

The origin of the project

ShaYangYe Cultural & Educational Foundation is committed to the deep cultivation of robot education and the promotion of industrial chain, and strives to make Taiwan become a stage for international competitions. Since 2018, the TIRT International Robotics Invitational Tournament has been jointly held with the Taoyuan City Government per year. In the past four years, it has created a brilliant record of more than 8,000,000 people participated online and offline, 20 countries participating in the joint competition, and a total of 6,551 teams. It is hoped that robot training, competitions and related industries will be promoted to expand the international horizons of Taiwanese players and create a cross-domain robotics international event based in Taoyuan and dazzling the world! 2022 TIRT Top International Robotics Tournament, in view of the promotion Taiwan's robotics industry and self-made brand energy are planning to promote a series of events --- TIRT Autonomous Car of Maker Online Race, which combines multiple program-controlled competitions to show the strength of Taiwan's intelligent manufacturing technology and then link up with TIRT international competitions!

Project goals

Through competition activities and study exchanges, increase opportunities for domestic and international teams to observe programming, electromechanical integration, and sharing exchanges to stimulate students' motivation to learn. Combine multiple open control systems, plan diverse competition, and integrate and expand students' creative ability, design ability, integration ability and programming ability.

Co-organized by

Education Bureau of Taoyuan City Government, SHA YANG YE Industrial Co. Ltd.

Supervised by

Taoyuan City Government, Taoyuan City Council

Organized by

Taoyuan City Government Economic Development Bureau, Taoyuan City ShaYangYe Cultural & Educational Foundation

Participants

Students from primary schools and junior high schools across the country.
International teams of the same age are open to participate.
Contestants must have a valid student status recognized by the Ministry of Education.

Competition items

Autonomous car racing challenge.

Competition Categories:

Participants are allowed to use any "plastic building blocks" components (no restrictions on the main control board system).

- 1) Elementary School Category: Limited to elementary school students, with a maximum of 3 team members.
- 2) Junior High School Category: Limited to junior high school students, with a maximum of 3 team members.
- 3) High School/Vocational School/College Category: Limited to high school, vocational school, and college students (including master's and doctoral students), with a maximum of 3 team members (inter-grade competition is allowed, for example, one college student can team up with two high school students to compete).

The same team members cannot register for multiple categories. If discovered by the organizing committee, the team will be disqualified.



Event Description and Schedule:

1. Registration: To register, please visit the official TIRT website (<https://www.tirtpointsrace.org/>) and click on "Autonomous Car Maker Online Race" to proceed with registration. Participants must comply with the content stated in the affidavit and agree to it before participating in the competition. Failure to agree will result in disqualification without scoring.
2. Registration Period: From May 22, 2023, to August 31, 2023.
3. Video Submission Deadline: Videos must be submitted by 6:00 PM on September 24, 2023.
4. Submission Method: Participants must record their own videos and upload them to the YouTube platform. The video link should be provided in the registration system.
5. Evaluation and Review: The evaluation and review process is expected to take place from September 25, 2023, to October 2, 2023.
6. Results Announcement: The results will be announced on October 13, 2023, on the official fan page and website.
7. Award Ceremony: The public award ceremony is scheduled to take place on October 29, 2023 (Sunday) at the Taoyuan Dome (No. 1, Section 1, Sanmin Road, Taoyuan District). Please refer to the official website for any updates or changes.

Other Matters:

The organizer reserves the right to modify the regulations and rules stated in the handbook. For any unresolved issues, please refer to the latest announcements by the organizer on the official competition website. If you have any concerns or inquiries regarding this event, please contact Mr. Liu at extension 5339 or Mr. Qin at extension 5338. Their contact number is +886-3-3623452.

Note: The above translation assumes that the contact number provided is correct. Please verify the contact details for accuracy.

TIRT
2023 AI TAOYUAN

Competition rules

2023.06

1. Eligibility:

The competition is open to three categories: Elementary School Category, Junior High School Category, and High School/Vocational School/College Category (inter-grade competition is allowed in the latter category).

2. Competition Format:

Self-driving Car Speed Challenge: The competition venue and video submission deadline will be announced by the organizer. Each team must upload a video showcasing the complete mission process. To ensure fairness, the video for the speed challenge must not be edited or post-processed. Participating teams must upload their videos within the specified time frame. Failure to do so will result in disqualification.



3. Vehicle Specifications:


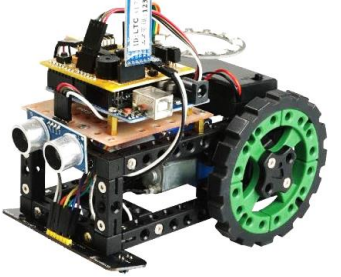
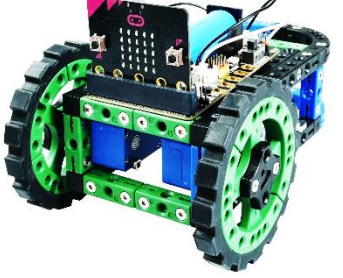

- 1) The vehicle must be a wheeled vehicle, with a maximum of two wheels for the main drive (motors) and an unlimited number of auxiliary wheels.
- 2) The main structure of the vehicle cannot be a control board. It must be constructed using "plastic building blocks" and cannot include homemade components or composite materials (except for the fixing of electronic components). Metal materials are allowed for the connectors of the plastic building blocks. The main drive wheels (motors) must be installed on the "plastic building blocks." The maximum size limit for the vehicle is 25cm in length, 25cm in width, and 25cm in height.

★ If it is difficult to determine whether the vehicle meets the specifications based on the provided diagrams, please send a clear image of the vehicle to

Tim.Liu@shayangye.com for inquiries.

- 3) Illustrated Vehicle Specifications: (Please provide the relevant illustrations or refer to the official documentation for the specific diagrams)

The main body of the car	Description
 <div style="text-align: center; border: 1px solid black; width: 40px; height: 40px; margin: 10px auto; display: flex; align-items: center; justify-content: center;">X</div>	<ol style="list-style-type: none"> 1. The main structure of the vehicle must be made of "plastic building blocks." The primary body structure cannot be a metal frame or body. 2. The main drive wheels must be installed on the "plastic building blocks."
 <div style="text-align: center; border: 1px solid black; width: 40px; height: 40px; margin: 10px auto; display: flex; align-items: center; justify-content: center;">X</div>	<ol style="list-style-type: none"> 1. The main structure of the vehicle must be made of "plastic building blocks." It cannot be the control board or any other material. 2. The main drive wheels must be installed on the "plastic building blocks."

The main body of the car	Description
 <input data-bbox="596 472 682 555" type="radio"/>	<ol style="list-style-type: none"> 1. The main structure of the vehicle must be made of "plastic building blocks. " 2. The main drive wheels should be installed on the "plastic building blocks."
 <input data-bbox="596 783 682 866" type="radio"/>	
 <input data-bbox="596 1094 682 1176" type="radio"/>	
 <input data-bbox="596 1404 682 1477" type="radio"/>	

- 4) Participants must carry the power source (battery) on their own.
- 5) There are no restrictions on the main control board platform/system.
- 6) The participating self-driving cars must be fully autonomous and must **utilize infrared line-tracking** for the competition. The use of wireless communication or remote/wired control systems to control the self-driving car is not permitted. Failure to comply with this requirement will result in disqualification.

Competition rules

I. Autonomous Car racing challenge:

- A. Each participating team needs to record a video of the competition. The video of the speed challenge must not be edited or post-processed. It should showcase one complete cycle of the mission process, from the starting point to the finish line. The maximum duration of the video is 5 minutes. Videos exceeding this time limit will not be scored.
- B. Teams must upload their videos within the specified time frame. Failure to do so will be considered as forfeiting the competition.
- C. The vehicle must move autonomously using line-tracking along the designated route, starting from the starting point and reaching the finish line. The completion time will be the basis for determining the final score. If it is discovered by the organizer that the vehicle is being moved using remote control, the team will be disqualified.
- D. If the vehicle fails to come to a stop at the finish line after reaching it, it will be considered disqualified with no room for objection.
- E. The timer must be operated using the designated timing URL provided by the organizer. The timer must display the time with two decimal places (e.g., 00:45.32). If the display is not clear or complete, the judges will round it up to the nearest hundredth of a second (e.g., 45.99). The timer must start simultaneously with the vehicle's activation.

Timing URL: (<https://reurl.cc/9V88Xx>)



- F. The following rules must be followed in the recorded video for the speed challenge. Failure to comply will result in disqualification:

- 1) The video must be shot in one continuous take without any cuts.
- 2) Before the start of the race:

Step 1:

The vehicle must be clearly shown from all angles in front of the camera, with each side of the vehicle remaining in view for three seconds. The fixed mechanism of the main drive wheel (motor) must be clearly displayed for the referee's inspection. The use of homemade parts or composite materials (excluding electronic component fixtures) for the motor is prohibited. If it is not possible to determine compliance with the regulations (refer to page 4, point 3, Vehicle Specifications), the referee has the authority to declare disqualification.

Step 2:

After the 360° display, the vehicle must be placed within the designated starting area (a box measuring 25cm in length, 25cm in width, and 25cm in height). No part of the vehicle should extend beyond the boundaries of the starting area (box). A clear overhead shot of the vehicle within the starting area (box) must be recorded. If it is not possible to determine compliance with the regulations (refer to demonstration video), the referee has the authority to declare disqualification.

Step 3:

After capturing the overhead shot, the camera device must be securely positioned in the designated location (refer to page 9, Competition Venue Map, and related camera positions).

- 3) Disputes regarding the placement of the vehicle within the starting area (box) will be determined based on the footage. If, for example, any part of the self-driving car crosses the boundary lines, the referee will assess the situation. If it is not possible to determine through video confirmation, the referee has the authority to declare disqualification.
- 4) The timer must be clearly displayed in the recording and should not obstruct the view of the racecourse.
- 5) During the vehicle's movement throughout the race, the video footage must cover the entire racecourse to facilitate the evaluation of timing-related criteria.
- 6) The camera setup should remain fixed until the completion of the respective speed challenge.
- 7) Here is an example video of the speed challenge: : <https://reurl.cc/rLpOzZ>



example video

- G. If the infrared line tracking modules used for the starting point and the finishing point are not the same module, it will be considered a violation, and the team may be disqualified. Therefore, it is important to ensure that the infrared line tracking module used for the starting point and the finishing point are identical to comply with the rules of the competition.
- H. Here are the guidelines for uploading the video:
 - ① Upload the video to the YouTube platform.
 - ② Set the video as "Unlisted."
 - ③ Include the video link during registration.
 - ④ You can make changes to the video link before the submission deadline.
 - ⑤ Once the submission deadline has passed, no further changes will be accepted.
- I. Before the race starts, place the vehicle in the designated starting area. When the race begins, both the timer and the vehicle should start simultaneously. The vehicle should complete one full lap of the track, with any part of the vehicle touching the finish line. Once the vehicle comes to a complete stop, the timer should also stop (to facilitate accurate timing for the judges). The judges have the authority to add or subtract seconds based on the recorded video of the start and stop points. Any disputes regarding the timing adjustment will not be entertained. To ensure fairness in the competition, the video footage must show the vehicle positioned in the starting area. Failure to capture this scene may result in the disqualification of the video submission.

J. During the course of the race, if the vehicle comes to a stop for more than 2 seconds without continuing the track-following movement towards the finish line or fails to follow the designated route to reach the finish line, the judges have the authority to determine the failure, and no disputes will be accepted.

K. Track Tracing Regulations and Definitions:

When the vehicle is driving, it must follow the following rules:

- 1) Track Indication Line: The vehicle must stay between the track tracing modules, and the track must be traced and corrected throughout each straight section and curve.
- 2) Track Tracing Movements: The vehicle must perform track tracing movements, including straight tracing and turning tracing, at each straight section and curve.
- 3) No Pre-Calculated Distance Timing: The vehicle must not rely on pre-calculated distance timing and must rely on sensor feedback to autonomously correct its path.
- 4) Tire Contact with Track Indication Line: Tire contact with the track indication line is allowed and does not count as a violation.

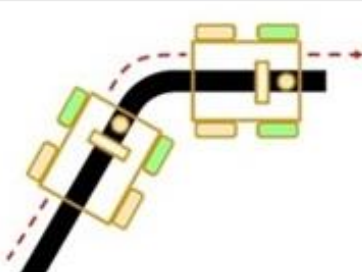
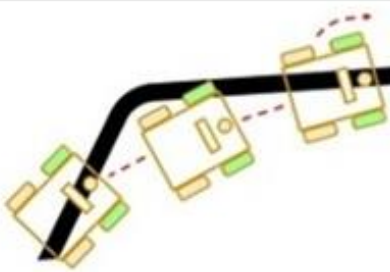
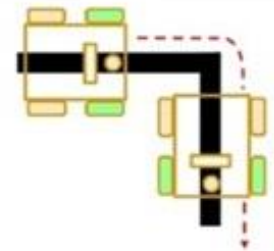
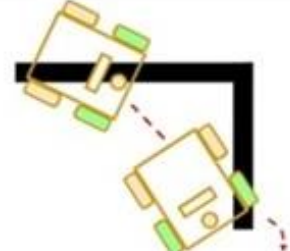
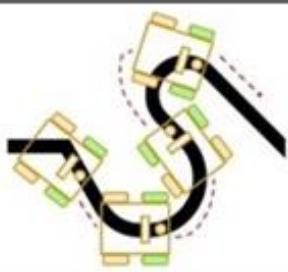
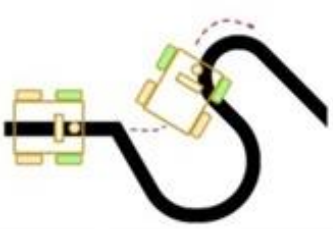
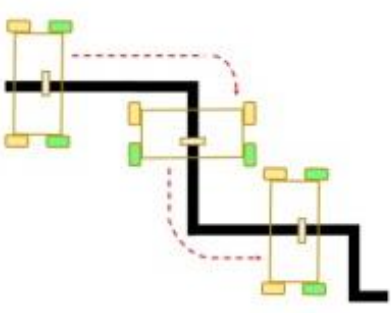
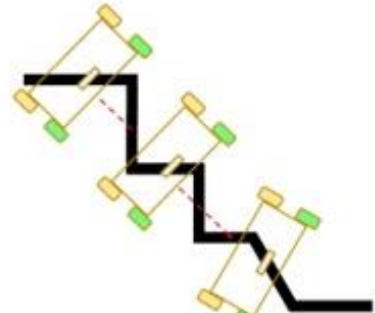
L. Violation of these regulations will result in disqualification. In the event of a dispute concerning the fairness of the competition, the organizing committee reserves the right to request a second verification (to be completed by October 2nd).

- 1) The verification can be conducted either by students at the Presenter's Competition venue or by the chief referee at the team's competition venue.
- 2) In cases of epidemic or special circumstances, an online verification method may be adopted.
- 3) The judges and the organizing committee have the authority to determine the competition results, and no objections will be accepted after the results are announced. The competition vehicles must be retained until the second verification. If the vehicle used for the second verification is not the same, it will result in disqualification.

M. Track Tracing Regulations - Diagram Explanation:

In the diagram, the following color scheme is used to illustrate the track tracing regulations:

- 1) Yellow Color: Represents the active wheels (maximum of two wheels). These are the main wheels responsible for propelling the vehicle.
- 2) Green Color: Represents the auxiliary wheels (unlimited quantity). These wheels provide additional support and stability to the vehicle during track tracing.

Diagram Description	
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 <input type="radio"/>	 <input checked="" type="checkbox"/>

Competition Scoring:

The competition rankings are based on the completion time of each team's full race challenge, with teams ranked from shortest to longest completion time. If there are teams with the same time, they will be tied for the same rank, and the next rank will be skipped.

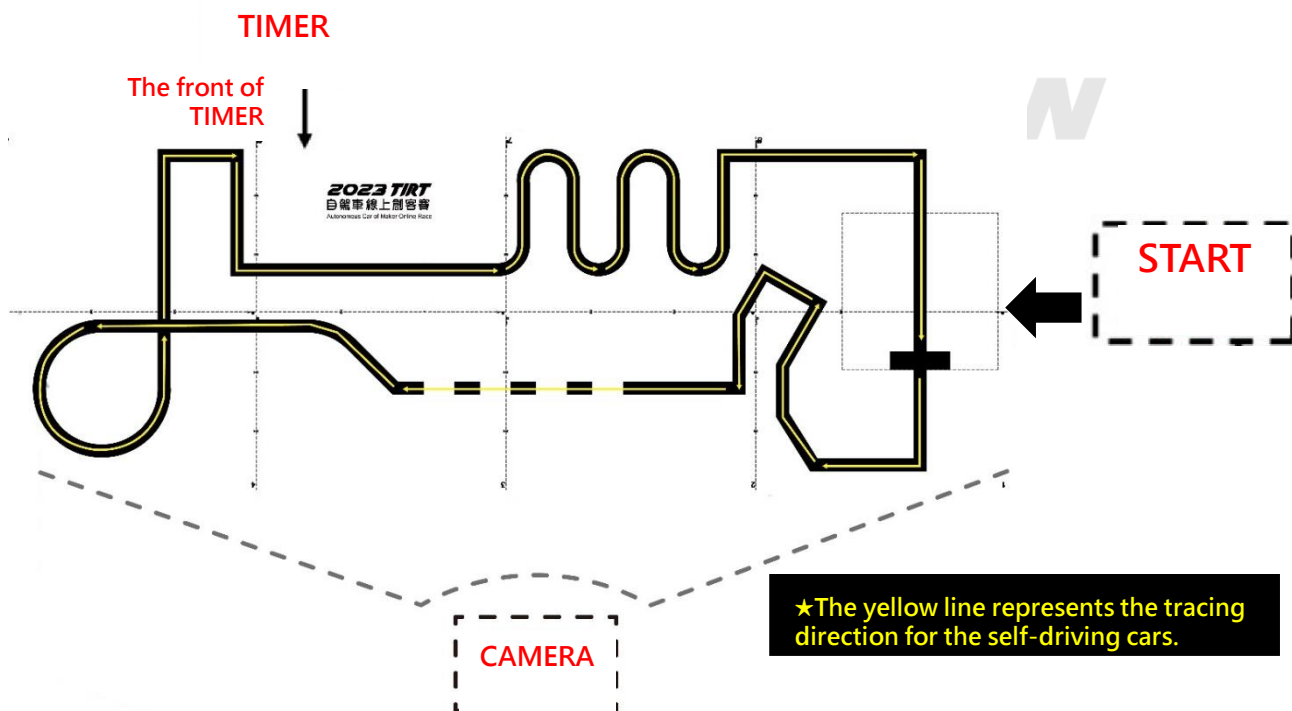
Competition Venue:

To ensure consistent venue specifications and fair competition, it is mandatory to purchase the competition venue from the organizers. The cost is NT\$599 (shipping fee not included). Please visit the purchasing link below to make the purchase.

Purchase Link → <https://reurl.cc/GeMx4A>



Competition Track Map and Camera Equipment Placement Instructions



Rewards

Participants who successfully upload and submit their videos will receive a participation certificate.

Autonomous Car of Maker Online Race		
Ranking	Prize Money (NTD)	Certificate of Merit
 The 1 st Place	\$3,000	V
 The 2 nd Place	\$2,000	V
 The 3 rd Place	\$1,000	V
 Excellence	-	V