Smart Phone Controlled Fan using Bluetooth Technology

Surbhi Seth [*], Ankit Kumar Singh, Achman Saxena, Arun kumar

Department of Electronic and Communication Engineering, MIT, Moradabad, Uttar Pradesh, India

Article Info

Abstract

This paper includes the advancement in the Bluetooth technology. Bluetooth has been used in mobile phones, PCs, laptops etc. during the past few year, which has provided a wireless connection between the various devices to monitor them using a single microcontroller. This technology provides the remote access of a device in families and individuals with physical limitations. This is not only used in home but also in industries to control various electrical appliances which reduces man power and provide an ease to access the appliances from a remote location and reduces maintenance cost. It has a network, which contains a remote, mobile host controller and several clients. The clients communicate with the host controller through Bluetooth devices.

1. Introduction

Bluetooth is an open standard specification for a radio frequency based short range connectivity technology that promises to change the face of computing and wireless communication (using short-wave length radio waves in the ISM band from 2.4 to 2.485 GHz). It is designed to be an inexpensive, wireless networking system for all classes of portable devices, such as laptops, PDA (personal digital assistants), and mobile phones. It also will enable wireless connections for desktop computers, making connections between monitors, printers, keyboards, and the CPU cable free. The controlling device of the whole system is a microcontroller. Bluetooth module relays board is interfaced to the microcontroller. The data received by the Bluetooth module from android smart phone through the Bluetooth is fed as input to the controller. According to the message sends through the Smartphone the controller acts accordingly on the relays to switch connected electrical appliances. In achieving the task the controller is loaded with a program written using embedded C language.

The input is 230V AC which is step down using the transformer (12-0-12) .The 12V ac input is fed to the bridge diode to gives 12V pulsating DC. This DC voltage is filtered through the capacitor to remove the ripples. The filtered DC is fed to 7805 regulator to fetch +5v regulated output. This regulated voltage is given to all the components to function properly. The proposed system can be divided into the control system that controls the appliance, Bluetooth module,

Corresponding Author,
E-mail address: surbhiseth99@gmail.com

micro-controller relay driver and the user interface. And control parameter that controls the switching of the device.
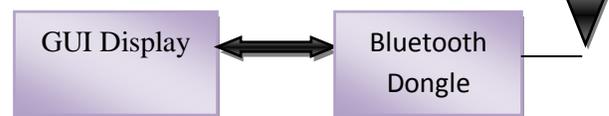

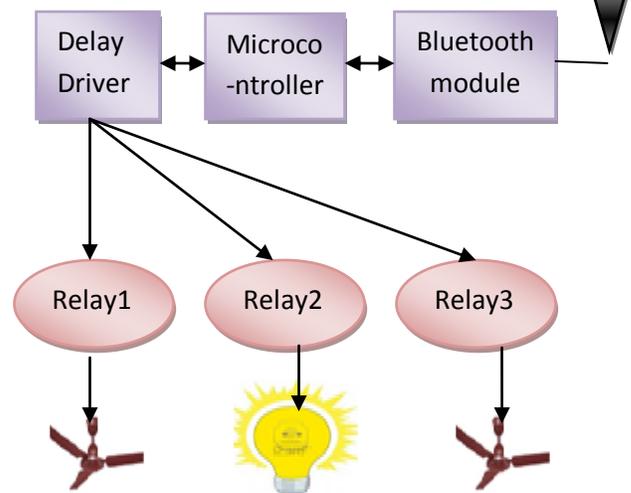**Fig: 1.** Block diagram of Transmitter section


Fig: 2. Block diagram of Receiver section

2. System specifications

The Atmel ATmega48/88/168 is a low-power CMOS 8-bit micro-controller based on the AVR enhanced RISC architecture. The Atmel® AVR® core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are

directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC micro-controllers. The ATmega48/88/168 privedes the following features: 4K/8K/16K bytes of In-System Programmable Flash with Read-While-Write capabilities,256/512/512 bytes EEPROM, 512/1K/1K bytes SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible Timer/counter with compare modes, internal and external interrupts, a serial programmable USART, a byte-oriented wire Serial Interface, an SPI serial port, a 6-channel 10-bit ADC (8 channels in TQFP and QFN/MLF packages), a program-Mable Watchdog Timer with internal Oscillator, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, USART, 2-wire Serial Interface, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or hardware reset. In Power-save mode, the asynchronous timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. The ADC
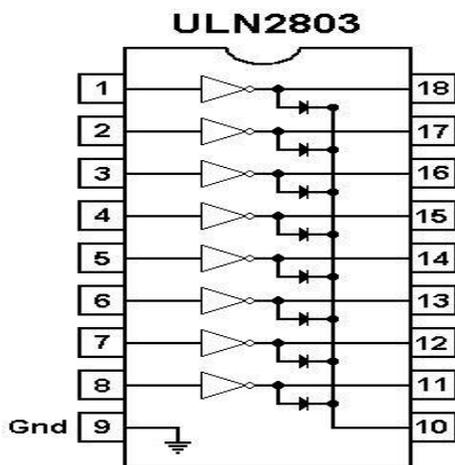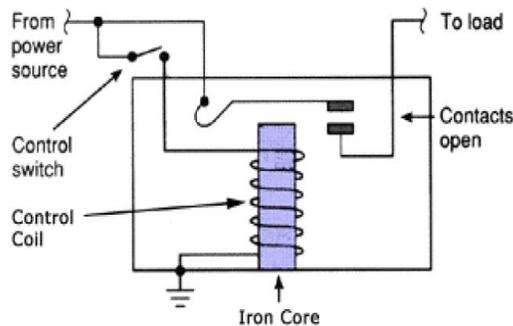
Noise Reduction mode stops the CPU and all I/O modules except asynchronous timer and ADC, to minimize switching noise during ADC conversions. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping.

Relays are electromechanical switches. Relays are used throughout the automobile. Relays which come in assorted sizes, ratings, and applications, are used as remote control switches that are controlled by another switch, such as a horn switch or acomputer as in power train control module. Relays allow a small current flow circuit to control a higher current circuit.

Current flows through the control coil, which is wrapped around an iron core. The iron core intensifies the magnetic field attracts the upper arm and pulls it down, closing the contacts and allowing power source to go to the load.

ULN2803 is an 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 require-ments of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications. All devices feature open–collector o/ps and freewheeling clamp diodes for transient Suppression. The ULN2803 is designed to be compatible with standard TTL families while the ULN2804 is optimized for 6 to 15 volt high level CMOS or PMOS. The major advantage of using this IC is that it can fulfill the need for high voltage and high current also. This is enabled through a low voltage and low current source to give high voltage and high current output.

Bluetooth is an alliance between mobile communications and mobile computing companies to develop a short-range communications standard allowing wireless data communications at ranges of about 10 meters. Bluetooth will encompass both a standard communications interface and a low-cost computer chip. It is a cross between the DECT (Digital European Cordless Tele-phone) and IrDA (infra Red Data Association) technologies. Bluetooth was conceived by Ericsson, but founded by Nokia, Ericsson, IBM, Intel and Toshiba. The Bluetooth Interest Group has since been joined by hundreds of companies including One2One; a UK mobile network operator, Motorola, Qualcomm, Compaq, Dell, 3Com Palm, VLSI, Xircom, Psion Decoma and Lucent. Bluetooth does NOT involve mobile network transactions- its spectrum is freely available to use in the unlicensed spectrum area (at 2.45 gigahertz). Data transmission speeds using Bluetooth are expected to be between 720 kbps and one megabit per second (Mbps).Bluetooth will facilitate wireless Local Area

Networks in which networks of different handheld computing terminals and mobile terminals can communicate and exchange data, even on the move and when there is no line-of-sight between those terminals. Bluetooth will mean that if users have several (Bluetooth-enabled) portable terminals, they can nonetheless use them with all the advantages of an integrated smart phone, without having to re-enter data or find the most recent versions on different terminals. This kind of synchronization and exchange of data are Bluetooth's major applications, as are electronic commerce applications such as electronically paying for parking meters, bus tickets, shopping, and movies and so on. Smart offices are envisaged in which an employee with a Bluetooth device is automatically checked in when entering the building and this triggers a series of actions such as lights and PCs being switched on. The Bluetooth partners see one of its main advantages as being that it does not need to be set up- Bluetooth runs in the background and line of sight is not even needed for the machines to automatically initiate and trigger processes. Such proactive intelli-gence could turn out to be a nuisance rather than a convenience for Bluetooth users unless it is under the control of the device owner(s). Indeed, the Bluetooth standard does incorporate these kinds of control mechanisms, since each device is assigned a unique 12 byte address and to connect to that device, its address must be known.

References

[1] N. Sriskanthan, F. Tan, A. Karande, Bluetooth based home automation system, Microprocessors and Microsystems 26 (2002) 281–289
[2] Bluetooth Committee, Specifications of the Bluetooth System (Core), 1999, V1.0B
[3] Home System Specification, EHS, 1997
[4] Ericsson Mobile Communications AB, User Manual—Bluetooth PC Reference Stack, 1543 VNX 2/901 184 Uen Version R1a, 2000
[5] I. S. McKenzie, The 8051 Microcontroller, Prentice Hall, Upper Saddler River, NJ, 1999
[6] Phillips Semiconductors, 87C51 8-bit Microcontroller Data Sheet, 1999
[7] Bluetooth Committee, Profiles of the Bluetooth System (Profiles), 1999, V1.0B
[8] J. Kelsey, Programming Plug and Play, Sam's Publication, 1995
[9] USB Design by Example, A Practical Guide of Building I/O Devices, John Hyde, Wiley, New York, 1999.
[10] Philips Semiconductors, The I2 C Bus Specification, 2.1, 2000

There will also be an enquiry feature so to search for other Bluetooth-enabled devices within range.

3. Applications

The project designed is very practical in nature because everything can be controlled with the help of just a mobile phone which is widely available nowadays and also proves to be handy. Also the project is feasible because the cost of the project is very less as compared to the expensive Wi-Fi based home control systems presently available in the market which require an additional cost of internet services.

4. Future scope

This project can be further developed by integrating it with the internet to monitor your home while sitting in a remote area. By doing this, one can keep an eye on his or her home through an internet connected to the user's mobile phone or PC or laptop. This will not only improve the security of your home in this modern day world but will also assist in conservation of energy like if you left any home appliance switched on by mistake, then you can check the status of the appliance on the graphical interface made on your mobile and can switch it off using the internet connectivity.