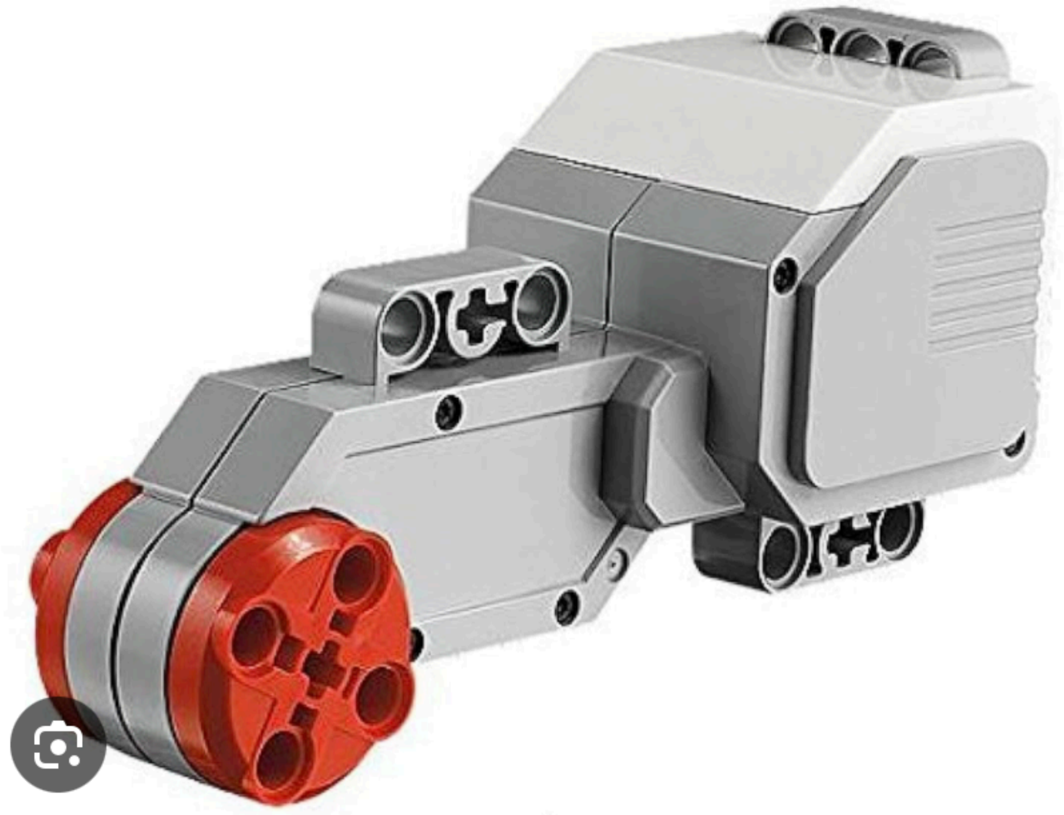
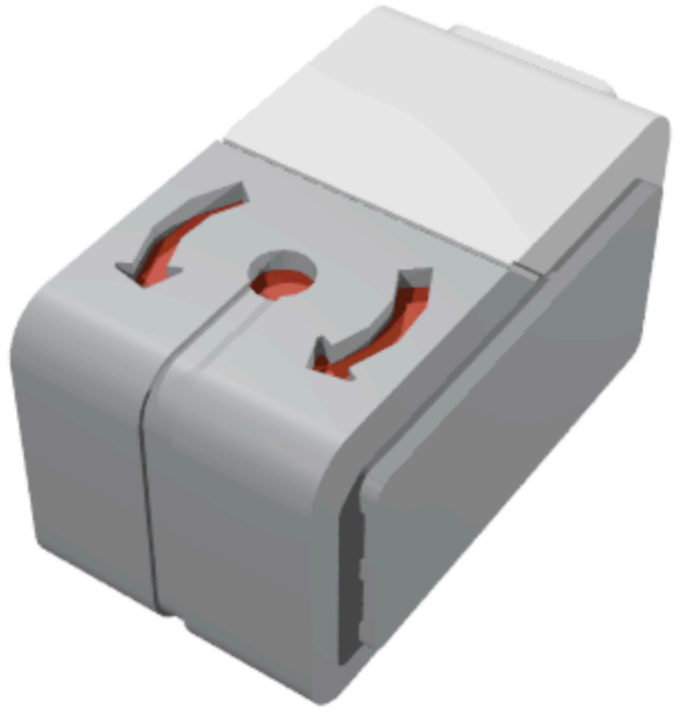
Pandas Programming Python

What is Python?

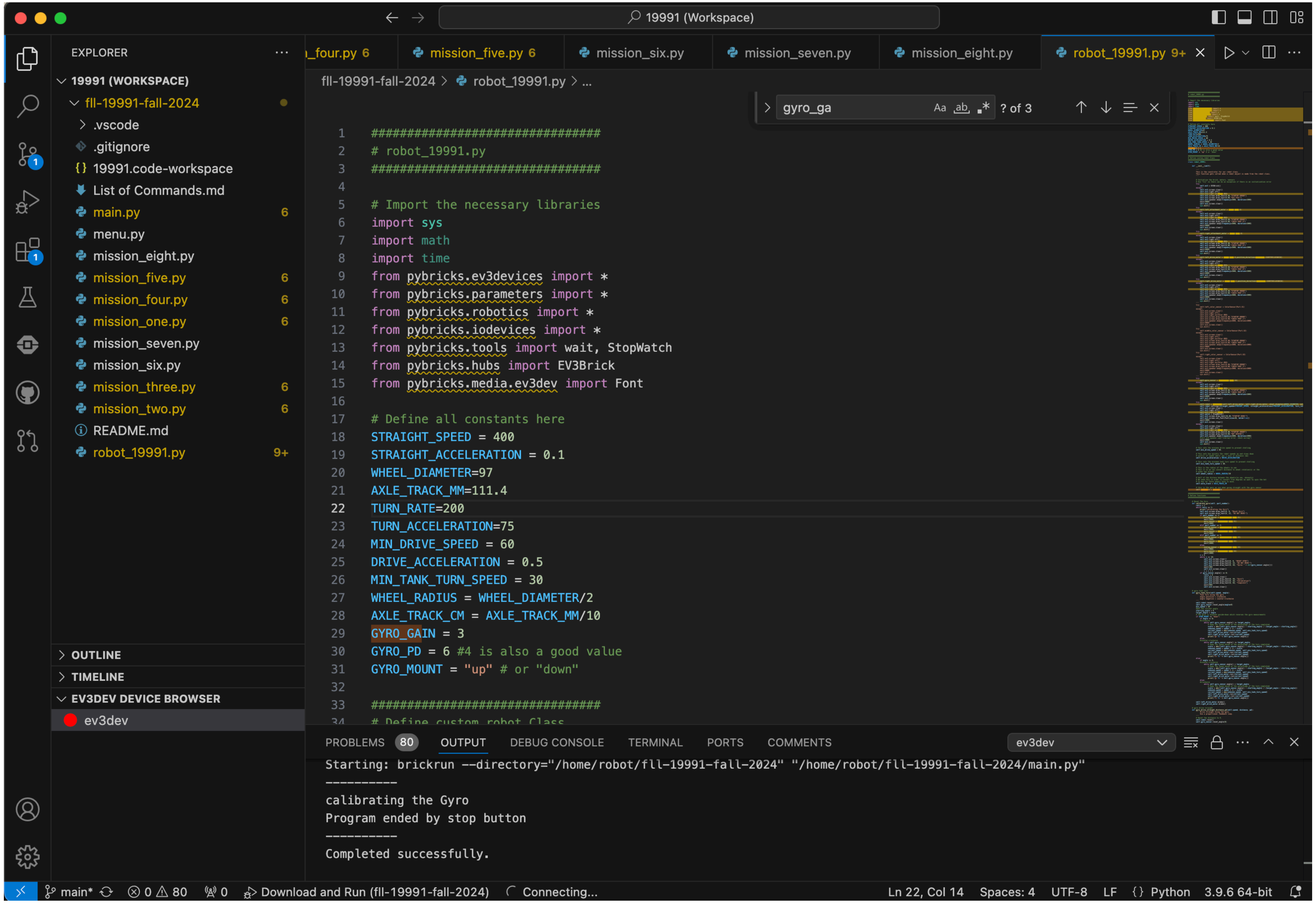
- Python is a programming language
- It is how you tell the robot what to do
- The way you talk to the robot is important
- “Sandwich mom a please me make” won’t get you a sandwich!

EV3 Robot





Python Project

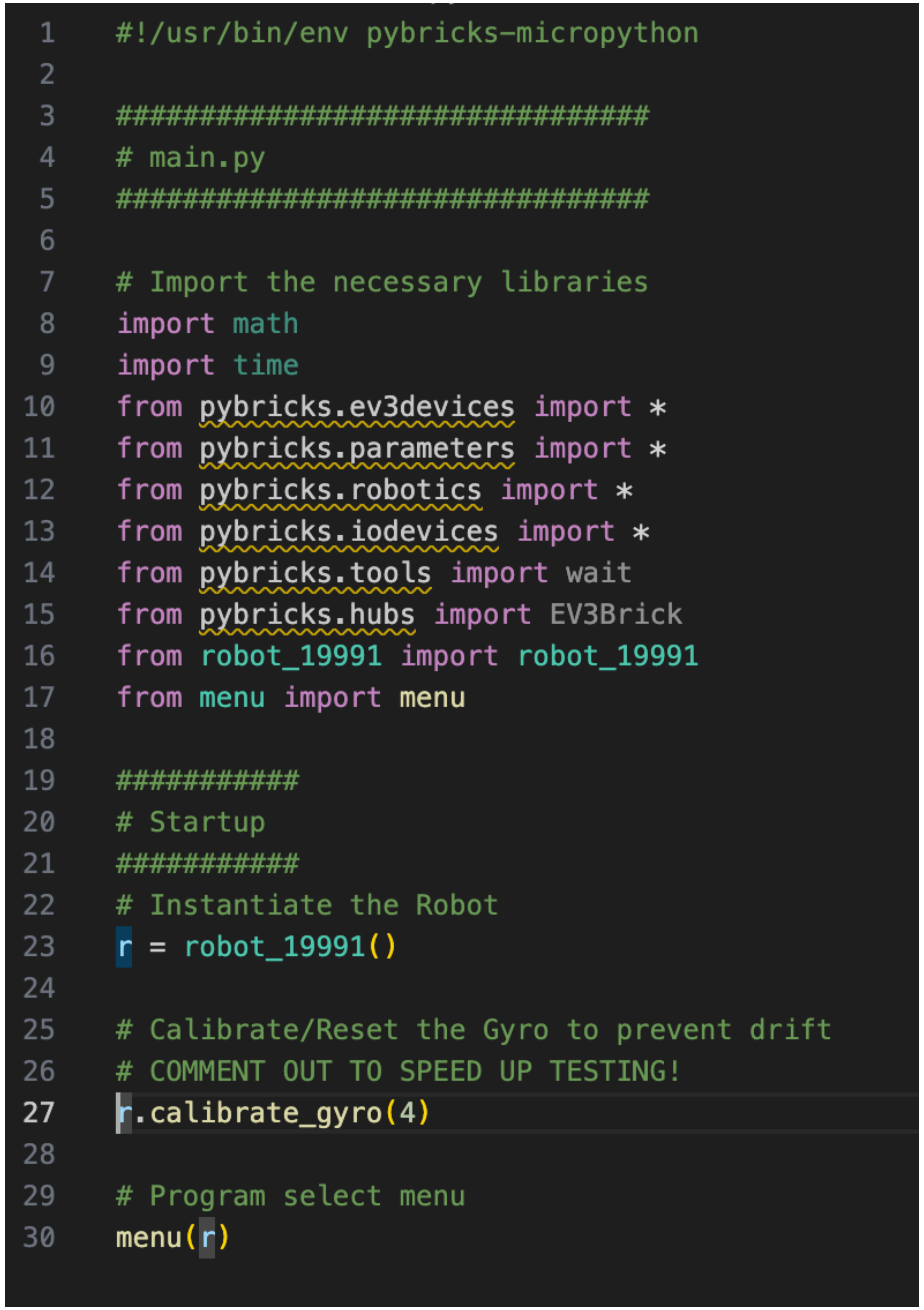


```python
#################################
# robot_19991.py
#################################

# Import the necessary libraries
import sys
import math
import time
from pybricks.ev3devices import *
from pybricks.parameters import *
from pybricks.robotics import *
from pybricks.iodevices import *
from pybricks.tools import wait, StopWatch
from pybricks.hubs import EV3Brick
from pybricks.media.ev3dev import Font

# Define all constants here
STRAIGHT_SPEED = 400
STRAIGHT_ACCELERATION = 0.1
WHEEL_DIAMETER=97
AXLE_TRACK_MM=111.4
TURN_RATE=200
TURN_ACCELERATION=75
MIN_DRIVE_SPEED = 60
DRIVE_ACCELERATION = 0.5
MIN_TANK_TURN_SPEED = 30
WHEEL_RADIUS = WHEEL_DIAMETER/2
AXLE_TRACK_CM = AXLE_TRACK_MM/10
GYRO_GAIN = 3
GYRO_PD = 6 #4 is also a good value
GYRO_MOUNT = "up" # or "down"

#################################
# Define custom robot Class
```

```
Starting: brickrun --directory="/home/robot/fll-19991-fall-2024" "/home/robot/fll-19991-fall-2024/main.py"
----------
calibrating the Gyro
Program ended by stop button
----------
Completed successfully.
```

What is Happening??

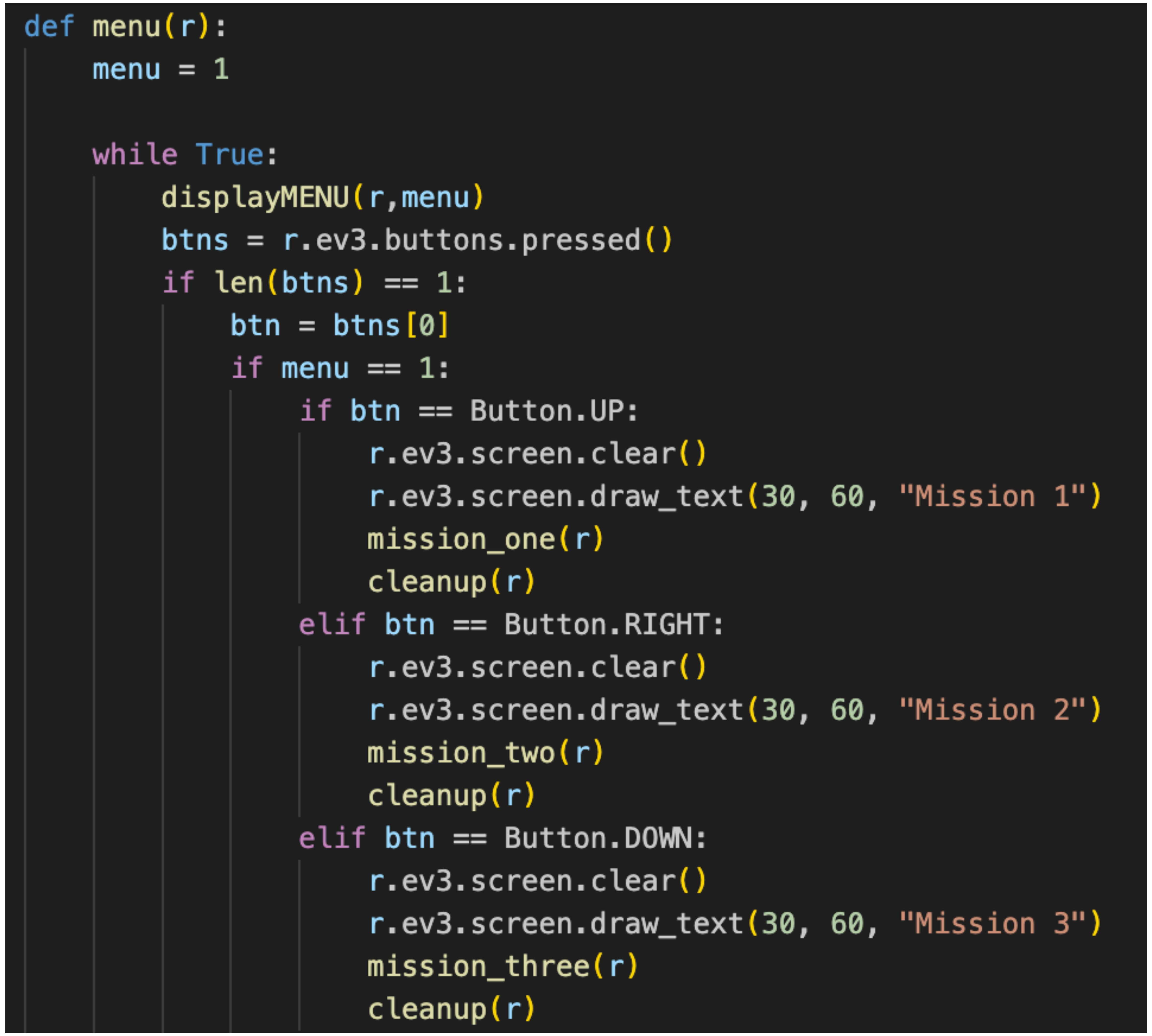
- main.py file starts the program
- Line by line
- r=robot_19991() creates our robot!
    - Tells the robot which ports to use
    - Tells the robot how big its wheels are, why?
    - Also gives us drive functions, easy peasy!
- menu(r) tells it what to do next



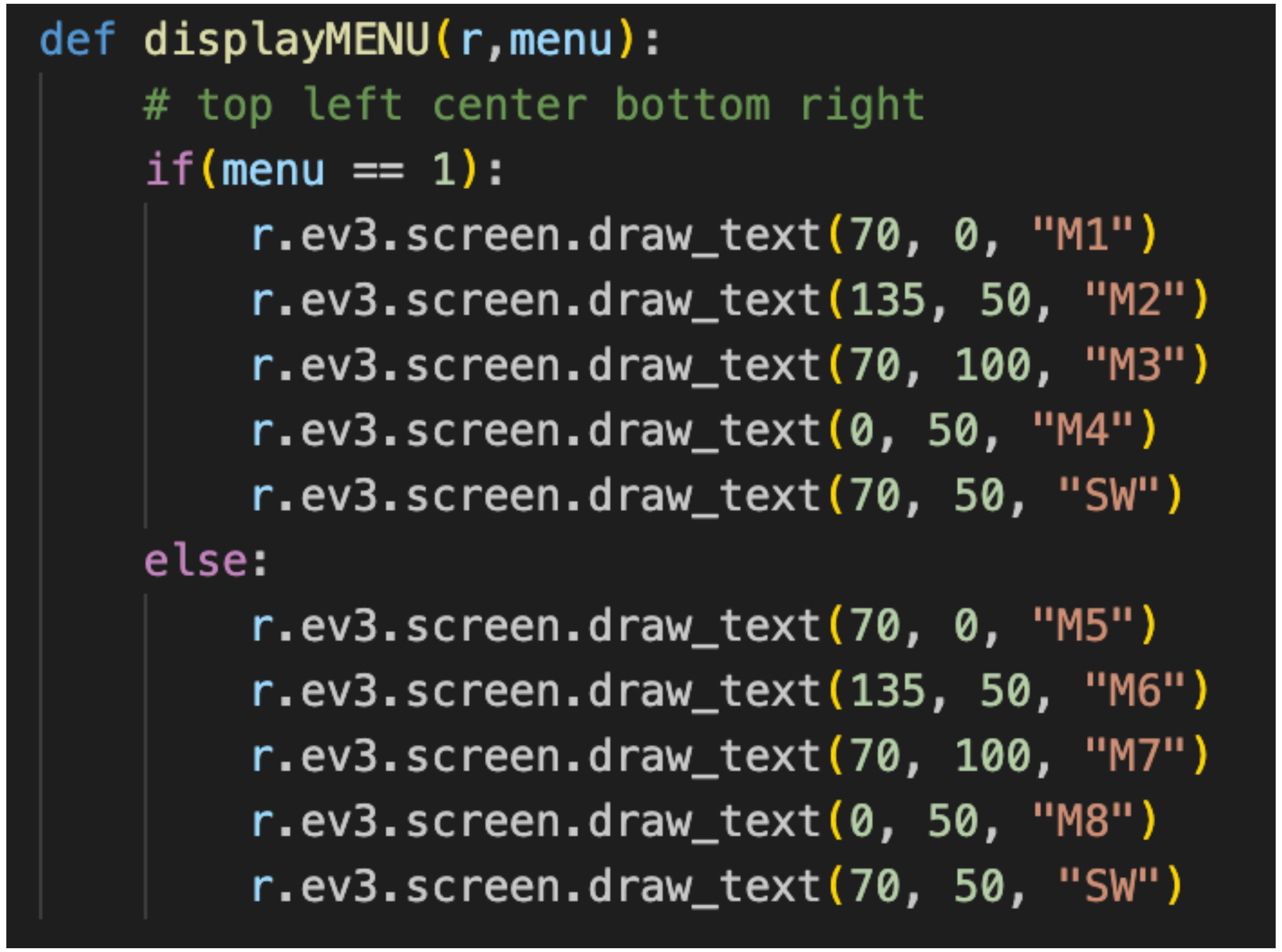
```
#!/usr/bin/env pybricks-micropython

################################
# main.py
################################

# Import the necessary libraries
import math
import time
from pybricks.ev3devices import *
from pybricks.parameters import *
from pybricks.robotics import *
from pybricks.iodevices import *
from pybricks.tools import wait
from pybricks.hubs import EV3Brick
from robot_19991 import robot_19991
from menu import menu

###########
# Startup
###########
# Instantiate the Robot
r = robot_19991()

# Calibrate/Reset the Gyro to prevent drift
# COMMENT OUT TO SPEED UP TESTING!
r.calibrate_gyro(4)

# Program select menu
menu(r)
```

What is Happening??

- menu(r) draws the menu you see
- Waits for you to push a button

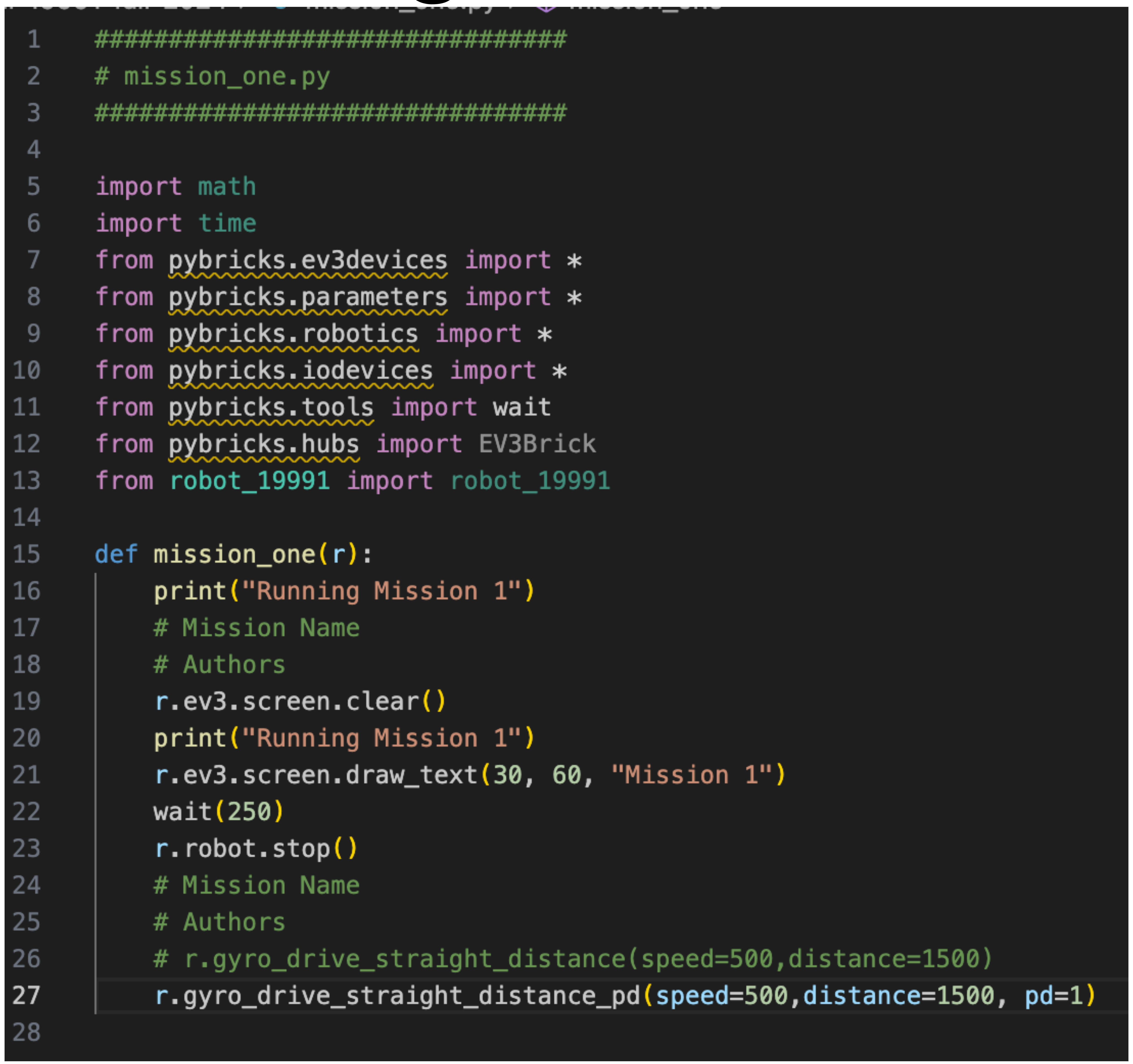


```python
def menu(r):
    menu = 1

    while True:
        displayMENU(r,menu)
        btns = r.ev3.buttons.pressed()
        if len(btns) == 1:
            btn = btns[0]
            if menu == 1:
                if btn == Button.UP:
                    r.ev3.screen.clear()
                    r.ev3.screen.draw_text(30, 60, "Mission 1")
                    mission_one(r)
                    cleanup(r)
                elif btn == Button.RIGHT:
                    r.ev3.screen.clear()
                    r.ev3.screen.draw_text(30, 60, "Mission 2")
                    mission_two(r)
                    cleanup(r)
                elif btn == Button.DOWN:
                    r.ev3.screen.clear()
                    r.ev3.screen.draw_text(30, 60, "Mission 3")
                    mission_three(r)
                    cleanup(r)
```



```python
def displayMENU(r,menu):
    # top left center bottom right
    if(menu == 1):
        r.ev3.screen.draw_text(70, 0, "M1")
        r.ev3.screen.draw_text(135, 50, "M2")
        r.ev3.screen.draw_text(70, 100, "M3")
        r.ev3.screen.draw_text(0, 50, "M4")
        r.ev3.screen.draw_text(70, 50, "SW")
    else:
        r.ev3.screen.draw_text(70, 0, "M5")
        r.ev3.screen.draw_text(135, 50, "M6")
        r.ev3.screen.draw_text(70, 100, "M7")
        r.ev3.screen.draw_text(0, 50, "M8")
        r.ev3.screen.draw_text(70, 50, "SW")
```

Finally, We’re Doing Something



```python
################################
# mission_one.py
################################

import math
import time
from pybricks.ev3devices import *
from pybricks.parameters import *
from pybricks.robotics import *
from pybricks.iodevices import *
from pybricks.tools import wait
from pybricks.hubs import EV3Brick
from robot_19991 import robot_19991

def mission_one(r):
    print("Running Mission 1")
    # Mission Name
    # Authors
    r.ev3.screen.clear()
    print("Running Mission 1")
    r.ev3.screen.draw_text(30, 60, "Mission 1")
    wait(250)
    r.robot.stop()
    # Mission Name
    # Authors
    # r.gyro_drive_straight_distance(speed=500,distance=1500)
    r.gyro_drive_straight_distance_pd(speed=500,distance=1500, pd=1)

```

Commands

- r.gyro_drive_straight_distance(speed=12345,distance=6789)
- r.gyro_drive_straight_time(speed=12345,time=6789)
- r.gyro_tank_turn(speed=12345,angle=6789)
- r.robot.brake()

Commands

- r.left_attachment_motor.run(speed=12345)
- r.right_attachment_motor.run(speed=12345)
- r.left_attachment_motor.run_time(speed=12345, time=6789, then=Stop.HOLD, wait=True)
- r.right_attachment_motor.run_time(speed=12345, time=6789, then=Stop.HOLD, wait=True)
- Also have run_angle and run_target