

# 04\_01\_while\_teacher\_\_

May 2, 2025

Part of the InnovatED STEM and DroneBlocks Land, Air, and Sea Robotics Curriculum  
Licensed for educational use in schools only.  
Redistribution, commercial use, or resale is strictly prohibited.  
© 2025 InnovatED STEM & DroneBlocks. All rights reserved.

## 1 Flying with while Loops + MultiRanger Obstacle Sensing

This notebook shows how to use `while` loops to repeatedly check flight conditions and make decisions based on MultiRanger sensor data. The `CrazyflieSimulator` now simulates realistic sensor values, just like a real drone.

```
[ ]: # Setup
import time
from crazyflie_sim import CrazyflieSimulator

drone = CrazyflieSimulator(real=False)
```

### 1.1 Takeoff First

```
[ ]: drone.takeoff(1.0, 0.3)
time.sleep(2)
```

### 1.2 Example 1: Hover until height is above 0.8m

```
[ ]: while drone.get_height() < 0.8:
    print(" Waiting to reach 0.8m...")
    time.sleep(0.5)
print(" Altitude reached!")
```

### 1.3 Example 2: Move forward until X position > 1.0

```
[ ]: while drone.get_position()[0] < 1.0:
    drone.forward(0.1, 0.2)
    time.sleep(1)
print(" Stopping forward motion.")
```

#### 1.4 Example 3: Rotate until yaw < 90°

```
[ ]: while drone.get_yaw() > 90:
      drone.rotate(-10, 0.5)
      time.sleep(0.5)
print(" Yaw aligned!")
```

#### 1.5 MultiRanger Example: Move forward until obstacle < 0.5m

```
[ ]: while drone.get_distances()['front'] > 0.5:
      print("Path clear. Moving forward...")
      drone.forward(0.1, 0.2)
      time.sleep(0.5)
print(" Obstacle too close. Stopping.")
```

#### 1.6 Exercise 1: Fly upward until height is at least 1.5m

```
[ ]: # while drone.get_height() < :
      #     drone.up( , )
      #     time.sleep( )
```

#### 1.7 Exercise 2: Hover until yaw < 45

```
[ ]: # while drone.get_yaw() > :
      #     drone.rotate( , )
      #     time.sleep( )
```

#### 1.8 Exercise 3: Zig-zag left/right until X > 1.2

```
[ ]: # while drone.get_position()[0] < :
      #     drone.left( , )
      #     time.sleep( )
      #     drone.right( , )
      #     time.sleep( )
```

#### 1.9 Exercise 4: Rotate until yaw is between 80 and 100

```
[ ]: # while not (80 <= drone.get_yaw() <= 100):
      #     drone.rotate( , )
      #     time.sleep( )
```

#### 1.10 Exercise 5: Move up until 'up' sensor sees obstacle < 0.4m

```
[ ]: # while drone.get_distances()['up'] > :
      #     drone.up( , )
      #     time.sleep( )
```

### 1.11 Exercise 6: Back up until object behind is closer than 0.3m

```
[ ]: # while drone.get_distances()['back'] > :  
#     drone.backward( , )  
#     time.sleep( )
```

### 1.12 Land and Close

```
[ ]: drone.land(0.3)  
drone.close()
```