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CSE321 Project 1

Part 3: Creating Your Code Template

1.) Create new project in MBED Studio and edit the **main.cpp** file that's generated to include a header comment.
2.) Add screenshot of **main.cpp** to this document, make sure it shows the **code template file**, and that **project file tree** is **open**.
3.) Save **main.cpp** as **CSE321_project1_rchen56_template.cpp**

Headers should answer these questions:

1.) Author
2.) Files Purpose
3.) Modules/Subroutines
4.) If it corresponds to any assignments
5.) Inputs/Outputs (Peripheral Connections for the main file)
6.) Constraints
7.) Source and References (with links)

Use https://www.cs.utah.edu/~germain/PPS/Topics/commenting.html as a guide.

Part 4: Setting Up Git

GitHub username: mraddtab

1.) Go to https://github.com/CSE321-Fall2021/cse321-portfolio-mraddtab
2.) Create a **"readme.md"** file, with an "**About"** section summarizing what the **repository** will contain.
3.) Make three folders "**Project 1**", "**Project 2**", and "**Project 3**".
4.) Place this word doc **CSE321_project1_rchen56.docx** into **"Project 1"**.
5.) Write your GitHub username in this document.

Note: Make sure the repository is private.

Part 5: Establishing Good Planning Practices.

Problem: "An IoT device is needed for controlling traffic on campus based on geese proximity. These are special geese, and they need to stay safe. The device will be programmed with a standard embedded OS and will make use of sensors for detecting traffic and geese. The traffic is controlled by a single light that will stop traffic in all directions, when needed, to protect the geese by turning red. When traffic can flow, the light blinks red and is treated as a stop sign.

Ask: Identify the need and constraints

- **Objective**: A special breed of geese must be kept safe from oncoming traffic. There is a single traffic light which controls traffic in all directions. When geese are present, the traffic light turns red halting all traffic. The light will blink red when traffic can resume. A IoT sensor device will communicate to the traffic light when to turn red or blink red.
- **Input**: Data from motion detectors
- **Output**: Red Signal when geese present, Blink Signal when safe
- **Constraints**: Motion detectors may have trouble differentiating geese and other objects. They detectors and light must always remain active, which will require a continuous power source.

Research: Research the problem: IOT Info: https://ieeexplore.ieee.org/document/7373221

IoT (Internet of Things) devices are physical devices that have the capability of communicating with other devices and systems. There are two types of IoT devices, general purpose, and sensing. Sensing IoT devices pick up data from the world around them, where they can then send to other devices to interpret. These devices include phones, smart cars, and microphones.

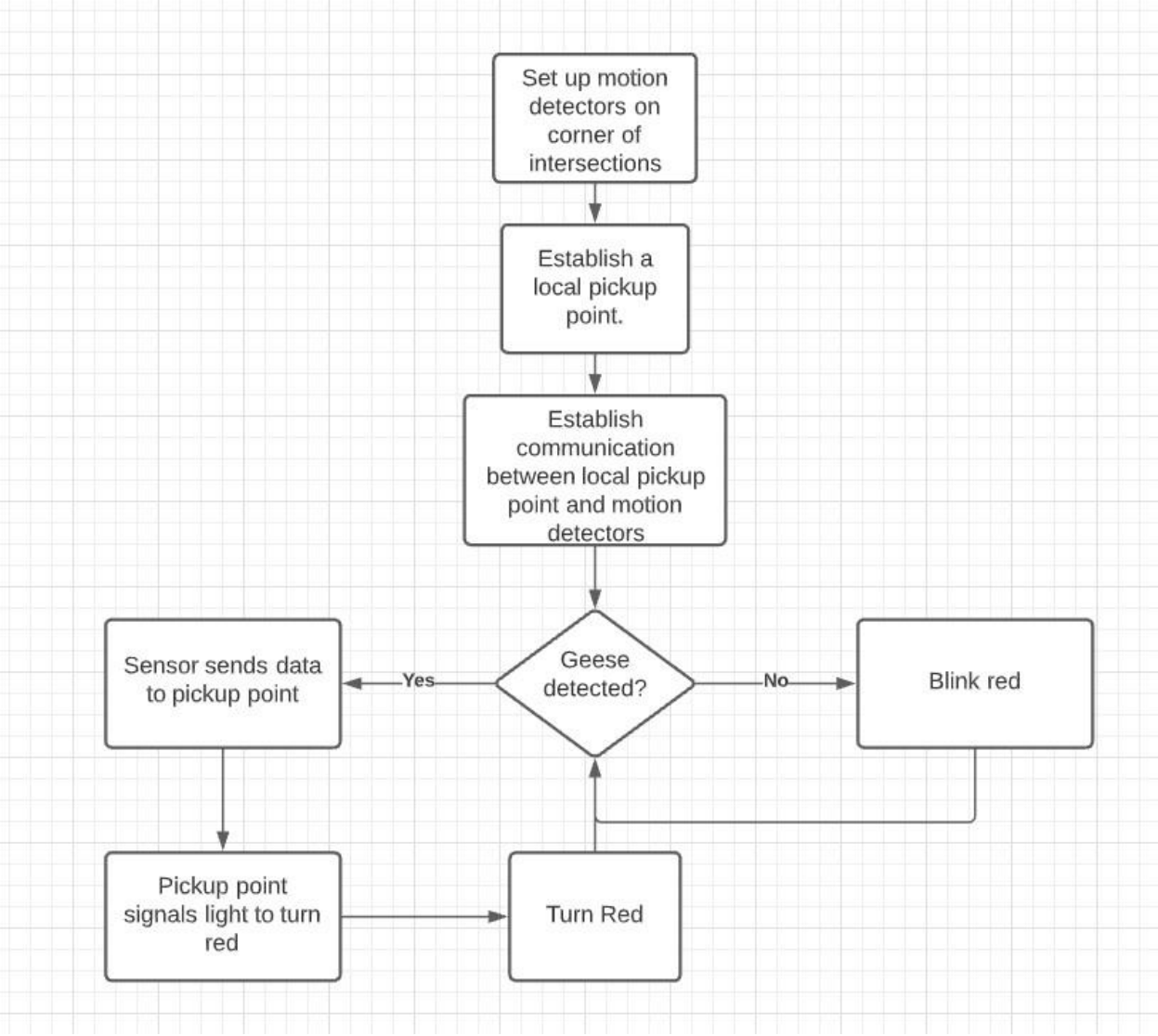
[1] **Architecture of an IoT:** Is associated with 4 levels. Data must be transported, stored, processed and made available

- **Local Environment**: The connected objects and the local pickup points (phones, computers). These objects communicate through wires like ethernet, optic fiber, etc. or through wireless links (Wi-Fi, Bluetooth, etc.)
- **Transport level**: Allows connected objects from the local environment to communicate with the command servers.
- **Storage & Data Mining**: Data is stored and mined in the cloud to be processed.
- **Make Available**: Data is made available for users/systems to access.

Actuators are objects that can interact with their environment. (Create sound, change a light, move). **Sensors** are objects that can receive data from its environment, but not interact. A sensor can have memory, or no memory. A **sensor without memory** must send data as it

receives it to a local pickup point, or the data will be lost. A **sensor with memory** can store the data it receives, allowing it to send data periodically. This allows for cuts on energy.

Assuming the traffic light is positioned in the middle of a four-way intersection, geese must be detected before they can enter. Motion detectors detecting up to a 90-degree radius may be placed around the perimeter of the intersection, allowing 360 degrees of coverage. The motion detectors must be without memory and always-on. When geese are detected approaching the intersection, the motion detector will send data to a nearby local pickup point nearby, and in turn signal the traffic light to turn red.



Part 6: Establishing Good Coding and Documentation Practices

Provided Code:

1.) Open **p1_code_provided.cpp**
2.) Address the following issues.
    a. Professional Free Field layout
    b. Include a header
    c. Add and fix comments.
    d. Change inappropriate variable names
    e. Remove unnecessary and inappropriate elements.
3.) Program must have the same behavior after refactoring.
4.) Save this file as **CSE321_project1_ *rchen56_corrected_code.cpp***

Do not change:

```
#include "mbed.h"
Thread
DigitalOut
InterruptIn
.start
.rise
.fall
.get_state
thread_sleep_for(500)
thread_sleep_for(2000)
printf
```

README:

1.) Update the provided **readme.md** file
    a. Professional Free Field layout
    b. Fix grammar and language
    c. Relevant and correct content
    d. Clear and correct specifications
    e. Correct constraints, parameters, and names.
2.) Save as **CSE321_project1_*rchen56_readme.md***

Note: For a guide on what to include in readmes.
https://docs.github.com/en/repositories/managing-your-repositorys-settings-and-features/customizing-your-repository/about-readmes

References

[1] B. Dorsemaine, J. Gaulier, J. Wary, N. Kheir and P. Urien, "Internet of Things: A Definition & Taxonomy," 2015 9th International Conference on Next Generation Mobile Applications, Services and Technologies, 2015, pp. 72-77, doi: 10.1109/NGMAST.2015.71.