

Automate and Secure Your Home Using Zigbee Technology

Amol Jadhve

M.Tech,

Department of ECE,

Raja Mahendra College of Engineering, Hyderabad.

S.Archana

M.Tech(VLSI),

Assistant Professor,

Raja Mahendra College of Engineering, Hyderabad.

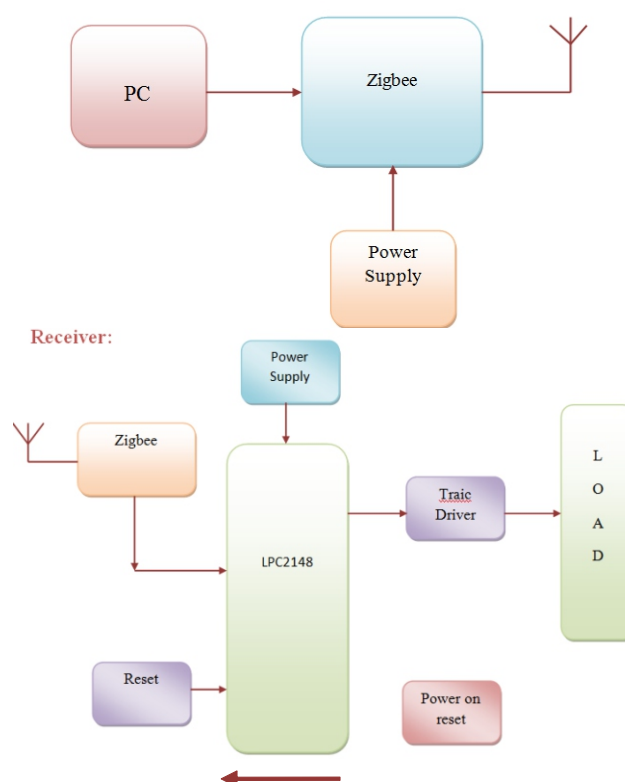
ABSTRACT:

In this present era everything is Atomized right from home to industrial area. A home automation system integrates electrical devices in a house with each other, in this competitive world and busy schedule human cannot spare time to perform his daily activities manually. The most common thing that he needs to do are switching ON/ OFF the loads without much human involvement wherever they are required by using wireless devices to control different appliances. The theme of this project is to control different loads using wireless technology. One such implementation is home Automation using Zigbee Technology. This project uses PC at the Transmitter end to transmit the data through keyboard using Zigbee trans receiver. This information will be send to the receiver end to switch ON/OFF the electrical appliances. These electrical appliances can be interfaced to the AT89S52 MCU using Triac driver. The Triac driver consists of a combination of BT136 (Triac) and a Opto-coupler (MOC3021) to drive AC loads.

Explanation Of Devices:

ZigBee is the name of a specification for a suite of high level communication protocols using small, low-power digital radios based on the IEEE 802.15.4 standard for wireless personal area networks (WPANs), such as wireless headphones connecting with cell phones via short range radio. The technology is intended to be simpler and cheaper than other WPANs, such as Bluetooth. ZigBee is targeted at radio-frequency (RF) applications that require a low data rate, long battery life, and secure networking. ZigBee is a low-cost, low-power, wireless mesh networking standard. The low cost allows the technology to be widely deployed in wireless control and monitoring applications, the low power-usage allows longer life with smaller batteries, and the mesh networking provides high reliability and larger range. Here we are using LPC2148 as our controller.

Block Diagram: Transmitter:



ARM7 LPC2148 is ARM7TDMI-S Core Board Microcontroller that uses 16/32-Bit 64 Pin (LQFP) Microcontroller No.LPC2148 from Philips (NXP). All resources inside LPC2148 is quite perfect, so it is the most suitable to learn and study because if user can learn and understand the applications of all resources inside MCU well, it makes user can modify, apply and develop many excellent applications in the future.

Because Hardware system of LPC2148 includes the necessary devices within only one MCU such as USB, ADC, DAC, Timer/Counter, PWM, Capture, I2C, SPI, UART, and etc.

Board Technical Specifications

Processor*	: LPC2148
Clock speed	: 11.0592 MHz / 22.1184 MHz
Clock Divisors	: 6 (or) 12
Real time Clock	: DS1307 on i2c Bus /w Battery
Data Memory	: 24LCxx on i2c Bus
LCD	: 16x2 Backlight
LED indicators	: Power
RS-232	: +9V -9V levels
Power	: 7-15V AC/DC @ 500 mA
Voltage Regulator	: 5V Onboard LM7805

Specifications of Board:

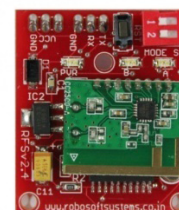
- Use 16/32 Bit ARM7TDMI-S MCU No.LPC2148 from Philips (NXP)
- Has 512KB Flash Memory and 40KB Static RAM internal MCU
- Use 12.00MHz Crystal, so MCU can process data with the maximum high speed at 60MHz when using it with Phase-Locked Loop (PLL) internal MCU.
- Has RTC Circuit (Real Time Clock) with 32.768 KHz XTAL and Battery Backup.
- Support In-System Programming (ISP) and In-Application Programming (IAP) through On-Chip Boot-Loader Software via Port UART-0 (RS232)
- Has circuit to connect with standard 20 Pin JTAG ARM for Real Time Debugging
- 7-12V AC/DC Power Supply.
- Has standard 2.0 USB as Full Speed inside (USB Function has 32 End Point)
- Has Circuit to connect with Dot-Matrix LCD with circuit to adjust its contrast by using 16 PIN Connector.
- Has RS232 Communication Circuit by using 2 Channel.
- Has SD/MMC card connector circuit by using SSP.
- Has EEPROM interface using I2C.
- Has PS2 keyboard interface.
- All port pins are extracted externally for further interfaces.

Zigbee:

ZigBee is an established set of specifications for wireless personal area networking (WPAN), i.e. digital radio connections between computers and related devices. WPAN Low Rate or ZigBee provides specifications for devices that have low data rates, consume very low power and are thus characterized by long battery life.

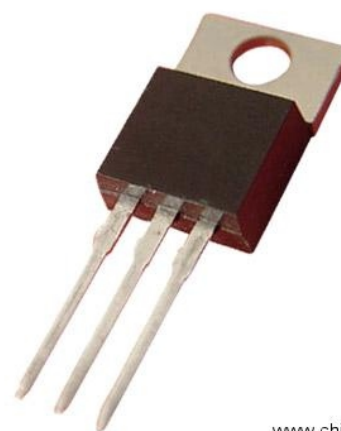
ZigBee makes possible completely networked homes where all devices are able to communicate and be controlled by a single unit. The ZigBee Alliance, the standards body which defines ZigBee, also publishes application profiles that allow multiple OEM vendors to create interoperable products. The current list of application profiles either published or in the works are:

- Telecommunication Applications
- Personal Home
- Home Automation



TRIAC (BT136):

TRIAC, from Triode for Alternating Current, is a generalized trade name for an electronic component which can conduct current in either direction when it is triggered (turned on), and is formally called a bidirectional triode thyristor or bilateral triode thyristor.



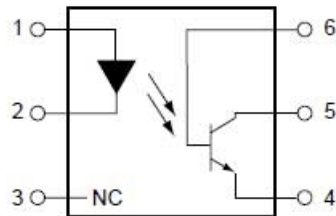
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Opto coupler (Moc 3021)

MOC3021:

There are many situations where signals and data need to be transferred from one subsystem to another within a piece of electronics equipment, or from one piece of equipment to another, without making a direct ohmic electrical connection. Often this is because the source and destination are (or may be at times) at very different voltage levels, like a microprocessor which is operating from 5V DC but being used to control a triac which is switching 240V AC. In such situations the link between the two must be an isolated one, to protect the microprocessor from overvoltage damage. Relays can of course provide this kind of isolation, but even small relays tend to be fairly bulky compared with ICs and many of today's other miniature.

Functional Block Diagram



PIN 1. ANODE
2. CATHODE
3. NO CONNECTION
4. EMITTER
5. COLLECTOR
6. BASE

KEIL SOFTWARE:

Keil compiler is a software used where the machine language code is written and compiled. After compilation, the machine source code is converted into hex code which is to be dumped into the microcontroller for further processing. Keil compiler also supports C language code.

PROLOAD:

Proload is a software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller placed in the programmer kit and this is done by the Proload. Programmer kit contains a microcontroller on it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the keil compiler and dumps this hex file into the microcontroller which is to be programmed.

Advantages:

- Ease of operation
- Low maintenance cost
- Fit and forget system
- No wastage of time
- Durability
- Accuracy

Applications:

- Hospitals
- Remote heart rate monitoring applications
- Local monitoring applications

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