

MAE 6291– Midterm project presentation

Unattended Candle Notifier

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Spring 2025

THE GEORGE WASHINGTON UNIVERSITY

Photo: Kartik Bulusu

Introduction and motivation

Motivation:

- I saw the flame sensor and immediately gravitated towards it
- House of candle enjoyers
- The issue of leaving candle unattended
- Witnessed friend take pictures of candle as a reminder

Task breakdown:

- Research hardware
- Build the circuit and code
- Testing + Redesign



Expectations and goals:

1. Find a way to notify user they are leaving a candle unattended
2. Have a failsafe where the recommended time for a candle to be lit is not exceeded
3. Explore the flame sensor because it sounds so cool
4. Don't start a fire or set off any sprinkler system

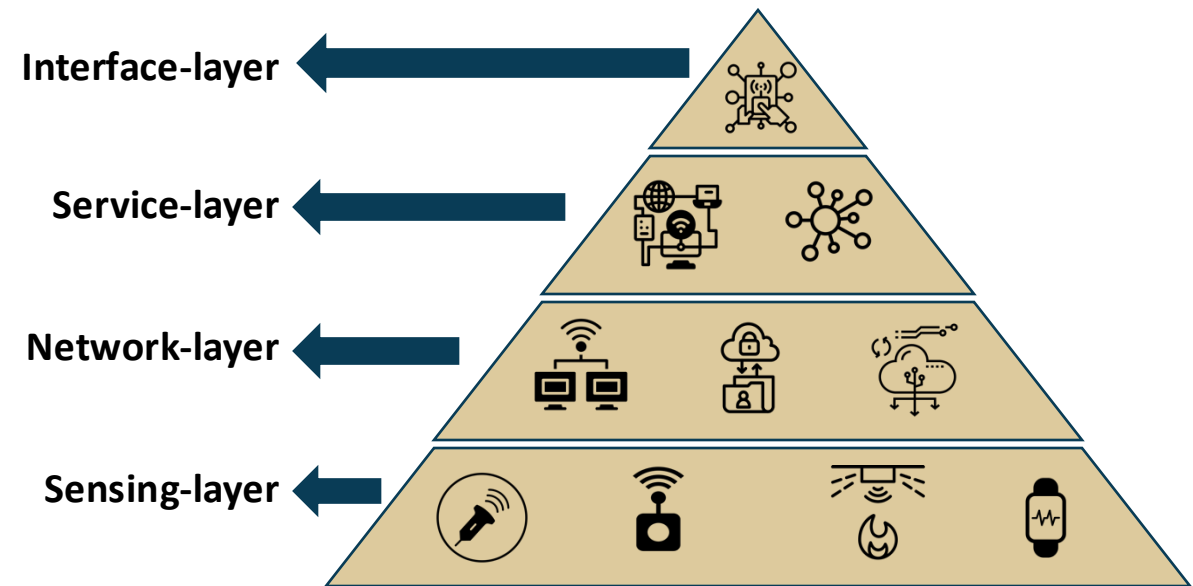
IOT Layered Model

Interface: Yagmail library reaches out to the user and communicates a message via email

Service: Python Code allows all the components to interact together

Network: Sensors and motors wired together, Raspberry Pi connects the data to the internet via WiFi

Sensing: Flame and Ultrasonic sensors



Sources:

sensor by Carolina Cani; sensor by Pham Duy Phuong Hung, sensor by Tippawan Sookruay, sensor by Lorenzo:

<https://thenounproject.com/browse/icons/term/sensor>



wifi network by Matthias Hartmann: <https://thenounproject.com/browse/icons/term/wifi-network/>



application by Chaowalit Koetchuea: <https://thenounproject.com/browse/icons/term/application/>

IoT Architecture layers: <https://www.startertutorials.com/blog/iot-architecture-layers.html>

Materials and methods

Materials and hardware used:

1. Flame Sensor – triggered when candle is lit
2. Ultrasonic Sensor – triggered when person exits
3. DC Motor w/ propeller – extinguishes candle
4. L298N Motor Driver 
5. 9V Battery 
6. Raspberry Pi Model 4B, Raspbian OS
7. WiFi

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Description of App or API developed and strategy incorporated:

1. Python
2. Yagmail – sends email notification
3. Time – ultrasonic sensor, delays motorized fan
4. Threading – timer for fan + ultrasonic sensor trigger

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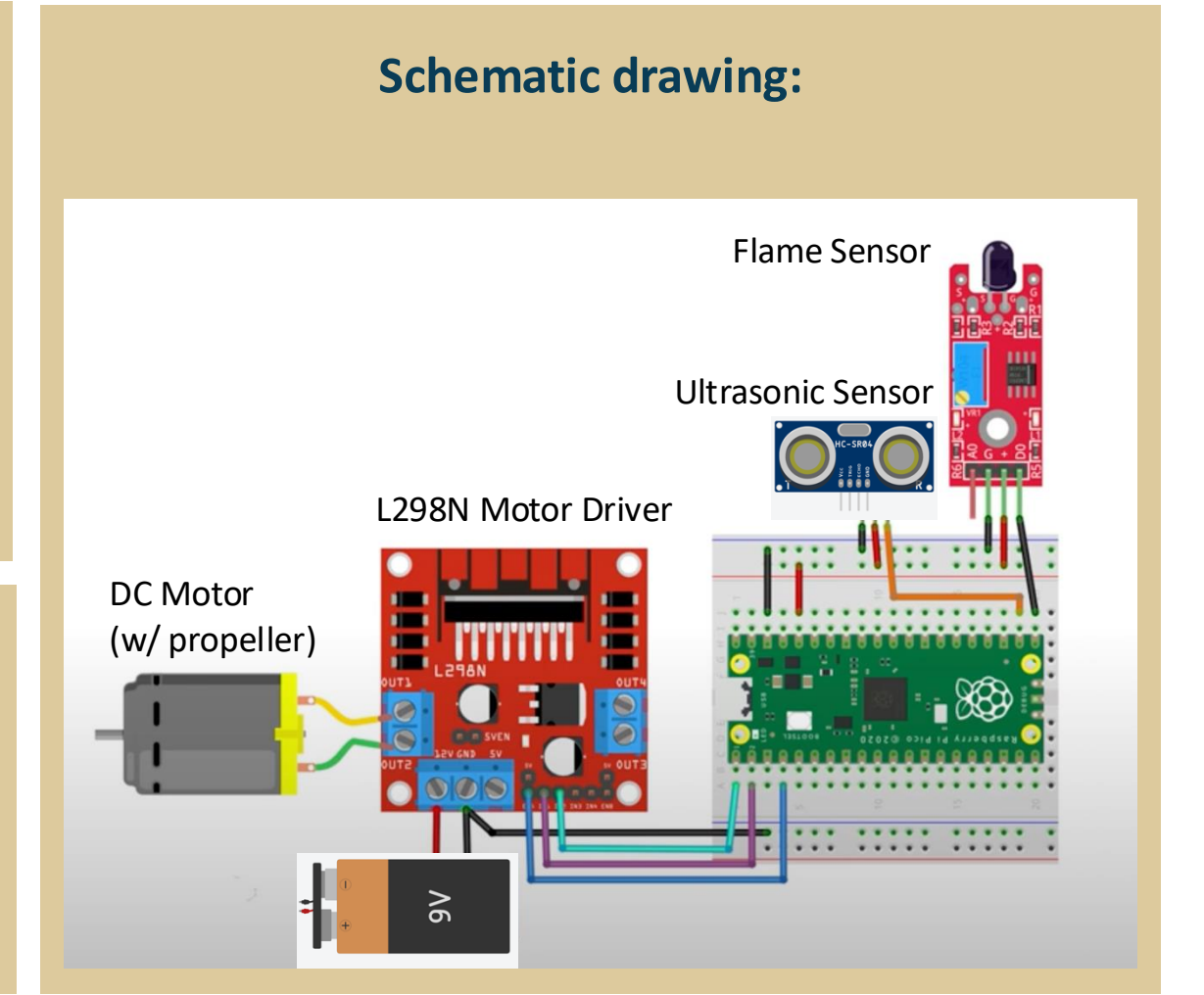
Firmware and front-end development

Schematic drawing:

The schematic drawing illustrates the wiring of a Raspberry Pi-based fire alarm system. The components and their connections are as follows:

- Flame Sensor:** A red PCB sensor module connected to the Raspberry Pi's I2C pins (SDA and SCL).
- Ultrasonic Sensor:** A blue HC-SR04 sensor module connected to the Raspberry Pi's digital pins (VCC, GND, Trig, and Echo).
- L298N Motor Driver:** A red motor driver module connected to the Raspberry Pi's digital pins (VCC, GND, and PWM pins for motor control).
- DC Motor (w/ propeller):** A grey motor with a yellow propeller connected to the L298N Motor Driver's output pins.
- 9V Battery:** A 9V battery connected to the L298N Motor Driver's power pins (VCC and GND).

The Raspberry Pi is shown as a green circuit board with various components and pins labeled. The connections are color-coded: red for power (VCC), black for ground (GND), and other colors for data and control lines.



Conclusions and demonstration

- Found a way to notify a candle-user using yagmail
- Triggered this with an ultrasonic sensor to symbolize someone leaving the room
- Included a timer for a motor to get triggered by threading
- The flame sensor works like a charm
- Hopefully I did not set fire to anything other than my candle
- Potential Improvements
 - Using dweet to give user option to trigger fan remotely
 - Two ultrasonic sensors to differentiate someone leaving and someone entering the room

**Demonstrate your
IoT device**

