SIMPLE SECURITY SYSTEM USING ARDUINO AND SENSORS

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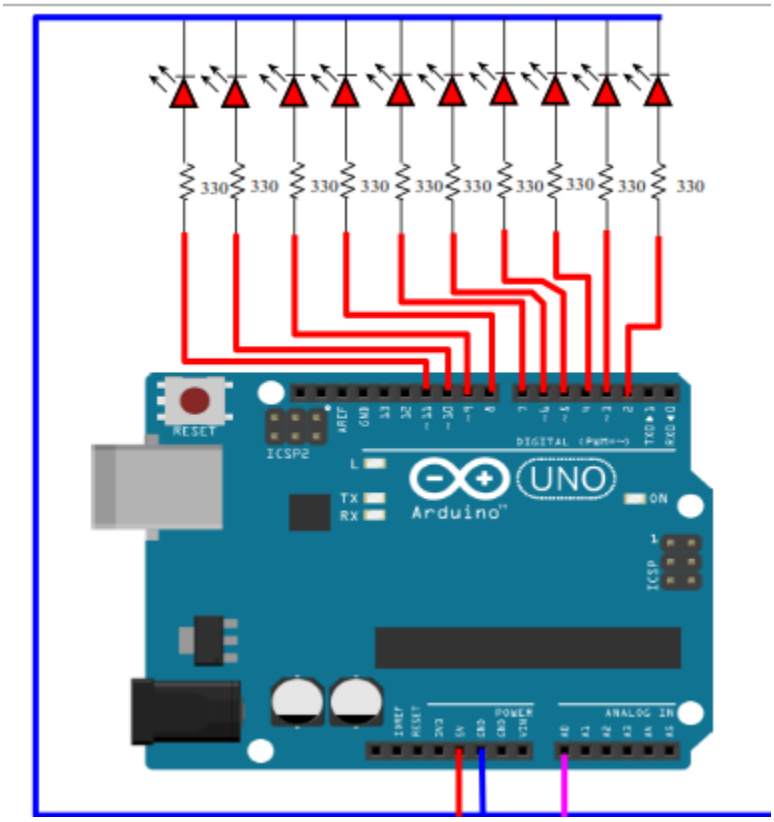
Abstract

This report “Simple security system using Arduino and sensors” aims to discuss how the project is made, the tools and components we used, the concept behind making this project. The project is about how to use microcontroller (ARDUINO) and attached sensors to detect the surrounding environment and keep the place secure.



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1 Introduction

Our project tries to make a simple security system using sensors like temperature sensor(lm-35), gas sensor(MQ-2) and PIR to detect motion of who enters the system(room).
there are several systems like museums and labs which need to be secured, this system simplify how it can be done.

1.1 Problem statement

Our main goal is to use the sensors to indicate the environment change and act upon these reads, we act using Arduino controller to read these signals and output what we desire to warn, suck smoke and cool the temperature based on detections.

1.2 Meta behind the project

To apply what we studied in the course, Feel the meaning of a system and how to control it, create new systems and know how to execute them.
To know how to use sensors (reading, sensitivity and accuracy) and use controller and how to code it using its IDE and attach it to LabVIEW to control using computer.

2 System design

Designing a system is a four stage process:

- Choosing the circuit that we need to apply our project.
- Using an electronic design tool (protues and EAGLE).
- Attach components to TESTBOARD and Arduino.
- PCB and soldering components and Arduino.

2.1 Choosing circuit

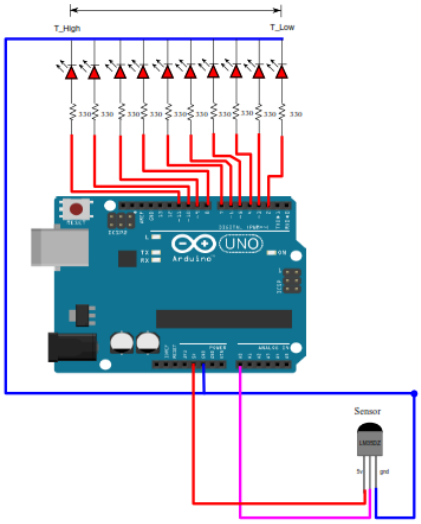

Figure 1 - Choosing circuit

We added to this circuit a PIR sensor and a blinking LED and MQ-2 and a fan to suck the gas.

2.2 Electronic design tool and PCB

To simulate our project we used LabVIEW and protues to assure that our circuit works correctly.

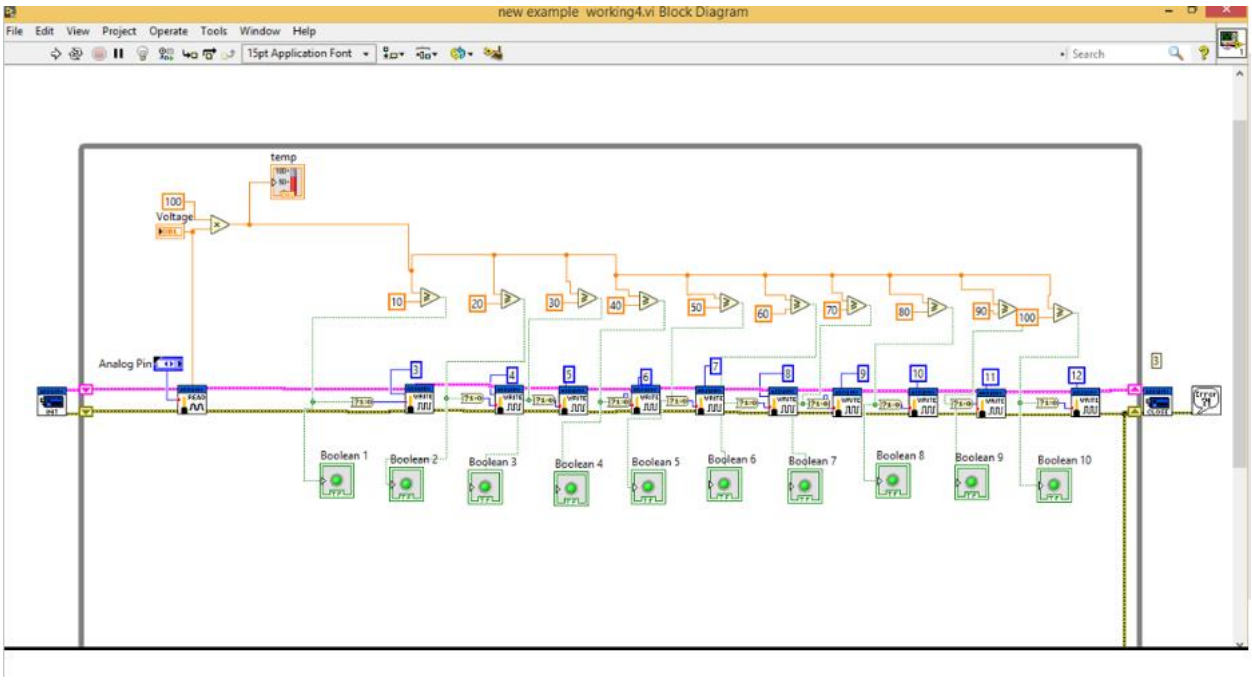

Figure 2 - labVIEW vi

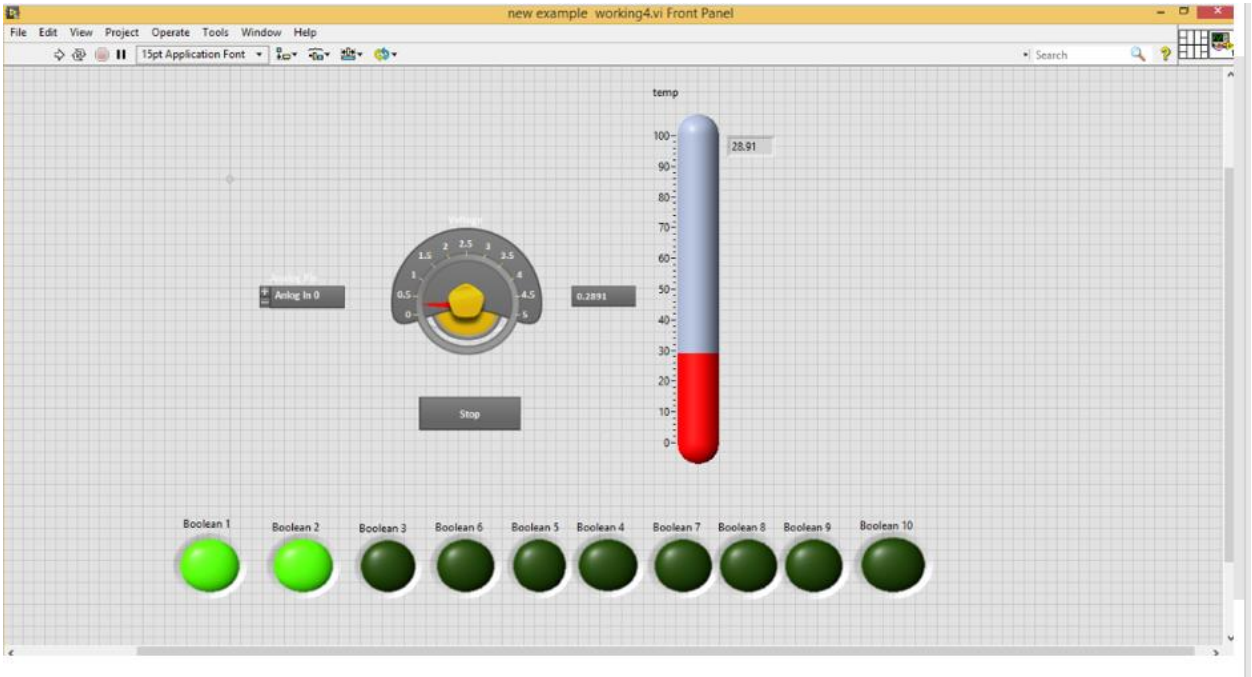

Figure 3 - labVIEW app

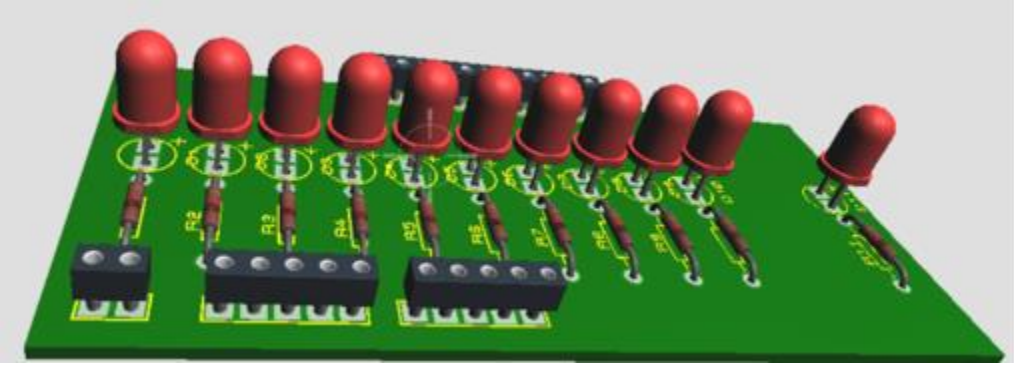

Figure 4 - 3d PCB

2.3 TESTBOARD

We attached the components to the testboard to test our project before soldering to PCB and it worked fine. See videos in references file.

2.4 PCB and attaching it to makit

Makit is a way to simulate a simple project of what can be done in real life. We used it to make a small security system that serves our goal.

3 Components

3.1 Sensors

3.1.1 PIR sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.

PIRs are basically made of a pyroelectric sensor (which you can see above as the round metal can with a rectangular crystal in the center), which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted. The sensor in a motion detector is actually split in two halves. The reason for that is that we are looking to detect motion (change) not average IR levels.

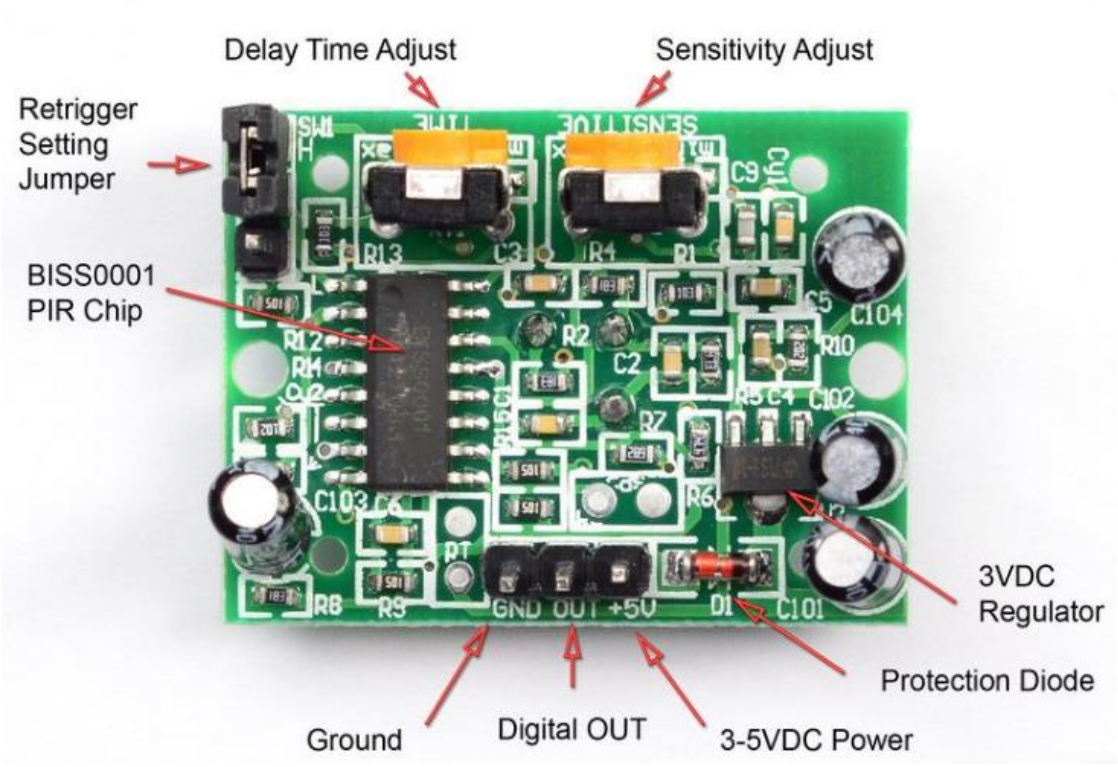

Figure 5 - PIR circuit

3.1.1.1 How it works

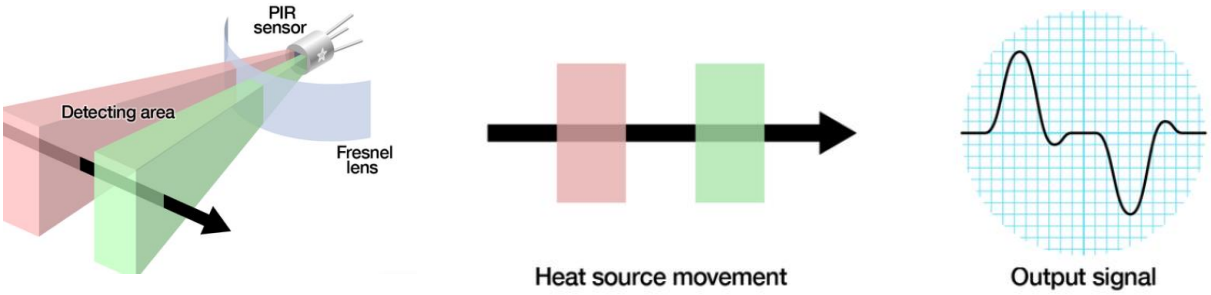

Figure 6 - How PIR works

3.1.2 LM-35 temperature sensor

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in˚ Kelvin

We used zd which range from 0 to 100 and -20 to 150.

It works from 2.2 to 30v

Figure 7 - LM-35

3.1.3 MQ-2 gas sensor

Gas Sensor(MQ2) module is useful for gas leakage detection (home and industry). It is suitable for detecting H2, LPG, CH4, CO, Alcohol, Smoke or Propane. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible. The sensitivity of the sensor can be adjusted by potentiometer.MQ-2 is used for Combustible Gas, Smoke. It works from 4.9 v to 5.1 v

Figure 8 - Gas sensor

3.2 Other components

3.2.1 Motor

Motor is used to suck smoke.

3.2.2 LEDS

For temperature and motion detection.

3.2.3 Wires

To connect components.

Component	Price
PIR	50
MQ-2	45
LM-35	17
LEDs	10
PCB	10
Others	25
TOTAl	167

Figure 9 - List of components

4 How the system is controlled?

We use the controller Arduino to control the system using code and another system using LabVIEW so code in Arduino and blocks in LabVIEW is the main controller here

To see the code, see the references.

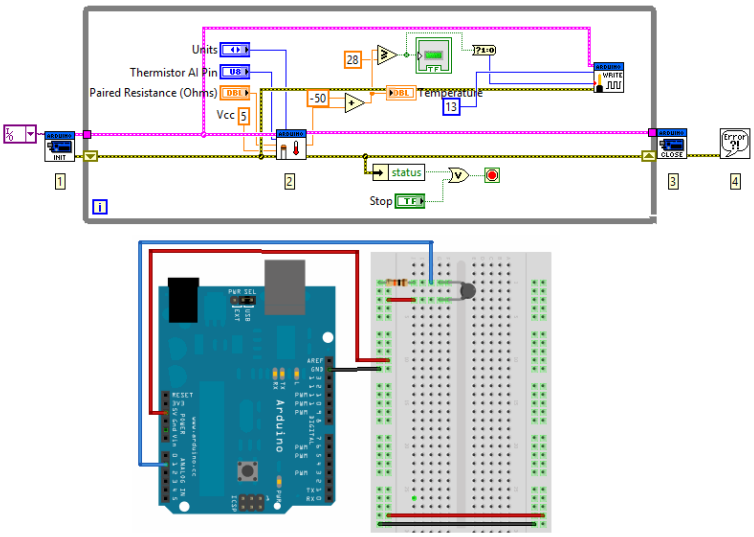

Figure 10 - System control

5 Reference

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http://www2.ece.ohio-state.edu/~passino/LM35.pdf

http://www.ti.com/product/LM35

http://wiki.seeed.cc/Grove-Gas_Sensor-MQ2/

Handbook of Modern Sensors Physics, Designs, and Applications

Modern Sensors Handbook