Home Security System

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Abstract

The goal of this project was to create a Home Monitoring/Security System for the average homeowner. We wanted our Security System to be motion enabled. By doing that, we are able to create processes after motion has been detected. The goal for this project was to accomplish the following three components listed below.
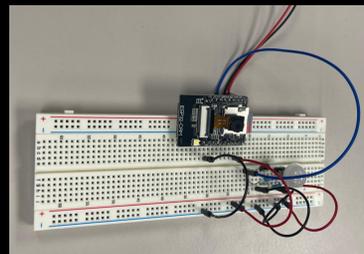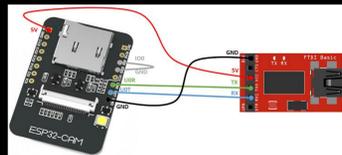
When motion is detected:

1. Take a photo of the intruder.

2. Send a smartphone push notification indicating motion has been detected.

3. Sound an alarm commanding the intruder exit the premises.

Materials & Software

- PIR Motion Sensor
- ESP32 Camera
- Arduino Uno WiFi
- FTDI Programmer
- MicroSD Card

- Arduino Nano
- DFPlayer Mini MP3 Module
- Speaker
- Arduino IDE
- Telegram Application

Circuit 2: Notification

The Telegram application is used in order to have notifications sent from the ESP32 to a mobile device. A bot is created through Telegram for this specific project. We obtain a unique bot token that is used in our code so we can add to our bot. For example, commands can be created, and we just created the /start command to let the bot begin sending notifications. Then, once the PIR Motion Sensor that is attached to the ESP32 detects motion, we should receive a notification to our mobile device from the Telegram application that motion has been detected. A notification will be received every single time that the motion sensor detects any movement.
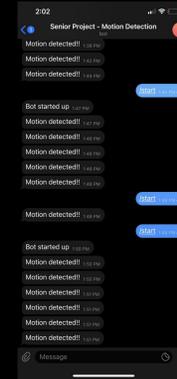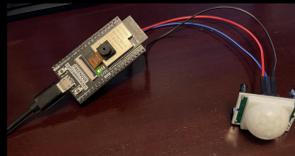

Circuit 1: Photo Capture

The FTDI programmer is used in order to upload code from the Arduino IDE to the ESP32 Cam. Once the code was successfully uploaded to the ESP32, the RESET button on the ESP32 is pressed for it to begin working. A PIR Motion Sensor is connected to the ESP32. Whenever the PIR sensor detects motion, the LED on the ESP32 turns on indicating that motion was detected and that a picture has been taken. The picture taken is saved into the SD card in the ESP32. After taking out the SD card, we are able to see the pictures taken by the ESP32 after opening the files in a computer.

Circuit 3: Alarm

For this circuit, when the PIR Sensor is activated, the Arduino Nano accesses the file stored on the MP3 Decoder. The Arduino Nano uses the stored audio from the MP3 Decoder and plays it through the speaker. This circuit is powered through the Arduino Nano's USB slot. When motion is detected by the PIR Motion Sensor, it sends a signal to the MP3 Decoder which then plays the stored sound through the speaker.
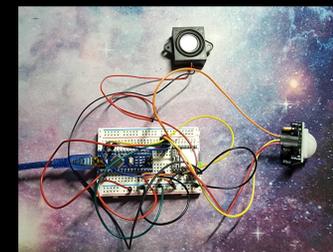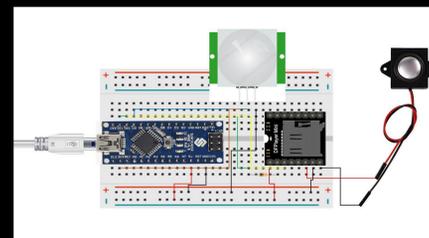
Results

Our group was able to successfully complete our goals for this project. We were able to create three separate circuits that, when motion was detected, could take a photo and store the photo in the MicroSD Card, send a push notification alert to our smartphone, and sound an alarm to deter the intruder from burglary.

Our group was consistently meeting deadlines, innovating new ideas, and engineering new methods in order to complete our project on time.

Future Implementations

Regarding the future design of our Home Security System, we would like to incorporate all three components/functions of this project into one circuit in order to be the most energy efficient. Furthermore, we would like to add an auto dialer function so when motion is detected multiple times throughout the home, it can be set up to call the homeowner or the authorities. Finally, we would like to incorporate a way to have the photo send directly to the smartphone instead of storing in the MicroSD Card.

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