Security System Music Player

Milestone #3

Group members:

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- **Abstract idea of the project:** Today's modern anti-theft systems have evolved from much simpler systems, starting with the basic lock and key concept. Since the invention of this and other less complex safety mechanisms, a variety of high tech security devices have been produced, including RFID tags and biometric identification. However, users do not currently have the option to customize the security device they want, instead they have to choose from the devices currently available on the market. For Milestone 3, we want to introduce a customizable anti-theft product that will play the user's choice of music when the device detects a possible threat around user's home.

- **Detailed project ideas:**

1, Overall Description of Project Idea:

The central idea for our project is to develop a high level security system that will feature a customized sound alert system to disclose the presence of a potential threat. The mechanics of the system will function by playing music based on user's preference after the alarm is triggered by an outside threat. One of the main goals of this system is monitoring the user's safety in their home, protecting them from a variety of possible dangers. To get started, the user will first need to set up the system by selecting a list of audios to include into the system, then select a sequence for those audios to play when the system senses someone near the user's house. The audio can be a variety of songs, or simply a short sound clip.

2, Initial Project Design stating how multiple Arduinos will be used:

Since we have three members in our group, we plan on using at least three Arduino microcontrollers for this project. The three Arduino's will be connected to different appliances and devices to cover those threads. They will also be connected together using Bluetooth to send signals to each other. The actual communication between each Arduino will be discussed in the third section.

3, Expected Plan for Use and Communication between the multiple Arduinos:

For the project design, one Arduino will be connected to a motion sensor; the second Arduino will be connected to a static buzzer; and the last Arduino will be connected to a speaker. These devices are combined together and placed around the user's house. The touch sensor that is connected to the first Arduino will always be turned on, constantly listening for input. When the touch sensor detects someone near the house, it will send signal to the second Arduino for the static buzzer to start alerting the house by buzzing for 30 seconds. After 30 seconds, the touch sensor will then send a second signal to the third Arduino, thus triggering the speaker to play music. The music will be played continually until the user taps the pause button on the speaker or simply turns off the system and resets it to the original state so it can be used again next time.

4, Initial Project Design stating Expected Inputs/Outputs:

For the alarm, input devices like LCD, LEDs, sensors, buzzers, and potentiometer could be used to detect the threat, create an appropriate response, and print out a message to the LCD screen. For the music player, output devices would be a speaker and LEDs to indicate that the signal is on and start to play music. Input devices would be a microphone, custom knobs to change the shape/frequency/ amplitude of the wave, or even an iOS app to control the music player using BLE/Wireless.

5, Description of the original work being attempted by your project:

Typically, security systems such as fire alarms and theft alert systems are restricted in the number of available sound options, with one or two selections being standard. For our project, however, far more complicated sounds will be produced. We aim for our project's security system to work with no less than 20 different customized sounds. It is also capable of playing a full-length song.

- REQUIRED Supporting Materials:

1, Proposed timeline

+ Design Presentation of Project - 11/25/19

+ Project Demonstration - 12/2/19

+ Project Final Report - 12/4/19

+ Team Work Assessment - 12/6/19

2, List of Materials Expected to be Needed

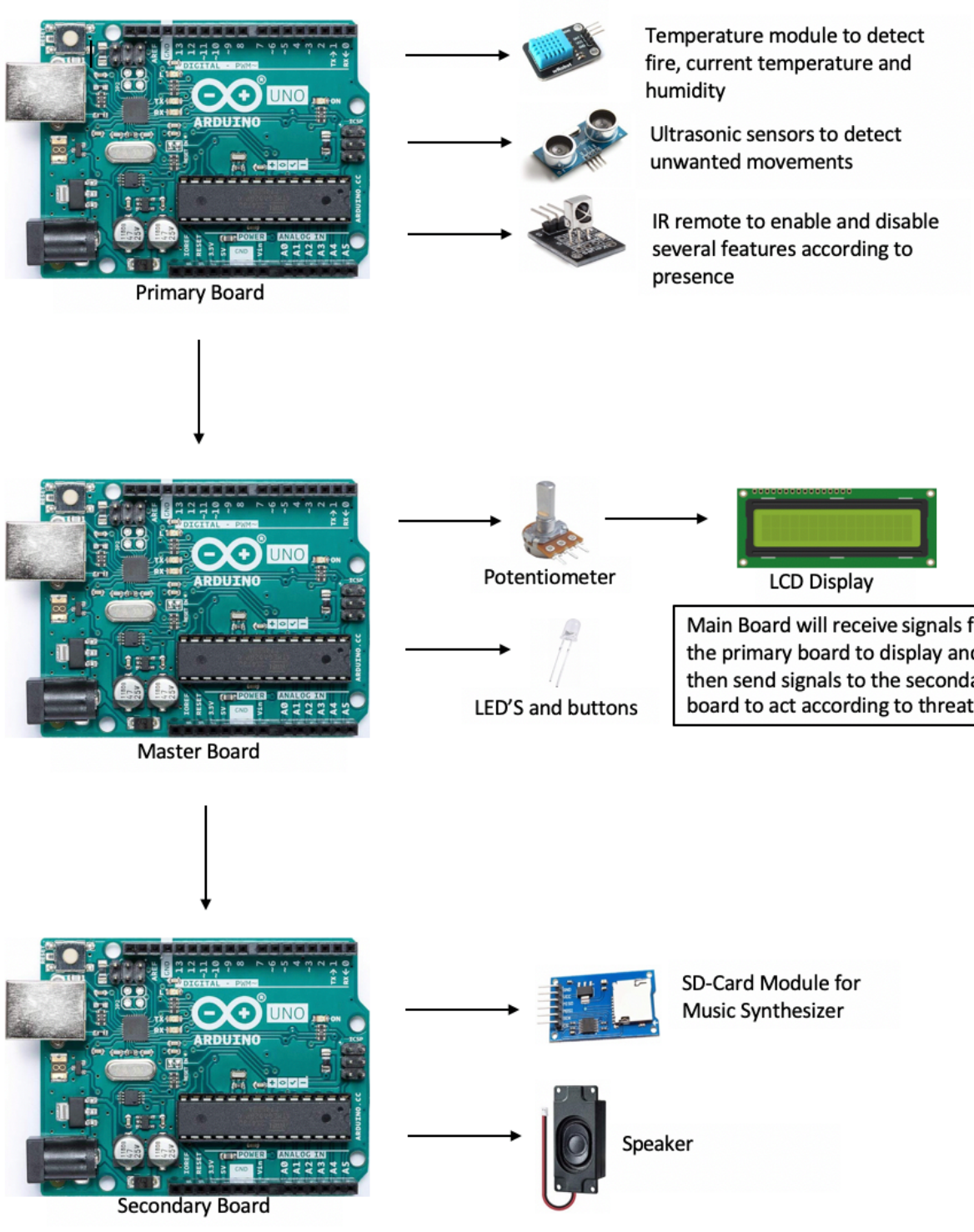
LCD, LEDS, motion sensors, buzzers, potentiometer, speaker, microphone, and custom knobs

3, List of References

- Arduino music player (https://circuitdigest.com/microcontroller-projects/arduino-audio-music-player)

- Arduino fire alarm (https://create.arduino.cc/projecthub/fradirosa00/arduino-fire-alarm-4da798)

4, Diagrams



5, Code

```
typedef unsigned int uint;

#include <LiquidCrystal.h>

static LiquidCrystal lcd(12, 11, 5, 4, 3, 2);

static const uint LCD_COLS = 16;

static const uint LCD_ROWS = 2;

static const uint BUTTON = 1


static const uint NUM_LEDS = 4;  // number of LEDs

static const uint LEDS[NUM_LEDS] = {8, 9, 10, 11};  // LEDs pin

static const uint BUZZER_PIN = 7;  // buzzer pin

static const uint POTEN_PIN = A0;  // potentiometer pin

static const uint PHOTO_PIN = A1;  // photoresistor pin
```

```
/* ------------------------------------------------- */

void setup() {

  // setup for LCD

  lcd.begin(LCD_COLS, LCD_ROWS);


  // setup for external devices

  for (uint i = 0; i < NUM_LEDS; i++) {

    pinMode(LEDS[i], OUTPUT);

  }

  pinMode(BUZZER_PIN, OUTPUT);

  pinMode(BUTTON, INPUT);

  // ...

}
```

```
void loop() {
  /* FIRST ARDUINO */
  // get info from temperature module to detect hazard
  // get info from motion sensor
  // get info from IR remote

  /* SECOND ARDUINO */
  // setup the LCD to print information
  lcd.print(debugInformation());

  // LED to output some information
  digitalWrite(LEDS[i], HIGH);
  // Button to turn on/off the device
  digitalRead(BUTTON);

  /* THIRD ARDUINO */
  // control the synthesizer using knobs and buttons
  // ...

  // play music from SD Card
  // ...
}
```