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Android Based Switch Controlling Technique for LED Bulbs Using Bluetooth/Wi-Fi Technology

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ABSTRACT

This paper presents an efficient approach to switch on/off and control the intensity of an LED bulb from a remote place using Android Applications installed in a Smartphone. As LED household bulbs and lights are energy efficient, drop-in replacements for the incandescent lighting found in homes and offices. These lights produce a warm brightness while providing a significant cost savings over traditional lighting. Bluetooth & Wi-Fi modules are used simultaneously as an interface that make connection between Android Application and the LPC2148 controller by which the generated output can be viewed with the help of an LED bulb and control various other devices, based on the availability in particular areas.

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1. INTRODUCTION

This project aims at designing a system which is capable of controlling our Home appliances using Android Smartphone with Multi communication .This project uses both Wi-Fi and Bluetooth communication simultaneously and controls Various devices based on the availability in particular areas. The system controls the LED light Intensity to high and Low using Wi-Fi or Bluetooth technology, Microcontroller and can also control any 230v Home appliances using our smart Phone. This system is very user-friendly ,accurate and future technology. Bluetooth is an open standard specification for a radio frequency (RF)-based, short-range connectivity technology that promises to change the face of computing and wireless communication. It is designed to be an inexpensive, wireless networking system for all classes of portable devices, such as laptops, PDAs (personal digital assistants), and mobile phones. It also enables wireless connections for desktop computers, making connections between monitors, printers, keyboards, and the CPU cable-free. Wi-Fi stands for Wireless Fidelity and is a wireless technology for PCs and PDAs that allows multiple devices to share high speed Internet connection over a distance of about 300 feet.

The Block Diagram here depicts a transmitter and receiver. At the transmitter we find a smartphone application. The smartphone application is nothing but an android application which is the main source for giving the instruction to the Wi-Fi module. The transmitter of Wi-Fi/Bluetooth modules transmits the data given by the application using radio waves technology. The Wi-Fi and Bluetooth work on radio waves technology, as the data to be passed through them is converted into the electromagnetic signal which is then sent using the antenna. This signal is received and decoded by the router at the receiving end. This signal is passed to the controller which is nothing but LPC2148Micro controller. The controller further operates the received information and performs operations on the appliances, which are driven by the driver i.e, (LED Driver that drives the LED lamp to ON/OFF and Intensity control condition), a relay switch is connected to microcontroller through which ac appliances can be connected and controlled.

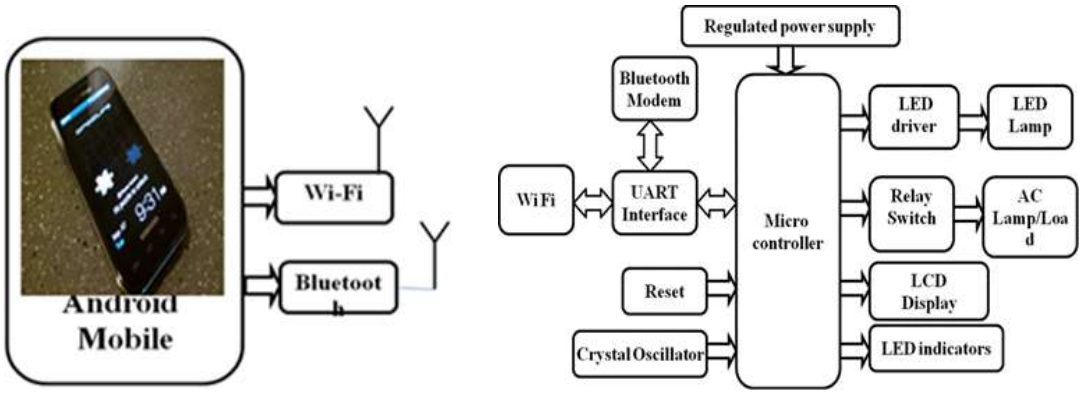

Figure 1. (Transmitter) and block diagram (receiver)

2. SOFTWARE REQUIREMENTS

- KEIL MICROVISION4 (Simulation)
- FLASH MAGIC
- HYPERTERMINAL (Bluetooth Module CI)
- TELNET (Wi-Fi Module App)

3. HARDWARE REQUIREMENTS

- LPC2148 Microcontroller
- Regulated Power Supply
- LED Indicators
- Wi-Fi Module
- Bluetooth
- Relay
- LCD Display

LPC2148 Microcontroller:

The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with embedded high-speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. It has various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels.

Regulated Power Supply:

The power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V and +12V for various applications.

LED Indicator:

A light-emitting diode (LED) is a semiconductor diode that emits light when an electrical current is applied in the forward direction of the device, as in the simple LED circuit. The effect is a form of electroluminescence. Where incoherent and narrow-spectrum light is emitted from the p-n junction. A series of miniature LED's with ultra high output of size 8mm and round dome top shape are used in the project.

Wi-Fi Module:

Wi-Fi is a technology that allows an electronic device to exchange data or connects using microwaves in the 2.4 GHz and 5GHz bands. The module is based on the Institute of Electrical and Electronics Engineers 802.11 standards. Wi-Fi is more suitable for sensitive applications. It has power saving mechanisms and extended battery life. Support transparent transmission mode as well as multiple network protocols. This is a wireless networking technology for PCs and PDAs that allows multiple devices to share a single high speed Internet connection over a distance of about 300 feet. The Wi-Fi module used is embedded

based on the universal serial interface network standard, built-in TCP / IP protocol stack, enabling the user serial port, Ethernet, wireless network (Wi-Fi) interface between the conversions. The modules integrate all of the RF components required, removing the need to perform expensive RF design and test. It simply connects switches to the module I/O pins or UART interface. An in-built router is used to establish the connection between the mobile and the module.

Bluetooth Module:

Bluetooth uses a very robust radio technology called frequency hopping spread spectrum. It chops up the data being sent and transmits chunks of it on up to 75 different frequencies. In its basic mode, the modulation is Gaussian frequency shift keying (GFSK). It can achieve a gross data rate of 1 Mb/s. Bluetooth used is Parani-ESD100/110/200/210 which has a working distance ranging from 10 to 100meters and can be extended up to 1000 meters using patch antenna and easy to use Windows configuration tool available.

Relay:

A relay is an electrically operated switch which are 25 A or 40 A solid state contactors. They are necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. A solid state relay is used which is a solid state electronic component that provides a similar function to an electromechanical relay but does not have any moving components, increasing long-term reliability.

LCD Display:

A liquid crystal display (LCD) is a thin, flat display device made up of any number of color or monochrome pixels arrayed in front of a light source or reflector. One of the most common devices attached to a controller is an LCD display. A 16x2 smart LCD Display which displays 16 characters per line by 2 lines is used in this project. It displays the status of the device such as a Wi-Fi/Bluetooth module is ON/OFF and also about the LED lamp conditions.

4. FLOW DIAGRAM

The Figure 2 shows the Flow Diagram which describes the process of implementation. The user gives the command to Wi-Fi/Bluetooth module using the application installed in the smartphone. The respective modules process the information and send it to the microcontroller (in the case of Wi-Fi, signal is sent via router).The processed signal from microcontroller is converted in to Electrical signal and the switching action is achieved with the help of driver circuit through which we can control the LED lamp according to our conditions.

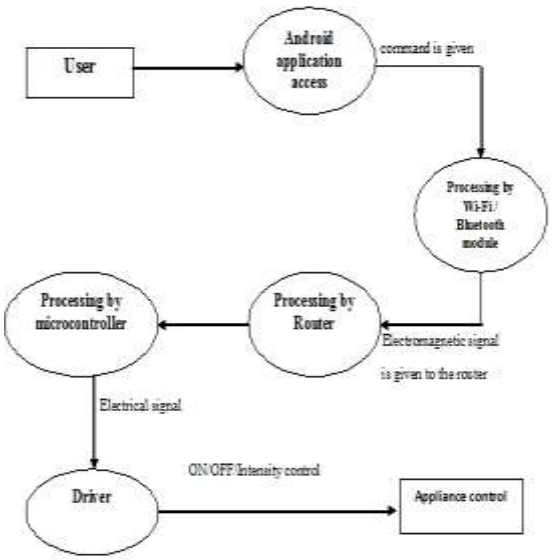

Figure 2. Flow diagram

5. IMPELEMENTAITION SNAP SHOTS :

The Figure 3. shows the assigning crystal frequency and RAM & ROM sizes which describes the implementation. The Figure 4. Shows the debugging and executing the code which describes the implementation Debugging and executing the code:

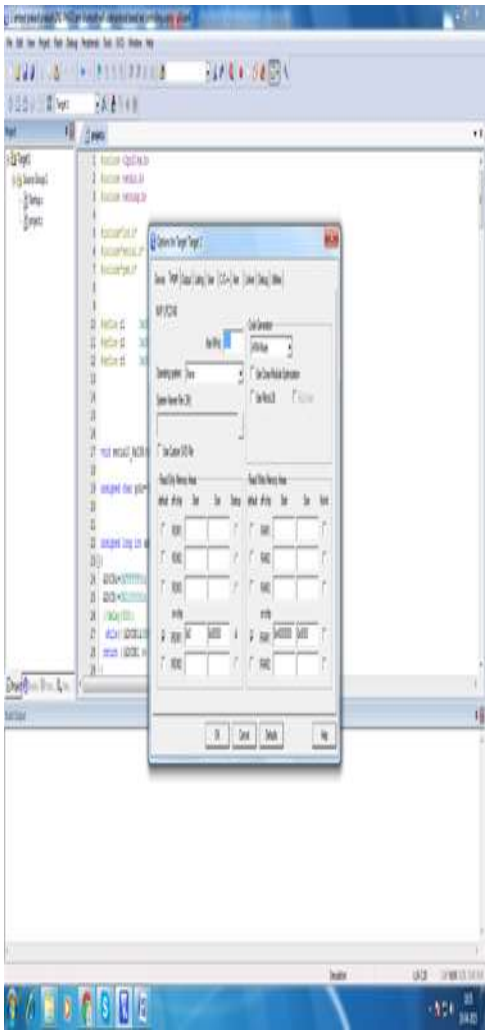

Figure 3. Assigning crystal frequency and RAM & ROM sizes

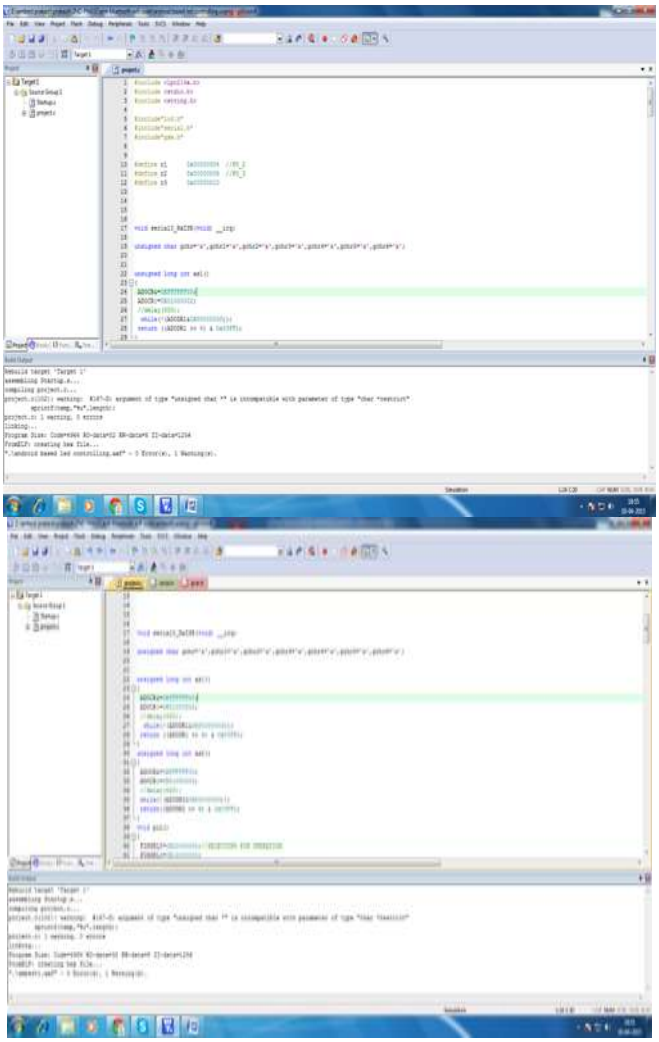

Figure 4. Debugging and executing the cod**e**

6. CONCLUSION

This project brings out a smart approach for home automation which unifies new technologies available in the market.The LED'S used here are for the on/off and intensity control conditions for DC supply purpose. It can be further upgraded with different wireless modules like GPRS, Zigbee, Z-wave etc.The kit can also be advanced by connecting through GPRS and update the usage duration and controlling details maintaining a server. Additional modules for AC circuits can also be added which are with 230v power supply and support up to 600 watts output like (fans, television) etc

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