a prototype electrical device control system using Web. They also set the server with auto restart if the server condition is currently down. Amul Jadhav developed an application in a universal XML format which can be easily ported to any other mobile devices rather than targeting a single platform

3. SYSTEM OVERVIEW:

The below figure shows the prototype architecture of the home automation system.

Bluetooth Commands



Arduino and relay connection

Figure 3.1 Block diagram of the system

This architecture shows the implementation of the home automation system from arduino-uno to the appliances .This architecture is the integration of arduino board, relay module, android phone and android application to control the devices. When we open the app, it sends Bluetooth commands to the Bluetooth module, which further sends the commands to arduino board .Since the TxD pin of Bluetooth module is connected to the arduino board; the arduino board processes the commands and activates or deactivates the relays or devices.

4. HARDWARE USED:

ARDUINO BOARD:

Arduino is an open source board based on microcontroller board designs which consists of various microcontrollers like Atmel 8-, 16- or 32 bit AVR microcontroller. The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter.

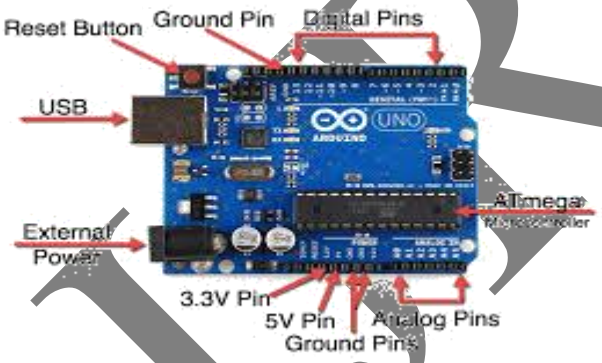


Figure 4.1 Arduino-uno board

RELAY:

Relay is basically an electromagnetic switch which can be turn on and off by an applying the voltage across its contacts. It has two states of operation i.e. normally open in this natural state when the coil is energized the contacts are closed.And Normally closed in this natural state when the coil is energized the contacts are opened.

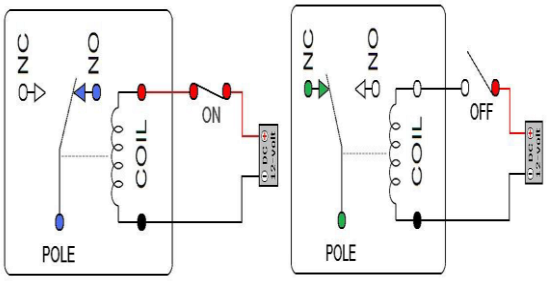


Figure 4.2 Relay Normally open and closed

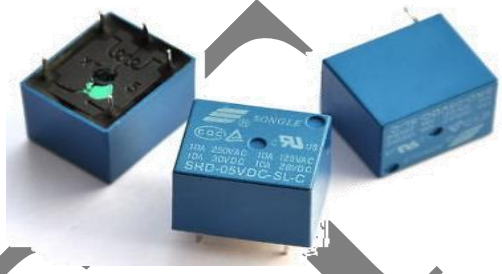


Figure 4.3 Relay Switch.

5. SOFTWARE USED:

ARDUINO IDE:

The arduino provides integrated development environment (IDE) which is a cross platform application based on the IDE for languages processing and wiring. The arduino IDE supports for the languages C and C++. The below flowchart shows the process carried in the implementation of the home automation system through the android app. Figure flowchart

ANDROID AND ANDROID APP:

Android is an open source operating system which means that any manufacturer can use it in their phones free of charge. An android app is meant for phones with android based operating systems. They can be downloaded from the android app Market which is pre-loaded on every android phone. Blue control APP and Bluetooth Spp APP are some examples. The following figure gives the app structure used in the project.

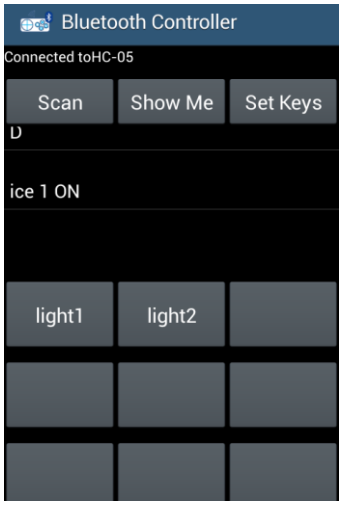
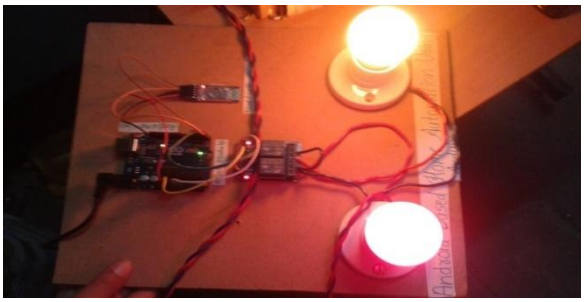


Figure 5.1:Structure of app.

6. RESULTS:

The proposed home automation system is shown in the figure when the light1or light2 key is pressed through the app the successive devices will turn on and when the same key is again the device will turn off.



7. CONCLUSION:

The low cost system can be implemented to improve the standard living in the home. This proposed system uses the readily available technology i.e. Bluetooth. This concept can be extended to improve the security of the home by providing a door locking mechanism. The range of Bluetooth is limited to 10 to 100 meters which can be extended with the help of the trending "internet of things".

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