04_02_obstacles___

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1 Simple Obstacle Avoidance with MultiRanger

This notebook teaches how to combine sensor input and logic to help your drone avoid obstacles automatically using `while`, `if`, and sensor readings.

Obstacle detection is simulated using the `CrazyflieSimulator` with realistic distance values.

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

drone = CrazyflieSimulator(real=False)
```

1.1 Takeoff

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

1.2 Obstacle Avoidance Logic

The idea is simple: - If there's something **in front** (`< 0.5m`) → stop and move **back** or **turn** - Otherwise → keep moving **forward**

[ ]:
```
print(drone.get_distances())  # See example sensor values
```

[ ]:
```
# Simple forward motion with obstacle check
for _ in range(10):
    distances = drone.get_distances()
    if distances['front'] < 0.5:
        print("Obstacle ahead! Backing up.")
        drone.backward(0.2, 0.2)
        drone.rotate(90, 1)
    else:
        drone.forward(0.2, 0.2)
```

```
    time.sleep(1)
```

1.3 Exercise 1: Try using left/right sensors to dodge obstacles

Hint: If there's an object in front and space on one side, turn that way instead of backing up.

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1.4 Exercise 2: Loop until you detect an obstacle within 0.4m in any direction

[ ]:

1.5 Land and Close

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1.6 Exercise 3: Turn around if blocked on both front and sides

Use logic to rotate 180° if there's no space in front, left, or right.

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1.7 Exercise 4: Cautiously move forward until object is closer than 0.6m

Use a loop and stop at safe distance.

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1.8 Exercise 5: Try a mini square pattern, only if no object ahead

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