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FPGA BASED ENERGY EFFICIENT HOME APPLIANCE CONTROL WITH EMBEDDED IoT

[1]Ms.R.Mohanabarathy, [2]Pradeep P, [3]Priya Dharshini R, [4] Usha M

ABSTRACT—*The Home Automation concept is a brand new approach of wireless controlling of the home appliances. The terms "Smart Home", "Intelligent Home" is Associated with the type of system and has been used to introduce the concept of networking appliance and devices in the home. This represents the power efficiency by adapting security and energy efficiency which is done by using FPGA controller based on the core system. In this the hardware method is explained and the software design is adopted completely by the flow of embedded product. It can analyse the real time information from the sensors by the switch system behavior consequently. Some parameters from automating the home mainly for energy saving into a great market. Nowadays we can see a technology enabled in digital network rapidly.*

Keywords--*FPGA, Sensors, Home Automation, Power Efficiency.*

I. INTRODUCTION

The Home Automation is generally used mainly to calculate the power efficiency and to control the home devices. It is help full to comfort and improve the home appliances using sensors. FPGA can also connect to the DC motor, stepper motor and LED. DC motor helps to control the robot by constructing and navigating with help of and android mobile. We perform this home automation by using the finite state machine (FSM). Technology makes everything smarter and better to use with more intelligence and which is highly advanced by their automatic system for the security purpose of the home which is useful for everyone in their a day to day life to get more advanced home automating technology. This process of home automation concentrates mainly on controlling various appliances at home. In this sensors used are analog, for interfacing the FPGA which require to convert the sensors to analog output so the sensors in digital, where the controller can easily read them. The intention of the design is to endorse the engineers and scholars to exercise and explore the capabilities of FPGA architectures with many interfacing modules on board point LEDs , Slide switches, LCD, ADC, DAC, Buzzer, UART and push with ease create a stand.

[1] *Assistant Professor/ECE, Department of Electronics and Communication EngineeringKPR Institute of Engineering and Technology Arasur, Coimbatore, rmohanabarathy@kpriet.ac.in*

[2] *UG scholar, Department of Electronics and Communication Engineering, KPR Institute of Engineering and Technology Arasur, Coimbatore, pradeeppradeep81755@gmail.com*

[3] *UG scholar, Department of Electronics and Communication Engineering KPR Institute of Engineering and Technology Arasur, Coimbatore, priyataj1024@gmail.com*

[4]*UG scholar Department of Electronics and Communication Engineering KPR Institute of Engineering and Technology Arasur, Coimbatore, ushamanickam19@gmail.com*

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II. LITERATURE REVIEW

In this project we use sensors which is integrated with FPGA controller. The sensors are PIR sensor, Temperature sensor and gas sensor.

A.PIR Sensor

A Passive infrared sensor (PIR sensor) is an electronic sensor which detect changes in the amount of infrared radiation. It varies depending on the temperature and surface characteristics of the object in front of the background such as a wall, the temperature at that point in the sensor's field of view will rise from room temperature to body temperature, and then back again. The sensor converts the resulting the change in the incoming infrared radiation in to a change in the output voltage, and this triggers the detection. Objects of similar temperature but different surface characteristics may also have a different infrared emission pattern. The most common models have numerous Fresnel lenses or mirror segments, an effective range of about ten meters (thirty feet), and a field of view less than 180 degrees. Models with wider fields of view, including 360 degrees, are available typically design to mount on a ceiling.

B.Temperature Sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. It is calibrated directly in degree Celsius and linear to +10.0mV /degree Celsius scale factor. They are 0.5 degree Celsius accuracy (at + 25^0C). it is rated for full -55^0 to +150^0C range. Temperature sensor operates from 4 to30 Volts. It is less than 60mA current drain, it is also low self-heating 0.08^0C in still air. It is low impedence output as 0.1ohm for 1mA load. they are low cost due to wafer-level trimming.

C.Gas Sensor

Ideal sensor for use to detect the presence of a dangerous LPG leak in your car or in a service station storage tank environment. This unit can be easily incorporated into an alarm unit, to sound an alarm or give a visual indication of the LPG concentration. The sensor has excellent sensitivity combined with a quick response time. The sensor can also sense iso-butane, propane, LNG and cigarette smoke. They are high sensitivity with the detection range of 100 – 10,000 ppm iso- butane propane. They have fast response time greater than 10s. it has heater voltage of 5.0V. the dimensions are 18mm Diameter, 17mm High excluding pins, SPins- 6mm High.

III. METHODOLOGY

In this project the security system suffers from platform fragmentation and lack of technical standard situation

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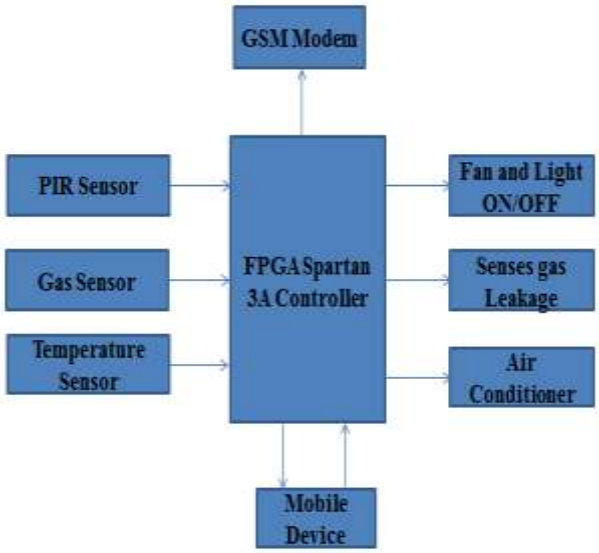


wherethe variety of home automation devices.

Figure 1: Block Diagram

A.PIR Sensor

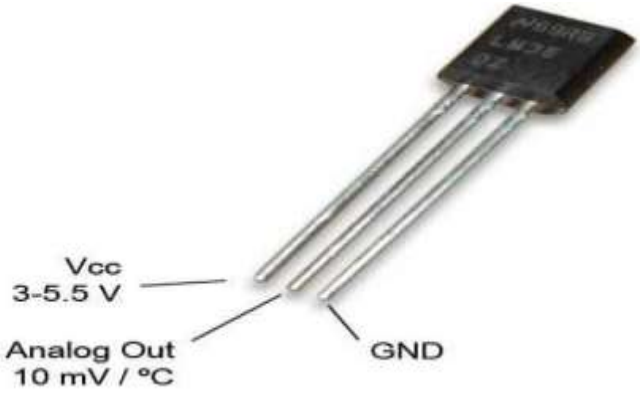
PIR325 sensor has two sensing elements connected in a voltage bucking configuration. This arrangement canc cancels signals caused by vibration**,** temperature changes and sunlight. A body passing in front of the sensor will activate first one and then the other element whereas other sources will affect the elements simultaneously and be cancelled. The radiation source must pass across the sensor in a horizontal direction when sensor pins 1 and 2 are on a horizontal plane so that the elements are sequentially exposed to the IR sorce. A

Figure 2: PIR Sensor

B.Temperature Sensor

Temperature sensor play a vital role of variety in every products. We use this mainly for home automation to control devices like ovens, refrigerators and thermostats all rely on maintenance of temperature which controls in order for the proper function. They also monitor the possible functions for the safety purpose. They provide valuable data for the thermal conditions. The temperature thresholds functional goes above or below to initiate actions for real time protection for the system. The system performance is maximised during normal operations

when the temperature changes.so the temperature sensor has the great ability to protect the home appliances and critical components.



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C.Gas Sensor

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Figure 3: Gas Sensor

IV. SIMULATION OUTPUT

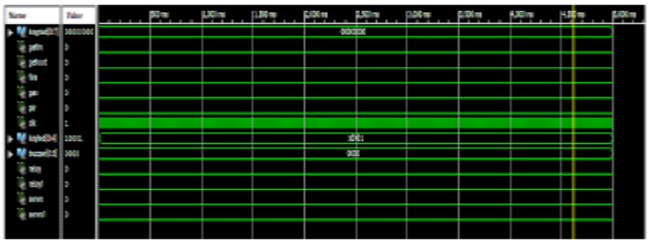

Figure 4: When no input is provided from any sensor or keypad,nothing happens

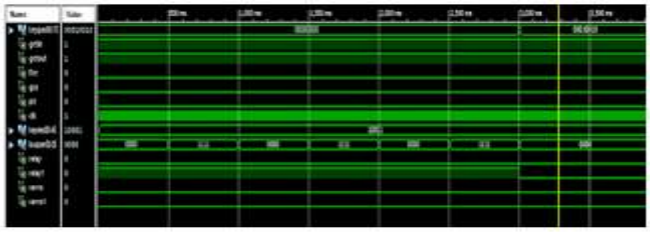

Figure 5: When any of the three alarm is raised(fire/gas/theft),buzzer beeps and Red bulb glows

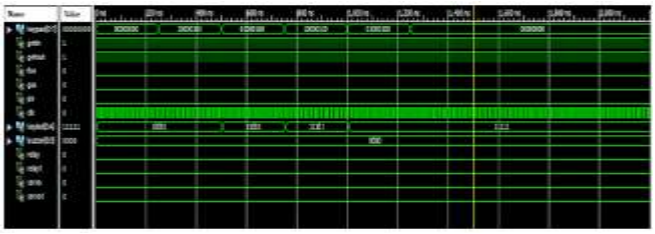

Figure 6: When entering 4 digit password,one LED glows after each keypress

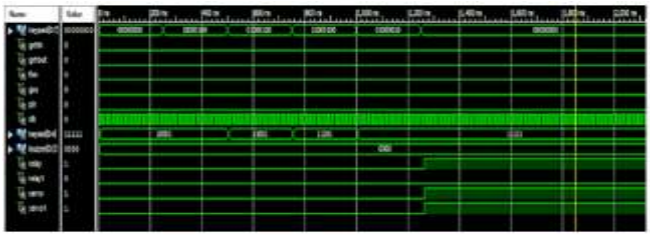

Figure 7: When correct password is entered,both the doors open and White bulb glows

V. RESULT AND CONCLUSION

This implementation of a home automation presented the usage of an FPGA which is a central controller. From this we automate the home appliances automatically by using the sensors and it is helpful to calculate the power efficiency of each appliances and to detect any kind of problem and it is automatically detected by using sensors and senses everything and if anything occurs the information is stored in the cloud and throughout the GSM modem it sends the information to the mobile device. Thus the smart home automation should be used by everyone, so that the security of the total home appliances is guaranteed. This home automation is a smart home automating system. It will be more useful and protective for the future generation and brings more awareness on power efficiency and energy of the home appliances and it will be a smart idea.

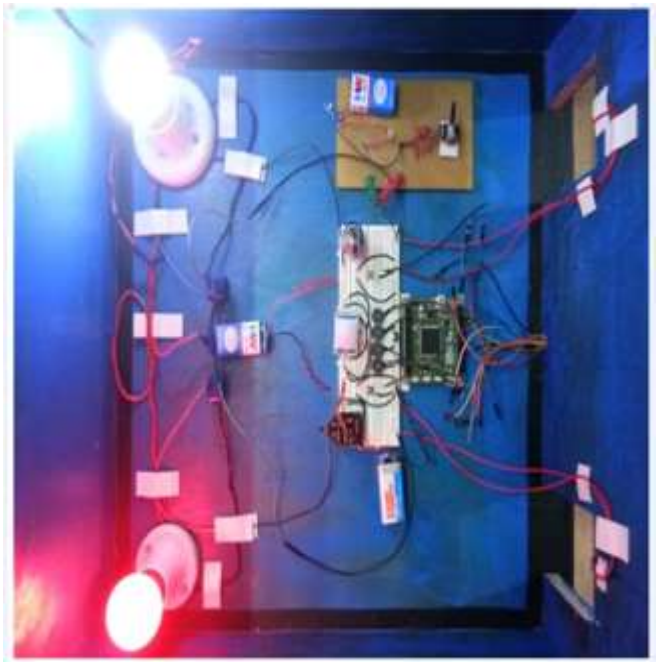

Figure 8: Schematic of whole Safehouse Syste

REFERENCES

1. Cristina Guzman, Alben Cardenans, Kodjo Agbossou, "Evaluation of meta-heuristic optimization methods for home energy management applications", IEEE 26th International Symposium on Industrial Electronics(ISIE),2017.
2. Sami H.A.Almalki, Iman I.M.abu Sulayman, Majed O.Dwairi, "Designing Reliable Dual Mode Real-Time Home Automation System Based on Very High Speed Description Language", IEEE-GCC Conference and Exhibition(GCCCE),2017.
3. Pratik Waghmare, Prafull Chaure, Mayur Chandgude, "Survey on Home Automation Systems," International conference on Trends in Electronics and Informatics(ICEI),2017.
4. Sunny Arief Sudiro, Bheta Agus Wardijono, Darwis Abdul Rohman, "Automatic controller component development using FPGA device", International Conference on Informatics and Computing(ICIC),2016.
5. Jesus Garcia-Guzman, Edgar O.Moctezuma-Monge, Farah H.Villa-Lopez, "FPGA implementation of a smart home lighting control system", IEEE Fourth International Conference on Consumer Electronics Berlin(ICCE-Berlin),2014.
6. sTaewan kim, Hyungsoo Park,Sang Hoon, "Integrated System of face recognition and sound localization for Smart door phone", IEEE Transactions on Consumer Electronics",2013.
7. N.K.Anish, B.Kowshick, S.Moorthi, "Ethernet basedindustry automation using FPGA", IEEE 2013.
8. DR.Sanjeev sharma, "FPGA based cost Effective smart home systems", electronics and telecommunication sandip foundation(SITRC),IEEE 2018.
9. Sami H.A.Almalki, "Designing Reliable Dual Mode Real-Time home automation system based on very high speed description language", IEEE 2017.
10. Pooja. S.Chinchansure, Charudatta V.Kulkarni, "Home automation system based on FPGA and GSM",

IEEE 2016.

11. Anish NK, Kaswick and S.Moorthy, " Ethernet based industry automation using FPGA" ,IEEE 2015.
12. Madhuri R Mukkawar, " Energy Efficent Automation system with Smart Task Scheduling", IEEE 2015.
13. M.Priyanka Bansode, Vinayak, B.Kulkarni "FPGA based Fluid flow rate IR sensor for Microstructure", Int J of Advanced Foundation and Research in computer(IJAFRC), 2015.
14. Chetana Sarode, Prof. Mr.H.S.Thakar, " Intelligent home monitoring system" , International Journal of Engineering Research and Applications (IJERA), 2013.