KAU AI Drone Racing

using Airsim

ForFun

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CONTEXT

ForFun

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Keypoints

02

Challenges

03

Process

04

Video

Keypoints

1. Finish without missing gates

2. As fast as possible

3. Apply AI modles

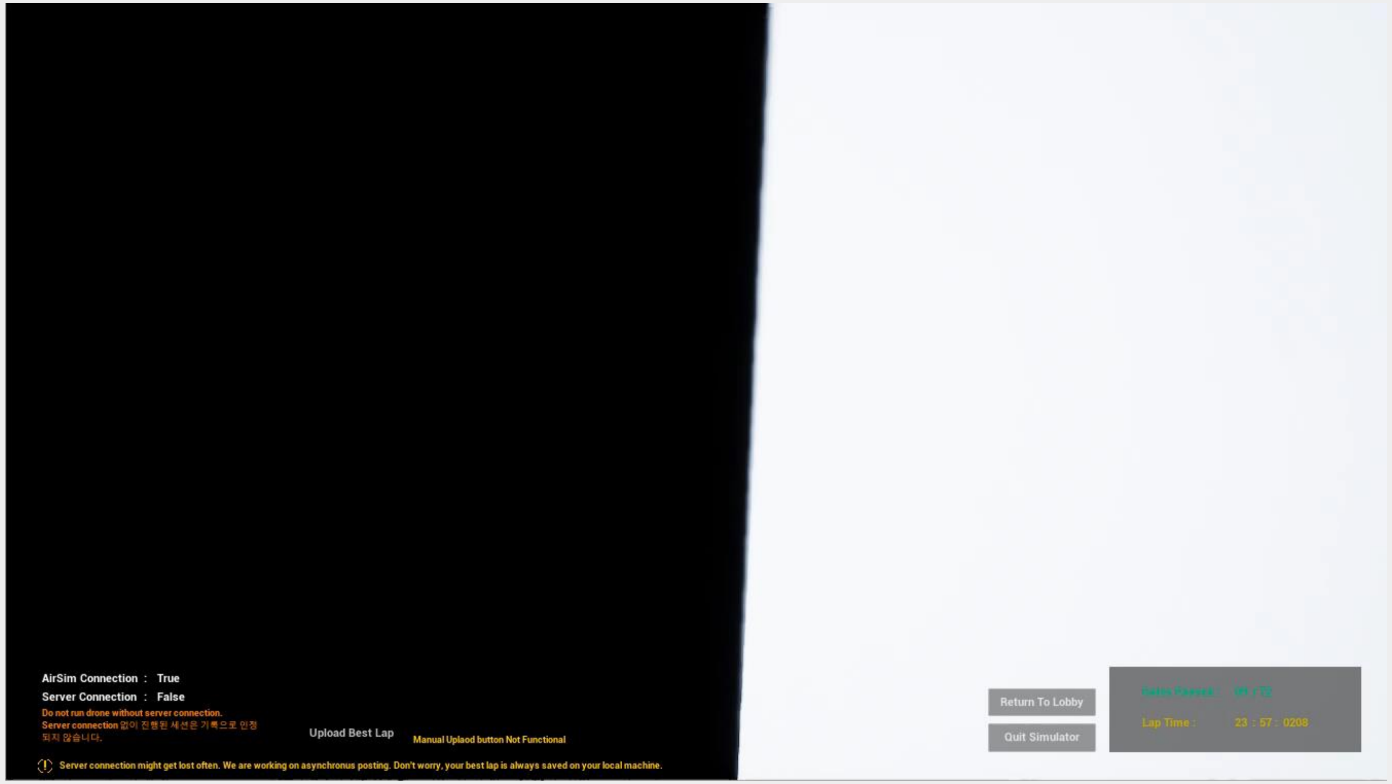
Challenges

1. Stop and go, swing

2. Overshooting

3. POV problem

4. Yaw angle



AirSim Connection : True
Server Connection : False
Do not run drone without server connection.
Server connection 없이 진행된 세션은 기록으로 인정되지 않습니다.

Manual Uplaod button Not Functional

Server connection might get lost often. We are working on asynchronus posting. Don't worry, your best lap is always saved on your local machine.

Gates Passed : 01 / 12
Lap Time : 23 : 57 : 0208

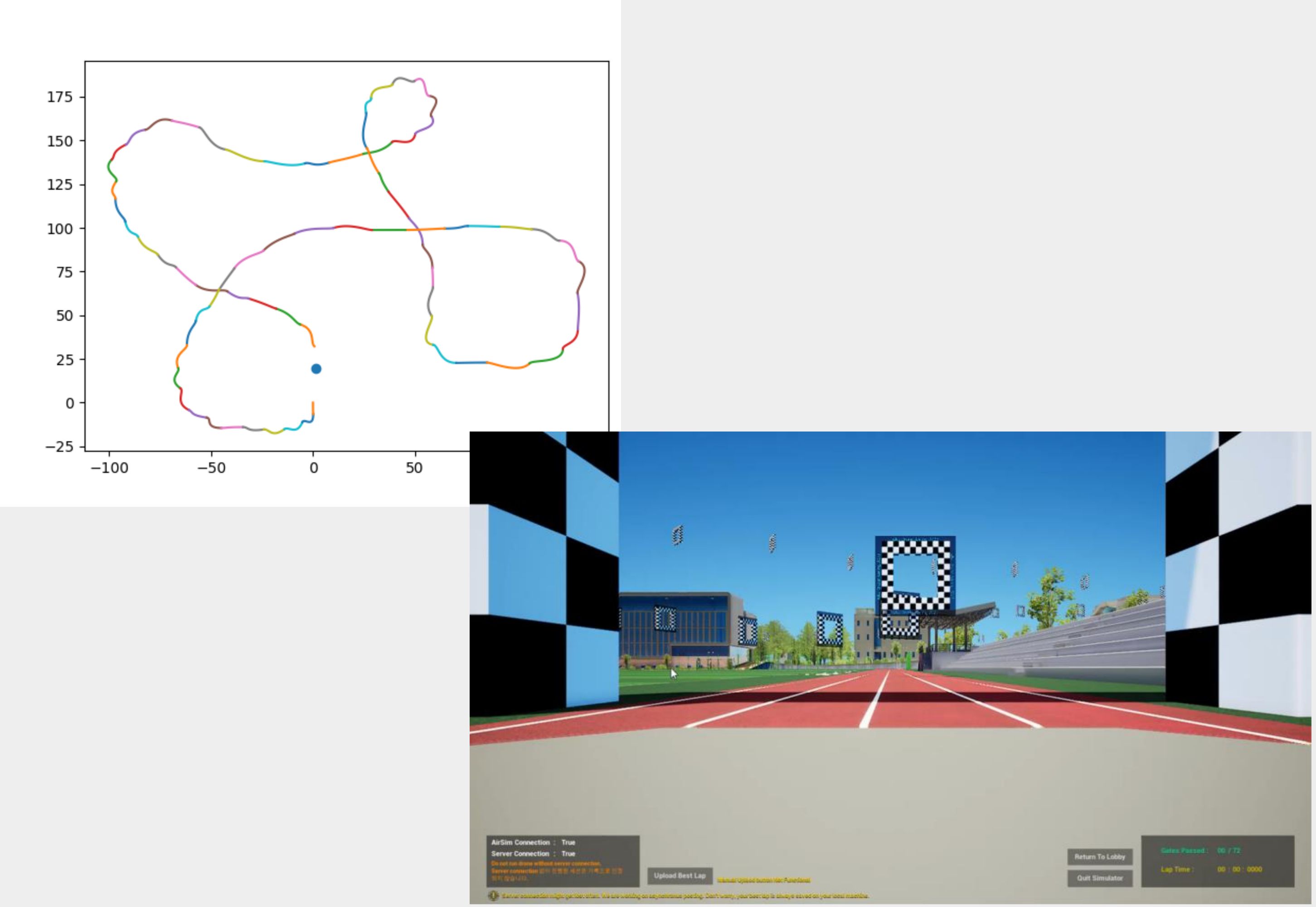
Challenges

1. Stop and go, swing
   ~~PD control~~

2. Overshooting
   ~~Ferguson Curve~~

3. POV problem

4. Yaw angle



AirSim Connection : True
Server Connection : True
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Gates Passed : 00 / 72
Lap Time : 00 : 00 : 0000

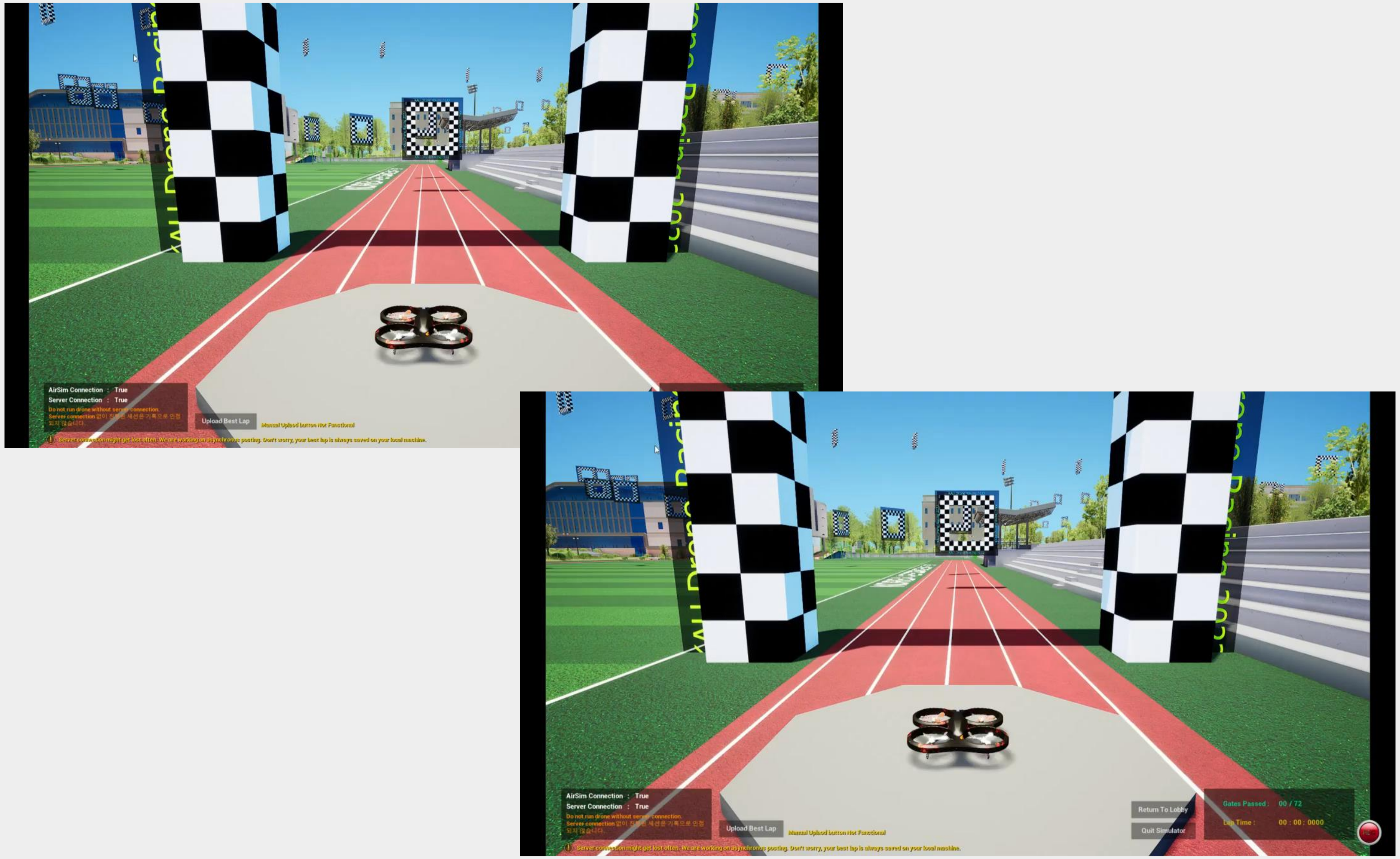
Challenges

1. Stop and go, swing
   Velocity control

2. Overshooting
   Variable speed(MLP)

3. POV problem

4. Yaw angle



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Gates Passed : 00 / 72
Lap Time : 00 : 00 : 0000

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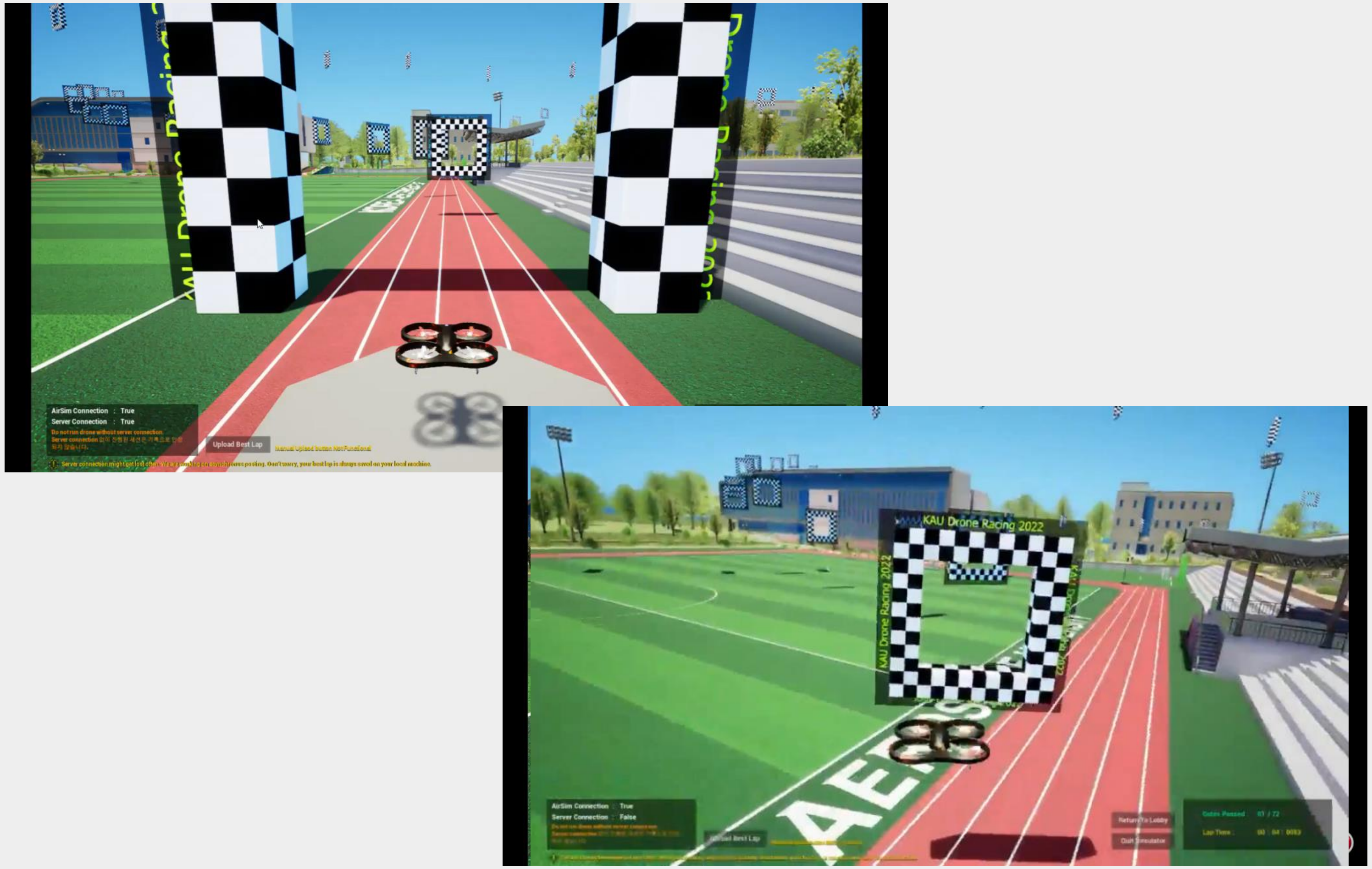
Challenges

1. Stop and go, swing
   Velocity control

2. Overshooting
   Variable speed(MLP)

3. POV problem
   Join → Polling

4. Yaw angle



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AirSim Connection : True
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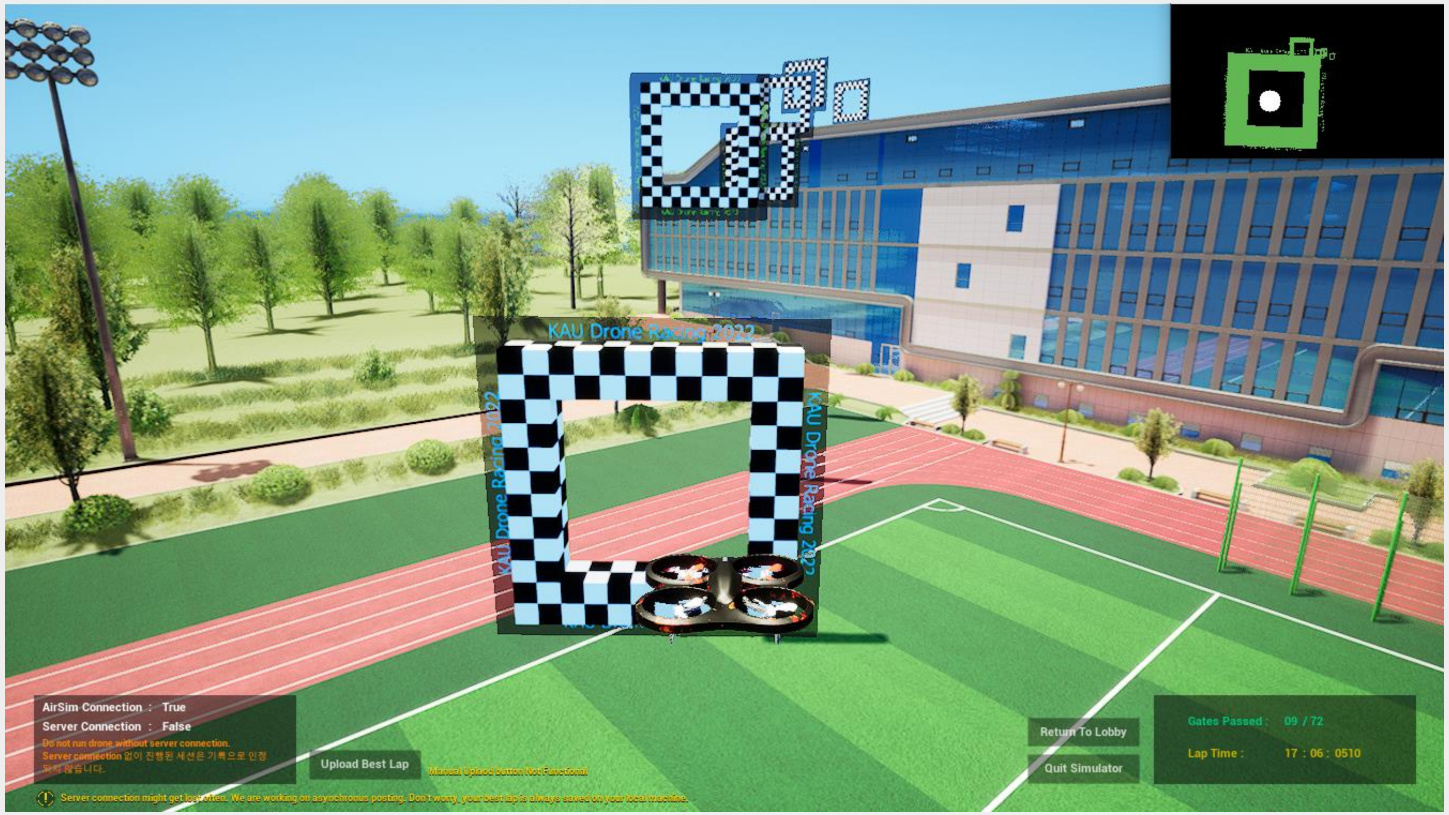
Challenges

1. Stop and go, swing
   Velocity control

2. Overshooting
   Variable speed(MLP)

3. POV problem
   Join → Polling

4. Yaw angle
   Yaw mode



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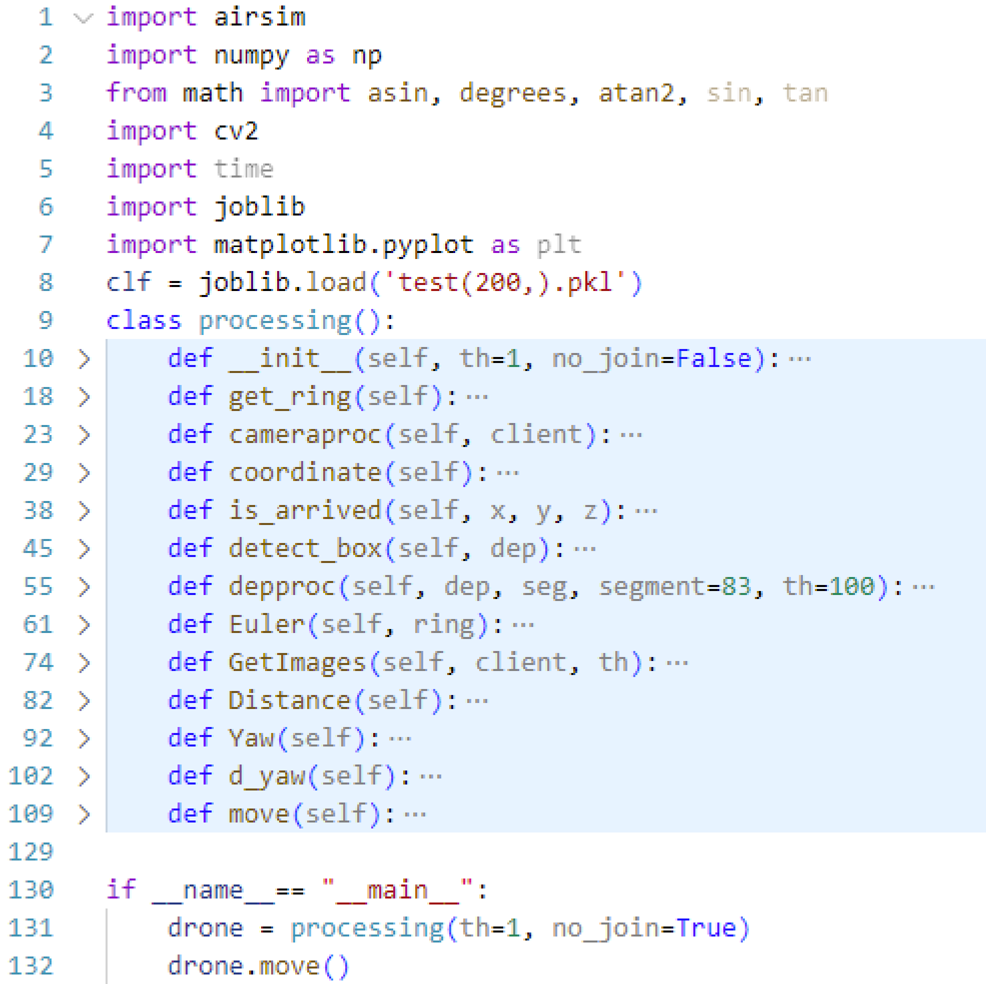
Gates Passed : 09 / 72
Lap Time : 17 : 06 : 0510

Process



```
import airsim
import numpy as np
from math import asin, degrees, atan2, sin, tan
import cv2
import time
import joblib
import matplotlib.pyplot as plt
clf = joblib.load('test(200,).pkl')
class processing():
    def __init__(self, th=1, no_join=False):···
    def get_ring(self):···
    def cameraproc(self, client):···
    def coordinate(self):···
    def is_arrived(self, x, y, z):···
    def detect_box(self, dep):···
    def depproc(self, dep, seg, segment=83, th=100):···
    def Euler(self, ring):···
    def GetImages(self, client, th):···
    def Distance(self):···
    def Yaw(self):···
    def d_yaw(self):···
    def move(self):···

if __name__== "__main__":
    drone = processing(th=1, no_join=True)
    drone.move()
```

init: 함수 초기화

get_ring: ring 정보 추출

cameraproc: 카메라 프로세싱 파이프라인

GetImages: Depth와 Segmentation 이미지 추출

detect_box: 이미지에서 사각형 중점 계산

depproc: Depth와 Segmentation이미지를 통해 ring 검출

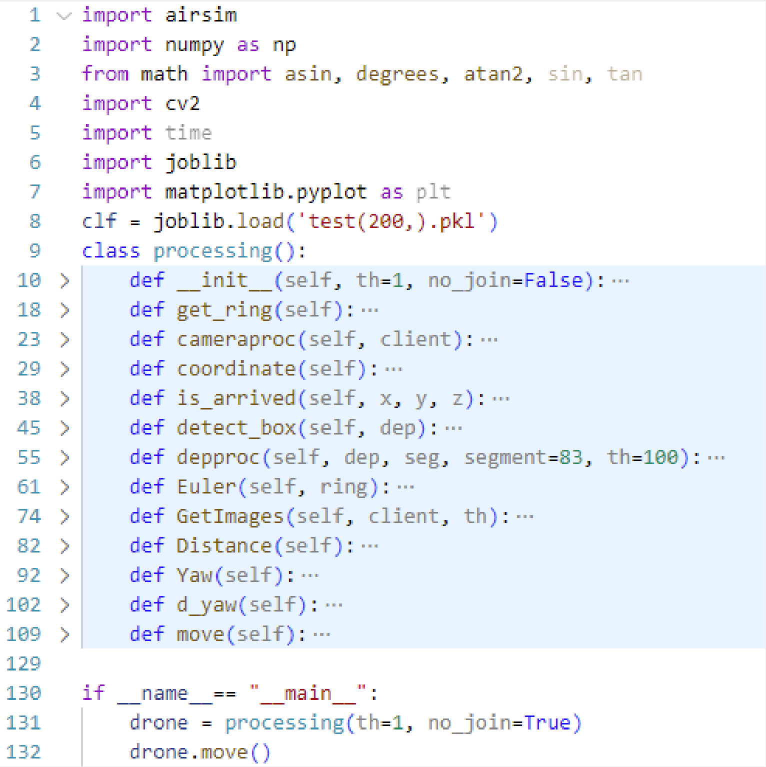
is_arrived: ring에 도달했는지 여부 계산

Distance: 현재 위치와 목표점 사이의 거리 계산

Yaw: ring 정보에서 yaw값 계산

Euler: ring의 yaw, roll, pitch 연산

Process



```python
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import cv2
import time
import joblib
import matplotlib.pyplot as plt
clf = joblib.load('test(200,).pkl')
class processing():
    def __init__(self, th=1, no_join=False):⋯
    def get_ring(self):⋯
    def cameraproc(self, client):⋯
    def coordinate(self):⋯
    def is_arrived(self, x, y, z):⋯
    def detect_box(self, dep):⋯
    def depproc(self, dep, seg, segment=83, th=100):⋯
    def Euler(self, ring):⋯
    def GetImages(self, client, th):⋯
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    def Yaw(self):⋯
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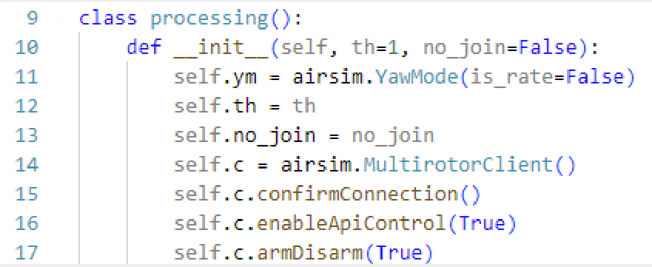
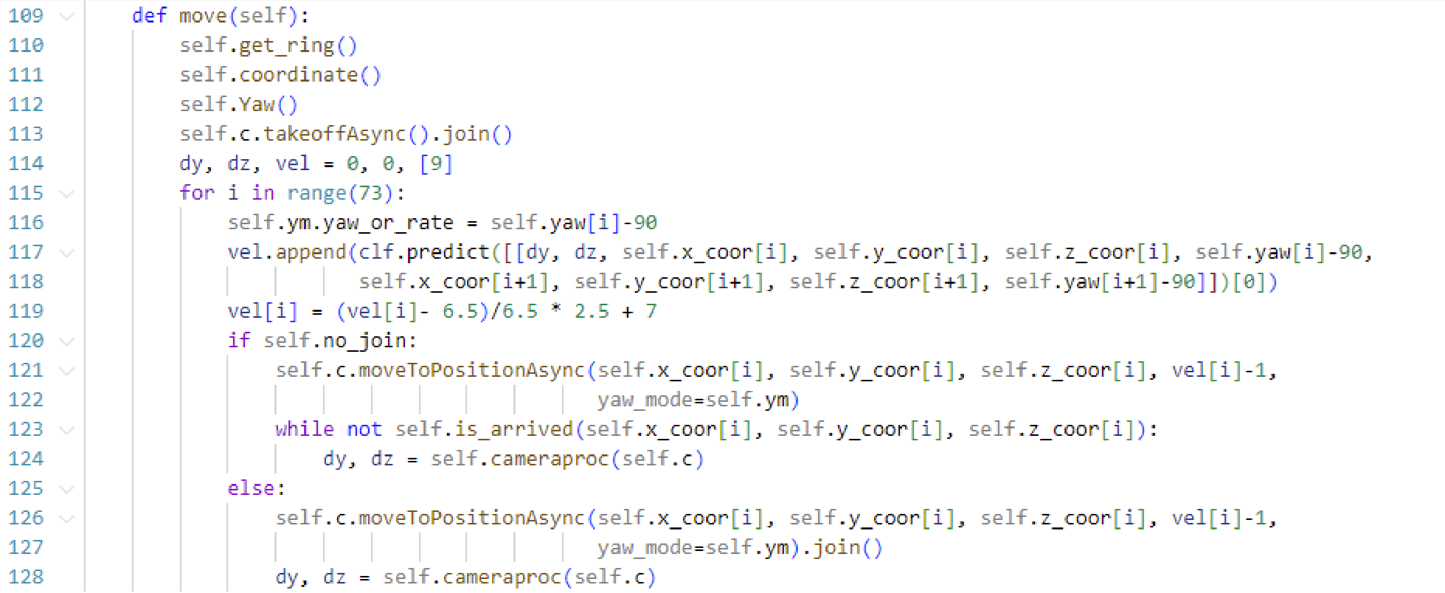


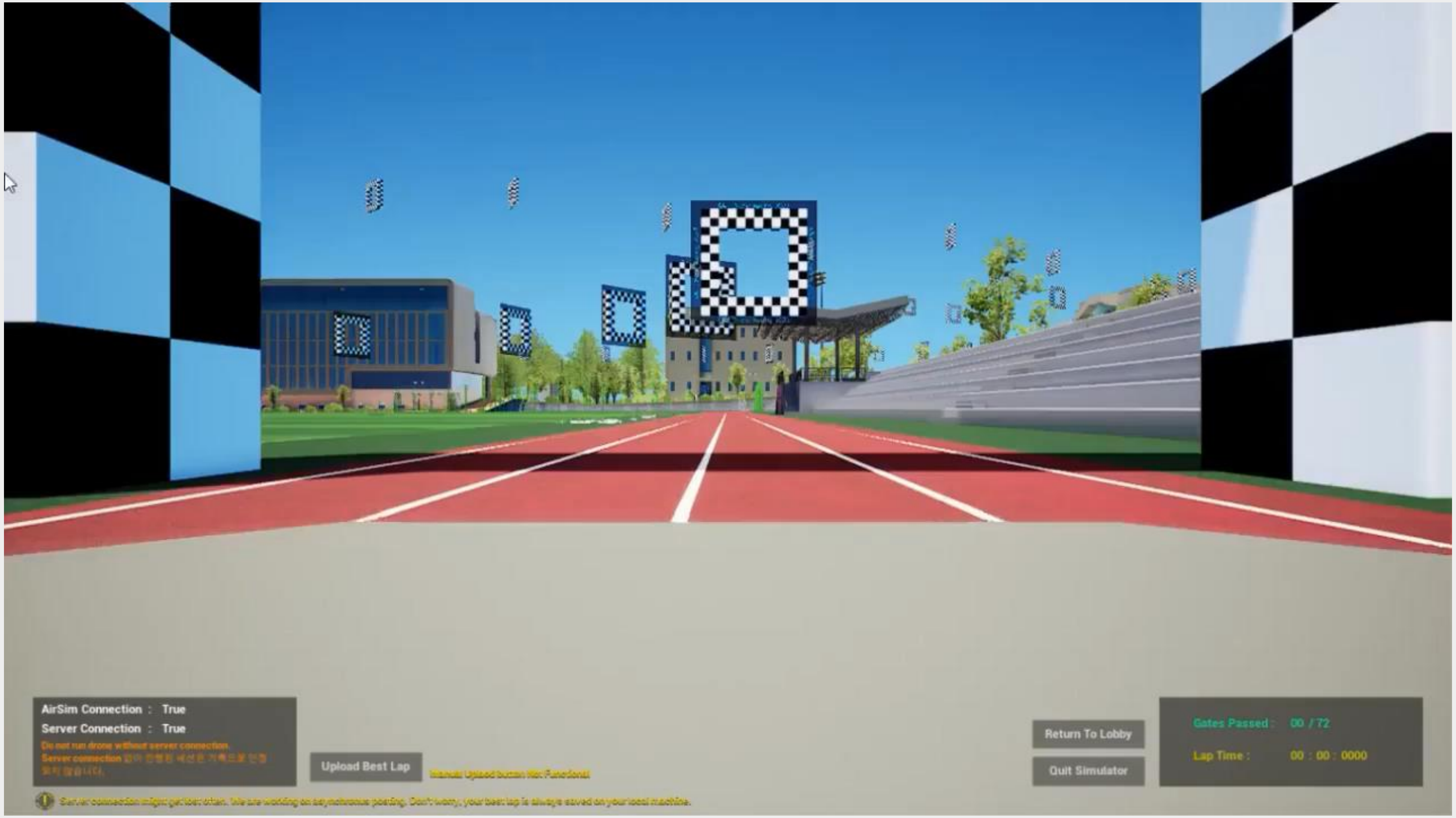
```python
class processing():
    def __init__(self, th=1, no_join=False):
        self.ym = airsim.YawMode(is_rate=False)
        self.th = th
        self.no_join = no_join
        self.c = airsim.MultirotorClient()
        self.c.confirmConnection()
        self.c.enableApiControl(True)
        self.c.armDisarm(True)
```



```python
    def move(self):
        self.get_ring()
        self.coordinate()
        self.Yaw()
        self.c.takeoffAsync().join()
        dy, dz, vel = 0, 0, [9]
        for i in range(73):
            self.ym.yaw_or_rate = self.yaw[i]-90
            vel.append(clf.predict([[dy, dz, self.x_coor[i], self.y_coor[i], self.z_coor[i], self.yaw[i]-90,
                     self.x_coor[i+1], self.y_coor[i+1], self.z_coor[i+1], self.yaw[i+1]-90]])[0])
            vel[i] = (vel[i]- 6.5)/6.5 * 2.5 + 7
            if self.no_join:
                self.c.moveToPositionAsync(self.x_coor[i], self.y_coor[i], self.z_coor[i], vel[i]-1,
                                       yaw_mode=self.ym)
                while not self.is_arrived(self.x_coor[i], self.y_coor[i], self.z_coor[i]):
                    dy, dz = self.cameraproc(self.c)
            else:
                self.c.moveToPositionAsync(self.x_coor[i], self.y_coor[i], self.z_coor[i], vel[i]-1,
                                       yaw_mode=self.ym).join()
                dy, dz = self.cameraproc(self.c)
```

04
Video (x1.5)

ForFun



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Lap Time : 00 : 00 : 0000

Thank you