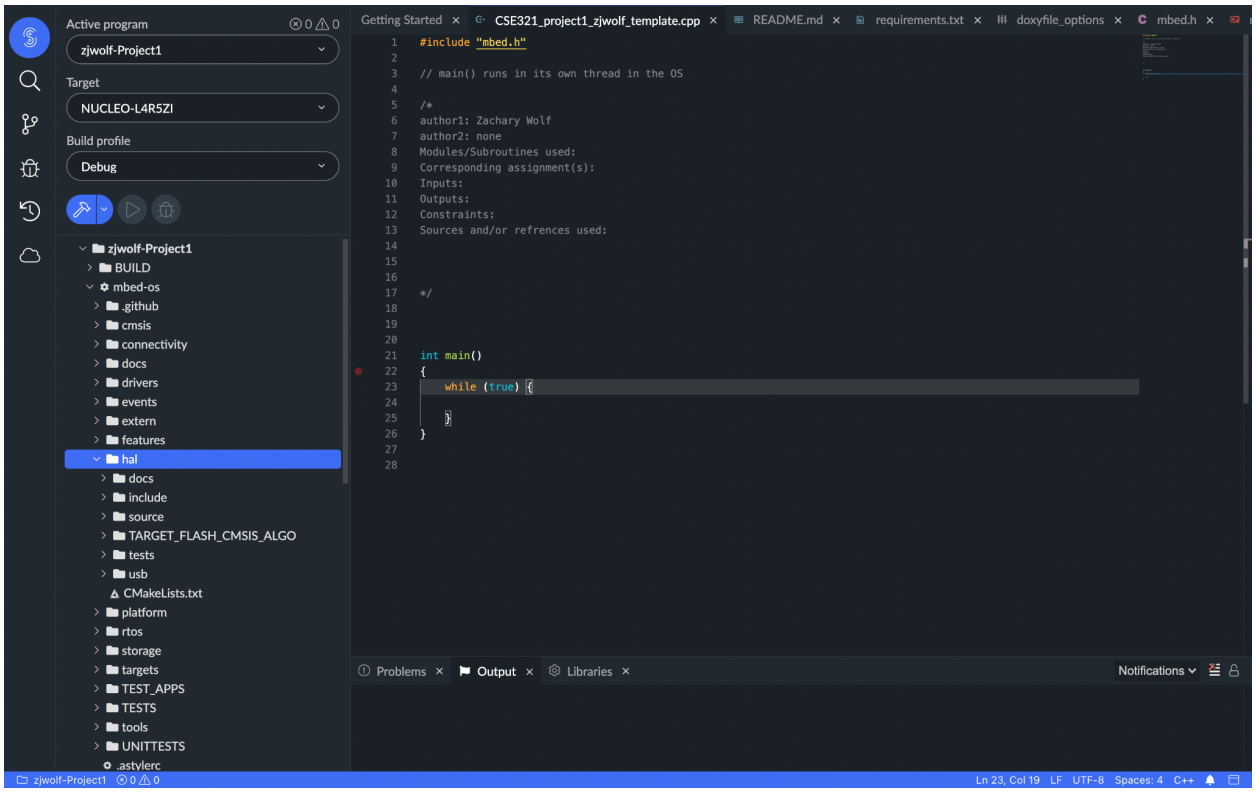
Part 1:



Part 4:
Github username: zachary0816

Part 5:

Ask: Identify needs and constraints
Needs:

- Light must turn Red when geese are in danger of being hit by a car

Constraints

- Must be controllable by an IoT device running and embedded OS
- Inputs to the embedded OS will be done by sensors that detect traffic and geese
- Traffic signals are limited to either solid red for stop, or blinking red for stop sign.

Research the problem

- Geese do not observe human traffic signals and therefore may cross at any time
- Geese may not treat human traffic as a potential danger and therefore may go regardless of danger.
- Drivers are generally trained to spot other cars, and in the case of pedestrian areas, humans. They may not mentally process a goose as a hazard.

- Geese may or may not treat humans as potentially hostile based on previous human actions. If they see humans as a threat, they will try to keep their distance. If not, they may walk right up to them.
- Geese may linger within the designated hazard area resulting in potential slowdowns for drivers.

Imagine: possible solutions

1. Place pressure plates on the roads calibrated to detect the weight of a goose. Upon detection of goose weight, turn red.
2. Train a machine to know what a goose looks like. Visually define to the same machine where the bounds of the road are. Set up a camera (or multiple) at the intersection connected to the trained machine (which will be running off an embedded OS). When it identifies a goose within the confines of the road, turn the light red.
3. Set up a grid of non-visible laser trip wires right above the surface of the road. Set up a second set of lasers high enough to be triggered by cars, but not by geese. When the bottom laser is triggered and the top is not for a predefined period of time (likely around 1 second), turn the light red. Turn back to flashing once the goose leaves area.

Plan: by selecting a promising solution
Selected idea: Option 3

Option 3 will require the following hardware to be set up.

- 4 container boxes set around the sides of the given intersection
  Each box will contain:
    - The hardware required to connected to the embedded OS system
    - Battery back or hard wiring to local power grid
    - Two lasers, one about an inch above the ground. The other approximately 2 feet off the ground.
        - Lasers will use a part of the EMS(Electro-magnetic spectrum) not visible to the naked eye. Likely infrared
        - Lasers will use the other laser boxes as static references points. The 4 boxes should form the corners of a square with the lasers acting as the sides.

Within the embedded OS, the following processes will be included

- For each laser box process
    - If the bottom laser is triggered for more than 1 second without the top laser also being triggered, it will be presumed that a goose has entered the hazard area of the intersection. This will change the light to solid red.
    - Once the light is red, it will change back to flashing red once the following two conditions are met
        - If either the bottom laser is longer triggered, or the top laser is also triggered.
        - Once a set period of time has passed (possibly 30 seconds)

- After the two conditions have been met, it can be presumed that either the goose has left the hazard zone, or that enough waiting time has passed that waiting cars are familiar with the presence of the goose and will take the next logical steps from there.
- If the goose has been in the hazard area for longer than 30 seconds, it can be presumed that the embedded OS could not easily gain enough information to keep making logical outputs, therefore it is best at this point to default to human judgement.