

10th ROBO-ONE Match Regulations



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Produced by the ROBO-ONE Committee

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PARTICIPANT-SUBMITTED TRANSLATION



Participation Flow for the 10th ROBO-ONE Competition

The flow of the Tenth ROBO-ONE competition is defined as follows.

- 1) Participation application
- 2) Participation qualification review
- 3) Preliminary demonstration
- 4) Final tournament

1. Participation Application

For this competition, the application for participation can be done according to the rules on the ROBO-ONE homepage (<http://www.robo-one.com>). Also, the document won't be judged during application. At the participation qualification review, if the participating robot doesn't conform to the standards of the competition, the judges may request changes to the robot's structure.

(Regarding robot manufacture, please carefully read the competition regulations so as not to breach the rules).

2. Participation Qualification Review

We will review whether or not the robot satisfies the participation qualification requirements. (The robot's measurements, extension and reach will be checked). Please note that robots which qualified for participation in the 9th Competition (provided they are acknowledged to be completely unchanged) are exempt from this review. However, this standards review will be enforced.

3. Preliminary Demonstration

In the preliminary demonstration, each participating robot must perform a two-minute autonomous demonstration. Radio control is prohibited. The judges will grade the content of the demonstration and determine a score. During the preliminary demonstration, loading of programs is prohibited. Robots must participate in this compulsory demonstration.

The theme of the Tenth Competition's demonstration is "bunny hop".

4. Final Tournament

The top 32 machines will advance from the preliminary demonstration to the final tournament. In the final tournament, robots will compete in matches.

5. The ROBO-ONE Rumble

In the Rumble, 8 robots will enter the ring at the same time and will attempt knock each other out of the ring. The last robot remaining in the ring will be declared the victor.

During the match period, for three-to-five minutes the match will be decided according to the judges' decisions. If more than one robot remains in the ring at the end of this period, the winner will be decided according to the applause of the audience.

The Rumble will proceed according to the top 8 and bottom 8 of the best 16 robots.



ROBO-ONE Participation Qualification and Match Regulations

Participation qualification

During the participation qualification review, the robot's measurements and movements will be checked according to 2 items. During the movement check, autonomous movement will be enforced.

During parts two through five of the movement check (see 2-5 below), neither radio nor wired control of the robot is allowed. The movement check will consist of a sequence of movements performed in order. Between items, touching the robot (i.e. adjusting the robot's position in the ring) is permitted. Touching the robot during the check will be considered failure. Falling from the ring will also be considered a failure.

If the robot fails at any of items two through five, another attempt can be made at the failed item. The qualification review can be performed up to five times.

The ring used during the movement check will be a simple ring (90cm x 90cm) made of the same material as described in the Rules prepared by the Committee.

◆ Gauge Check

- 1) Must satisfy "ROBO-ONE Match Rules Chapter 3: Robot Measurements".

◆ Movement Check

- 2) Bipedal robots must be able to walk **10 paces within 10 seconds**. During each step, one foot must be clearly removed from the ground.
- 3) **Flexibility**
- 4) Must be able to side-step. One foot must clearly break contact with the ground.
- 5) From a standing position, falling down and getting back up, **from both backward and forward directions**.



ROBO-ONE Match Regulations

Preamble

The purpose of ROBO-ONE is to spread the “Joy of Robots” to many people. Robots and matches are enjoyable for the audience, and the robot bouts aim to stir the participants’ interest. For this purpose, the factors of entertainment and skill in the match are emphasized more than the winners and losers.

Moreover, in order to foster the popularity and healthy growth of the art of robotics, we present as much information about the art as possible.

Chapter 1: About the Match

During the match, competitors prepare their originally manufactured robots and place them inside the provided ring. They then perform the preliminary demonstration and final match, the winners of which will be decided by decision of the referee/judges.

The tournament's final matches will come from the preceding preliminaries. Regarding the preliminaries, the process will be decided depending on the number of robots participating.

Chapter 2: The Ring's Measurements and Environment

- 2-1. In order to improve the performing robot's walking technique, the ring will be designed according to the competition regulations, in which the possibility exists for establishing obstacles and bumps on the ring surface. However, the ring shape and its details will be presented beforehand to the contestants.

Comment 1:

~~From this competition, the ring's dimensions are scheduled to be widened by 20cm in each direction. The details of the raw materials and exterior will be made available one month prior to the competition.~~

- 2-2. In regard to spectators and press, gauge parties using photographic equipment, no particular regulations are established. Therefore, when there is a risk that cameras, infrared video, flash, photographic lighting etc. can interfere with the competing robot, the participant must take appropriate precautionary measures.

- 2-3. Regarding the influence of room lighting, sunlight etc. on 2.2, similar measures should be taken.

Comment 2:

~~Due to progress in wireless technology, this section is repealed.~~

Considering the future of robots, as wireless systems are determined to be a very important technology, the ROBO-ONE committee expects further progress in wireless technology. Therefore, the committee has not set a recommendation for suggested or approved wireless systems, but in the future we believe that the way in which distinction and security are employed in participating robots' wireless systems will receive further study.



Chapter 3: Robot Standards

3-1. Motion Systems

3-1-1. Bipedal robots

3-1-2. The area and form of the feet are free within the limits of the following requirements (a) through (d).

(a) The length of the sole (the portion making contact with the ground) from front to back can be no more than 60% of the leg height. Also, the width of the foot from left to right can be no more than 40%. The leg height is defined by the uppermost part of the leg, front to back by the length from the shaft for left to right movement to the sole of the foot, measure in the leg's fully-extended position.

(b) The sole's maximum length must be no more than 11cm.

Comment 3:

As shown in Figure 1, the length of the foot is shown as the "length from the lateral motion shaft to the sole of the foot." The way to measure the distance from the lateral motion shaft to the sole is shown. (Note: measurement from the shaft that turns the foot is incorrect). Also, measurement of the size of the foot is as shown in Figure 2.

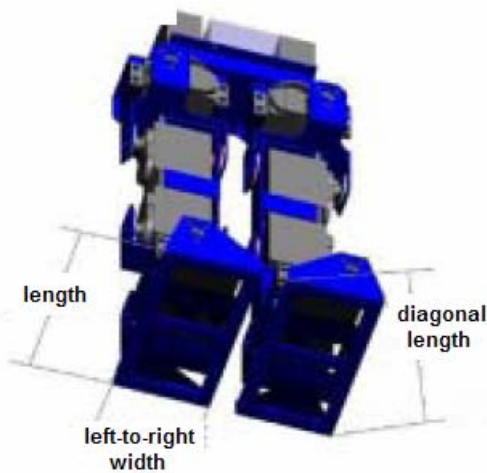


Figure 1

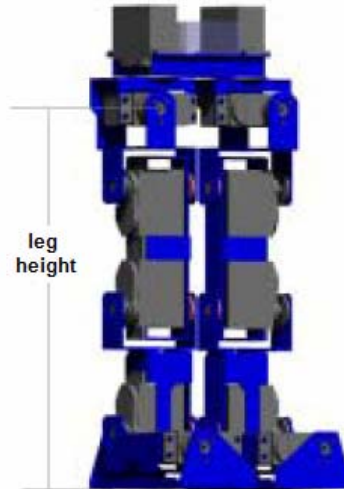


Figure 2

(c) In the standing position, seen from above, cables tied to the left and right feet must not overlap the outermost part of the sole.



Comment 4:

In the structure in Figure 3, since a line tying the outermost sections of the sole overlaps, it cannot compete. (The blue part overlaps.)

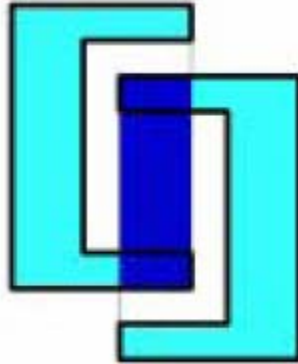


Figure 3

(d) Except as above, the judges will decide if a situation opposes the spirit of ROBO-ONE.

3-2. Robot Size and Weight

3-2.1. The robot's height must be between 20cm and 120cm.

3-2.2. There is no set limit on the robot's weight.

3-2.3. No changes to the robot's shape may be made between the preliminary and final events. However, if the judges deem it necessary, upon consideration the number of competing robots may be divided into different classes.

~~Comment 5:~~

~~At present, class divisions are not deemed necessary. However, in the future we will consider class divisions.~~

3-2.4. Except by express permission of the ROBO-ONE Committee, robots resembling Anime characters, etc, are prohibited from participation.

3-3. Methods of Robot Manipulation

3-3.1. During the preliminaries, the robot must be completely autonomous; **wireless controllers and other human control** are prohibited. However, robots autonomously processing human motion and voice via non-contact sensors such as cameras and microphones are not subject to this limit.

3-3.2. During the finals, either **autonomous computer control** or manual human control can be used. In the case of manual control, controllers must be **wireless (radio, IR etc.)**. As for the players, consider the match environment (light, sound, RF); even if your opponent is using the same system you must ensure there is no hindrance to control of your robot. Furthermore, in the case of low-power or weak wireless control, use a wireless system



with at least four channels or frequencies. Also, when using proportional RF controllers, please prepare at least four crystals.

Comment 6:

Please observe the following frequency limits for radio controllers.

27MHz band – From 26.975MHz to 27.255MHz (12 channels from 01 to 12).

40MHz band – From 40.61MHz to 40.75MHz (8 channels: 61, 63, 65, 67, 69, 71, 73, 75)

AD band – 25M Low-Power 20 band

Other approved protocols are Wireless LAN, Bluetooth and Zigbee.

It would be preferable to be able to use 8 robots' wireless systems simultaneously.

- 3-4. The robot must carry its own power source.
- 3-5. Ring theme songs can **only** be prepared by the secretariat.
- 3-6. Prohibited Items
 - 3-6.1. Robots cannot be equipped with weapons that can harm either the opponent or the ring. Blades, objects rotating at high speed, and other dangerous objects are prohibited.
 - 3-6.2. Vacuum/suction devices cannot be used on the sole of the foot.
 - 3-6.3. Robots cannot contain devices that may cause RF interference such as lasers, strobes, or other systems to deliberately disturb the opponent's controller.
 - 3-6.4. Components that may damage or compromise the ring may not be used.
 - 3-6.5. Robots cannot contain devices that blow liquids, powders or gases at your opponent.
 - 3-6.6. Robots cannot contain combustion devices.

Chapter 4: Match Directions

- 4-1. Preliminary Demonstration
 - 4-1.1. In the preliminaries, participants' robot demonstrations will proceed in the order decided by the Committee.



- 4-1.2. In the demonstrations, robots will move autonomously, and the player himself must display within two minutes the contestant robot's characteristics, techniques, etc. The contestant is free in composition of this demonstration. Further, the performance regulations are established, and will occupy the largest weight in grading.
- 4-1.3. The judges, consisting of at least three people, will decide the score according to the demonstration's content. The 32 top-scoring robots will advance to the final tournament.

4-2. Final Tournament

- 4-2.1. Matches will be fought as one 3-minute round, according to "knockdown" and "effective down-count". If the match isn't won within three minutes, a two minute extension will take place and the winner will be decided by the first effective knockdown. If a winner has not emerged after the extension, the winner will be decided by the judges' scores.

<p>Comment 7: During the extension, attacks, slipdowns, etc, will count toward the final score.</p>

- 4-2.2. Two minutes' preparation time is allowed before the beginning of the match. If this time is overrun, a warning will be given. One warning is considered as one "down". One warning will be given for each extra minute.

Chapter 5: Match Regulations

- 5-1. Immobile robots are not allowed. However, standing is permissible.
- 5-2. According to the referee's signals "hajime (begin)" and "fight", after taking at least two steps, attacks may begin.
- ~~5-3.~~ If a robot stops for three seconds or longer, it will be counted as a "Standing-Down". A robot getting back up from a knockdown will be restored. ~~When maintaining attack and defense postures, the judge may instruct the players to move. At the referee's call of "fight", players should attack.~~
- 5-4. Crouched walking (~~walking with the waist completely lowered~~) is prohibited, subject to the decision of the referee.

Comment 8:

~~"Crouched walking" means walking when the state of the knee joint is bent by 90 degrees or more from its state when the length of the leg was measured. There is no question that it bends at least 90 degrees during walking.~~

~~In a case where the knee joint uses two servos, it will be judged by the sum of these two.~~

"Crouched walking" means walking when the knee joint's angle is less than about 90 degrees from its bent state. There is no question that it bends less than 90 degrees during walking.

The case where there are two servos in the knee joint is similar. Please see Figure 4.

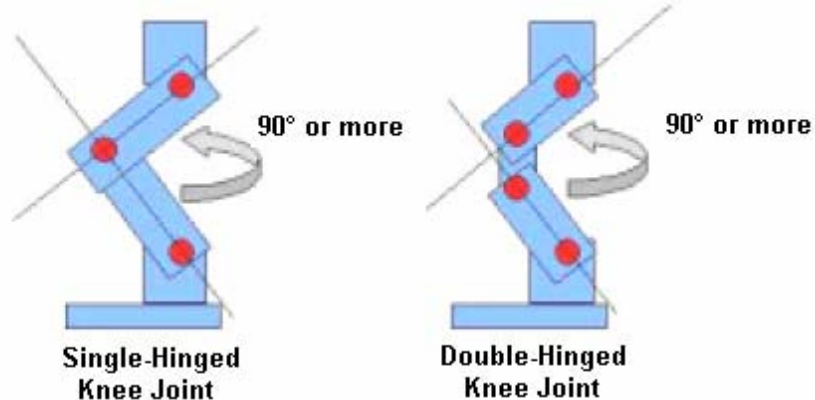


Figure 4

- 5-5. If any part outside of the robot other than the sole touches the ground due to a valid attack by the opponent, it will be considered a "down."
- 5-6. After a "down", the referee will give a ten-count. If the robot cannot recover from the down, a knockout will be declared and the match will go to the opponent. The count will continue after a round's timeout.
- 5-7. If the robot goes down three times in one round, a knockout will be called and the match will go to the opponent.
- 5-8. If, during an attack, both robots fall over each other, the match will still continue. However, if the referee determines that it is impossible to continue, the robots can be separated and placed apart in their fallen positions, a "down" will be called and the count will begin.



Comment 9:

When the robots are intertwined, it is preferable that they be able to be cut off at the referee's call. In order to let matches may resume quickly, please ensure that your robot is built such that the power supply can be cut quickly.

- 5-9. Giving up during the match, etc.: If the referee determines the match cannot continue, he may declare a "technical knock-out".

Comment 10:

The judges will judge the match from the point of view of the spectators. The referees may object.

5-10. Rules of "downs"

- 5-10-1. Only a valid attack on the opponent may constitute a "down". An attack not acknowledged to be valid will be called as a "slipdown", and if the opponent gets back up within a 10-count, will not be counted as a "down".
- 5-10-2. For an attack, when a part other than the sole touches the surface of the ring, or when the attacking robot touches the ring after the attack, if it gets up within 10 seconds, it will not be considered a "down". However, if the opponent dodges the attack and counters, it will be considered a "down".
- 5-10-3. If the robot cannot move while standing, it will be declared a "standing down" and a 10 count will begin.
- 5-10-4. If the robot leaves the ring, it will be considered a "down", and each time it returns will be scored similarly.
- 5-10-5. Robots cannot attack while "down".
- 5-10-6. If a robot goes out of the ring while recovering from a "down" caused by a valid attack, it will not be considered another "down". Also, if during an attack both robots go out of the ring, the robot executing a valid attack will not have a "down" counted against it.
- 5-10-7. If the match rules are broken or if good sportsmanship is not shown, either a "yellow card" (caution) or a "red card" (warning) may be administered by the referee.
- 5-10-8. Two yellow cards will be considered a "down".



Comment 11:

In order to avoid an opponent's technique, if a hand or other part besides the sole intentionally touches the ring, it will be considered an intentional "slipdown" and a yellow card will be given.

5-11. Requesting a Timeout

5-11-1. An athlete can call "time" to the referee during the match to declare a timeout.

5-11-2. After the referee accepts the call, he will judge the match's condition and call "time (timeout)".

5-11-3. A timeout can be a maximum of two minutes.

5-11-4. Calling a timeout will be considered a "down".

5-11-5. Valid attacks against one's own robot during a timeout will not be considered a "down".

5-12. Rules of Valid Attack Techniques

5-12-1. **Before and after** attacking the opponent, a part outside the sole reaching the ring is called a "body throw"; the same body throw can be successfully used only once against an opponent during the same match, **inclusive of extensions**.

5-12-2. Even if a throw has the same form, attacking from the front and attacking from the back are considered different techniques. Attacking from the left and attacking from the right are also considered different techniques. Attacking diagonally will be considered the same.

Comment 12:

From here on, techniques will be called by their formal names. In the case of original techniques, if the inventor calls the technique by a particular name during the match, the technique will be given that name.