Exploring RGB LED Control with OmniWheelControlNode

This notebook will guide you through controlling RGB LEDs using `node.set_color` and `node.blink`.

Objectives

- Learn how to set LED colors.
- Make LEDs blink.
- Create patterns and challenges for deeper exploration.

In [ ]:
```python
import rclpy
omni_robot_controller import OmniWheelControlNode  # Import control node

# Initialize ROS2 node
rclpy.init()
node = OmniWheelControlNode()
```

1 Setting LED Colors

Run the following cell to set an LED to red.

In [ ]:
```python
# Set LED 1 to Red
node.set_color(1, 255, 0, 0)  # LED 1 Red
```

2 Experiment with Different Colors

Try different color combinations to understand RGB values.

- Example: Green → (0,255,0) | Blue → (0,0,255) | Yellow → (255,255,0)

In [ ]:
```python
# Set LED 2 to Green
node.set_color(2, 0, 255, 0)  # Green

# Set LED 3 to Blue
node.set_color(1, 0, 0, 255)  # Blue
```

3 Making an LED Blink

Use `node.blink` to make an LED flash in different colors.

- Example: LED 1 blinks red three times with a 0.5s delay.

In [ ]:
```
# Blink LED 1 in red 3 times with 0.5s delay
node.blink(1, 255, 0, 0, repeat=3, delay=0.5)
```

4 Challenge: Custom Blinking Sequence

Create a sequence where an LED blinks blue **5 times** with a **1-second delay**.

Hint: Use `node.blink` and adjust parameters accordingly.

In [ ]:
```
# Write your custom blinking sequence here
# Example:
# node.blink(2, 0, 0, 255, repeat=5, delay=1)
```

5 Turning Off LEDs

It's important to turn off LEDs after use to prevent unnecessary power consumption.

In [ ]:
```
# Turn off all LEDs
node.set_color(1, 0, 0, 0)
node.set_color(2, 0, 0, 0)
node.set_color(1, 0, 0, 0)
```

6 Challenge: Traffic Light Simulation

Create a sequence where:

- **Red** stays on for 3 seconds.
- **Yellow** stays on for 1 second.
- **Green** stays on for 3 seconds.

Hint: Use `node.set_color` with `time.sleep()` to control timing.

In [ ]:
```
# Write your traffic light sequence here
# Example:
# import time
# node.set_color(1, 255, 0, 0)  # Red
# time.sleep(3)
# node.set_color(1, 255, 255, 0)  # Yellow
# time.sleep(1)
# node.set_color(1, 0, 255, 0)  # Green
# time.sleep(3)
```

7 Extension Challenge: LED Light Show

Create a **dynamic light show** using multiple LEDs with different colors and blink rates.

- Use **multiple colors**.
- Combine **blinking and steady lights**.
- Experiment with **timing and patterns**.

Example: A pattern where LEDs cycle through colors in a wave effect.

In [ ]:
```
# Write your LED light show sequence here
# Example:
# for i in range(5):
#     node.set_color(1, 255, 0, 0)  # Red
#     time.sleep(0.5)
#     node.set_color(2, 0, 255, 0)  # Green
#     time.sleep(0.5)
#     node.set_color(1, 0, 0, 255)  # Blue
#     time.sleep(0.5)
```

8 Shutting Down the Node

When you're done, shut down the node properly to free system resources.

In [ ]:
```
# Shutdown ROS2 node
node.destroy_node()
rclpy.shutdown()
print('Node shutdown complete.')
```