INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 6.078
(Volume 6, Issue 2)
Available online at: www.ijariit.com

ASIC implementation of smart home using VLSI design

Syed Muqtar Nawaz
syedmuqtar.nawaz@gmail.com
B V Raju Institute of Technology, Narsapur, Telangana

Sureddy Sravya
ssravyasureddy@gmail.com
B V Raju Institute of Technology, Narsapur, Telangana

Mohammed Imran
mohammedimran78655@gmail.com
B V Raju Institute of Technology, Narsapur, Telangana

C. Ramesh Kumar Reddy
rameshkumarreddy.c@bvrit.ac.in
B V Raju Institute of Technology, Narsapur, Telangana

ABSTRACT

In the upcoming new era, the need for improvement in technology and upgrades of existing devices has more priority. With such idea of upgrading the home automation system we have designed this model. In this model we used six sensors that is, temperature sensor (LM35), PIR motion sensor, smoke detection, water level sensor, garage sensor etc. For different purposes which ultimately leads to two major visions that is, (a) security (b) Comfort. In this model we have developed has highly improvements in both visions, like PIR motion sensor detects unusual intrusion in the home which helps to provide security. Here we used software tools Xilinx 14.4 to develop simulation results for each sensor. RTL schematic diagram is used to represent the pin level diagram. Therefore, to implant more features in home automation system and with high performance at low cost is our ultimate goal.

Keywords— *Intrusion detection, Temperature and smoke detection, Xilinx, RTL schematic*

1. INTRODUCTION

ASIC: Application Specific Integrated circuit. The smart homes have more demand in this modern world. Everything is getting automated, so to make such automation system we need microcontrollers. These microcontrollers are chips which performs whole operation which is programmed and installed in its memory. It takes decision and executive necessary action which has been pre-installed. Thus, we have designed a Microcontroller at ASIC level to execute the operation of Home automation system.

The Home automation system has two major requirements i.e. security and comfort. Human beings need both security and comfort in their lives, so developing technology for the human need is more popular and rapid growth in the business. The future gadgets powered to make life in home very comfortable and pleasant. Thus, we encourage this technology and bring it to everyone at low cost is our moto.

2. PROPOSED SYSTEM

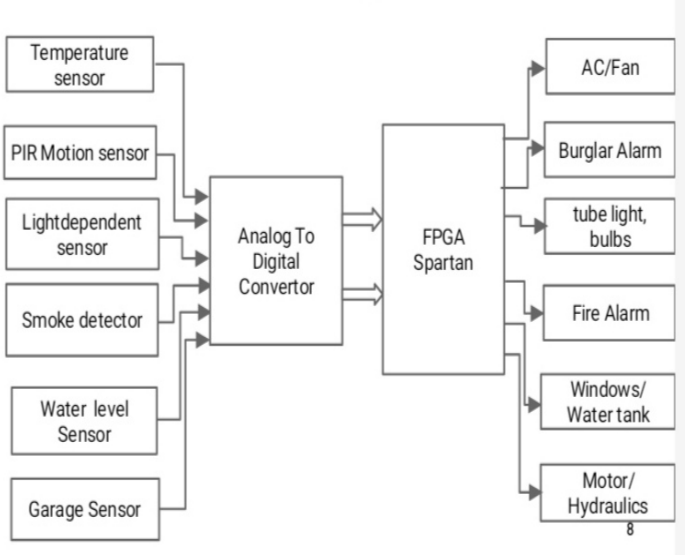
The objective of the proposed system is to design microcontroller in Xilinx software which offers a low- cost solution for a home automation system that overcomes the drawbacks of present device's. The required tools and process of execution of sensors are mentioned below, there are assumptions made based on functioning of sensors while developing code.

2.1 Software Tools Used

(a) Xilinx 14.4
(b) ISE Simulator

2.2 Functional Block Diagram

The figure below shoes the function of the proposed system.



2.3 Sensors Used

The following six sensors are used to develop the Verilog code, using the input/output of sensors Verilog code is written.

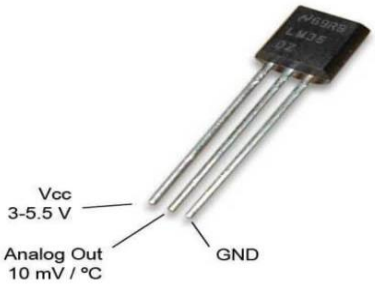


Fig. 1: Temperature sensor (LM35)

Fig. 2: Smoke detector

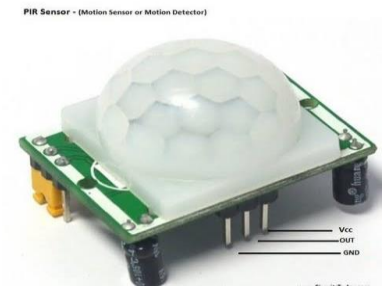


Fig. 3: PIR Motion sensor

Fig. 4: Water level sensor

Fig. 5: Light Dependent sensor

Fig. 6: Garage sensor

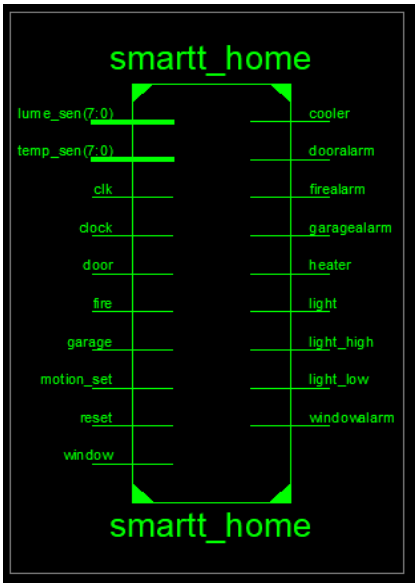
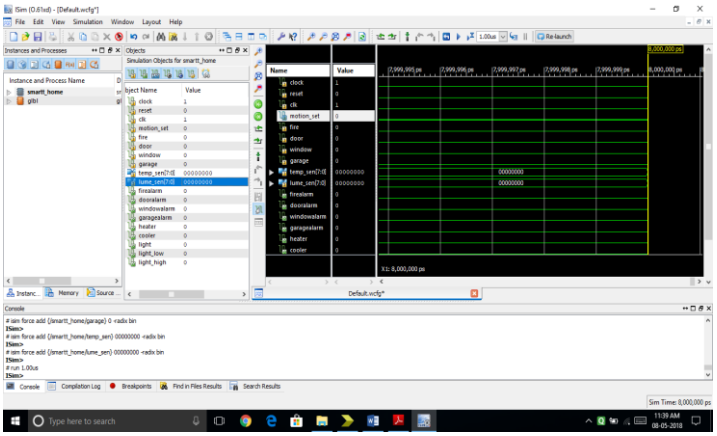


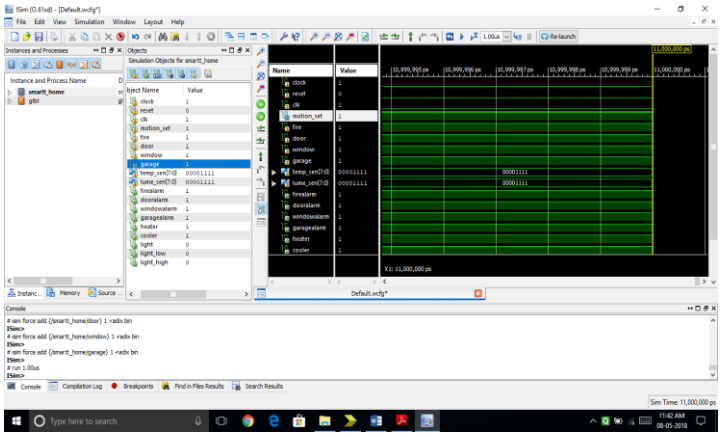
Fig. 7: RTL Schematic Pin Diagram

3. SIMULATION RESULTS

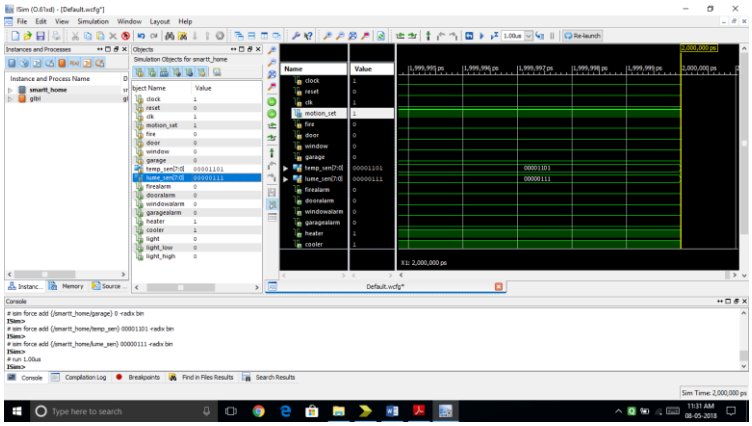
(1) No detection by sensor:



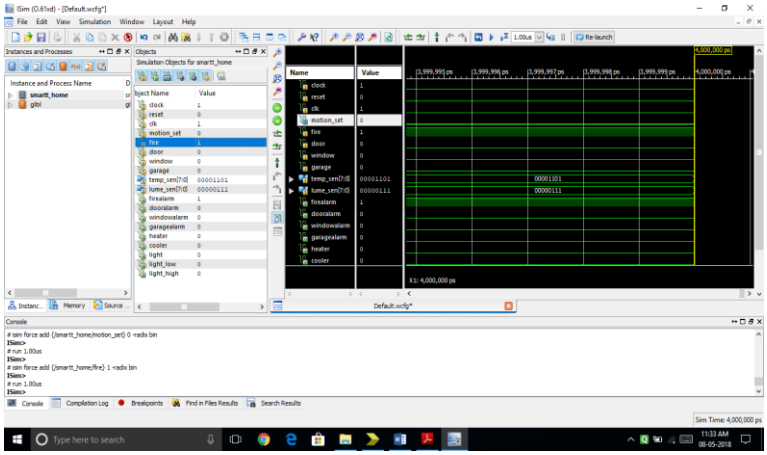
(2) All sensors are active:



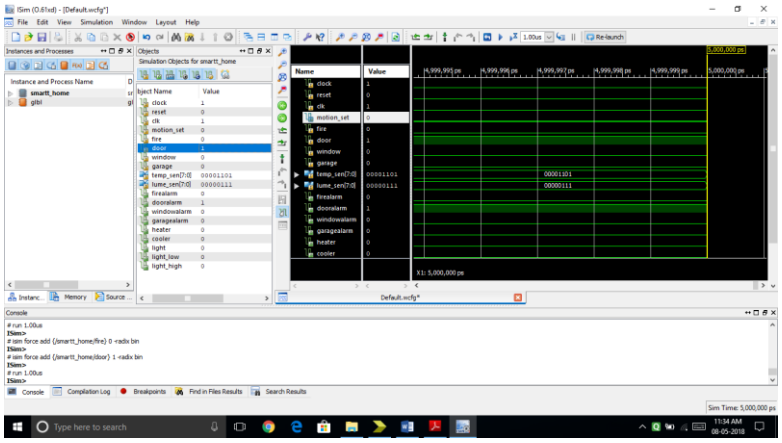
(3) PIR sensor (Motion)is active



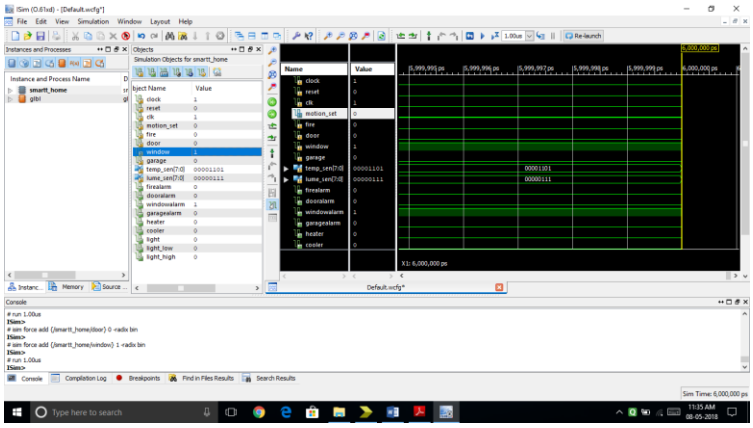
(4) Smoke sensor (fire) is active



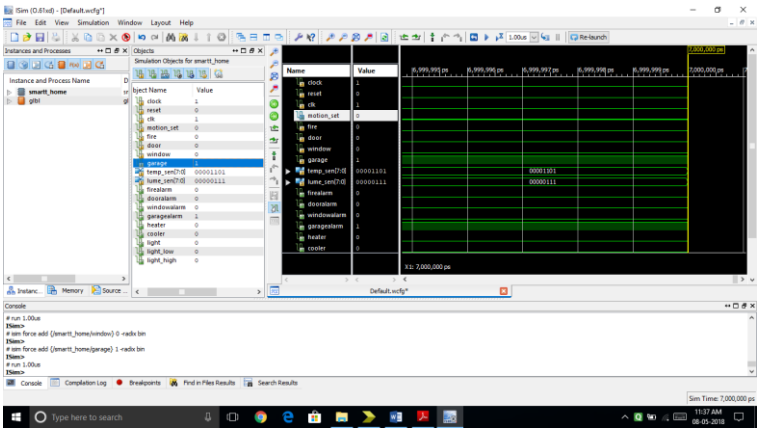
(5) LDR sensor (Light)is active



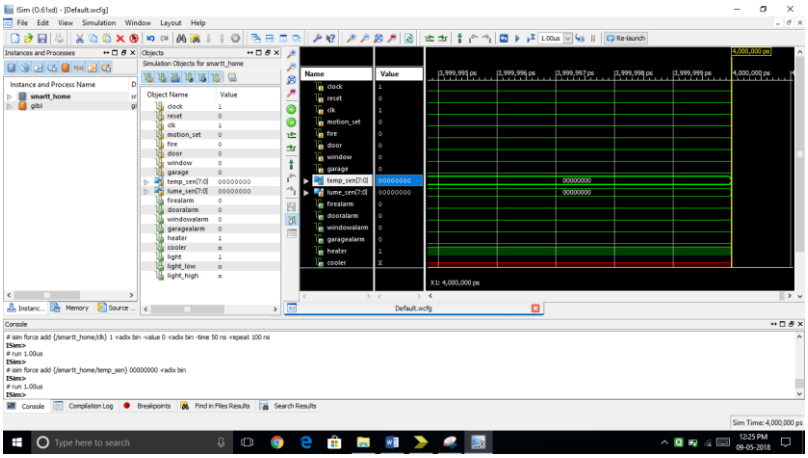
(7) LDR sensor (Window) is active



(8) LDR sensor (Garage) is active



(9) Temperature sensor is active



4. CONCLUSION

In our project we have used sensors i.e., LDR, PIR sensor and LM35.LDR controls the lighting of the compound. IR sensors operate the opening of garage door. It is also responsible for monitoring the interior lighting and fan regulation. Temperature senor (LM35) manages the temperature control of the air condition. There have been many assumptions all through, but efforts have been put in to make it as practical as possible. This is a low cost and effective device. This method is very easy to adapt and implement and can easily be embedded to another device.

We used Verilog HDL to implement the code part has really helped since it not only combines the hardware and software part, it also provides informative graphs and waveforms which are helpful in understanding the real concept of the project. Xilinx also has proved to be the most robust and learnable tool for simulation and a great integrated development environment.

5. ACKNOWLEDGEMENT

I would like to express my gratitude to my guide Mr. C. Ramesh Kumar Reddy, M.tech, Dept of ECE. I also extend my grateful thanks to the authorities of CENTER FOR VLSI DESIGN Lab at B. V. Raju Institute of Technology, Medak for their support to utilize their facilities and encouragement to write this paper.

6. REFERENCES

[1] S. Kangamalliga, S. Vasuki, A. Vishnu priya, V. Viji, "A zigbee and embedded based security monitoring and control system", Int J of Info Sci and Tech, Vol. 4, No.3, May 2014.
[2] Khusvinder Gill, Shung-Hua Yang, Fang Yao, and Xin Lua "Zigbee –Based Home Automation System" IEEE Trans on Consumer Electronics, Vol.55, No.2, MAY2009.
[3] II-Kyu Hwang, Member, Dae-Sung Lee, Jin-Wook Baek. "Home Network Configuring Scheme for All Electric Appliances Using ZigBee based Integrated Remote Controller" IEEE Trans on Consumer Electronics, Vol.55, No.3, pp 1300- 1307, August2009.
[4] K.N. Sweatha, M. Poornima, M.H. Vinutha "Advance Home Automation Using FPGA Controller" Int J of Advan Research in Computer and Communication Engineering Vol. 2, Issue 7, July2013.
[5] L. Larsson, A. Klindworth, K. Lagemann, "Teaching System Integration using FPGAs".
[6] M. Priyanka Bansode, Vinayak, B. Kulkarni "FPGA Based Fluid Flow Rate IR Sensor for Microstructures", Int J of Advance Foundation and Research in Computer (IJAFRC) Vol. 2, January2015.
[7] S. Karthik, T.R. Prasanna Vishal, S.G. Jayaram, K. Priyadarsini "GSM Based Configuration of FPGA". IOSR J of VLSI and Signal Processing Vol. 4, Issue 4, Aug.2014.
[8] S. Perelson and R. A. Botha, "An Investigation into Control for Mobile Devices", ISSA, Gallagher Estate, Johannesburg South Africa, 2004.
[9] R. Shahriyar, E. Hoque, S. Sohan, I. Naim, M. Akbar, M. Khan, "Remote Controlling of Home Appliance using Mobile Telephony", Int J of Smart Home, Vol.2, no.3, July 2008.
[10] I. Coskun H. Ardam, "A Remote Controller for Home and Office Appliances by Telephone", IEEE Trans. Consumer Electron, vol. 44, no. 4, pp. 1291- 1297, November1998.
[11] R. Shahriyar, E. Hoque, S. Sohan, I. Naim, M. Akbar, M. Khan,"Controlling Remote System using Mobile Telephony", ACM Mobilware , February2008.
[12] C. K. Das, M. Sanaullah, H. M. G. Sarower and M. M.Hassan, "Development of a cell phone based remote control system: an effective switching system for controlling home and office appliances", Int J of Electrical &Computer Sciences Vol: 9, No: 10, pp. 37- 43,2004.

