

# STUDY OF AUTOMATED HOME SECURITY SYSTEM USING FPGA.

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**Abstract**-Technology Advancement has made the implementation of various systems within our home.The demand for smart home automation with low cost is best idea to get our home automated. In this paper we are going to present you the Basic idea of project using FPGA through wired media. In this System, home appliances can be controlled and secure home from fire accidents and theft.

**Index terms**- Home automation, FPGA(field programmable gate array), VHDL.

## INTRODUCTION

The home automation and security system makes human life more comfortable and secure. With the help of recent technology, the control over home appliances will be possible. Monitor and control of home devices are done by using wired and wireless network in. The main controller is FPGA. Which will programmed by VHDL Language by using xilinx9.1 software. For detection various sensors are used. By which user is able to get alarm in case of emergency.ADC is also playing very important role in system to convert analog data to digital because fpga can understand digital bits. Various sensors like temperature sensor IR sensor, LDR used in project.

## COMPONENT USED

### Sensors

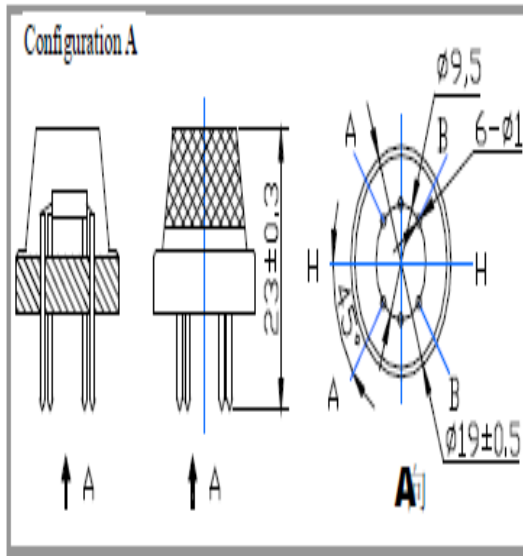
#### MQ5 GAS SENSOR

#### FEATURES

High sensitivity to LPG, natural gas.  
Smoke Fast response.  
Stable and longlife.  
Simpledrive circuit.

#### APPLICATION

This sensor used in gas leakage and detecting systems in family and industry, are suitable for detecting ofLPG, natural gas, town gas, avoid the noise of alcohol and cooking fumes and cigarette smoke.



## SENSITIVITY ADJUSTMENT

Resistance value of MQ-5 is different to various kinds and different concentric gases. So while using such components, sensitivity adjustment is very essential. It is recommended that you calibrate the detector for 1000ppm H<sub>2</sub> or LPG concentration in air and use a value of Load resistance (RL) about 20 K $\Omega$  (10K $\Omega$  - 47K $\Omega$ ). When accurately measured, a proper alarm point for the gas detector should be determined after considering the temperature and humidity influence.

## Temperature sensor-LM35

### DESCRIPTION

The LM35 series are precision integrated circuit temperature sensors with an output voltage linearly proportional to the centigrade temperature. Thus LM35 has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient centigrade scaling.

### Features:

1. Calibrated directly in degree Celsius.
2. Rated for full -55° C to +150° C range.
3. Suitable for remote application.

Operates from 4 to 30V

### SPECIFICATIONS

#### A. Standard work condition

Symbol	Parameter name	Technical condition	Remarks
V <sub>c</sub>	Circuit voltage	5V±0.1	AC OR DC
V <sub>H</sub>	Heating voltage	5V±0.1	AC OR DC
P <sub>L</sub>	Load resistance	20K $\Omega$	
R <sub>H</sub>	Heater resistance	31±10%	Room Tem
P <sub>H</sub>	Heating consumption	less than 800mw	

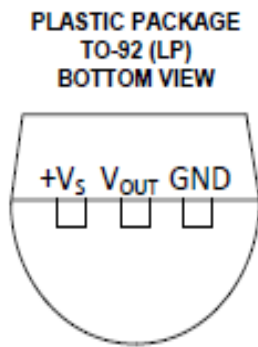
#### B. Environment condition

Symbol	Parameter name	Technical condition	Remarks
T <sub>ao</sub>	Using Tem	-10°C - 50°C	
T <sub>as</sub>	Storage Tem	-20°C - 70°C	
R <sub>H</sub>	Relative humidity	less than 95%Rh	
O <sub>2</sub>	Oxygen concentration	21%(standard condition) Oxygen concentration can affect sensitivity	minimum value is over 2%

#### C. Sensitivity characteristic

Symbol	Parameter name	Technical parameter	Remarks
R <sub>s</sub>	Sensing Resistance	10K $\Omega$ - 60K $\Omega$ (5000ppm methane)	Detecting concentration scope: 200-10000ppm LPG, LNG Natural gas, iso-butane, propane Town gas
$\alpha$ (5000ppm/1000ppm CH <sub>4</sub> )	Concentration slope rate	≤0.6	
Standard detecting condition	Temp: 20°C ± 2°C Humidity: 65% ± 5%	V <sub>c</sub> : 5V ± 0.1 V <sub>H</sub> : 5V ± 0.1	
Preheat time	Over 24 hour		

#### D. Structure and configuration, basic measuring circuit



- Automatic Headlight Dimmer
- Night Light Control
- Oil Burner Flame Out
- Street Light Control

### Light dependent resistor-

LDR is acronym for light dependent resistor is a resistor whose resistance depends on light. The resistance of LDR is of order of mega ohms in absence of light it reduce to few mega ohms in presence of light. Then light will on. The resistance of LDR will be high in absence of light hence Light will not glow.



Two cadmium sulphide(cds) photoconductive cells with spectral responsessimilar to that of the human eye.

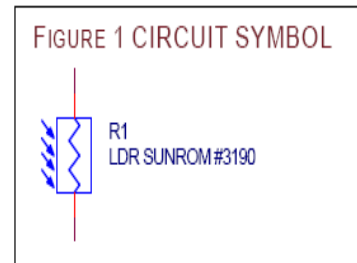
### Applications-

Applications of LDR are as follows

#### Analog application

- Camera Exposure Control
- Auto Slide Focus - dual cell
- Photocopy Machines - density of toner
- Colorimetric Test Equipment

### Digital Applications-



### Sensitivity

The sensitivity of a photo detector is the relationship between the light falling on the device and the resulting output signal. In the case of a photocell, means dealing with the relationship between the incident light and the corresponding resistance of the cell.

### Guide to source illuminations

Light source Illumination LUX

Moonlight 0.1

60W Bulb at 1m 50

1W MES Bulb at 0.1m 100

Fluorescent Lighting 500

Bright Sunlight 30,000

### IR SENSOR

The IR object detection module is quiet easy to implement. The circuit shown below is a low cost / low range. In this circuit a photodiode and IR LED is used to make a circuit. IR led is nothing but regular LED that you usually see in Television

Remote controls. The Main concept is simple, the IR led keeps transmitting IR infrared rays up to some range (there is a potentiometer also in the design with the help of which you can alter the range). If any object comes between IR infrared ranges, the IR waves hits the object and returns back and the Photo diode detects that IR rays and works as sensor.



### Main controller:-FPGA

A FPGA or field programmable gate array is an integrated circuit designed to be configured after manufacturing hence it is called as field programmable. Fpga contains programmable logic components. Infpga logic blocks are also include memory elements. The fpga has definite advantage that it can be programmed or updated by the user at sight for which the recurring cost remains insignificant in reference to an ASIC design.

### ADC0808/ADC0809

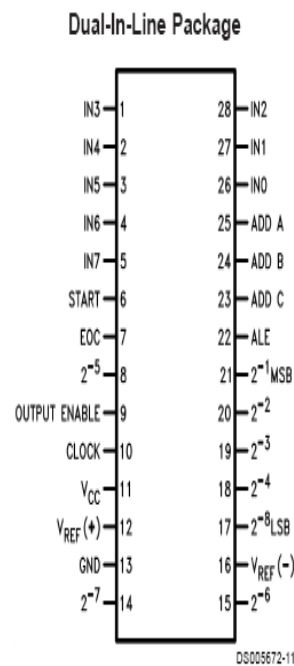
The ADC0808, ADC0809 data acquisition component is a monolithic CMOS device with an 8-bit analog-to-digital converter, 8-channel multiplexer and controller compatible control logic. It uses successive approximation as the conversion skill.

### Features

- Operates at the ratio of 5 VDC or analog span adjusted voltage reference.

- It has 8-channel address logic with multiplexer.
- input range is 0V to 5V with single 5V power supply
- It is available in 28 pin standard DIP package.
- 28-pin molded chip carrier package.

### PIN DIAGRAM OF ADC



Order Number ADC0808CCN or ADC0809CCN  
See NS Package J28A or N28A

### Conclusion:

The study of home automation and security system using FPGA is studied. In this paper we have 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 is designed is programmed by VHDL language and Xilinx spartan3 FPGA.

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