

The Education University of Hong Kong 2021-2022 Quality Education Fund Thematic Network - Tertiary Institutes STEM Project Team

SCHOOL: KOWLOON TONG GOVERNMENT PRIMARY
SCHOOL (P6)

TOPIC: AUTOMATIC WATERING SYSTEM FOR PLANTS

Plant Hotel

Soil Moisture Sensor

土壤濕度計

HW-080



Micro DC 3-6V Submersible Mini Water Pump/DC Motor

直流小水泵 3V-6V



The moisture of soil gets low sensed by the soil moisture sensor,
the water pump will start adding water to the soil.

當土壤濕度計檢測到土壤濕度低，水泵就會開始向土壤中加水。

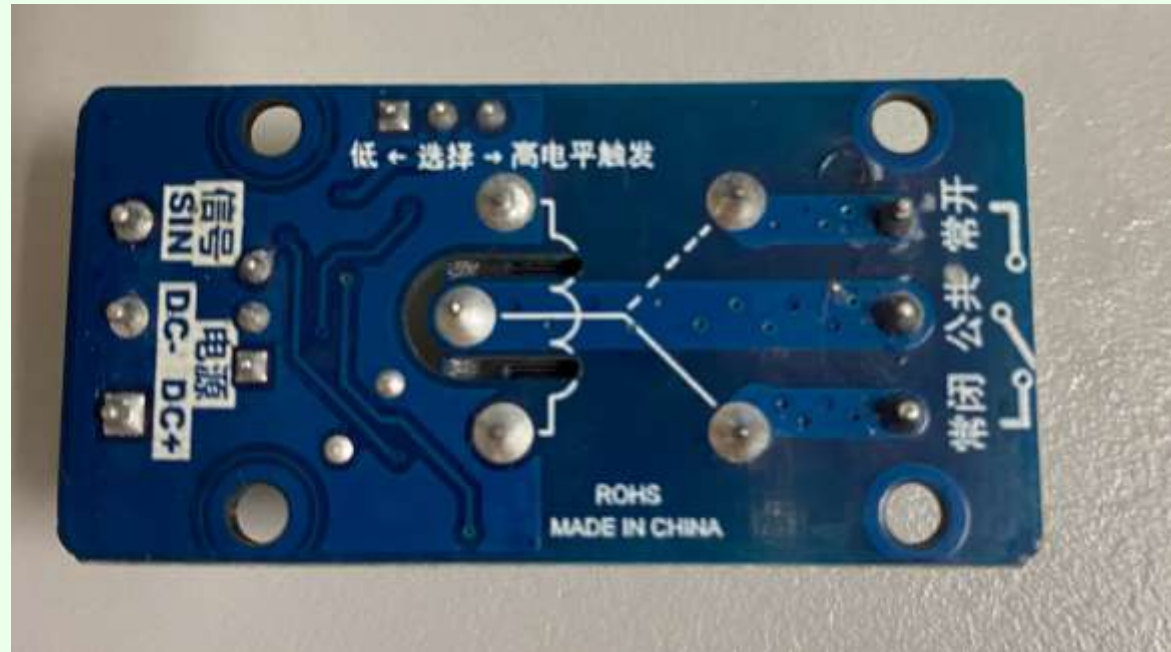
Soil Moisture Sensor 土壤濕度計



HW-080

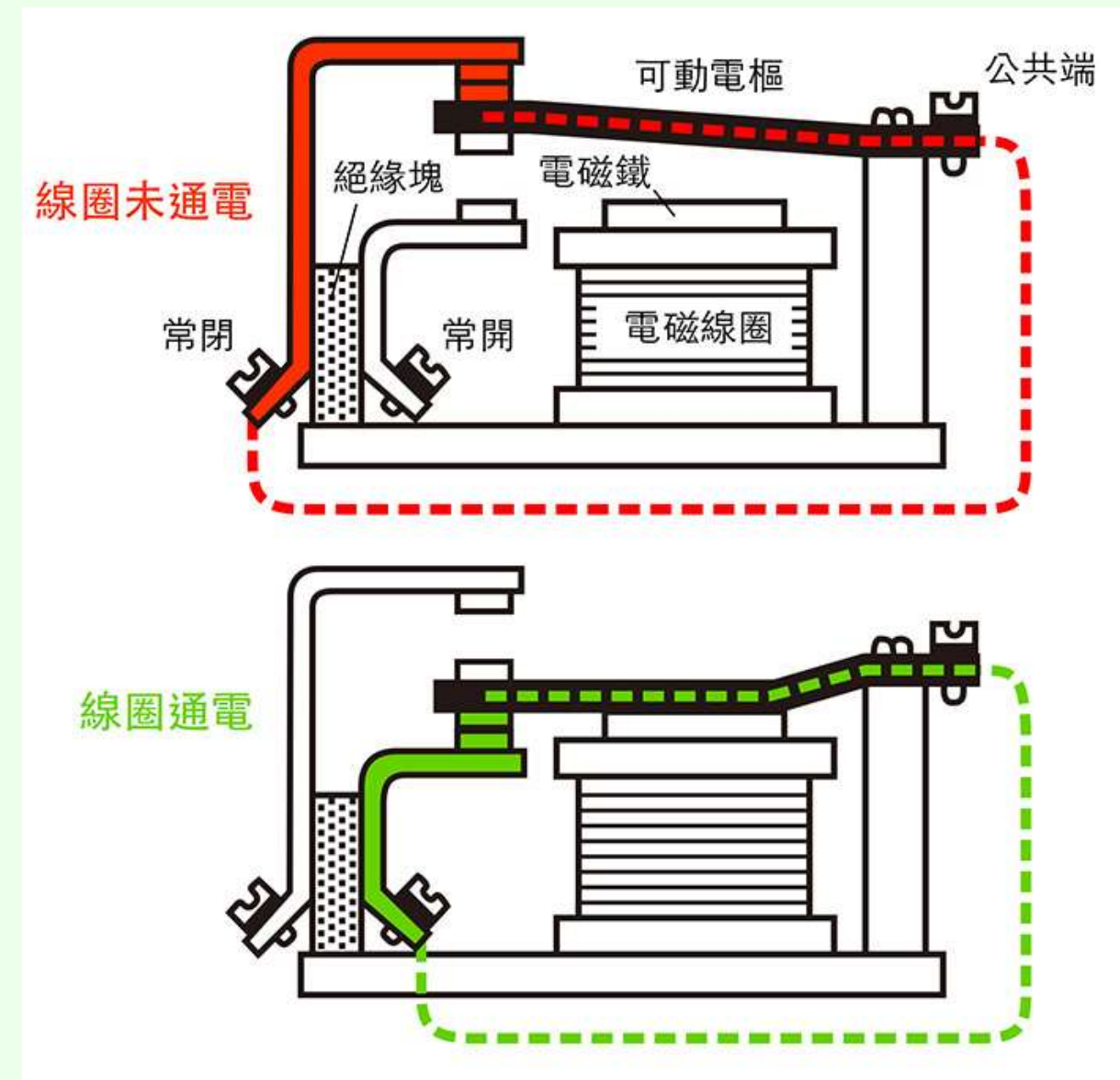
- **Measures soil moisture** due to the changes in electrical conductivity.
(測量土壤濕度對電導率變化的影響。)
- **Soil resistance increase with drought.**
(土壤電阻隨著乾旱而增加。)
- A **resistive soil moisture sensor** works by using the relationship between **electrical resistance** and **water content** to gauge the moisture levels of the soil.
(電阻式土壤濕度傳感器通過使用電阻和含水量之間的關係來測量土壤的濕度水平。)
- The electrical resistance is measured between the **two electrodes** of the sensor.
(在傳感器的兩個電極之間測量電阻。)

Relay Module 繼電器

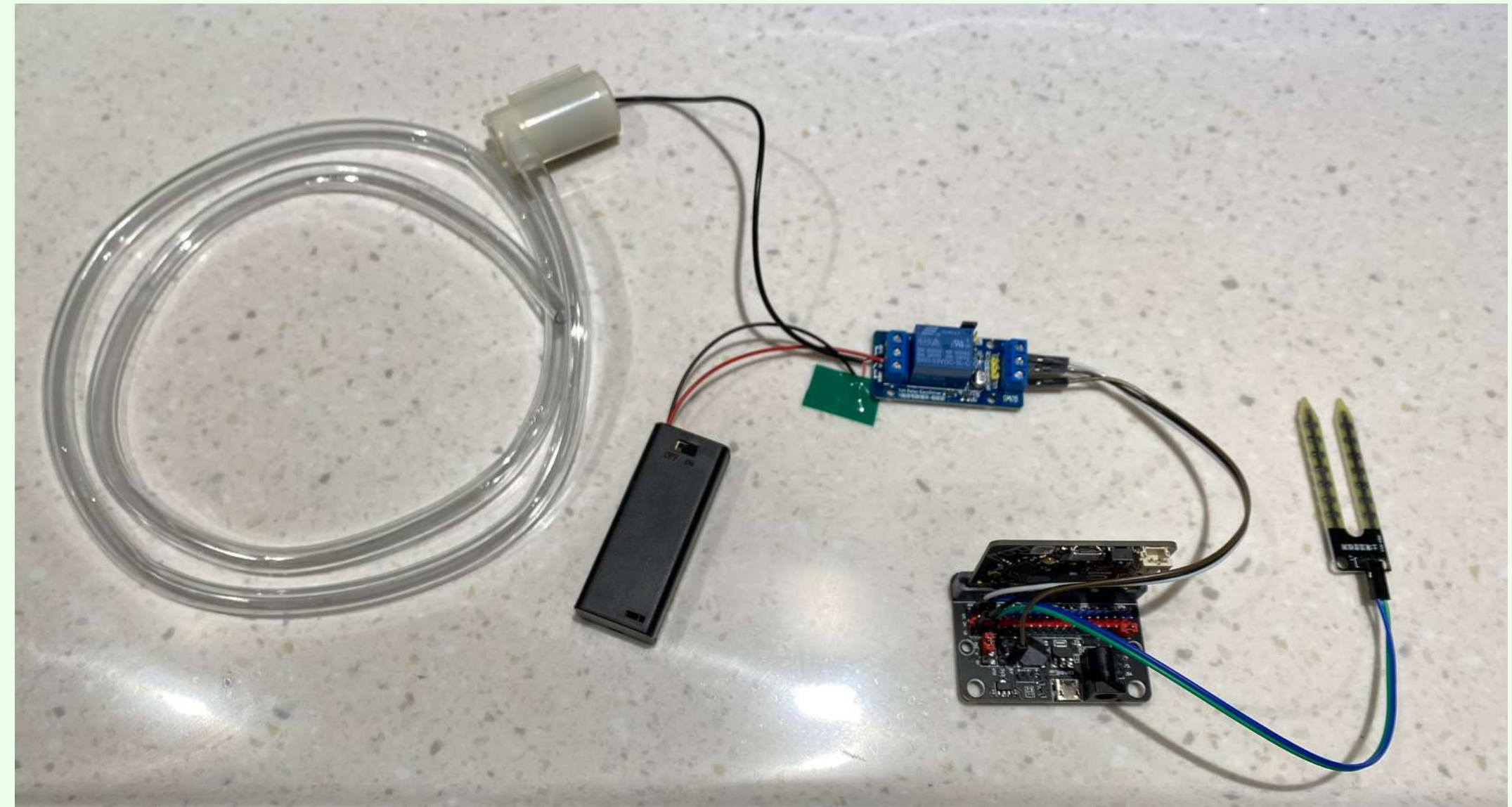
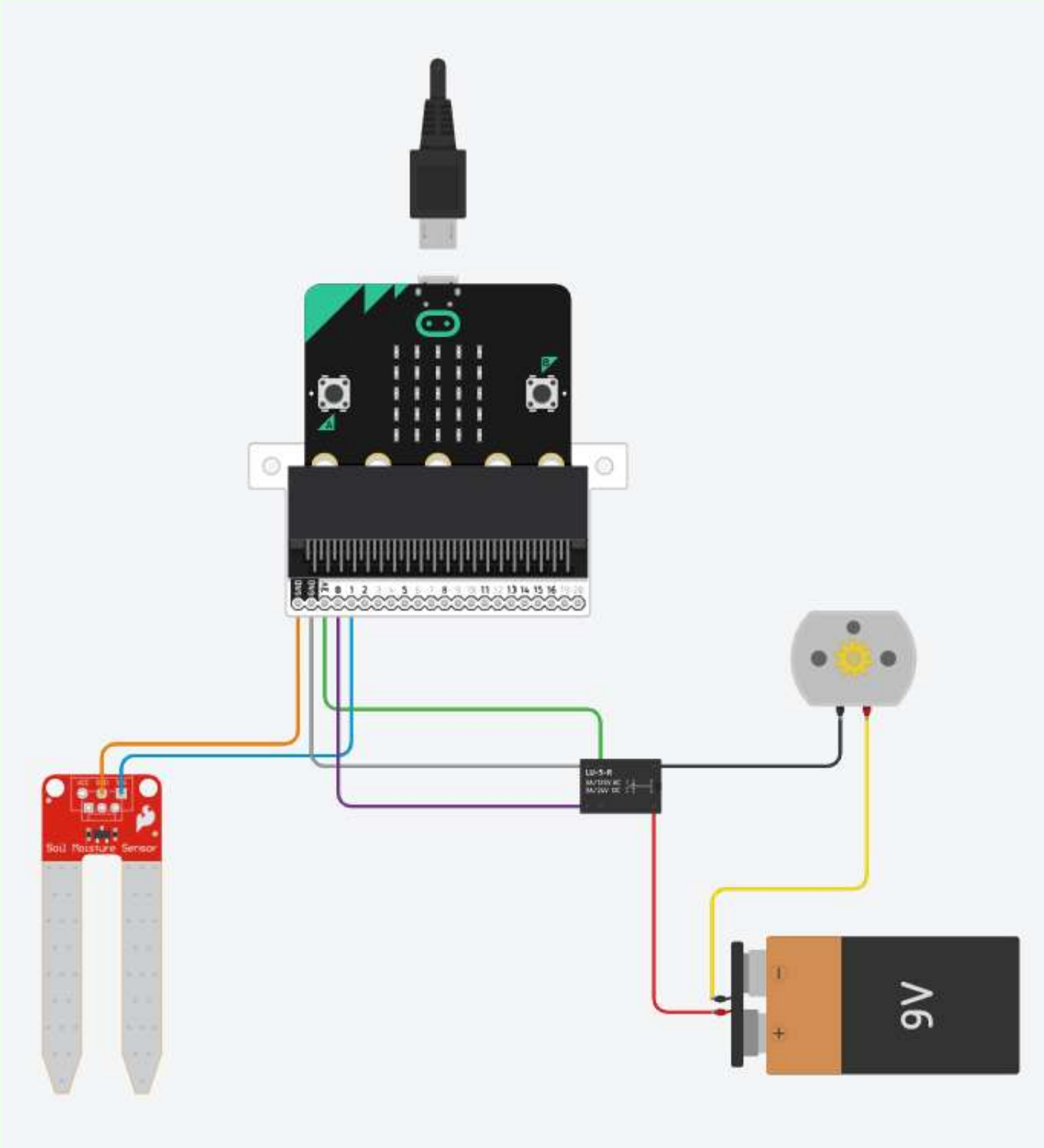


SRD-03VDC-SL-C

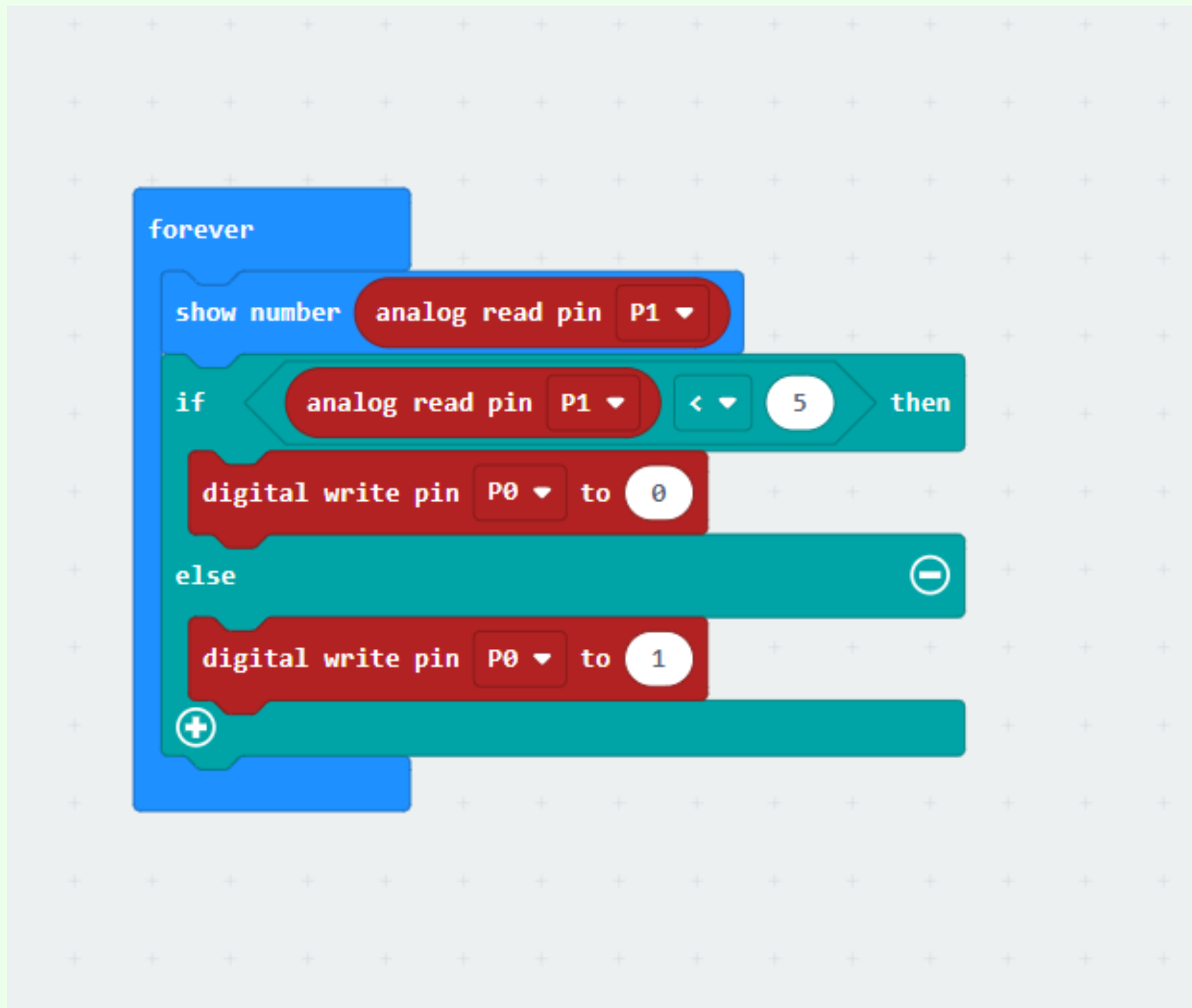
- An electronic control device.
(電子控制器件。)
- Usually used in automatic control circuits.
(通常應用於自動控制電路中。)
- Uses a smaller current to control a larger current.
(用較小的電流去控制較大電流。)
- Function: Safety protection and conversion circuit.
(有安全保護、轉換電路等作用。)



Circuit



Coding

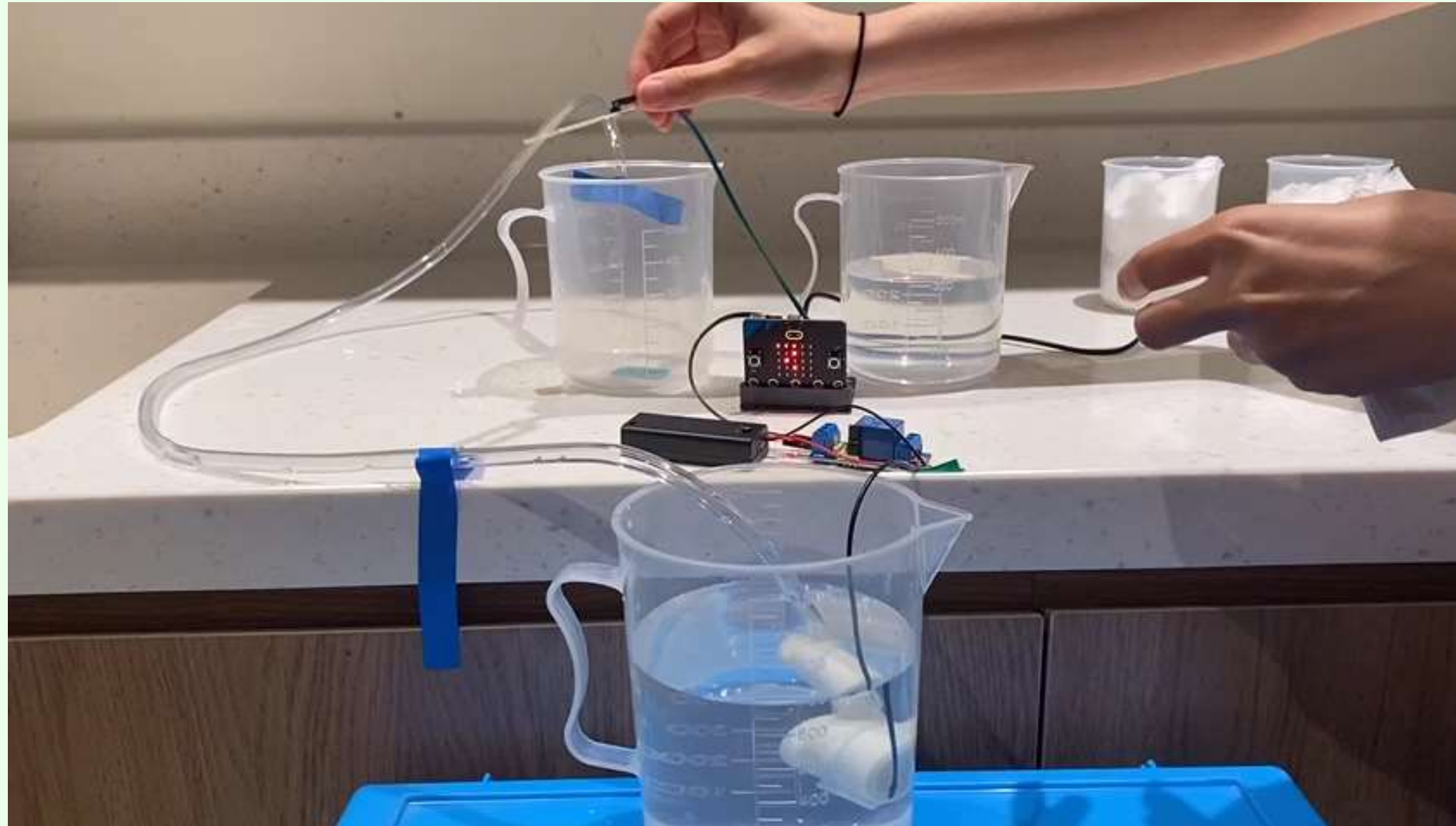


```
forever
  show number analog read pin P1
  if analog read pin P1 < 5 then
    digital write pin P0 to 0
  else
    digital write pin P0 to 1
```

P0 = Water Pump

P1 = Soil Moisture Sensor

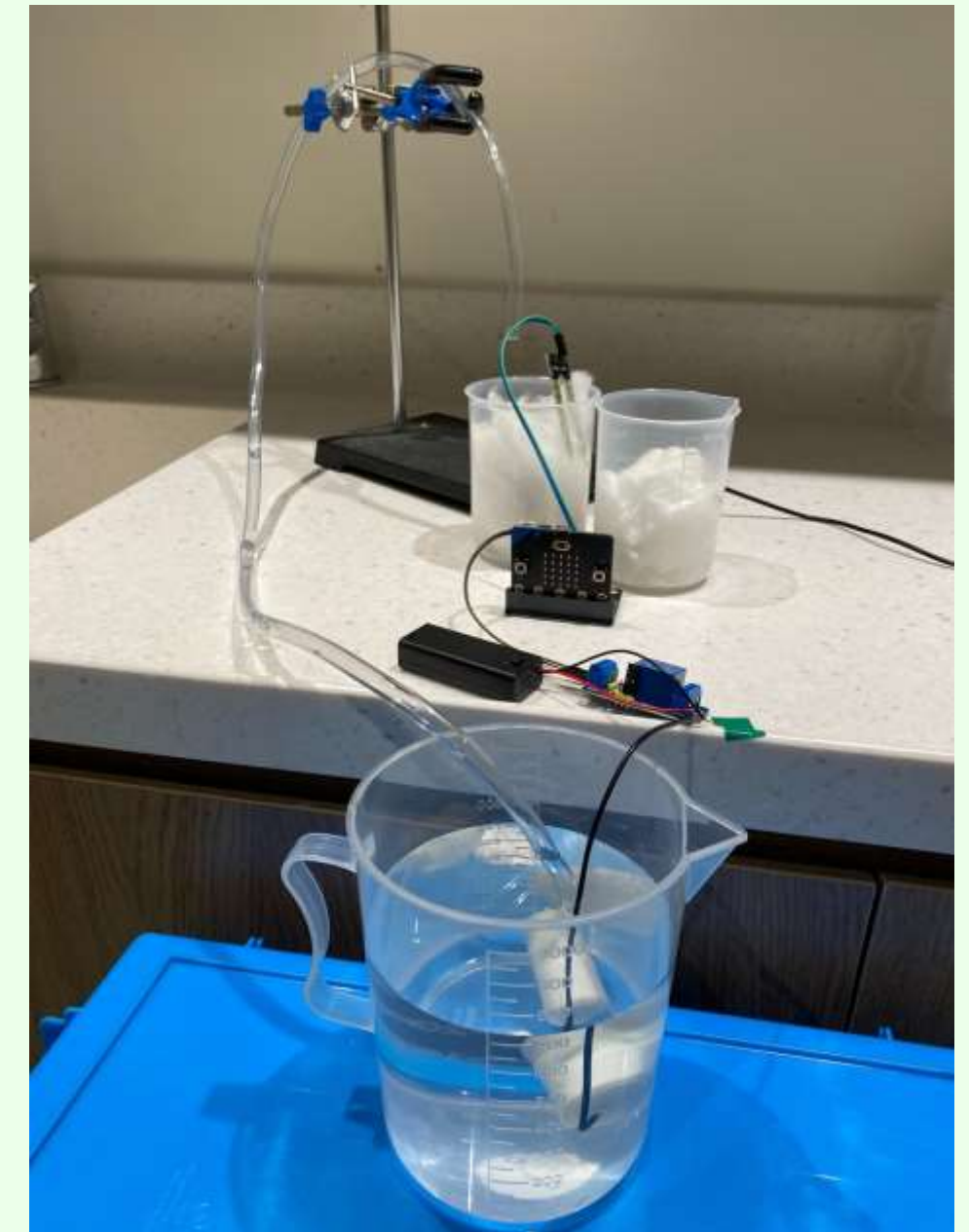
Trial 1 - Air vs Water



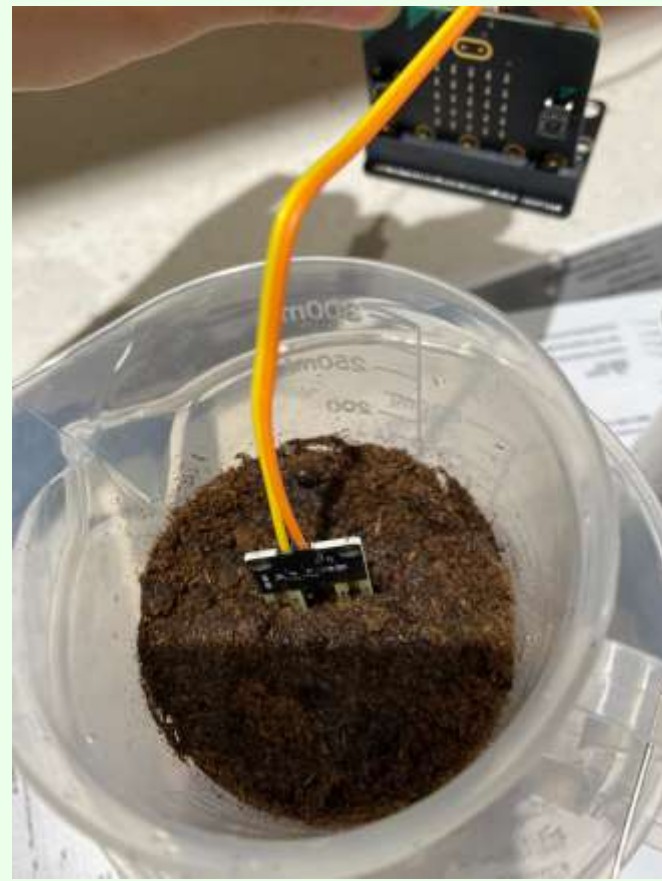
Substance	Air	Water
Measure (Mirco:bit)	600-700	30-50

Trial 2 - Dry Cotton vs Wet Cotton

Substance	Cotton (Dry)	Cotton (Wet)	Cotton (Super Wet)
Measure (Micro:bit)	600-700	50-60	0-30



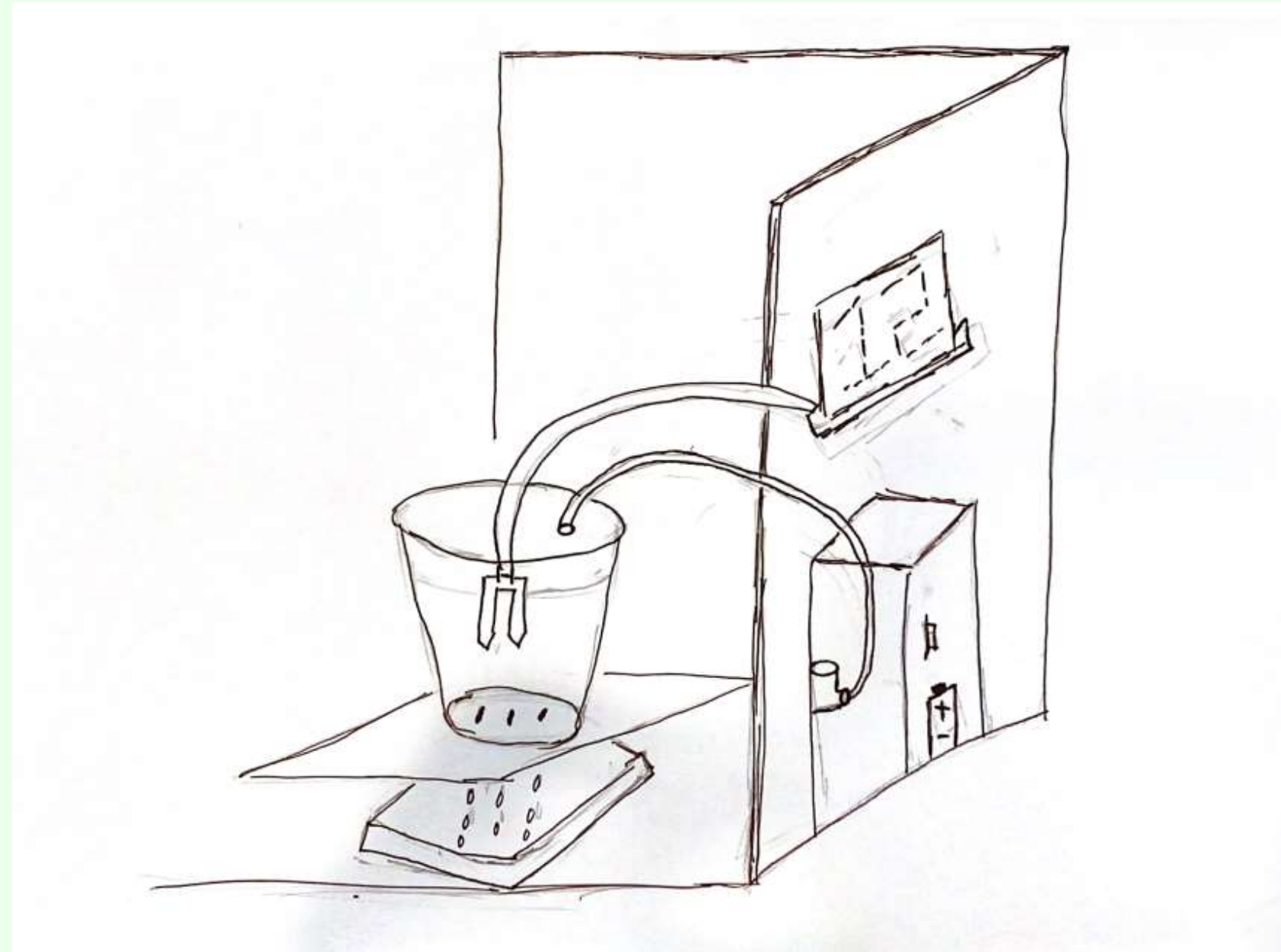
Trial 3 - Dry Soil vs Wet Soil



Substance	Soil (Dry)	Soil (Wet)	Soil (Super Wet)
Measure (Mirco:bit)	70-120	20-30	0



Design



Closed Circuit, Coding, Basic Application of Sensor

(閉合電路、編程、傳感器基本應用)

Material List

No.	Product	Unit Price	Estimated Quantity
1	Relay 繼電器	HKD 6 *未計運費	110
2	DC Water Pump 水泵 & Water Pipe 水管	水泵: HKD 5 水管 (1M): HKD 2 *未計運費	水泵: 110 水管: 60M
3	Soil Moisture Sensor 土壤濕度計	HKD 2 *未計運費	110
4	Battery Case 電池盒 & Battery 電池	電池盒(連蓋): HKD 4 電池(兩粒): HKD 3 *未計運費	電池盒(連蓋): 110 電池(兩粒): 110

Material List

No.	Product	Unit Price	Estimated Quantity
5	Extension Board 擴展板	HKD 28 *未計運費	110
6	Dupont Line 杜邦線	FF(21cm): HKD 3 MM(21cm): HKD 5 MF(21cm): HKD 5 *未計運費	50
7	脫導線鉗	RKY-116B: HKD 68 *未計運費	10

Q & A