

# 42nd ROBO-ONE Competition Rules



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## Participation Flow for 42nd ROBO-ONE

The participation and attendance flow for the 42nd ROBO-ONE competition are as follows.

- 1) Publication of competition rules (2023/06/23)
- 2) Participation applications received (2023/09/01)
- 3) First day of the competition (2023/09/23)
  - ROBO-ONE Performance
  - ROBO-ONE Rumble
- 4) The second day of the competition (2023/09/24)
  - ROBO-ONE Fight (ROBO-ONE Light will not be held.)

\* Participant guide will be issued 10 days before the event as a guide. Please check it and join us. Especially the judges and the referee will check the ID card in the standards screening, Preliminaries, and the finals tournament. Please do not forget to print and bring it.

### 1 Publication of competition rules

The competition rules are generally published on the official ROBO-ONE website (<http://www.robo-one.com>).

### 2 Participation applications

Participation in ROBO-ONE is open to all. There are no nationality requirements.

Participation applications are only taken on the official ROBO-ONE website (<http://www.robo-one.com>). You must register as a competitor and register to participate. Complete the registration procedures by following the instructions on the screen. Applications are not screened, so when building your robot be sure to read the competition rules carefully to avoid rule infractions.

Team and robot names should be 14 letters or less.

Also, please be sure to register the photo of the robot by the day of the convention.

An operator can register one person for each robot. No one other than the registered operator can control the robot.

#### Explanation 1-1

Robot and team names can be registered in Japanese, but you must also enter English names. At international competitions, the English names (letters) are used. The English robot name should be easy to read and understand in 14 characters or less. Make sure to check it because it will be called in the same way as the pronunciation on the Google translation site.

### 3 Standards screening

In the standards screening, robots are screened for whether they have been created in accordance with the competition rules. The weight limits for this competition are 4 kg or less for ROBO-ONE Certified robots can participate in all classes if they satisfy the certified robot standards.



If your robot fails the standards screening, you will not be able to participate in the competition, so make sure to sufficiently review the rules and standards in advance.

#### Explanation 1-2

If you participate in auto, it is assumed that the weight will exceed 1.2Kg by adding new sensors and boards for official robots of 1.2Kg or less and robots that have participated in past ROBO-ONE Light etc. with 1.2Kg or less.

Considering these, if the weight of the robot participating in auto is 1.5Kg (1.2Kg + 300g) or less, the robot weight standard of "5.3.1 Legs and feet" and "5.3.2 Arms and tails" is 1.2Kg or less provisions apply.

## 4 Preliminaries

ROBO-ONE will carry out a newly established performance division and will not conduct preliminaries.

## 5 Performance

In the Performance Division, we aim to create cool, beautiful, and fun robot performances that excite the audience and make them want to see it again. Performances will be scored by three or more judges, and awards will be given in order of the highest score.

The top 30 robots from the performance division will compete in the fight division. In addition to this, the top 3 robots in the ranking and robots that have qualified for the Fight Division can also participate in the Fight Division. The top 3 robots in the ranking and robots that have qualified for the fight category must also participate in the performance category. Affects placement on the tournament table. If you do not participate in the performance division, you will be included in the tournament table as the lowest performance division.

**This time, we will not set a theme for the performance, so please set it freely and perform.**

**[About abstaining from participating in the Fight Division]** Even if you win the top prize in the performance category and get the right to participate in the fight category, it does not force you to participate in the fight category. Participation in the performance division only is also welcome. If there is a withdrawal, the next ranked participant can participate in the Fight Division.

#### **[What is Ranking]**

After the ROBO-ONE tournament held by the Biped Robot Association, the robots will be ranked. ROBO-ONE qualifying, performance category, final, fight category and points up to 3 years ago will be added.



Please see our website for details.

<Benefits>

Applies to robots ranked up to 3rd in each class and participating in the next competition.

1. Participation fee for the applicable tournament will be free.
2. Competitions with qualifying and performance divisions can participate in the final tournament or fight division regardless of the results of the qualifying and performance divisions.

### **About Finals, fight division participation right**

The official ROBO-ONE, which will be held after the certified tournament, is entitled to participate in the final tournament or fight division regardless of the result of the qualifying or performance. Rights are given to robots and pilots. Robot and pilot changes are not permitted. However, remodeling of the robot is permitted.

You will be awarded if you get excellent results at a certified tournament. Official tournament entry fee will be free.

### **Rules of certified tournament**

A certified tournament is a tournament in which a team that has achieved excellent results in the tournament is entitled to compete in ROBO-ONE's finals or fight division (Finals, fight division participation right). Biped robot contests in various places applies this system.

It is necessary to hold a certified referee at the certified tournament.

It is also a requirement to use the latest competition rules as of 1 month ago.

Up until now, it has been held by member companies, but now it is possible to hold an accredited tournament by general companies and groups. Please apply from the Biped Robots Association website. We will also introduce certified referees.

### **Official Referee System**

It is considered as the official referee system of 3 ranks of special A grade, A grade and B grade. At first, we examine referee in certified tournaments etc. and assume registration system.

Special Class A: You can refer to all competitions, including international matches. The referee is required to be able to respond to players in English in the game.

Class A: You can refer to official tournaments in each country.

Class B: You can refer to certified tournaments and ROBO-ONE Light.

Those who have passed a year or more in each class, who have experienced 2 or more certified tournaments, or who have 20 or more matches in the C-Ring can take an A grade or higher.



## 6 Fight Division

The Fight Division will be held with the top winning robots in the Performance Division, the top 3 robots in the ranking, and robots that have qualified for entry.

However, only one robot per operator can participate in the Fight Division.

The game will be a 3-minute 1-round system, and depending on the situation, there may be a 2-minute overtime, or a re-extension, so please prepare your batteries. However, due to operational reasons such as the number of participants, the game time may be set to 1 round per 2 minutes.

In this case, extra time will be 1 minute without maintenance time. In addition, extra time may not be implemented.



## **ROBO-ONE Competition Rules**

### **1 Preamble**

The purpose of ROBO-ONE is to promote the fun and excitement of robots to more people. It aims to be a robot competition that is enjoyable for spectators and highly motivating for participants. For this reason, it emphasizes technological prowess and entertainment value over winning and losing.

Technical information is also released to the extent possible to promote the spread and sound development of robotic technologies.

### **2 About the spirit of ROBO-ONE**

ROBO-ONE respects the following aspirations so that many participants can learn and have fun together. Participants should participate with the following feelings in mind.

- 1). Have fun building robots.
- 2). Learn new technologies and actively incorporate them.
- 3). Aim to create a robot that impresses.
- 4). Fight fair and fun.
- 5). Build robots that are safe and do not hurt people.
- 6). Respect each other's robots and use them as a reference.

### **3 About the Competition**

The competition involves matches in a preset ring between biped robots created by participants. The decision of referees and judges determine winners and losers. The competition consists of a tournament-style main round and a preliminary round preceding it.

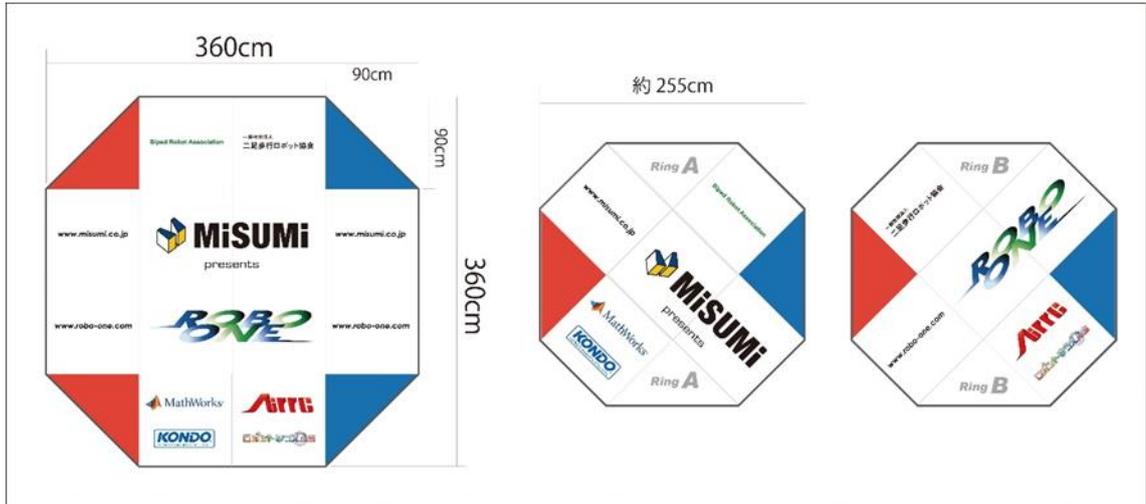
### **4 Ring Standards and Conditions**

#### **4.1 Ring**

The size of the rings is shown in Diagram 1. There are cases where the game progresses simultaneously with two rings and the case where it progresses with one ring and the dimensions are as described respectively.

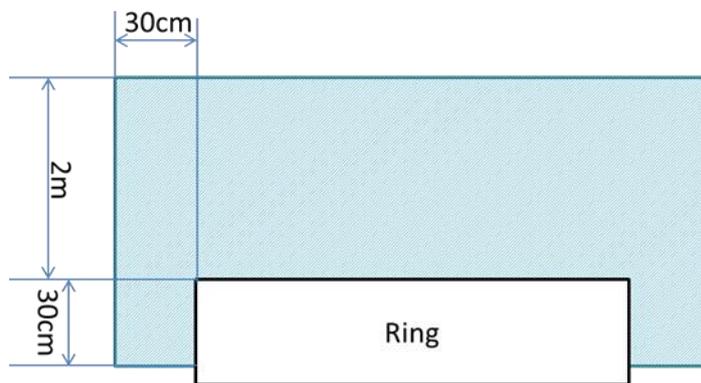
Surface bumps are  $\pm 1\text{mm}$  or less. There are no specifications regarding the material.

Do not place objects up to 2 m of the ring and 30 cm around the ring, down to 30cm to the floor around the ring (See diagram 1-(3)). However, the referee can move this range freely.



(1) With one ring

(2) With two rings



(3) Side view of the ring

Diagram 1 the size of rings

## 4.2 Outside disturbances

There are no specific regulations on the photographic equipment used by general spectators, media members or competition officials. For this reason, if there is a chance that a participating robot will be impacted by indoor lighting, sunlight, infrared light from cameras or video cameras, flashes, or photographic lighting, etc., the participant is responsible for taking countermeasures.

## 5 Robot Standards

### 5.1 Method of movement

Robots must be bipeds capable of walking with steps that are 10 mm or higher.

#### Explanation 2

Walking is not screened in the standards screening, but if a referee or judges during the competition that this standard has not been met, the competition will be interrupted, and walking will be judged, so make sure your robot is able to walk right, left, forward and back taking steps that are 10 mm or higher. If it is not possible to judge whether it is 10 mm higher

or not, judge it by going up and down to 10 mm board. Please be prepared. It is not being prohibiting to walk with step lower than 10mm during the game.

If the robot does not satisfy this standard, the referee gives 1 down and a correction time of 2 minutes. If you can't fix it, you will be a knockout. Everything related to the robot standards will be handled in the same way.

Robot standards are common to ROBO - ONE, ROBO - ONE Light, and ROBO - ONE auto unless otherwise specified.

Please prepare for regulations related to the referee instructions during the standard screening and game, so that you can operate as instructed.

Please refer to 11-1 for the regulations of walking.

(b)When walking, walk with robot's hands at least 50 mm away from the floor of the ring.

## 5.2 Direction of movement

The front-back direction of the robot is defined as the direction perpendicular to the line connecting the yaw axes (of both legs that move away from the upper body) and the perpendicular. If there is no yaw axis, judge by the pitch axis (Figure D-1). In addition, the front/rear/left/right of the robot is determined by the orientation of the sole of the foot when the robot stands upright (Figure D-2).

Walking the robot in the front-back direction is referred to as forward movement and backward movement and moving in the left-right direction is referred to as left movement and right movement. In addition, the rules for front, back, left, and right also apply to each item of this competition rule.

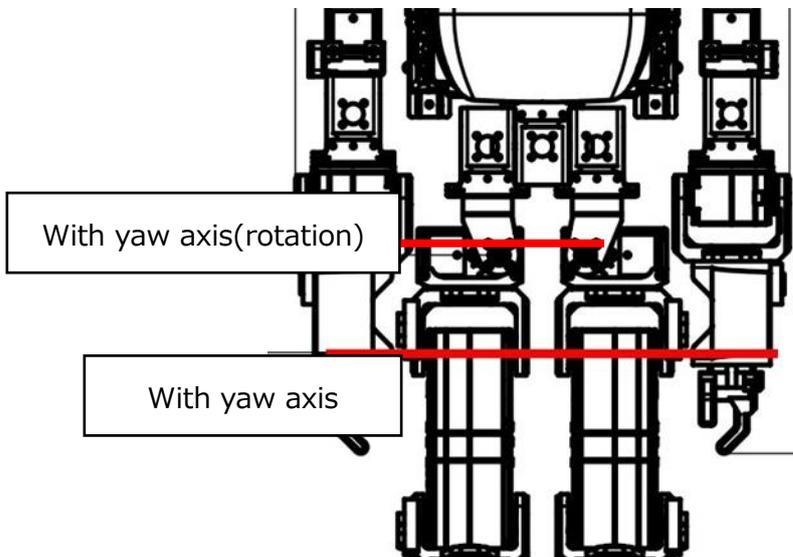


Figure D-1

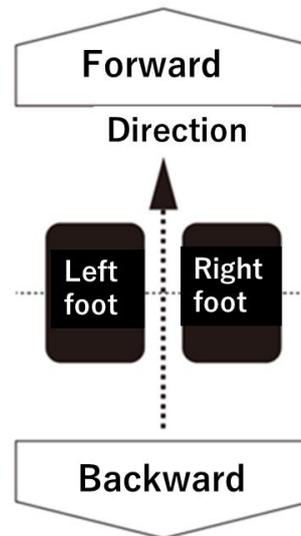


Figure D-2

### Explanation 3-1

Since this provision is a rule for determining the front, back, left, and right, it is not prohibited



to walk with non-parallel foot. It is defined as a criterion for items that have front and rear provisions, such as the direction of movement and the direction of attack.

### 5.3 Robot standards

The robot's shape is open if the following rules are observed. However, it is required to have feet, two legs, two arms, trunk(torso) and head. Also, the head should be independent of the torso. The size must be at least 2cm above and below, left and right, and front and back. Each arm must have at least one working axis.

#### Explanation 3-2

- The head should be a separate part from the torso. We do not accept anything with eyes or mouth on the torso.
- It is possible to add tails for attack.

#### 5.3.1 Rules on feet and legs

(a) The size of the soles of the feet (the part that contact with the ground) is stipulated per weight category as shown in Table 1. The length of the sole from front to back must be X% or less of the length of the leg. **However, soles can be no longer than Y cm.** The width of the sole from right to left must be Z% or less of the length of the legs. Leg length is measured from the axis of forward and back movement at the very top of the leg to the sole of the foot when the leg is fully extended.

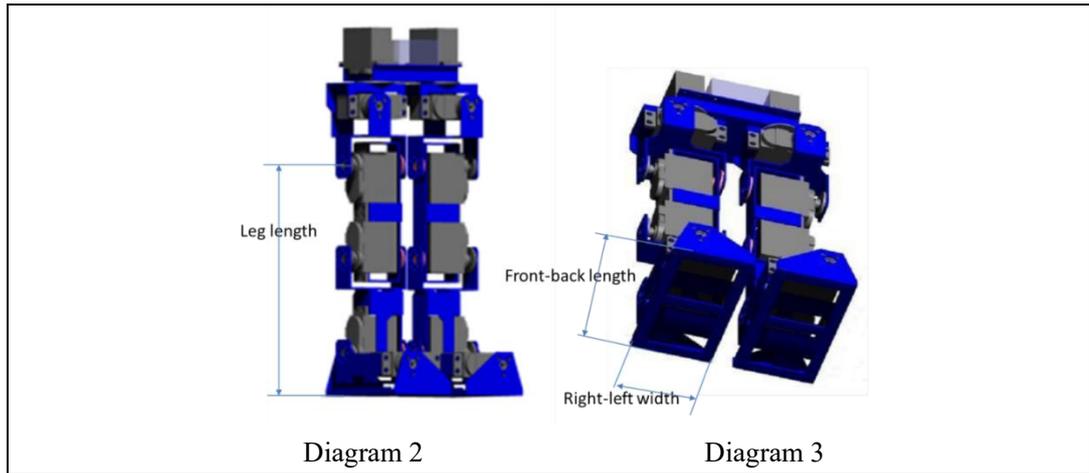
Table 1 Robot Sole by Weight

Robot Weight	X	Y	Z
1.2 kg or less (ROBO-ONE & Light) 1.5 kg or less(auto)	55%	10 cm	35%
2 kg or less (ROBO-ONE & auto)	50%	11 cm	30%
3 kg or less (ROBO-ONE & auto)	45%	12 cm	25%
5 kg or less (ROBO-ONE auto)	40%	13 cm	25%
7 kg or less	35%	14 cm	20%
10 kg or less	30%	15 cm	20%
Over 10 kg	25%	16 cm	15%

(Figures for weights over 5 kg are for reference.)

#### Explanation 3-3

As shown in Diagram 2, the leg length is the length from the axis of forward and back movement to the sole of the foot. The size of the foot is measured as shown in Diagram 3. If the axis moving back and forth is a parallel link, measure from a higher axis position.



- (b) If in the shape of a clog (*geta*), the sole length is measured as the length of the red line in Diagram 4.

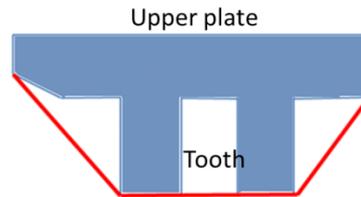


Diagram 4

- (c) When the robot is standing, the lines tracing the outermost perimeter of the soles of the left and right feet must not overlap when looked at from above.

**Explanation 4**

In the structure shown in Diagram 5, the lines tracing the outermost perimeter of the soles overlap, so the robot would not be allowed to participate. (The dark blue portion is the area that would be judged to overlap.)

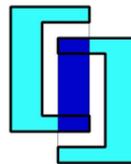


Diagram 5

- (d) Suction/absorption devices (including adhesive materials) must not be placed on foot soles.

5.3.2 Arms, tails, etc.

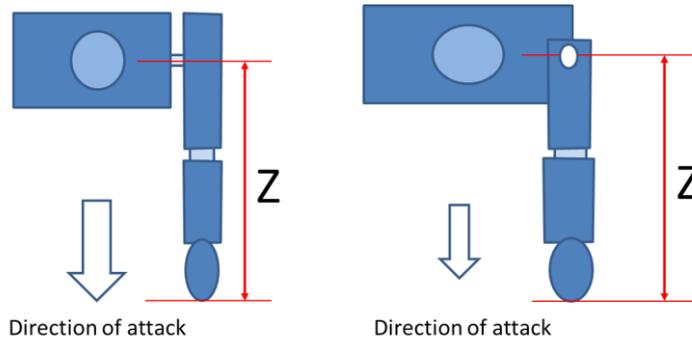
- (a) The length of parts that move away from the torso (arms, tail, neck, etc. excluding legs) should be less than Z-cm from the center of the servo axis that supports the part that moves away from the torso as shown in Table 2 by robot weight. The judge will measure the length of the arm in the attack state extended back and forth. (see Diagram 6).

Table 2 Standards by Weight for Parts that Move Away from the Trunk

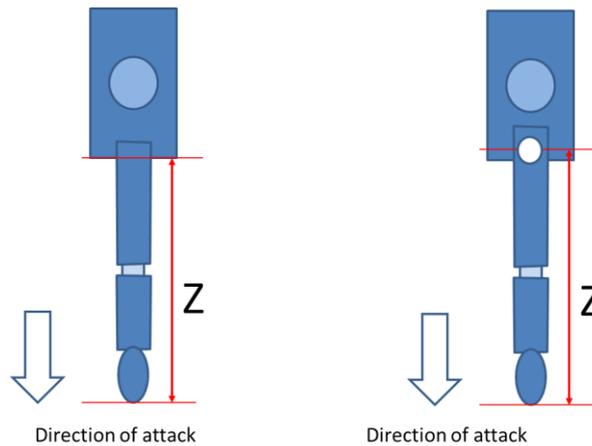
Robot Weight	Z
1.2 kg or less (ROBO-ONE & Light) 1.5 kg or less(auto)	26 cm
3 kg or less (ROBO-ONE & auto)	30 cm
5 kg or less (ROBO-ONE auto)	35 cm
7 kg or less	40 cm
10 kg or less	45 cm
Over 10 kg	50 cm

(Figures for the over 5 kg category are for reference.)

**Explanation 5**



(1) Measurement of length (View from the top)



(2) Measurement when attacking while rotating the body

**Diagram 6**

The judge will measure the length of the arm in the attack state extended back and forth as Diagram 6-1 and 6-2. In the case of an authorized robot, it conforms to the certified robot standard.

(The movable range regulation is abolished.)

(b) When using transparent materials such as acrylic plates on the hands of the robot, surround



the area with tape or painting to make it easier for referees and judges to check the position of the minion.

### 5.3.3 Battery safety management

For the safety control of a battery, you must bring altogether batteries used in the hall and take the examination by the start of the competition. (For details, refer to participant guide)

When it is judged that there is a dangerous possibility of leading to serious accidents, such as, the main part of a battery having swollen extremely, or serious damage of main part, cables, and connectors, it cannot be used.

The battery which safety has checked is attached a "checked seal."

Since batteries without the seal cannot be used, attach the seal till the end of the event.

When it turns out that the battery without the check seal is used and charged, we will suspend you.



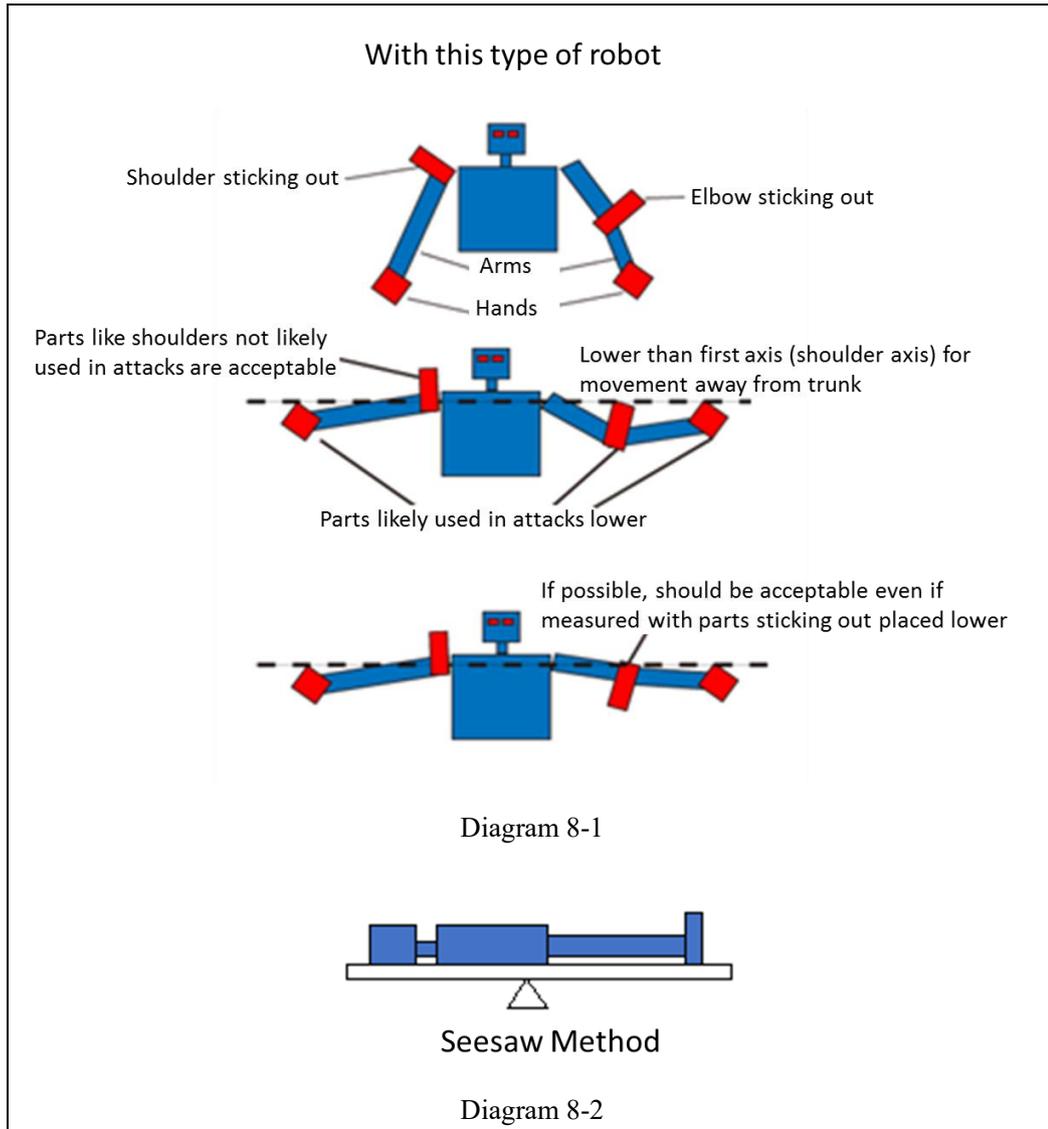
Diagram 7 checked seal

### 5.3.4 Center of gravity rules

- (a) The robot's center of gravity in the vertical direction must be clearly higher than the axis of forward and back movement at the very top of the legs. Also, when measuring center of gravity, parts like hands used for attacks must be placed below the axis for moving them away from the trunk. Center of gravity is measured using the seesaw method.

#### **Explanation 6**

Center of gravity is measured with the legs fully extended and the hands placed lower than when horizontally extended (see Diagram 8-1). Program the robot so that it can get into a position that allows its center of gravity to be measured (see Diagram 8-2).



## 5.4 Prohibitions

- (a) The power source must be mounted inside the robot.

### Explanation 7

If the battery is exposed on the outside, there is a risk of shorts or fire, so position the battery to prevent shorts and battery damage in normal matches between robots made of metal and plastic, etc. Also, adequately protect circuit boards and power-supply lines. Also, if the wiring is hanged down carelessly, it may be judged as a dangerous condition, so please bundle the wiring together.

If judged to be in a dangerous position, a red card (1 “down”) is assessed, and if it is not repaired within 2 minutes, a technical knockout is assessed. If there is smoke or fire, a technical knockout is immediately assessed.



For example, if the battery cover comes off during the match and exposes the battery, the referee judges that there is risk involved and orders it repaired. This count as 1 “down,” and the repair time is 2 minutes, the same as timeout rules.

At this time the participant is not allowed to increase the weight or change the position of the center of gravity. Repairs could include screwing the cover down or taping it down with plastic tape, etc.

Also, install the power switch in a position that is easy to operate and protect it against malfunctioning with a cover etc. The game will continue even if the switch turns off by contact of robots during game.

- (b) Parts that could hurt someone are not allowed.

**Explanation 8**

The judge checks in the standards screening by directly touching the parts, and if judged to be a danger, the participant is asked to make repairs. If repairs cannot be made, the robot is disqualified. Make sure to conduct adequate processes such as deburring.

- (c) Robots must not have jamming devices or other devices that intentionally disrupt the opponent’s control such as lasers or strobes. However, sensing equipment such as laser range sensor is excluded.
- (d) Robots must not use any parts that could damage or dirty the ring.
- (e) Robots must not have objects, liquids, powders, or liquids that can be blown at the opponent.
- (f) Robots must not have devices that ignite.
- (g) Robots must not have weapons that could damage the opponent or ring. Dangerous objects like knives or things that revolve at high speeds are prohibited.
- (h) Robots are not allowed to fly or move using fans or propellers, etc. that revolve at high speeds. CPU cooling fans are not limited to this.
- (i) In addition to the above, if a judge or referee judges something to be antithetical to the spirit of ROBO-ONE, it is ruled non-compliant.
- (j) Robots are not allowed to have structures that hook other things or have hands, arms or tails that hold highly adhesive materials, hooks among others.
- (k) When decorating, keep the robot’s decoration in a length that does not touch the ring when standing upright and walking.



#### **Explanation 9-1**

When a robot grabs and knocks down its opponent using a hooking structure or with hands made with a highly adhesive material, the attack is not valid.

If the referee decides that it is against the regulation, makes it 1 down and asks the player to make correction within 2 minutes.

It is desirable that the structure to be caught is about 120 degrees or more in the case of bending.

In the standard screening, the judges judge strictly whether the paper sticks to stickiness.

However, this does not mean that grabbing, pinching or hugging actions, etc. are disallowed.

#### **Explanation 9-2**

Dazzling high-brightness LEDs etc. may be judged to be disturbing lights to the driver, so it is desirable that they be able to dim the light and turn off.

#### **5.5 Shape may not be altered**

Robots must not be modified to alter their shape at any time during the preliminaries and finals.

#### **5.6 Replicas not allowed**

Robots that replicate the shapes or forms of existing characters or people not authorized by the Biped Robot Association, as well as use of their illustrations or photos, etc., are prohibited. Copyrighted music and voices, trademarked names and other equivalent items also must not be used.

When necessary, the participant must obtain permission.

In addition, if you receive permission, contact the Biped Robot Association in advance.

#### **5.7 Prohibit expressions related to political ideas and content that violates public order and morals.**

The following are prohibited. Any violation will result in immediate disqualification and expulsion from the venue.

(a) Decoration of robots, participants' clothes, performances, etc. for the purpose of promoting political or religious claims or advertising.

(b) Names of individuals not recognized by the Bipedal Robot Association, items promoting a specific country, region, organization, etc., robot decorations, participants' clothes, performances, etc. for the purpose of advertising.

(c) Robot decorations, participants' clothing, performances, etc. that are offensive to public order and morals.



## 5.8 Standards for certified robots

- (a) Commercially available robot certified by the Biped Robot Association.
- (b) Complies with the rules stipulated for each certified robot listed on the official ROBO-ONE website.
- (c) Do not use optional parts other than the certified optional parts listed on the official ROBO-ONE website. If optional parts are no longer available because of the end of sales, you can install self-made parts of the same shape and weight.
- (d) When attaching a part to arms, the weight must not increase more than 20% and the length of the left and right arms must not exceed more than 260 mm each. However, the weight must not exceed 2 kg.

Modifications may include adding color, adding stickers, adding head parts that do not enhance performance, decorating with paper, fabric, plastic, or sponge materials, and changing the software. Adding decorative lights and sensors and changing the control microprocessor are also permitted.

- (e) When modifying or decorating within the homologation rules, the weight increase must be up to 20%, and the length of the left and right arms must be within 260mm maximum. However, the weight must not exceed 2 kg.
- (f) Servo torque shall be less than 20kgcm.
- (g) If you use a certified robot and participate in auto, allow a weight increase of up to 20% + 300g from the default in item (e) due to the additional installation of a CPU board and camera. In order to install these, modifications are permitted within the range that satisfies the safety regulations. When participating in auto, the maximum weight is 2.3 kg.

**Explanation 9-3** Please refrain from participating with certified robots as much as possible for excellent robots with high ranking points, and participate with robots of 1.2 kg or less.

## 6 Robot Control

### 6.1 Prelims/Finals/performance/fight Control Method

During the prelims, Finals, performance and fights, robots may be self-controlled by a computer or controlled manually by a human operator. If controlled manually, wireless communications must be used (radio, infrared, etc.). Participants must consider match conditions (light, sound, radio waves) and take steps to keep from obstructing control by the opponent even if using the same system. If using low-power, weak-signal radio control, use a wireless system with eight or more frequency channels. Also, if using an RC proportional controller, have at least eight crystal oscillators available.



### **Explanation 10**

RC controllers should use the following frequencies.

27 MHz band: 26.975-27.255 MHz (12 bands, 1 to 12)

40 MHz band: 40.61-40.75 MHz (8 bands, 61, 63, 65, 67, 69, 71, 73, 75)

AD band (25 MHz weak, 20 bands)

2.4 GHz band, 5 GHz band

Approved wireless LAN, Bluetooth, ZigBee, etc. may also be used.

Use of wireless formats not approved in the host country is prohibited.

You should use systems that allow eight channels to be used simultaneously.

Preparations may be performed by friends or a team. After participants in the final's tournament are determined, wireless frequencies are assigned to the robots. If using a remote controller, have the crystal oscillators available up to this time.

#### 5.1-2. ROBO-ONE auto's robot operation method

Through preliminaries and the finals tournament, the robot must be an autonomous motion by a computer and a sensor installed in the robot during the game. However, the robot is connected to the network and the robot can exchange information without human operation.

The robot is designed to start its motion at the beginning signal of the referee and to stop the motion with a wait or a stop signal, and at this time human manipulation is permitted.

However, it shall be equipped with wireless start, stop, and depower mechanism. You cannot touch until the robot is completely stopped.

Also, do not touch the controller during the game. Therefore, take countermeasures such as hanging the controller from the neck to quickly stop or depower the robot.

If you touch the controller without instructions during the match, you will be eligible for a yellow card. In addition, if the referee or the judge judges that the process is dangerous, such as when the robot runs out of control during the competition, the robot may be instructed to stop. In that case, the operator should immediately stop it wirelessly or manually. If humans are at risk, they may be disqualified as a result of consultation.

## **7 Prelims Format**

This time we will implement the performance section.

## **8 Performance Division**

### 8.4.1 Competition details

(a) Robots will perform for the time limit of 2 minutes and compete for ranking based on the points they get.

(b) Participants can freely express themselves based on the theme announced in advance.



- (c) Start the game as directed by the referee and start the 2 minute timer.
- (d) While the robot is performing, participants can freely introduce the content of the performance, the robot's mechanism, movement, and devised points. Violations of Laws 5.3.7 and 5.3.8 will result in immediate dismissal.
- (e) Posture, standing position, etc. at the start of the performance are free. However, it is forbidden to start outside the stadium or touch the robot.
- (f) The robot shall operate automatically during the performance.
- (g) Basically, do not touch the robot during the competition. However, recovery after the robot falls, when it stops moving, when it falls from the stage, or when it prevents it from falling, can be carried out at the discretion of the participant. For safety, stop the operation of the robot once before touching it. A wireless controller or PC can be used to start the performance and to stop the robot. All of these responses are subject to review.
- (h) The clock shall not be stopped unless instructed by the referee.
- (i) The order of performance divisions will be determined by random numbers, and will be conducted in the determined order. A penalty of 10 points is given for each pass. Only one pass is permitted.

**Explanation 7.4-1** The use of props is permitted during the performance. It is also possible to hand props to the robot. However, points will be deducted if you touch the robot. Observe "Robot Standard 5.4 Prohibited Matters" for props as well. However, ping-pong balls, soft rubber balls, etc. can be used as props and thrown. Even if it is not clearly stated in the prohibited items, if the judges and referees judge that it is dangerous, such as bows and arrows, they cannot be used. Stairs, seesaws, etc. can also be installed as long as they can be installed and removed immediately.

#### 8.4.2 Scoring method

Performance scores are based on "coolness", "fun", "technical skills", "ideas", and "design", and three or more judges judge each performance with 100 points. No objections will be accepted against the results of the examination.

#### 8.4.3 Stadium

Use the diagram below (large ring) for the stadium.



Figure F-4. Stadium



## 9 Rumble

- (a) After the performance division, a rumble will be held for participants who do not have the right to participate in the fight division but wish to participate in the fight division. About 10 robots enter the ring and fight in Rumble. Approximately 10% of robots participating in Rumble will be eligible to participate in the Fight Division.
- (b) Rumble shall be 3 minutes per game.
- (c) Before the start of the rumble, the referee designates one of the red and blue areas in the four corners of the ring as the goal point and starts the rumble. The winner is the robot closest to the center of the designated goal point after 3 minutes. Alternatively, when there is only one robot left in the ring, that robot can participate in the fight division.
- (d) In rumble, there is no down or slip judgment, and it is necessary to ring out the opponent.
- (e) It is possible to attack a fallen robot, crouching movement, crouching attack, and side attack.
- (f) If the referee judges that the robot cannot move or get up, or if the robot is out of the ring, that robot will be eliminated at that point.
- (g) The operator must be at least 50 cm away from the ring during the match.

## 10 Finals Tournament, Fight Division

- (a) Matches are generally 1 round of 3 minutes and are won by knockout or number of “downs.” Depending on the number of participants and other circumstances, the match time may be changed.
- (b) The referee issues yellow cards and red cards according to circumstances, but it becomes one red card with two yellow cards. Red cards are handled equally as one “down”.

### Explanation 12

A 1-point difference in the number of yellow cards cannot determine a victory. Only the difference in the number of downs (including two yellow cards) determines which robot won. However, this does not apply to overtime.

- (c) When neither robot secures a victory in one round, there is a 2-minute overtime round that is decided by sudden death—whichever robot scores a down first wins. If there is no winner even after overtime, victory is determined by the judges on points. However, if it is the Final Tournament, depending on the situation, there may be overtime. Also, when there are large numbers of participants, victory may be determined by decision without conducting overtime.
- (d) If the game time is 2 minutes, the extension and the re-extension shall be one minute

### Explanation 13

Judgment of games is done as follows.

<In the usual round>



The number of downs (including red cards) will determine the outcome. Winning or losing is not decided by yellow card difference.

<Overtime round>

If winning or losing cannot be decided, the judges will score based on the number of yellow cards, the number of slips-downs and the number of offenses within the extension time and decide on winning or losing. At this time the yellow cards in the round will be handed over.

The number of slip and attacks are not handed over.

<Re-overtime round>

If the judge cannot judge it, we will perform re-overtime round, but at this time without a maintenance time (battery exchange is not allowed), we will immediately extend for 2 minutes.

If there is not down, decide the outcome by the number of slips. In the case of the same number of slips, decide by the number of attacks. Furthermore, if it is the same number, we do further extension without maintenance time.

<In the non-overtime round>

Just like the above "Overtime round", the judges will score based on the number of yellow cards, the number of slips and the number of offenses ~~within the extension time~~ and decide on winning or losing.

If it is impossible to judge by any means, it will carry out an extension round in the same way as "Re-overtime round" above.

- (e) The preparation time to the start of the game shall be within 2 minutes, if it exceeds this, it shall be defeated. However, if there is an application for late arrival by a participant or an agent during the preparation time, we will wait for the participants to be ready. When the preparation time has passed, it will be 1 down and give a red card every 2 minutes thereafter.

#### **Explanation 14**

The match order is listed on the tournament schedule, so be ready at your match venue by the start of the match three matches prior to yours. After you are called, the match proceeds in accordance with the above competition rules.

The progress can be checked by updating the ROBO-ONE site's tournament table in real time.

- (f) The ring has a red corner and a blue corner; the left side of the tournament schedule is red, and the right side is blue. When the schedule is written vertically, the upper is red and the lower is blue.
- (g) There are rules on where participants may stand during the competition to allow spectators to enjoy the technological brilliance and entertainment value of the robots and to record the

proceedings for video distribution. During finals matches (not including timeouts) and the prelims, participants must not enter the ring or touch the robots. Touching a robot results in a yellow card.

**Explanation 15**

Participants are everyone around the ring, including the people operating or controlling the robots, people participating in teams and other supporters, etc. People other than those controlling the robots may not stand. Also please keep at least 30 cm away from the ring. Please follow the instructions of the referee as to where the contestants stand in the convention venue.

**Request for operator's second or supporter**

Avoid support that could affect the referee's judgment and management. It may be a yellow card.

**11 Match Rules**

**11.1 Walking**

- (a) If instructed by the referee, the robot must lift the soles of its feet at least 10 mm off the ground and proceed forward, backward, left and right for at least three steps. If the walking of regulation can't be done, give 1 down and give 2 minutes correction time. If it can't be modified, it will be knocked out. (Refer to explanation 2 in 4.1)
- (b) Robots are not allowed to walk in a crouching position, and the judgment on this is made by the referee.

**Explanation 16**

Walking in a crouching position refers to when the knee joints are at 90 degrees or less, or when crouching with the hip joints open 90 degrees or more left to right. The same applies when two servos are used for the knee joint (see Diagram 10). This is not the limitation for the swing leg.

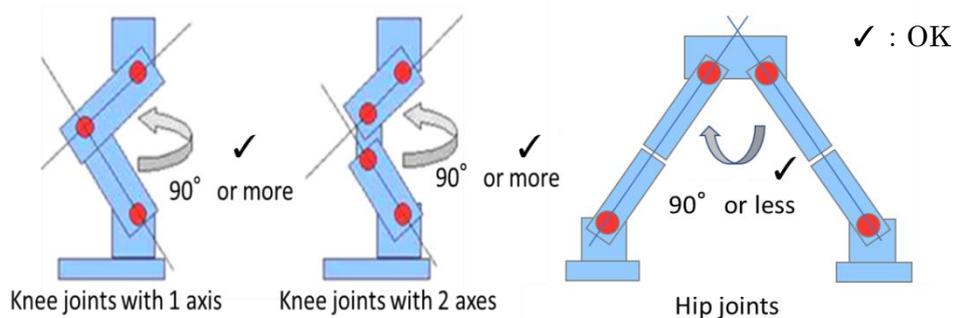


Diagram 10



## 11.2 Match Proceedings

- (a) The referee calls the start of the game "Hajime", the end of the game "Yame", and "Mate" to stop the game. At this time, the referee stops the timer as necessary. To resume, call "Hajime". After the opponent gets down (slipping, standing) and gets up, you can start an attack with a "fight" signal.
- (b) If the opponent goes down, you must leave a distance that does not disturb your opponent's getting up.

### **Explanation 17**

Since the same rule is adopted also in ROBO - ONE auto, please be able to detect that opponent is down. It is a yellow card when you disturb opponent's getting up or attack. However, in the case of ROBO - ONE auto, if the opponent gets up, even if there is no instruction of the referee, it is possible to attack. At the time of game restart or at the start of the extension game, depending on the judgment of the judges, there are cases where the robot is placed at a short distance for easy detection of the position of the opponent.

- (c) When a robot goes down and does not get up after the referee counts to ten, it is a knockout (K.O.), and the other robot is awarded the victory. The count will continue even if the round has ended.
- (d) If robot fall after doing own attack, even opponent go down it is not a "down" but "slip". However, if you can't get up during 10 counts of referee, it will be knocked out. If both sides cannot get up at the same time, an overtime will be held.
- (e) Even if the robot does not fall, it will slip if it touches the ring other than the sole of the foot, and will be subject to the yellow card if it occurs frequently.
- (f) When a robot is knocked down three times during the same match, it is ruled a knockout and victory is awarded to the opponent.
- (g) When participating in ROBO-ONE and ROBO-ONE Light with auto, the robot starts the game from -1 down. If you participate by auto, you must meet the participation conditions of ROBO-ONE auto. The auto rule is applied to the robot even during the match.
- (h) The match continues even if both robots fall on top of each other due to an attack. However, if the referee judges that it is not possible to continue the match, the robots are placed in the fallen position apart from each other and the count is commenced.

### **Explanation 18**

Make it possible for your robot to depower at the referee's signal if the two robots become entangled. Build your robot so that the power can be turned off quickly and it can be restarted quickly.

Also, in order to ensure the referee's safety, do not operate your robot without the referee's signal. The penalty is a yellow card. The referee leaves them to move from the intertwined



position to the inside of the ring.

In addition, the venue makes a variety of lighting to improve the entertainment quality and make it easier to see. Please take countermeasures for this.

- (i) Do not attack a robot when it has gone down.
- (j) “Give up” may be indicated to the referee during the match. If the referee then judges that the match cannot be continued, a “technical knockout” may be declared.
- (k) In case of crouching with defense, fall prevention etc., it must stand back up within 3 seconds. The robot then may not attack or crouch again until it has taken at least three steps. If there is a violation, the referee will issue a yellow card.

#### **Explanation 19**

Walking in a crouching position refers to when the knee joints are 90 degrees or less, or when crouching with the hip joints open 90 degrees or more left to right. This same applies when two servos are used for the knee joint.

See Diagram 10 in Explanation 16.

- (l) If the match rules are broken or there is unsportsmanlike conduct, a yellow card or red card may be issued on the referee’s judgment.
- (m) If a part falls off (not including screws), a yellow card is assessed. If the situation is judged to be dangerous, a red card is assessed, and the participant is ordered to make repairs.
- (n) Time does not stop unless there is indication from the referee.

### 11.3 Rules on Downs

- (a) A robot is ruled “down” only if it falls due to a valid attack.

#### **Explanation 20**

Attacks should be effective punches or moves that involve grabbing and throwing the opponent.

- (b) If the robot goes out of the ring, it is treated as equivalent to one down.
- (c) If the robot goes out of the ring when standing up after going down due to a valid attack, it does not count as an additional down.
- (d) If the robot stops for more than 3 seconds without falling, or if it does not move left and right more than 10 seconds, call "Standing" and if it does not move within 3 counts Then call "Standing down" and start to count from this point. If it cannot move within 10 counts, it will be a technical knockout. Assume that the robot has recovered from "down" when it moves.  
"Standing" is treated as equivalent to slip.
- (e) If the referee judges that a robot has repeatedly slipped intentionally (including falls that do not result in a down or diving in response to an attack, etc.), a yellow card is assessed.



#### 11.4 Taking timeouts

- (a) Participants may request that the referee call “time” (a timeout) once per match.
- (b) The referee receives the request, judges the situation in the match and calls the timeout.
- (c) Timeouts must be no longer than 2 minutes.
- (d) When the timeout is called, it is treated as one down.
- (e) The timeout is not recognized if your robot has received a valid attack or during standing down. In the case of slip, timeout can be requested.

##### Explanation 21

For the timing to finish the timeout, priority is given to the call on the side that took the time. So, the side who have not taken must follow this.

#### 11.5 Attack rules

##### 11.5.0 What is an effective attack?

An attack that defeats the opponent by an attack action that uses a part of the body such as hands, feet, head, tail, etc. If the own robot defeats the opponent without falling down, it can be called an effective attack and take down.

##### 11.5.1 Crouching attacks

- (a) Crouching attacks are prohibited. This is the subject of the yellow card.

##### Explanation 22

“Crouching attack” refers to attacks made in a crouching position, the same as walking in a crouch in Explanation 16.

##### 11.5.2 Lateral attacks

- (a) Lateral attacks are prohibited. This is the subject of the yellow card. However, if you raise one leg and attack with that foot, you can also lateral attacks.
- (b)

##### Explanation 23

“Lateral attack” refers to attacks made at  $\pm 45$  degrees in the lateral direction from your robot. Whether the attack is effective or not is judged by whether the hit point to the opponent is outside the NG range of plus or minus 45 degrees of yourself. For example, if you hit a hook to the opponent in the front direction, the place you hit is valid if it is out of NG range. Also, if you hit in the NG range in the middle of motion, it will be invalid and will be eligible for yellow card. (Diagram 12)

A motion that apparently attacks only the NG range in a series of actions is judged to be a side attack and is subject to the yellow card.

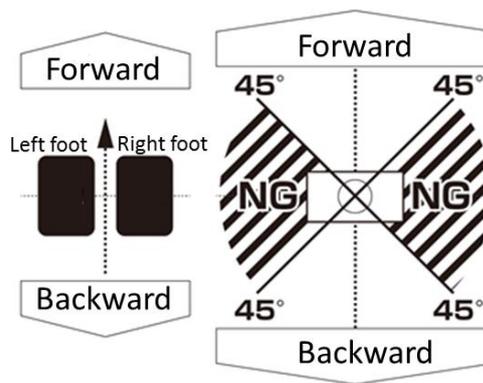


Diagram 11

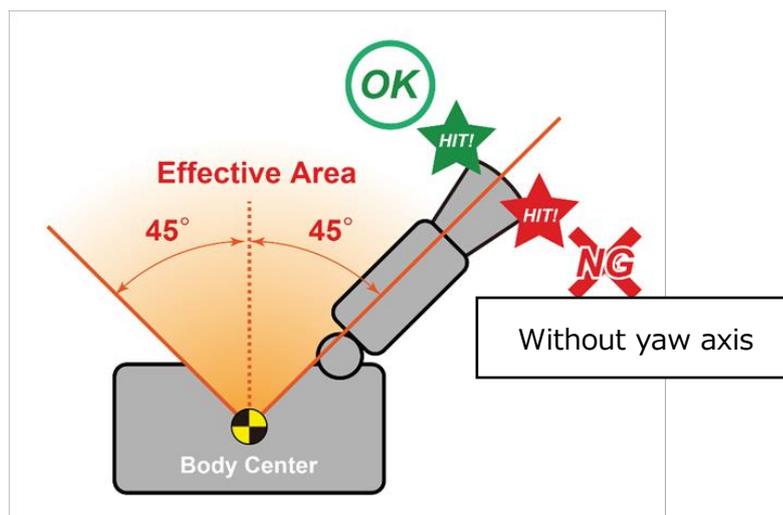


Diagram 12

### 11.5.3 Sacrifice attacks

- (a) Attack moves in which a part of the robot other than the feet touch the ring just before or after attacking the opponent are called “sacrifice attacks,” and It is not a valid attack, it is a slip.
- (b) Even if you defeat the opponent with a valid attack, if your own machine collapses at the same time, it will be slip.

#### Explanation 24

Extensive use of slipping and sacrifice attacks will be subject to yellow cards.

When attacking from below, a hand touching the ring, etc. is regarded as intentional. Be aware though that it may also be regarded as a sacrifice attack.



#### 11.5.4 Owaza (“bold attack”)

- (a) Attacks to attract spectators are called “Owaza,” or “bold attacks.” Owaza can take up to 2 downs. Owaza decisions are made by the referee, but they require the consent of most judges.
- (b) The attacks that the opponent fly higher than the waist of the own robot is taken as an Owaza.
- (c) If the robot falls your opponent with a kick that is higher than own waist position, it is an Owaza. In the kicking motion, only the robot's sole of the foot must touch the ring until the opponent is kicked.
- (d) Own robot rotates back and forth 180 degrees or more, and the attacks to defeat the opponent during the rotation is Owaza.
- (e) For the Owaza, it is excluded from the lateral attacks and sacrifice attacks. Crouching attacks are prohibited, but this does not apply if crouching movements are included during the attack. You may crouch and walk up to 3 steps just before the attack.  
In addition, lateral attacks, sacrifice attacks, and crouching in "Owaza" are not fouls even if they fail.
- (f) "Ultimate Time" will automatically start 30 seconds before the end of the match. Ultimate time continues until the end of the match. During Ultimate Time, both robots have no slip judgment, and are exempt from the ban on attacks on fallen robots, crouching movements, crouching attacks, and side attacks. You can get down by only Owaza. Down from normal attacks cannot be obtained. Also, the ringout will be 1 down as usual.
  - (g) If you participate in auto, you may give the robot the opportunity to start the ultimate time with a PC or wireless controller.
  - (h) There is no limit to the number of Owaza that can be used during Ultimate Time. Also, during the ultimate time, you can use all the big moves used during this match regardless of success or failure.
  - (i) During the ultimate time, the 10 count rise after being knocked down, and the prohibition of attacking while downed are as per normal regulations.
  - (j) Times may be obtained within the limits of the normal rules even during the ultimate time. Ultimate time is restarted after the time ends.
  - (k) A red card may be given to a robot that the referee or the judges have decided is unwilling to fight during the ultimate time.

#### **Explanation 24-2**

The waist positions in (b) and (c) refer to above the axis that moves back and forth as shown in Explanation 3-1.



The criterion (e) is to allow a crouching motion to occur momentarily at the beginning of a motion such as back drop. A technique that completes a series of actions while crouching is judged to be a crouching attack.

Momentary crouching motion refers to the crouching motion when the motion is not stopped. For example, crouching, holding an opponent, moving the centre of gravity, lifting, etc. are included in a momentary crouching motion.

- (f) Owaza with lateral attacks or sacrifice attacks includes overtime, same attacks can be used only once in one game regardless of whether it is valid or invalid.

### Explanation 25

If any of 11.5.4 a). b). c). d) is satisfied, the Owaza will be recognized by the judge.

Owaza are specifically defined as follows with the names commonly used in martial arts. However, they are not limited to these moves; the decision of the referee and judges is given precedence.

In addition, it is necessary that Qwaza must be clearly distinguishable by referee.

Attacks that will be targeted in the left and right front and rear are regarded as the same. backward kick and the lateral turn kick are all the same technique as the forward kick.

\*Owaza are still not clearly defined and are left up to the judgment of the referee and judges. In the case of a new Owaza, or if the referee cannot make a clear decision, the referee and judges make the decision. The following are "OWAZA" and the number of downs. You should consider the risk that a move may not be recognized as Owaza before taking up the challenge.

- Back-drop -----2 downs

When robot lifts the opponent and throw it behind and tach to the ring, Backdrop is enabled if the top of the opponent's torso exceeds the head of your robot and hits the ring before your robot. The same technique applies to throwing forward, backward, left and right.

- Shoulder throw -----2 downs

It is effective when your robot carries the opponent on his back, throws it, the opponent falls forward, and the opponent's back touches the ring.

- Leg sweep -----2 downs

While standing, it is effective when both feet of the opponent float in the air by the foot sweep technique.

- Overhead throw -----2 downs

It is effective when the opponent is lifted up with his / her foot and the opponent rotates 180 ° or more and the opponent touches the ring from the back.



- Forward rotation kick -----1 down (Backward rotation kick and Side rotation kick are also 1 down)

It is effective when your robot rotates forward and kick and defeat the opponent during rotation. The same technique applies to backflip kicks and cartwheel kicks.

- High kick -----1 downs

Raise your robot feet higher than your robot hips and make sure that only your robot feet(sole) touch the ring until your robot kicks.

- Heel drop ----- 1 down

Raise your foot higher than the waist of your robot, squeeze the heel of your robot's foot against the head of the opponent's robot in front of your robot, and hit the attack to defeat the opponent's robot. If so, the technique is valid. Make sure that only the soles of your robot's feet touch the ring until you kick it.

However, it may be 1 down depending on the degree of difficulty of the technique.

## 12 Objection

If there is a mistake in the judgment of the referee or if you feel doubt about the judgment, please inform the judge (not the referee) when the game stops. For example, it is better to offer after the signal of "waiting" "stop" of the referee. The operator raises his / her hand and in large loud voice please offers the judge "objection".

The judge will stop the watch and deliberate the content. If it is not decided, the judging committee chairperson will finally judge it.

In addition, oppositions and deliberations shall be conducted within 2 minutes, and oppositions longer than 2 minutes will not be accepted. If a relentless claim to the judges is determined to be a delay in the match, you may be sent off.

The decision will be confirmed at the end of the match. It will not be covered after that.

There will be more than two judges for fairness.

## 13 Signal of referee

### • Explanation 29 Signal of referee

The referee signals for the following purposes. Also, the referee's voice may not be heard, so the gesture has been clarified.

Please remember.

- Start = "Hajime" or "Fight": Signal when starting the game, starting after stopping, starting after waiting.

Raise a palm vertically and lower it from top to bottom.

- Wait = "Mate" or "Wait": Signal for interrupting the game

Point a palm toward the operator or robot and push it forward.



- Stop = "Yame" or "Stop": Sign of the game finish  
Open both hands and raise above.
- Fight = "Fight": a cue to encourage fighting. It is also used after getting up from the slip.  
Put palms forward and encourage the fight with both hands.
- Down = "Down": In case of falling due to a valid attack  
Point with index finger.
- Slip = "Slip": In case of collapse other than effective attack  
Put a hand forward and shake left and right twice.
- Standing = "Standing": When stopping in a standing state or judging that it entered closed loop.  
Bend the elbow at a right angle and raise your hand.
- Standing Down = "Standing Down": 3 seconds after the call of "Standing".  
Same as down, "point with index finger."
- Ring out = "Ring out": When the robot falls off the ring.  
Point to the ring side by hand.
- Time out = "Time out": When time approved  
Make a letter T with your right and left hand.
- Ready? = "Ready?": To confirm that you are ready  
Point to the operator.
- Break = "Break": When instructing to leave 1 m or more.  
Put hands forward and open the gap.
- Torque off = "Torque off": When instructing torque off of robot  
Open hands and move it down.
- Power off = "Power off": When instructing to turn off the power.  
Cross hands.
- Winner Red / Blue Corner = "Winner is red / blue": When declaring a winner  
Raise hand on the winner's side.
- Bold attack = "Owaza": declare a bold attack.  
Make a letter O with both hands.
- Owaza Failure = "Owaza failure": Declare a failure of a Owaza.  
After making the letter O with both hands, shake a hand.
- Stand away = "Stand away": when putting distance by the other's getting up etc.  
Same as Break, "Put hands forward and open the gap."
- Walking check = "Walking check": Declare to perform walking check.  
After pointing at the robot, pose to walk with two fingers.
- Stand up = "Stand up": Instruct to stand up.  
Open both hands and move up from the bottom.  
Ultimate Time : Declare the start of Ultimate Time.