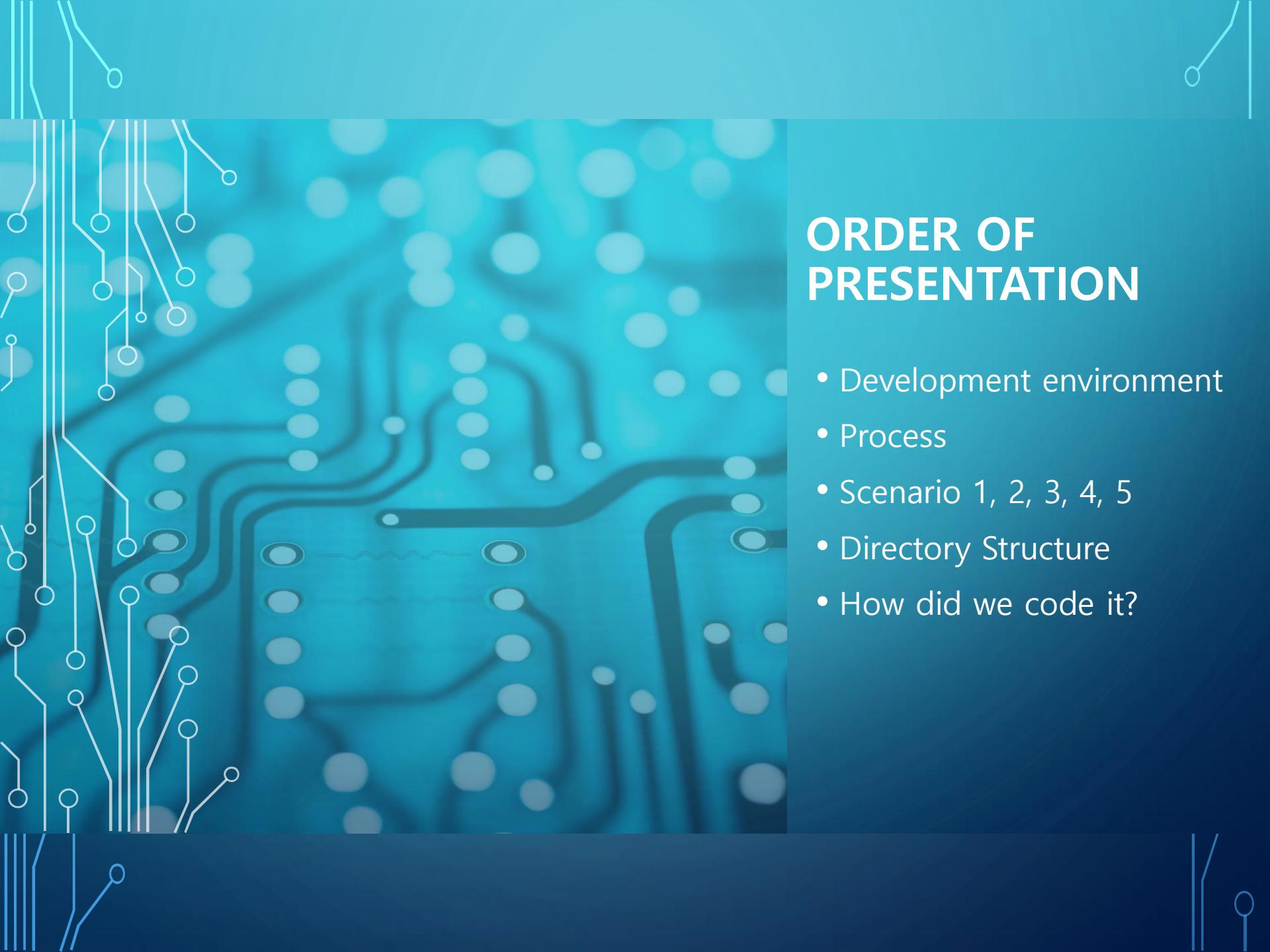


SMART PENGSOO

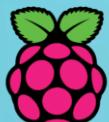
김채진, 이준호, 전고은, 현영광



ORDER OF PRESENTATION

- Development environment
- Process
- Scenario 1, 2, 3, 4, 5
- Directory Structure
- How did we code it?

DEVELOPMENT ENVIRONMENT



RaspberryPi



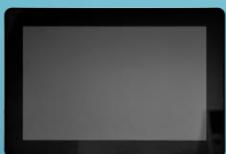
Servor motor



Gyroscope
Sensor



Touchscreen
Display



WebCam
Camera



RaspberryPi + Python = Raspbian

python



Speech Recognition



mongoDB



GitHub

PROCESS

STEP 1



STEP 2



RESULT

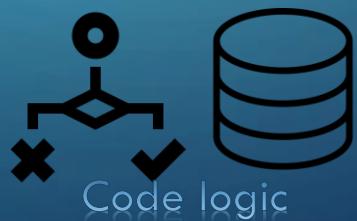


SCENARIO 1

“인사”



Speech Recognition



[팔동작]



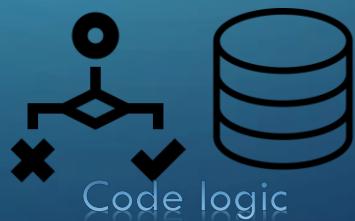
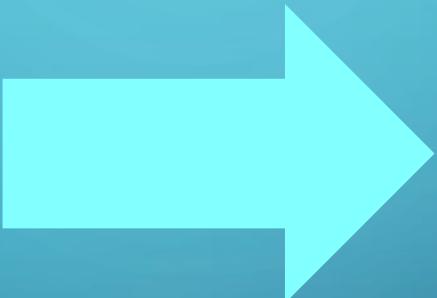
Servor motor

SCENARIO 2

“노래”



Speech Recognition



[음악재생]



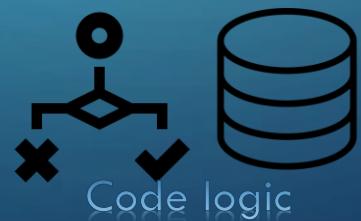
Play a music file

SCENARIO 3

“다음”



Speech Recognition



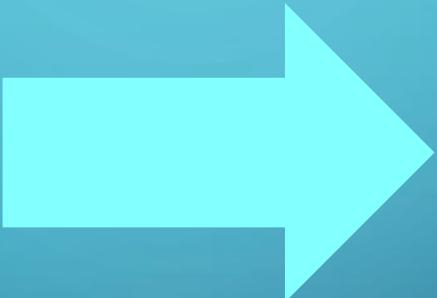
[다음곡재
생]



Play a music file

SCENARIO 4

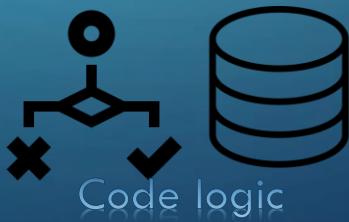
“그만”



[음악정지]



Speech Recognition

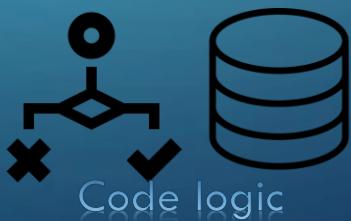


SCENARIO 5

“사진”



Speech Recognition



[사진촬영]



Camera

DIRECTORY STRUCTURE



HOW DID WE CODE IT?

```
faceCascade = cv2.CascadeClassifier('ha/haarcascade_frontalface_default.xml')
cap = cv2.VideoCapture(0) # 웹캠 설정
cap.set(3, 960) # 영상 가로길이 설정
cap.set(4, 480) # 영상 세로길이 설정
checkid=0
r = sr.Recognizer()

while True:
    if checkid==0 :
        ret, frame = cap.read()
        gray = cv2.cvtColor(frame, cv2.COLOR_BGR2GRAY)
        faces = faceCascade.detectMultiScale(gray,1.2,5)
        for (x,y,w,h) in faces:
            cv2.rectangle(frame,(x,y),(x+w,y+h),(255,0,0),2)
            roi_gray = gray[y:y+h, x:x+w]
            roi_color = frame[y:y+h, x:x+w]
            if w*h>=60000:
                checkid=1
    cv2.imshow('divx', frame)
    if checkid==1:
        cv2.destroyAllWindows()
    k = cv2.waitKey(1) & 0xff
    if k == 27:
        break
```

STEP1



얼굴이 충분히
접근했을 때 접속

HOW DID WE CODE IT?

STEP2

```
elif checkid==1:  
    with sr.Microphone() as source:  
        r.adjust_for_ambient_noise(source)  
        print(order[0])  
        audio_text = r.listen(source)  
  
    try:  
        print(order[1])  
        r2=r.recognize_google(audio_text,language='ko-KR')  
        print(r2)  
  
        if r2 == command.START_MUSIC:  
            music = spsmusic.music()  
            db.insert_command_one(command.START_MUSIC,'',SPEAKER)  
        elif r2 == command.GREETING:  
            hi=spshi.hi()  
            hi.start(0)  
            db.insert_command_one(command.GREETING,'',SPEAKER)  
        elif r2 == command.CAPTURE:  
            cap = cv2.VideoCapture(0)  
            ret, frame = cap.read()  
            cv2.imshow('divx', frame)  
            cv2.imwrite("c.jpg",frame)  
            cap.release()  
            db.insert_command_one(command.CAPTURE,'',SPEAKER)  
        elif r2 == command.END:  
            db.insert_command_one(command.END,'',SPEAKER)  
            break  
  
    except:  
        print(retry)
```

Google Web
Speech API를
이용한 음성 판별
및 출력

명령에 따른
클래스 호출

HOW DID WE CODE IT?

SCENARIO 1

“인사”

```
elif checkid==1:  
    with sr.Microphone() as source:  
        r.adjust_for_ambient_noise(source)  
        print(order[0])  
        audio_text = r.listen(source)  
        try:  
            print(order[1])  
            r2=r.recognize_google(audio_text,language='ko-KR')  
            print(r2)  
            if r2 == command.START_MUSIC:  
                music = spsmusic.music()  
                db.insert_command_one(command.START_MUSIC,'',SPEAKER)  
            elif r2 == command.GREETING:  
                hi=spshi.hi()  
                hi.start(0)  
                db.insert_command_one(command.GREETING,'',SPEAKER)  
            elif r2 == command.CAPTURE:  
                cap = cv2.VideoCapture(0)  
                ret, frame = cap.read()  
                cv2.imshow('divx', frame)  
                cv2.imwrite("c.jpg",frame)  
                cap.release()  
                db.insert_command_one(command.CAPTURE,'',SPEAKER)  
            elif r2 == command.END:  
                db.insert_command_one(command.END,'',SPEAKER)  
                break  
  
        except:  
            print(retry)
```



spshi.py

class hi 생성
start 메소드 실행
명령어 DB 저장

HOW DID WE CODE IT?

SCENARIO 1



spshi.py

```
import RPi.GPIO as GPIO
import time

class hi:
    def __init__(self):
        self.pin = 13 #왼
        self.pin2 = 19 #오
        GPIO.setmode(GPIO.BCM)
        GPIO.setup(self.pin, GPIO.OUT)
        GPIO.setup(self.pin2, GPIO.OUT)
        self.p2=GPIO.PWM(self.pin2,50)
        self.p= GPIO.PWM(self.pin, 50) #PWM:펄스 폭 변조
        self.cnt = 0
```



A black silhouette of a human head facing right, with a light blue speech bubble coming from its mouth containing the Korean text "인사".

```
def start(self,a):
    try:
        self.p.start(0)
        self.p2.start(0)
        self.cnt = 0
        while True:
            if a==0:
                self.p.ChangeDutyCycle(8)
                self.p2.ChangeDutyCycle(8)
                time.sleep(0.2)
                self.p.ChangeDutyCycle(4)
                self.p2.ChangeDutyCycle(4)
                time.sleep(0.2)
                self.cnt += 1
            if self.cnt != 3:
                continue
            self.p.stop()
            self.p2.stop()
            break
```

HOW DID WE CODE IT?

SCENARIO 2

“노래”

```
elif checkid==1:  
    with sr.Microphone() as source:  
        r.adjust_for_ambient_noise(source)  
        print(order[0])  
        audio_text = r.listen(source)  
        try:  
            print(order[1])  
            r2=r.recognize_google(audio_text,language='ko-KR')  
            print(r2)  
            if r2 == command.START_MUSIC:  
                music = spsmusic.music()  
                db.insert_command_one(command.START_MUSIC,'',SPEAKER)  
            elif r2 == command.GREETING:  
                hi=spshi.hi()  
                hi.start(0)  
                db.insert_command_one(command.GREETING,'',SPEAKER)  
            elif r2 == command.CAPTURE:  
                cap = cv2.VideoCapture(0)  
                ret, frame = cap.read()  
                cv2.imshow('divx', frame)  
                cv2.imwrite("c.jpg",frame)  
                cap.release()  
                db.insert_command_one(command.CAPTURE,'',SPEAKER)  
            elif r2 == command.END:  
                db.insert_command_one(command.END,'',SPEAKER)  
                break  
  
        except:  
            print(retry)
```



spmusic.py

class music 생성
명령어 DB 저장

HOW DID WE CODE IT?

SCENARIO 2



spmusic.py

“노래”



```
import pygame
import speech_recognition as sr
import random
import Command

class music:

    def __init__(self):
        command = Command.Command()

        self.music_cmd = ["Playing... - func => playingmusic", "명령 : 1. 그만 | 2. 다음", "명령을 확인중...", "다시 말해 주세요.", "재생을 정지합니다."]
        self.filename = ['music/Do It.mp3', 'music/noma - Color.mp3', 'music/Sakura.mp3', 'music/Dawn.mp3', 'music/Tomorrow.mp3']
        self.music_num = random.randrange(0,5)

        self.initMixer()
        self.r = sr.Recognizer()
        self.playmusic(self.filename[self.music_num])
        self.count = self.music_num
```

명령 리스트
파일 삽입
랜덤 재생목록 생성

HOW DID WE CODE IT?

SCENARIO 2



spmusic.py

```
def playmusic(self,soundfile):
    pygame.init()
    pygame.mixer.init()
    self.clock= pygame.time.Clock()
    pygame.mixer.music.load(soundfile)
    pygame.mixer.music.play()

while pygame.mixer.music.get_busy():
    #print("Playing... - func => playingmusic")
    print(self.music_cmd[0])

    self.clock.tick(1000) # 초당 1000프레임이상이 안되게 제한

    with sr.Microphone() as source:
        self.r.adjust_for_ambient_noise(source)
        print("%s번째 곡 : %s"%(self.count%5)+1, self.filename[self.count%5]))

    #print("명령 : 1. 그만 | 2. 다음")
    print(self.music_cmd[1])
```

“노래”



음악재생

HOW DID WE CODE IT?

SCENARIO 2



spmusic.py

```
def playmusic(self,soundfile):
    pygame.init()
    pygame.mixer.init()
    self.clock= pygame.time.Clock()
    pygame.mixer.music.load(soundfile)
    pygame.mixer.music.play()

while pygame.mixer.music.get_busy():
    #print("Playing... - func => playingmusic")
    print(self.music_cmd[0])

    self.clock.tick(1000) # 초당 1000프레임이상이 안되게 제한

    with sr.Microphone() as source:
        self.r.adjust_for_ambient_noise(source)
        print("%s번째 곡 : %s"%(self.count%5)+1, self.filename[self.count%5]))

    #print("명령 : 1. 그만 | 2. 다음")
    print(self.music_cmd[1])
```

“노래”



재생 중 명령
수행 준비

HOW DID WE CODE IT?

SCENARIO 3



spmusic.py

```
try :  
    #print("명령을 확인중...")  
    print(self.music_cmd[2])  
  
    r2=self.r.recognize_google(self.audio_text,language='ko-KR')  
    print(r2)  
  
    if command.STOP in r2:  
        self.stopmusic()  
        db.insert_command_one(command.STOP,'',SPEAKER)  
  
def stopmusic(self):  
    """stop currently playing music"""  
    #print("재생을 정지합니다.")  
    print(self.music_cmd[4])  
    pygame.mixer.music.stop()
```

“그만”

HOW DID WE CODE IT?

SCENARIO 4



spmusic.py

```
try :  
    #print("명령을 확인중...")  
    print(self.music_cmd[2])  
  
    r2=self.r.recognize_google(self.audio_text,language='ko-KR')  
    print(r2)  
  
    if command.STOP in r2:  
        self.stopmusic()  
        db.insert_command_one(command.STOP,'',SPEAKER)  
  
    elif command.NEXT in r2:  
        self.count+=1  
        self.playmusic(self.filename[self.count%5])  
        db.insert_command_one(command.NEXT,'',SPEAKER)
```

“다음”



HOW DID WE CODE IT?

SCENARIO 5

“사진”

```
elif checkid==1:  
    with sr.Microphone() as source:  
        r.adjust_for_ambient_noise(source)  
        print(order[0])  
        audio_text = r.listen(source)  
        try:  
            print(order[1])  
            r2=r.recognize_google(audio_text,language='ko-KR')  
            print(r2)  
            if r2 == command.START_MUSIC:  
                music = spsmusic.music()  
                db.insert_command_one(command.START_MUSIC,'',SPEAKER)  
            elif r2 == command.GREETING:  
                hi=spshi.hi()  
                hi.start(0)  
                db.insert_command_one(command.GREETING,'',SPEAKER)  
            elif r2 == command.CAPTURE:  
                cap = cv2.VideoCapture(0)  
                ret, frame = cap.read()  
                cv2.imshow('divx', frame)  
                cv2.imwrite("c.jpg",frame)  
                cap.release()  
                db.insert_command_one(command.CAPTURE,'',SPEAKER)  
            elif r2 == command.END:  
                db.insert_command_one(command.END,'',SPEAKER)  
                break  
  
        except:  
            print(retry)
```

현재 카메라의
이미지를
c.jpg로 저장

HOW DID WE CODE IT?

```
from pymongo import MongoClient
from pymongo.cursor import CursorType
import datetime

...
데이터베이스 이름 : pengsoo
테이블 : User(name, pwd)
테이블 : Command(input, output, device, date)
ex) {"hi", "Hi, How are you?", "speaker", new Date()}
...

class MongoDB:

    def __init__(self):
        self.host = "192.168.0.136"
        self.port = "27017"

        self.mongo = MongoClient(self.host, int(self.port))
        print(self.mongo)
        #print(self.mongo.database_names())

        self.database = self.mongo['pengsoo']
        self.collection = self.database['command']
        self.now = datetime.datetime.now().strftime('%Y-%m-%d %H:%M:%S')
```



input	output	device	date
안녕	안녕	Servor Motor	2020-10-30
노래		Speaker	2020-10-30
사진		Camera	2020-10-31
멈춰		Speaker	2020-11-02
...

HOW DID WE CODE IT?

```
# Command 테이블에 데이터 추가
def insert_command_one(self, command, output, device):
    data = {'input':command,
            'output': output,
            'device': device,
            'date': self.now }

    result = self.collection.insert_one(data).inserted_id
    print('MongoDB-Insert : ', result)
    return result

def insert_command_many(self, data, db_name=None, collection_name=None):
    result = self.collection[db_name][collection_name].insert_many(data).inserted_id
    return result

# Command 테이블에 데이터 수정
def update_command_one(self, data):
    data = {'input':command, 'output': output, 'device': device}

    result = self.collection.update_one(data).upserted_id
    print('MongoDB-Update : ', result)
    return result

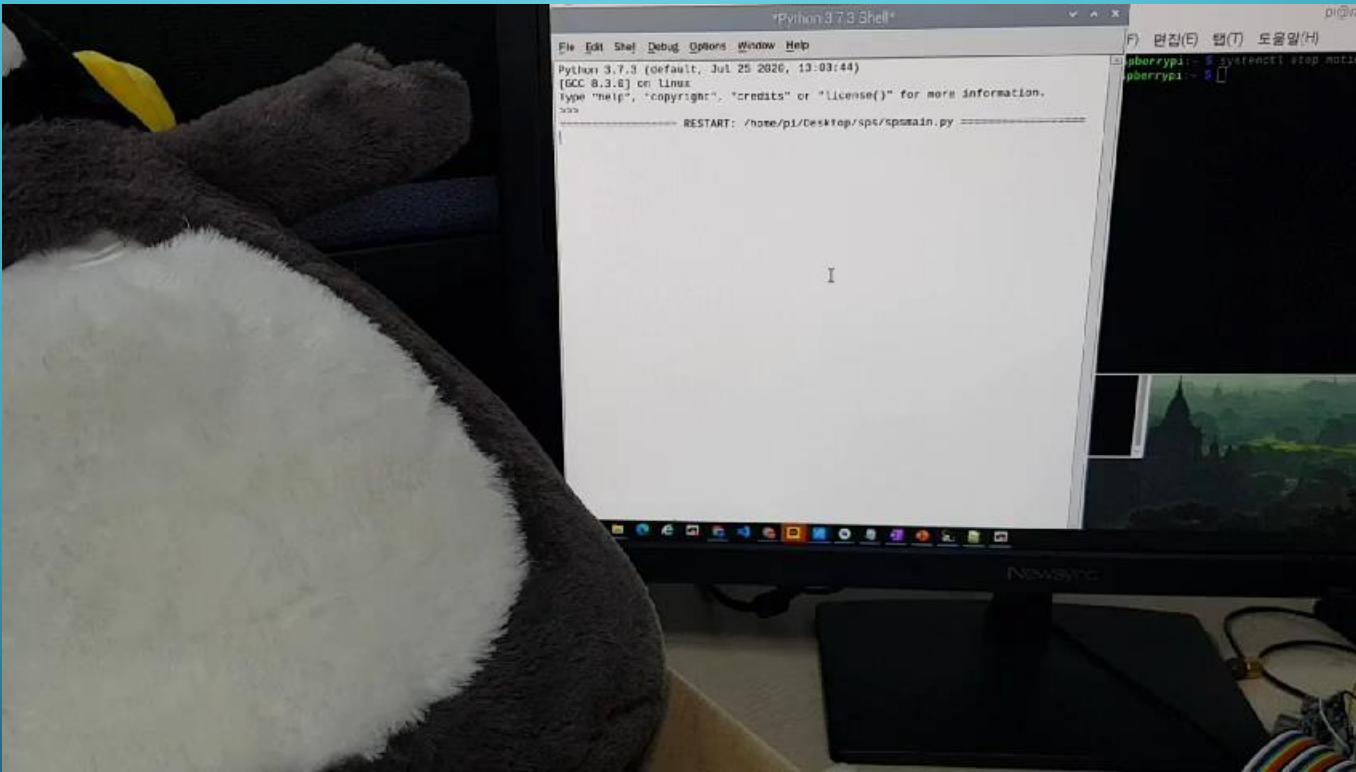
# Command 테이블에 데이터 삭제
def delete_command(self, condition=None, db_name=None, collection_name=None):
    result = self.collection[db_name][collection_name].delete_one(condition)
    return result

# Command 테이블에 데이터 불러오기
def select_command_One(self):
    return self.collection.find_one()

def select_command_All(self):
    return self.collection.find()
```



실행 영상



THANK YOU FOR YOUR ATTENTION.