



WRS Future Convenience Store Challenge Preliminary Competition 2018

Task: Customer Interaction

Rulebook

2018 /08/27

Revision History

August 27, 2018

- A note on the official language (English) for the demonstrations has been added.

February 2, 2018

- A subject about an energy saving has been added.

January 15, 2018

- First Draft

0. Terminology

Term	Definition
Mobile Robot	A robot that can move autonomously.
Infrastructure (Robot)	Unique infrastructure that can be installed inside convenience stores to assist in the robot's task. This equipment includes markings, IC tags, sensors, actuators and auxiliary tools to add equipment to products. Infrastructure made up of sensors and actuators can also be seen as stationary robots.
Manipulator	Robot arms, end effectors and other equipment that execute operations which can be installed on a mobile robot or as part of the infrastructure.
Product	Products found at a convenience store.
Customer	Person who visits the store to purchase products.
Container	Container used to hold and transport multiple products. A container may also be called "carton."
Product Display Area	Section of the convenience store with display cases or bookshelves installed.
Cashier Area	Section of the convenience store with the cashier counter installed.
Restroom Area	Section of the convenience store with the toilet installed (Abbreviation: Restroom).
Aisle Area	Section of the convenience store for customers and mobile robots to come and go. (Abbreviation: Aisle)
Backyard Area	Area of the convenience store where customers are not allowed (Abbreviation: Backyard).
Home	Standby station of the mobile robot. The standby station is located in a designated place inside the backyard area.
Display Case A	Case for displaying products. There are no products placed in this display initially.
Display Case B	Case for collecting disposal items. Multiple products are mixed in this case initially.
Disposal items	In the Disposal task, those products that the judges set

	to be disposed.
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1. Overview

This challenge aims to develop technology to automate customer interaction, which is part of the job for employees at a convenience store. Participants of this competition task will develop a robot that autonomously moves and interacts with customers, as well as infrastructure to install inside of a simulated convenience store. In this challenge, participants will use the robots and infrastructure they develop to compete in terms of the innovation, viability and feasibility of their systems when performing customer interaction demonstrations in a simulated convenience store space.

The layout of the convenience store interior consists of a product display area, cashier area, restroom area, aisles, and backyard area as shown in a document provided separately.

Participants can freely choose a customer interaction challenge and perform a system demonstration within the time limit of the round.

In addition, the proposed system will be required to contribute to energy saving and an efficiency of work in convenience stores.

2. Flow of the Round

The time limit for this task will be 20 minutes. The task will proceed in four phases with the following order:

- (1) Renovation time
- (2) Setting time
- (3) Presentations
- (4) Customer interaction demonstrations

Participants can distribute the time to each phase as they prefer. Participants must indicate their progression to the judges when starting each phase and when completing the task.

Please note that the presentations and the customer interaction demonstrations **MUST** be spoken in English, which is the official language of this competition.

2.1. Renovation time

Participants will add or replace furniture such as shelves or other infrastructure. The work allowed during the renovation time is as follows:

- Installation of unique infrastructure inside the convenience store.
- Replacement of existing furniture such as display cases and the cashier counter.

Participants should inform the judges when they finish their renovations or if renovations are not required.

2.2. Setting time

Participants will set up their robot and necessary products. Participants will arrange the robot and products in any initial position inside the simulated convenience store. Participants must inform the judges when they finish their setup or if the setup is not required.

2.3. Presentations

Participants will explain the purpose and an overview of the system they developed. The presentation may also be conducted at the same time as the demonstration. Participants must inform the judges when the presentation is over or if the presentation will be conducted at the same time as the demonstration.

2.4. Customer Interaction Demonstration

After the judges confirm that the preparations are finished, the demonstration will begin.

The participants will input the start command into the system.

After the system operation starts, the participants are not allowed to control the robot or to take any actions that will influence the operation of the system. Any team that manipulates the operation of the system will be withdrawn from the task at that point.

The participants can decide to retry the task as described hereafter, if continuing the demonstration is deemed difficult due to system malfunction.

3. Details of Challenge

3.1. Customer Interaction Challenge

Participants can freely choose a customer interaction challenge and perform a system demonstration within the time limit of the round. For example, the competition expects a demonstration similar to those below.

- Heating purchased products (lunch boxes, etc.) or bagging products
- Receiving orders and retrieving products for products ordered through a clerk such as hot snacks and cigarettes
- New services based on recognizing gender, age and products customers are hesitant to purchase
- Recommendation of products
- Prevention of shoplifting
- Customer service for customers with special needs such as elderly, foreign nationals, or people who use a wheelchair
- Assistance and other services

These are only a few examples of customer interaction. Not all of these services need to be implemented. However, the competition expects proposal and demonstrations that foresee a future of new services including the interaction between people (staff/customers) and robots. The competition also expects participants to generate appeal by illustrating the specific use prescribed to their system in their demonstration via role-playing and other means. The judging panel evaluates those customer interaction from the perspectives outlined below.

Judges score customer interaction by awarding points based on the following criteria:

- Presentation
- Viability
- Feasibility

Furthermore, role-playing customers for the demonstrations should be

arranged by the participants.

3.2. Retry

Participants can ask the judges to terminate the demonstration to retry the task if the system malfunctions and continuing the demonstration is deemed difficult.

Participants can retry many times. However, the clock will continue to run while the demonstration is stopped. The participants can decide in what state to resume the task.

4. Specifications and Restrictions

4.1. Simulated Convenience Store

The convenience store will be an 8 m × 7 m space which consists of a product display area, cashier area, restroom area, aisles, and a backyard area. The cashier area will have a counter. The product display area will include display cases and bookshelves. Detailed information about the layout, counter and display cases inside the convenience store will be provided in a separate document.

Participants are not allowed to make changes to the layout inside the convenience store during the renovations such as rearranging the display cases in the aisles

4.2. Products

Participants shall prepare the products to use in the demonstration.

4.3. Mobile Robot and Infrastructure Restrictions

4.3.1. Hardware Restrictions

- There are no restrictions for the number of mobile robots.
- Each mobile robot must occupy less than 1 m x 1 m of floor space and all of the mobile robots must fit into the home area.
- Infrastructure can be installed anywhere inside the convenience store, but different restrictions apply according to the area of the store. Please see the documents provided separately for more information.

4.3.2. Software Restrictions

- The robots and infrastructure must operate autonomously after the start of the task. However, participants may monitor the internal status remotely to know the state of their system.
- Mobile robots are prohibited from moving outside of the convenience store.

4.3.3. Energy Source Restrictions

- Participants should prepare an energy source to use for their robots.
- A power supply within AC100V/1500W is planned as the energy source for participants to use.
- Any energy source deemed to be dangerous or inappropriate for use will not be allowed.

4.3.4. Venue Restrictions

- Participants are prohibited from intentionally staining or damaging the convenience store.
- Infrastructure must be removed immediately after the task ends to return the venue to its original state.
- The convenience store has no ceiling or walls.

4.3.5. Safety Restrictions

- Systems must have an emergency shutdown switch in case of an emergency. All of the movable parts included in the system must immediately stop operating if the emergency shutdown switch is pressed.
- The design must prevent the system from tipping over at all times, including during an emergency stop.
- Measures must be put in place to shield any area with a danger of entangling the arms or legs of people in the vicinity.
- Hot areas and sharp edges must not protrude.
- Energy sources utilizing fire or high temperatures are prohibited.
- Any laser used in the system must be class 1 or lower.
- Products and parts of robots must not eject anything.

5. Other

This rulebook is subject to change without notice.