

# **2024TIRT** Lightweight Sumo Robots

## Competition Regulations

October 23, 2024 version

### **I. Project Background:**

ShaYangYe is committed to advancing robotics education and promoting industry collaboration, with the aim of establishing Taiwan as an international stage for robotics competitions. Since 2018, we have collaborated with the Taoyuan City Government to organize the INTERNATIONAL ROBOTIC FESTIVAL IN TAOYUAN for six consecutive years. This pioneering event brings together four major robotics competition fields: land, sea, air, and maker. Over the past six years, it has attracted over 12 million participants both online and offline, with teams from 20 countries participating and a total of 9,400 teams from domestic and international regions. Our goal is to connect robot training and competitions with relevant industries, expand the international perspectives of Taiwanese participants, and create a cross-domain international robotics extravaganza that shines in Taoyuan and the world!

For the 2024 INTERNATIONAL ROBOTIC FESTIVAL IN TAOYUAN, in order to promote Taiwan's robotics industry and self-made brands, we are planning a series of events, including the TIRT Autonomous Vehicle Racing Competition. This competition combines diverse control systems to showcase Taiwan's technological prowess in intelligent manufacturing. Furthermore, it serves as a link to the TIRT International Competition and Conference.

### **II. Project Goals:**

1. Through competition activities and study exchanges, increase opportunities for domestic and international teams to observe program design, mechatronics integration, and sharing exchanges to stimulate student learning motivation.
2. By combining various open control systems and planning different competition targets, integrate and expand students' creativity, design ability, integration skills, and programming ability.

### **III. Supervising Units:**

Taoyuan City Government, Taoyuan City Council

### **IV. Organizer:**

Department of Economic Development. Taoyuan

### **V. Implementing Unit:**

ShaYangYe Charity and Education Foundation, Taoyuan City

## **VI. Participants:**

1. Students from elementary schools, junior high schools, senior high schools, vocational high schools, and colleges nationwide (including master's and doctoral students).
2. Athletes must have a valid student status recognized by the Ministry of Education.
3. International teams of the same age are allowed to participate (must provide proof of valid student status in their country).

## **VII. Event Categories:**

Sumo Robot Lightweight Class

## **VIII. Competition Grouping:**

1. Elementary School Group: Restricted to elementary school students, with a maximum of 3 players per team.
2. Junior High School Group: Restricted to junior high school students, with a maximum of 3 players per team.
3. Senior High School/Vocational School/College Group: Restricted to high school, vocational school, and college students (including master's and doctoral students), with a maximum of 3 players per team.

## **IX. Activity Description and Schedule Planning:**

1. Registration Method: Visit the TIRT official website (<https://www.tirtpointsrace.org/>) and click on "Register. "
2. Registration Period: From May 30, 2024, to October 28, 2024 (subject to adjustment based on team registrations).
3. Competition Date: November 10, 2024
4. Venue: The Taoyuan Arena (No. 1, Section 1, Sanmin Road, Taoyuan District, Taoyuan City)

## X. Other Matters:

1. The organizer reserves the right to modify the regulations and rules of the event. For any matters not covered herein, please refer to the latest announcements by the organizer on the official competition website. In case of any doubts or inquiries, please contact the organizer at the following numbers: Mr. Chiu at extension 5334 (Tel: 03-3623452) or Mr. Qin at extension 5338 (Tel: 03-3623452).



TIRT Official website.

**TIRT**  
**2024 AI TAOYUAN**

# 2024 TIRT Lightweight Sumo Robots

## Competition Rules

October 9, 2024 version

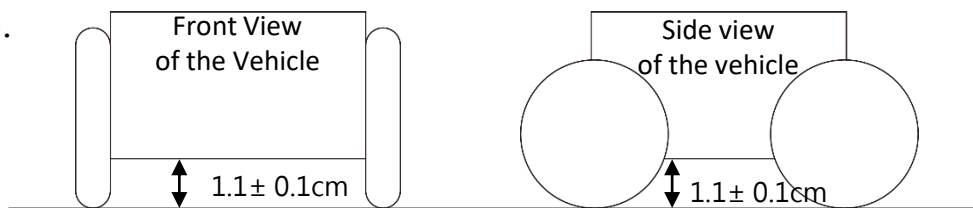
### I. Eligibility for Participation :

The competition eligibility is divided into three categories: elementary school, junior high school, and a combined group for high school, vocational schools, and colleges. The high school, vocational school, and college group competes together across different grade levels, and awards will be presented collectively.

### II. Vehicle Specifications for Participation: :

1. The main body of the sumo robot must be made of plastic building blocks, while other parts may use composite materials (limited to plastic). Metal components can be used for connection points and weights (the weights must be fully enclosed by plastic building block pieces).
2. The dimensions of the vehicle body must not exceed 25cm in length, 25cm in width, and 25cm in height, and must not be smaller than 15cm in length, 15cm in width, and 15cm in height. The vehicle body must not have deformable or extendable mechanisms. Furthermore, apart from the main drive wheel, there should be no other motor-driven devices except for light detection and ranging (LiDAR) devices, and the main drive wheel must only contact the ground on one side of the vehicle body.
3. Sumo cars are not allowed to use track designs. The number of main and auxiliary wheels is unlimited but must be installed on the same side of the vehicle body. Only the contact point with the ground will be considered as a wheel. Apart from the wheels (tires) that come into contact with the ground, all other components must maintain a distance of at least 1.2cm from the ground (with a tolerance of  $\pm 0.1\text{cm}$ ).

Diagram:



# **2024 TIRT** Lightweight Sumo Robots

## **Competition Rules.**

July 1, 2024 version

4. The total weight of the sumo car, including the battery, must be 2500 grams or below.
5. Each participating sumo car is only allowed to use one microcontroller (single-chip controller).
6. The rated voltage of the battery supply should be limited to DC 9V or below. The referees have the right to request participants to open the microcontroller for inspection. If the specifications are not met within the inspection period, the team will not be eligible to participate in the competition.
7. The participating sumo car must be fully autonomous. The use of wireless communication or remote/wired control systems to control the sumo car is not permitted. Failure to comply will result in disqualification of the team.
8. If there are special materials or designs, please contact the organizer first. Otherwise, the inspection will be based on the organizer's determination. The referee has the right to re-inspect the car body at each stage of the competition.

### **III. Competition Format:**

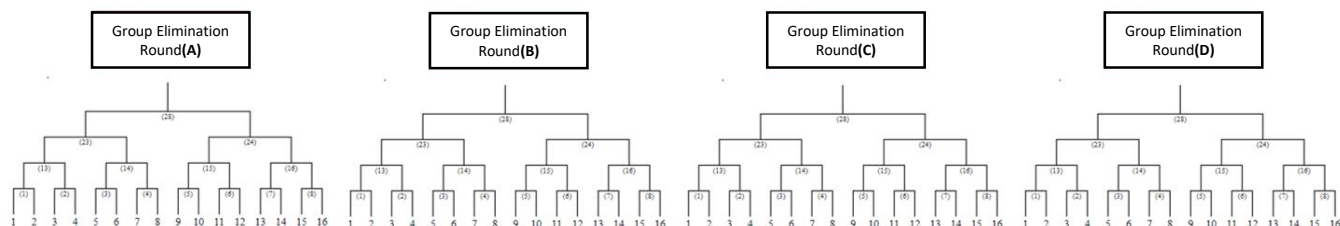
The competition format is primarily composed of qualifying matches, elimination rounds with revival opportunities, and round-robin matches. Any adjustments to the format will be announced by the referees on the day of the competition.

### **IV. Format Explanation:**

Prior to the competition, the organizers will conduct a random draw to assign competition numbers to all teams. These competition numbers will determine the positioning of teams in each stage of the competition. The sequence of team numbers is as follows: Elementary School (A, Z), Junior High School (T, Q), Senior High School/College/University (R, U).

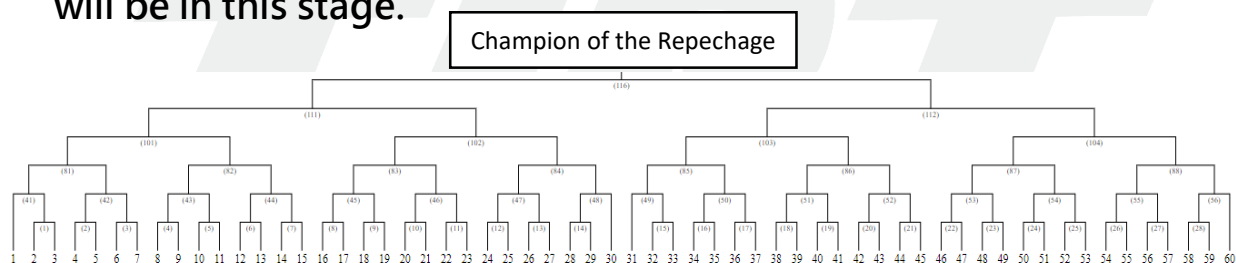
## 1. Qualifying matches :

All teams will be divided into several groups (depending on the number of registered teams) for group stage matches, with group champions being selected. Each match consists of 3 rounds, following a best-of-three format where a team must win 2 out of 3 matches to secure victory.



## 2. Elimination rounds with revival opportunities :

Teams that are defeated in the qualifying matches will proceed to the elimination rounds to compete for the losers' championship. Each match consists of 1 round, following a single-elimination format where a team must win 1 match to advance. **The higher a team progresses in the qualifying matches, the higher their seed number will be in this stage.**



## 3. Round-robin matches :

The finalists from each group will compete in a round-robin tournament, with the final rankings determined by the number of wins and losses. If a loser's bracket is held, the champion from that bracket will also join. In the case of a tie in the total number of wins and losses, the ranking will be determined by the number of rounds won. If the number of rounds won is also tied, it will be determined by the number of rounds lost. If that is still tied, a sudden-death round will be held. Each match consists of 5 rounds, following a best-of-five format (first to win 3 rounds).



team	Inclusion1	Inclusion2	Inclusion3	Inclusion4	Champion of the Repechage	Victory	Number of Laps	ranking
Inclusion1								
Inclusion2								
Inclusion3								
Inclusion4								
Champion of the Repechage								

## v. Competition Rules :

1. After completing on-site check-in, team members, coaches, and instructors must proactively obtain their identification badges from the event organizers and wear them in a visible location. Each participant, teacher, and coach is limited to one badge, which cannot be collected on behalf of someone else, and no replacements will be issued. If a replacement is needed, the damaged badge must be presented to the staff for assessment. If the damage is deemed reasonable, a replacement will be provided; otherwise, no replacements will be issued.
2. After receiving the identification badge, the team name, competition number, and participant' s name must be written in a standard script (such as Biau kai) in the blank space provided on the badge for easy identification by the event organizers. The badge must be worn in a location visible to the referees. Failure to wear the badge as instructed will result in the individual not being recognized as a member of the competing team by the event organizers.
3. If someone is found impersonating a member of a competing team, the involved team will be disqualified from the competition and have their awards revoked after verification.
4. After on-site check-in is completed, all accompanying personnel, except for the participants, coaches, and instructors, must leave the competition area. If they refuse to leave after being advised, the event organizers will confirm the situation, and the relevant team will be 7 disqualified from the competition and have their awards revoked.

5. Teams that have completed check-in should proceed to the designated area to collect their team score sheets and keep them safe. If the score sheet is lost before being collected by the competition officials, the team will be disqualified from the competition.
6. Teams that have collected their score sheets may practice based on the practice tickets listed on the score sheet before the practice time ends. Each team is allowed to use the practice tickets twice. Unauthorized collection or use of another team's tickets will result in disqualification from the competition.
7. Each practice session at the competition venue must be registered. Each practice is limited to 1 minute, with a maximum of one team per practice area at a time, and only one team member is allowed to enter. Any violation of these rules will result in disqualification from the competition.
8. During practice sessions at the competition venue, teams are allowed to bring computers or mobile devices to adjust their programs and may modify their vehicles on-site. However, they must not interfere with other teams' practice. Any violation of this rule will result in disqualification from the competition.
9. Each practice session is limited to 1 minute. At the end of the session, teams must promptly pack up their vehicles and belongings and leave the venue. If a team refuses to comply after being advised, the event organizers will disqualify that team from the competition. The organizers will not be responsible for any items left behind and reserve the right to dispose of them as they see fit.
10. Once the practice time for the competition schedule ends, the event organizers will no longer accept any registrations. Only teams that have registered but have not yet practiced, as well as those whose practice time has not reached the 1-minute limit, will be allowed to continue practicing. All other practice at the competition venue will be prohibited, and any violations will result in disqualification from the competition.



11. Teams must proactively return their score sheets to the competition organizers after completing two practice sessions or once the practice time has ended. If a team has not returned their score sheet before the competition begins, they will be disqualified from the competition.
12. At the start of the check-in process, the referees will instruct teams to place their vehicles in the check-in area for inspection. Once a vehicle has passed the inspection, no modifications, disassembly, or changes to the vehicle's condition are allowed. Any violations will result in disqualification from the competition.
13. If a team does not complete and pass the inspection within the designated check-in time, they will be disqualified from the competition.
14. After passing the inspection, participants must place their vehicles in the designated area themselves. If staff assist with positioning or placement, participants are responsible for verifying it themselves. Any issues that arise will be the sole responsibility of the participants.
15. If a team has not caused damage to another team's vehicle due to competition actions, the referees will evaluate whether that team should be disqualified from the stage competition, the overall competition, or have their awards revoked.
16. If a participating vehicle is damaged after the check-in period due to non-competitive actions by another team, the affected team members may perform repairs (including replacing batteries, control boards, or downloading programs) under the supervision of the staff. They have a time limit of ten minutes to complete these repairs and must undergo re-inspection. If they fail to pass the re-inspection, they will be disqualified from the competition. If the judges investigate and determine that the team acted with premeditation, that team will be blacklisted and prohibited from participating in any related TIRT competitions.

17. Each team is allowed to use only one sumo robot, and exchanging robots or parts between different teams is strictly prohibited, except for repair or cleaning tools. Any team found in violation of this rule will be disqualified from the competition.
18. Before the start of each match, teams will be called by name or competition number, with a maximum of three calls. If a team fails to arrive within 30 seconds after the final call, they will lose their qualification for that stage of the competition.
19. In each match, each team may designate only one team member (the competing participant) to enter the competition area. Once inside the competition area, the participant may not receive any items from individuals inside or outside the area. Upon leaving the competition area, the participant may not take any items that were not brought in with them. Any team found in violation of this rule will be disqualified from that stage of the competition.
20. If a participant leaves the competition area without taking their belongings that were brought in, the event organizers will not be responsible for the safekeeping of those items and reserve the right to dispose of them as they see fit.
21. Before entering the competition area, competing participants must actively verify the information on their team score sheet. They may only take their sumo robot after completing the verification. If any violations are discovered, the team will be disqualified from that stage of the competition.
22. When retrieving the sumo robot, if a participant takes a robot that does not belong to their team, they will be disqualified from that stage of the competition. If any issues arise while staff assist with positioning or retrieving the robot, the participant will be responsible for those issues.

23. After retrieving the sumo robot, competition staff will provide identification items (such as ropes, straps, clips, etc.). Competing participants must install these identification items in a visible location on the robot for the referees to identify. These items must be returned after each match; failure to return them will result in the loss of award eligibility.
24. The starting positions for each match will be determined by a rock-paper-scissors game. The winning team will choose their side. After each round of competition, if no winner is determined, both teams must switch sides.
25. After the rock-paper-scissors determines the starting position, the competing participants may proactively request preparation time before the referee says "ready." Once one team makes a request, both teams will share the preparation time. After the referee announces the start of the preparation period, a 1-minute countdown will begin. During this time, teams may adjust their sumo robots (including changing the position of the robot or sensors, but not adding any parts) and replace batteries, but they are not allowed to download programs. Any team found in violation of this rule will be disqualified from that stage of the competition.
26. Once the referee announces the end of the preparation time, competing participants must immediately cease all preparation activities. If a team continues to prepare despite the referee's warnings, they will be disqualified from that stage of the competition.
27. After the referee announces "ready," teams have a 10-second limit to place their robots and raise their hands to indicate readiness. If a competing participant does not raise their hand within the 10 seconds or raises their hand and then lowers it again, that team will be deemed to have lost the round, and the opposing team will be declared the winner. If both teams violate this rule, the lighter robot will be declared the winner. If both robots weigh the same, the round will be replayed.

28. The competing participants must place their sumo robots within the starting area, ensuring that the entire robot is covered by the designated area. If a team's robot is not fully within the starting area, that team will be deemed to have lost the round, and the opposing team will be declared the winner. If both teams violate this rule, the lighter robot will be declared the winner. If both robots weigh the same, the round will be replayed.
29. Once the referee announces "ready" and before announcing the start, if a participant has raised their hand, they are not allowed to move their robot. If they do move the robot, that team will be deemed to have lost the round, and the opposing team will be declared the winner. If both teams violate this rule, the lighter robot will be declared the winner. If both robots weigh the same, the round will be replayed.
30. After the referee announces the start, both teams may lower their raised hands and must activate their robots within 5 seconds (multi-stage activation is allowed). The method of activation is not limited, but activation via computers or mobile devices is not accepted. If a team fails to activate their robot within 5 seconds after the referee's announcement or uses an activation method that the referee does not approve, that round will be deemed a failure, and the opposing team will be declared the winner. If neither team completes the activation, the lighter robot will be declared the winner. If both robots weigh the same, the round will be replayed. For any special activation methods, please consult the organizing committee in advance; otherwise, the referee's judgment will prevail.
31. Between the time before and after the robot's activation, the robot must not leave the competition area. If a violation occurs, that round will be deemed a failure, and the opposing team will be declared the winner. If both teams violate this rule simultaneously, the lighter robot will be declared the winner. If both robots weigh the same, the round will be replayed.

32. After the referee announces the start, the competing player must quickly retreat to the designated area with the accompanying items within 3 seconds of activating the robot. If the team fails to comply after 3 seconds, despite the referee's warning, the opposing team will be declared the winner. If both teams violate this rule simultaneously, the lighter robot will be declared the winner. If both robots weigh the same, the round will be replayed.
33. After both robots are activated, they must first touch their own black border line before making contact with the opponent's robot. If a team violates this rule, that round will be deemed a failure, and the opposing team will be declared the winner. If both teams violate this rule simultaneously, the lighter robot will be declared the winner. If both robots weigh the same, the round will be replayed.
34. After the referee announces the start, each round has a time limit of 1 minute. The referee will make a decision based on the situation at the moment the time limit ends.
35. If the sumo car makes contact with the floor outside the designated area, that round will be considered a failure, and the opponent will win. If both cars leave the designated area simultaneously, the lighter car will be declared the winner. If both weights are the same, that round will be replayed.
36. During the competition, if both sumo robots are in a state of collision and neither can gain an advantage, or if there is no contact at all, the referee has the authority to declare a stalemate. The referee will start a countdown, and after 5 seconds, the timer will be paused. Both sumo robots must be retrieved and powered off, and the remaining time of that round will be used to resume the competition.
37. If a stalemate determination countdown is in progress and the situation on the field does not comply with Rule V-36, the referee has the authority to interrupt the countdown and continue the match.



38. After each round of competition begins, if any parts of the sumo robots fall off unexpectedly, those parts are no longer considered part of the robots until a winner is determined. The referee has the authority not to remove the fallen objects if they affect the outcome of the round, and neither competitor may dispute this.
39. If a participating player manually removes fallen objects from the field after the competition has started, it will be judged according to Rule V-40.
40. After each round of competition, the competitor must retrieve their fallen objects from the field. If they have not retrieved them after being notified by the referee, the referee will have the authority to handle the fallen objects.
41. If the vehicle violates the participation regulations due to fallen objects, as stated in Regulation II-3, the opponent will be awarded the match.
42. If the referee determines that a team has designed the ability to drop objects, whether intentionally or not, the referee has the authority to award the match to the opponent, and the fallen objects cannot be reattached to the sumo robot.
43. After each round of competition begins and until a winner is determined, no reassembly or replacement of any components, parts, or batteries of the sumo robot is allowed, nor can a pause in the competition be requested.
44. After each match begins, if any personnel from the participating team interfere with the competition in any way, the match will be immediately stopped, and the opposing team will be declared the winner. The team that interfered will be disqualified from the competition. If the interference is caused by someone not affiliated with the participating team, the round will be replayed.



45. When the one-minute time limit for each round expires, if both sumo robots are still on the field, the robot with the lighter weight will be declared the winner of that round. If both robots have the same weight, the round will be replayed.
46. If the above rules occur simultaneously, the order of rule determination is as follows:

**V.33 > V.35 > V.30 > V.32**

47. After the referee announces the result of the round, the sumo robot competitors must retrieve their robots on their own. If any damage occurs to either robot during the retrieval process or if the retrieval is assisted by event staff, any issues that arise will not be adjudicated under Rules V.15 or V.16, and the competitors will be responsible for their own actions.
48. Except for the final round of each match, after the outcome of each round is determined, each team may proactively request repair time. As long as one party requests it, both teams will share the repair time. Once the referee announces the start of the repair period, a 30-second timer will begin. Only the participating competitors may perform repairs, and teammates may not enter the field to assist with repairs.
49. After the repair period begins, both teams may adjust their sumo robots or reassemble fallen parts on the spot (they may also change the position of the chassis or sensors, but no additional parts may be added). However, they are not allowed to install any new components, download programs, or replace batteries.
50. When the referee announces the end of the repair time, the participating competitors must immediately stop any repair activities. If a team continues to perform repairs despite the referee's admonition, they will be disqualified from the current stage of the competition.

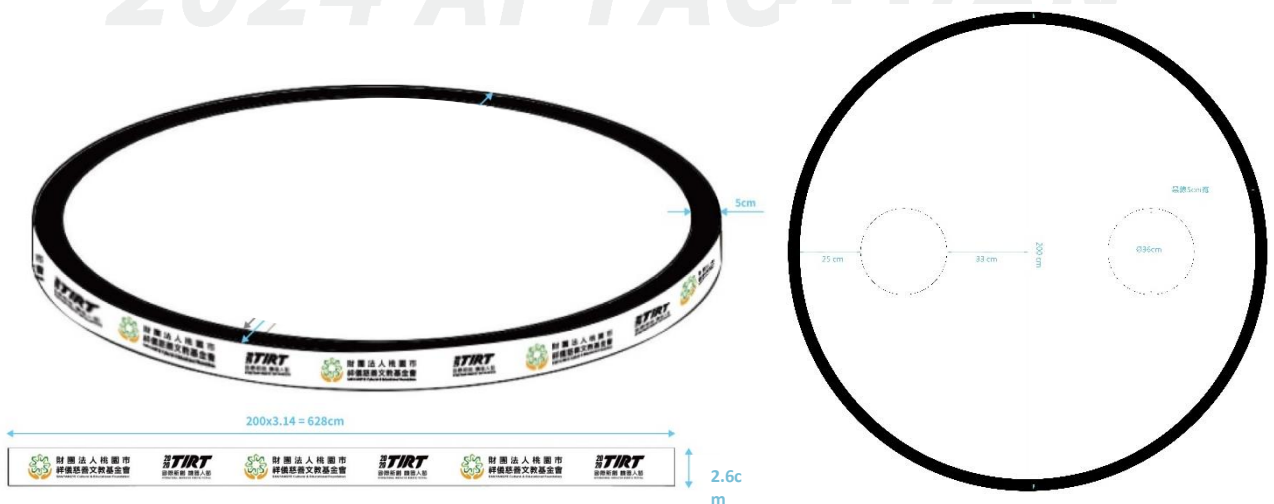
51. Before the loser's bracket revival matches, after each competition ends, the participating competitors must return their sumo robots to the designated storage area. If a participating competitor removes the sumo robot from the competition area, the event organizers will disqualify them from the competition.
52. After the loser's bracket revival matches begin, for each competition, the losing competitor must remove their sumo robot from the competition area. If the sumo robot is left in the competition area, the event organizers will not be responsible for its safekeeping and have the right to dispose of that team's sumo robot at their discretion.
53. From the start of the round-robin tournament until its conclusion, all participating teams may not replace their competitors except in cases of force majeure.
54. After each match concludes, please actively verify the advancement bracket or round-robin scores with the referee. If there are any objections, they must be raised at that moment. Once a competitor leaves the competition area or after the match has concluded, no further disputes will be accepted.
55. The referee will record the match results, and teams must actively sign to confirm. If there are any objections, they must be raised at that moment. Once the competitors leave the competition area or after the match has concluded, no further disputes regarding the referee's recorded results will be accepted.
56. If a team does not complete the signature of the match results before leaving the competition area, that team cannot contest the results.
57. If a team refuses to sign the match results due to dissatisfaction with the ruling, the event organizers will disqualify that team from the competition and revoke their eligibility for awards.

58. After each match concludes, unless required by the event organizers, participating competitors must immediately leave the competition area. If they remain in the competition area despite staff admonitions, the event organizers will disqualify that team from the competition and revoke their eligibility for awards.
59. If a team is disqualified from the competition (regardless of the stage), the event organizers have the authority to sign the match results on their behalf.
60. If there are any doubts, the participating competitors should raise them with the referee during the competition for handling and judgment. Once the match has concluded or the team has signed the match results, no further issues will be accepted. In case of differing opinions, the consensus of the refereeing team will be the final decision, and no objections will be permitted.
61. This competition does not accept any video recordings or photographs as a basis for competition complaints.
62. The event will provide the competition venue for teams to conduct pre-match practice. The practice times will be based on the schedule announced by the event organizers. Teams must queue in the competition area during the designated times to test their sumo robots. Participating teams must bring their own sumo robots and are not allowed to bring competition venue paper for practice.
63. This competition will not provide power sources on-site. Participating teams must prepare their own competition equipment. If a team connects to the power source used in the competition area despite being advised not to, that team will be disqualified from the competition and will lose their eligibility for awards.
64. If a participating team connects to a power source outside the competition area and receives complaints from other parties, that team will be disqualified from the competition and will lose their eligibility for awards.

65. If a participating team connects to a power source and any accidents occur, they will be responsible for the consequences.
66. Destruction or damage to the competition venue is prohibited. If the situation is severe, the team will be disqualified from the competition. If the competition causes damage or pollution to the venue, the match will be immediately stopped, and the opponent will be declared the winner.
67. If there are any doubts on the day of the competition, the refereeing team has the final authority for interpretation, and no objections will be accepted.

## VI. Venue Description :





The competition venue is a circular area with a white background and black border lines. The overall diameter of the venue is approximately 200cm, with the inner white circular area having a diameter of 190cm. The starting line is about 40cm away from the center line, and the black circular border has a width of around 5cm. The thickness of the venue is approximately 6cm, and the distance from the surface of the venue to the ground is about 6cm. The center line and the positions for placing the Sumo cars are marked with thin lines visible to the naked eye but not affecting the sensors. The exact positions, dimensions, and weights of the competition venue and its accessories are based on the information provided on the day of the competition.



VII. Reward Mechanism :

The criteria for awards will be based on the results of the qualifying matches and the round-robin tournament, categorized by elementary school group, junior high school group, and senior high school/college group.

- 1. Elementary School Division
- 2. Junior High School Division
- 3. High School and College Division

Ranking	Bonus (NTD)	Certificate
 1 <sup>st</sup> Prize	\$5,000	V
 2 <sup>nd</sup> Prize	\$3,000	V
 3 <sup>rd</sup> Prize	\$2,000	V
 Excellent Work	—	V

If there are any concerns during the competition, the decision of the referee shall prevail, and no objections shall be made.