

A. Origins of the Project :

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!

B. Objectives of the Project :

1. By organizing competition activities and facilitating learning exchanges, we aim to provide domestic and international teams with opportunities to observe and learn about programming, mechatronics integration, and knowledge sharing, thereby inspiring students' motivation to learn.
2. By incorporating diverse open control systems, we plan to design different competition targets that foster the development of students' creativity, design skills, integration abilities, and programming capabilities.

C. Guiding Organization :

Taoyuan City Government, Taoyuan City Council

D. Host Organization :

Department of Economic Development, Taoyuan

E. Executing Unit :

SHAYANGYE Cultural & Educational Foundation

F. Eligible Participants :

1. Students from high schools, vocational schools, and colleges affiliated with various counties and cities nationwide (including master's and doctoral students).
2. Participants must have a valid student status recognized by the Ministry of Education.
3. International teams of the same age are allowed to participate (**with proof of valid student status in their respective countries**).

G. Competition events :

Sumo robots



TIRT Official website.

H. Competition grouping :

1. High School/Vocational Group: : Limited to high school/vocational school students to participate, with a maximum of 3 players per team.
2. College/University Group : Limited to college/university students (including master's and doctoral students) to participate, with a maximum of 3 players per team.

I. Event description and schedule planning :

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

J. Other matters :

The organizer reserves the right to modify the regulations and rules of the event. For any other matters not mentioned, please refer to the latest announcements on the official competition website as the authoritative source. If you have any concerns regarding this project, please contact the organizer directly at the following phone numbers: 03-3623452 ext. 5338 (Ms. Chin).

A. Competition qualification :

The eligibility for participation is divided into the high school vocational group and the college group, and awards will be presented separately during the award ceremony.

B. Competition Format :

The tournament format may vary for each event depending on the number of matches scheduled for the day, including different methods of advancement such as group elimination, loser's bracket, round-robin, etc. The specific format will be determined by the organizers and announced by the referees.

1. Round 1 :

All teams are divided into several groups (according to the number of teams present) for a draw to determine the groupings in the elimination rounds, selecting the top two teams from each group.

2. Round 2 :

To stage a comeback for the defeated teams, a new draw will be conducted among the first-round group stage losers for the knockout round, determining the final two contenders.

3. Round 3 :

The teams that have advanced from the first and second rounds in each group will be subject to a redraw for the knockout stage to determine the qualifiers.

4. Round 4 :

Conduct a round-robin tournament for the participants who advanced to the third round, and determine the rankings based on points.

C. Robot Regulations :

1. Participants' robots must be wheeled robots (tracked robots are not allowed), and there are no restrictions on the types and quantities of other mechanisms and components.

2. Before the start of the competition, the overall length (L) of the robot must be $\leq 30\text{cm}$, the width (W) must be $\leq 25\text{cm}$, and there are no restrictions on the height (H).
3. After the competition starts, it is not allowed to use separate parts as one of the methods of attack.
4. The total weight limit of the robot is 5kg (including the battery).
5. All robots must be fully autonomous and cannot be operated using a remote controller from the beginning to the end of the competition. Various sensors can be installed to perceive robot and environmental information, but participation is also allowed without sensors.
6. The robot must be powered by an independent power source (external power supply is not allowed), and combustible power sources are not permitted.
7. Sharp and dangerous weapons are not allowed for attacking the opponent.
8. The robot must maintain a distance of at least 6mm (with a tolerance of 10%) from the ground, except for the parts in contact with the tires.
9. The materials and functional design used in the robot must comply with the regulations of 'preserving the venue and opposing robots,' meaning any dangerous devices such as saws or flamethrowers will result in disqualification and liability.
10. The referees have the right to assess the safety of the robot before the competition, and participation will be prohibited if there are any concerns regarding safety.

D. Competition rules :

1. Before the start of the competition, the two participating robots must be placed at the center of the diagonally opposite white circular areas, with no restriction on their facing direction, i.e., they do not need to have their backs or fronts facing each other, as shown in Figure 1.

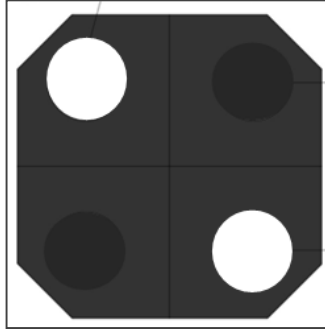


Figure 1

2. After the referee blows the whistle, the operator activates the robot. Within 10 seconds, the robot must completely exit the white circle (re-entering the circle after complete exit is allowed) using fully autonomous movement (including autonomous sensing). Each round of competition lasts for 60 seconds.
3. After the robot is activated, the player must follow the referee's instructions to exit the field to avoid interfering with the robot's judgement. Violators will be warned, and the referee may declare them as failures, resulting in the opponent winning that round.
4. The following behaviors by the robot will be considered as failures (meaning the opponent wins that round) :
 - a. The entire robot is pushed out of the arena by the opponent's robot or runs out of the arena on its own.
 - b. The countdown starts, and the robot must leave the starting point within 10 seconds; failure to do so within 10 seconds will result in disqualification (re-entering after completely leaving the white circle is allowed).
 - c. The robot violates the rules of the competition.
 - d. If the robot loses its mobility (e.g., partially falling, flipping over, staying still) for more than 10 seconds, it is considered a failure.

- e. If any component of the robot falls off inside the arena and has the potential to affect the competition (with the shortest side exceeding 20mm), measurements will be taken to determine the outcome at the end of the round.
- f. At the end of each round, if both robots are still on the field and no winner can be determined, the round will be considered a draw.
- g. If both robots almost simultaneously fall off the field, the referee will decide to reset them to their initial positions and continue the match.
- h. In the elimination rounds, each match consists of three rounds. The competitor who wins more rounds advances to the next stage. In the championship match (round-robin), each match consists of five rounds. The competitor who wins more rounds earns 1 point. If the points are tied, the lighter competitor will be declared the winner based on the judges' decision.
- i. If a match ends in a draw (with no qualifier), a sudden-death match will be held. Both robots will be placed in designated positions and the competition will resume in the same manner as the regular match (with both sides pushing each other). The time limit is removed in the sudden-death match, and the competition continues until a winner is determined. The rules stated in Article 4 of the Competition Rules will be followed in making decisions. If the sudden-death match also ends in a draw, the lighter competitor will be declared the winner based on the referee's decision.
- j. After each competitor enters the field, they are allowed to change their batteries before the start of the first round. The replacement batteries must have the same specifications as those recorded during the inspection. If the referee discovers that the weight of the vehicle exceeds the limit after the battery replacement, the competitor will not be allowed to participate.
- k. Before each round of the competition begins, participants are given 2 minutes to perform repairs on their robots within the arena. Teammates are allowed to assist, but downloading programs or changing batteries is not permitted (except for battery replacement 之前 the first round). If the robot cannot be repaired within the given time, it is considered as forfeiting the match, resulting in the opponent advancing to the next round.

- L. The referee will decide, based on the conditions of the competition day, whether participating teams are allowed to retrieve their robots for adjustments after each round of the competition. If allowed, a new inspection must be conducted before the start of each round.
- M. Once the round of the competition is underway, there are no opportunities for pauses, modifications, or adjustments to the robot (such as downloading programs, changing batteries, replacing parts, or repairing the robot). Teams can request to forfeit the round. If there is no declaration and the robot on the field is touched without referee consent, the referee can issue a warning and potentially disqualify the team (not just from that round).
- N. After the robot is called onto the field, if the referee determines that the robot violates the regulations, the team has 2 minutes to modify the non-compliant components. If they fail to complete the modifications within the given time to meet the requirements for participation, immediate disqualification will occur.
- O. The referee has the final authority in the competition, and participants cannot raise objections.

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E. competition venue :

1. As shown in Figure 2, both the bottom panel and the upper panel of the competition venue are black square acrylic boards measuring 2200x2200mm. The thickness of both panels is 5mm. The upper panel is cut to remove four circular areas with a diameter of 500mm. The centers of these four circular areas are all located at a distance of 550mm from the edges. Two of the circular areas located diagonally are covered with white cloth adhesive. The upper panel and the bottom panel are assembled using adhesive bonding. The height of the venue from the ground is 35mm ($\pm 5\%$).

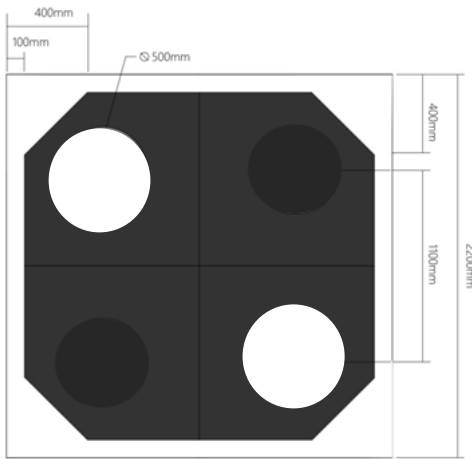


Figure 2:
Top View of Robot Sumo Competition Arena

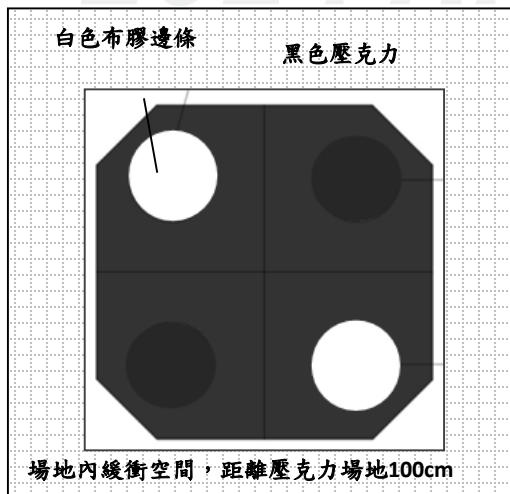


Figure 3 :
Illustration of the spatial scope of the competition venue.

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2. The four circular areas have a recessed depth of 5mm.
3. The boundary line of the venue is a white line, 100mm in width, made by attaching white adhesive tape.
4. To prevent robot collisions, there is a 100mm high fence around the perimeter of the venue, approximately 1000mm away from the venue boundary. The fence walls are made of wooden boards.
5. The dimensions and measurements provided in this rule for the venue's description or annotations have an error margin of less than $\pm 5\%$ compared to the actual dimensions at the competition site.

F. Tournament Advancement Format :

1. Round 1 :

All teams are divided into several groups (based on the number of teams present) and drawn into elimination matches, selecting the top two teams from each group.

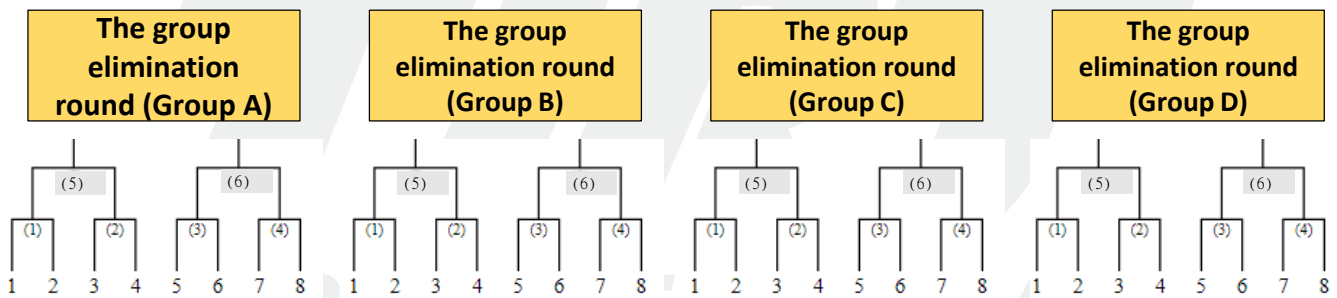


Figure 2: First Round of Group Elimination Matches (default)

2. Round 2 :

To stage a comeback for the defeated teams, a redraw of the first round of group stage losers will be conducted for the elimination matches, determining the final two contenders.

**Resurrection
Team of Defeat.**

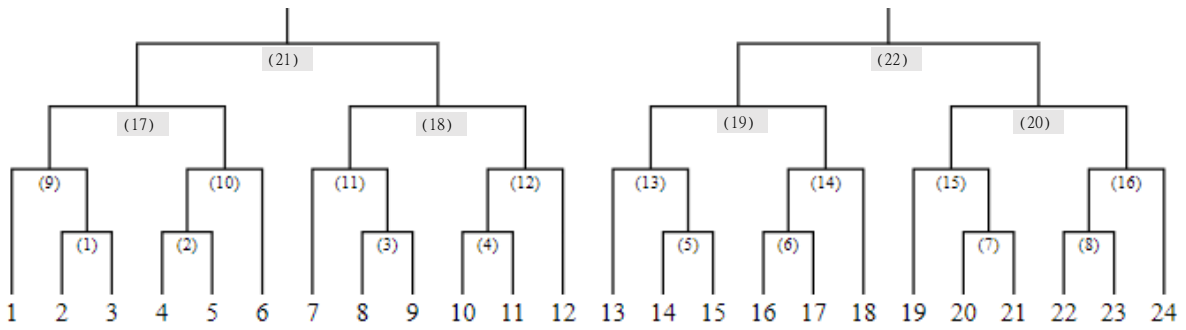


Figure 3: Second Round of Loser's Revival Match (Default)

3. Round 3 :

The teams that have advanced from the first and second rounds in each group will be redrawn for the elimination matches to determine the qualifiers.

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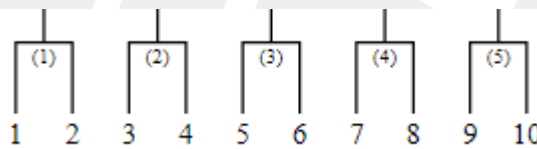


Figure 4: Third Round of Elimination Matches (Default)

4. Round 4 :

Conduct a round-robin tournament for the teams that advanced to the third round, determining their rankings based on points.

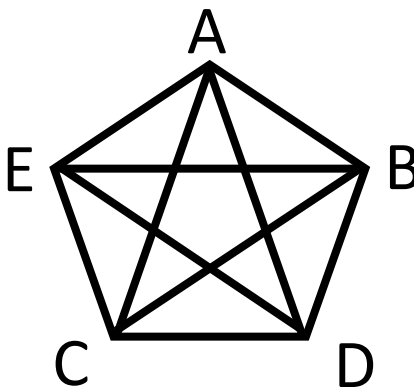


Figure 5: Fourth Round of Round-Robin Matches (Default)

G. Reward mechanism :

Ranking	Prize Money (NTD)	Certificate
 1st Place	\$5,000	V
 2nd Place	\$3,000	V
 3rd Place	\$2,000	V
 Excellent Work	-	V

If there are any doubts regarding the competition format on the day of the event, the decision of the referee shall prevail, and no objections shall be raised.

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