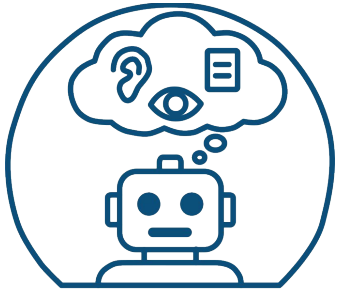
ROS2: Turtlebot4 with Gazebo

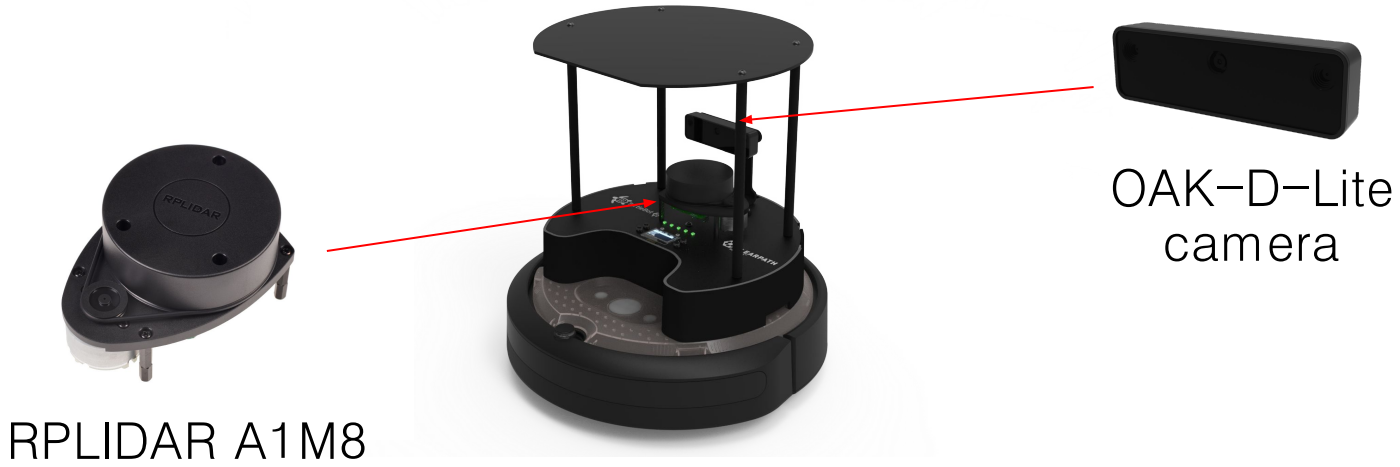
운영체제의 실제

안인규 (Inkyu An)



Turtlebot4

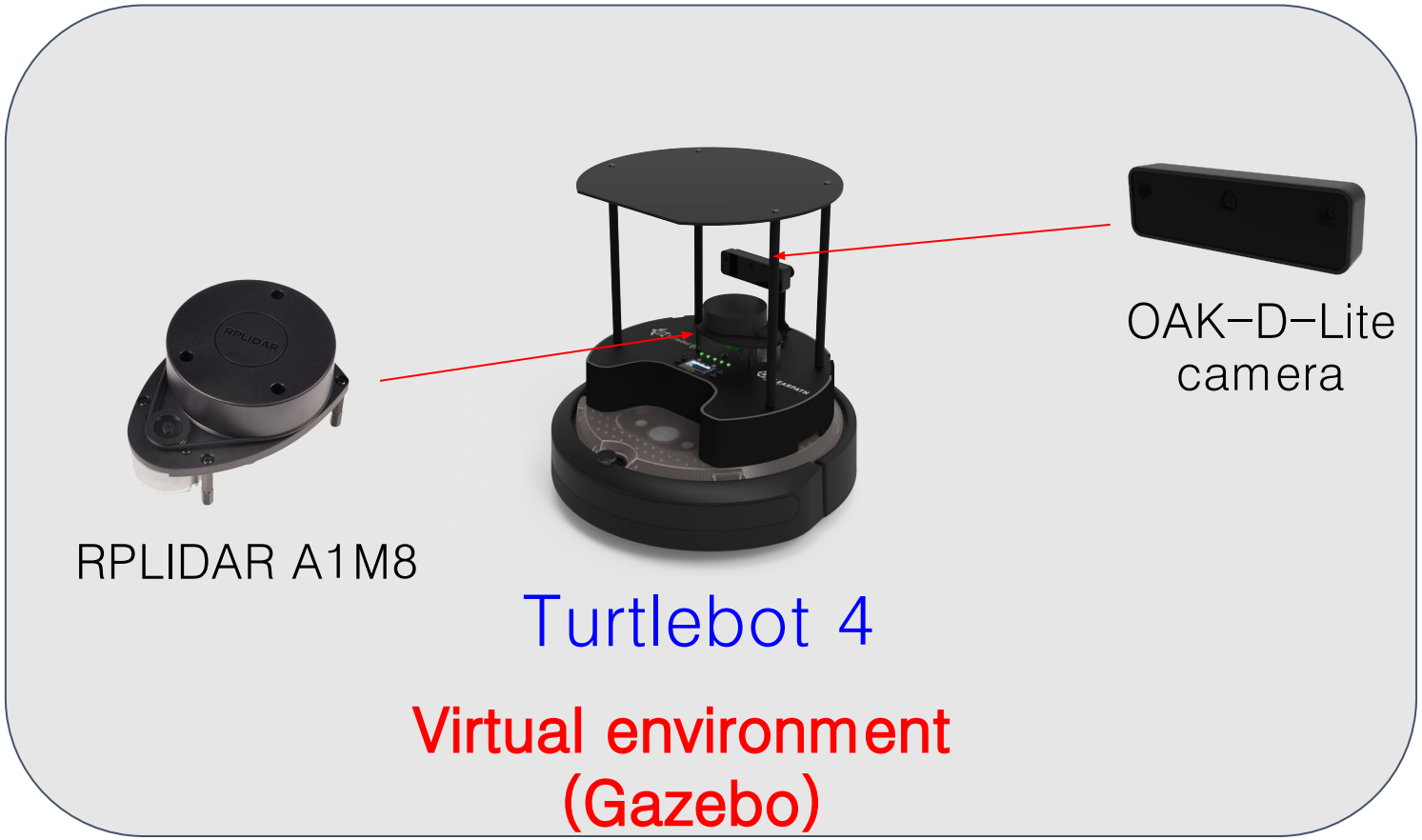
- In this class, we plan to conduct practical sessions using real robots:
- Turtlebot 4 – Clearpath Robotics
  - RPLIDAR A1M8: 360 degree Laser Range Scanner with a 12m range
  - OAK-D-Lite camera: stereo camera (we can obtain depth information)

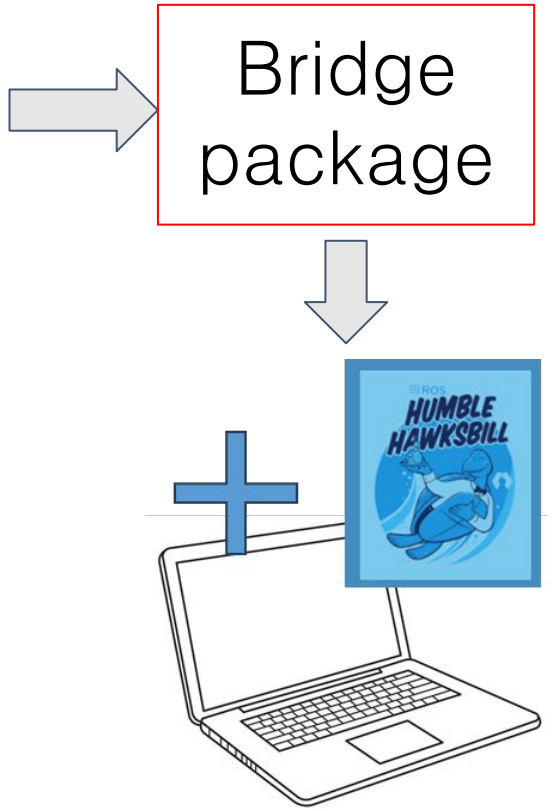


Turtlebot 4

Turtlebot4 – Simulation

- Before using real robots, we plan to conduct practical exercises using the Gazebo simulation.





Turtlebot4 – Simulation

- **Turtlebot4 simulator**
  - Install the Turtlebot4 simulator:

```
$ sudo apt install ros-humble-turtlebot4-simulator ros-humble-irobot-create-nodes
```

  - Install useful development tools:

```
$ sudo apt install ros-dev-tools
```

  - Gazebo is already installed in the previous class

Turtlebot4 – Simulation

- **Configuring ROS2:**
  - As we learned in the previous lecture, it is necessary to connect ROS2 with Gazebo, and this should be done using the ros_gz_bridge package.
  - E.g.,

```
$ source /opt/ros/humble/setup.bash
$  ros2 run ros_gz_bridge parameter_bridge
/model/vehicle_blue/cmd_vel@geometry_msgs/msg/Twist]ignition.msgs.Twist
```

  - Turtlebot4 has the “turtlebot4_ignition_bringup” package
  - It contains launch files and configurations to launch ignition Gazebo:
    - **Turtlebot 4 Ignition Launch:** Launches Ignition Gazebo and all required nodes to run the simulation.
    - **Ignition:** Launches Ignition Gazebo only.
    - **ROS Ignition Bridge:** Launches all of the required ros_ign_bridge nodes to bridge Ignition topics with ROS topics.
    - **TurtleBot 4 Nodes:** Launches the turtlebot4_node and turtlebot4_ignition_hmi_node required to control the HMI (디스플레이/버튼 인터페이스) plugin and robot behaviour.

Turtlebot4 – Simulation

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Turtlebot4 – Simulation

- Turtlebot4 Ignition launch configuration options:

옵션	의미	선택지	기본값
model	사용할 TurtleBot4 모델	`standard`, `lite`	`standard`
rviz	RViz 실행 여부	`true`, `false`	`false`
localization	localization 실행 여부	`true`, `false`	`false`
slam	SLAM 실행 여부	`true`, `false`	`false`
nav2	Navigation2 실행 여부	`true`, `false`	`false`
world	사용할 시뮬레이션 월드	`depot`, `maze`, `warehouse`	`warehouse`
namespace	로봇 네임스페이스 지정	문자열(옵션)	`""`
x, y, z	로봇이 월드 내에서 생성될 좌표	float	`0.0`
yaw	로봇의 시작 방향(회전각)	float	`0.0`

- E.g.,

```
$ ros2 launch turtlebot4_ignition_bringup turtlebot4_ignition.launch.py rviz:=true
```

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We will learn …

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