ROS

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Robot Operating System

- Open source framework
- Released in 2007
- Good community, popular in research and commercial products
- Contains tools, libraries, and more
- C++, Python are most common

Robots

- Actuators → things that move
- Sensors → things that read the world

- Control Systems → robot's brain
  - ROS helps developers quickly build these components
    - Connect them using topics and messages
    - Messages can be recorded using .bag files

ROS2

- 2nd version of ROS
- Supports microROS
  - Variant of ROS
  - Runs natively on embedded microcontrollers running real-time operating systems

ROS Nodes

- ROS2 program that interacts with ROS2 communications and tools
- ROS2 comes with example packages you can use to start a node without having to create one
- Talker Node → Listener Node

```
# Run node
ros2 run [package name] [node name]
```

RQT Graph

- GUI tool for ROS2

```
# Representation of all running nodes
rqt_graph # Installed package inside ros2
```

Turtlesim

- Package to experiment with robots in 2-D
- Lightweight simulator for learning ROS2
  - Illustrates what ROS2 does at a basic level

```
# Run node
ros2 run turtlesim turtlesim_node
```

Setup Notes

```
# Add ros2 environment setup to WSL terminal startup
nano ~/.bashrc
source /opt/ros/humble/setup.bash
```

ROS2 Workspace

- Build and install custom code for use
- Can share ROS2 workspace (containing nodes) for collaboration

```
# Create workspace directory
mkdir ros2_ws

# Create source folder
mkdir src

# Build
    # fetch code inside /src
colcon build

# Reload bash script in current terminal session
```

```
    # Runs each time new terminal created
source ~/.bashrc
```