

Automatic detection of human and Energy saving based on Zigbee Communication

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Abstract—This paper proposes automatic detection of human and Energy saving room architecture to reduce standby power consumption and to make the room easily controllable with an IR remote control of a home appliance. To realize the proposed room architecture, we proposed and designed the Zigbee communication. Zigbee is a low-cost, low-power, wireless mesh networking. 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. The proposed auto detection of human done using the IR sensor to indicate the entering or exit of the persons. Microcontroller continuously monitors the infrared receiver. When any object pass through the IR receiver then the IR rays falling on the receiver are obstructed, this obstruction is sensed by the microcontroller (LPC2148-ARM7) also PIR sensor will check the presence of human beings with the help of radiations emitted by human beings. Then microcontroller will check the input coming from these two sensors and simultaneously if somebody is present then automatically checks for the light intensity and the temperature. And then if the room is found dark it switches ON the lights and if the temperature is more it switches ON the fans. And if nobody is present then all the lights will be switched off automatically.

Keywords- LPC2148 (ARM7); Embedded 'C'; Flash magic; Zigbee

I. INTRODUCTION

Generally in public and private sector companies, offices most of the people are not interested to switch OFF the consumer electronic appliances like fan, light etc, if they are not present. As more and more consumer electronic and home appliances are deployed and the size of them is becoming large, power consumption in home area tends to grow. Moreover, useless power consumption occurs when they do not perform the primary function.

Although much effort is made to reduce the standby power of consumer devices themselves, efficient power management schemes over a room or home region are greatly required to reduce the total power consumption in home. The controlling and power monitoring capability is indispensable to home power management. The network capability is also required to communicate one another. In this paper, we propose a remote-controllable Automatic detection of human and Energy saving room architecture. To realize our proposed room architecture, ZigBee as wireless network is used to transfer the control information

II. SYSTEM STRUCTURE

The Automatic detection of human and Energy saving design is divided in to two sub systems (1) Transmitting section and (2) Receiving section.

The transmitting section consists of (1) Zigbee transmitter (2) LPC2148 (ARM7) Microcontroller, (3) Temperature Sensor (LM35) (4) IR Transmitter-Receiver (5) PIR Sensor(D203B)

The receiving section consists of (1) LPC2148 (ARM7) Microcontroller (2) Zigbee receiver (3) Consumer electronic devices. Fig.1 shows the Block diagram of the Automatic detection of human and Energy saving system using zigbee

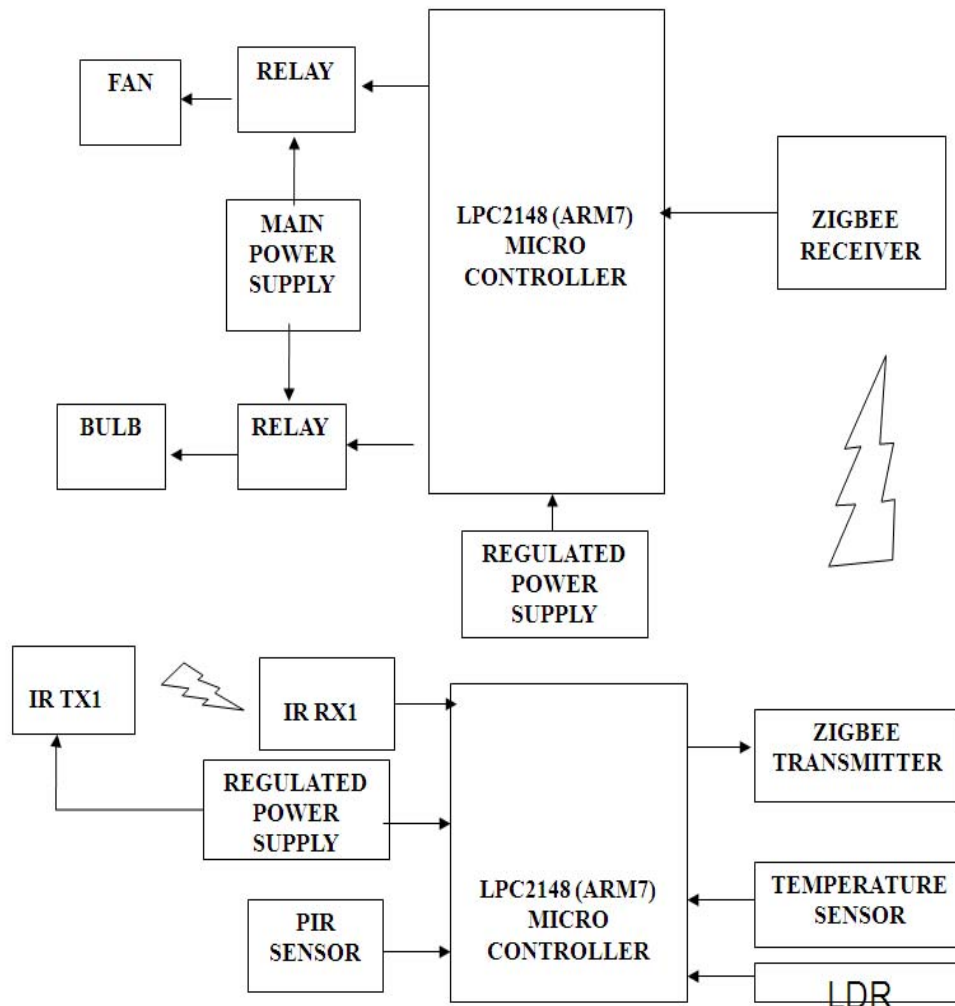


Fig.1 Block diagram of the Automatic detection of human and Energy saving system using zigbee

The IR signal and PIR sensor signals are connected to the transmitter side arm7 microcontroller I/O ports to P1.16 and P1.17 respectively. Measured temperature value and Light intensity value are given to ADC1.1& ADC1.2 respectively. Zigbee transmitter is connected to pin 19 of ar m7 microcontroller on TX side.

Light and fan are connected to the receiver side arm7 microcontroller I/O ports to P0.11 and P01.12 respectively. Zigbee receiver is connected to pin 17 of ar m7 microcontroller on Rx side.

When a person enters the room, the IR signal immediately followed by PIR signal is generated. Then count should be incremented. When no person is present in the room (i.e., count=0) then send commands to receiver to switch off light and fan.

When person is present (i.e., count>0),

- a. If value of temperature >50 then send command to Rx to switch ON fan else switch off the fan.
- b..If light intensity is dark then send command to Rx to switch ON light else switch off the light.

Person exit is identified by PIR signal immediately followed by IR signal. Then decrement count. The commands are sent to receiver as follows. First from M1 to Zigbee TX and then to Zigbee Rx and then to M2. The devices are operated using P0.11 and P0.12 values in M2.

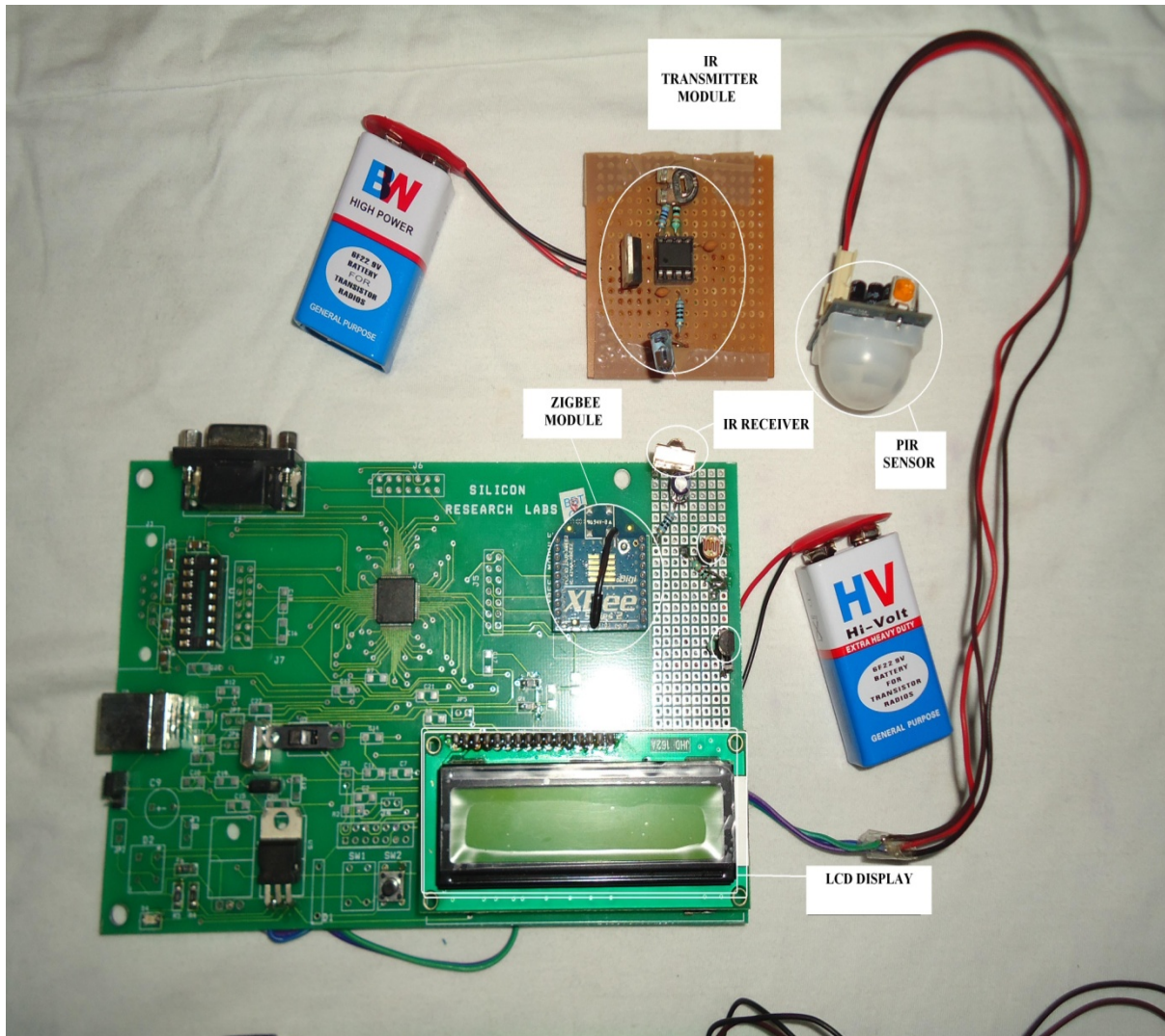


Fig.2 Transmission Section

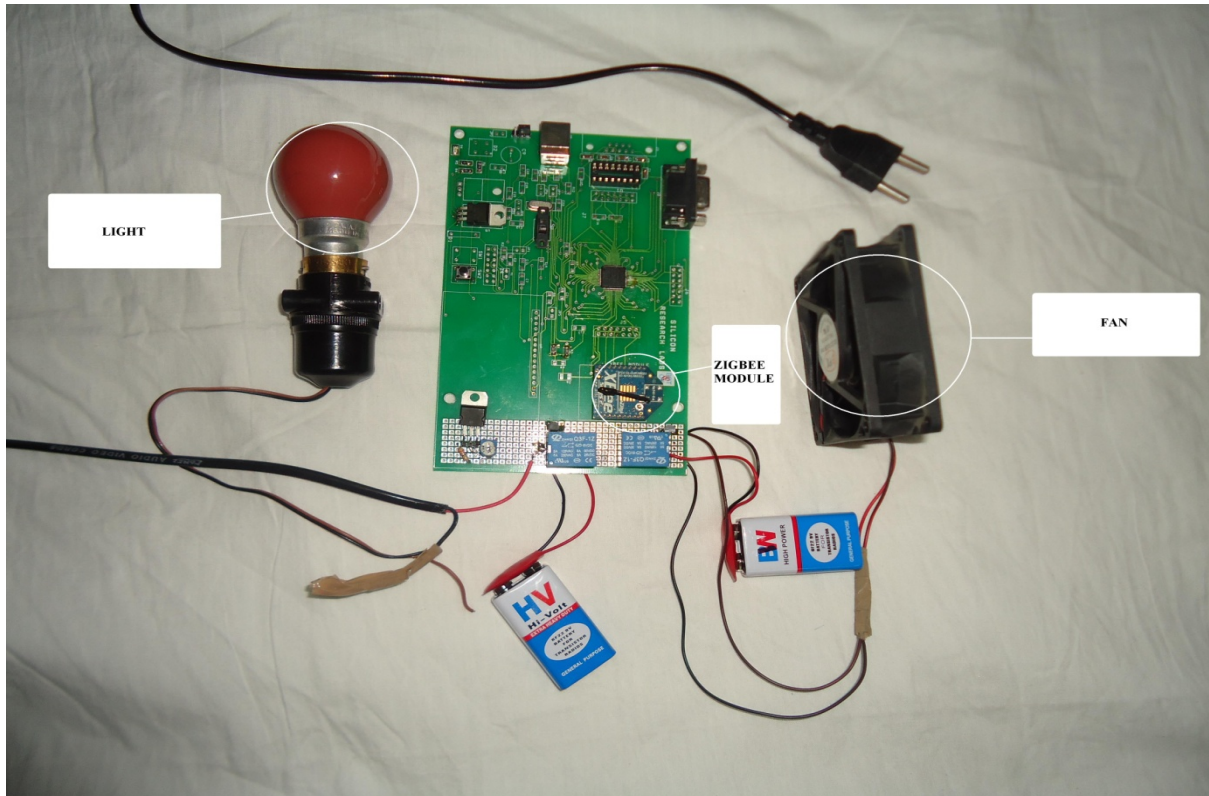


Fig.3 Receiver Section

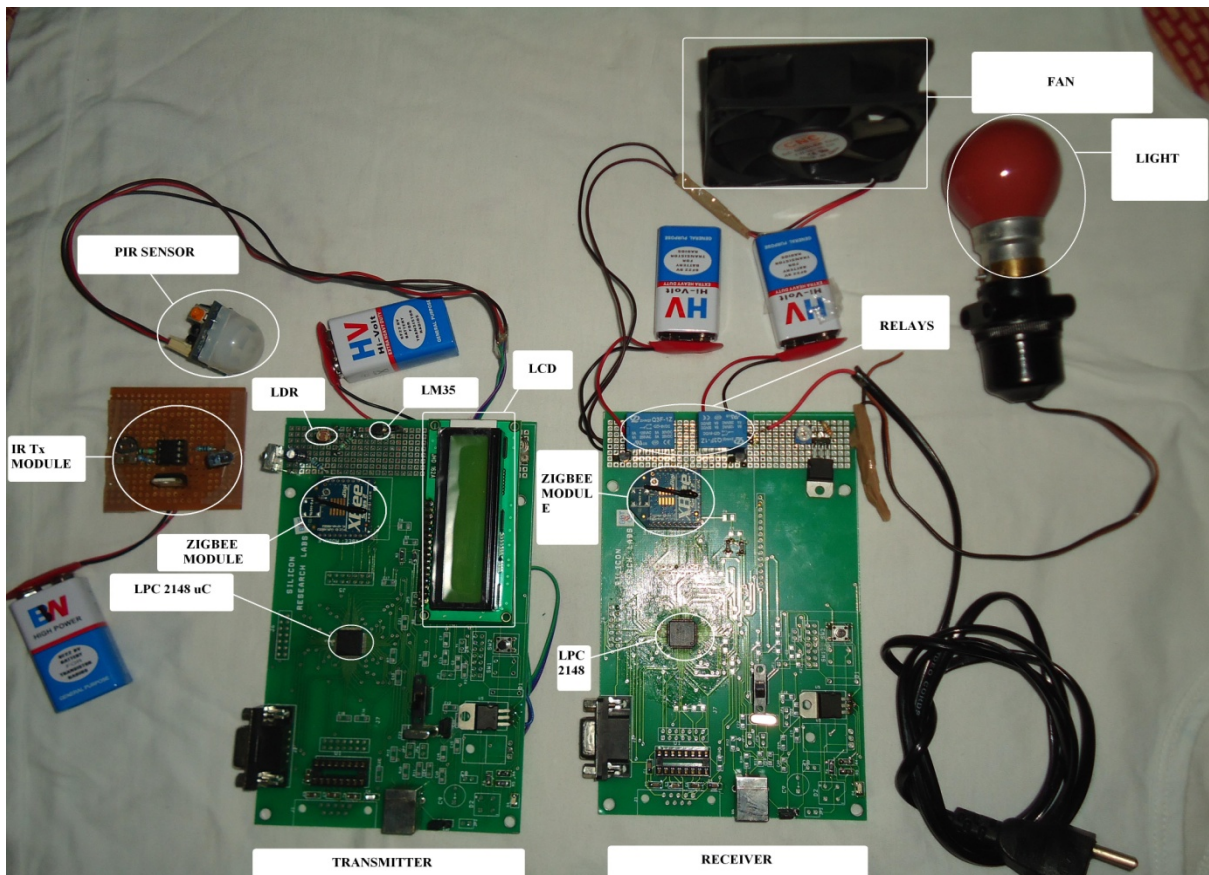


Fig.4 Transmission and receive sections

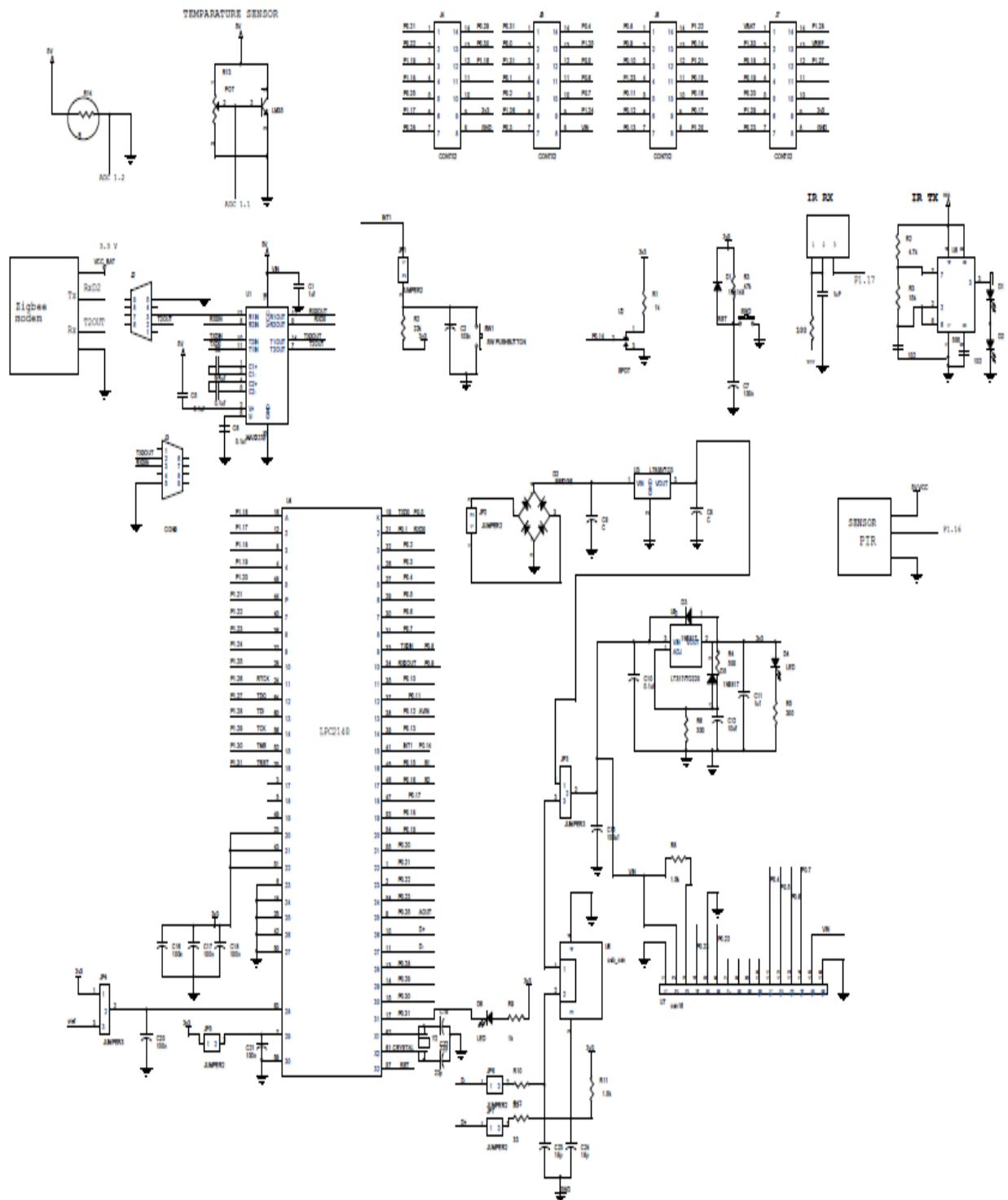


Fig.5 Schematic view of Energy-Saving Room Architecture Tx Section

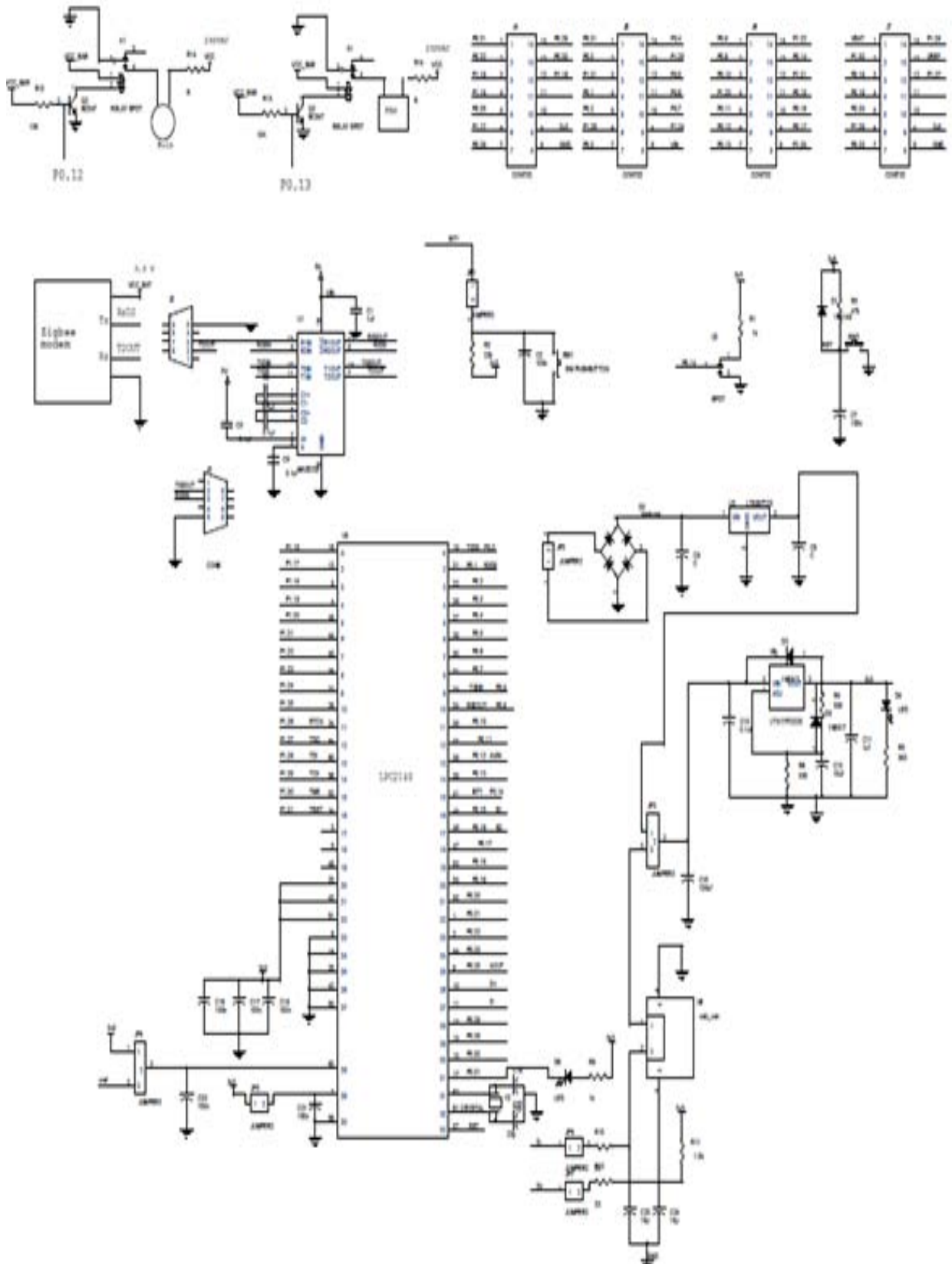


Fig.6 Schematic view of Energy-Saving Room Architecture Rx Section

III ALGORITHM

Step1: Start

Step2: Initiate microcontrollers M1, M2.

Step 3: Check for IR interrupt signal. If it is followed by PIR signal, then increment count.

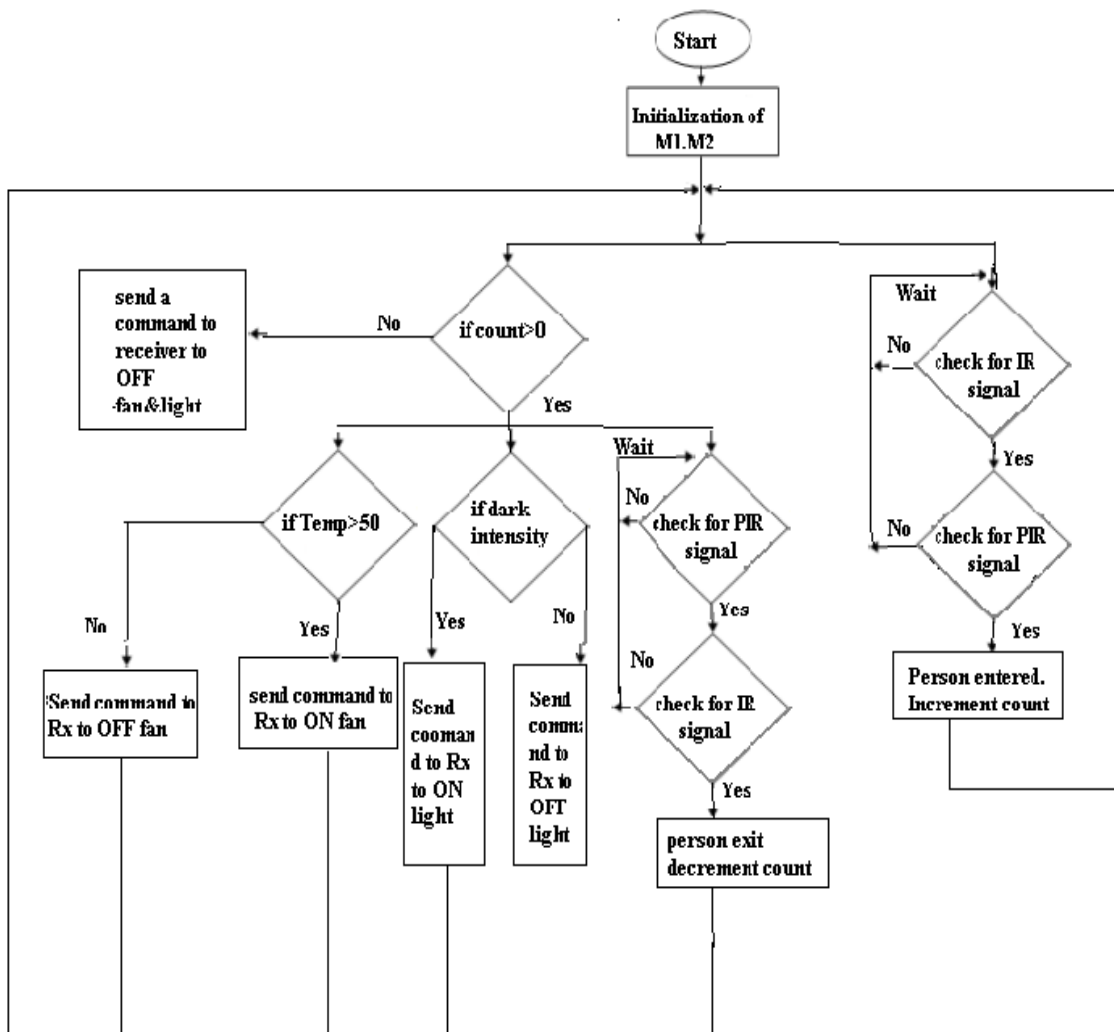
Step4: When count >0 do the following:

1. If temperature >50 then send a command to receiver to switch ON fan else send a command to receiver to switch OFF fan
2. If room intensity is dark then send a command to receiver to switch ON light else send a command to receiver to switch OFF light.
3. Check for PIR signal. If it is followed by IR interrupt signal. Then decrement count.

Step 5: When count <0 send command to receiver to switch OFF fan and light.

Step 6: Repeat the steps 3, 4 and 5 in parallel.

IV SYSTEM FLOW CHART



V CONCLUSION

We proposed Automatic detection of human and Energy saving room architecture based on Zigbee Communication. With the help of this architecture, we can control the power when a person enters in the room and exit the room automatically along with we considered additional requirements also. This can be extended to more number of consumer electronic and home appliances also.

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