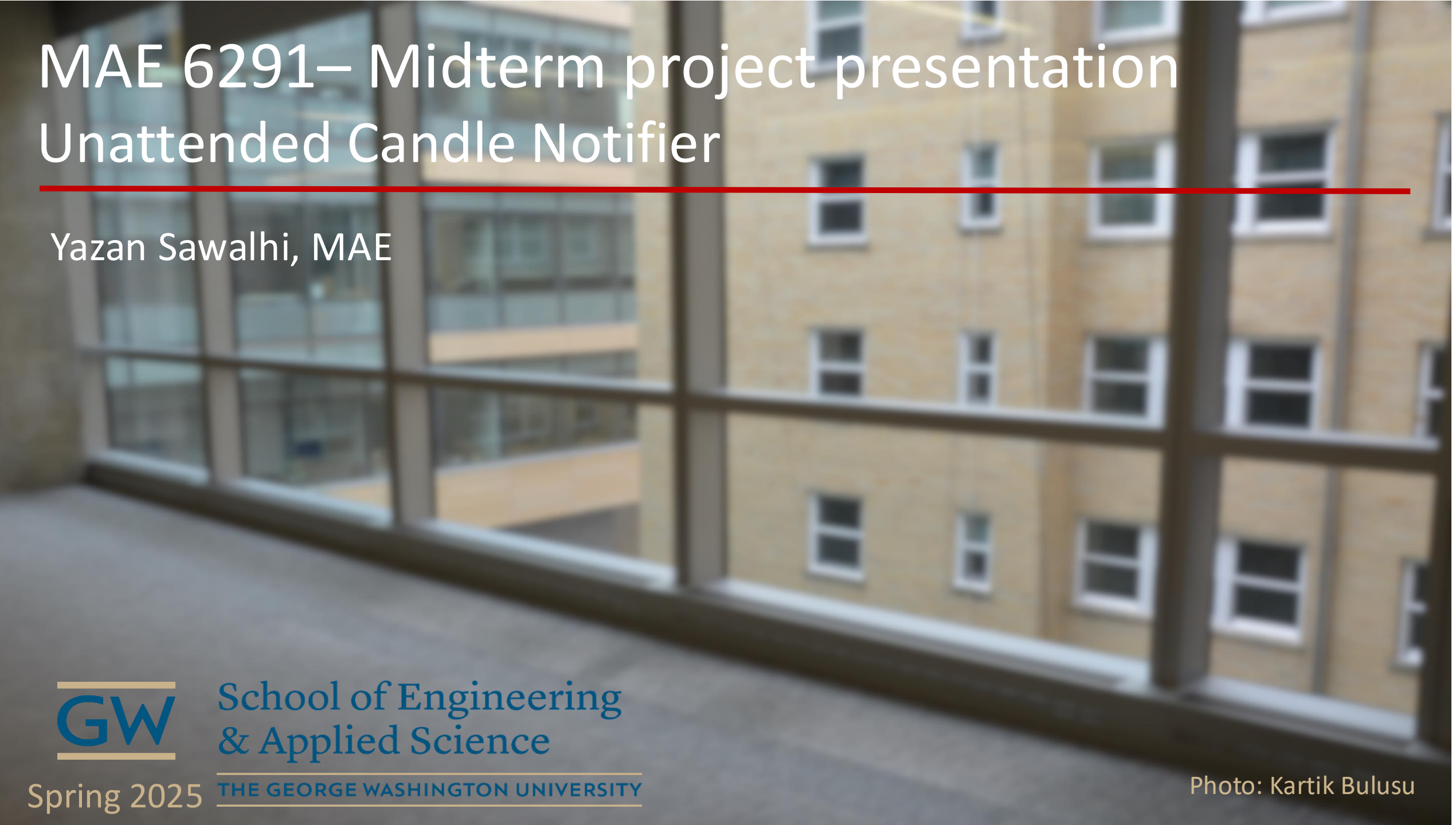
MAE 6291– Midterm project presentation
Unattended Candle Notifier

Yazan Sawalhi, MAE



GW School of Engineering & Applied Science
THE GEORGE WASHINGTON UNIVERSITY

Spring 2025

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

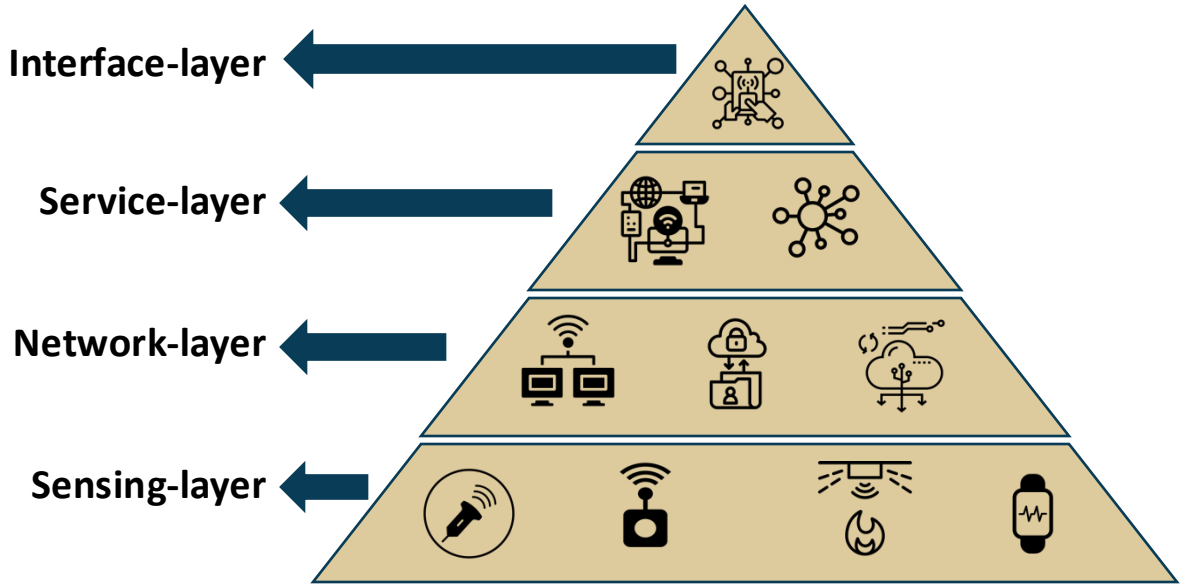
IOT Layered Model

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

Firmware and front-end development

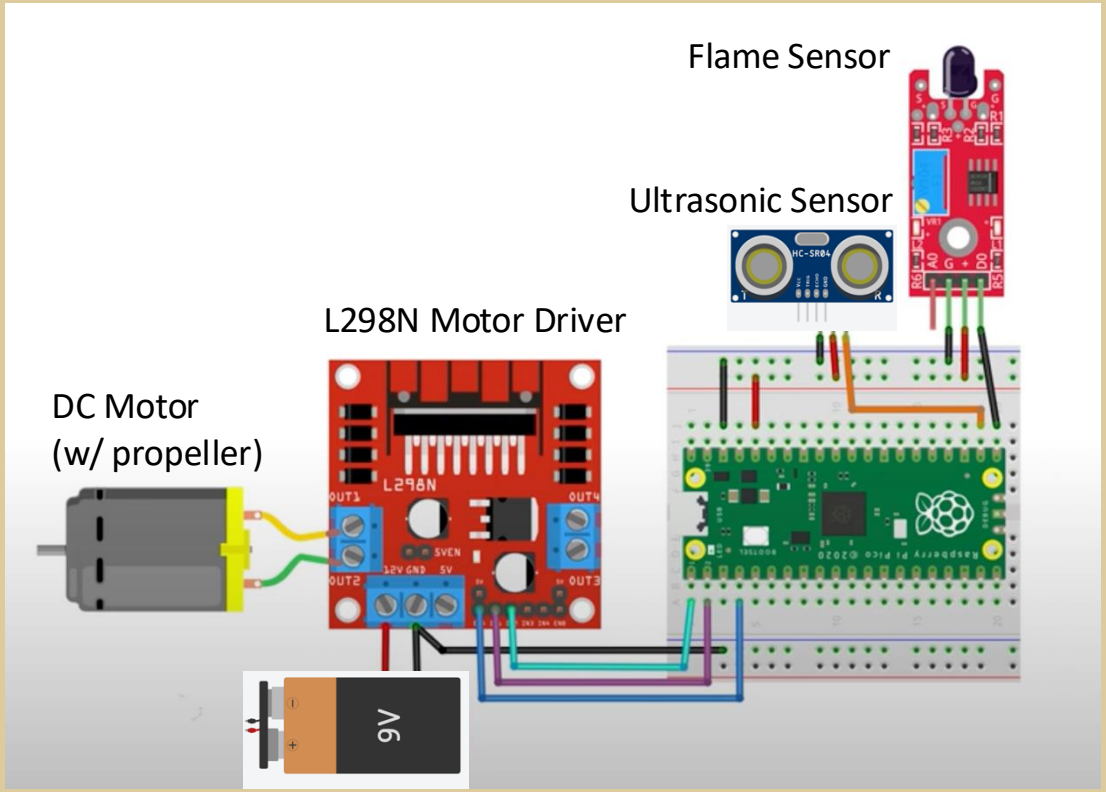
Materials and hardware used:

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

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

Schematic drawing:



School of Engineering & Applied Science
THE GEORGE WASHINGTON UNIVERSITY

GW

Inspired by:
https://www.youtube.com/watch?v=y1_scz9l0go

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