

The Education University of Hong Kong

2022-2023 Quality Education Fund Thematic Network - Tertiary Institutes

STEM Project Team

SCHOOL: 東華三院鄺錫坤伉儷中學 TWGHs Mr & Mrs Kwong
Sik Kwan College

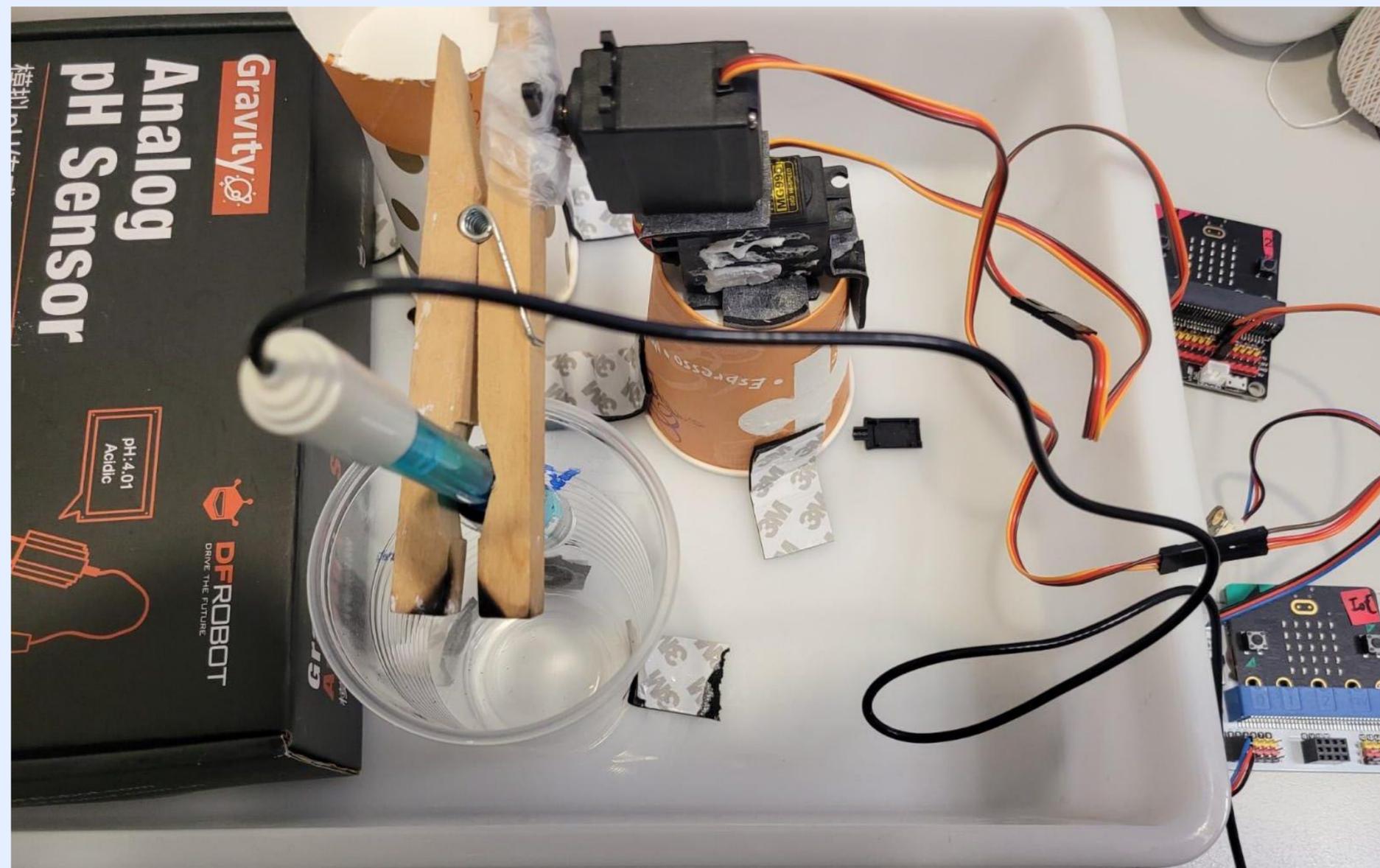
TOPIC: Fish Tank Sensor

Topic

- To monitor different condition of fish tank

Experiment 1 material

- 2 mg996r
- 2 microbit
- 1 IoT bit
- 1 extension board (5V)
- 1 test tube holder
- 1 gravity: analog pH sensor



Objectives of Experiment 1

- To washing the pH sensor after take the pH reading of the fisk tank water
- Upload the pH value to ThingSpeak everyday

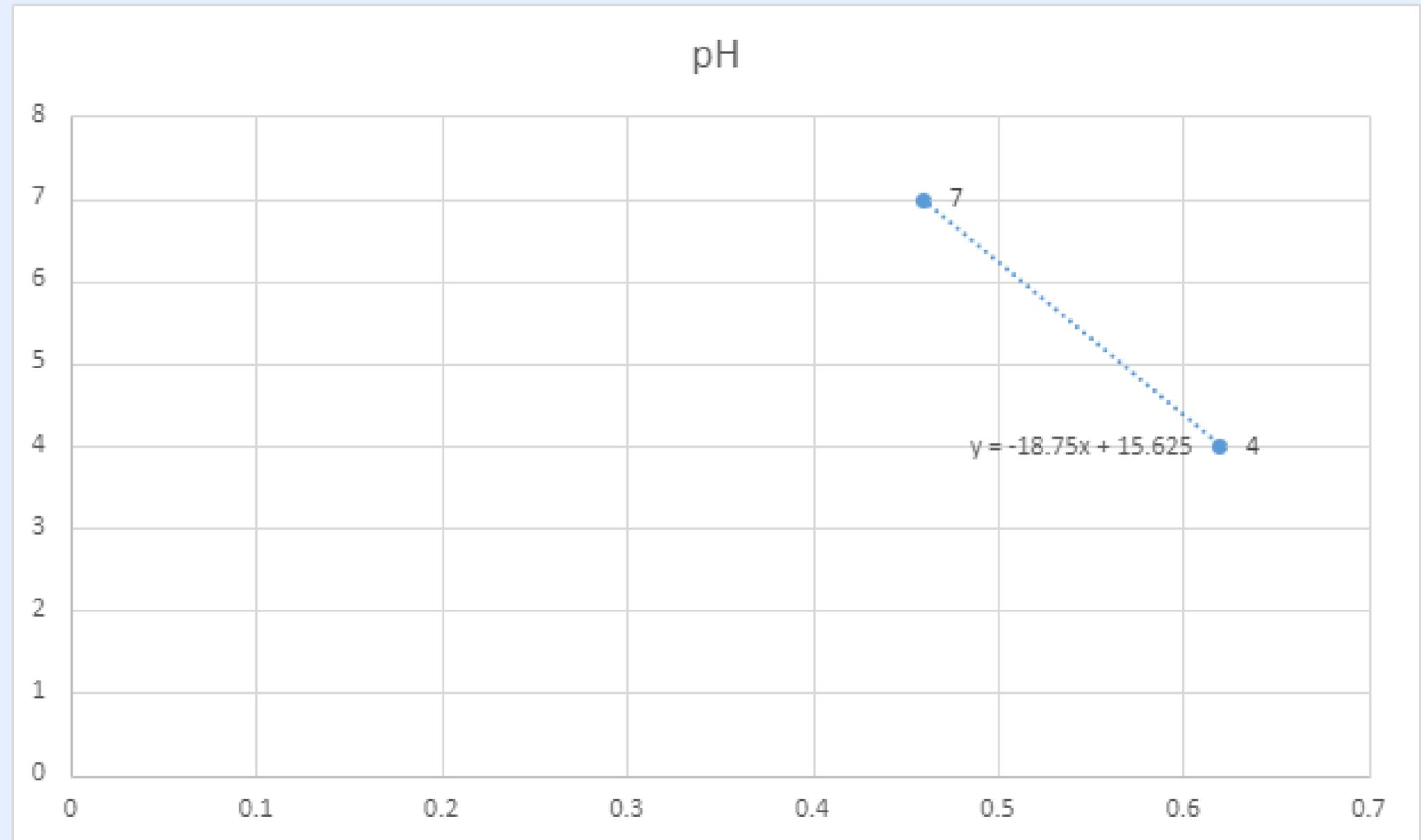
Coding for pH sensor

```
on start
  set ESP8266 RX P8 TX P12 Baud rate 115200
  connect Wifi SSID = "IoT" KEY = "eduhk+IoT+2018"
  if Wifi connected true then
    show icon [grid icon]
  +

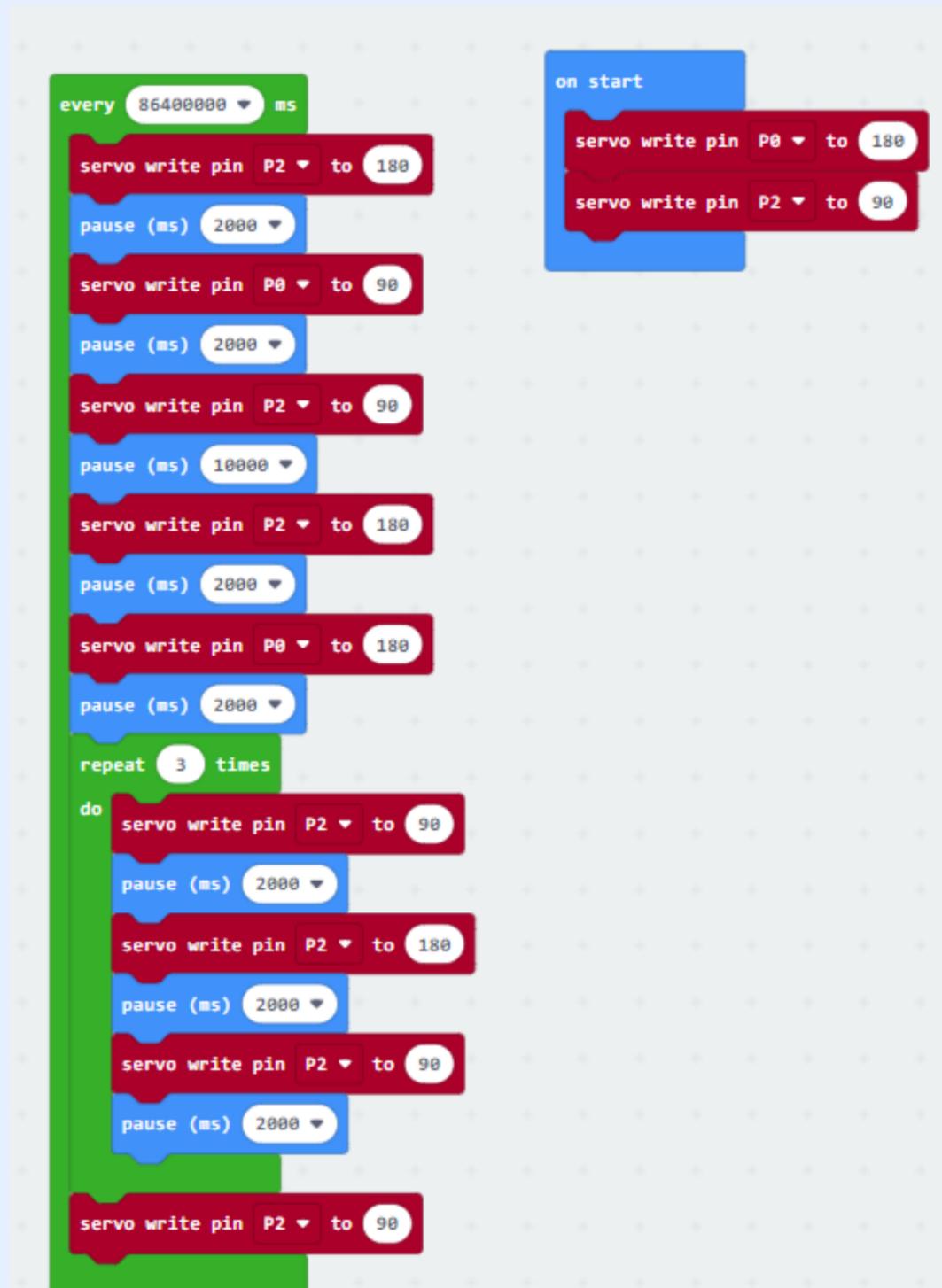
forever
  set x to analog read pin P1 ÷ 1000
  set mx to -18.75 × x
  set pH to mx + 15.625
  show number pH
  connect thingspeak
  set data to send ThingSpeak
  Write API key = "DP3P89XWFT9JD7MO"
  Field 1 = pH
  +
  Upload data to ThingSpeak
```

Calibration

reading	pH
0.46	7
0.62	4



Coding for washing the pH sensor



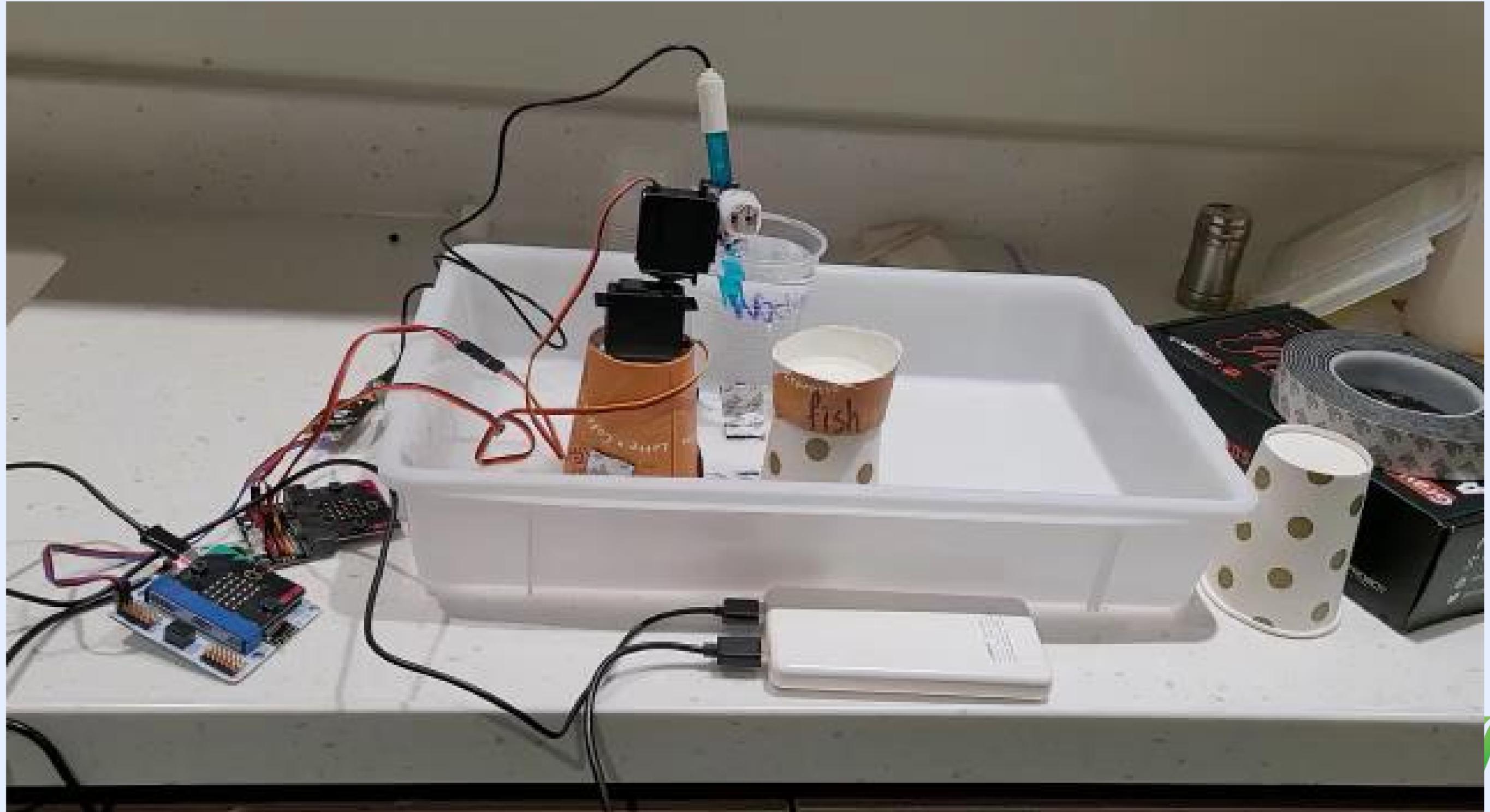
The image shows a Scratch code editor with a green flag clicked event and an on start event. The main code block is a green 'every' loop with a duration of 86400000 ms. Inside this loop, there are several servo write and pause blocks. The sequence is: servo write pin P2 to 180, pause (ms) 2000, servo write pin P0 to 90, pause (ms) 2000, servo write pin P2 to 90, pause (ms) 10000, servo write pin P2 to 180, pause (ms) 2000, servo write pin P0 to 180, pause (ms) 2000. This is followed by a 'repeat 3 times' loop containing: servo write pin P2 to 90, pause (ms) 2000, servo write pin P2 to 180, pause (ms) 2000, servo write pin P2 to 90, pause (ms) 2000. Finally, there is a servo write pin P2 to 90 block at the bottom of the green loop.

```
on start
  servo write pin P0 to 180
  servo write pin P2 to 90

every 86400000 ms
  servo write pin P2 to 180
  pause (ms) 2000
  servo write pin P0 to 90
  pause (ms) 2000
  servo write pin P2 to 90
  pause (ms) 10000
  servo write pin P2 to 180
  pause (ms) 2000
  servo write pin P0 to 180
  pause (ms) 2000
  repeat 3 times
    servo write pin P2 to 90
    pause (ms) 2000
    servo write pin P2 to 180
    pause (ms) 2000
    servo write pin P2 to 90
    pause (ms) 2000
  servo write pin P2 to 90
```

https://makecode.microbit.org/_YF4ffUdgsab1

Demo



Objectives of Experiment 2

- Upload the pH value, temperature and turbidity to ThingSpeak everyday

Experiment 2 material

- 1 microbit
- 1 IoT bit
- 1 gravity: analog pH sensor
- 1 Temperature Sensor DS18B20
- 1 SEN0189 (Turbidity)

Coding for pH, temperature and turbidity

```
on start
  set ESP8266 RX P8 TX P12 Baud rate 115200
  connect Wifi SSID = "KSKC_eLearning" KEY = "Kskc24699010"
  if Wifi connected true then
    show icon [grid icon]
  forever
    set x to analog read pin P1 ÷ 1000
    set mx to -18.75 × x
    set pH to mx + 15.625
    connect thingspeak
    set data to send ThingSpeak
    Write API key = "DP3P89XWFT9JD7M0"
    Field 1 = pH
    Field 2 = pin2 Temperature_number
    Field 3 = analog read pin P3
    Upload data to ThingSpeak
```

https://makecode.microbit.org/_FvHKqx5XsMzH