World Robot Summit Call for Tenders:
A Standard Robot Platform in Simulation
for Tunnel Disaster Response and Recovery Challenge

The Japanese Ministry of Economy, Trade and Industry (METI) and the New Energy and Industrial Technology Development Organization (NEDO) will hold the World Robot Summit (WRS) in 2020 that consists of a robot competition and a robot exhibition. WRS aims to bring together the most advanced robot technologies from all over the world and overcome the limits to solve challenges that arise; deepen people's understanding of robots; and induce positive discussions that would lead to concrete uses and applications of robots. WRS will feature two events: 1) World Robot Challenge (WRC), in which robots compete with one another and 2) World Robot Expo (WRE), where the latest robotic technologies will be exhibited. A total of 8 challenges under 4 categories (Industrial Robotics, Service Robotics, Disaster Robotics and Junior) are planned to be held.

In the Tunnel Disaster Response and Recovery Challenge in Disaster Robot Category of WRC, a robot will gather information and provide emergency response in case of a tunnel disaster, e.g., life-saving, removing vehicles from tunnels. At the Preparatory Summit in 2018, a part of this Challenge will be performed in computer simulation by using a standard robot platform specified by WRS.

The WRS hereby announces a call for tenders to develop and distribute a standard robot platform (simulation model) for the Tunnel Disaster Response and Recovery Challenge in simulation for the Preparatory Summit in 2018. One or a few platforms will be chosen after careful review.

The following sections describe the functionalities and other requested features of the Tunnel Disaster Response and Recovery Challenge as well as the call schedule and the contact.

Additional information, including a Q&A, will be provided during the call at http://www.robotcompetition.org

1. Functionalities

The standard platforms in robot simulation are expected to be used as a base robot system for the competing teams to develop their software with integrating robot intelligence that gives solution to the disaster response problem. The followings are the requested functionalities as examples. The detail will be discussed after the decision. Proposal of new functionalities not addressed here are also welcome.

- Mobility: The robot can move on uneven terrain with successive gaps 10 cm high. See Fig.1 for an image of the terrain.
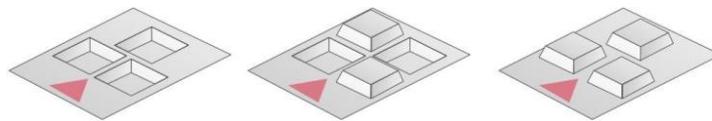

Figure 1. An image of uneven terrain with successive gaps 10cm high.

- Manipulation: The robot can use disaster-response tools, e.g., a hammer drill and a spreader with around 15kg weight. In addition, it can remove debris of complex shape. See Fig.2 for an image of the removal of debris.
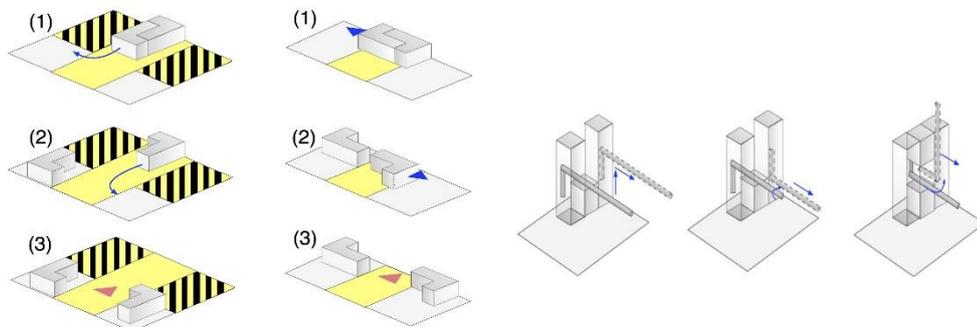

Figure 2. An image of removal of debris

- Sensors: The robot can simulate functions of sensors installed in the robot. The sensors are, for example, force, acceleration, angular velocity, visual image (camera), depth image, LIDAR, and so on.

- User Interface: The robot has an user interface suitable for teleoperation of performing the tasks.

- Task Execution: The robot can perform response tasks of tunnel disasters. Fig.3 shows an example of the disaster response task.
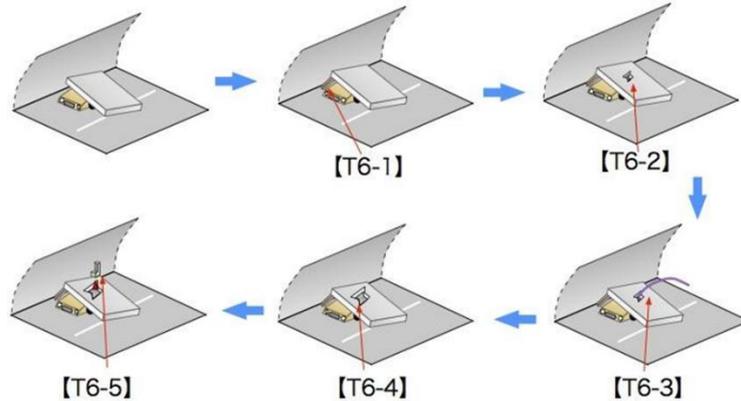

Figure 3. An example of disaster response task: Response to a car accident caused by cave-in of a tunnel. [T6-1] Shoring (stabilize the debris), [T6-2] Breaching 1 (make a hole), [T6-3] inspection inside of the car, [T6-4] Breaching 2 (enlarge the hole), [T6-5] Pull out an object from the car

2. Software

Requirements of the software of the proposed robot model are summarized as follows:

- The model is simulated by "Choreonoid."
- The program used in the model is implemented in C++ language.
- The model has a user interface in order to check and control the robot status.
- The sensors and actuators of the model can be controlled with RT components of OpenRTM or with ROS.
- English documents of the model are provided.

3. Hardware

A real physical robot based on the robot model can be provided for WRS in 2020, if the related conditions are appropriate.

4. Availability and support

- The platform must be affordable for university research groups and must be usable (with minimal revisions) for the Tunnel Disaster Response and Recovery Challenge in simulation in 2018.

- Expected yearly cost of service and maintenance should be described in the proposal.
- The license of the platform robot model is creative commons license of Attribution 4.0 International or Attribution-ShareAlike 4.0 International.
- The robot model should be available for about 12 teams in 2017 with appropriate support. WRS is an international event and teams from around the world are expected to participate.

5. Distribution
- The platform robot model is distributed through Internet.

6. Schedule

March 31, 2017	Deadline for submission of proposals(1st)
April 14, 2017	Final decision by WRC(1st)
June 30, 2017	Deadline for submission of proposals(2nd, only if 1st one is not enough)
July 31, 2017	Final decision by WRC(2nd)
2017	Trial Competition
October 2018	World Robot Summit 2018 (Preparatory Summit)
2019	Trial Competition (Tentative)
October 2020	World Robot Summit 2020

7. Submission of proposals
Interested companies and organizations are invited to submit a full proposal in English containing detailed technical specifications of the proposed platform. Multiple options (optional parts or features) are also welcome to be addressed in the proposal. In addition, the proposal should include the following details:
- Company or organization profile;
- Delivery schedule;
- Worldwide support for teams;
- Company's interest in becoming a global sponsor of WRS; and
- Any other information that can be useful for the evaluation of the proposal.

Proposals must be submitted as a single PDF document and may optionally contain links (i.e., URL) to additional material (e.g., photos, videos) showing some capabilities or features of the proposed platform.

Proposals must be sent to kimura@mech.nagaokaut.ac.jp by e-mail with a subject line that contains "[WRSD Platform]."

The deadline is March 31, 2017.

A confirmation e-mail will be sent upon receipt of the proposal.

8. Contact
The Competition Committee is available to provide additional information at any time during the call period at kimura@mech.nagaokaut.ac.jp by e-mail with a subject line containing "[WRSD Platform]."