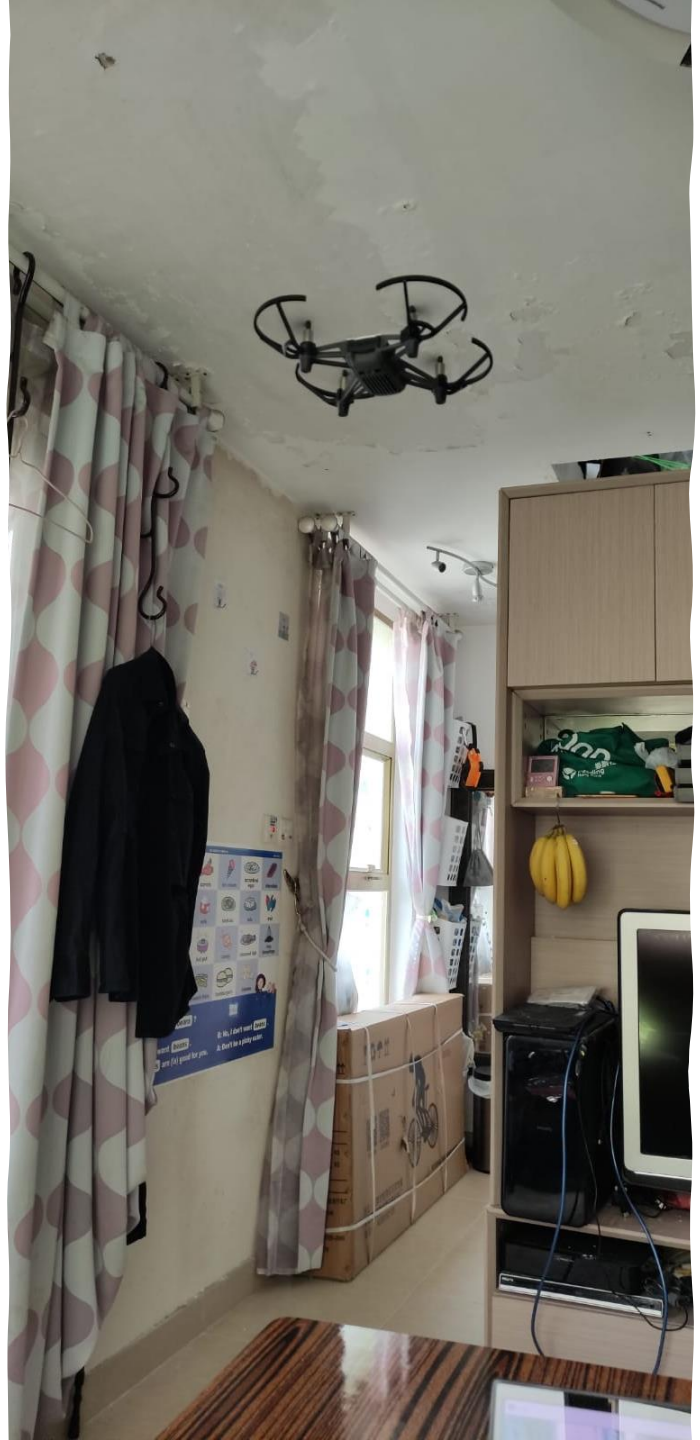
DRONE HUMAN DETECTION

With Using Keyboard Control

220171174
By Cheung Tsz Chun Noddy

- CLEARLY SHOW THE OBJECTIVE OF YOUR PROJECT



TARGET USERS -SEARCH AND RESCUE TEAMS

- Fire Services Department (FSD)
- Hong Kong St. John Ambulance Brigade (SJA)
- National Search and Rescue Agency (NASRA)
- United States Coast Guard Search and Rescue

SPECIAL FEATURES

- Real-time video streaming
- Highlight the detected humans, create a beep sound if humans are detected
- Keyboard control of the drone
- Mapping and finding out the distance in meters
- Take photos with the drone and send them back to the computer
- can be easily customized to detect specific objects (including dogs and cats)

APPLICATIONS

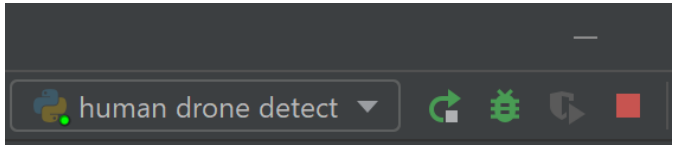
Search and rescue	locate missing persons in remote or inaccessible areas
Monitor	monitor large areas
Others	detecting missing animals (like dogs and cats)

THE METHOD USED

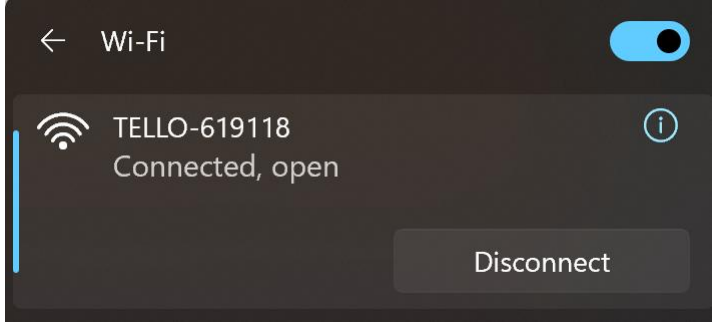
- utilize the 'pygame' library to initialize the keyboard controls, fly the drone and take pictures with code, and implement YOLOV3 for detection
- used Python math and OpenCV for mapping
- Use ‘winsound’ to generate a beep sound if any humans are detected

WHY SUCH METHOD IS SELECTED

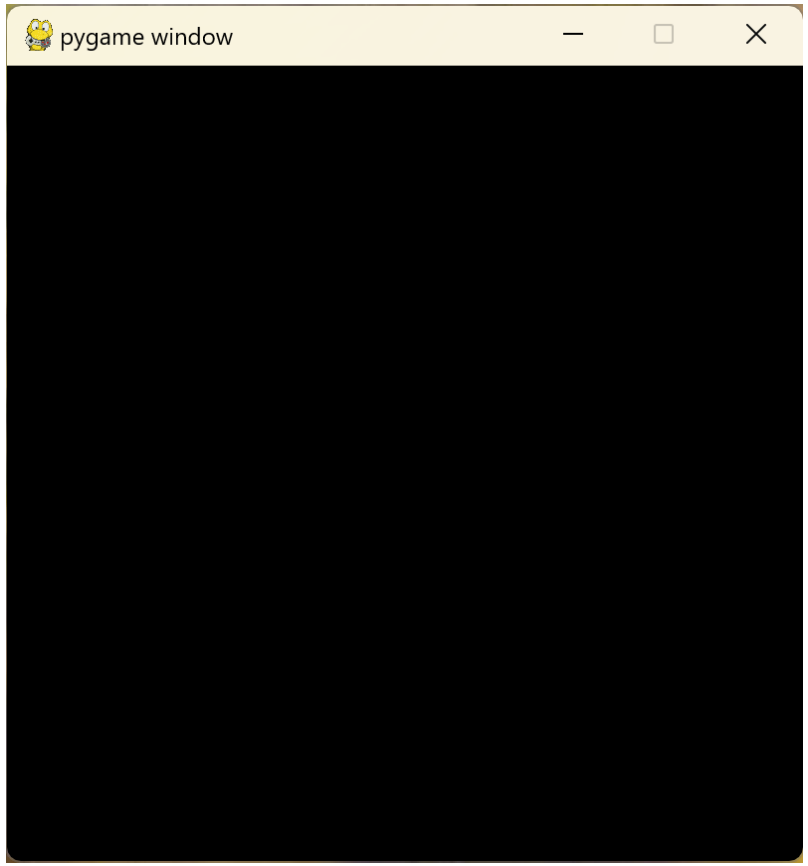
- Speed: YOLO can process images and video frames at very high speeds
- Accuracy: high accuracy in detecting objects, including people
- Reliability: YOLO has been extensively tested and validated on large datasets, making it a reliable and trustworthy tool for object detection
- Flexibility: YOLO can be easily customized to detect specific objects (including dogs and cats)

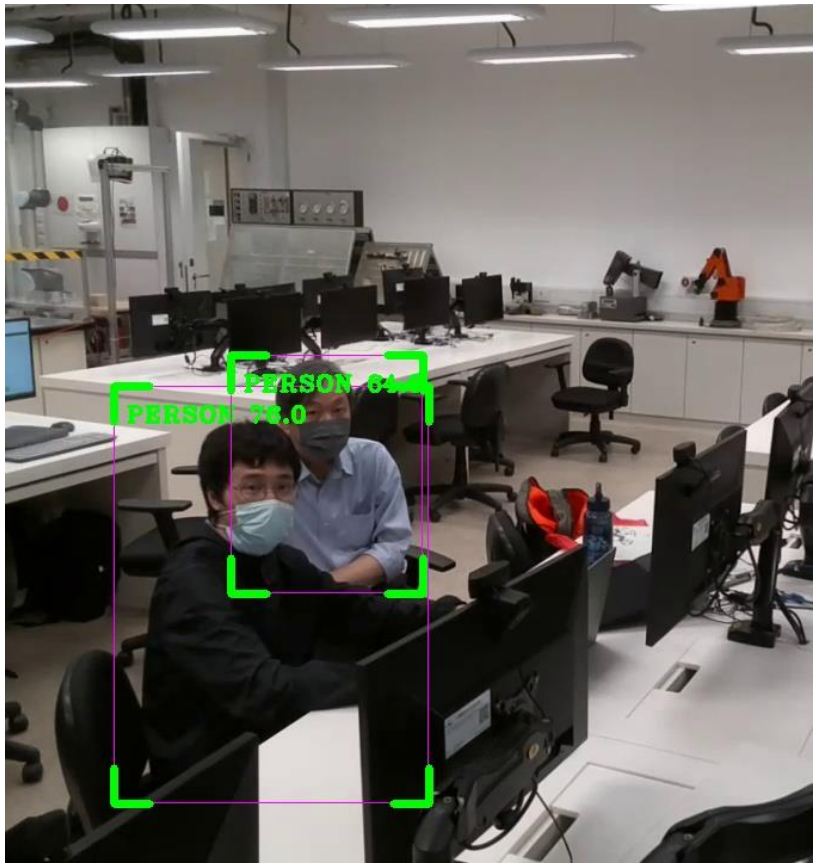


HOW TO CONTROL

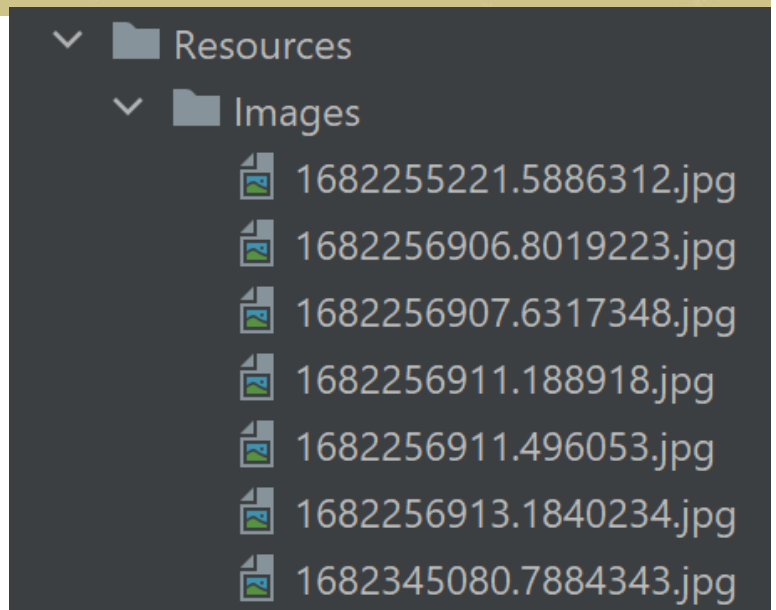


- 1. Connect to Drone Wi-Fi
- 2. Click the pygame window
- 3. press keyboard button to control
- 4. press the stop button to stop the program





Command	Drone Movement
LEFT, RIGHT	left-right
Up, Down	forward-backward
“w”, ”s”	up-down
“a”, ”d”	yaw (rotation) movement
“q”, ”e”	Land, Takeoff
“z”	Take Pictures



TAKE PHOTOS WITH THE DRONE AND SEND THEM BACK TO THE COMPUTER

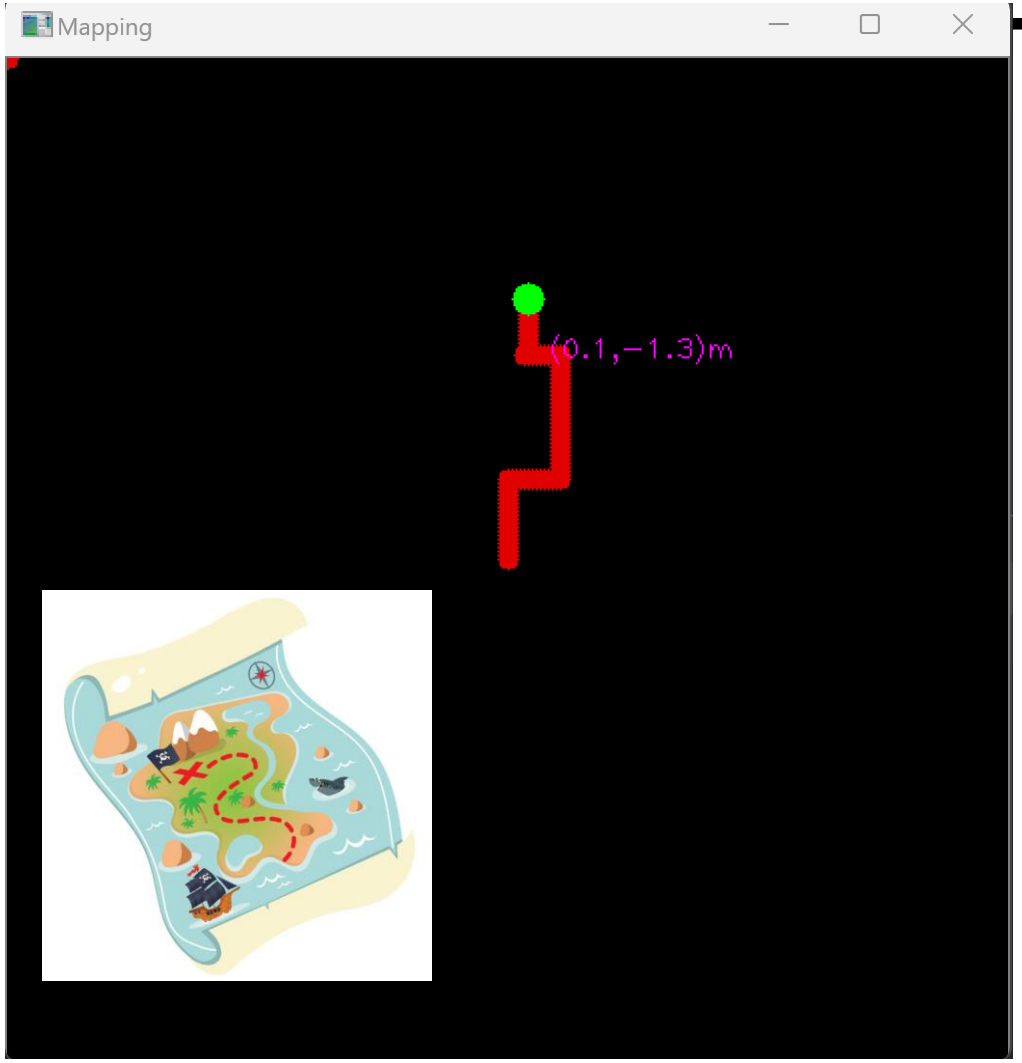
- Taken photos will be sent back to your PC in the Images folder inside the Resources folder
- The photos are named by time, so the name won’t get duplicated
- 0.25s per photo for the interval, preventing too many pictures taken at the same time

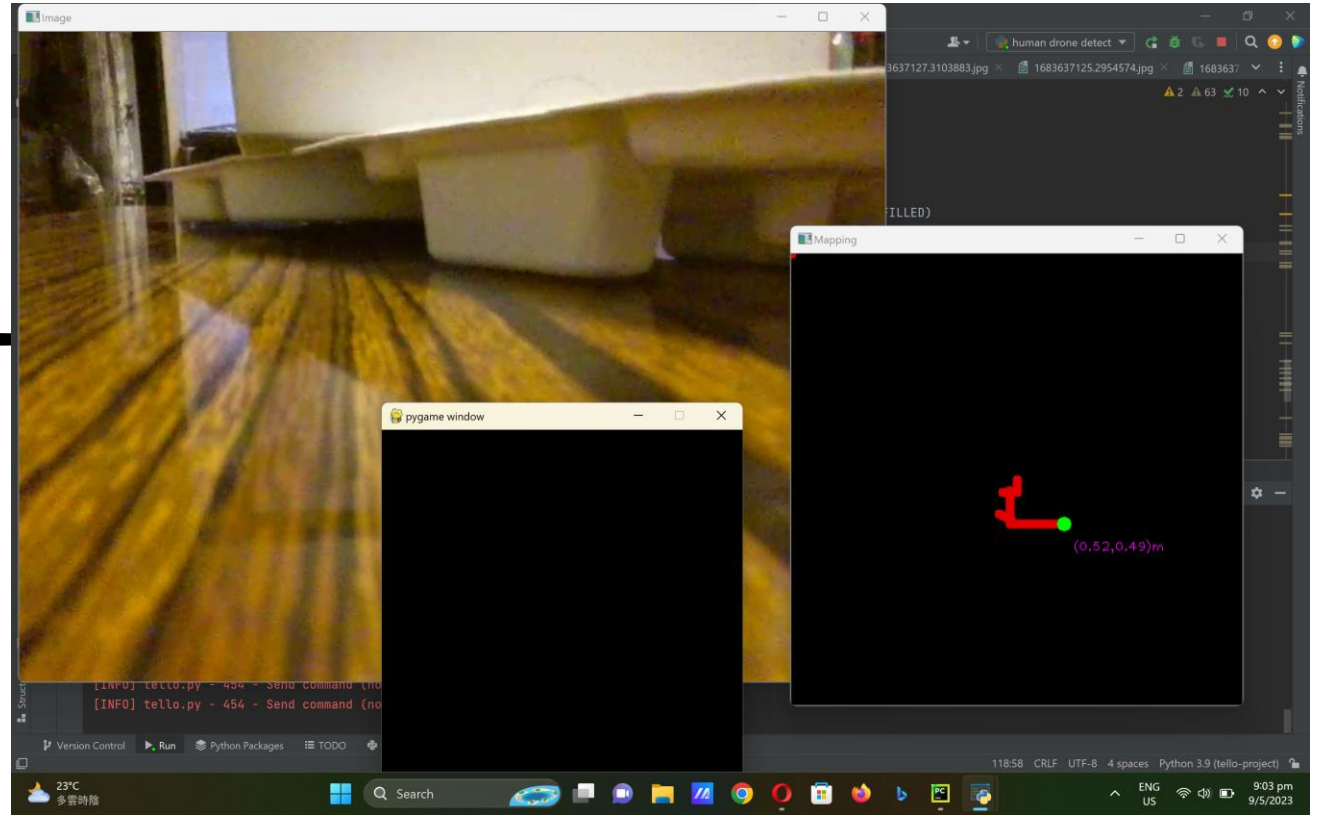
GENERATE A BEEP NOISE

```
10    freq=1000
11    dur=50
```

- The code will alarm the rescue team every time the drone finds a person
- The frequency is 1000 HZ and the duration is 50 milliseconds
- It’s useful for searching for multiple people over a large area, as it can be difficult for rescue teams to keep track of all the search results

MAPPING





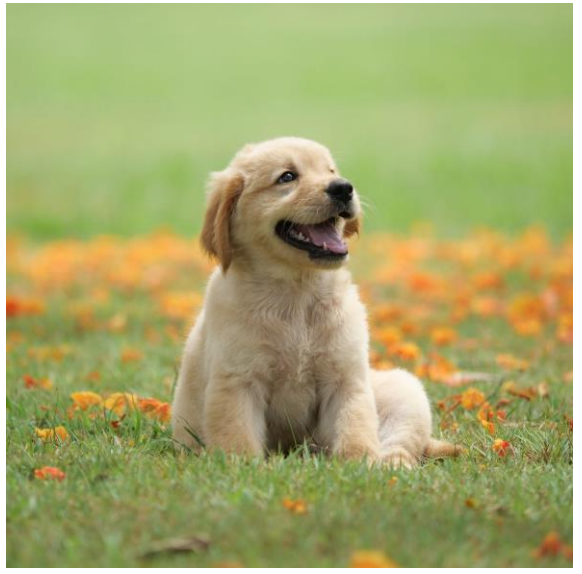
- Knowing the (X, Y) axis in meters by calculating the drone speed (15 cm/s)
- Record the drone search history
- Help to locate missing persons

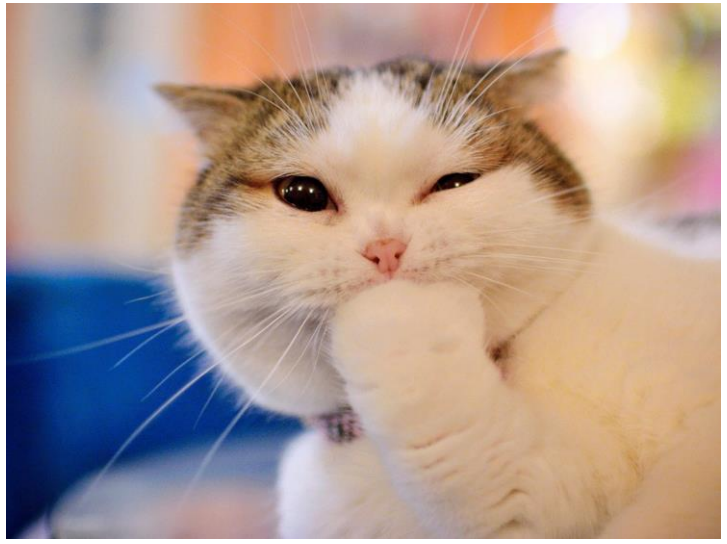
DETECT OTHER OBJECTS(LIKE DOGS AND CATS)

```
42    class_of_interest = classNames.index('person') + 1
```

- We can select other objects to detect by simply changing classNames.index(‘Person’) in line 42
- It can help the rescue team search for missing pets in emergency situations

!!?





LIMITATIONS OF MY DESIGN

→impact long-range surveillance or monitoring

Battery life: ~ 13 minutes

Environmental factors: lighting conditions, weather, and obstacles

Wi-Fi range: ~ 100m

YOLOv3 resolution: 416x416

IMPROVEMENT THAT CAN BE DONE IN FUTURE

- Set up Wi-Fi range extender: coverage area ⬆
- Hardware upgrades: drone or computer ⬆
- Environmental monitoring: install extra sensors to monitor (GPS and weather)
- Battery life extension: external battery packs

ETHICAL ISSUE

- Privacy concerns
- Data security: may collect and store sensitive data (video footage and personal information)
- Safety risks: particularly if the drone is flown in crowded or restricted areas

TIMELINE OF THE PROJECT

- Easter Holiday: Project planning and research
- 17/4: Hardware setup. Ask school and teacher to bellow the drone
- 24-25/4: coding the keyboard part
- 29-30/4,1/5: coding the YOLO part to detect human and write the PowerPoint
- 9-10/5: coding the Mapping part and final testing

REFERENCE LINK

- https://youtu.be/5dh9abXqMok
- https://youtu.be/LmEcyQnfpDA

The GitHub URL for my code:

https://github.com/noddycheung/cv2/blob/03e5f72156c6ec88f823be5a69f80dacd20bc814/dronemap%2Bcam%2Bnoise

https://github.com/noddycheung/cv2/blob/bfb04e090110f04e3ee33516714a286696f2f35a/KeyPressModule