Implantation of home automation and security system using FPGA

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Abstract:

The project aims to design and implementation of a home automation and security system with the use of FPGA. In our project , domestic equipment are controlled from the remote location. It also provides security from accident and thief. Implementation of home automation and security system   is very essential in day to day life to make the human life secure. Home automation provides a complete ,low cost and user friendly system which provides 24 hours monitoring. In this paper, we are going to present controlling of real time appliances which are interface with FPGA. Here we are using wired connection between FPGA and domestic equipments.

Introduction:

Home automation and security system are commonly found in electronic from with the help of recent technology, the control over domestic equipments. We are using FPGA as main controller of our system and different sensor and component connected to it. FPGA is programmed through VHDL language. In electronic a VHDL is specialize computer used to describe the structure design and operation of electronic circuit and most commonly digital logic circuit. We are using VH-DL(VHSIC hardware description langauge). It is the most widely and well supported HDL's language. A FPGA is an integrated circuit design to be configured after manufacturing hence it is called field programmable. Monitor and control of home devices are done using wired or wireless communication for securing various sensor are used by which user is able to get alarm in case of emergency

(Key words: VHDL- very high speed integrated circuit hardware description language, FPGA-field programmable gate array).
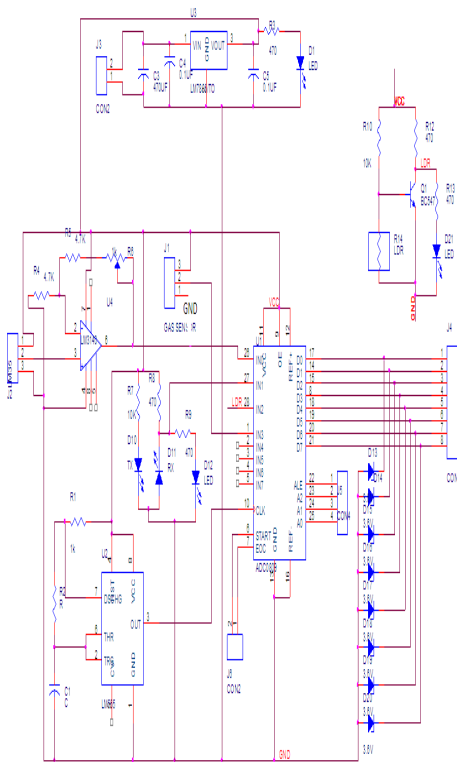
Block diagram:
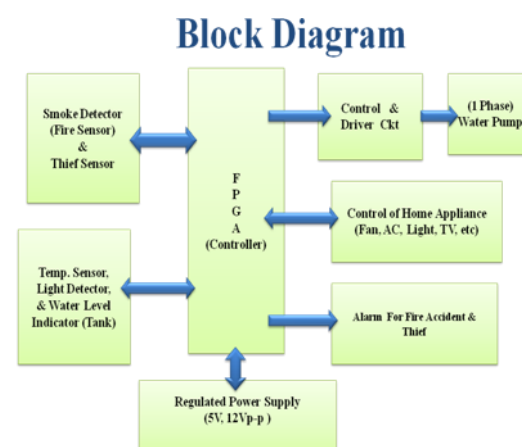
Circuit diagram:

Fig.1

Working:

A block diagram of implemented system is shown in figure 1. For this circuit we require 5v power supply. The system works as a remote sensing for the electrical appliances at home to check whether it is on or off. The FPGA is the heart of the system which is connected to the different type of sensors smoke detector, temperature sensor, gas sensor, light dependent sensor. ADC(analog to digital convertor) is connected to different sensor as a input. When the sensor sense some change, as per logic present FPGA control circuits is work and the operation of respective home appliances is control. Then this data is converted into digital logic which will present at data pins of ADC(D0-D7). zener is connected between ADC and FPGA. Because FPGA require 3.3v and at the output of ADC we get 5v.According to condition we made in

program and after detecting any change in input sensors output will change. At the same time the FPGA is connected to the controlled devices like fan, buzzer, light bulbs through relays for switching. According to conditions device will run through relays. In this way the system will work.

Result: VHDL test bench were designed to test all the end at top level developed VHDL code both at block level before downloading the synthesized code on the FPGA. the waveform were checked to verify correct operation, both states and timing, of the hardware.
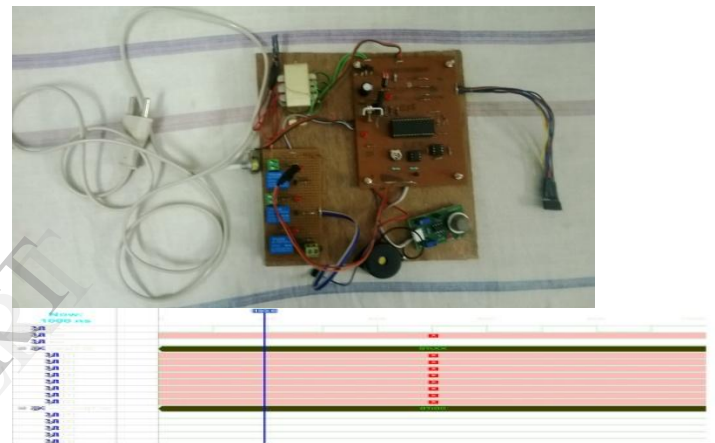
Conclusion:

The implementation of home automation and security system using FPGA is achieved. In this paper we introduce different sensor and control system using FPGA. This system is suitable for monitoring home as well as controlling and sensing with the help of various controlled devices. The system has been implemented and hardware is programmed by VHDL language and xilinx spartan3 FPGA. At the output , the operation of fan, light, buzzer and IR sensor process that the circuit has been simulated and verified the correct result and the working operation of the system.

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