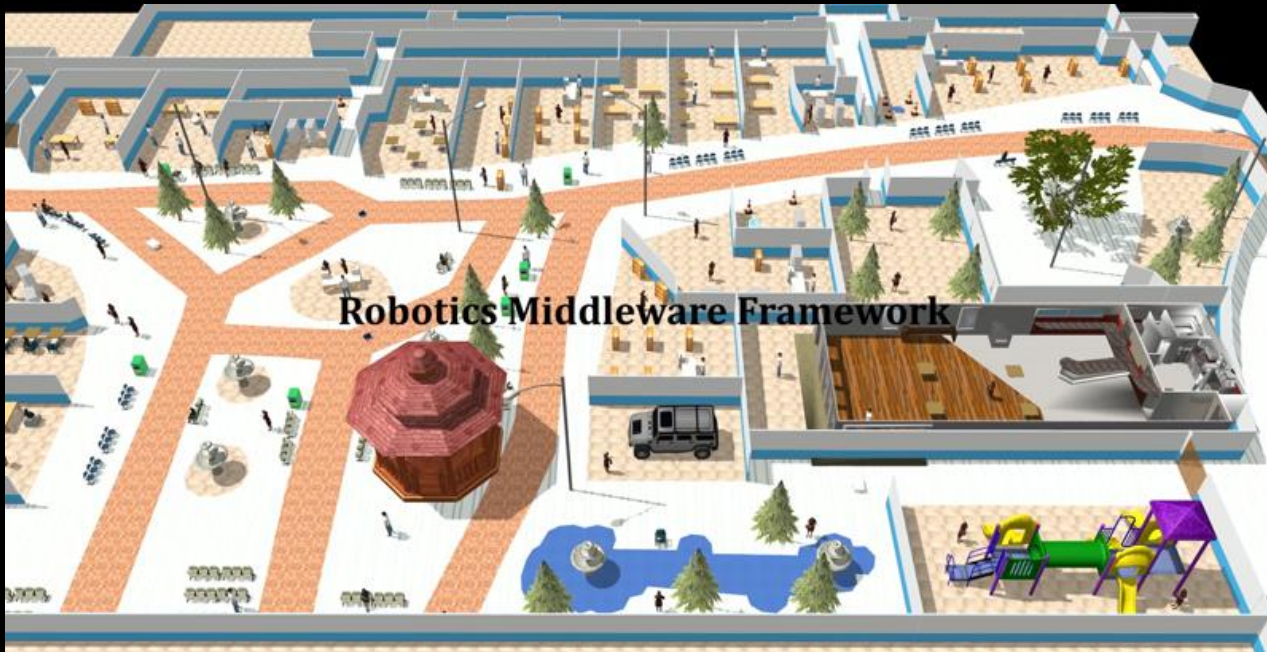




A Common Language for Robot Interoperability



## Lecture 4

정은빈

# Contents

01 **Airport Terminal  
world Demo**

02 **RMF Panel**

# **Airport Terminal world Demo**

# Airport Terminal world Demo

---

## ⦿ Airport Terminal world 실행

### ┆ 환경 불러오기

```
cd ~/rmf_ws && source install/setup.bash
```

### ┆ Classic Gazebo로 **Airport Terminal** world 실행

```
ros2 launch rmf_demos_gz_classic airport_terminal.launch.xml
```

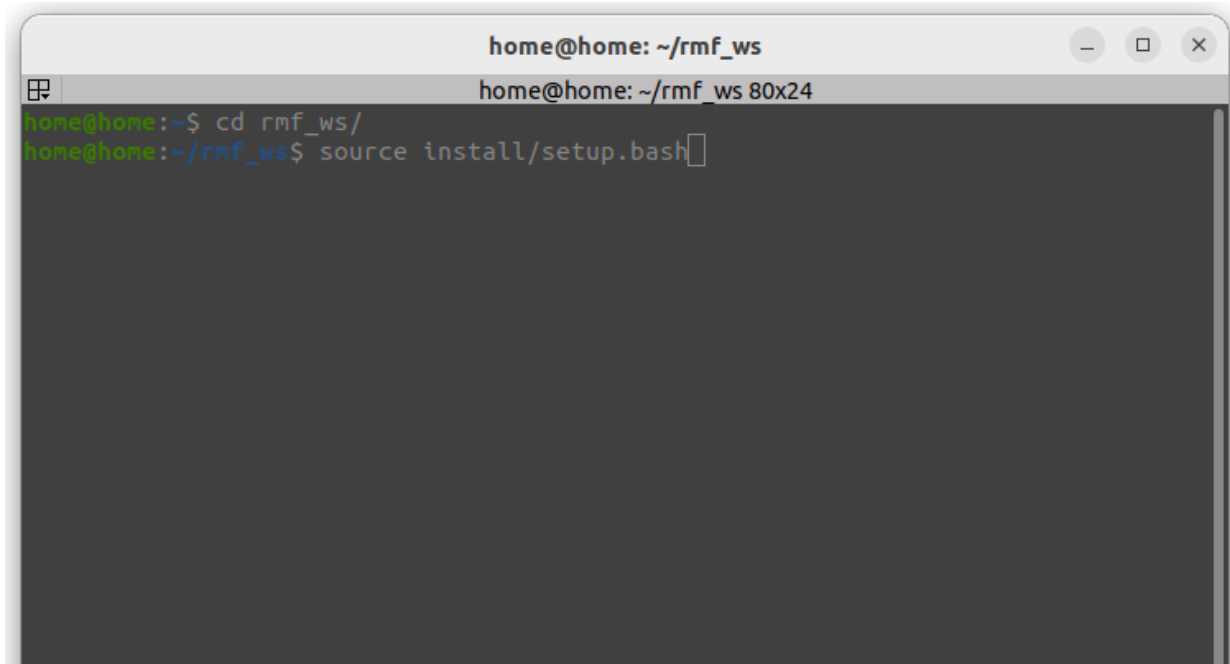
# Airport Terminal world Demo

---

## ⦿ Airport Terminal world 실행

### ┆ 환경 불러오기

```
cd ~/rmf_ws && source install/setup.bash
```

A terminal window titled 'home@home: ~/rmf\_ws' with standard window controls. The terminal shows the command 'cd rmf\_ws/' being executed, followed by 'source install/setup.bash' which is currently being typed. The prompt is 'home@home:~/rmf\_ws\$'.

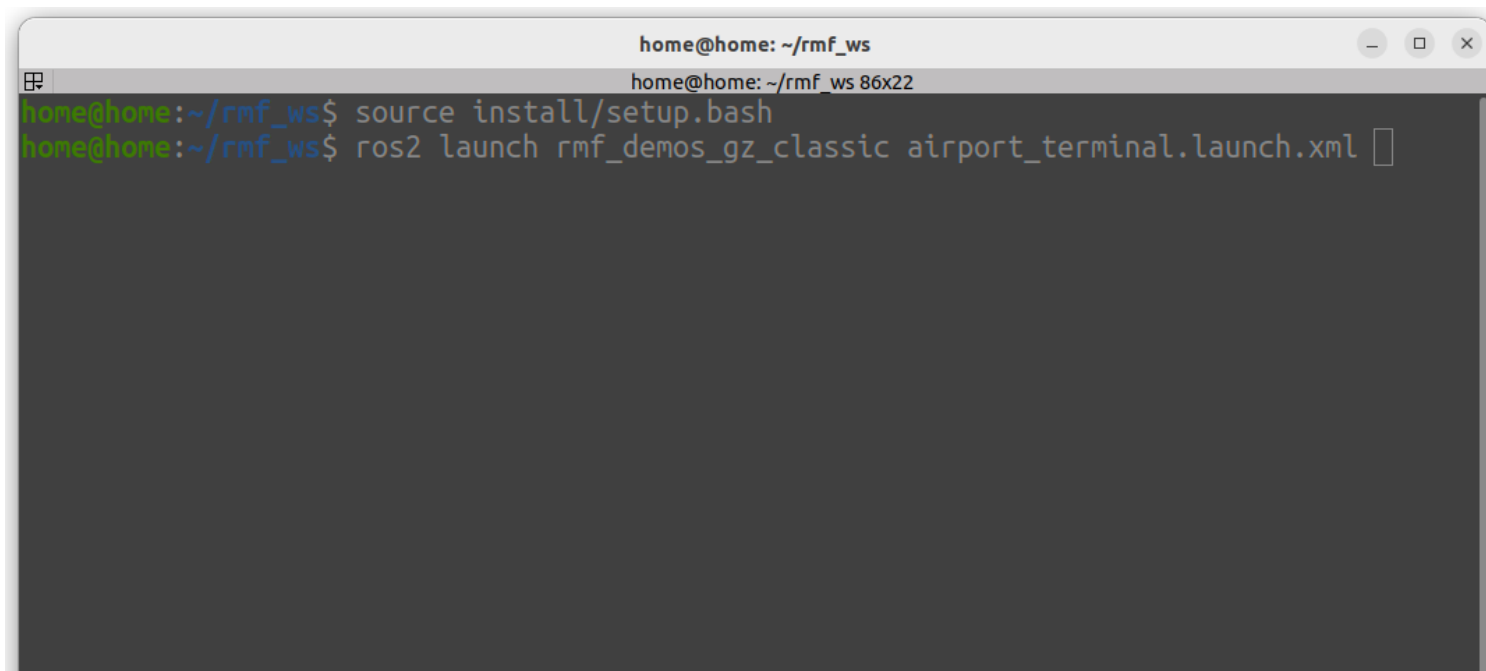
```
home@home: ~/rmf_ws
home@home:~/rmf_ws$ cd rmf_ws/
home@home:~/rmf_ws$ source install/setup.bash
```

# Airport Terminal world Demo

## 🕒 Airport Terminal world 실행

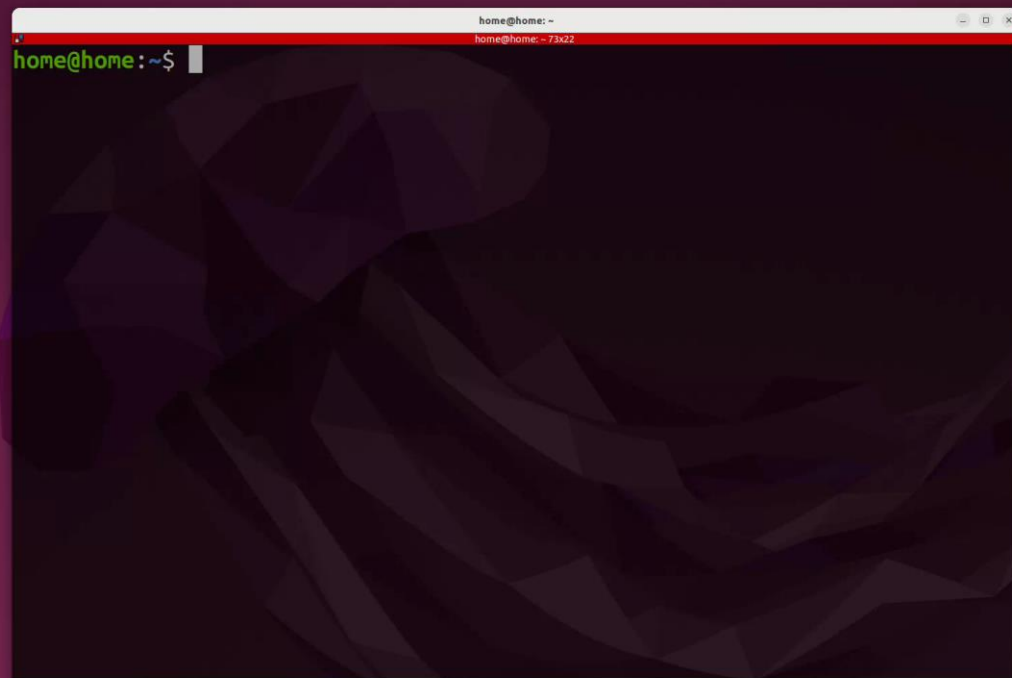
1 Classic Gazebo로 **Airport Terminal** world 실행

```
ros2 launch rmf_demos_gz_classic airport_terminal.launch.xml
```



A terminal window titled "home@home: ~/rmf\_ws" with standard window controls. The prompt is "home@home: ~/rmf\_ws 86x22". The terminal shows two commands being entered: "source install/setup.bash" and "ros2 launch rmf\_demos\_gz\_classic airport\_terminal.launch.xml". The second command is followed by a cursor icon.

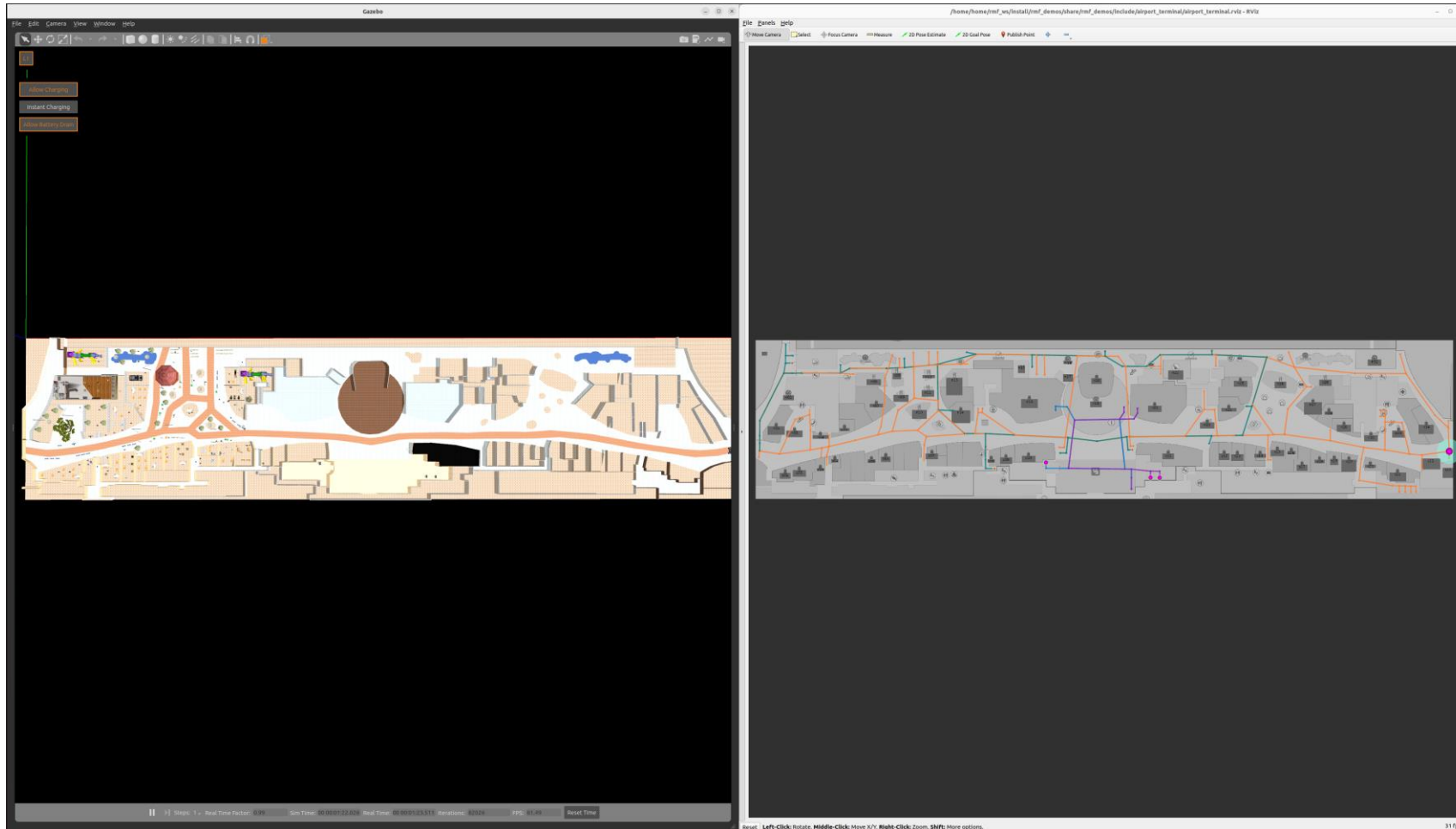
```
home@home:~/rmf_ws$ source install/setup.bash
home@home:~/rmf_ws$ ros2 launch rmf_demos_gz_classic airport_terminal.launch.xml
```



# Airport Terminal world Demo

## ⦿ Airport Terminal world 실행

### ┆ Classic Gazebo로 Airport Terminal world 실행

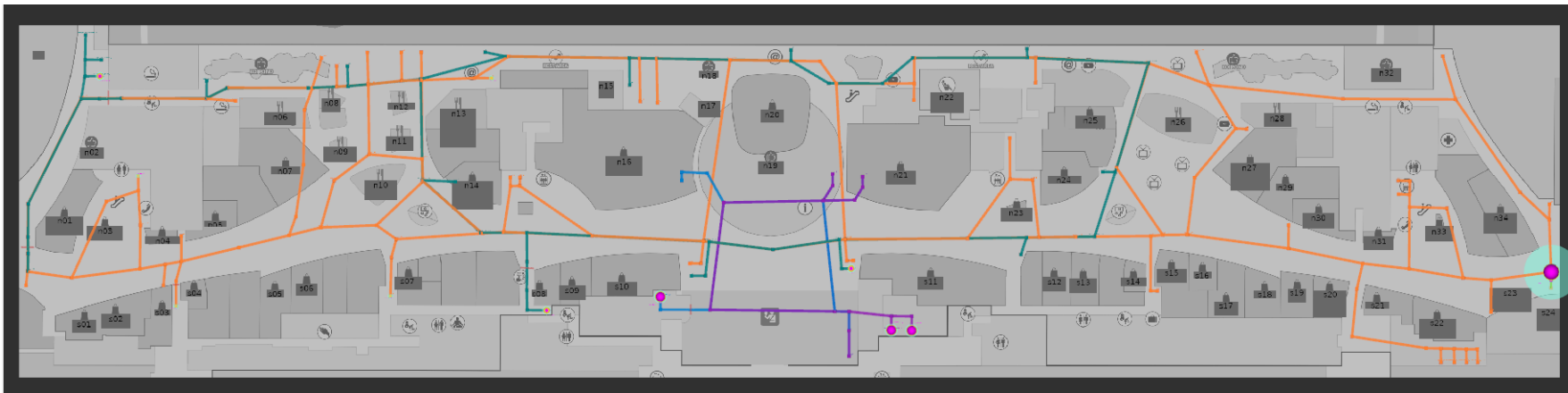
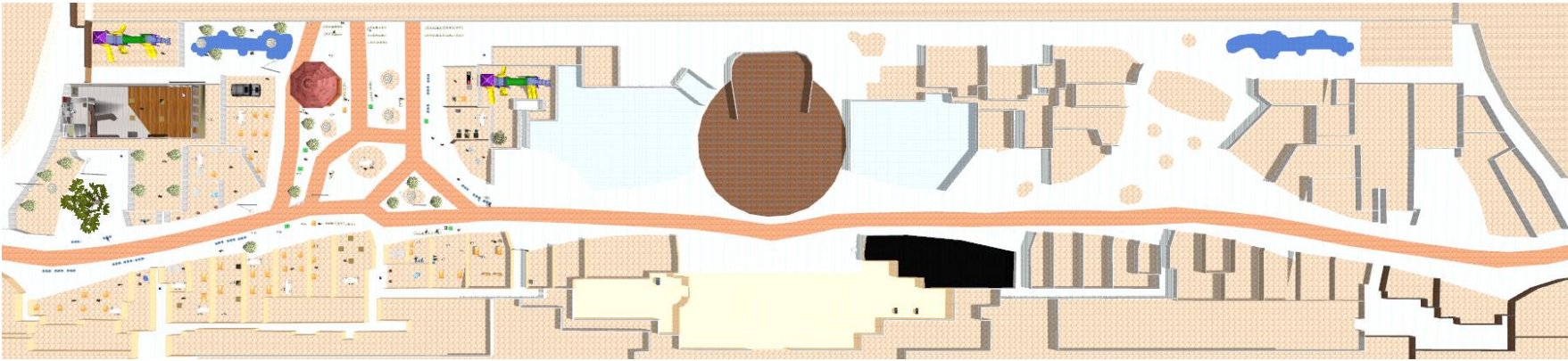




# Airport Terminal world Demo

## ⦿ Airport Terminal world 실행

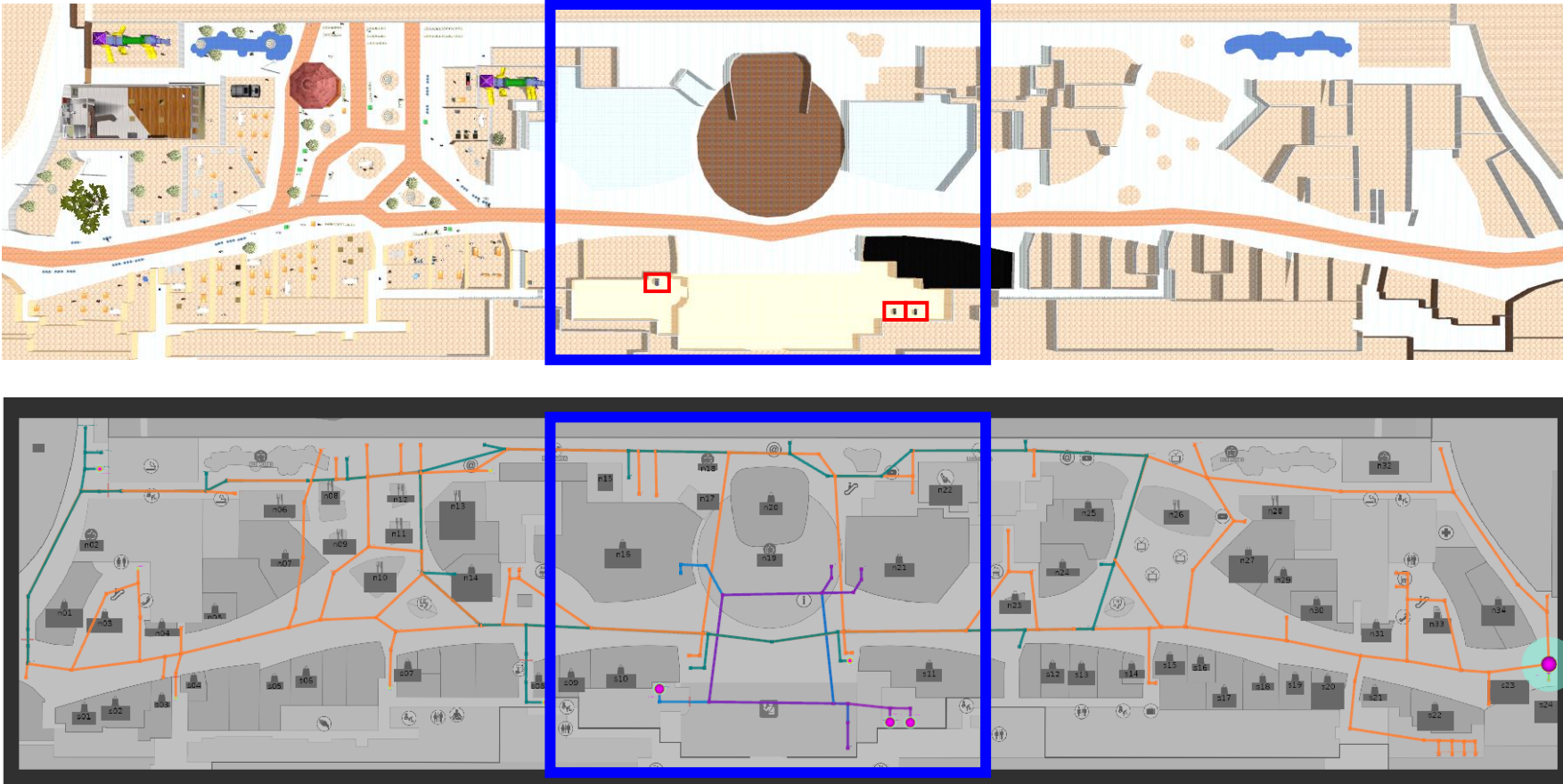
### | Airport Terminal world 설명



# Airport Terminal world Demo

## ⦿ Airport Terminal world 실행

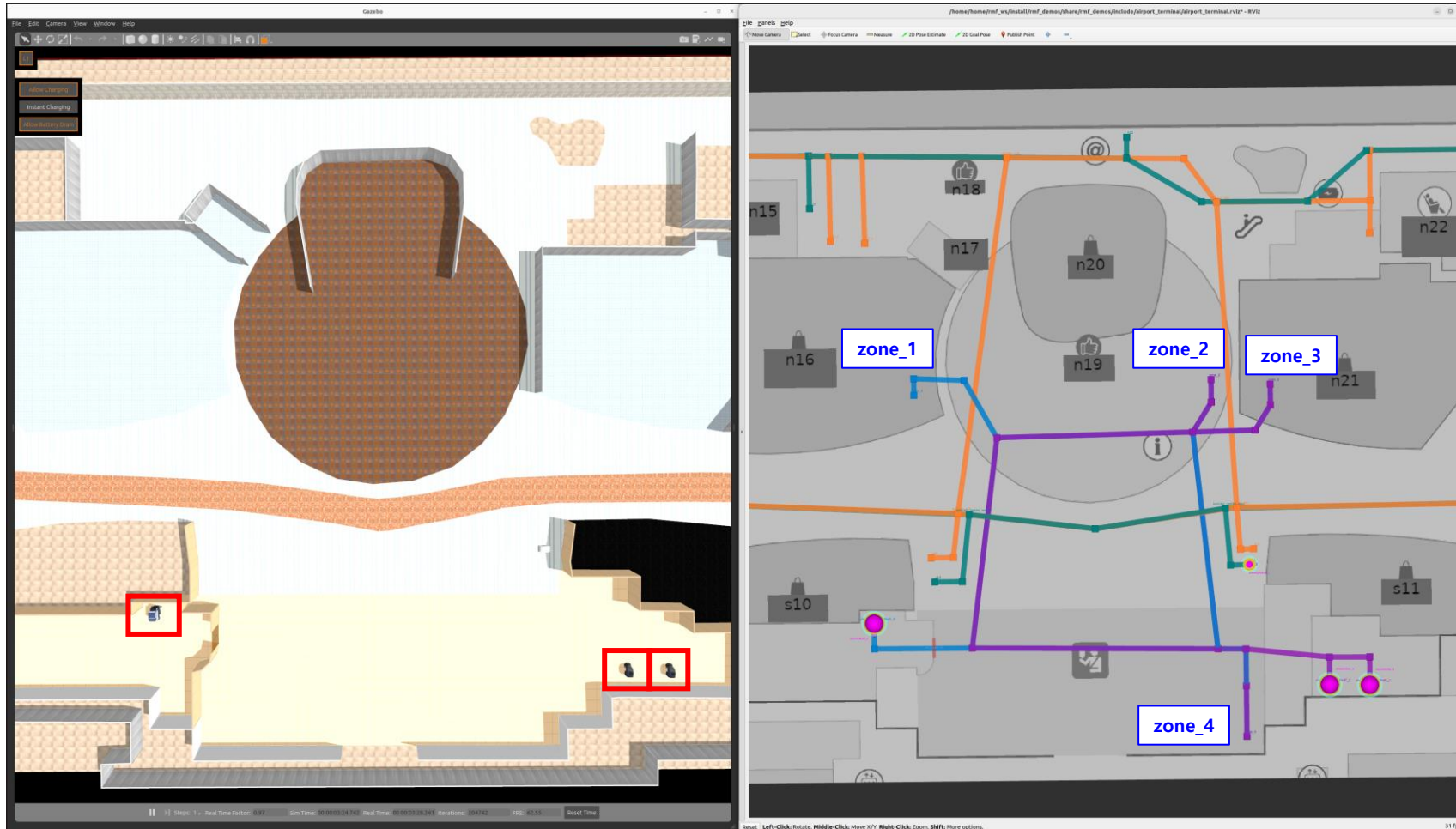
### ┃ Airport Terminal world 설명



# Airport Terminal world Demo

## ⦿ Airport Terminal world 실행

### | Airport Terminal world 설명



# Airport Terminal world Demo

---

## ▶ Clean Task 실행

### ┆ 환경 불러오기

```
cd ~/rmf_ws && source install/setup.bash
```

### ┆ Clean Task 명령

```
ros2 run rmf_demos_tasks dispatch_clean -cs zone_3 --use_sim_time
```

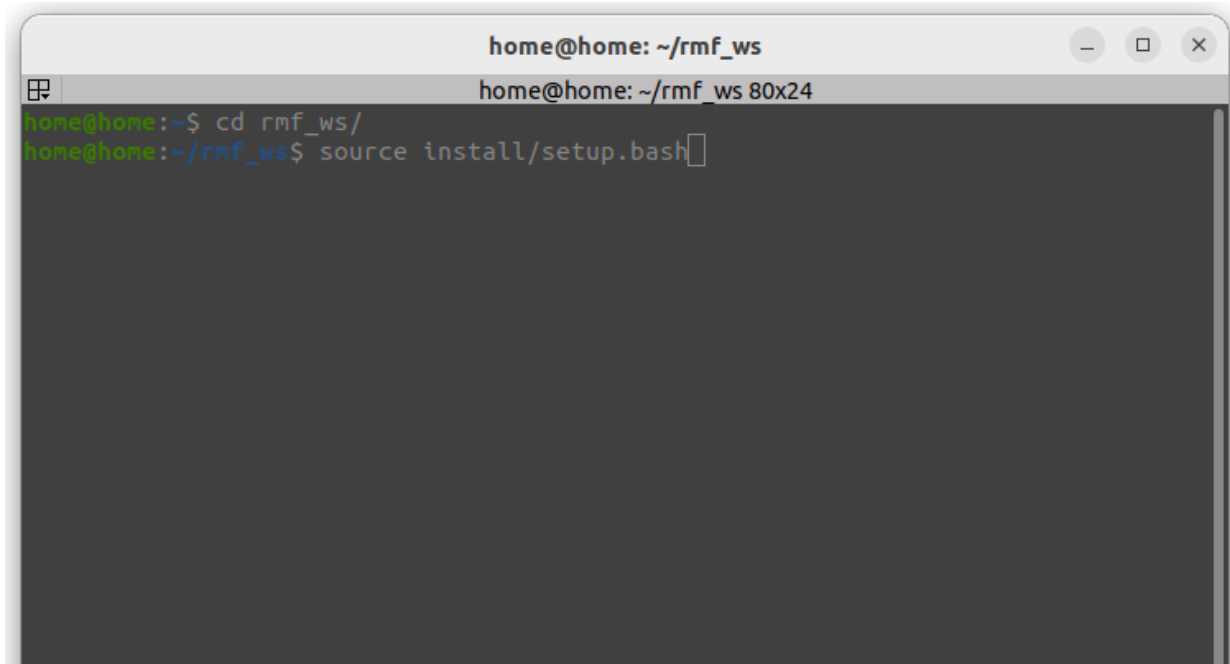
# Airport Terminal world Demo

---

## ▶ Clean Task 실행

### ┆ 환경 불러오기

```
cd ~/rmf_ws && source install/setup.bash
```

A terminal window titled 'home@home: ~/rmf\_ws' with standard window controls. The terminal shows the command 'cd rmf\_ws/' being executed, followed by 'source install/setup.bash' which is currently being typed. The prompt is 'home@home:~/rmf\_ws\$'.

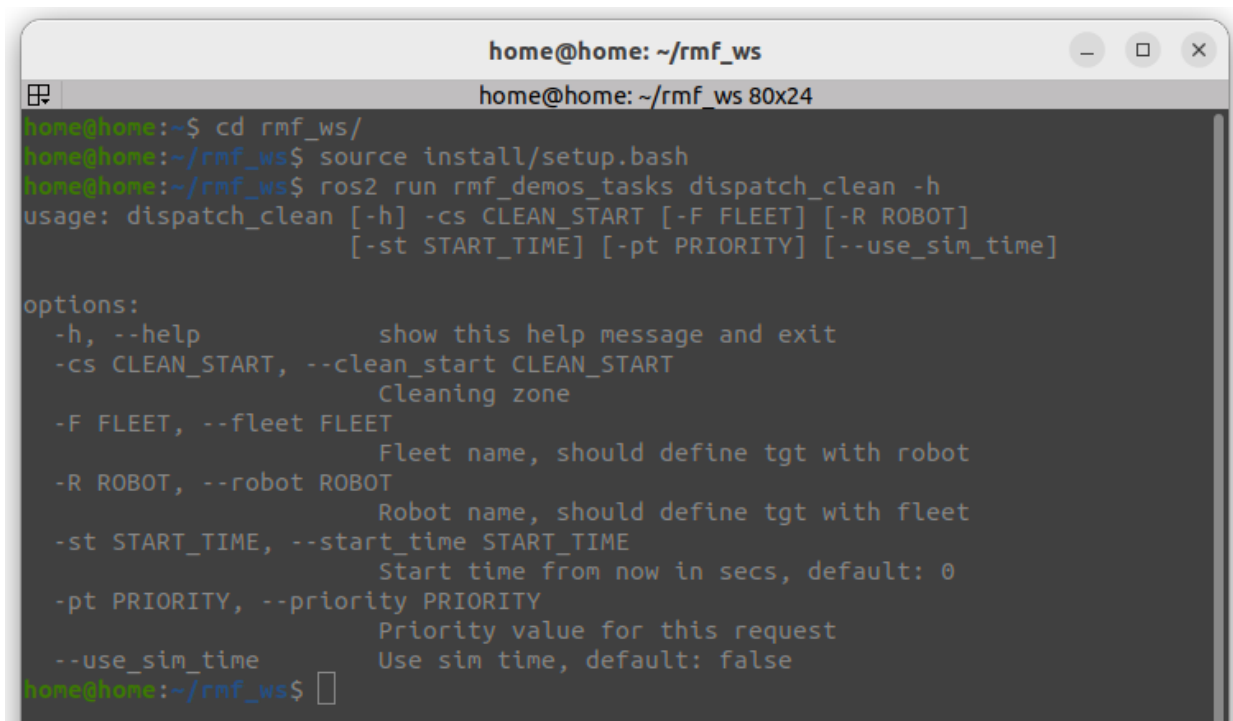
```
home@home: ~/rmf_ws
home@home:~$ cd rmf_ws/
home@home:~/rmf_ws$ source install/setup.bash
```

# Airport Terminal world Demo

## ◉ Clean Task 실행

### ┆ Clean Task 명령

```
ros2 run rmf_demos_tasks dispatch_clean -cs zone_3 --use_sim_time
```



```
home@home: ~/rmf_ws
home@home: ~/rmf_ws 80x24
home@home:~$ cd rmf_ws/
home@home:~/rmf_ws$ source install/setup.bash
home@home:~/rmf_ws$ ros2 run rmf_demos_tasks dispatch_clean -h
usage: dispatch_clean [-h] -cs CLEAN_START [-F FLEET] [-R ROBOT]
                    [-st START_TIME] [-pt PRIORITY] [--use_sim_time]

options:
  -h, --help            show this help message and exit
  -cs CLEAN_START, --clean_start CLEAN_START
                        Cleaning zone
  -F FLEET, --fleet FLEET
                        Fleet name, should define tgt with robot
  -R ROBOT, --robot ROBOT
                        Robot name, should define tgt with fleet
  -st START_TIME, --start_time START_TIME
                        Start time from now in secs, default: 0
  -pt PRIORITY, --priority PRIORITY
                        Priority value for this request
  --use_sim_time        Use sim time, default: false
home@home:~/rmf_ws$
```

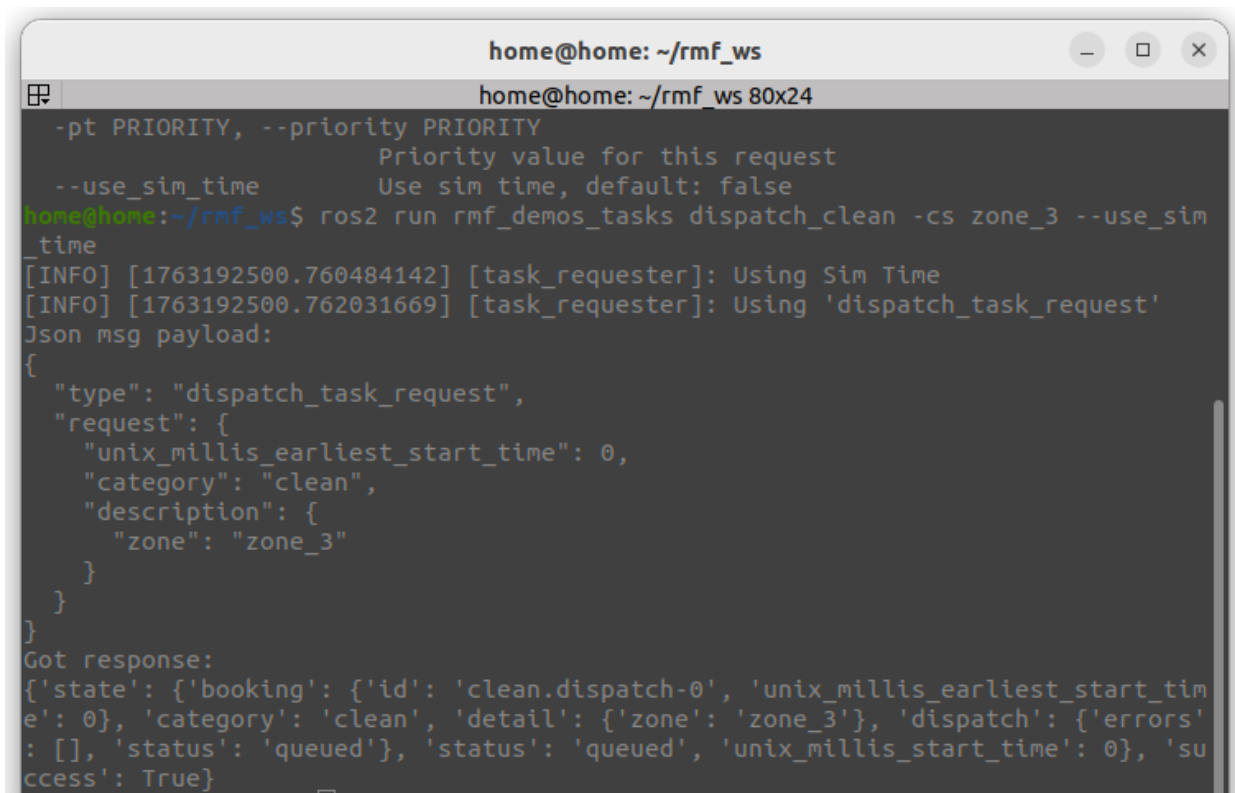


# Airport Terminal world Demo

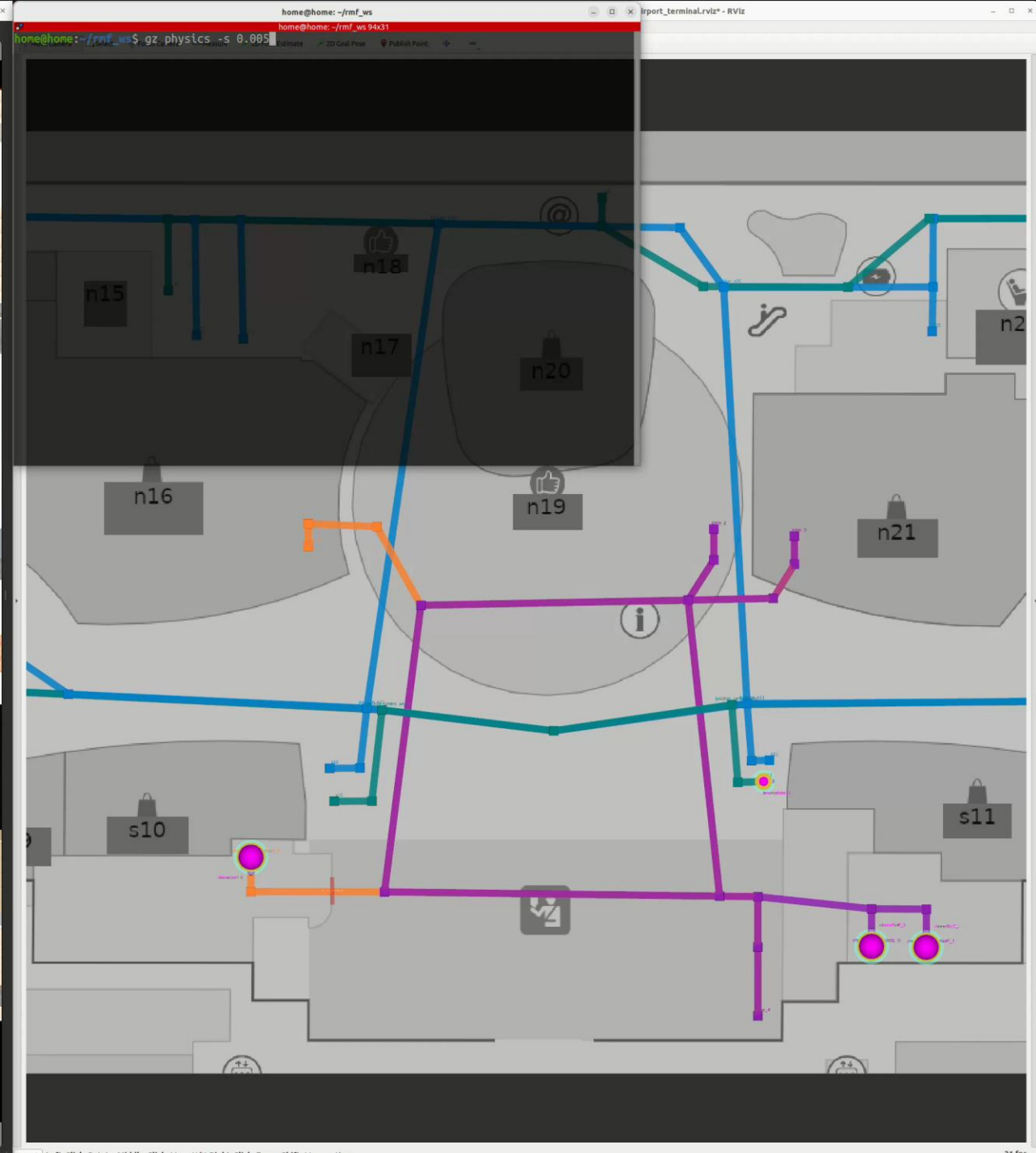
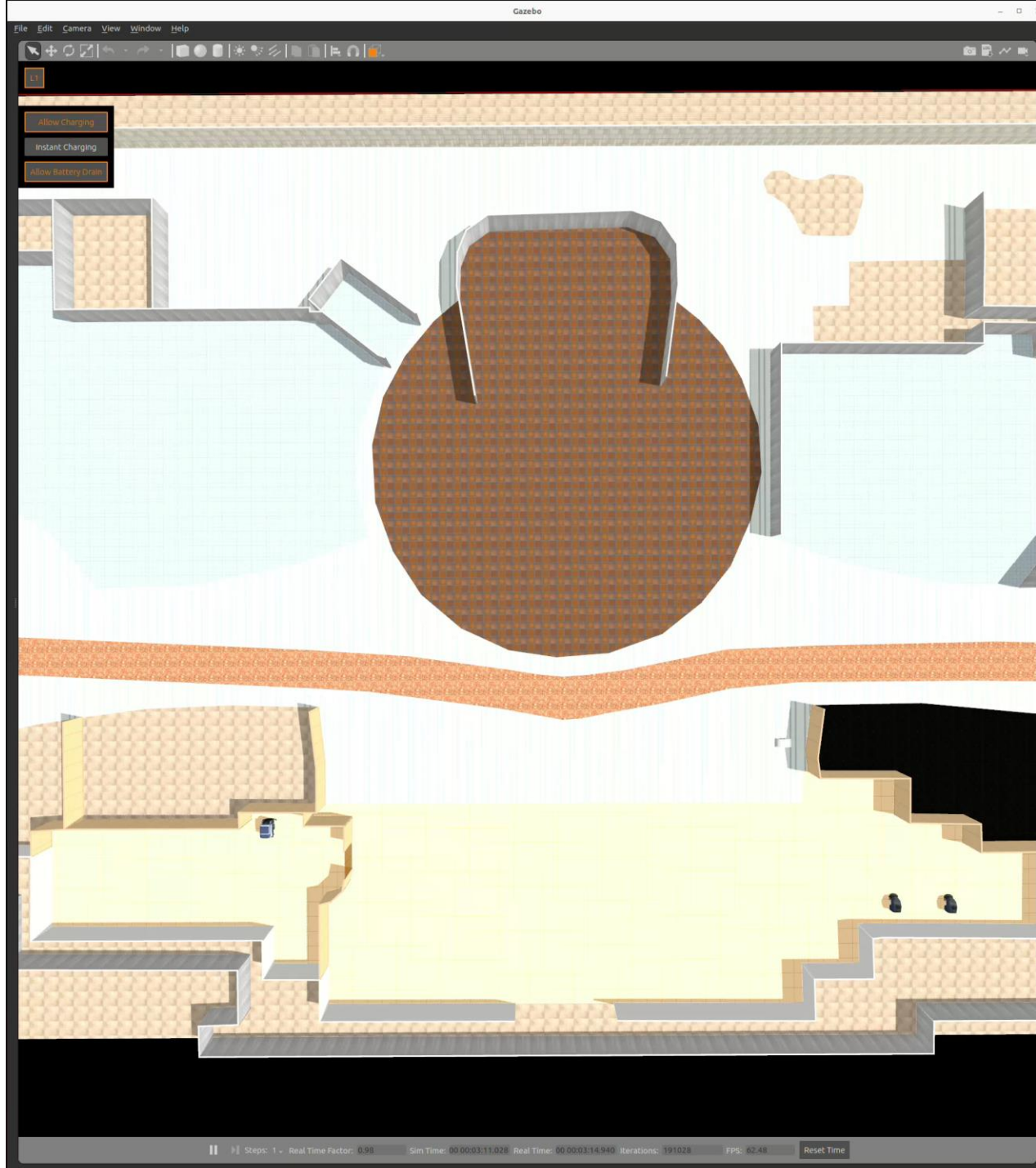
## ◉ Clean Task 실행

### ┆ Clean Task 명령

```
ros2 run rmf_demos_tasks dispatch_clean -cs zone_3 --use_sim_time
```



```
home@home: ~/rmf_ws
home@home: ~/rmf_ws 80x24
-pt PRIORITY, --priority PRIORITY
                        Priority value for this request
--use_sim_time          Use sim time, default: false
home@home:~/rmf_ws$ ros2 run rmf_demos_tasks dispatch_clean -cs zone_3 --use_sim_time
[INFO] [1763192500.760484142] [task_requester]: Using Sim Time
[INFO] [1763192500.762031669] [task_requester]: Using 'dispatch_task_request'
Json msg payload:
{
  "type": "dispatch_task_request",
  "request": {
    "unix_millis_earliest_start_time": 0,
    "category": "clean",
    "description": {
      "zone": "zone_3"
    }
  }
}
Got response:
{'state': {'booking': {'id': 'clean.dispatch-0', 'unix_millis_earliest_start_time': 0}, 'category': 'clean', 'detail': {'zone': 'zone_3'}, 'dispatch': {'errors': [], 'status': 'queued'}, 'status': 'queued', 'unix_millis_start_time': 0}, 'success': True}
```





# Airport Terminal world Demo

## ◉ Clean Task log 확인

### ┆ Task 할당 log

```
[fleet_adapter-16] [INFO] [1763192511.870197685] [tinyRobot_command_handle]: Robot tinyRobot 3 has successfully navigated along requested path.
[rmf_task_dispatcher-13] [INFO] [1763192515.792854841] [rmf_dispatcher_node] Add Task [clean.dispatch-1] to a bidding queue
[rmf_task_dispatcher-13] [INFO] [1763192515.905752550] [rmf_dispatcher_node] - Start new bidding task: clean.dispatch-1
[fleet_adapter-24] [INFO] [1763192515.905906995] [cleanerBotE_fleet_adapter] [Bidder] Received Bidding notice for task_id [clean.dispatch-1]
[fleet_adapter-24] [INFO] [1763192515.906017515] [cleanerBotE_fleet_adapter] Planning for [2] robot(s) and [1] request(s)
[fleet_adapter-22] [INFO] [1763192515.905908902] [cleanerBotA_fleet_adapter] [Bidder] Received Bidding notice for task_id [clean.dispatch-1]
[fleet_adapter-22] [INFO] [1763192515.906008485] [cleanerBotA_fleet_adapter] Planning for [1] robot(s) and [1] request(s)
[fleet_adapter-16] [INFO] [1763192515.905909001] [tinyRobot_fleet_adapter]: [Bidder] Received Bidding notice for task_id [clean.dispatch-1]
[fleet_adapter-18] [INFO] [1763192515.905909434] [deliveryRobot_fleet_adapter]: [Bidder] Received Bidding notice for task_id [clean.dispatch-1]
[fleet_adapter-22] [INFO] [1763192515.906462323] [cleanerBotA_fleet_adapter] Submitted BidProposal to accommodate task [clean.dispatch-1] by robot [cleanerBotA_0] with new cost [747.538261]
[fleet_adapter-24] [INFO] [1763192515.906923407] [cleanerBotE_fleet_adapter] Submitted BidProposal to accommodate task [clean.dispatch-1] by robot [cleanerBotE_1] with new cost [692.147233]
[fleet_adapter-24] [INFO] [1763192516.048701963] [cleanerBotE_command_handle]: Robot [cleanerBotE_0] has reached the destination for cmd_id 32
[rmf_task_dispatcher-13] [INFO] [1763192517.905844985] [rmf_dispatcher_node] Determined winning Fleet Adapter: [cleanerBotE], from 4 responses
[rmf_task_dispatcher-13] [INFO] [1763192517.905911742] [rmf_dispatcher_node] Dispatcher Bidding Result: task [clean.dispatch-1] is awarded to fleet adapter [cleanerBotE], with expected robot [cleanerBotE_1].
[fleet_adapter-24] [INFO] [1763192517.906115879] [cleanerBotE_fleet_adapter] Bid for task_id [clean.dispatch-1] awarded to fleet [cleanerBotE]. Processing request...
[fleet_adapter-24] [INFO] [1763192517.906440128] [cleanerBotE_fleet_adapter] Assignments updated for robots in fleet [cleanerBotE] to accommodate task_id [clean.dispatch-1]
[fleet_adapter-24] [INFO] [1763192517.906654403] [cleanerBotE_fleet_adapter] Beginning new task [clean.dispatch-1] for [cleanerBotE/cleanerBotE_1]. Remaining queue size: 1
[fleet_adapter-24] [INFO] [1763192517.906724823] [cleanerBotE_command_handle]: Requesting cleanerBotE_1 to stop...
```

# RMF Panel

# RMF Panel

---

## ◉ RMF Panel으로 Clean Task 명령 내리기

### ┆ 환경 불러오기

```
cd ~/rmf_ws && source install/setup.bash
```

### ┆ Classic Gazebo로 airport\_termnal world 실행

```
ros2 launch rmf_demos_gz_classic airport_terminal.launch.xml server_uri="ws://localhost:7878"
```

### ┆ RMF Panel 접속

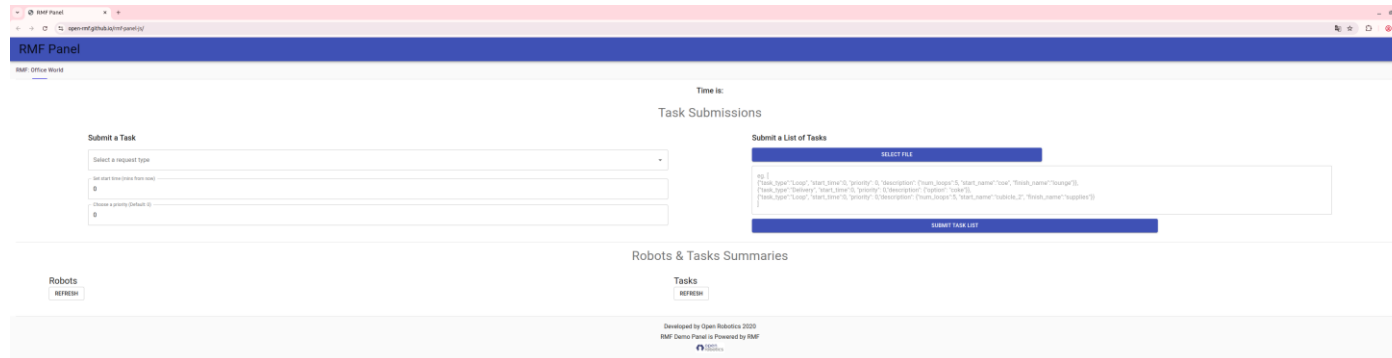
<https://open-rmf.github.io/rmf-panel-js/>

# RMF Panel

## ◉ RMF Panel으로 Clean Task 명령 내리기

### ┃ RMF Panel 접속

<https://open-rmf.github.io/rmf-panel-js/>



# RMF Panel

## RMF Panel으로 Clean Task 명령 내리기

The screenshot displays the RMF Panel web interface. At the top, a blue header bar contains the text "RMF Panel". Below this, a white bar shows the URL "open-rmf.github.io/rmf-panel/jy". The main content area is divided into several sections:

- Task Submissions:** This section includes a "Submit a Task" form with a dropdown menu for "Select a request type", a text input for "Set start time (now from now)" with the value "0", and a text input for "Choose a priority (Default: 0)" with the value "0". To the right is a "Submit a List of Tasks" section with a "SELECT FILE" button and a text area containing a JSON task list. Below the text area is a "SUBMIT TASK LIST" button.
- Robots & Tasks Summaries:** This section is divided into two parts: "Robots" and "Tasks". The "Robots" part features a "REFRESH" button and a grid of robot status cards. Each card displays the robot's name, assigned tasks, status, battery level, and location. The "Tasks" part also has a "REFRESH" button.

At the bottom of the interface, a footer bar contains the text "Developed by Open Robotics 2020" and "RMF Demo Panel is Powered by RMF", along with the Open Robotics logo.

# RMF Panel

## RMF Panel으로 Clean Task 명령 내리기

The screenshot displays the RMF Panel web interface in a browser window. The interface is divided into several sections:

- Header:** "RMF Panel" and "RMF: Airport Terminal World".
- Task Submissions:**
  - Submit a Task:** A dropdown menu for "Select a request type" with options: Delivery, Clean, Loop.
  - Submit a List of Tasks:** A "SELECT FILE" button and a text area containing JSON task definitions. Below it is a "SUBMIT TASK LIST" button.
- Robots & Tasks Summaries:**
  - Robots:** A "REFRESH" button and a grid of robot status cards. Each card shows the robot name, assigned tasks, status, battery level, and location. The robots shown are cleanerBotE\_1, cleanerBotE\_0, deliveryRobot\_2, deliveryRobot\_1, deliveryRobot\_0, caddy, tinyRobot\_3, tinyRobot\_2, tinyRobot\_1, and tinyRobot\_0.
  - Tasks:** A "REFRESH" button.

At the bottom, a footer states: "Developed by Open Robotics 2020", "RMF Demo Panel is Powered by RMF", and includes the Open Robotics logo.

# RMF Panel

## RMF Panel으로 Clean Task 명령 내리기

The screenshot displays the RMF Panel interface in a web browser. The browser's address bar shows the URL `open-rmf.github.io/rmf-panel/j/`. The page has a blue header with the text "RMF Panel" and a sub-header "RMF: Airport Terminal World".

The main content area is divided into several sections:

- Submit a Task:** A form with a dropdown menu set to "Clean", a "Set start time (none from now)" field with "0", and a "Choose a priority (Default: 0)" field with "0". Below this is a "Schedule a Clean Request" section with a "Pick a zone" dropdown set to "zone\_2" and a "SUBMIT REQUEST" button.
- Task Submissions:** A section titled "Task Submissions" with a "Submit a List of Tasks" button, a "SELECT FILE" button, a text area containing a JSON task list, and a "SUBMIT TASK LIST" button.
- Robots & Tasks Summaries:** A section titled "Robots & Tasks Summaries" with a "Robots" tab and a "Tasks" tab. The "Robots" tab is active, showing a grid of robot status cards. Each card displays the robot's name, assigned tasks, status, battery level, and location.

The robot status cards are as follows:

Robot Name	Assigned Tasks	Status	Battery	Location
cleanerBotE_1	cleanerBotE	Idle-0	100%	L1
cleanerBotE_0	cleanerBotE	Idle-0	100%	L1
deliveryRobot_2	deliveryRobot	Idle-0	100%	L1
deliveryRobot_1	deliveryRobot	Idle-0	100%	L1
deliveryRobot_0	deliveryRobot	Idle-0	100%	L1
caddy	caddy	Moving-2	100%	L1
tinyRobot_3	tinyRobot	Idle-0	100%	L1
tinyRobot_2	tinyRobot	Idle-0	100%	L1
tinyRobot_1	tinyRobot	Idle-0	100%	L1
tinyRobot_0	tinyRobot	Idle-0	100%	L1

The footer of the page contains the text: "Developed by Open Robotics 2020", "RMF Demo Panel is Powered by RMF", and the Open Robotics logo.

# RMF Panel

## RMF Panel으로 loop, delivery Task 명령 내리기

The screenshot displays the RMF Panel interface in a web browser. The interface is divided into several sections:

- RMF Panel Header:** A blue header bar with the text "RMF Panel" and "RMF: Airport Terminal World" below it.
- Task Submissions:** A section on the right with a red border, containing a "Submit a List of Tasks" form. The form has a "SELECT FILE" button and a "SUBMIT TASK LIST" button. Below the buttons is a text area with an example JSON task list:

```
eg [
  { "task_type": "Loop", "start_time": 0, "priority": 0, "description": { "from_loop": 3, "start_name": "cow", "finish_name": "lounge" },
  { "task_type": "Delivery", "start_time": 0, "priority": 0, "description": { "option": "coke" },
  { "task_type": "Loop", "start_time": 0, "priority": 0, "description": { "from_loop": 3, "start_name": "cubicle_2", "finish_name": "supplies" }
]
```
- Submit a Task:** A form on the left with a "Select a request type" dropdown (set to "Clean"), a "Set start time (now from now)" input (set to "0"), and a "Choose a priority (Default: 0)" input (set to "0").
- Schedule a Clean Request:** A form with a "Pick a zone" dropdown (set to "zone\_2") and a "SUBMIT REQUEST" button.
- Robots & Tasks Summaries:** A section at the bottom with two tabs: "Robots" and "Tasks". The "Robots" tab is active, showing a grid of robot status cards. Each card displays the robot's name, assigned tasks, status, battery level, and location.

Robot Name	Assigned Tasks	Status	Battery	Location
cleanerBotE_1	cleanerBotE	Idle-0	100%	L1
cleanerBotE_0	cleanerBotE	Idle-0	100%	L1
deliveryRobot_2	deliveryRobot	Idle-0	100%	L1
deliveryRobot_1	deliveryRobot	Idle-0	100%	L1
deliveryRobot_0	deliveryRobot	Idle-0	100%	L1
caddy	caddy	Moving-2	100%	L1
tinyRobot_3	tinyRobot	Idle-0	100%	L1
tinyRobot_2	tinyRobot	Idle-0	100%	L1
tinyRobot_1	tinyRobot	Idle-0	100%	L1
tinyRobot_0	tinyRobot	Idle-0	100%	L1

Developed by Open Robotics 2020  
RMF Demo Panel is Powered by RMF



RMF Panel

RMF: Airport Terminal World

Time is:

Task Submissions

Submit a Task

Select a request type

Loop

Set start time (mins from now)

0

Choose a priority (Default: 0)

0

Schedule a Loop Request

Select start location

ko\_l\_pond

Select end location

west\_ko\_l\_pond

Number of Loops

1

SUBMIT REQUEST

Submit a List of Tasks

SELECT FILE

```
{
  "task_type": "Delivery",
  "start_time": 0,
  "priority": 0,
  "description": {
    "option": "mop"
  },
  "task_type": "Loop",
  "start_time": 0,
  "priority": 0,
  "description": {
    "num_loops": 1,
    "start_name": "ko_l_pond",
    "finish_name": "west_ko_l_pond"
  }
}
```

SUBMIT TASK LIST

Robots

REFRESH

deliveryRobot\_2

deliveryRobot

Assigned Tasks

Status

Idle-0

Battery

L1

deliveryRobot\_1

deliveryRobot

Assigned Tasks

Status

Idle-0

Battery

L1

deliveryRobot\_0

deliveryRobot

Assigned Tasks

Status

Idle-0

Battery

L1

cleanerBotE\_1

cleanerBotE

Assigned Tasks

Status

Idle-0

Battery

L1

cleanerBotE\_0

cleanerBotE

Assigned Tasks

Status

Idle-0

Battery

L1

cleanerBotA\_0

cleanerBotA

Assigned Tasks

Status

Idle-0

Battery

L1

caddy

caddy

Assigned Tasks

Status

Moving-2

Battery

99%

L1

tinyRobot\_3

tinyRobot

Assigned Tasks

Status

Idle-0

Battery

L1

tinyRobot\_2

tinyRobot

Assigned Tasks

Status

Idle-0

Battery

L1

tinyRobot\_1

tinyRobot

Assigned Tasks

Status

Idle-0

Battery

L1

tinyRobot\_0

tinyRobot

Assigned Tasks

Status

Idle-0

Battery


L1

Tasks

REFRESH

Developed by Open Robotics 2020

RMF Demo Panel is Powered by RMF



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# 감사합니다

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