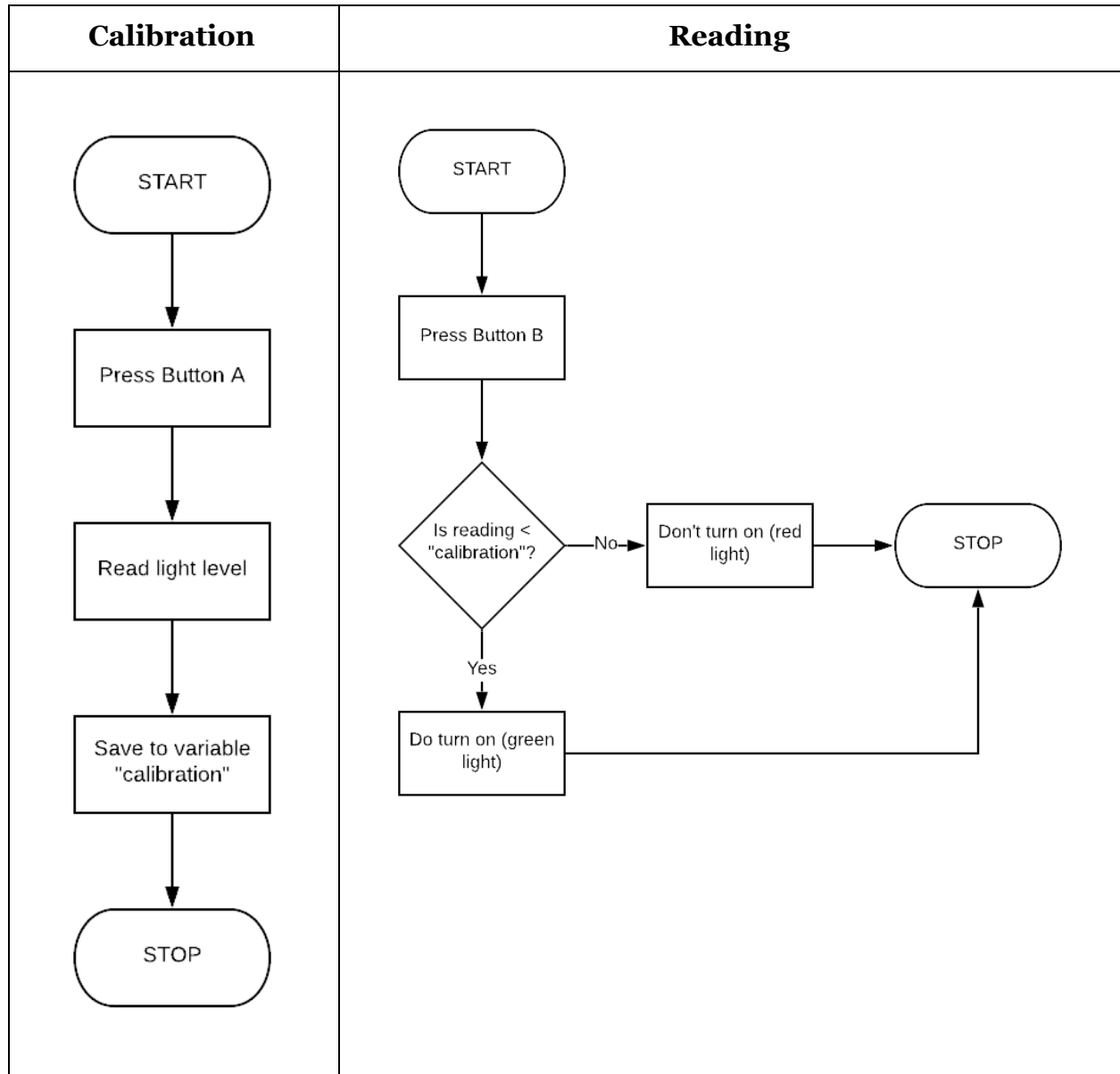


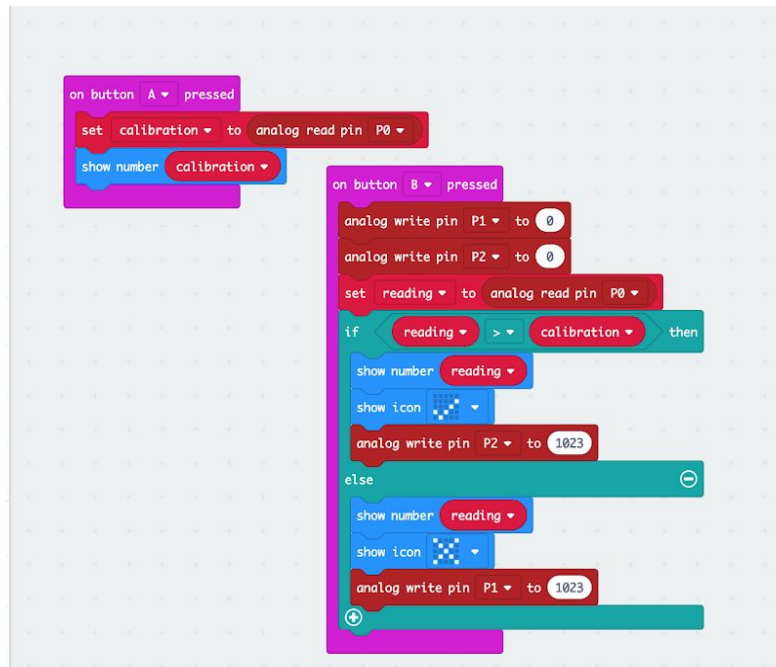
POND DELIVARABLES

- Justin, Tung, Tu Nam -

1. Flowcharts



2. Implemented Code



3. A picture/video of functioning micro:bit configuration

<https://drive.google.com/open?id=1K4q2I25N3xGYBmtG18FPzUutSrtyAnkL>

4. Answers for Questions

- a. [How will this give an indication of the amount of algae in the water sample?](#)
 - It will compare the light level passing through clear water and the light level passing through a sample of water of water. If the light level passing through the sample is not as much as the light level in the clear water, that sample probably has algae or is dirty.
- b. [Why is calibration needed? How often is calibration needed?](#)
 - So that the system knows the light level that we would consider as clean. And by comparing other sample to calibration, we can determine if the sample is clean or not.
 - We should calibrate once a week in the instance that the light sensor read light level differently than before.
- c. [Document your apparatus setup \(video and/or photo\). Explain why you made specific connections](#)

- We connect all the voltage to 3V and all the ground to the ground in order for the sensors and LEDs to work
- We choose to use button A for calibration and button B for reading. I do this because the microbit has convenient built-in buttons that is useful in this setup
- We connect the light level to P0, red light to P1, and green light to P2. I put them close together so that it would be less confusing to code and look at.
- We also color coded the wire so that it would be easier to know if the wire are connected to the right place

d. What event(s) will you use to trigger the calibration? The reading?

- When the A button is pressed, the sensor will check the light level cuts through, which is then assigned to variable “calibration”.
- When the B button is pressed, the sensor will check the light level cuts through, which is then assigned to variable “reading”.

e. How would you edit the program script if you wanted the filter to keep the pond water even cleaner in the future?

- We would make it so the program define variable “calibration” to be even lower.

f. What is the difference between an analog sensor and a digital sensor? What type of sensor are you using and how will it impact your code?

- The difference between an analog sensor and a digital sensor is that an analog sensor produces continuous output that’s in voltage relative to quantity and a digital sensor produces discrete output that’s in binary.
- Based on these differences, our control system would be using an analog sensor as it records the darkness level and turns it into an integer based on the quantity.

g. Explain what a control system is and why this pond filtration system is a control system.

- A control system is a system that provides a response by controlling the output. Our pond filtration system is a control system because we change the bottles that contain the varied pollution levels of water, which will give different outputs. If the bottle has dirty water, the filter turns on. If the bottle has clean water, the filter doesn’t turn on.

h. Define “sensor”. What sensor(s) did you use in this control system? Explain how additional sensor(s) could be used in this control system.

- A sensor is a device that detects or records a physical property.
 - We used a light sensor for our control system to measure the amount of light passing through a body of water. By comparing light levels, we can determine the cleanness of the water
 - We can add a water level sensor. By collecting the water level, combining with the light level, we can use some kind of formula to calculate the time that the filter would turn on for.
- i. [Define “actuator”. Explain how actuator\(s\) could be used in this control system.](#)
- An actuator is a device that is responsible for moving and controlling a mechanism, such as a valve.
 - We used the buttons on our micro:bit as an actuator. The actuator can be used to activate for when the system calibrates the water or when it checks the water light level.
- j. [Explain the relationship between the sensors, microprocessor, and actuators/indicators in this control system.](#)
- The light sensors detect the light level passing through the bottle, which gets transferred to the variable in the microprocessor's (Microbit) code.
 - When the actuator (button B) is pressed, the sensor will detect the current light level cutting through the bottle and compare that to the variable that contains the light level of a clean water bottle.
 - It then decides if the light should be green (turn on) or red (turn off).
- k. [Would this control system be considered an “open loop” control system, or a “closed loop” control system? Explain the difference between these types of control systems in your answer.](#)
- The difference between an open loop system and a closed loop system is that open loop systems are mostly manual while closed loop systems are automatic.
 - Based on these differences, our control system would be an open loop system as we need to press the buttons and change the water sample ourselves.
- l. [Discuss the social impacts and ethical considerations associated with the use of this control system.](#)
- If this control system could be implemented in real life, it would make many impacts on the environment. We can keep the water cleaner and many marine animals don't have to keep living in dirty water. In that

sense, this control system is contributing to prevent water pollution. This further makes it more accessible for people around the world to get and use clean water. This means that people living in underdeveloped areas in an underdeveloped country like Vietnam can get access to basic human rights and live a better life.

- One of the ethical issues that could happen is that the system requires too much energy and makes it worse to use the system rather than not using it. One of the others is that there is a malfunction in the system which causes it to read dirty water as clean and doesn't filter the water. If a person uses this "clean" water, some complication might happen

m. [What were the sensors and actuators used in the automatic watering control systems video?](#)

- In the video, they have a moisture sensor in the potted plant and a button on the microprocessor (microbit).

5. Team Members and Contributions

Tung:

- Assistance in Setting Up
- Answering Questions
- Coding

Tu Nam:

- Setting Up Wires and Sensors
- Answering Questions
- Assistance in Coding

Justin:

- Setting Up Wires and Sensors
- Answering Questions
- Assistance in Coding