

IoT HOME ALARM SYSTEM

ECE 442: Internet of Things and Cyber
Physical Systems

Part 0: Preliminary Project Proposal

Due Date: 05/25/2022

THE TEAM:

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- c) Hamad Abdelrahim

INTRODUCTION:

We came together as a team and discussed interesting project topics that suited our interests and skill sets. After some deliberation, we decided on the IoT Home Alarm System. Upon Alan's suggestion, we further included his Smart Mirror to the IoT network as a display and interaction node.

THE PROJECT:

The IoT Home Alarm System is intended to allow the user to monitor entrances such as windows and doors. It will monitor the windows by using the contact sensors and the front door by a motion sensor and camera. Through a companion Android app, users can remotely monitor and modify the status of the sensors and front door camera feed, while getting precise alerts when unauthorized entry is detected. With the addition of the Smart Mirror to the IoT home network, users can have a display and quick access node using the app to also monitor sensor and camera

activity. The app allows users to check the on/off status of the sensors, and allows individually inputted hours of operation to suit user requirements. The proximity sensor at the front door will trigger a light and camera when sensing motion within a certain range, and the camera is placed in an optimal position so as to get a clear visual of the potential intruder's face. Camera functionality can be extended to include facial recognition, allowing access to individuals deemed 'friendly' by the user.

HARDWARE: (tentative)

1) Raspberry Pi:

- The Raspberry pi will be used as the central node for this project and will also be used to connect the system to the cloud using either XAMPP or IFTT.

2) Arduino Uno;

- The Uno will be used as the primary microcontroller to which the sensors and actuators will communicate with. Using a Zigbee module the sensors/actuators will communicate with the Uno wirelessly.

3) Contact sensor:

- Will let the user know that a window has been opened. When a window is opened the sensor's magnetic field breaks and causes a switch to flip, this will then cause the sensor to send a signal to the user's phone alerting them.

4) Ultrasonic sensor (HC-SR04)/PIR sensor:

- Will be used to detect motion at the front door and send a signal to the Arduino Uno.

5) Camera:

- Will trigger once the motion sensor is tripped. It will allow the user to view the intruder/friend that is at the door.

6) LED light:

- Will shine once an individual triggers the motion sensor. This will help the user identify who is at the door.

SOFTWARE: (tentative)

1. C# in Arduino

- To code the algorithm and protocols need to design and implement the microcontroller, sensors, and actuators.

2. OpenCV

- It is an open-source software to add features to visual feed. We will use OpenCV to add facial recognition and codes to identify whether the individual is a friend/intruder.

3. Linux:

- To program/ setup OpenCV and cloud integration for the Alert system.