

Keihanna Avatar Challenge 2025

Races & Rules

Remotely controlled robots (avatars) face many challenges in the real world. Even when performing tasks such as running errands, there are various obstacles such as stairs, obstacles, opening and closing of doors, etc. In crowded places, humans themselves can be a big obstacle and hinder the avatar's movement.

This competition will create a place where avatars who coexist with humans can experience various situations and compete in their skills. For this reason, our goal is to encourage technological progress and provide a place where we can intuitively understand the evolution of technology. We believe that people who not only understand technology but also are interested in using technology to improve work efficiency are the ones who can coexist with their avatars and lead vibrant lives.

1 *General Rules*

Anyone can participate in the competition as long as they meet the following conditions. Both able-bodied and disabled people have equal opportunities. As for age, there is no problem as long as you are 10 years old or older.

1.1 *Competitive participation unit*

1.1.1 *Participation in competition as a team, similar to the F1 car race*

We are inviting teams of avatar providers and competitors to participate, not only to spread the use of remotely controlled robots (avatars) and to explore the fun of manufacturing them, but also to share the joy of operating them.

If you are unable to form a team (avatar provider, competitors) by yourself, the competition can arrange one for you.

1.1.2 *The team consists of three competitors: <driver, caregiver A, and caregiver B>.*

1.1.2.1 *The pilot will access the avatar via the Internet using a computer or other control device, but does not necessarily have to be present at the venue.*

1.1.2.2 *Two caregivers*

Two caregivers (A, B) will accompany the avatar and perform tasks such as monitoring the avatar's behavior, checking road conditions, and transporting the avatar at an avatar malfunction or other cases. They must accompany the avatar.

1.2 *Eligibility criteria*

1.2.1 *General Rules*

The following rules apply for this competition:

RULE 1 Technical, functional, and safety information about the avatar as well as competitors' health information must be submitted by the teams several months prior to the competition in accordance with registration and submission deadlines. If a team does not meet the deadlines, they will be removed from the starting list.

RULE 2 The avatar must pass the Technical Check (AvatarCheck) .

RULE 3 Competitors must be 10 years old and in good health on the first day of competition.

RULE 4 Competitors must understand the race and rules and have sufficient communication skills to follow the instructions of competition staff.

RULE 5 Competitors must take the Competitor Proficiency Test¹ prior to the competition and meet the Competitor Eligibility Criteria.

RULE 6 After registration, if there is a change in Technical, functional, and safety information about the avatar or the competitors' health status (anything that affects their eligibility to compete or their general health), they must immediately notify the competition.

1.2.2 *Technology eligibility criteria*

It is allowed to use a commercial avatar, a modified version of a commercial avatars, prototypes, or research devices. In any case, assistive devices must fulfil all the following criteria to be eligible for participation:

RULE 7 The avatar must be safe for the competitors and their environment at any time.

RULE 8 The avatar must pass the Technical Check (AvatarCheck) according to Avatar Formula 2 and 3 specifications.

RULE 9 After all requirements of the AvatarCheck have been met, no further changes may be made to the assistive device that would alter its function or its safety. Violation of this rule leads to disqualification.

RULE 10 In addition to the predefined review during the AvatarCheck, additional reviews of a team's avatar can be carried out by the technical examiners at any time during the competition. Teams who refuse the review will be disqualified.

RULE 11 The driver must be able to emergency stop the assistive device at any time during the competition.

¹ This will be specified separately later.

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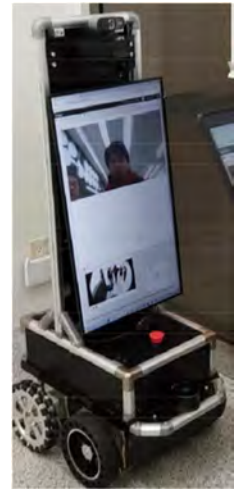
Comment:

- The avatar can be operated in manual, or semi-autonomous modes.
- Input (control) devices can include any standard or novel technology such as a joystick, a touchpad or any other technology.
- Any object such as intercom push button that must be manipulated in the task, must only be touched and manipulated using the robotic manipulator.

1.3 Avatar specifications and inspection (*AvatarCheck*)

1.3.1 Avatar Formula 3 specifications

- Size: Width 60cm or less, height 150cm or less (length 120cm or less)
- Weight: 35kg or less
- Speed: less than 6 kilometers per hour
- Collision energy: 14J or less
- Any technological means (and combinations thereof) may be used to collect information about the environment (e.g. LIDAR, vision, ultrasound)

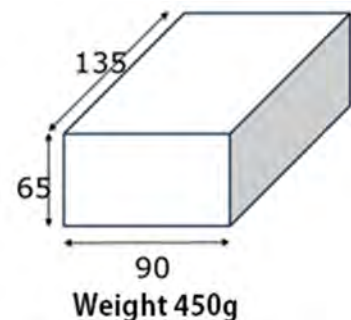


1.3.2 Avatar Formula 3 specifications

- In addition to Avatar Formula 3, have an actuator that can push the intercom at the entrance to the house (approximately 1m high)

1.3.3 Specifications common to Avatar Formula 2 and 3

- Must be equipped with a basket for sweets and Big Macs.
- There are no sharp protrusions that could pose a hazard to pedestrians.
- The avatar must be able to automatically stop in the event of an emergency, such as when communication with the driver is delayed for a certain period of time, or when communication is interrupted.
- If a traffic accident occurs, the occurrence of the accident can be recognized immediately.
- Get disability insurance (arranged by the competition executive committee)
- Two-way video communication is possible with the driver via mobile phone network/Wi-Fi.
- ✓ In addition to multi-AP Wi-Fi, we provide communication devices (see figure on the right) that bundle commercial mobile phone networks to provide stable, low-latency wireless connections. The interface to the avatar robot is Ethernet compatible.
(<https://www.ipros.jp/product/detail/2000711518>)

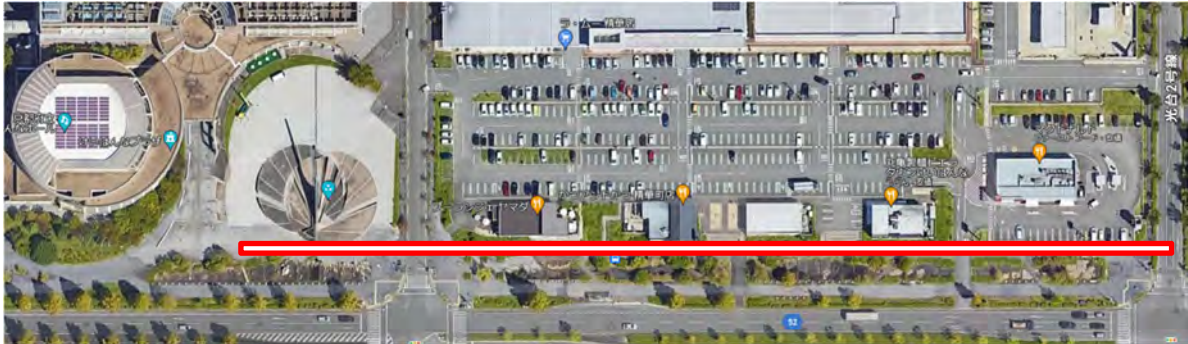


2 Competition venue

The competition will start from Sundial Square (1-7 Hikarudai, Seika-cho, Soraku-gun,

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Kyoto Prefecture, 619-0237) and will be held on the track along the following sidewalk along Seika Boulevard. Unless otherwise defined, the race direction is left to right in all subsequent illustrations.

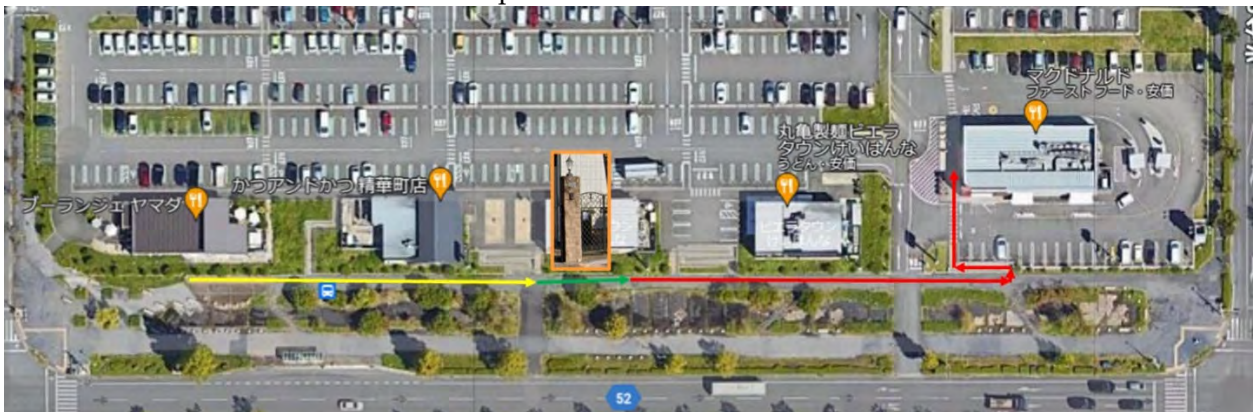


3 Task definitions

Each task is described in the following sections.

Slalom, Jizo-bon², and shopping at McDonald will be continuous competitions held on the sidewalk, and only hill climbing will be a single competition in the sundial plaza.

The diagram shows the trucks used for Slalom, Jizo-bon, and shopping at Mac with yellow, green, and red arrows respectively. The end of the arrow is the finish line, and the base is the start line of each competition.



The overall ranking will be determined by the sum of the elapsed time for both³.

3.1 Slalom

3.1.1 Introduction

The question arises as to whether slalom is necessary in daily life, but in order for avatars to coexist with humans and live in society, they must be able to move in a

² A festival similar to Halloween popular in the Kansai region, Japan.

³ If Competitor A completes the slalom, Jizo-bon, and shopping at McDonald in a total of 180 seconds and climbs the mountain in 55 seconds, and Competitor B completes the distance in 170 seconds and 67 seconds, respectively, Competitor A completes the race in 235 seconds and Competitor B completes the race in 237 seconds. In this case, Competitor A will be ranked higher.

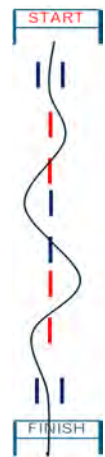
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space designed according to human physical abilities. In order to get through the crowds that are common in cities, it is necessary to move forward while dodging obstacles such as people coming toward you, which requires slalom skills. Your ability to predict the direction your opponent will move, your walking strategy according to your prediction, and your ability to quickly respond when your prediction is incorrect is tested.



3.1.2 Task set-up & description

Avatars must pass through gates marked by a pair of red cones and a pair of blue cones placed along the sidewalk. Slalom has open gates with cones placed perpendicular to the direction of travel, and cross gates with cones placed diagonally.



3.1.3 Competition track

The competition will be held on far side, not the near side, of the sidewalk between Le Patissier Yamada and McDonald on Seika Boulevard.



3.1.4 Task rules

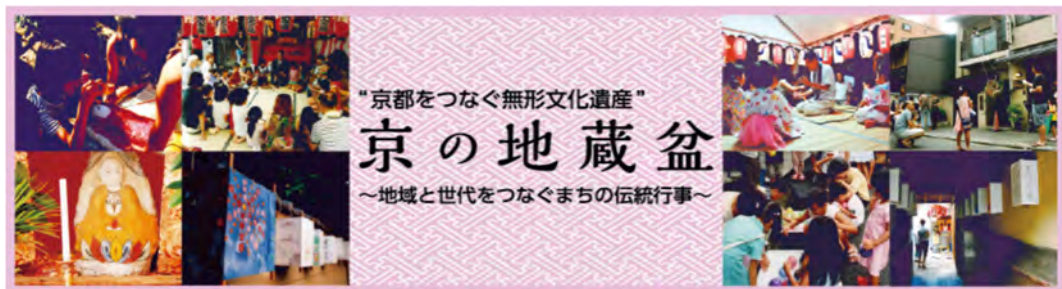
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- SL-RULE-1 The driver controls the avatar via the Internet from a location other than where the avatar is traveling.
- SL-RULE-2 The avatar must have two caregivers who will assist the avatar in the event of abnormal behavior.
- SL-RULE-3 The referee confirms that the avatar has arrived at the starting line and says, "Okay, go."
- SL-RULE-4 The avatar must first pass through the gate closest to the task's start line, then pass through the gates in sequence, and finally pass through the gate close to the finish line.
- SL-RULE-5 The winner will be determined by the time they cross the finish line. The shortest one will be the winner. (If it is a consecutive competition, proceed to the next one.)
- SL-RULE-6 Avatars and caregivers must not touch the gate cone. If you touch it, you will be disqualified.
- SL-RULE-7 Caregivers must carry the avatar in a carrier when the avatar crosses the crosswalk.
- SL-RULE-8 Caregivers must not touch the avatar except in SL-RULE-7. If you touch it, you will be disqualified.
- SL-RULE-9 The starting order will be decided by lottery, and the next competitor will start after 60 seconds.

3.2 *Jizo-bon (or Halloween)*

3.2.1 *Introduction*

Jizo-bon is a festival dedicated to Jizo Bodhisattva that is widely held especially in the Kansai region. Jizo Bosatsu is considered the guardian deity of children and travelers, and Jizo-bon is an event to pray for the growth and health of children. It is an event very similar to Halloween in Europe and America, where children visit each home and receive sweets and other gifts.



Here, participants compete to see who can receive sweets from the residents of each household by pressing the intercom at the front door of each household.

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3.2.2 Task set-up & description

The avatar presses an intercom located in a place that resembles the entrance of a house, and receives sweets from the resident.



3.2.3 Competition track

The competition will be held on far side, not the near side, of the sidewalk between Le Pâtissier Yamada and McDonald on Seika Boulevard. The competition will take place at one point along the path, with an intercom like the one shown below set up.



3.2.4 Task rules

- JB-RULE-1 The driver controls the avatar via the Internet from a location other than where the avatar is traveling.
- JB-RULE-2 The avatar must have two caregivers who will assist the avatar in the event of abnormal behavior.
- JB-RULE-3 The referee confirms that the avatar has arrived at the starting line and says, "Okay, go." (If the event is followed by a slalom, the finish line of the slalom will become the start line for the Jizobon event, so no judges are required.)
- JB-RULE-4 The avatar must first depart from the task's starting line, receive some Jizobon sweets by asking the person, who called on the touch-

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tone phone, to place them in a "basket," and finally pass through the finish line.

JB-RULE-5 The winner will be determined by the time they cross the finish line. The shortest one will be the winner. (If it is a consecutive competition, proceed to the next one.)

JB-RULE-6 Caregivers must not touch the avatar. If you touch it, you will be disqualified.

JB-RULE-7 The starting order will be decided by lottery, and the next competitor will start after 60 seconds. (This does not apply if back-to-back with a slalom.)

3.3 *Shopping at McDonald*

3.3.1 *Introduction*

When avatars coexist with humans and live in society, being able to use them to run errands is an important functional evaluation point, especially for the elderly. This competition will verify whether avatars can smoothly perform tasks such as QR code payment, assuming that such tasks are possible.

The key is whether they can safely travel on sidewalks, overcome steps, and open doors. This time, it will be assumed that there will be assistance from a caregiver when it comes to steps and doors.



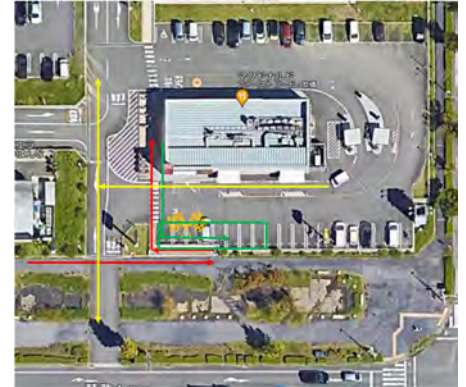
3.3.2 *Task set-up & description*

Avatars compete to see who can make it from the sidewalk of Seika Town Boulevard, into a McDonald's, buy a Big Mac, and then return to the finish line in the shortest time.



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As shown by the red arrow, the avatar will go down the ramp in the diagram on the right, cross the crosswalk on the McDonald's premises, and enter the restaurant. On the way back, it will reach the goal by following the route shown by the green arrow. Eight parking spaces at the goal point will be rented from 2:00 to 3:00 p.m. The diagram also shows the route of cars moving through the drive-thru with yellow arrows.



At this point, a security guard will guide the avatar to give priority to any cars waiting to enter the crosswalk.

3.3.3 Competition track

The race will be held on the sidewalk between the Sundial Square on Seika Boulevard and McDonald's, on a small path far from the road. The starting line for shopping at McDonald's will be decided at the finish line of the previous race. The diagram below shows the course for shopping at McDonald's after the Slalom and Jizobon races. The red line will be the McDonald's shopping truck.



3.3.4 Task rules

- MC-RULE-1 The driver controls the avatar via the Internet from a location other than where the avatar is traveling.
- MC-RULE-2 The avatar must have two caregivers who will assist the avatar in the event of abnormal behavior.
- MC-RULE-3 The referee confirms that the avatar has arrived at the starting line and says, "Okay, go." (If the event is followed by Jizobon, the finish line of the Jizobon will become the start line for Shopping at McDonald event, so no judges are required.)
- MC-RULE-4 Avatar begins the task at the starting line, opens the door to a McDonald's restaurant, enters the restaurant, orders a Big Mac

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from the staff, pays using a QR code, and has the purchase placed in the "basket."⁴

MC-RULE-5 The winner will be determined by the time they cross the finish line. The shortest one will be the winner.

MC-RULE-6 If the avatar cannot open the door, its caregivers can open it for the avatar.

MC-RULE-7 When an avatar crosses a pedestrian crossing near a McDonald's, it must follow the instructions of a security guard.

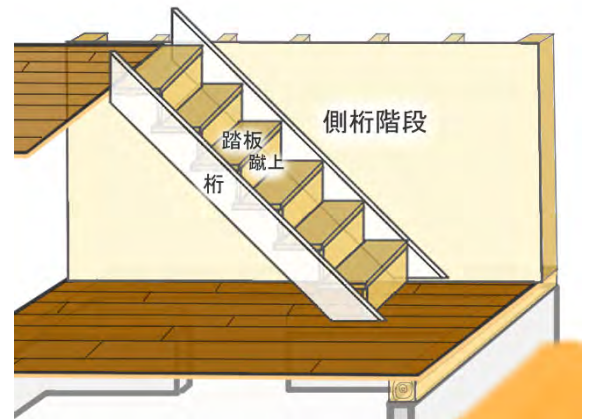
MC-RULE-8 Caregivers must not touch the avatar. If you touch it, you will be disqualified.

3.4 Hill Climbing

3.4.1 Introduction

For avatars to coexist with humans and live in society, they must be able to move around in a space designed according to human physical abilities. A major challenge in this regard is the presence of uneven surfaces, especially stairs.

Because it is technically very difficult for an avatar to go up and down stairs, this competition tests whether an avatar can overcome a ramp installed for wheelchairs.



3.4.2 Task set-up & description

The avatar must pass through each wheelchair ramp placed from the starting line to the finish line.

The starting order is decided by drawing lots, and the competitors start in order. The next competitor starts 60 seconds later.

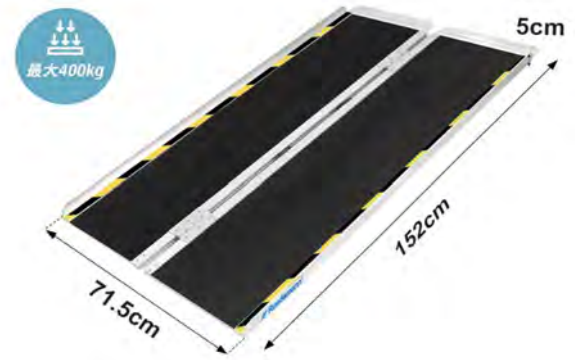
The maximum wheelchair ramp angle is 14 degrees, but wheelchair ramps are usually around 8 degrees. This makes up the course.



⁴Your avatar should be equipped with a basket for snacks and Big Macs.

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The materials used are generally available for purchase on Amazon⁵ etc.



3.4.3 Competition track

The course will be set up in the Sundial Square (60m x 80m) at Keihanna Plaza.

3.4.4 タスクの規則

HL-RULE-1 The driver controls the avatar via the Internet from a location other than where the avatar is traveling.

HL-RULE-2 The avatar must have two caregivers who will assist the avatar in the event of abnormal behavior.

HL-RULE-3 The referee confirms that the avatar has arrived at the starting line and says, "Okay, go."

HL-RULE-4 The avatar must first pass through the slope closest to the task's start line, then pass through the slopes in sequence, and finally pass through the slope close to the finish line.

HL-RULE-5 The winner will be determined by the time they cross the finish line. The shortest one will be the winner.



5

https://www.amazon.co.jp/s?k=%E8%BB%8A%E3%81%84%E3%81%99%E7%94%A8%E3%82%B9%E3%83%AD%E3%83%BC%E3%83%97&ref=sr_nr_p_rk_sp_0

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HL-RULE-6 Caregivers must not move the ramp or they will be disqualified.

HL-RULE-7 Caregivers must carry the avatar in a carrier when the avatar crosses the street.

HL-RULE-8 Caregivers must not touch the avatar except in SL-RULE-7. If you touch it, you will be disqualified.

HL-RULE-9 The starting order will be decided by lottery, and the next competitor will start after 60 seconds.

4 Avatar Parade

Prior to the competition, a parade of competitors will take place along Seika Boulevard. Teams participating in the competition are encouraged to join the parade.



The image of the parade is shown below. At the front are the human street performers.

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It is possible to create various figures using a 3D printer or other device and participate in this parade on the pedestal of the avatar robot. In this competition, the specifications for the part where the figures are attached are as shown below, with holes for M5 screws drilled at the vertices of a regular hexagon inscribed in a circle with a radius of 101.6 mm (4in).

