

Mobile Relay Configuration Using Wireless Sensor Network

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Abstract- This paper describes The Bluetooth module and android phone(version4.0) based flexible, low cost, safety and home automation monitoring system. We have proposed a smart home system which can supervise household appliance remotely and realize monitoring of home automation status through mobile phone and it provides security, when the user is away from the place.

Home automation allows us to control household appliances like light, door, fan, AC, garden sprinkler, etc. The project is developed in Java programming language by using the Eclipse Integrated Development Environment (IDE). The major part of this system is the Bluetooth based android smart phone and Relay connectivity establishment which controls the household appliances. The main objective of this system is to build application that provides the luxurious facilities to the human beings. It also helps elder peoples who faces problem in locomotion to move from one place to another place for turning ON/OFF the devices.

Index Terms- Mobile- Android Smart phone, Wireless Network- Bluetooth module, Relay control, Smart home.

I. INTRODUCTION

With the continuous growth of technology and mobile devices in its features and functionality the demand for advanced mobile applications in people's daily lives is continuously increasing. Now a days, smart phones are more powerful with increased processor speed, largest storage capabilities, high entertainment facilities(video games, play movies ,etc.) and more communication methods. Bluetooth is mainly used for exchange the data and add new features in smart phones. Bluetooth is the wireless technology and it is a revolutionizing way of the people who accept the digital technology in their homes and office environment.

A concept of smart home application and automation development includes different implementation techniques and technologies and technology is drastically developing. Bluetooth is preferred to use over the other competitor technologies because of its lowest power consumption, simple development, no problem associated with the range. Bluetooth is a inbuilt function in every smart phone so there are no requirement for paying extra charges. So, Bluetooth is better platform as compared to Wi-Fi and Wi-max.

This Automation Systems gives a great research opportunity for creating new fields of engineering, architecture and computing. Now a day's Home Automation becoming more popular and enter quickly in the global market. due to the

complexities and cost of the system end users do not always accept these systems. Due to the advancement of wireless technology, there are different types of connections are introduced such as WIFI, ZIGBEE, GSM, and Bluetooth. Each of these connection has their own unique specifications and applications.

Out of the above four popular wireless connections Bluetooth is often implemented in Home Automation system because of it's suitable capability. Bluetooth is globally available with the frequencies of 2.4GHZ and it is capable of providing connectivity up to 100 meters at speed of up to 3Mbps depending on the Bluetooth device class. Also Bluetooth master device is able to connect up to 7 devices in a Pico net. The capabilities of Bluetooth are sufficient to be implemented in the design. Also, most of the current laptop/notebook, tablets or cell phones are come with built-in Bluetooth facility. It will indirectly reduce the cost of this system.

II. RELATED LITERATURE

The design and implementation of a microcontroller based voice activated wireless automation system is presented in [8]. The users speaks the voice command through a microphone, which is processed and sent wirelessly via a radio frequency (RF) link to main control receiver unit . Voice recognition module is used to extract the features of voice command. This extracted signal is processed by the microcontroller to perform the desired option. The drawback is that the system can only be control from within the RF range . Reference [9] also represent a voice activated smart home automation system . This system provide graphical user interface (GUI) using Microsoft Visual Basic software hosted by a PC, and uses Microsoft Speech Recognition engine. The signal is transmitted via RF link to the microcontroller to which the home appliances are interfaced . Again a PC is used that account for an increase cost and power consumption.

In [2], Wi-Fi based home automation system is presented. It uses PC (with built in Wi-Fi card) based web server that manages the connected home devices . The system support a wide range of home automation devices like power management components and security component . As similar architecture is proposed in [3] where the action is coordinated by the home agent running on a PC. Other papers such as [4-7] also presented internet controlled systems consisting of a dedicated web server , data base and a web page for interconnecting and managing the devices this system utilizes the PC which leads to a direct increase in cost and power consumption . On the other hand , the

development and hosting of the web page will also result in additional cost.

III. PROBLEM DEFINATION

In this system we are using android smart phone and relay configuration to control the devices. Relay works as a switch, just ON/OFF but switching speed of relay is slow. For higher switching speed we are using transistor in our system. Bluetooth is acts as a mediator between android smart phone and hardware circuit which receives and transmits the data alternatively.

IV. SYSTEM IMPLEMENTATION

We are implementing this system which consists of two modes in our project.

i. Manual Mode:

In manual mode we are using android phone and Bluetooth module. Android phone is used for wireless remote control and for wireless communication Bluetooth module is used.

ii. Automatic Mode:

If we use only manual mode then some problems created when users are away from the place and He / She forget to turn OFF the system then there energy / power will be wasted. So to overcome this problem automatic mode is used. Automatic mode is done by using sensors such as temperature sensor, LDR Sensor, etc.

Methods for Bluetooth connectivity:

Normally, when communication devices are connecting it can use two methods for initiating communication with each other which can be done normally either by searching other nearby devices to detect the address and services that are provided by other devices or by knowing the device address beforehand and directly using that address for further communication process. Normally for Home Appliance Control, the second method is used.

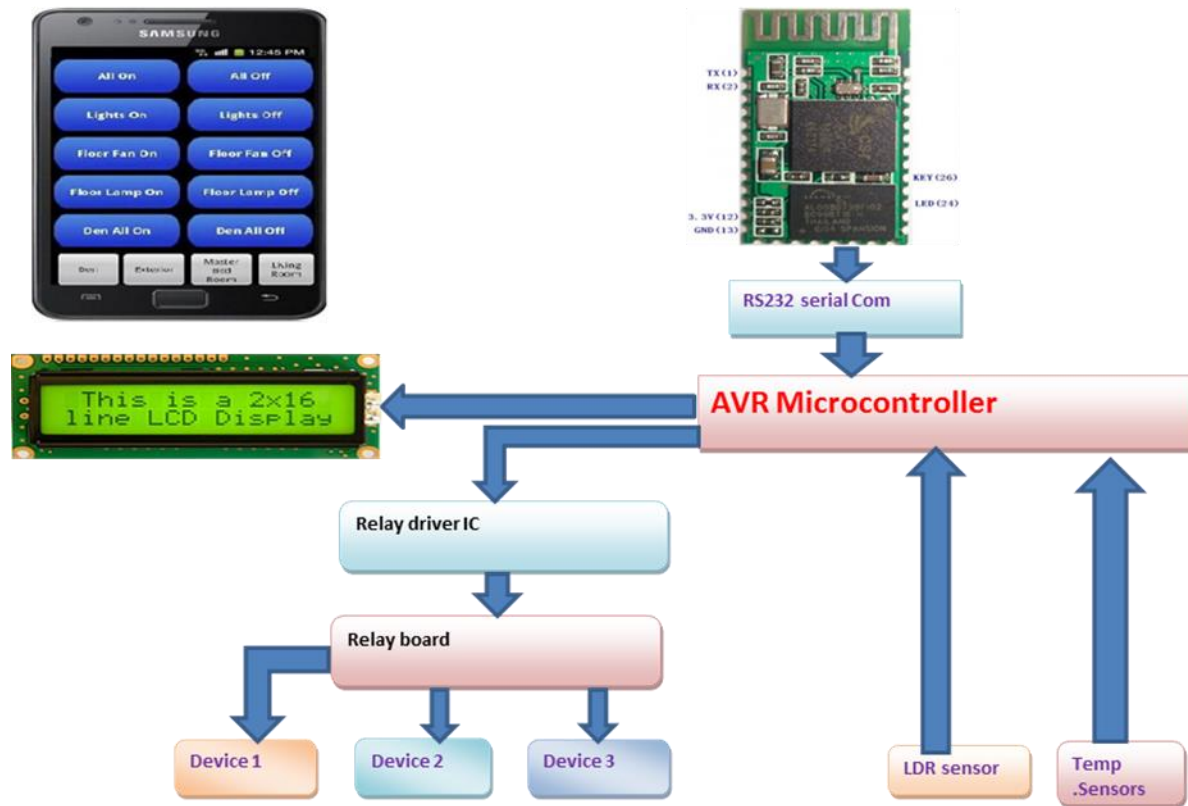


Fig: Block Diagram

V. DESCRIPTION

Bluetooth Modem

Bluetooth modem is a device that acts as mediator between any embedded system and the Bluetooth communication medium. It has built-in protocol for serial communication i.e. serial port profile. Thus it provides an ideal solution for developers who want to integrate Bluetooth wireless technology into their design with limited knowledge of Bluetooth and RF technologies. This unit requires +3.3 V DC for its proper operation.

Specification

- UART interface
- 10 meters range
- Easy to use
- Minimum External Components
- Status LEDs

Serial Communication

Serial communication is a very common protocol for device communication that is standard on almost every PC. Most computers include two RS232 based serial ports. The serial port sends and receives bytes of information one bit at a time. It is simpler and can be used over longer distances.

Atmega 16A(AVR Microcontroller)

Specification:

High-performance, Low-power Atmel AVR 8-bit Microcontroller

- High Endurance Non-volatile Memory segments
- 16KBytes of In-System Self-programmable Flash program memory
- 512Bytes EEPROM
- 1KByte Internal SRAM

LDR (light sensor)

The top circuit diagram shows an LDR (light sensor) connected so that the LED lights when the LDR is in darkness. The variable resistor adjusts the brightness at which the transistor switches on and off. Any general purpose low power transistor can be used in this circuit.

Temperature Sensor(LM35)

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. Low cost is assured by trimming and calibration at the wafer level. As it draws only 60 μ A from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35 is rated to operate over a -55° to +150°C temperature range. The fan will turn on when the temperature goes beyond the specified temperature and the fan will turn off when the temperature falls below specified temperature.

Relay Driver IC ULN2803

The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications.

Relay

The basis for relays, is the simple electromagnet the simplest relay, is the Single Pole, Throw (spst) relay. It is nothing more than a single electrically controlled on-off switch. Its biggest property is the ability to use a very small current to control a much larger current. This is desirable because we can now use smaller diameter wires, to control the current flow through a much larger wire, and also to limit the wear and tear on the control switch.

LCD

A liquid crystal display (LCD) is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals. The basic function of the LCD is to display the action performed by the microcontroller.

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