



Explore our Earth from horizon above

ARKLAB _ Ruby Huang





Ruby Huang

HJUAV- Marketing executive

**Feng Chia University, Taiwan – BIBA
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C.D.I.O



Conceive



Design



Implement



Operate

Courses outline

Class 1.

UAV Programming and Flight Demonstration

Class 2.

Monitoring Environment Change with Drone Technology

C**Introduction to flight****Introduction to UAV****D****Programming****UAV Control****I****Hands on UAV****Drone DIY****O****UAV Application****UAV v.s. SDGs**



I. Introduction to Flight & UAV





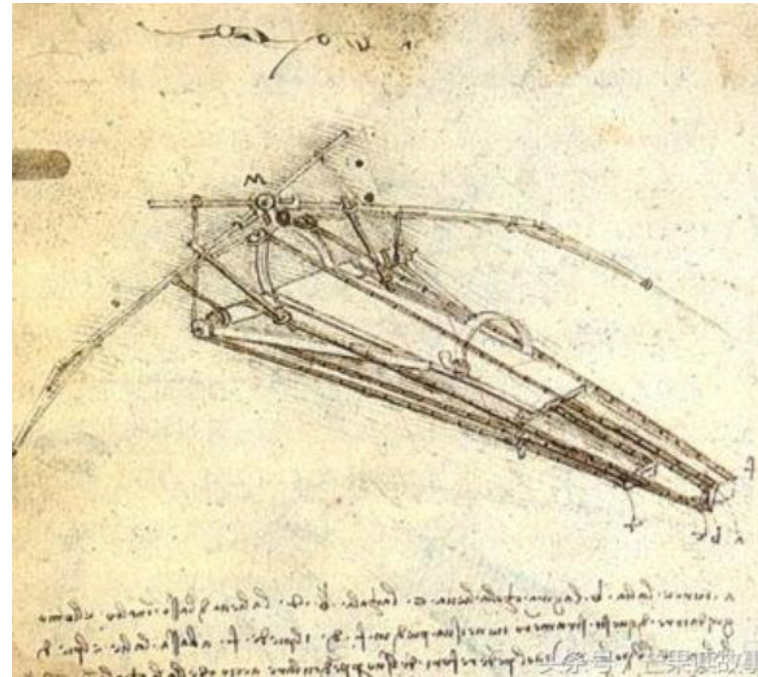
Part I. Introduction to Flight



Have you ever think that you can fly in the sky?

https://www.youtube.com/watch?v=_d2BvnPy4ZQ

Ornithopters



The Birth of Aerial Vehicle

George Cayley

- Fixed-wing aircraft
- Thrust and lift structure should separated

“The Father of Aeronautics”

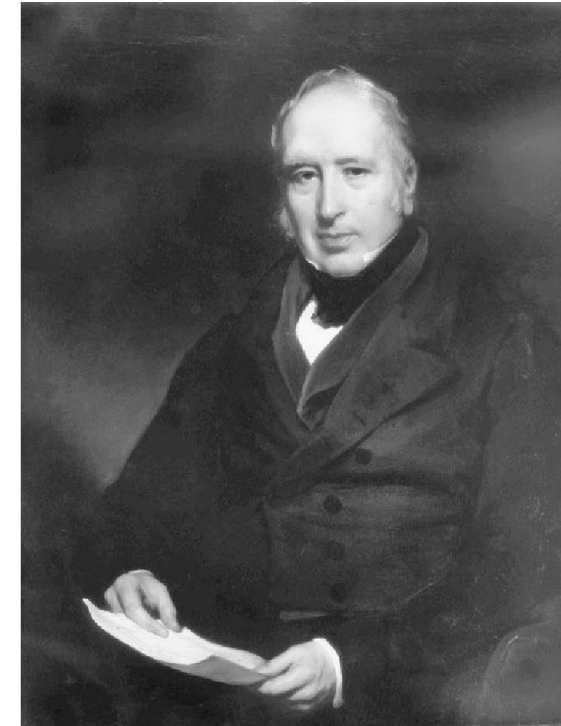
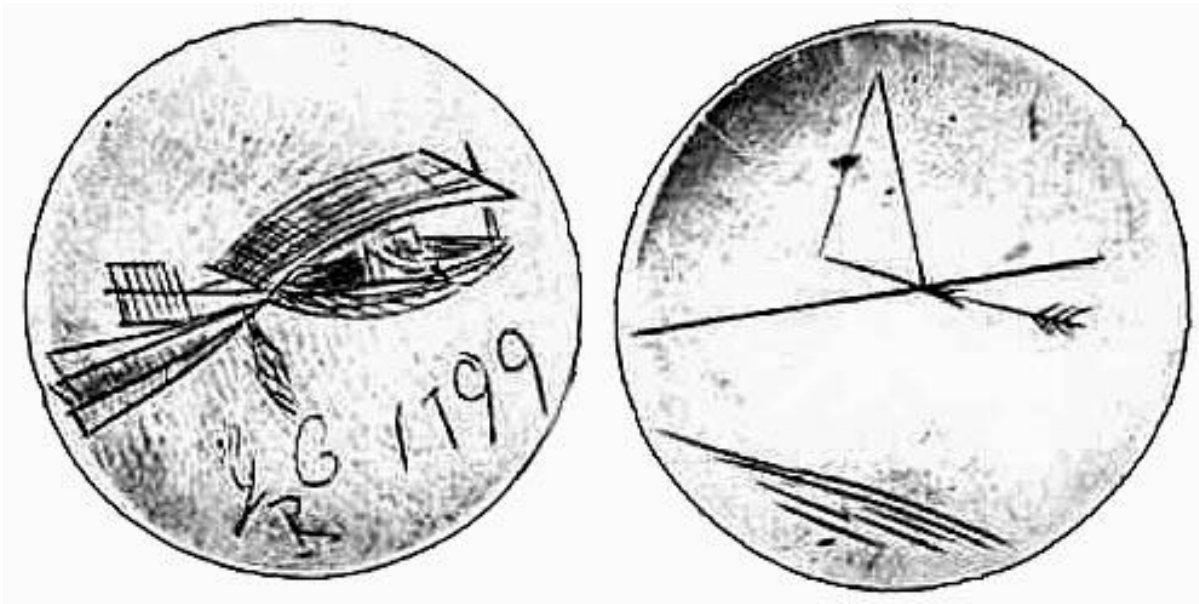
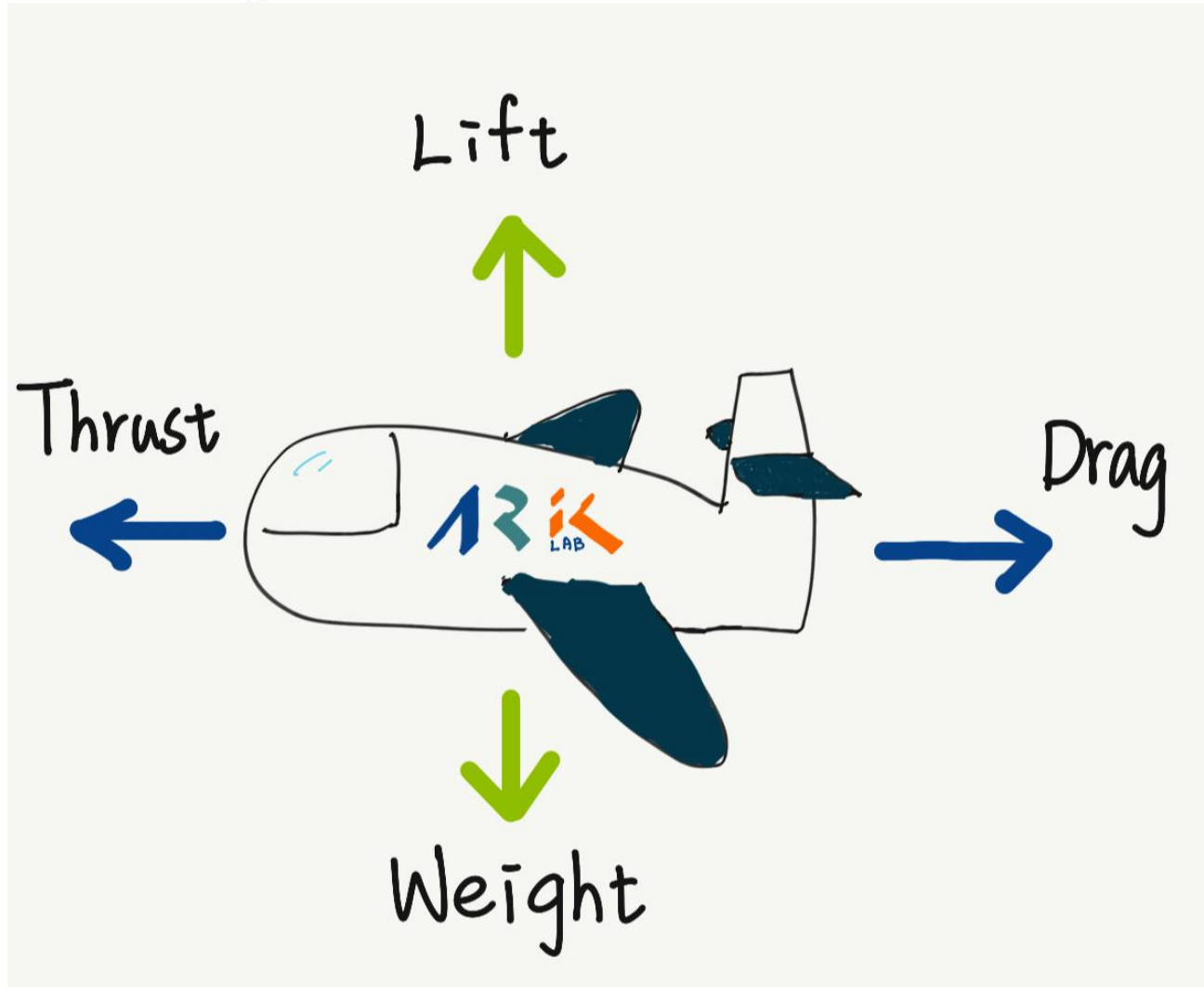
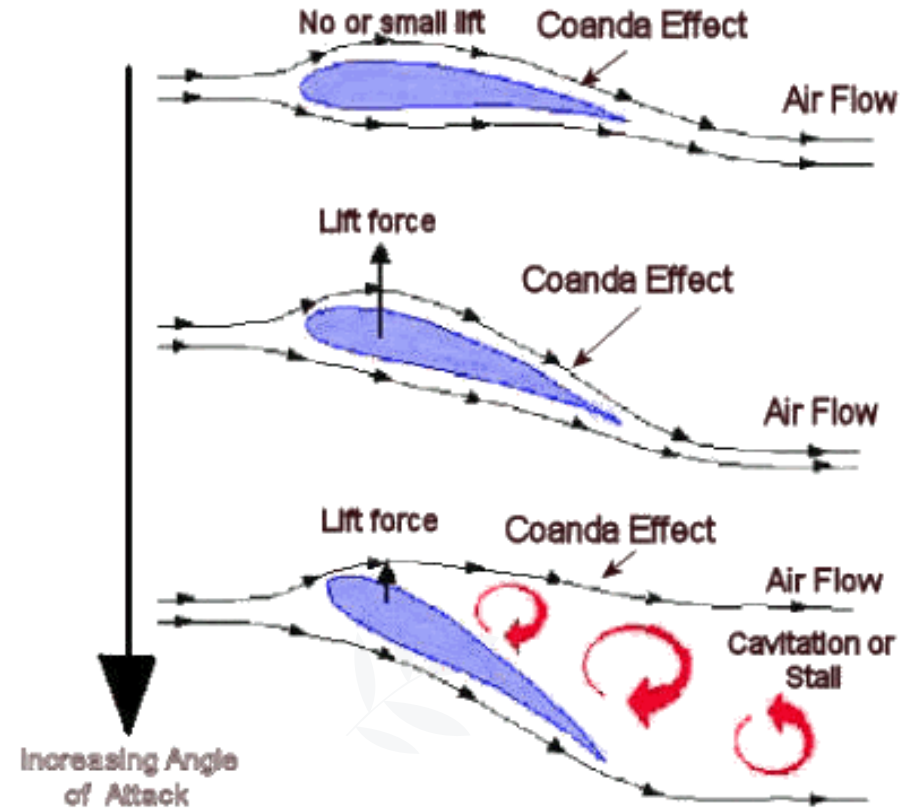


Figure 1. Sir George Cayley. Portrait by Henry Perronet Briggs. R.A. 1841

The Four Forces of Flight



Coandă Effect



Quiz 1. what is the theory that can simply describe to flight? (one or more than two answer)

- (A) Coandă effect**
- (B) Bernoulli's principle**
- (C) Newton's third law of motion**
- (D) All of the above**

Please complete in Corelab





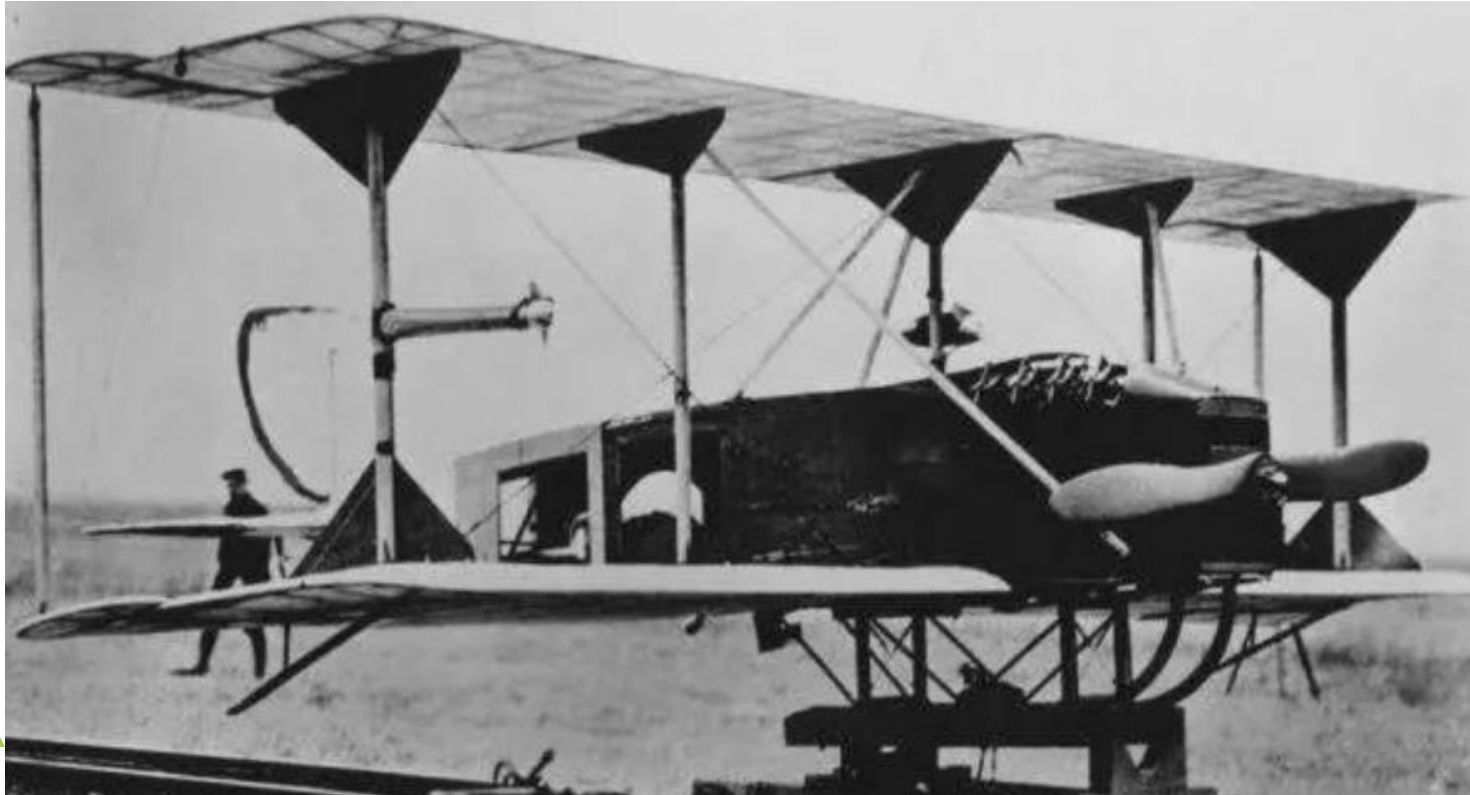
Part 2. Introduction to UAV





Unmanned Aerial Vehicle





1917 Sperry Aerial Torpedo

It could take off and flight stalely and this design for the WWII. However it cannot landing after complete mission. So this aircraft never put into practice. Which makes it only an concept design.

UAV

Fixed-wing aircraft



Rotation wing

Multicopter



Helicopter



Quiz 2. Which type of UAV is more stable in the air?

- (A) Fixed- wing aircraft
- (B) Helicopter
- (C) Multicopter
- (D) All above are stable in the air
- (E) All above are not stable at all

Please complete in Corelab

Quiz 3. What is the purpose of designing first UAV ?

- (A) Logistic**
- (B) Photography**
- (C) Military**
- (D) Detecting**
- (E) All above**

Please complete in Corelab



II. Programming & UAV Control





Part 3. Programming





What is algorithmic thinking?

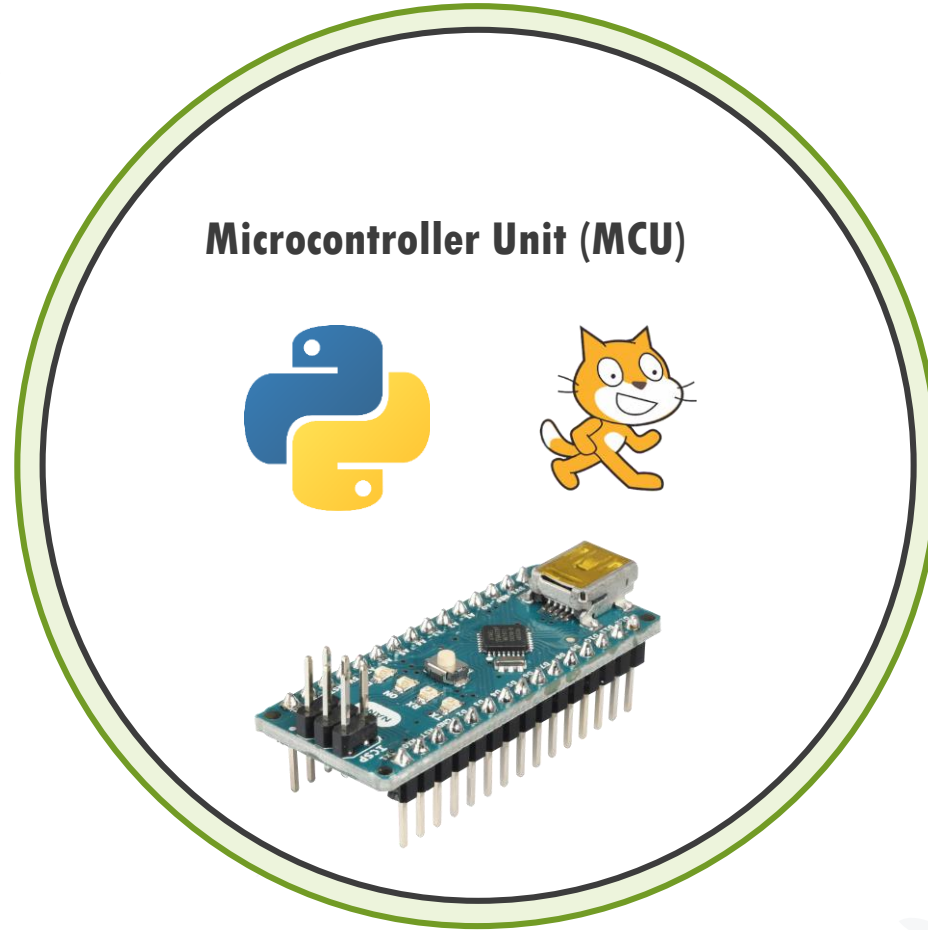
- 1. Find out problems**
- 2. Clarify and define problems**
- 3. Analysis problems**
- 4. Find out solution**
- 5. Verify problems and solution**



Sensor



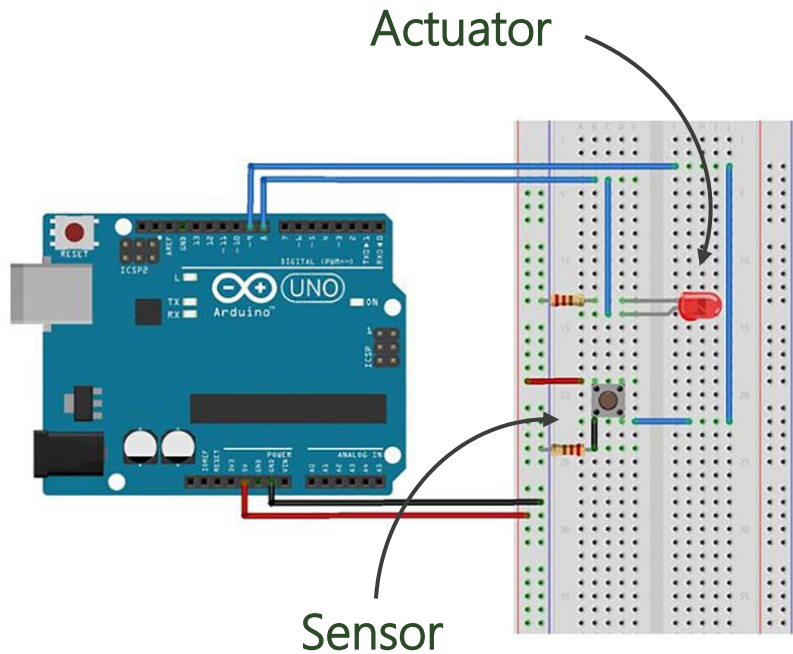
Microcontroller Unit (MCU)



Actuator



If the pushbutton is pressed → Turn on the LED



```

const int led    = 8;
const int button = 9;
void setup()
{
  pinMode(led, OUTPUT);
  pinMode(button, INPUT) ;
}
void loop()
{
  int reads = digitalRead(button);
  if(reads == true){
    digitalWrite(led, HIGH);
  }
}

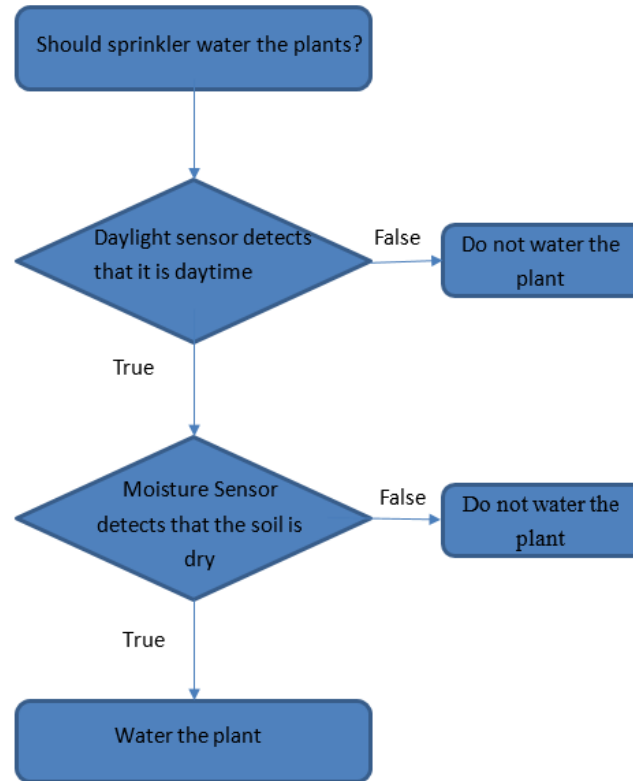
```

Quiz 4. We will only water the plants in the daytime and when the soil is dry.

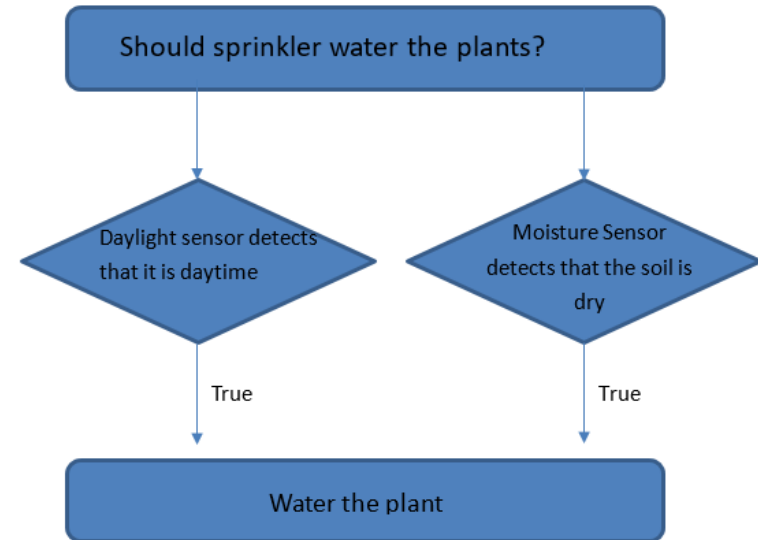
Based on the algorithmic thinking, how should we design the flow chart that can let the sprinkler water the plants in the right time?

Which flow chart is the correct one?

(A)



(B)



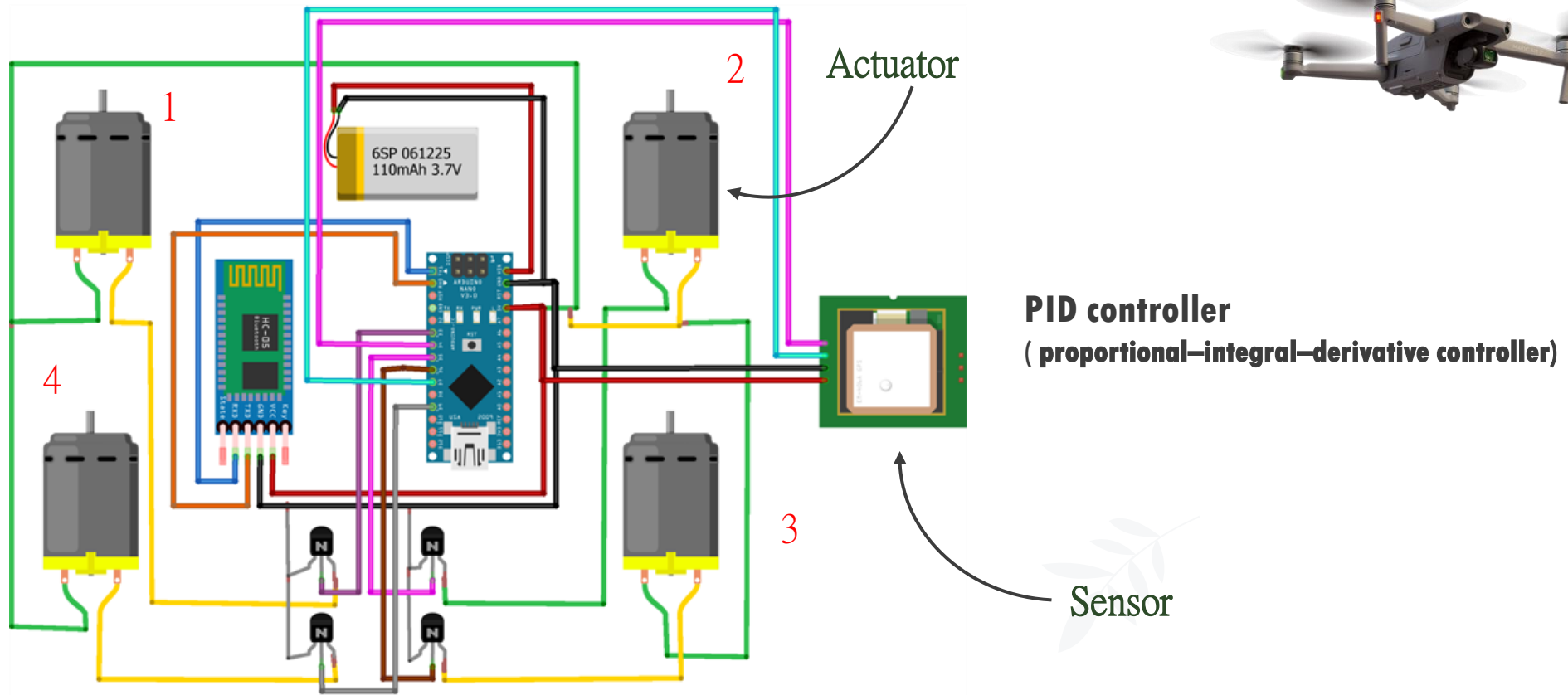
Please complete in Corelab



Part 4. UAV Control



If drone incline to left → 1, 4 increase the turning speed
Else if drone incline to right → 2, 3 increase the turning speed

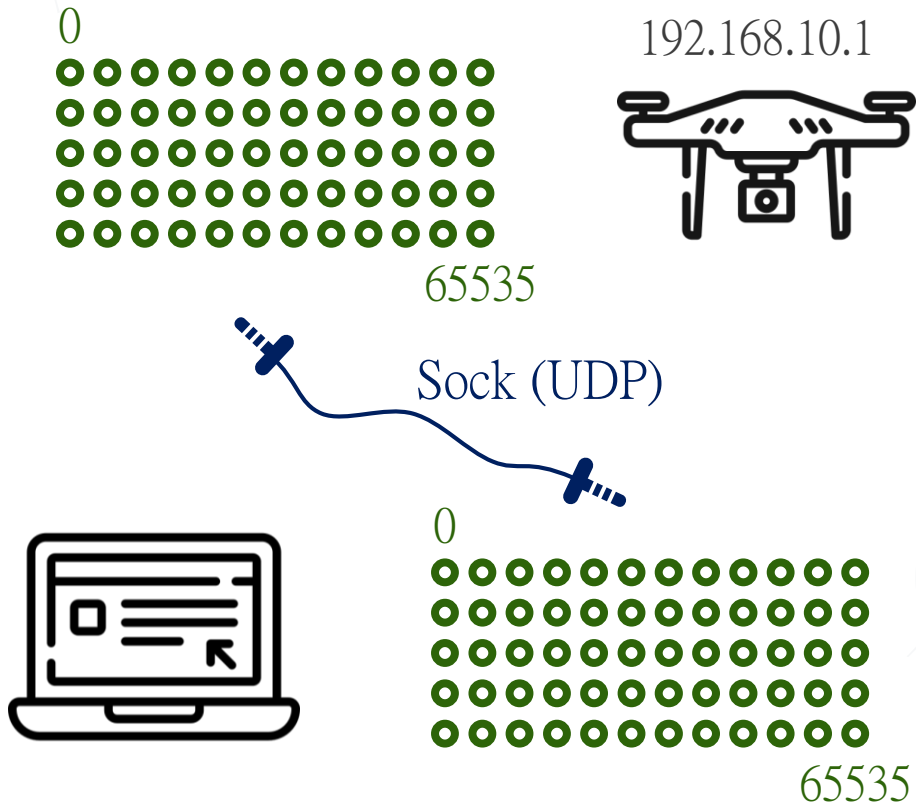




UAV DEMONSTRATION



Build WiFi connection



```
1 # IP and port of Tello
2 tello_address = ('192.168.10.1', 8889)
3
4 # IP and port of local computer
5 local_address = ('', 9000)
6
7 # Establish a UDP connection for sending command
8 sock = socket.socket(socket.AF_INET,
9                       socket.SOCK_DGRAM)
9
10 # Bind to the local address and port
11 sock.bind(local_address)
12
13 sock.sendto('Command'.encode(), tello_address)
```

Python3 single drone coding control

```
import .....

tello_address = .....

print("Please input Tello SDK commands and
press 'Enter'. Enter 'quit' to exit the program.")

while True:
    command = input('>>> ')
    if command != '' and command != '\n':
        if 'quit' in command:
            print("Program exited sucessfully")
            break
        else:
            sock.sendto(command.encode(), tello_address)
            time.sleep(10)
```




<https://www.youtube.com/watch?v=R4X8qrGDvVY>

Quiz 5. What is not algorithmic thinking doing ?

- (A) Find out problems
- (B) Clarify and define problems
- (C) Analysis problems
- (D) Find out solution
- (E) Know how to type words in computer

Please complete in Corelab

Week 3 Student of the Week Contest



Topic: C.D.I.O Framework and Algorithmic Thinking

Project Description

Find out a daily problem that happened in our environment and try to design a creative solution in rational way. This design can follow Conceive Design Implement Operate (CDIO) structure.

Describe what and why is the problem and how to solve the problem. You can use the flow chart to show the solution or a simple paragraph description that can be understood easily.

Project Format

Problem description + solution (flow chart or words description) + Hashtag #STEAMup #Studentoftheweek

Deadline

July 30th, 14:00PM (GMT+8)
3 hours before our July 30th class begins

Example Problem:

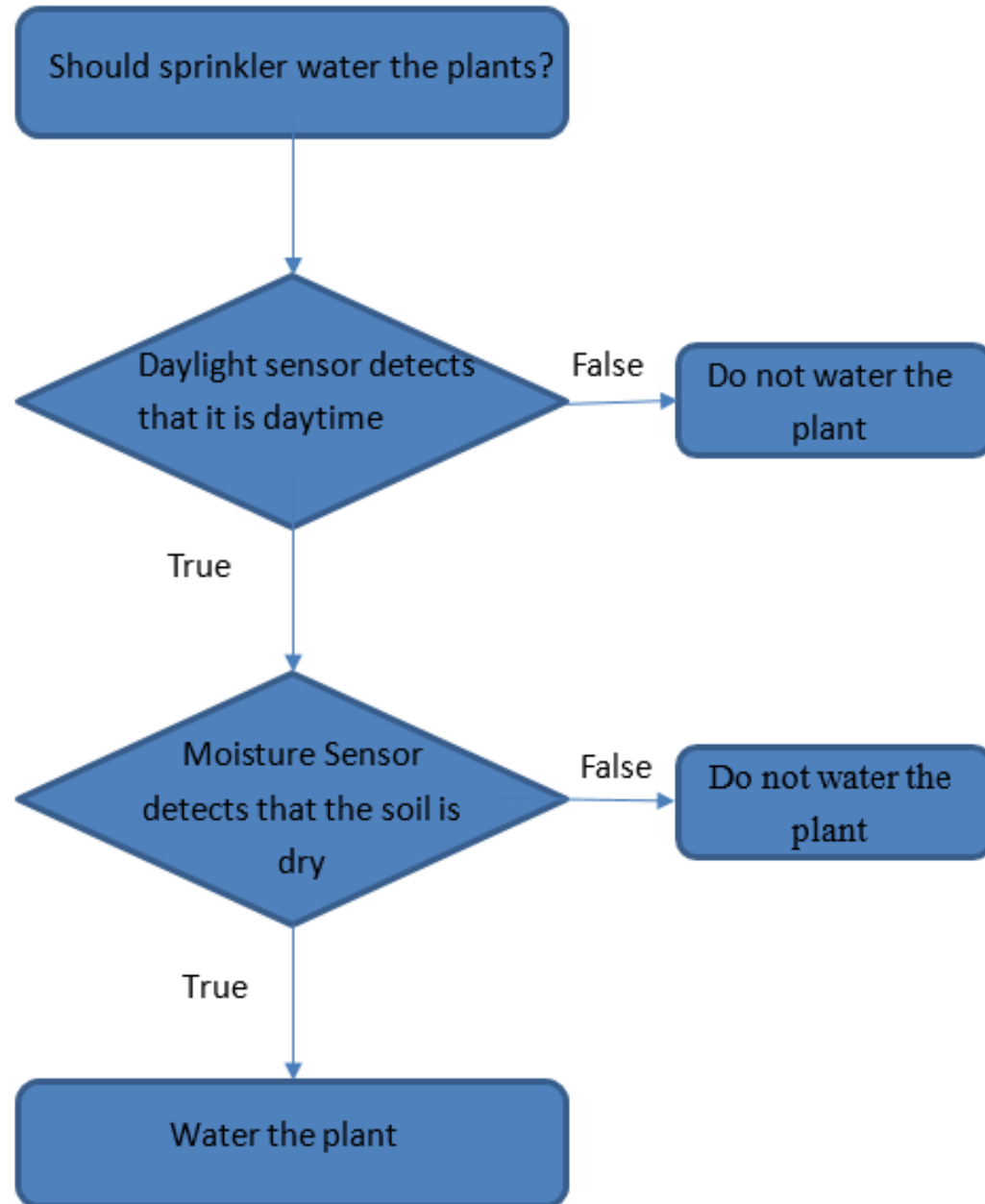
Since the global warming, the heatwave keep attack our daily life and the plants in gardens need more watering to stay alive. However, we have to work in the daytime and have no time to water the plants in daytime. To keep the plants alive, we figure out a solution that can help us water the plants and only water it when the plants needed which can reduce the water waste.

Solution:

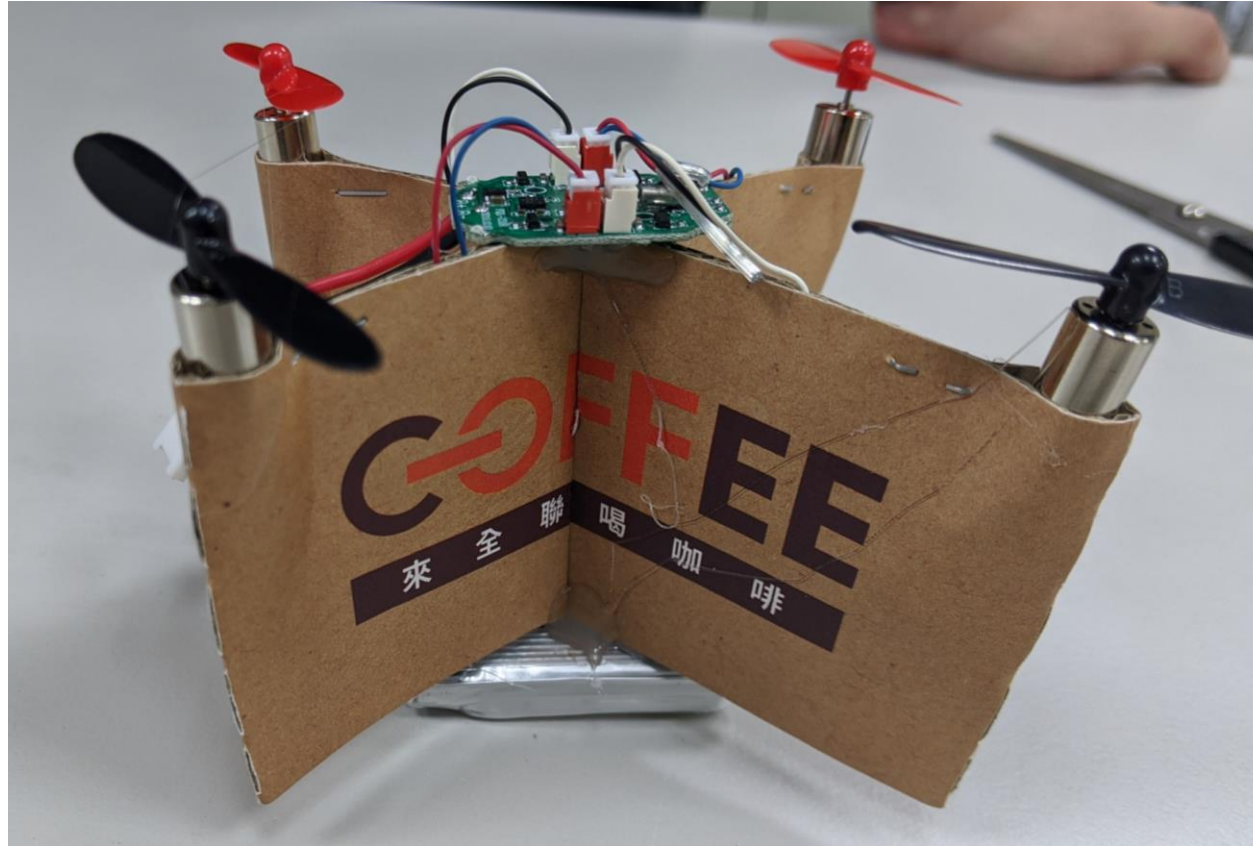
Set the automatic sprinkler and connect it with two control sensor, one is daylight sensor and the other is soil moisture sensor. We set that the sprinkler will only water in daytime and the soil is dry. Because these limit, the sprinkler can water the plants in the right time and will not waste water.

3 Prizes: Fashion Coloring Book (Age 8-13)





About Next Class~





Any Question?



Find us on



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Thank you!

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