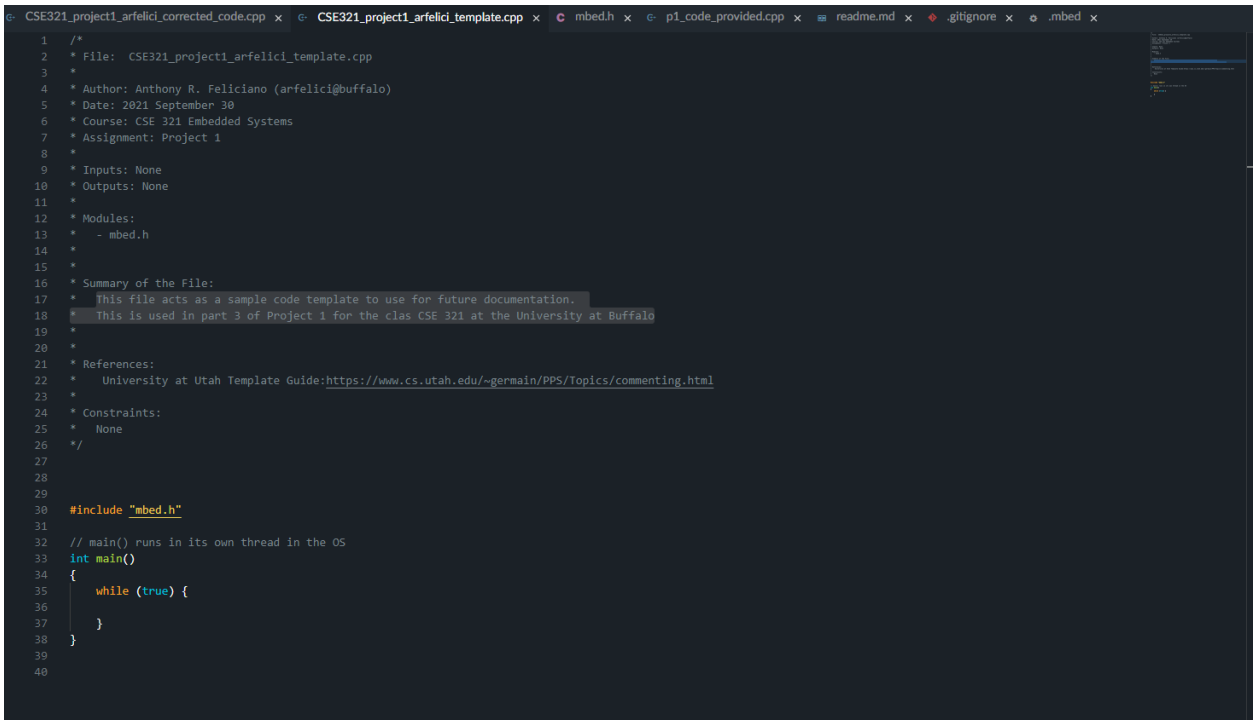
Anthony Feliciano
CSE321
Project 1

Project 1 Word Document

GitHub account:antmar17

Part 3 Screenshots:

Code Template:



```
/*
* File:  CSE321_project1_arfelici_template.cpp
*
* Author: Anthony R. Feliciano (arfelici@buffalo)
* Date: 2021 September 30
* Course: CSE 321 Embedded Systems
* Assignment: Project 1
*
* Inputs: None
* Outputs: None
*
* Modules:
*   - mbed.h
*
*
* Summary of the File:
*   This file acts as a sample code template to use for future documentation.
*   This is used in part 3 of Project 1 for the clas CSE 321 at the University at Buffalo
*
*
* References:
*    University at Utah Template Guide:https://www.cs.utah.edu/~germain/PPS/Topics/commenting.html
*
* Constraints:
*   None
*/



#include "mbed.h"

// main() runs in its own thread in the OS
int main()
{
    while (true) {

    }
}
```

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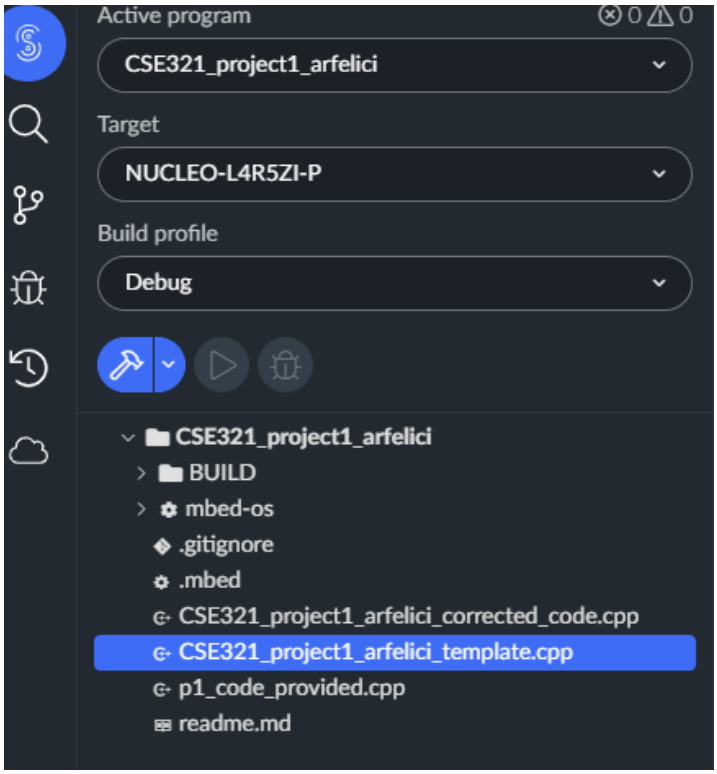
Project Tree:



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Part 5

UB Geese Protection Project Proposal

Purpose of Project:

Implement a device on campus to help keep Geese and UB students on campus safe while using the roads and crosswalks on campus. While also ensuring minimal traffic while on campus

Target Population:

- UB students
- Visitors to UB
- Geese that inhabit and walk through UB campus

Requirements for Device:

- Must sense when Geese are nearby the road
- Must be able to turn lights red at intersection when Geese are too close to the road
- Must be able to make light blink in order for traffic light to be used as a stop sign
- Device should be able to detect geese at night as well

Constraints:

- Device should be able to withstand cold and wet weather conditions, which are common in Buffalo
- Sensor should be able to detect geese in cold and wet weather conditions
- Device should be reasonably priced and programmable
- Device must be able to be embedded in existing traffic light

Research:

- According to Younis Ossama's, and Nader Moayeri's Research Journal "Cyber-Physical Systems: A Framework for Dynamic Traffic Light Control at Road Intersections."(1) an asynchronous detection based Traffic Control system can help decrease traffic as well as guarantee safety. It is also stated that infrared sensors would be used for their Traffic Control system.

- According to Forbes article "Why Do Canadian Geese Fly at Night?"(2) canadian geese often travel at night to avoid predators meaning that the sensors should also detect Geese and Students during the night time.

Proposed Plan

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- On every crosswalk of an intersection have a device that detects pedestrians and geese using an infrared Sensor.
- The infrared Sensor will be able to detect objects at night and in the cold
- Program device to have all lights turn red when the infrared detects an object and otherwise have the light blink red

Pseudo Code:

```
//initial state

IR_inputs = 0;

while(true){

    if (IR_inputs.read() == 1){

        light.turnRed();

    }

    else{

        light.blink()

    }

}
```

Proposed Materials

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1) Development board: **STM-Nucleo L4R5ZI**

- Modular,cheap and programmable
-Price: $20.22

2) Infrared Sensor: **5PCS HC-SR505 PIR Motion Detector Mini IR Infrared Human Sensor Module Pyroelectric for Arduino Raspberry Pi ESP32-Cam**

-Compatible with STM-Nucleo L4R5ZI
- Requires less then 60uA of power
-Working temperature: -20 °C to 80 °C
-Cheap and compatible with STM-Nucleo L4R5ZI
-Price: $11.99

Estimated Cost

- For each cross walk there is in an intersection there will need to be 2 devices
- Thus the cost for said device will be (11.99 + 20.22) * 2 = $64.42
- So the cost will ultimately be $64.42 * *(# of roads at intersection)*

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Citations

- (1)Younis, Ossama, and Nader Moayeri. “Cyber-Physical Systems: A Framework for Dynamic Traffic Light Control at Road Intersections.” *2016 IEEE Wireless Communications and Networking Conference*, 2016, https://doi.org/10.1109/wcnc.2016.7564921.

- (2)Quora. “Why Do Canadian Geese Fly at Night?” *Forbes*, Forbes Magazine, 1 Mar. 2018, https://www.forbes.com/sites/quora/2018/03/01/why-do-canadian-geese-fly-at-night/?sh=3296d6e44c16.