WORLDSKILLS SINGAPORE 2025
TECHNICAL DESCRIPTION
AUTONOMOUS MOBILE ROBOTICS

Skill Competition

1. This competition involves designing, fabricating, assembling, programming, testing, troubleshooting, and operating an autonomous mobile robot. Work organization and management, as well as communication and interpersonal skills, are also to be observed.

2. Conducted as 2-person team event, competitors are given 18 to 22 hours over 3 days to complete the Test Projects for this competition.

Scope of Work

3. Competitors must be able to demonstrate competencies in the following areas:
   - Assemble/disassemble
   - Troubleshoot
   - Navigate on the ground
   - Manipulate
   - Design/Fabricate and integrate add-on component(s) [i.e, Gripper or End-Effector]
   - Develop an application program using vision and other sensors

Assessment

1. Each competition challenge task description package will include details defining the particular rules of the competition arena, game and scoring method that will be applied in that task.

2. The assessment criteria and relative weighting of marks are as follows:

Criterion		Marks
A	Work Organization, Management and Communication	10
B	Design and Assembly	10
C	Prototyping	10
D	Navigation and Localization	10
E	Vision	10
F	Robot Environment Interaction	10
G	Testing and Fault Finding	10
H	Performance Review	30
	Total	100

3. Final overall standing will be based on the total points scored by a team over the competition days.
4. "Time taken to complete the task" may be one of the components used to evaluate performance.

<u>**Major Equipment, Tools and Materials**</u>

5. The following equipment and tools will be used in the competition:

- Each team is required to bring 1 set of the WorldSkills Mobile Robotics Lyon collection 2024 or latest kit and all the necessary parts [i.e., add-on components for the gripper or end-effector] for the competition.
- Only 1 kit is allowed. Additional parts allowed for the end-effector or gripper. No additional active components are allowed.
- Each team will be provided with a standard PC configured in a dual boot access, containing two operating systems. These operating systems are Windows 10 Pro and Ubuntu 20.04 (with ROS Noetic)The ROS setup will adhere to the guidelines provided on the Studica website, which can be accessed [here (https://docs.wsr.studica.com/en/latest/docs/ROS/GettingStarted/installing-ros.html)](https://docs.wsr.studica.com/en/latest/docs/ROS/GettingStarted/installing-ros.html) .

- The exact versions of Ubuntu and ROS pre-installed in the PCs are

  - Ubuntu 20.04.6 (2023-03-16)
    https://releases.ubuntu.com/focal/
  - ROS-Noetic-Desktop-Full (contain the meta packages)
    https://wiki.ros.org/noetic/Installation/Ubuntu

- The PC will have the following software installed on Windows 10 Pro :
  - WPILib Java and C++ (2020)
  - Local version of Studica Docs Page
  - Control Station ConsoleE
  - Studica Update and Config App
  - NavX Utilities (e.g. Firmware Update, navXUI, navXConfig)
  - Magnetometer Calibration
  - VNC Viewer
  - Putty / Tera Term
  - SD Card Tools (e.g. Belena Etcher, SD Card Formatter)
  - LabVIEW (published version of LabVIEW from the Studica Docs page)
  - Python
  - OpenCV
  - Docker Desktop

- o   Local version of CVAT
- o   Fusion360

- The PC will have the following software installed on Ubuntu 20.04
  - ROS Noetic
  - VS Code 1.41.1
  - Cpp.vsix
  - JavaLang.vsix
  - JavaDeps.vsix
  - JavaDebug.vsix
  - WPILib.vsix
  - Vulkan
  - Kauailabs' NavX Library
  - Studica's Titan Library

Participants are permitted to install any additional packages or libraries for the standard software they deem useful during the familiarization day.