optimized for very long battery life measured in months to years from inexpensive, off-the-shelf non-rechargeable batteries, and can control lighting, air conditioning and heating, smoke and fire alarms, and other security devices. The standard supports 2.4 GHz (worldwide), 868 MHz (Europe) and 915 MHz (Americas) unlicensed radio bands with range up to 75 meters.

2. System Development

Printed circuit boards are extremely used for mounting electronic components with printed wiring on an insulating material. If we observed assembly of components in old electronics equipment. We find that is more complicated. It has hard wiring of components.

2.1 Advantages of PCB

Now this method of hard wiring has been totally replaced by a new technology of printed wiring that is printed circuit boards. PCB's are preferred for over hard nixing because of following advantages:

1. All wires are replaced by printed copper tack therefore circuit requires very small size. /
2. Uniform component assembly is possible which is more suitable in mass production of equipment's
3. Servicing of board becomes easier.
4. Using double sided board or multiplayer board can assemble sided number of components.
5. Saving the assembly & the impaction item.
6. Low cost of production because one layout for a circuit is designed large no. Of PCB's can be prepared.
7. Easy to solder & disorder the components.

2.2 Types of PCB

Different types of PCB's are manufactured. They are be classified according to material.

a. Phenolic Type.
b. Epoxy Type
    1. Single sided
    2. Double sided
    3. Multilayer with PTH (Printed through holes)
    4. Universal Boards.

1. Epoxy laminates (Gloss Epoxy)
This is another important type laminate. They are available in tow types
(1) Paper epoxy
(2) Glass epoxy.
Paper or glass is impregnated with epoxy resin.

Glass epoxy is widely used in industries for manufacturing theist instruments. This gloss epoxy boards are manufactured by dipping glass both in epoxy solution, which hardened the final board, this material is costly than phenolic type board. The color of this board is faint greenish white. Epoxy laminate has following advantage;

1) They are tougher than other type.
2) Low shrinkage
3) High alkali resistance
4) They do not attract moisture & can withstand high temperature.
5) Good chemical, electrical & water resistance.
6) They are more transparent than phenolic type.

There are other types of laminates such as polyester silicon & PTFE laminates. But these types are not used on large scale.

A. Double Sided Board (DSB)
In this type, copper foil is parted on both the sides of laminates & components are mounted on both sides. Large numbers of components are assembled on this board. PTH (printed through holes) technique is employed to connect outside to other side.

B. Manufacturing Process of PCB
Preparing a printed circuit board for a circuit is not so simple. Numbers of processes are to be carried out to prepare a good PCB. There are two different methods of preparing PCB as follows:

1. Laboratory method – suitable for one or tow boards
2. Industrial photo resists method – suitable for mass production. Flow chart is shown for both the methods.

a) Circuit diagram
Before preparing the layout artwork one should know correct circuit diagrams with proper symbols like symbol of potentiometer, the symbol for the components which are to be assembled outside the board the details of components whether is vertical or horizontal so on. Similarly the required size of board mush is known.

b) Layout Drawing
This is first most important step in making a PCB. Layout drawing means a rough sketch of the tracks, which can be prepared on the basis of trial error. While drawing a layout following prints mush be considered.

1. As far as possible ground line power supply line must have maximum spacing.
2. Components or lines should cross each other or overlap physically no two components should go in a same hole. Note that the PCB is just used for connection between the components i.e. connecting wires are replaced by the copper wire on PCB with additional condition of no cross over.
3. Coroners of copper line must be rounded up & line thickness should be about 1 & ½ mm.
4. The gaps between two lines / islands are critical; & dependent in components used nut normally this way be about 2 mm.
5. If double sided PCB is used & this is mainly for crossover troubles.
6. One should try to get horizontal lines o one side & vertical lines on other sided.
7. While going from one side to other a space for hole must be kept.
8. for crossover to back side use copper wire & solder on both sides.
9. The backside crossover should not lie under a component & particularly under an IC.
10. The layout should be compact & at the same time, heat dissipation must be taken into account.

The end product of layout deciding is the pencil sketched components & conductor copper tracks / which is called as 'Layout sketch' & which contains all relevant information from preparation of the artwork. A code can be used to specify holes & conductor width.

c) Artwork

Artwork means to prepare a diagram with maximum accuracy & it is designed according to layout but on quality graph paper. Artwork is prepared 2 to 4 times the size of the final printed circuit board.

For preparation of artwork following methods can be employed.

1) Ink drawing on white cardboard sheet.
2) Black taping on transparent base foil.

After preparing the artwork it is photographed & them reduced in size to produce a negative or positive.

d) Etching

Etching is the main process, in this method of PCB. The final board after printing, developing & dying is kept in a solution, of ferric chloride ($FeCl_3$) is most common because of its fast action. Now $FeCl_3$ reacts with copper, which is unmarked, & are copper tracks which are hard or on which dye is applied do not react with $FeCl_3$. After 15 minutes or ½ Hour the unwanted copper is dissolved & finally we get a board with printed copper tracks.

e) Stripping

After etching the unwanted copper gets completely dissolved but the copper tracks, which are covered with, resist that must be now removed. Stripping solution can do it. In laboratory method, the board is left with copper tracks, which is covered with paint. This paint is removed by acetone.

f) Drilling

Before drilling many time final boards is plated with either copper or tin. Drilling is done manually with electric drill machine. As per artwork used for assembly of components all the holes are drilled with specified drill bit.

g) Filling & Finishing

After drilling, filling is done in order to make edges of PCB sharp & smooth. Observing drilled holes, short tracks etc. does final checking.

h) Component Printing

Sometime PCB becomes very complicated due to large not of tracks. So one cannot recognize where what component is to be soldered. Similarly assembly worker should be assemble fast component size is printed with component symbol & tracks. White screen will is used for this purpose.

A. Layouts Of PCB
Steps in PCB Fabrication

3. Block Diagram

Figure shows block diagram of project electrical appliances control using zigbee. In this project we transmit digital data through radio frequency FSK modulation system, transmitting, receiving purpose zigbee transmitter and receiver is use. So this project has two sections. One is transmitter in which switches, micro-controller unit, and regulated power supply and zigbee transmitters. And second are receivers in which zigbee receiver, micro-controller unit, and relay are the main blocks.

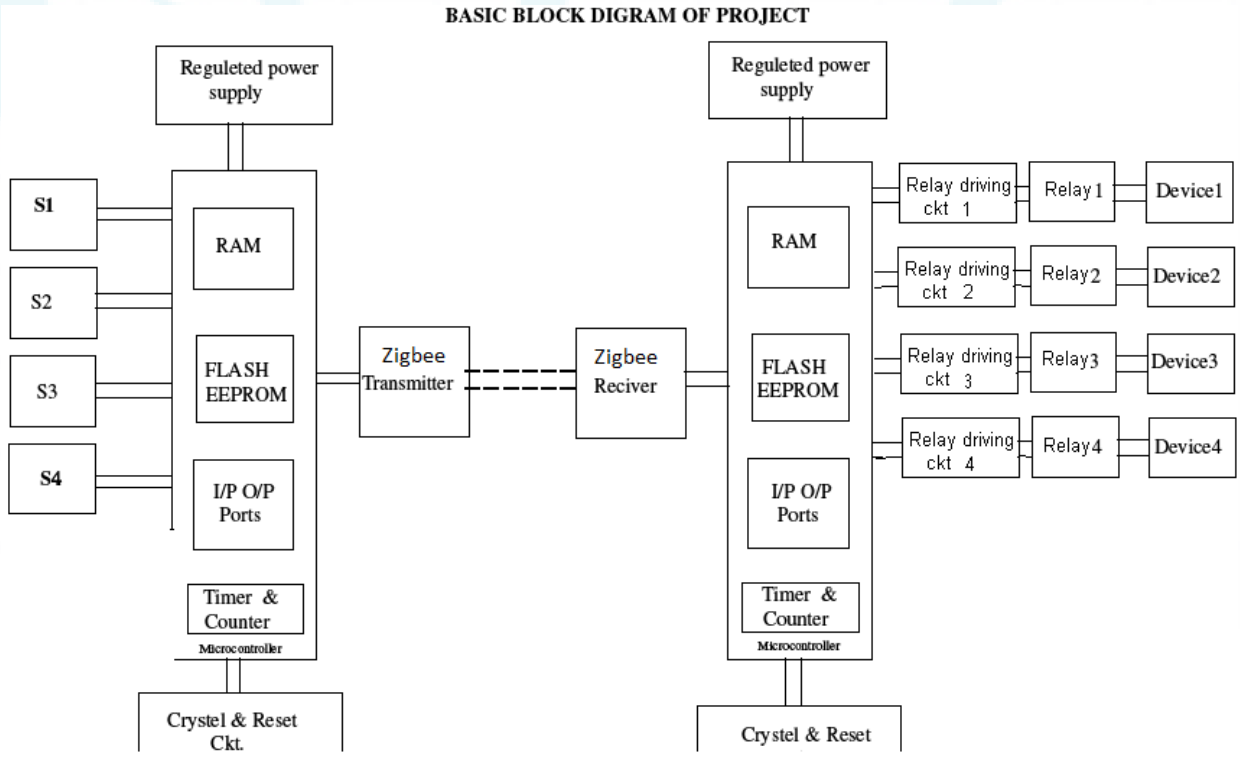

Figure 2: block diagram

Figure shows the complete circuit diagram of the project wireless home appliances control using Zigbee communication. Figure 1 shows transmitter section. In this section we use micro-controller IC 89C2051. The switches S1 to S4 are connected to P0.0 to P0.3. Transmitting module operated at 2.6GHZ is used which is connected to TXD pin of micro-controller because we use serial data transmission mode of micro-controller. For serial data transmission we use baud rate frequencies 2400 Hz. For this purpose we use time T0 in 8-bit auto reload mode. In micro-controller we feed program, which can continuously scan the switches. When any one key is pressed, micro-controller detects it using instruction JNB and transmits the digital Hex code with respect to that key. This Hex code is transmitted in SBUF, which is used for serial data transmission. According to this Hex code digital data is transmitted through zigbee transmitter.

At receiver section, again we use another micro-controller 89C52 for reception of signal transmitted by zigbee transmitter in transmitter section. The o/p of this receiver is connected to RXD pin of micro-controller. Micro-controller at receiver section can continuously scan the RXD line. When signal is present at RXD line, it can identify the Hex code, which is transmitted by transmitter and according to that Hex code it can ON or OFF the corresponding relay. There are six relay is used in our project. The function of this relay is to turn on and off the electrical appliances.

When we are use 12volt DC operated relay that purpose we are use switching transistor is use because micro controller output is zero or one(5v),we cannot drive 12volt relay for that purpose we use driving transistor as shone in figure. This is connected to pin P2.0 to P2.3. Micro-controller can switch ON that driving circuit and relay. Capacitor “C” and Resistance “R” are connected between RST (reset) pin of micro controller. So that when power is turn ON programmed execution start from starting memory location 000H between pin 18 & 19 (XTAL1 & XTAL2) quartz ceramic crystal of 12 MHz freq. Are connected to generate oscillation req. for machine cycle to fetch decode & execution of instruction in micro controller. For our project we req. regulated supply of +5v D.C. which can be generated using 230v/0-15(1Amp) step-down transformer, full wave bridge rectifier & filter condenser. For stability purpose we use 7805 voltage regulate IC at o/p at rectifier o/p we get +12v D.C. by dropping and converting 15v AC.

4. Applications and Future Scope of Zigbee

As stated earlier we have selected this project taking into consideration the newly emerging world without wires. There are so many applications of R.F link. Wherever we can think of wireless connectivity we can think of R.F of course it. It is for small distance. A few of the number of applications of R.F. link are discussed below:

a) Cordless/wireless keyboards, printers, mouse etc.
   The computer peripherals are all connected to CPU with wires. With wires spewing from every gadget on your computer desk, the fateful day when cord & coffee cup collide is inevitable. Wireless gadgets send digital signals to the ports. You can use them from a distance as far as 10ft. away from your PC, which makes the gadget a brilliant remote control for when you are watching a DVD on your PC or kids playing games.
b) Wireless LAN
   In a LAN system we can make it possible that the two PCs communicate with each other using R.F. link.
c) Wireless MODEMS
   In the modems, we are using nowadays; we have to connect telephone wire at one end and the wire, which connects it to PC at the other end. We can make it wireless by using R.F.link. We can attach transmitter & receiver pair to the telephone instrument and another to PC and use R.F. as channel for transmission. In this case a continuous data is transmitted.
d) Sequential control of machinery in an industry
   There are some multiple functioning machines, which perform different functions in a single threading, drilling etc. we need a labor for performing all these operations one after the other. If we make it such that all the functions are performed sequentially and these operations are controlled from a remote place. Then using R.F. link and setting delays for each operation we can make it happen. In this case, efforts of a labor are saved & ultimately time is also saved.

Abbreviation

INWPAN - wireless personal area networks
PCB - Printed circuit board
PTH - Printed through holes
DSB - Double Sided Board
FET – Field Effect Transistor
ROM – Read Only Memory
RAM – Random Access Memory
DPTR - Data Pointer
PC - program counter
EPROM – erasable programmable Read Only Memory
PSW - Program Status Word
SPCO - Single Pole Changeover
DPCO - double pole change over
SPDT - Single Pole Double Throw
DPDT - Double Pole Double Throw

5. Conclusion

It is often said that the cleanest source of energy is the energy not generated in the first place. That’s why conservation is touted as a cornerstone of the nation’s future energy program. Yet utilities are already struggling to manage the peak energy demand dilemma, where approximately 10 percent of total electric generating capacity exists only to be used less than one percent of the time. HANs will be instrumental in the success of Smart Grid initiatives to meet this energy conservation and demand response challenges. Zigbee wireless technology is a critical element of these communication systems, providing the robustness and reliability, low cost, security and ease-of-deployment required to make it all work together and deliver tangible benefits.

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