Buzzer_Challenge_9__Student

This is the **student version** of **Challenge 1: Buzzer Alert Based on Distance**.

Follow the instructions to complete the challenge on your own.

In [ ]:
```
import rclpy
from omni_robot_controller import OmniWheelControlNode  # Import control noc

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

ℹ ROS2 Node Initialization

This cell includes the correct libraries and initializes the `OmniWheelControlNode` for use with the challenges. **Make sure ROS2 is installed and sourced in your environment.**

Challenge 1: Buzzer Alert Based on Distance

Objective

Write a loop that continuously reads the robot's front distance sensor and adjusts the buzzer frequency based on the detected distance.

Instructions

1⃣ Read Sensor Data

- Retrieve the **distance** measurement from the LiDAR sensor.
- Use the appropriate **distance variable** from the robot's `OmniWheelControlNode` class.

2⃣ Calculate Buzzer Frequency

- Create a function that **maps the distance to a buzzer frequency**.
- Consider that **closer objects** should have a **higher pitch**, and farther objects a **lower pitch**.
- Think about using a **linear or exponential mapping function** to adjust the frequency.

3 Play the Buzzer Based on Distance

- Use the **robot's buzzer function** to generate sound.
- Ensure that the buzzer plays **with intervals** and **stops when needed**.

4 Use a Loop to Continuously Check Distance

- Continuously update the distance and adjust the buzzer.
- Stop the buzzer when no object is detected or when the robot moves beyond a threshold.

Available Functions & How to Use Them

Here are the key functions from the `OmniWheelControlNode` class that you can use:

** Read Distance**

- **Use one of the following variables to get distance:**
  - `node.front_distance`
  - `node.back_distance`
  - `node.left_distance`
  - `node.right_distance`
- These variables update automatically with sensor readings.

** Play a Buzzer Sound**

```
node.play_buzzer(frequency, on_time, off_time, repeat)
```

In [ ]:
```
#  Write your solution here
```