

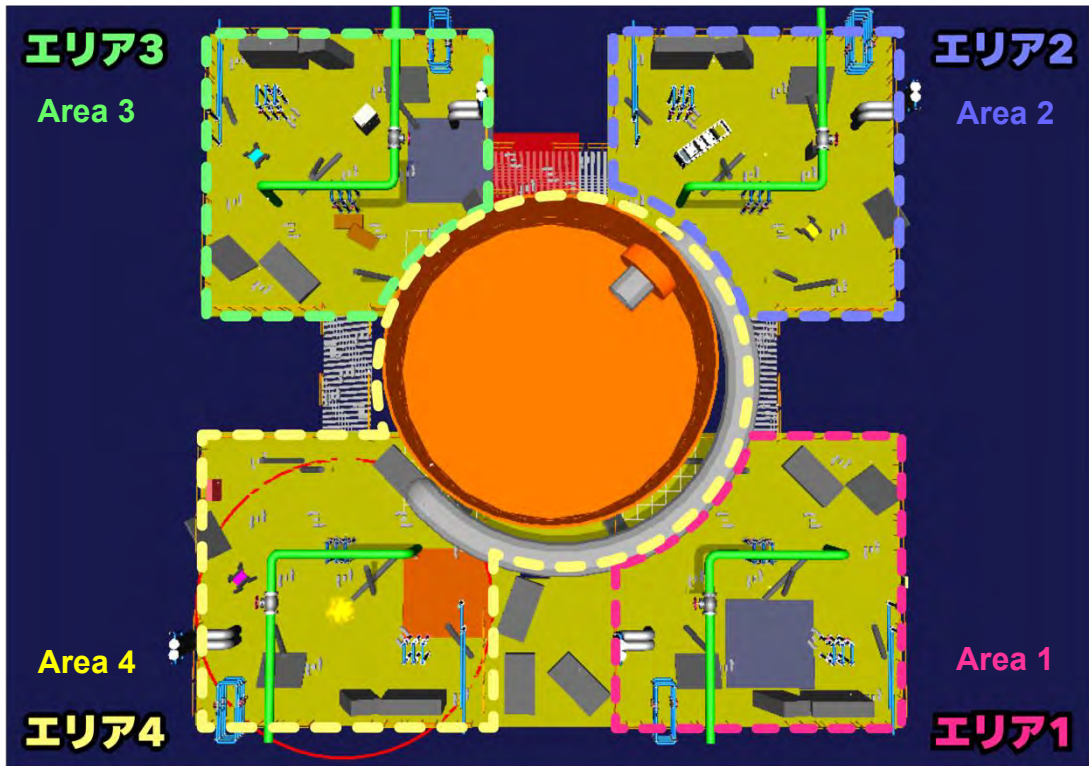
Simulation Disaster Challenge: Pre-tournament Event 2024

The competition model of the World Robot Summit 2025 Simulation Disaster Challenge Pre-tournament event 2024 has been uploaded.

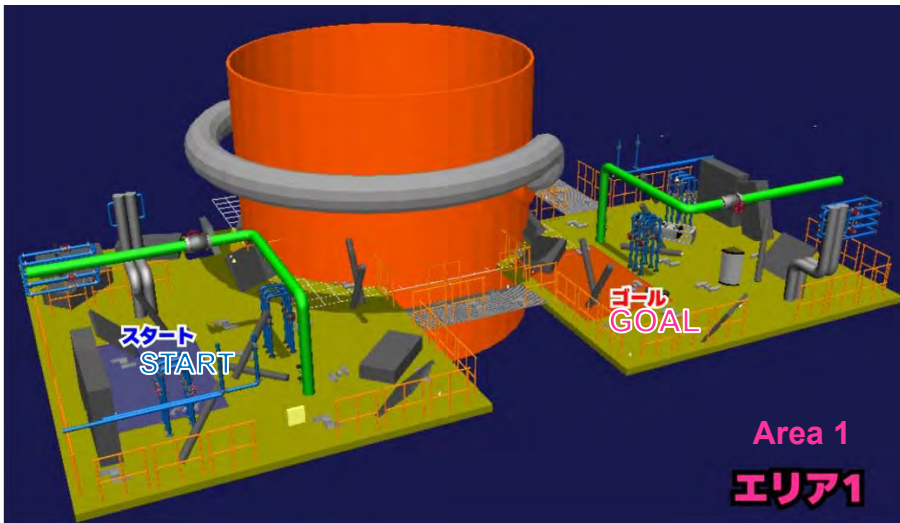
Tasks Outline

The setting for the Pre-tournament competition event 2024 is “information collection and emergency response of an assumed plant disaster under harsh environment conditions”. The competition consists of 4 areas, Area 1 to 4, as explained below. The competition is carried out in each area.

Overhead View of the Pre-tournament Event 2024 Course



Area 1: Lever Operation



Mission Content

The mission requires a robot to search across an area which is scattered with objects following a plant disaster. As the area is dark, the robot is required to operate the lever to switch on the electric light. To grasp the situation, the robot is required to read QR codes in various locations around the area, as well as reach the goal by the designated time limit. This competition task tests the robot's capabilities, including mobility, manipulation, and searching ability. Moreover, the robot should be prepared to respond in cases of deterioration of visibility caused by remote piloting communication failure, or a sudden power cut.

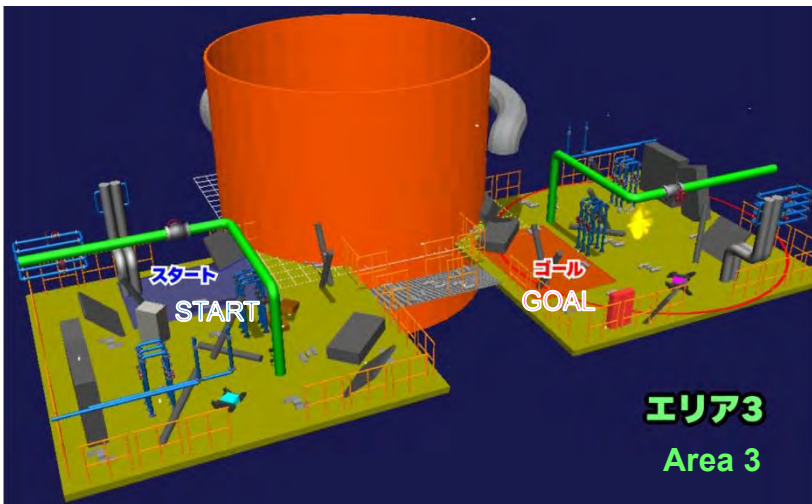
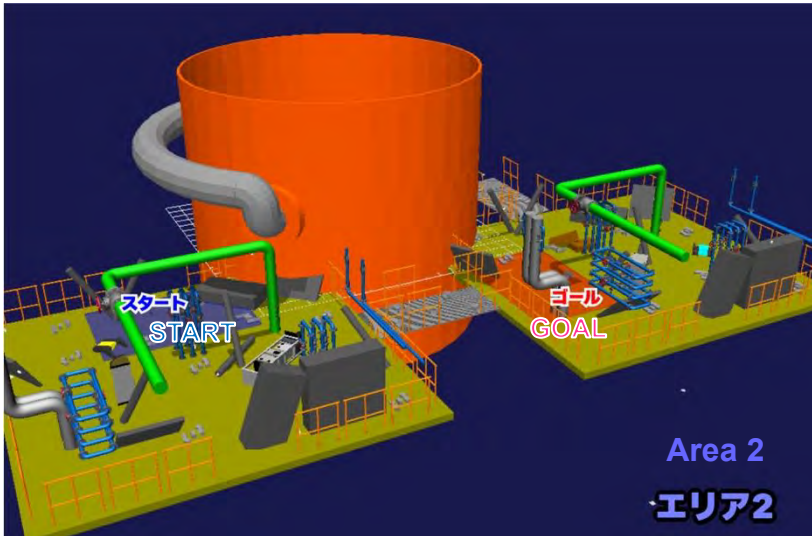
- Move the switch up to turn on the electric light



- Search the area and read the scattered QR codes



Area 2, 3: Valve Operation



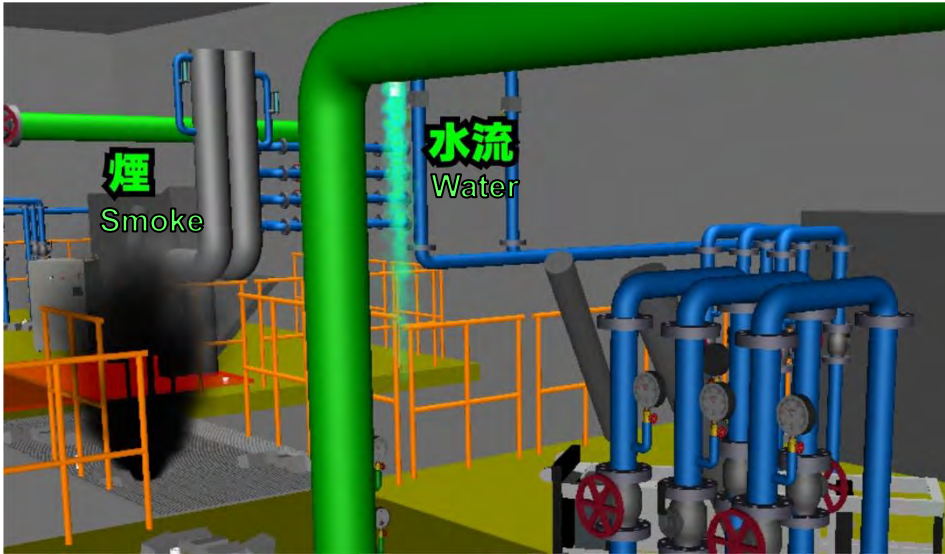
Mission Content

The mission requires a robot to search across an area which is scattered with objects following a plant disaster. The robot is required to operate the valve to stop gas pipe (smoke) and water pipe leakages in the area. To grasp the situation, the robot is required to read QR codes in various locations around the area, as well as reach the goal by the designated time limit. This

competition task tests the robot's capabilities, including mobility, manipulation, and searching ability. Moreover, the robot should be prepared to respond in cases of deterioration of visibility caused by remote piloting communication failure, or a sudden power cut.

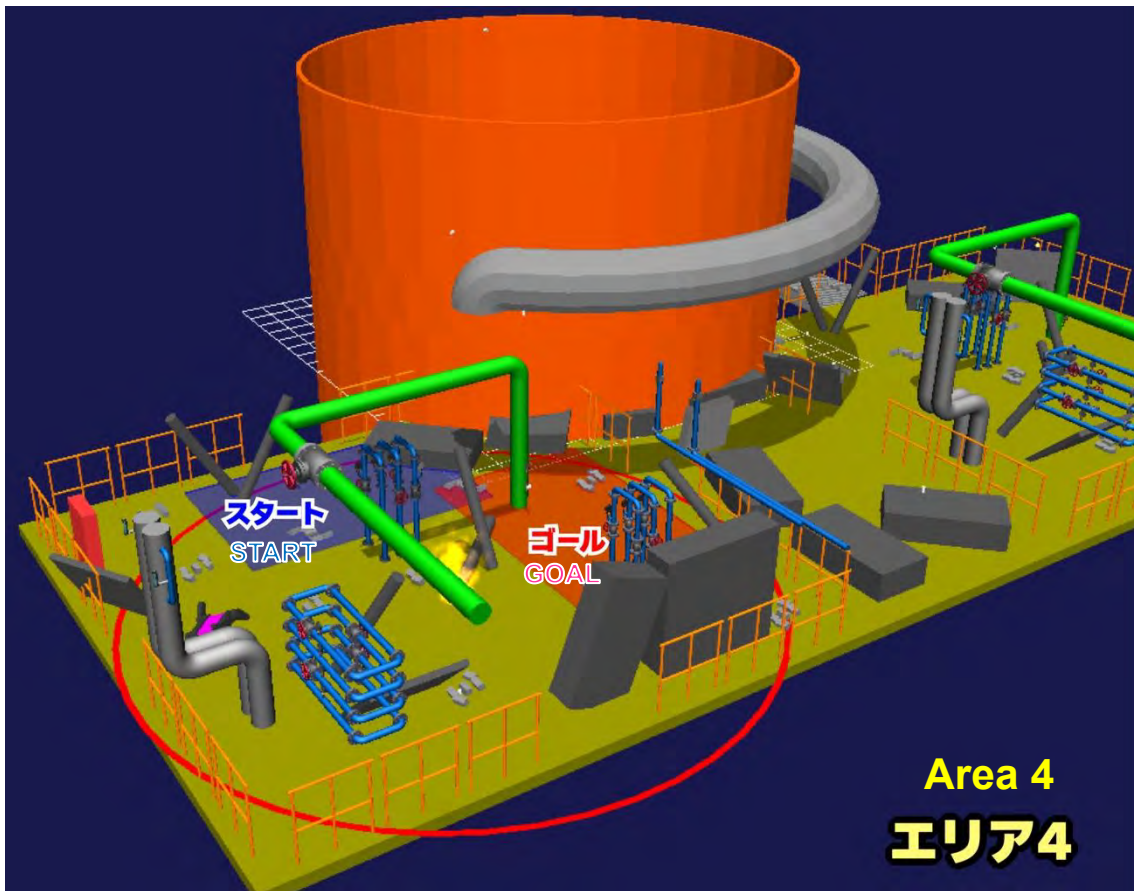
- Rotate valve to stop smoke and water leakage





Area 4: Extinguishing a Fire, Entering Ducts, and Investigating the Tank

Interior



Mission Content

The mission requires a robot to search across an area which is scattered with objects following a plant disaster. The robot is required to operate the valve to stop gas pipe (smoke) and water pipe leakages in the area. To grasp the situation, the robot is required to read QR codes in various locations around the area, as well as reach the goal by the designated time limit. This competition task tests the robot's capabilities, including mobility,

manipulation, and searching ability. Moreover, the robot should be prepared to respond in cases of deterioration of visibility caused by remote piloting communication failure, or a sudden power cut.

- Take out a hose from the fireplug box and extinguish the fire



- Enter the tank through the duct and investigate inside (if there is an air current, close valve before investigating)



Areas 1, 2, 3, and 4 are four types of field models which are prepared for this repository. You may use these fields for your own practice purposes. The difficulty level of these areas is intentionally set to a lower difficulty level. In each area, a maximum of 2 robots can simultaneously carry out tasks and cooperate with each other.

Choreonoid is used as the simulator for the World Robot Summit 2025 Simulation Disaster Challenge.

How to construct the competition environment

<https://k38-suzuki.github.io/hairo-world-plugin-doc/wrsutil/index.html>

How to install Choreonoid

- Precondition
 1. OS is set to Ubuntu22.04 and CPU to amd64 (Intel, Ryzen).
 2. The ROS2 version must be Humble Hawksbill.
 3. As the CPU is an arm-type, it is not possible to install Choreonoid in virtual environment of Mac's AppleSilicon.

- Environment construction on the player's computer
 1. First-time installing Choreonoid (without ROS2)
 2. Adding pre-tournament environment to an installed Choreonoid (without ROS2)
 3. Clean installation of Choreonoid for pre-tournament (with ROS2)

- 1. First-time installing Choreonoid (without ROS2)**
Build Choreonoid Without ROS2 for 1st Time

```

$ cd
$ git clone https://github.com/choreonoid/choreonoid.git
$ git clone https://github.com/wrs-frei-simulation/WRS-Pre-
2024.git
choreonoid/ext/WRS2024PRE
$ git clone https://github.com/k38-suzuki/hairo-world-plugin.git
choreonoid/ext/hairo-world-plugin
choreonoid/misc/script/install-requisites-ubuntu-22.04.sh
$ cd ~/choreonoid && mkdir build && cd build
$ cmake .. -DBUILD_AGX_DYNAMICS_PLUGIN=ON -
DBUILD_AGX_BODYEXTENSION_PLUGIN=ON -DBUILD_WRS2018=ON -
DBUILD_SCENE_EFFECTS_PLUGIN=ON -DBUILD_HAIRO_WORLD_PLUGIN=ON

$ make -j8 # is CPU core is 8 -j8, if CPU core is N -jN

# Run Choreonoid Without ROS2
$ ./bin/choreonoid

```

2. Adding pre-tournament environment to an installed Choreonoid

(without ROS2) (without ROS2)

```

# Rebuild Choreonoid Without ROS2 For Pre-competition (Already
built
Choreonoid)
$ cd ~
$ git clone https://github.com/wrs-frei-simulation/WRS-Pre-
2024.git
choreonoid/ext/WRS2024PRE
$ git clone https://github.com/k38-suzuki/hairo-world-plugin.git
choreonoid/ext/hairo-world-plugin
$ cd ~/choreonoid/build
$ cmake .. -DBUILD_AGX_DYNAMICS_PLUGIN=ON -
DBUILD_AGX_BODYEXTENSION_PLUGIN=ON -DBUILD_WRS2018=ON -
DBUILD_SCENE_EFFECTS_PLUGIN=ON -DBUILD_HAIRO_WORLD_PLUGIN=ON

$ make -j8 # is CPU core is 8 -j8, if CPU core is N -jN

```

3. Clean installation of Choreonoid for pre-tournament (with ROS2)

- **Install ROS2 (Humble Hawksbill) in advance.**

```
# Add the ROS 2 apt repository
$ sudo apt install software-properties-common
$ sudo add-apt-repository universe
$ sudo apt update && sudo apt install curl -y
$ sudo curl -sSL
https://raw.githubusercontent.com/ros/rosdistro/master/ros.key -
o
/usr/share/keyrings/ros-archive-keyring.gpg
$ echo "deb [arch=$(dpkg --print-architecture) signed-
by=/usr/share/keyrings/ros-archive-keyring.gpg]
http://packages.ros.org/ros2/ubuntu $(. /etc/os-release && echo
$UBUNTU_CODENAME) main" | sudo tee
/etc/apt/sources.list.d/ros2.list >
/dev/null
# Install ROS 2 packages
$ sudo apt update
$ sudo apt upgrade
$ sudo apt install ros-humble-desktop
$ sudo apt install python3-colcon-common-extensions
# Sourcing the setup script (for bash)
$ echo "source /opt/ros/humble/setup.bash" >> ~/.bashrc
$ source ~/.bashrc
```

- **Install Choreonoid.**

```
# Clean-Build Choreonoid With ROS2
$ cd ~/ros2_ws/src
$ git clone https://github.com/choreonoid/choreonoid.git
$ git clone https://github.com/choreonoid/choreonoid_ros.git
```

```
$ git clone
https://github.com/choreonoid/choreonoid_ros2_mobile_robot_tutorial.git
$ git clone https://github.com/wrs-frei-simulation/WRS-Pre-2024.git
choreonoid/ext/WRS2024PRE
$ git clone https://github.com/k38-suzuki/hairo-world-plugin.git
choreonoid/ext/hairo-world-plugin
$ git clone https://github.com/k38-suzuki/choreonoid_ros2_sample_drone_tutorial.git
$ choreonoid/misc/script/install-requisites-ubuntu-22.04.sh
$ cd ~/ros2_ws
$ colcon build --symlink-install --cmake-args -
DBUILD_AGX_DYNAMICS_PLUGIN=ON -
DBUILD_AGX_BODYEXTENSION_PLUGIN=ON -
DBUILD_WRS2018=ON -DBUILD_SCENE_EFFECTS_PLUGIN=ON -
DBUILD_HAIRO_WORLD_PLUGIN=ON
# Run Choreonoid With ROS2
$ source install/setup.bash
$ ros2 run choreonoid_ros choreonoid
```