

LABVIEW based Smart House Control

Arth Patel¹, Kalpesh Chudasama², Ravi Patel³ and Shreyas Patel⁴

^{1,3,4} Student, Department of electrical engineering, ADIT,
Gujarat, India

² Associate Professor, Department of electrical engineering,
ADIT, Gujarat, India

Abstract

Safety systems is a vital component in the protection from hazards. In smart house control system a safety system can be designed as a single control unit which includes detection of hazardous parameters using sensor like smoke detection, LPG leakage detection, motion detection, temperature monitoring etc. A smart home is one that is equipped with lighting, heating, and electronic devices and its protection. This paper proposed a LabVIEW based smart house control. The program for smart house monitoring and control is designed using LabVIEW and DAQ card. In our project, we use NI 6008 DAQ with LabVIEW interfacing. Different sensors like MQ-6, MQ-2, LM35 and PIR are used to sense LPG, smoke, temperature, and motion detection. This work involves measuring and monitoring of all these parameters using virtual instrumentation-LabVIEW. When the smoke or LPG level is higher than the rated value, the buzzer will remind us to look upon that by monitoring it. Likely the temperature sensor will sense the room temperature and system can give output based on the temperature. By the use of PIR sensor internal and external lighting can be operate.

Keywords: home automation, LabVIEW, Data Acquisition Card (DAQ card), sensors

1. Introduction

Now a days Home automation play an important role in our lives. Home automation become necessary for protection purpose as well as a comfort for our lives. Smart home is a home which can work smartly and precisely. Benefit of a smart home is a power consumption is also a less and a security of our home is improved.

Whonis et al in [1] proposed remote controlled smart home with LabVIEW software and microcontroller. Akshatha et al in [2] proposed smart home control using labview software only. Basil Hamed proposed work using labview PIC16F877A, data acquisition

card, remote control. Nathan et al in [4] proposed smart house control using Android Smartphone, Arduino. Rituparna et al in [5] proposed work with Arduino as a master control.

Here on we come up with an idea to comfort our lives. The remedies can be an automatic and smart system. We make a system which can measure the Real time data from a different Sensors and according that data its take a decision. Various system like a gas leakage indication, fire indication, temperature based system. Software which we are used for programming is a LABVIEW. For interfacing a sensors with a software we used a DAQ card. Various sensors like MQ-6, MQ-2, PIR, and LM35 are used in this system. We can connect all the sensors with a DAQ card and by using a laptop we can control and monitor all the sensors. In LABVIEW we done graphical programming. Graphical programming is a quite easy to program and benefit of LABVIEW software is we can easily interface it with a DAQ card. In different application like CO2 level detection, Fire detection and many more Laboratory Virtual Instrument Engineering Workbench (LabVIEW) is a system-design platform and development environment for a visual programming language from National Instruments. LabVIEW can monitor different sensor output at a same time easily with a single computer. For use of this software the computer must have high performance such as Laptop. When we started looking for the literature and research paper we came up with an idea of INTERFACING OF LabVIEW WITH DAQ CARD. The DAQ card is very high performance device in which we can monitor six numbers of sensors as a same time.

2. Materials and Methods

• LabVIEW:

Full name of lab view is laboratory virtual instrument engineering workbench. Which is made by national instruments. It is similar like MATLAB. Means it is also graphical programming language some kind of function are in lab view is,

- **Smoke sensor (MQ-2):**

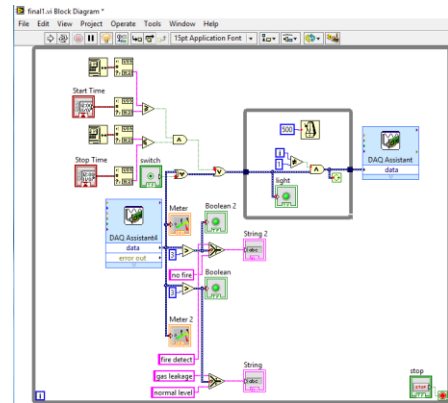
- The sensitive material of this sensor is SnO₂, which has lower conductivity in clean air.
- It detects fire in terms of smoke.

Features:

- It is highly sensitive to smoke and also so me gases.
- It has long life.
- It is also low in cost.
- Simple drive circuit.



(Figure: 5 MQ-2 Sensor)



(Figure: 6 main VI sheet of smart house controlling)

3. Results and Discussion

Overview of coding:

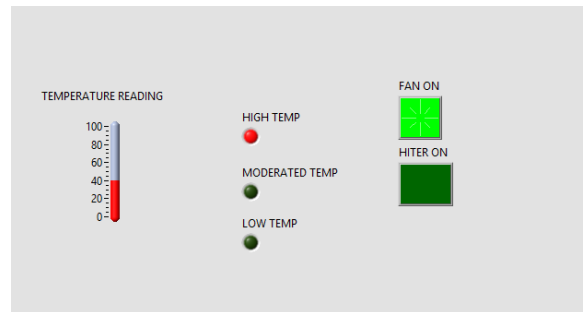
- The GUI coding for this project is developed in the block diagram as shown in fig 6 using Labview front panel.
- It has been developed for sensing different parameters like temperature, smoke, LPG and motion
- Lab VIEW uses the dataflow programming where the flow of data through the nodes and wires on the block diagram determines the execution order of the functions and VI's.
- The block diagram contains the coding and graphical source code which is also known as G code.

- The working of this system starts with the electrical analogue input sensing of the sensor. They sense temperature, smoke, LPG and motion using sensors by interfacing NI 6008 daq card.

- **Temperature:**

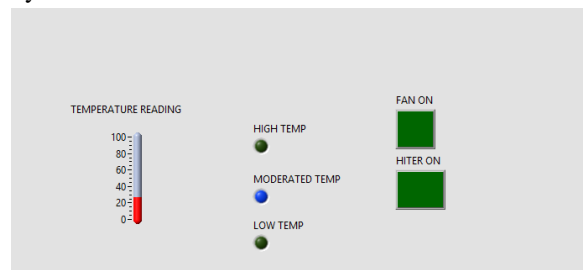
Temperature is continuously sense by LM35, we can monitor it and also control it by LabVIEW. Maximum and minimum temperature limit is set in programming. There will be 3 condition we can observe for the temperature which are:

- When the temperature cross the maximum limit it will indicate by HOT condition and RED LED on and also fan can be made on if used.



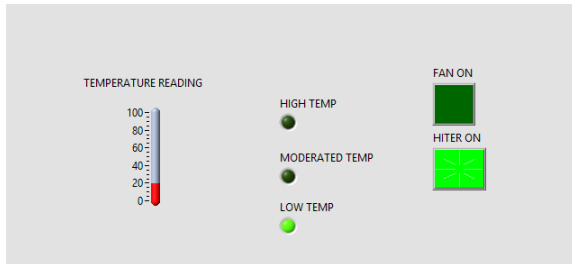
(Figure: 7 Control Panel for Temperature Monitoring at high temperature)

- When temperature is below limit it will indicate by BLUE LED and it will be COOL.



(Figure: 8 control panel for temperature monitoring at moderated temperature)

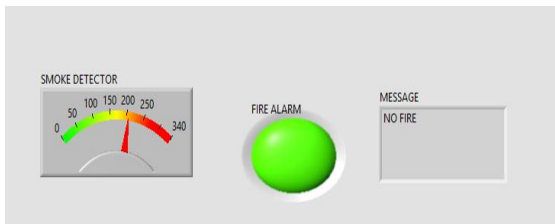
- When temperature is in between maximum and minimum limit it will be MODERATE and it will be indicate by GREEN LED.



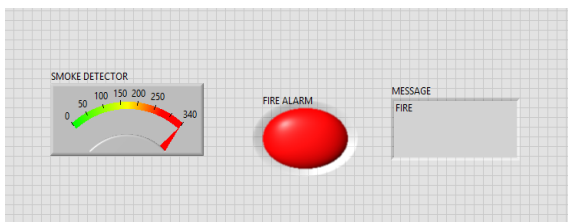
(Figure: 9 control panel for temperature monitoring at low temperature)

➤ **Smoke:**

when smoke is sensed due to fire or any other reason, sensor will sense and when the value will exceed the threshold limit led glow and buzzer can also be operate.



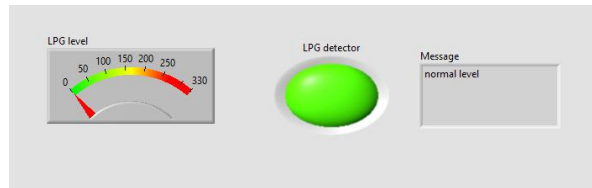
(Figure: 10 control panel of smoke sensor when level under limit)



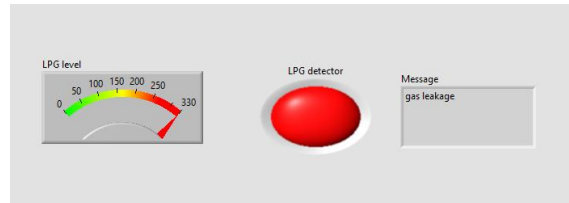
(Figure: 11 control panel of smoke sensor when level beyond Limit)

➤ **LPG:**

Now, when LPG is sensed due to gas leakage or any other reason, sensor will sense and when the value will exceed the threshold limit it will ON the buzzer and shown in display.



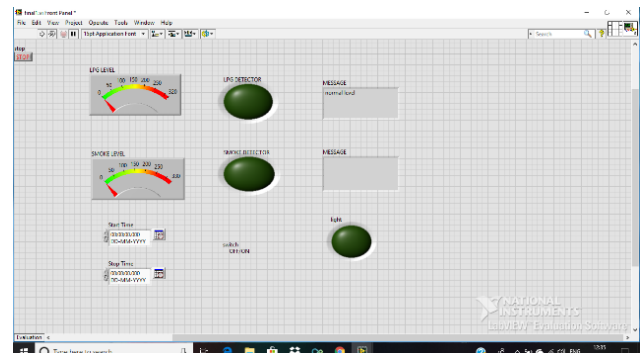
(Figure: 12 control panel of LPG sensor at regular condition)



(Figure: 13 control panel of LPG sensor when leakage occur)

- Below image shows the front panel of the LabVIEW and the results of all four sensors.

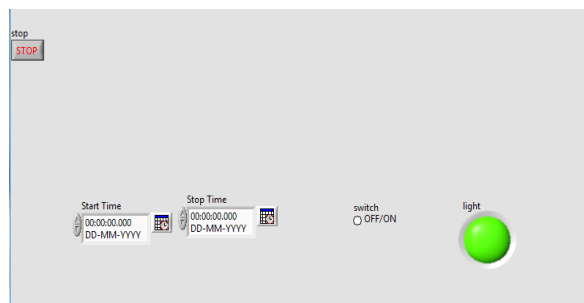
Sensors	value
Room Temperature	32 centigrade
Smoke level	330 PPM
LPG level	320 PPM



(Figure: 14 control panel for all the sensors at same time)

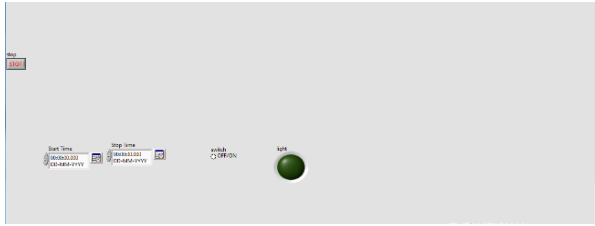
➤ **PIR:**

When PIR is sensed some motion in the room it will turn on the light at a desire time.



(Figure: 15 control panel for PIR sensor when it sense motion)

when PIR sensed no motion for a define time then it will turn off the light.



(Figure: 16 control panel for PIR sensor when it sense nothing)

4. Conclusions

In this work the sensor are connected through one control unit that is Data Acquisition Card (DAQ card). The control and monitoring of the sensor done by the LabVIEW. This system is reliable to user to do different type of automation.

By use of different sensor for the different purpose the user get more comfortable and fill safety from different hazards like gas leakage, fire and the security level of the house is

increase. On based on the sensor reading the system get desired output and control different parameter.

References

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