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#### A Low-Cost Arduino-Based Home Security System

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# **Arduino Based Home Security System**

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## Introduction

#### Project Progress and Results

Home security is important for every family, especially for the family which lives in a big house. Because the house is much bigger than an apartment or dorm, it is hard for the owner to notice if someone is intruding into their house. On the other hand, the home security systems in the market are expensive. To solve this problem, a low-cost home security system is proposed in this project

The control functions are implemented in Arduino, an opensource computer hardware, and software platform. Arduino has a user community that designs and manufactures singleboard microcontrollers and microcontroller kits for building digital devices and interactive objects. This project is still under progress. Figure 2 shows the related information is shown in the LCD display. Once the indoor temperature is higher than a setting temperature, the indoor alarm will also ring for potential fire alarm. The LCD will also show "Abnormal Detected" once a stranger is detected. Figure 3. shows the sample code for the LCD implementation and the results from TMP007. Figure 4. is a sample photo which was taken by the Mini-Spy camera.

/dev/cu.usbmodem1441 (Arduino/Genuino Uno)	
Send	
Object Temperature*: 20.69*C C*: 0.00*C	
Humidity: 18.50 %, Temp: 19.90 Celsius Object Temperature: 20.66*C	
Object Temperature*: 20.62*C C*: 0.03*C	
Humidity: 18.80 %, Temp: 19.90 Celsius Object Temperature: 20.62*C	

In this security system, thermopile sensors are used. Once a stranger is near the building, sensors will catch the signal and an indoor buzzer will ring and a mini spy camera which is connected to the system will be turned on. If the person still stands near the building after a certain duration set by the user, an outdoor alarm will ring. The owner can check the situation by the connected camera and decide any further actions.

### System Design

Figure 1. shows the block diagram of the whole system. The prototype included two types of sensors (DHT22 and TMP 007). Temperature & Humidity Sensor DHT 22 works on collecting the environment information of the house. The DHL22 humidity sensor will detect current humidity and temperature in the house, and display both humidity and temperature on the 1.8" TFT LCD screen. It can also make fire alarm if the indoor temperature is abnormal.

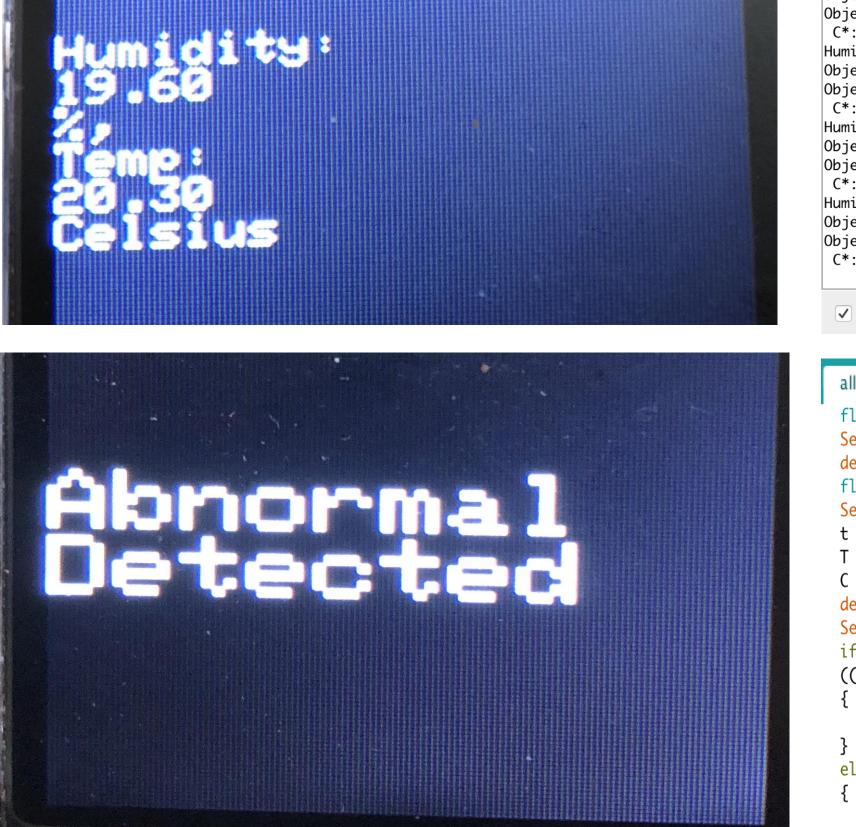


Figure 2. LCD Display Sample Results

#### Object Temperature\*: 20.62\*C C\*: 0.00\*C Humidity: 18.80 %, Temp: 19.90 Celsius Object Temperature: 20.59\*C )bject Temperature\*: 20.56\*C lumidity: 20.10 %, Temp: 19.90 Celsius Object Temperature: 22.53\*( Object Temperature\*: 22.62\*0 Humidity: 19.30 %, Temp: 19.90 Celsius )bject Temperature: 22.25\*( Object Temperature\*: 21.94\*0 C\*: 0.31\*C 9600 baud Autoscroll all\_3.0 § Adafruit ST7735.h DHT.h gfxfont.h float objt = tmp007.readObjTempC();

float objt = tmp007.read0bjTempC(); Serial.print("Object Temperature: "); Serial.print(objt); Serial.println("\*("); delay(4000); float objt2 = tmp007.read0bjTempC(); Serial.print("Object Temperature\*: "); Serial.print(objt2); Serial.println("\*("); t = objt; T = objt2; C = objt - objt2; delay(1); Serial.print(" C\*: "); Serial.print(C); Serial.println("\*C"); if ((C <= 0.15) && (C >= -0.15)) { noTone(10); } else { for ( x = 100; x < 3000; x++)</pre>

for ( x = 100; x < 3000; x++)
 tone (06, x, 3000);
delay(100); // play the tone</pre>

<text>

Figure 3. Sample Results and Sample Code

Figure 4. Sample Photo taken by the Mini-Camera

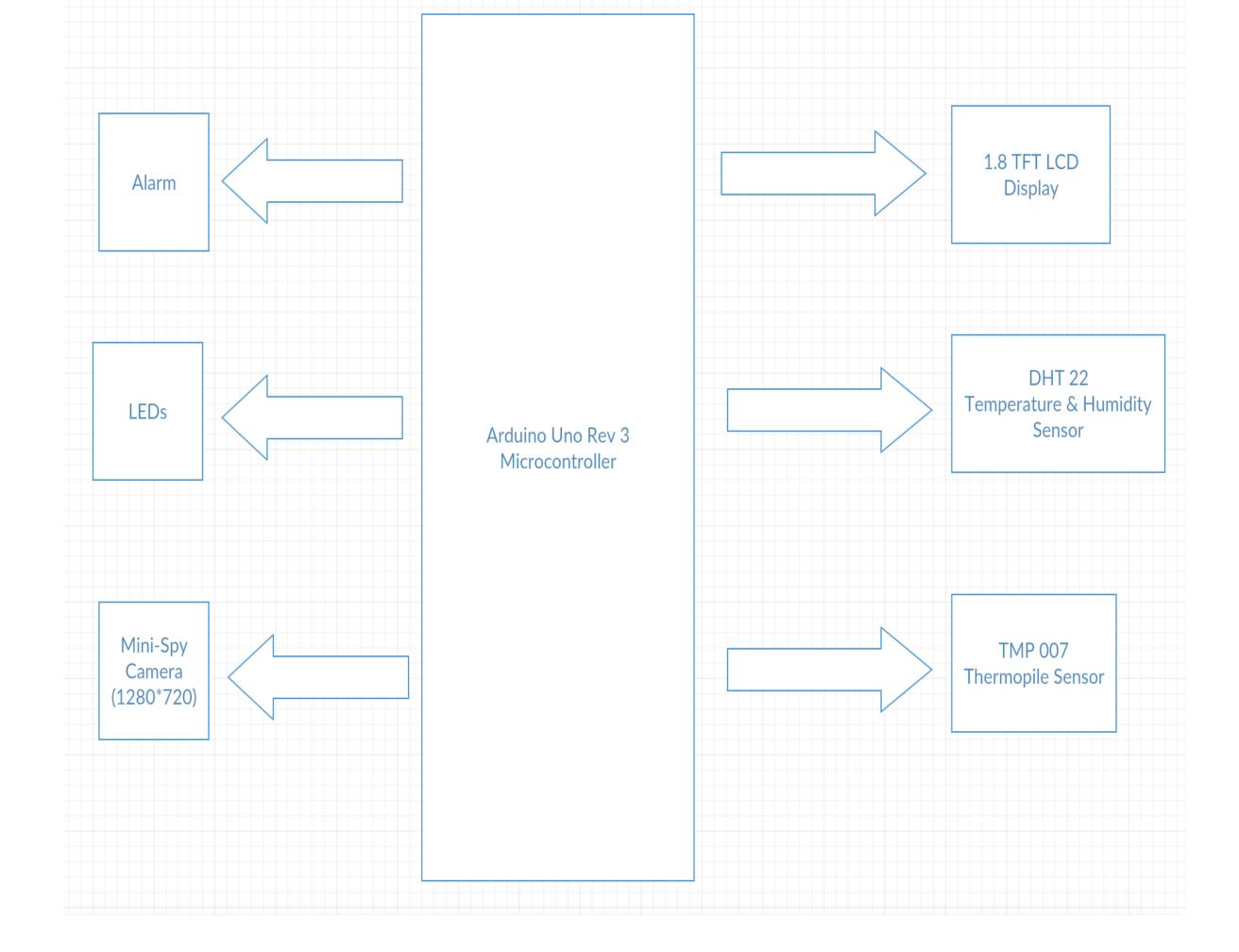
## **Conclusions and Future Plan**

This project aims to implement a cheaper, customized home security system. This project will keep updating in the future. More functions will be added. More powerful Microcontroller will be used in the future. In addition, wireless transmission will be added and the owner can control this system by his smartphone.

The thermopile Sensor TMP007 works on detecting if a person is presented in front of the door or windows. The sensors will detect object temperature every 4 seconds. Once a person comes near to the sensor, the object temperature will be changed rapidly. If the object temperature changes above a threshold for a given period, the alarm system will start.

Meanwhile, a mini spy-camera is controlled by Arduino board. Once a person is detected by TMP 007 sensor, the camera will take a photo and save it into the SD card. The LCD screen is set on the board to show the related information.

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**Block Diagram** 

Figure 1. System Block Diagram

#### References

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