University of Northern Iowa

UNI ScholarWorks

Apr 3rd, 11:00 AM - 1:30 PM

A Low-Cost Arduino-Based Home Security System

Qi Lu
University of Northern Iowa

Let us know how access to this document benefits you

Arduino Based Home Security System

Qi Lu
Department of Technology, University of Northern Iowa

University of Northern Iowa

University of Northern Iowa department of TECHNOLOGY

Introduction

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 open-source computer hardware, and software platform. Arduino has a user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects.

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.

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.

Acknowledgement
Thank CHAS GRASP for the support to this project.

Project Progress and Results

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.
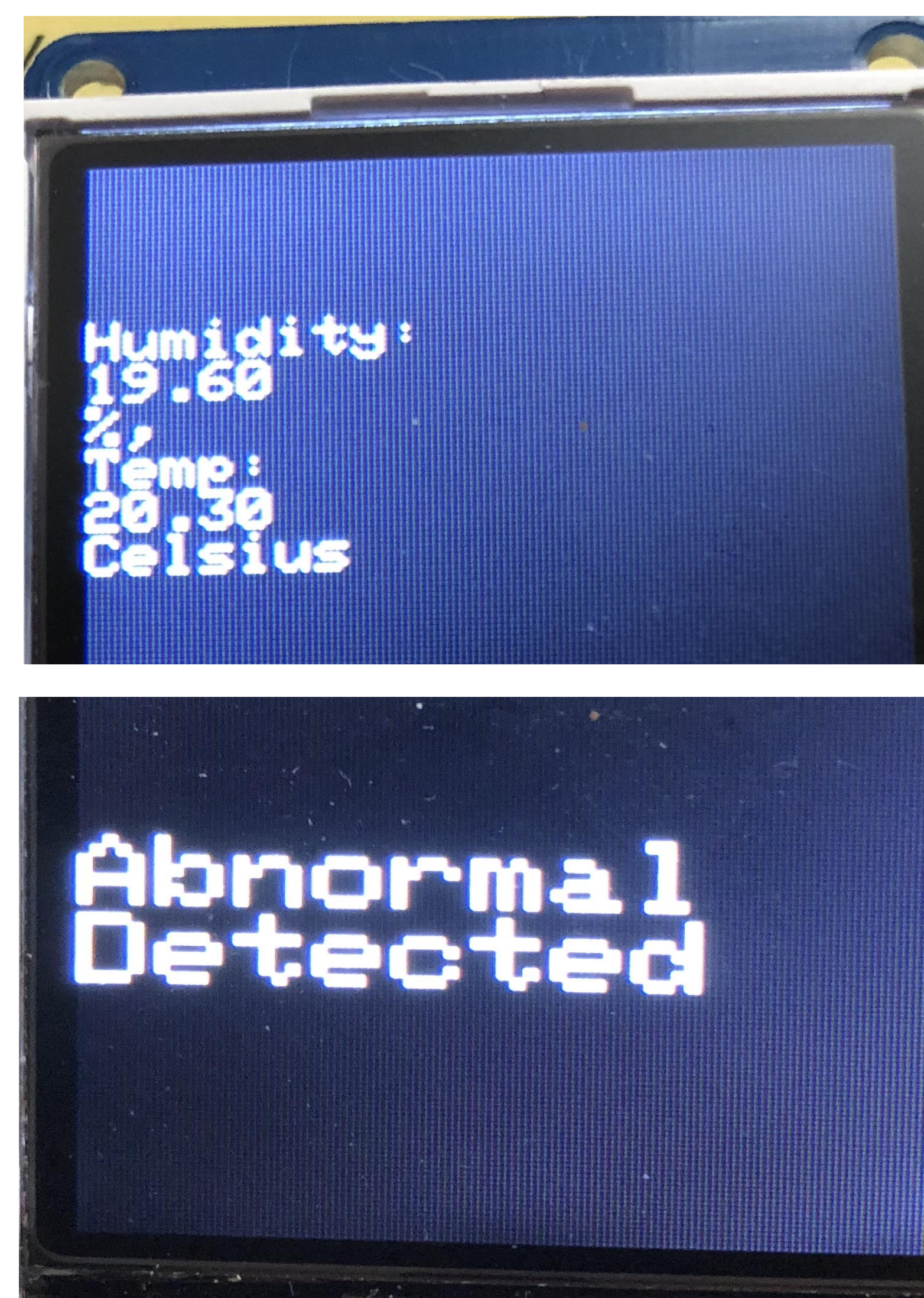
Figure 3. shows the sample code for the LCD implementation and the results from TMP007. Figure 4. is a sample photo which was taken by the Mini-Spy camera.
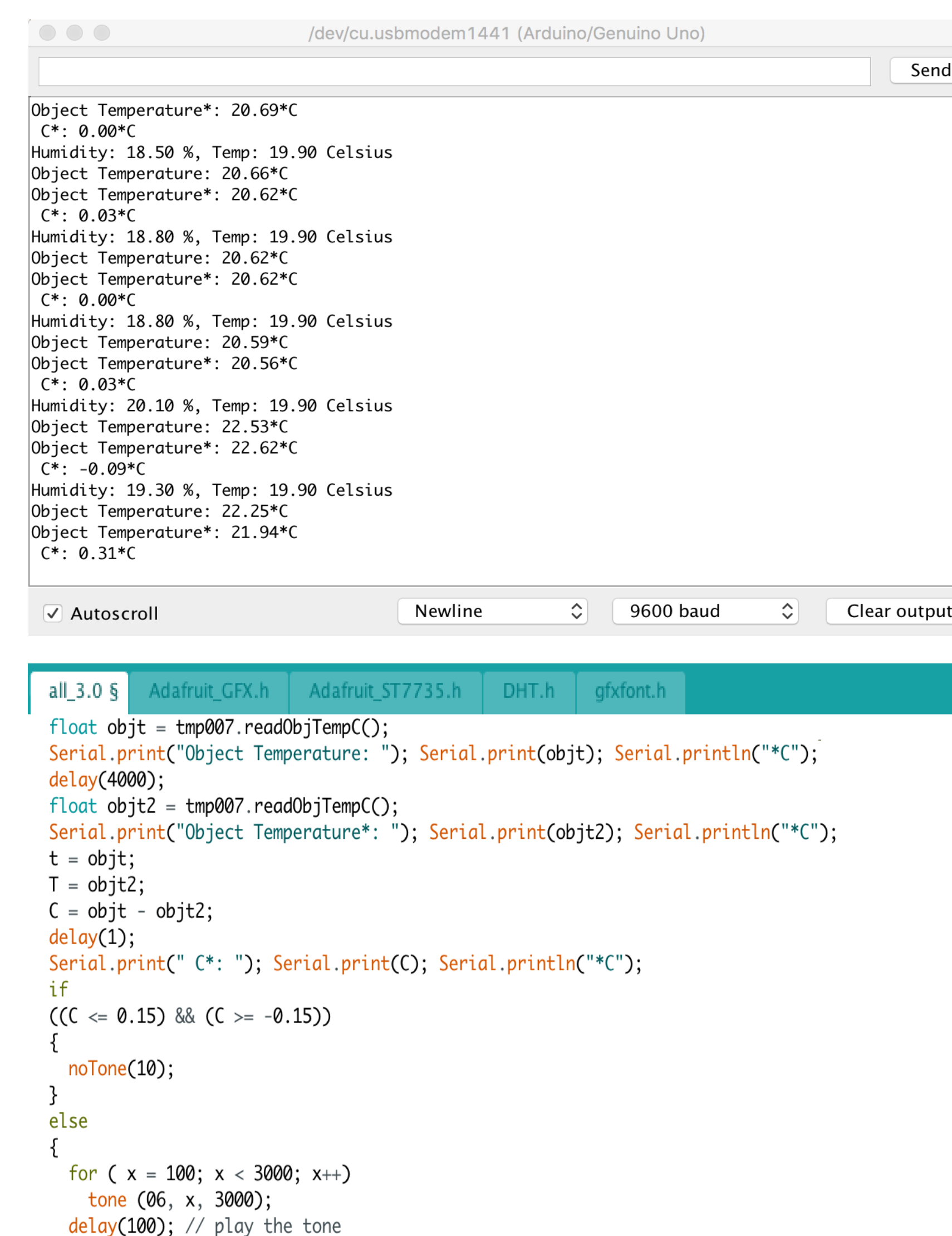

Figure 2. LCD Display Sample Results

Figure 3. Sample Results and Sample Code

Figure 4. Sample Photo taken by the Mini-Camera

Block Diagram

Alarm

LEDs

Mini-Spy Camera (1280*720)

Arduino Uno Rev 3 Microcontroller

1.8 TFT LCD Display

DHT 22 Temperature & Humidity Sensor
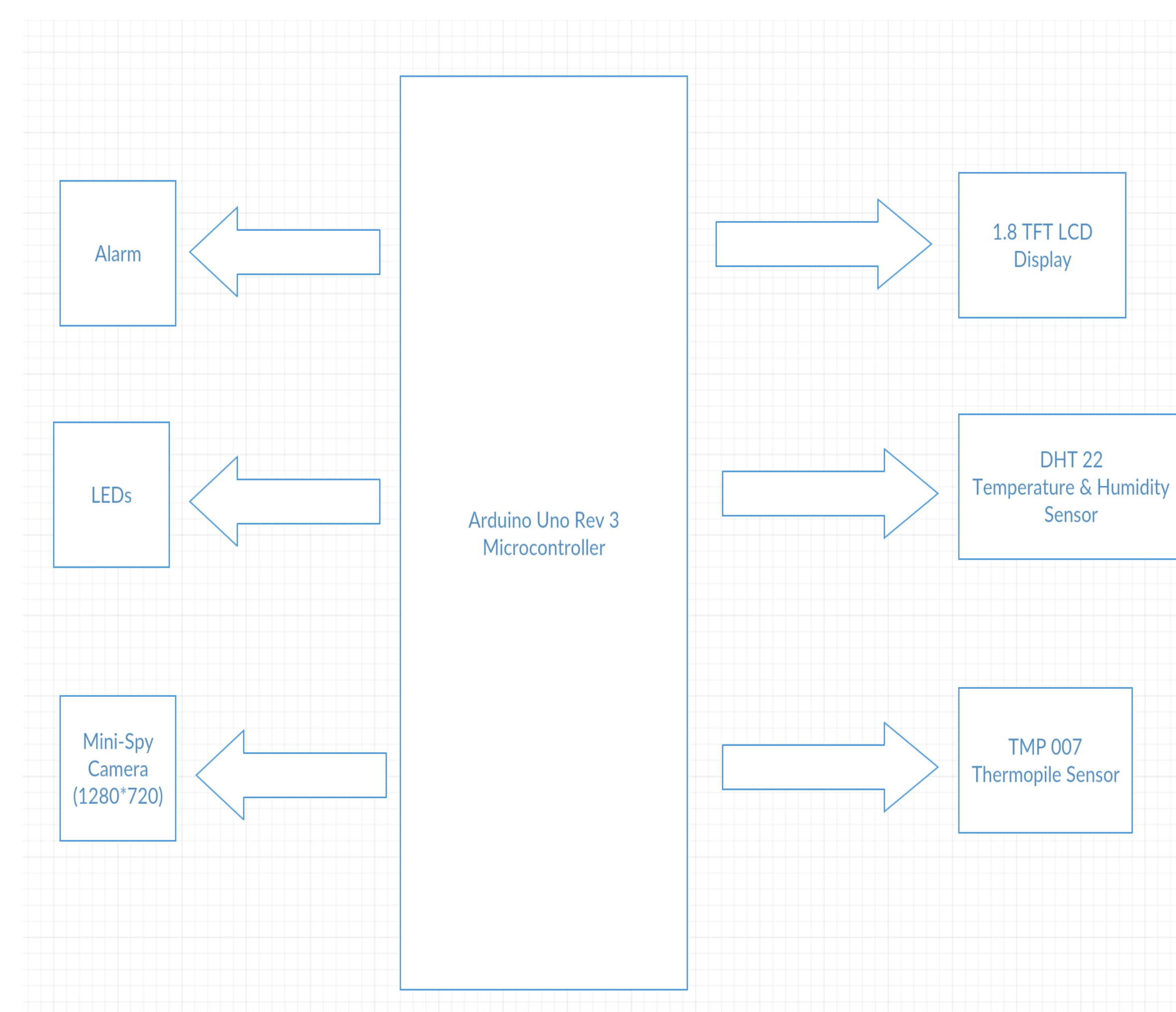
TMP 007 Thermopile Sensor

Figure 1. System Block Diagram

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.

References

Gabrielli, A., Mancini, L., Setia, S., & Jajodia, S. (2011). Securing Topology Maintenance Protocols for Sensor Networks. *IEEE Transactions on Dependable and Secure Computing, 8*, 450-465.
Rui Lin1, K. L. (2009). Self-adaptive Route Selection for DHT in Wireless Sensor Networks. *Frontiers in Neuroinformatics, 3*.