

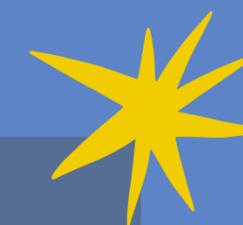
# The Education University of Hong Kong

## 2022-2023 Quality Education Fund Thematic Network - Tertiary Institutes

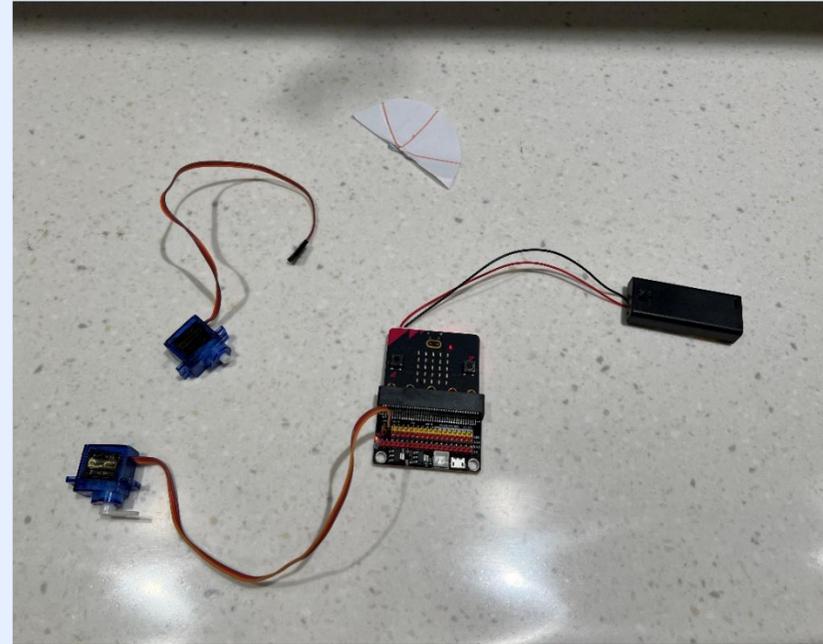
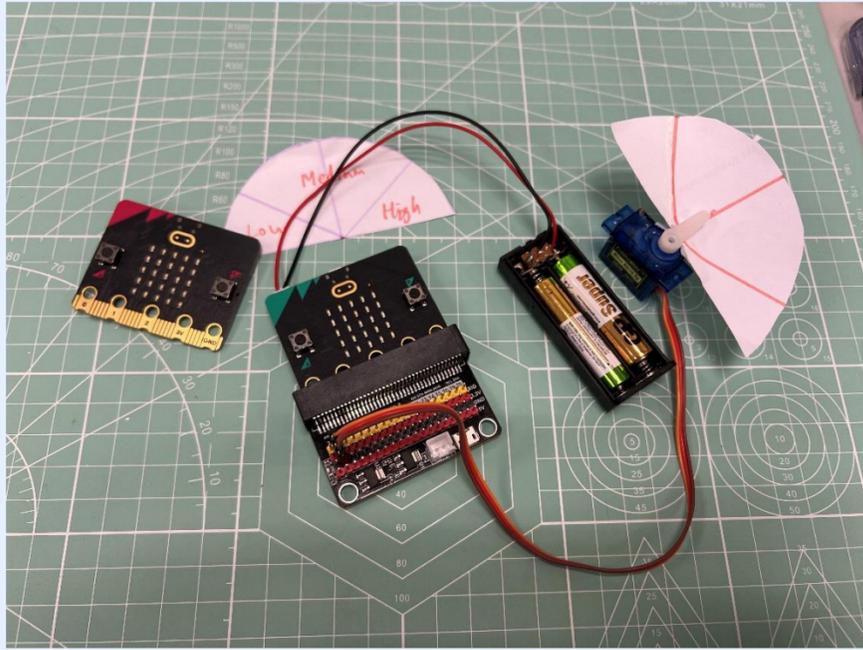
### STEM Project Team

SCHOOL: Sha Tin Methodist Primary School (P.5)

TOPIC: Sound insulation



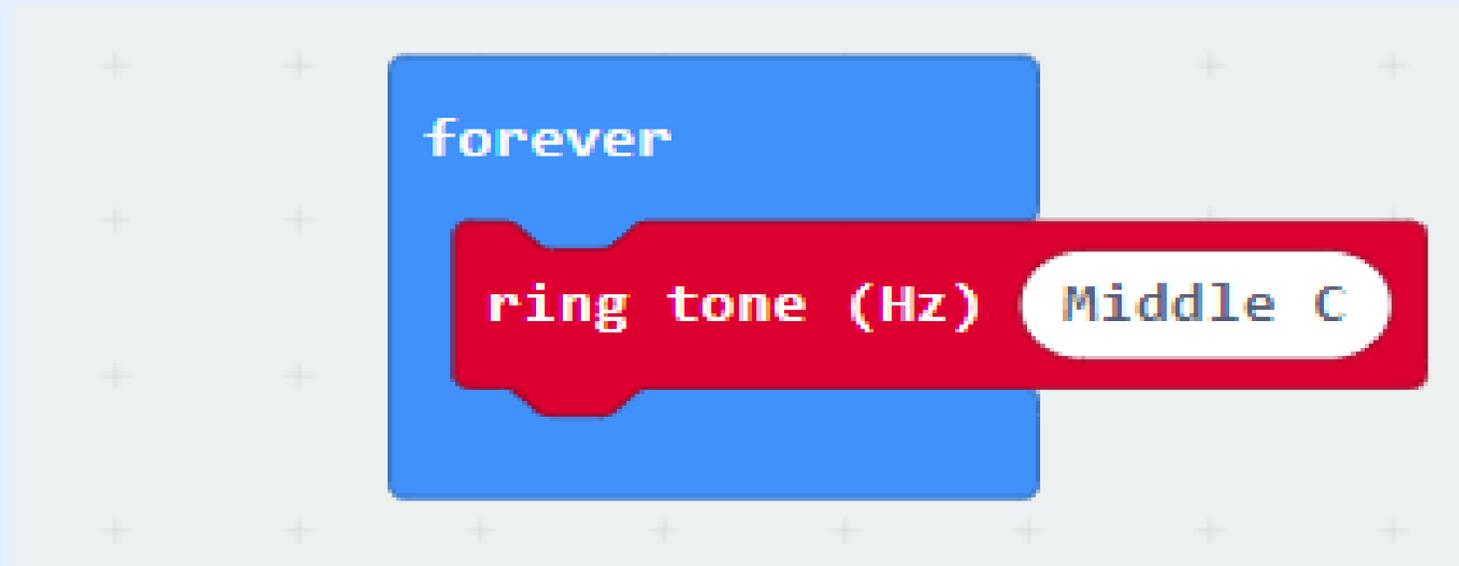
# Experiment material



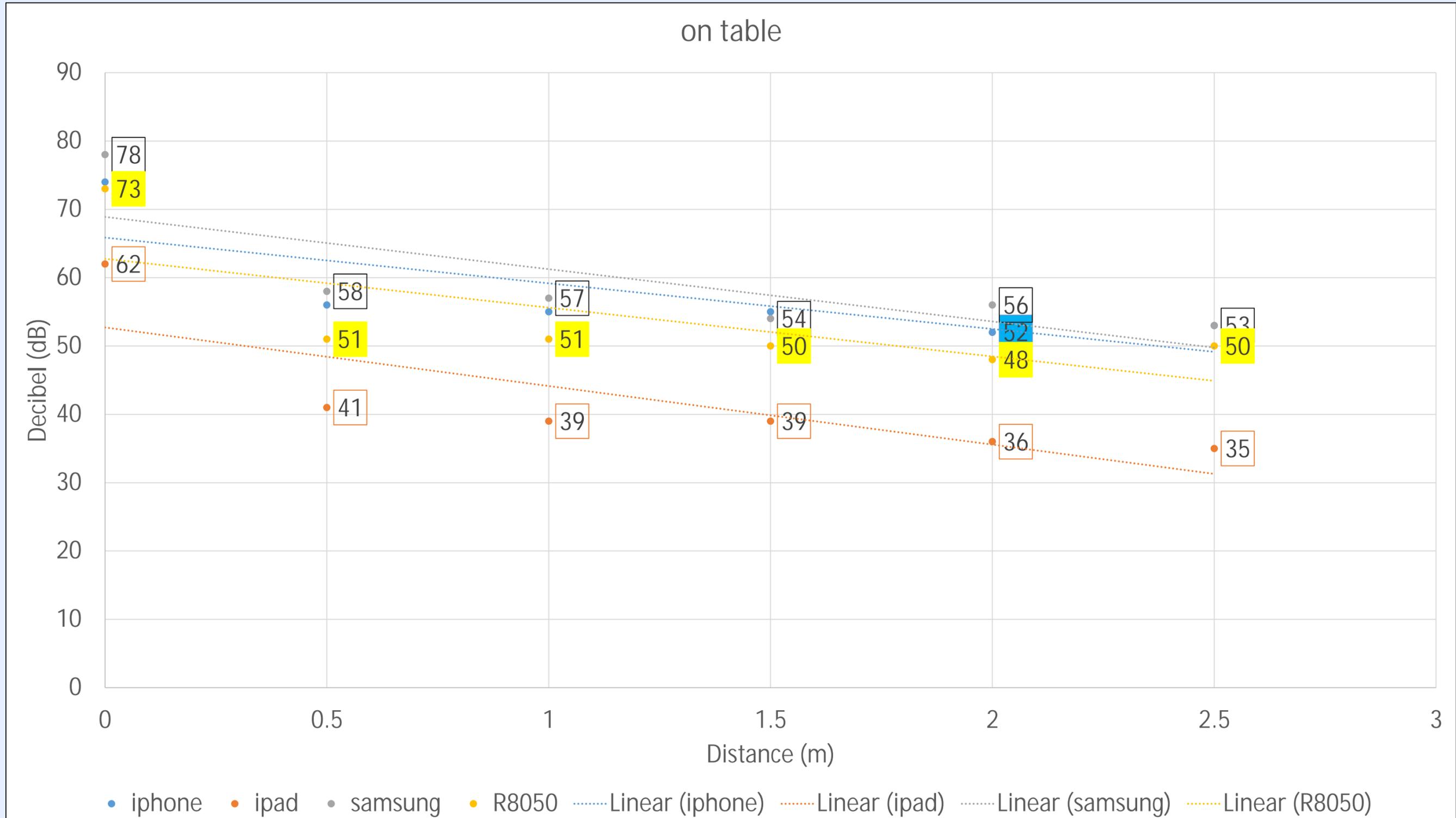
# Objectives of Experiment 1

- A) To compare sound meter apps on different device with Professional device R8050 in different distance
  
- B) To compare the sound meter level difference with the sound source place on the table and on the sponge by using different devices

# Sound Source Coding

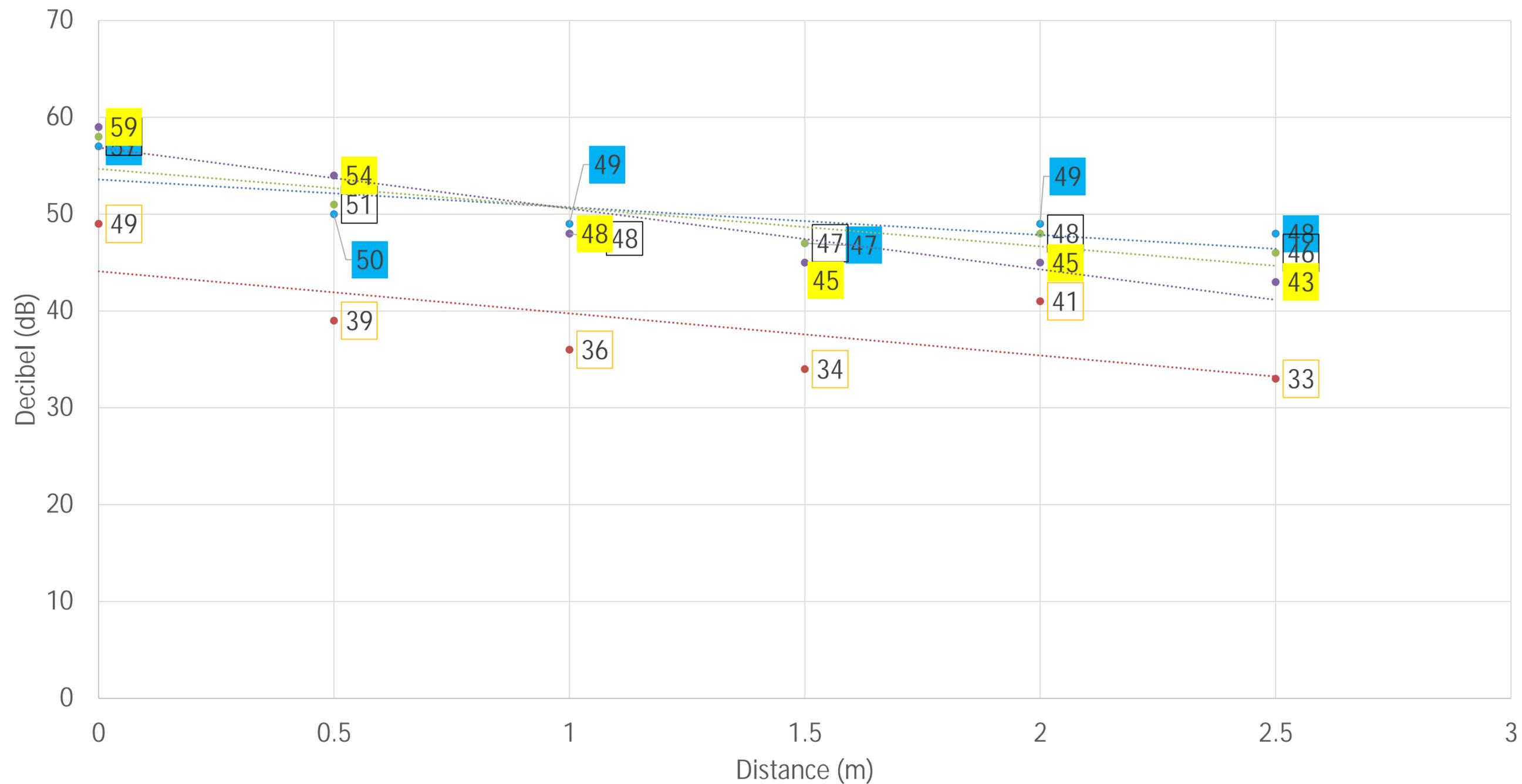


distance (on table)	R8050	iphone	calibration	ipad	calibration	samsung	calibration
0	73	74	-1	62	11	78	-5
0.5	51	56	-5	41	10	58	-7
1	51	55	-4	39	12	57	-6
1.5	50	55	-5	39	11	54	-4
2	48	52	-4	36	12	56	-8
2.5	50	53	-3	35	15	53	-3
/	/	/	Average -3.67	/	Average 11.8	/	Average -5.5



distance (on sponge)	R8050	iphone	calibration	ipad	calibration	samsung	calibration
0	59	57	+2	49	+10	58	+1
0.5	54	50	+4	39	+15	51	+3
1	48	49	-1	36	+12	48	0
1.5	45	47	-2	34	+11	47	+2
2	45	49	-4	41	+4	48	+3
2.5	43	48	-5	33	+10	46	+3
/	/	/	Average -1	/	Average 10.3	/	Average 2

on sponge



• iphone • ipad • samsung • R8050 ..... Linear (iphone) ..... Linear (ipad) ..... Linear (samsung) ..... Linear (R8050)



# Objectives of experiment 2

- To compare different sound source by using R8050 and Microbit

# Sound meter of micro:bit coding

```
forever
  plot bar graph of sound level
  up to 255
  if sound level < 5 then
    servo write pin P0 to 30
    pause (ms) 1000
  else if sound level > 60 then
    servo write pin P0 to 120
    pause (ms) 1000
  else
    servo write pin P0 to 90
    pause (ms) 1000

on button A pressed
  set max to 0
  if sound level > max then
    set max to sound level

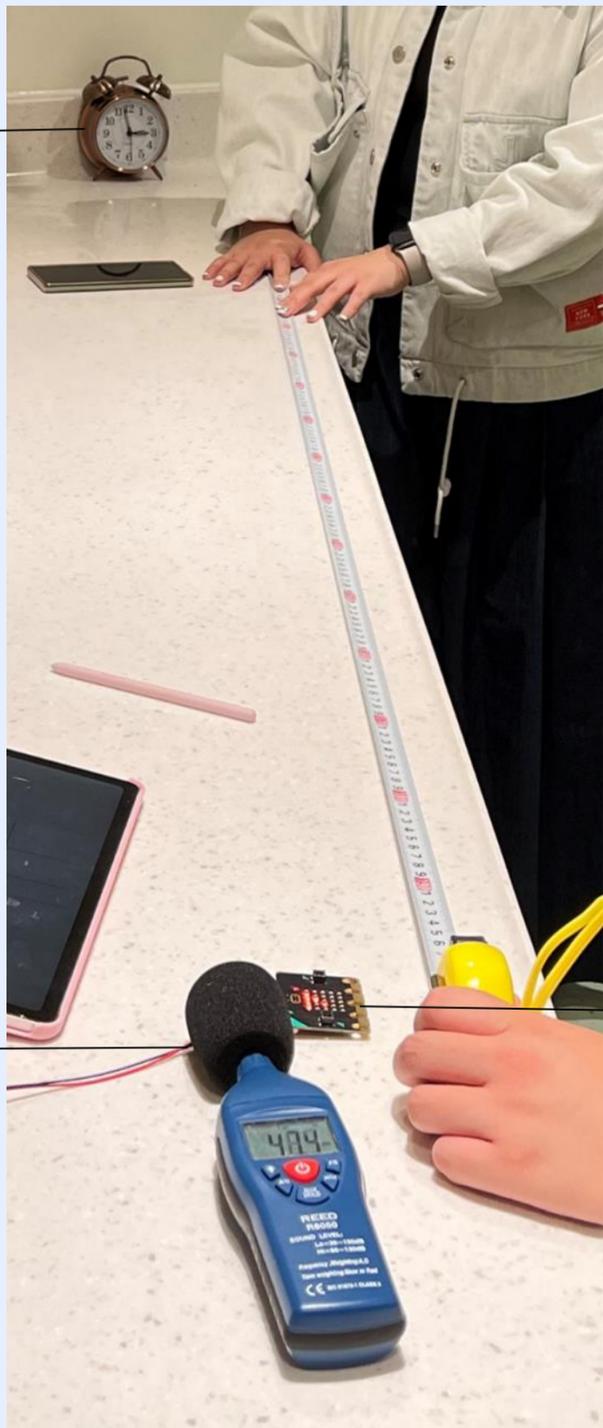
on button B pressed
  show number max
```

# Experiment 2

Distance (m)	clock	white noise
0	127/87	106/88
0.5	121/80	67/73
1	108/79	63/74
2	97/73	56/72

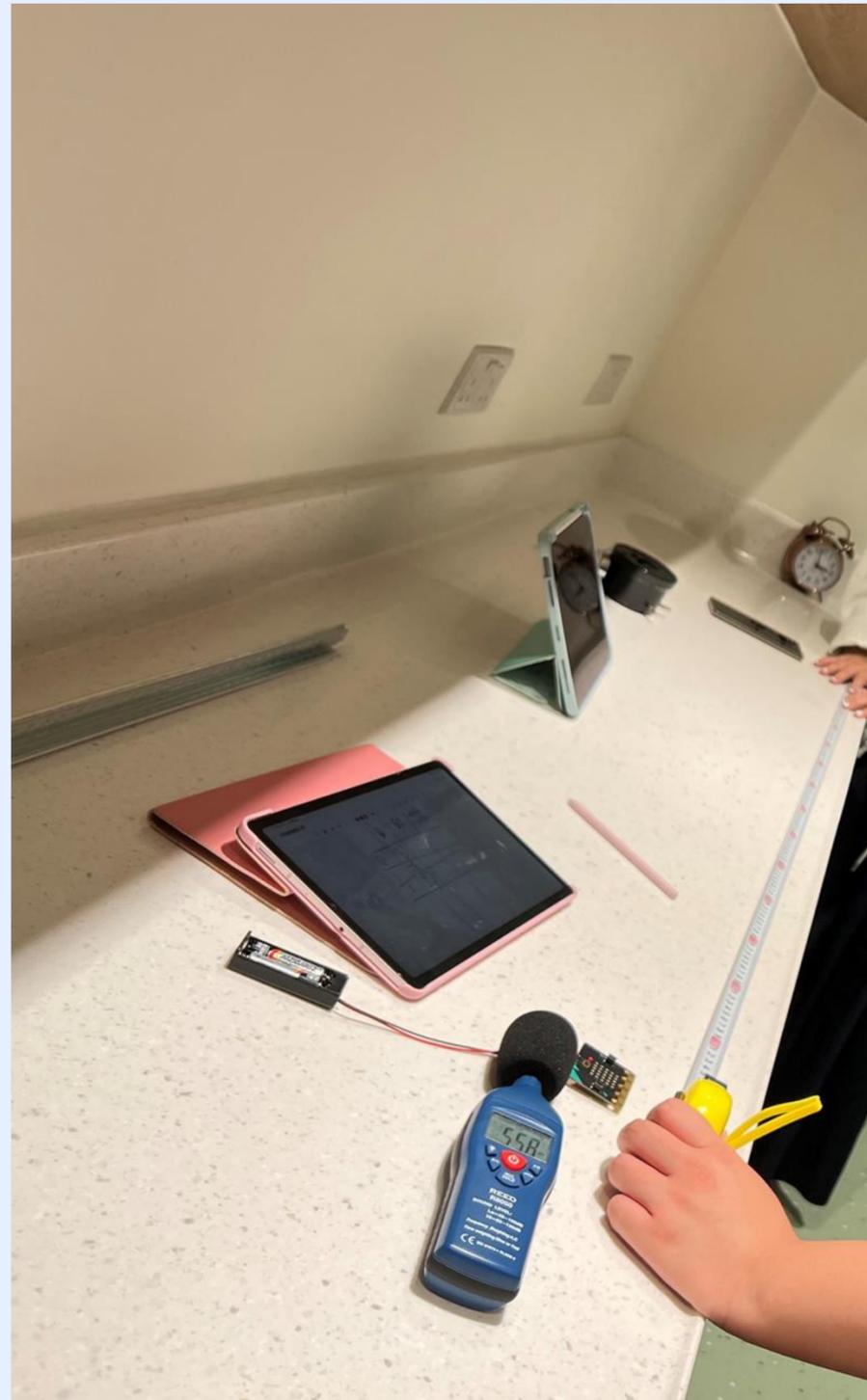
\*R8050/Microbit

Clock



R8050

Microbit



# Objectives of experiment 3

- To compare the effect of soundproofing of different sound insulation materials

# Experiment 3

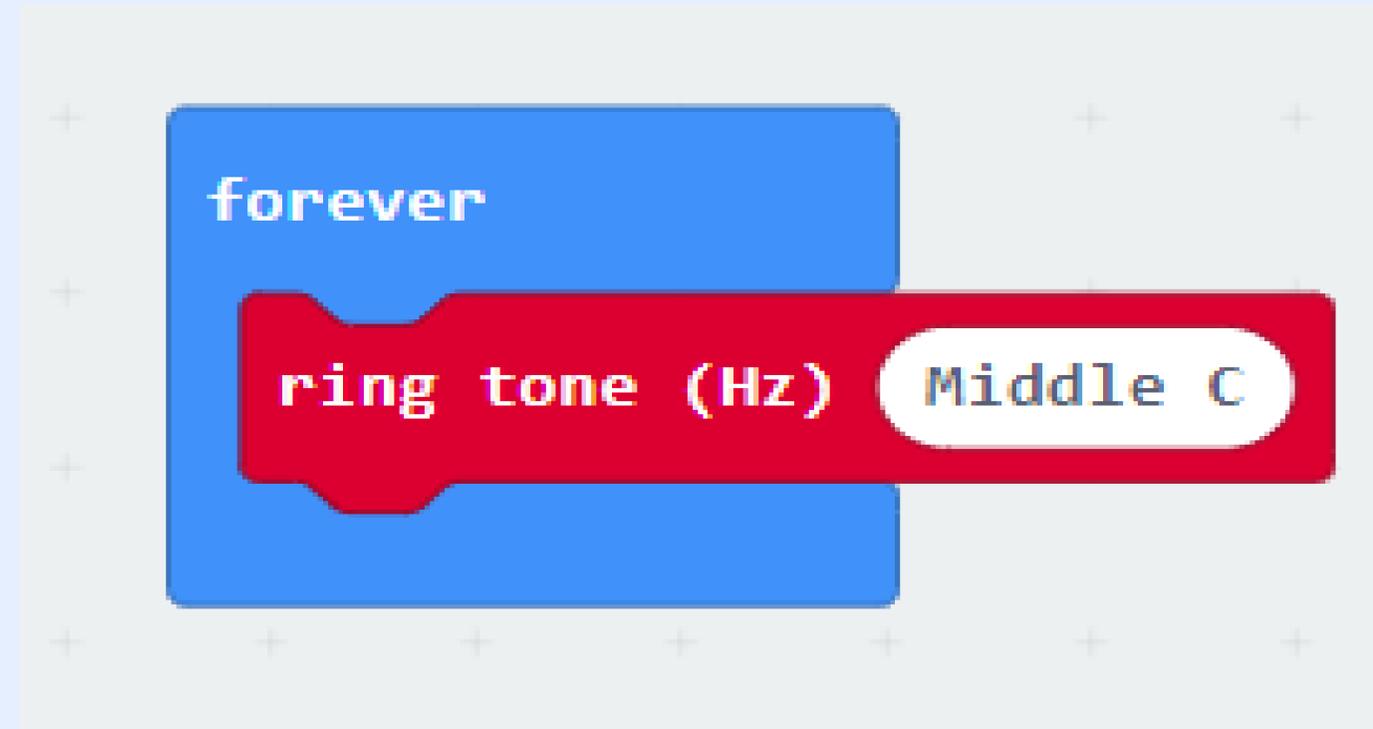
wrapping material	Decibel (dB)
none	71
pink gloves	62
white gloves	67
gray gloves	68
hand	50
all	45



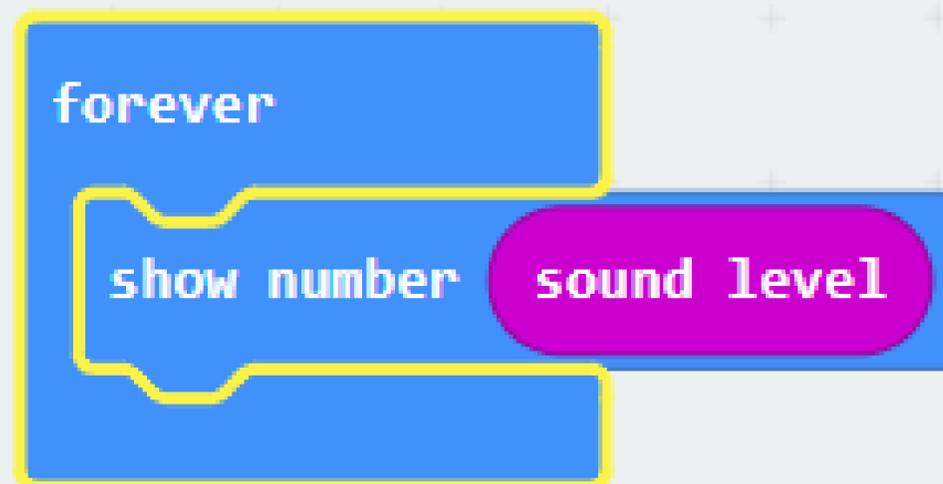
# Objectives of experiment 4

- Using Microbit as sound source, and measure sound level by using Microbit as sound meter

# Sound Source Coding



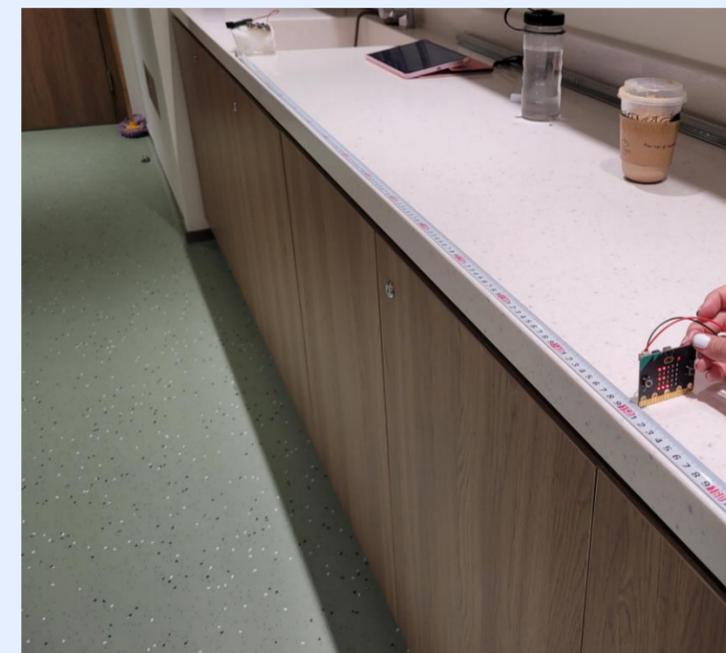
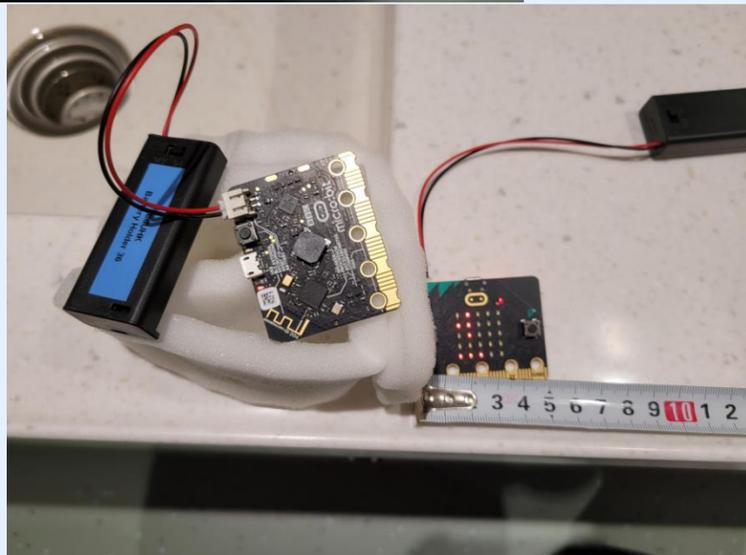
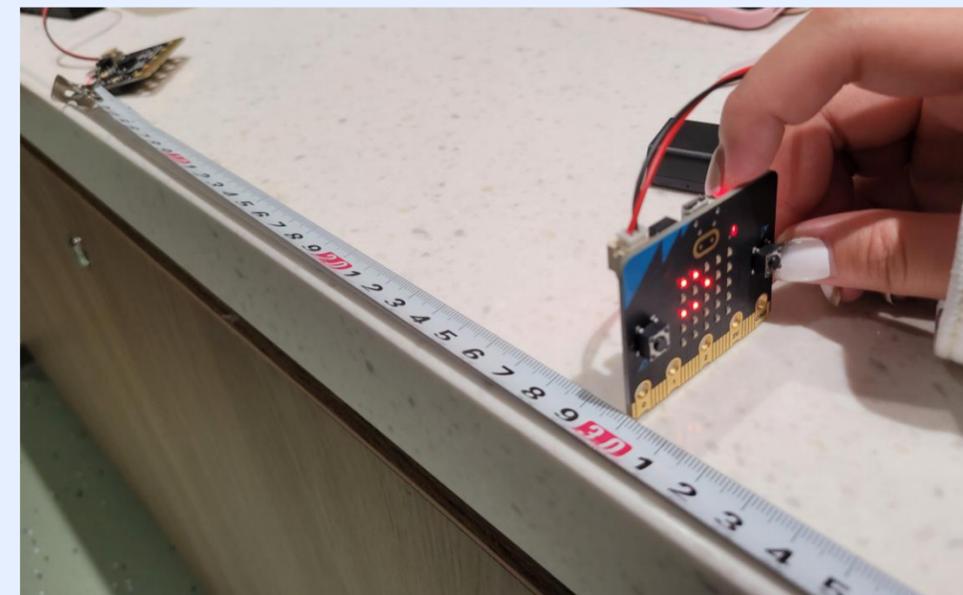
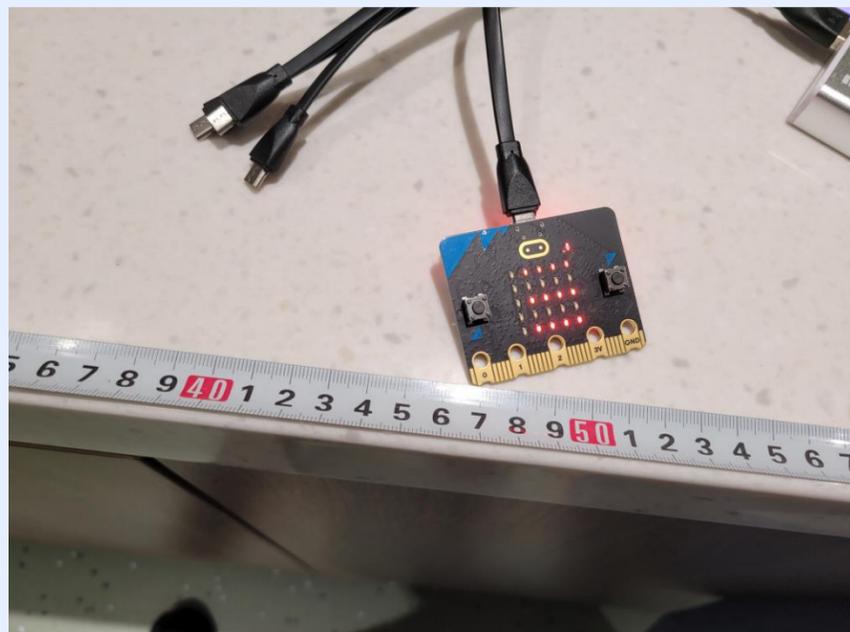
# Coding of sound meter in experiment 4



# Experiment 4

distance between 2 microbit (m)	Sound level of Microbit (receiver on table)	Average	Sound level of Microbit (receiver on sponge)	Average	Sound level of Microbit (both on sponge)	Average
0	60	60	52/56/60	56	33/37/48	39.3
0.5	22/30	26	22/30	26	15/22/33	23.3
1	15/22/30	22.3	22/30	26	15/22/30	22.3
1.5	22/30	26	15/22/30	22.3	15/22/30	22.3
2	15/22/30	22.3	15/22/30	22.3	22/30	26

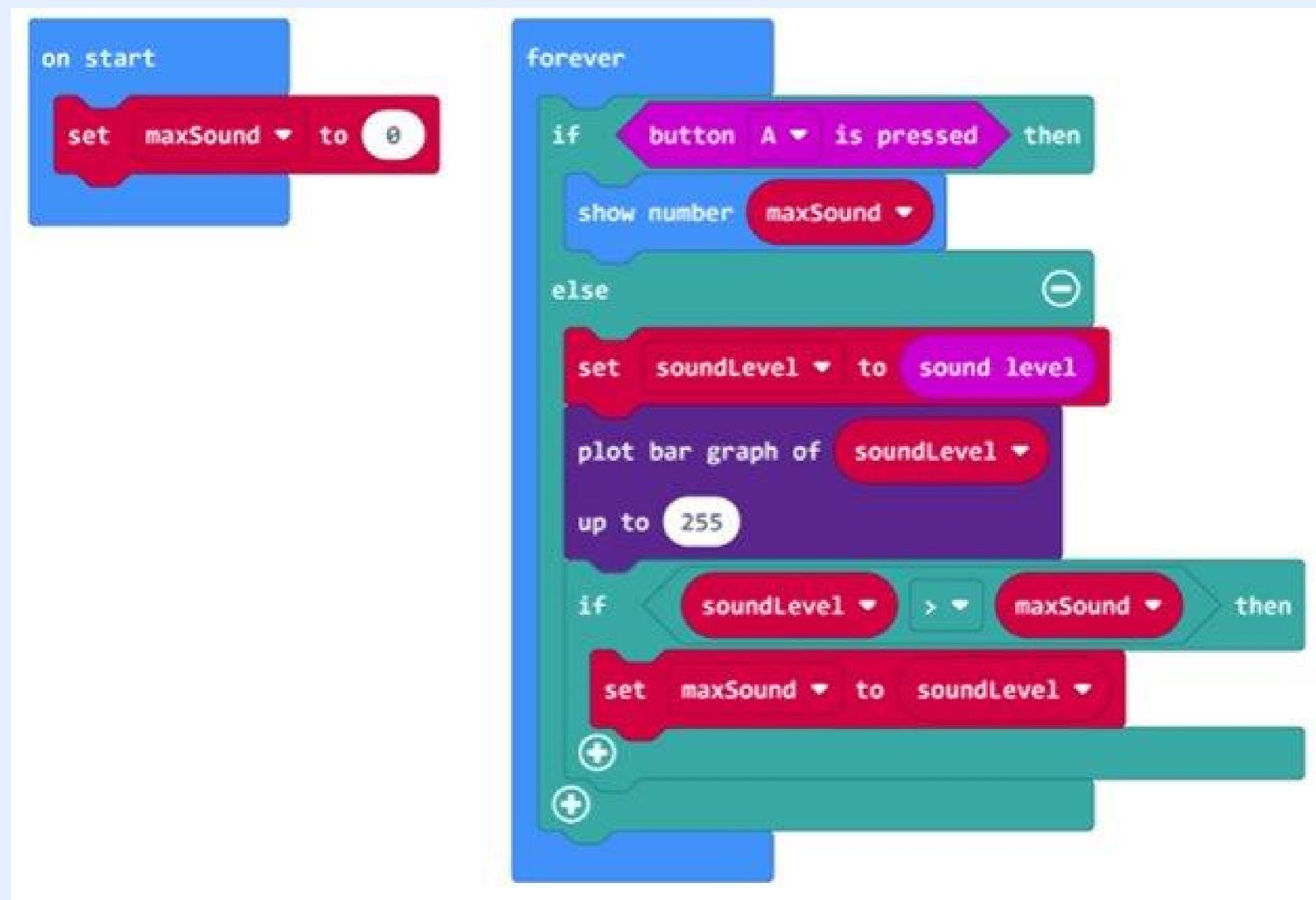
\* Result of holding and rotating the receiving micro:bit board do not have clear difference.



# Objectives of experiment 5

- Using Microbit as a sound logger to detect the maximum sound level of different sound source in the same distance(0m)

# Coding of sound logger in experiment



```
on start
  set maxSound to 0

forever
  if button A is pressed then
    show number maxSound
  else
    set soundLevel to sound level
    plot bar graph of soundLevel
    up to 255
    if soundLevel > maxSound then
      set maxSound to soundLevel
```

The image shows a Scratch script for a sound logger. It starts with an 'on start' block containing a 'set maxSound to 0' block. This is followed by a 'forever' loop. Inside the loop, there is an 'if button A is pressed then' block that shows the 'maxSound' variable. An 'else' block follows, which contains a 'set soundLevel to sound level' block, a 'plot bar graph of soundLevel' block with 'up to 255' as the range, and another 'if soundLevel > maxSound then' block that sets 'maxSound' to 'soundLevel'.

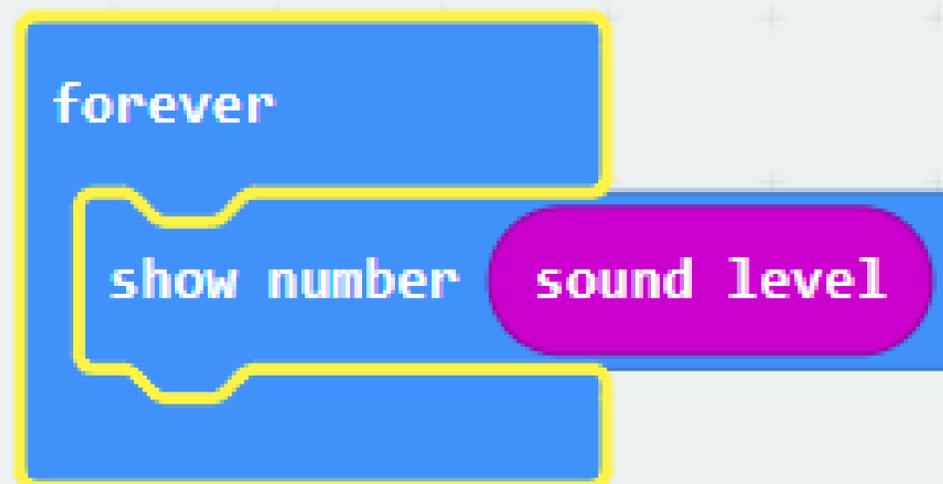
# experiment 5

sound source	Max sound level
Clock	131
2 clocks	131
human screaming	131
2 human screaming	131
all	131

# Objectives of experiment 6

- Compare the sound level differences of R8050 and Microbit by using Microbit as a sound source in the same distance(0m)

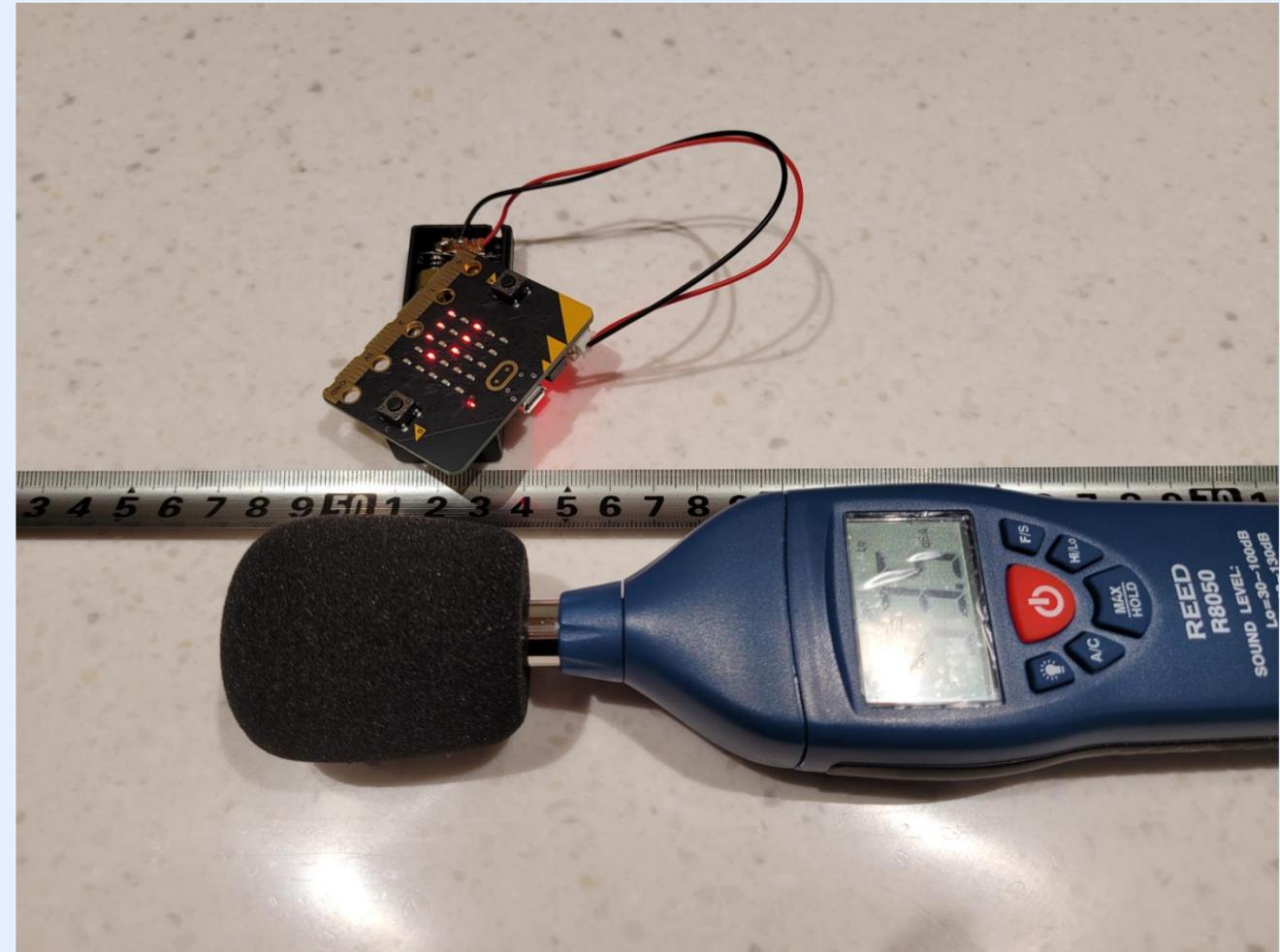
# Coding of sound meter in experiment 6



# experiment 6

distance	Microbit sound level	R8050 decibel
0	60	70.2
0.5	15	53.2
1	15	50
1.5	15	48.2
2	15	46.3

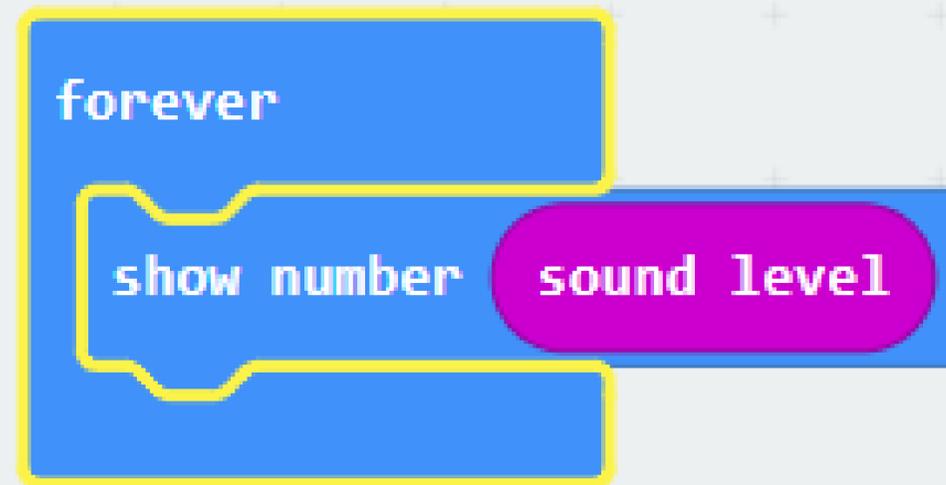
# experiment 6



# Objectives of experiment 7

- Compare the sound level differences of R8050 and Microbit by using Microbit as a sound source in the same distance(0m) with different Sound insulation material

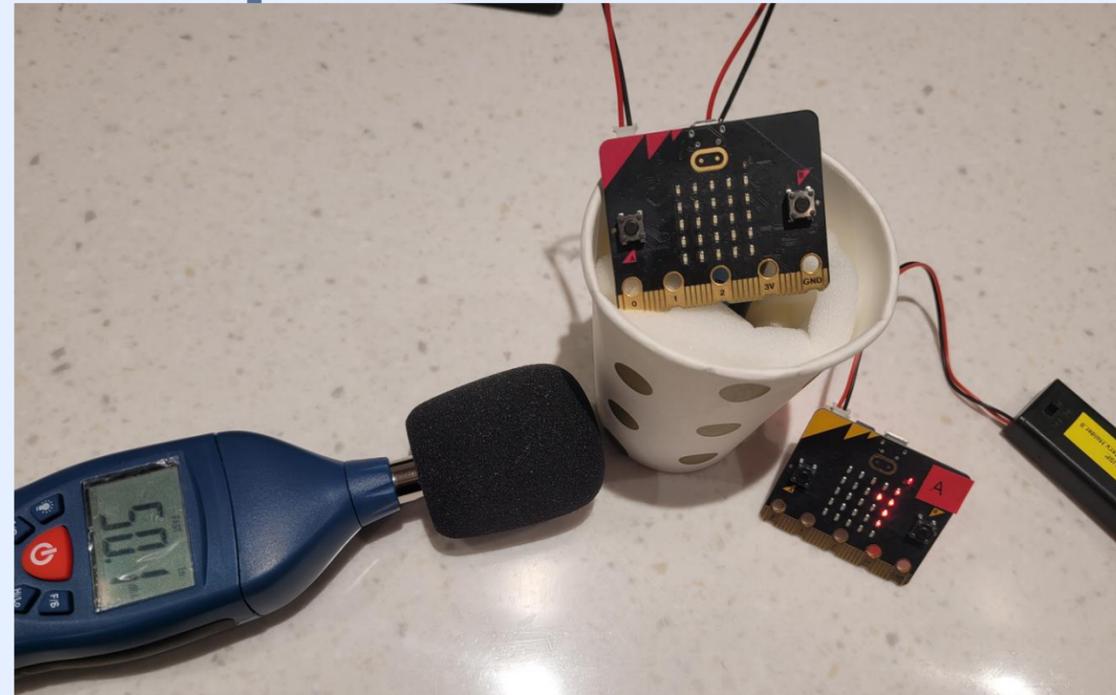
# Coding of sound meter in experiment 7



# experiment 7

Sound insulation material	Micro:bit sound level	R8050 decibel
N/A	45	74
inside a paper cup with sponge	30	64
inside a box with sponge (open)	15	60
inside a box with sponge (close)	7	46

# experiment 7



# Objectives of experiment 8

- Use Microbit A as sound meter and sender and Microbit B as receiver that receive data from Microbit A, and use 165Hz from Iphone as sound source, to detect the sound level by using different materials for sound insulation in 1m.
- A# Sound source in box
- B# Sound meter in box
- Sound source: <https://www.youtube.com/watch?v=bZyCHCop2WQ>

# experiment 8

Experiment 8a	Sound level
N/A	56
on the box with sponge	37
inside the box with sponge	30

Experiment 8b	Sound level
N/A	56
on the box with sponge	37
inside the box with sponge	30

# Coding of sender

```
on start
  radio set group 3

forever
  set sound level to sound level
  if < sound level > > max sound level then
    set max sound level to sound level
    +
    radio send number max sound level
  pause (ms) 2000
```

# Coding of receiver

```
on start
  radio set group 3

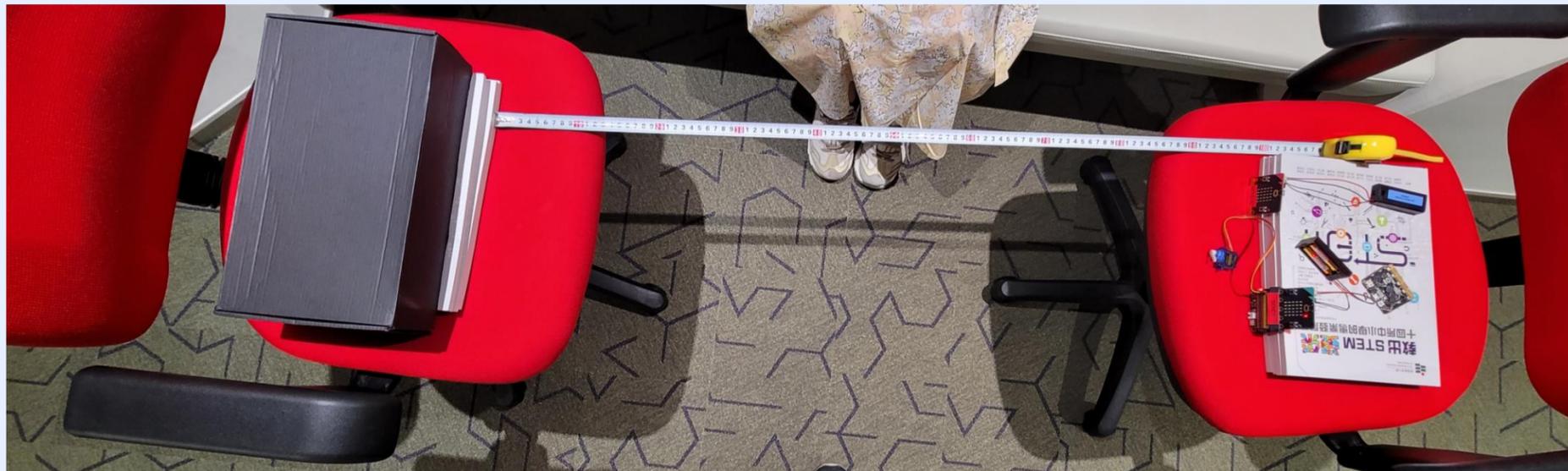
forever
  servo write pin P0 to max

on radio received receivedNumber
  show number receivedNumber
  set max to receivedNumber

on button A pressed
  set max to 0
  servo write pin P0 to 0
```

# experiment 8a

## Sound source in box



\* with video



experiment 8b

Sound meter in box

\* with video

# Objectives of experiment 9

Calibration to find out the

# Objectives of experiment 2

- To compare different sound source by using R8050 and Microbit

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