112 學年度臺南市「日本 RoboRAVE 國際機器人競賽」代表隊選拔實施計畫

壹、活動目的：

一、選拔本市代表隊參加「日本加賀 RoboRAVE 國際機器人競賽」。

二、提升國中小基礎科技教育。

三、融入中小學課程教學。

四、啟發學生創意，強化世界級的競爭力。

貳、辦理單位：

一、主辦單位：臺南市政府教育局

二、承辦單位：安平區石門國民小學

三、協辦單位：中華機器人科技教育學會

參、活動期程：

一、領隊會議：

(一)時間：112年 9 月 1 日（星期五）下午 2 時。

(二)地點：安平區石門國小至善樓 4 樓視聽教室，

(三)報名方式：請各校務必派人參加，並至研習護照報名(研習代碼：282020)。

(四)競賽辦法如有未竟事宜，於領隊會議討論補充並決議（領隊會議後，若仍有未注意事項，由裁判會議決議）。

二、競賽時間、地點及流程：

(一)時間：112年 9 月 17 日（星期日）上午8時30分至下午5時。

(二)地點：安平區石門國小石門館、石門館地下室，並依實際參加隊伍調整選拔時間及地點，請隨時注意相關公告。

(三)流程：

日期	時間	內容
112 年 9 月 17 日	08:30-09:00	選手報到、機器人檢錄
	09:00-10:30	1.公佈競賽場地 2.機器人練習、測試(限參賽學生進入競賽場地)
	10:30-12:00	各組初賽
	12:00-13:00	用餐時間(競賽相關設備不得攜進及攜出，午餐自理)
	13:30-14:30	各組初賽

	14:30-16:00	公布各組進決賽名單，隨即進行各組決賽(限參賽學生進入競賽場地)
	17:00-	公布成績

肆、參加對象及名額：

一、隊伍參賽組別：**以 2 至 4 名學生加 1 名指導教師組成1 隊**，可跨年級、跨校組隊，以最高年級為報名組別（**年級係指112學年度年級，必要時將檢查學生年級相關資料**），如多個學校組隊，以其中一所學校為主要報名學校即可。

(一)Elementary School（ES 組）：本市公、私立國小 4~6 年級學生。

(二)Middle School（MS 組）：本市公、私立國中學生。

(三)High School（HS 組）：本市公、私立高中職學生。

二、選拔類別及隊數

(一)a-MAZE-ing（迷宮）：國中組、國小組，各組選拔 3 隊合計至多 6 隊代表。

(二)Fastbot（急速救援）：國中組、國小組，各組選拔 3 隊合計至多 6 隊代表。

(三)AlpineBot（爬坡）：高中組、國中組、國小組，各組選拔 3 隊合計至多 9 隊代表。

(四)Line Following（循跡）：高中組、國中組、國小組，各組選拔 3 隊合計至多 9 隊代表。

(五)上述選拔之隊數，依實際情形調整，惟總隊數最多仍以30隊為主。

三、指導老師：

(一)**指導教師需為該隊參賽學生之學校正式編制內之教師**，

(二)每位指導老師至多指導總參賽學生10 位（依臺南市政府教育局所屬學校人員因公出國案件處理原則辦理）。

(三)獲選為代表隊學生的指導老師，必須參與後續相關會議及帶隊出國比賽。

伍、報名時間：請各校於112年8月25**日（星期五）**下午**4 時前至下列網站報名**， 網址: https://forms.office.com/r/LCVkXmPu97 ，並同時將紙本報名表（如附件1）核章後（指導老師需為校內正式編制內的教師），正本寄（送）至安平區石門國小教務處林柏宏主任收（地址：臺南市安平區安平路 700 號），逾期概不受理。報名資料之個人資料隱私權宣告如附件2。

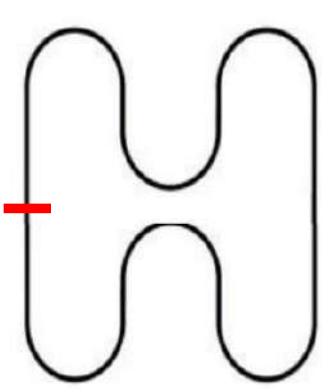
陸、競賽規則：

一、a-MAZE-ing (迷宮)：採用日本加賀2019 a-MAZE-ing Challenge國際賽規則（如附件3），國小組4段3彎、國中組6段5彎，木板長度最短46公分，唯每隊檢測 10 次，取最好 5 次成績，所有隊伍成績最高 8 隊進入決賽。

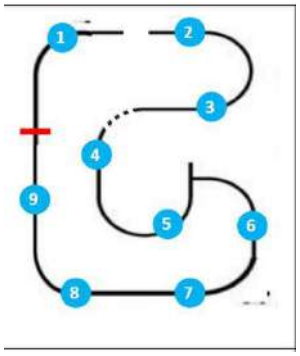
二、Fastbot (急速救援)：

(一)國小組、國中組-「急速救援」競賽場地**示意圖**如下：正式的競賽場地於競賽當天公佈，並抽籤虛線及斷路位置。

1. 國小組、國中組-「急速救援」競賽場地之紅色起點線及方向於當天直接黏貼。



高年級循線場地示意圖



數字圈會在線旁

國中組循線場地示意圖

2. 地寬度約 76.2 公分，長度約 152.4 公分，材質為相片紙輸出上霧膜或 PP消光帆布。場地底色為白色，軌跡線路的顏色為黑色，路線於現場公佈。
3. 國小組的軌跡線為連續軌跡無交叉路口、虛線或斷路位置，線寬 1.3 公分。國中組的軌跡線為連續軌跡，有 1 個 T 型路口（丁字路口），線寬約 1.3 公分，有一個虛線及一個斷路位置。

(二)實際場地以當天公佈為準。

1. 競賽方法：

(1)**每場競賽時間為 3 分鐘。**

(2)**比賽開始時，機器人前端正投影需置於紅色地點線後，且不超過紅色地點線(馬達連接線除外）。**

(3)**比賽過程中機器人正投影完全脫離軌跡線路，則視為循線失敗並結束比賽。**

(4)**比賽過程中選手接觸到機器人的任何部位，則視為結束比賽。**

2. 計分方式：

(1)**每場競賽分數以時間開始至結束為止(最高為 3 分鐘)。**

(2)**機器人從紅色地點線出發，軌跡線路每超過紅色地點線，則計算一次一圈成績。**

(3)**機器人未完成一圈時，則依機器人通過軌跡線路上旁的最高數字圈計算， 機器人後端必需超過數字圈且正投影在軌跡線路(馬達連接線除外)，則 算該數字分數。**

(4)**每回合成績為總圈數+最後完成數字圈**

(5)**每隊檢測 10 次，取最好 5 次成績，所有隊伍成績最高 8 隊進入決賽**

三、AlpineBot（爬坡）：採用日本加賀2019 AlpineBot Challenge國際賽規則（如附件4），機器人**起點需要在木板前出發，且出發前，前輪必須於地面上**，唯每隊檢測 10次，取

最好的 5 次成績，所有隊伍成績最高的 8 隊進入決賽。

四、 Line Following（循跡）：採用日本加賀2019 Line Following Challenge國際賽規則（如附件5），唯每隊檢測 10 次，取最好的 5 次成績，所有隊伍成績最高的 8 隊進入決賽。

柒、獎勵方式：

一、獎項：依組別及類別，頒發下述之獎項第一至六名各1隊，各隊獎狀數量以隊員人數核發，指導老師依本市高級中等以下學校教職員獎懲案件作業規定敘獎。

二、比賽成績為零分則不計名次，主辦單位保留上列各獎項組數之變更權利。

三、經選拔完成後，依選拔類別及隊數，代表本市參加「日本加賀 RoboRAVE 國際機器人競賽」，如因日本加賀取消(延後) RoboRAVE 國際機器人競賽等相關政策關係，則代表隊資格至 113年 7 月 31 日止自動失效，113年 8 月 1 日需要重新選拔代表隊資格，如有限制參賽隊伍，則依各組第一名依序成為代表隊，最多仍以目前總隊數 30 隊為限。

四、如未能代表本市參賽，則取消獲獎名次，並追回獎狀，由後往前遞補參賽。代表本市參賽指導教師及學生每人補助出國比賽經費新臺幣 5,000 元。

五、請注意：**本活動所頒發之名次獎狀已列入本市十二年國教超額比序競賽成績**。

捌、預期效益：藉由機器人教育之融合運用，啟發參賽者數位控制之應用，並激發學生對Coding產生興趣，進而提升學生未來學習能力。

玖、聯絡窗口

一、安平區石門國小教務處林柏宏主任，連絡電話：06-2223332、網路電話：38010，

二、洪駿命教師、電子郵件：hcm1206@gmail.com。

三、教育局課程發展科林禹萱科員，連絡電話：06-2991111 分機 8727；網路電話：99212。

壹拾、 獎勵：承辦活動相關人員，依據臺南市立高級中等以下學校教職員獎懲案件作業規定辦理。

附件1

參加「日本 RoboRAVE 國際機器人競賽」代表隊報名表

（**以下資料用於獲獎獎狀書寫，請務必正確填寫**）

學校名稱(中文)	(請寫全銜)	
學校名稱(英文)		
隊名		
組別	□Elementary School □Middle School □High School	
參賽種類	請勾選參加的項目(每隊只限參加一項) □a-MAZE-ing □Fastbot □AlpineBot □Line following	
指導教師 **(編制內教師)**	姓名(中文)：	
	姓名(英文)：	
	職稱：	連絡電話：
	學校名稱:	
	E-mail：	
參賽學生(學校名稱)1		
參賽學生(姓名)1	中文：	英文：
參賽學生(年級)1		
參賽學生(學校名稱)2		
參賽學生(姓名)2	中文：	英文：
參賽學生(年級)2		
參賽學生(學校名稱)3		
參賽學生(姓名)3	中文：	英文：
參賽學生(年級)3		
參賽學生(學校名稱)4		
參賽學生(姓名)4	中文：	英文：
參賽學生(年級)4		

承辦人：　　主任：　　校長：

附件2

臺南市 112 學年度「日本 RoboRAVE 國際機器人競賽」代表隊選拔隱私權宣告
（登記註冊報名、個人資料蒐集、處理及利用告知事項）

依據「個人資料保護法」(以下簡稱個資法)，依個資法第8條及第9條規定所為以下「報名個人資料蒐集、處理及利用告知事項」。

一、機構名稱：臺南市 112 學年度「日本RoboRAVE 國際機器人競賽」代表隊選拔。

二、個人資料蒐集之目的：基於辦理臺南市112學年度「日本RoboRAVE 國際機器人競賽」代表隊選拔各項必要行政措施，如製作競賽名冊、會場點名、 評審名單、分組公告、得獎名單公布、獎狀製作、官方網站公告等必要行政事宜。

三、 個人資料之蒐集方式：透過直接報名而取得個人資料。

四、個人資料之類別：本大會所蒐集之個人資料分為：識別個人者(C001 註)、政府資料中之辨識者(C003)、個人描述(C011)等個人資料類別，內容包括 姓名、教育資料、聯絡資訊、所屬單位等。

五、個人資料處理及利用：

(一)個人資料利用之期間：除法令另有規定公文辦理及成績資料保存期限外，以上開蒐集目的完成至賽會結束一個月所需之期間為利用期間，除必要之公開資料將依相關規定公告在官方網站外，其餘資料將進行銷毀。

(二)個人資料利用之地區：台灣地區（包括澎湖、金門及馬祖等地區）或經登記註冊報名人授權處理、利用之地區。

(三)個人資料利用之對象：除本局及主、協辦單位外，其它以法令規定依法得索取之單位，單位若有新增將公告至官方網站上。

(四)個人資料利用之方式：辦理臺南市112學年度「日本 RoboRAVE 國際機器人競賽」代表隊選拔各項必要行政措施， 如製作競賽名冊、會場點名、評審名單、分組公告、得獎名單公布、獎狀製作、官方網站公告等必要行政事宜事宜。

六、登記註冊報名人如未提供真實且正確完整個人資料，將導致影響後續比賽之權益。

七、登記註冊報名人得依個資法規定查詢或請求閱覽；請求製給複製本；請求補充或更正；請求停止 蒐集、處理或利用；請求刪除。得以電話或 E-mail 方式與本大會聯絡窗口聯絡， 行使上述之權利。

八、報名人拒絕提供本活動個人資料，將導致無法進行登記註冊報名，進而無法參加本次賽會。

本次競賽個資聯絡窗口：安平區石門國小教務處林柏宏主任收，連絡電話：06-2223332、網路電話：38010，洪駿命老師，電子郵件：hcm1206@gmail.com，教育局課程發展科林禹萱科員，連絡電話：06-2991111 分機 8727；網路電話：99212。

附件3

LAST EDIT: January 8th, 2019

RoboRAVE International
Robotics Education and Competition

2019 a-MAZE-ing Challenge

This challenge concludes in a **single elimination tournament**
Top 8 teams from each division, based on scores, will compete for awards

Goal

To design, build, and program a robot that can follow a raised wooden maze without falling off. The faster you can complete the maze increases your overall score.

Who Can Play

Teams in this challenge compete in **separate divisions**, typically:

- Elementary School
- Middle School

Requirements

Autonomous robot, any platform, costing $1,500 USD or less, and meets the following design constraints, which will be **verified during Check-In:**

- Robot can navigate a *46cm* long straight board, 90 degree right, *46cm* long straight board during check in.
- Robot is **not allowed to use any external sensors** to assist it in following the maze but wheel encoders are allowed.
- Volume of the robot must **not** exceed *65030cm*^{3}.

General Rules of Play

- The robot has **2 minutes** to complete the maze with the clock running backwards from 120 seconds.
- Teams can attempt as many runs as needed to post their best scores.

Challenge Specifications

All a-MAZE-ing tracks are identical in design and constructed of particle wood that is *24cm* wide and *2cm* tall. There are various lengths with combinations of 45, 90, and 135 degree angled turns in either direction.

While both divisions will utilize the same track, each division has a different finish line:

- Elementary Division – Finish line will be halfway between the 3rd and 4th angled turn.
- Middle School Division – Finish line will be at the end of the last straight.

All Challenge Dimensions are Approximate

Scoring

- Each completed straight-away is worth 50 points, once completed with back wheels passing over the scoring zone.
- Each completed angle is worth 100 points, once completed with back wheels passing over the scoring zone.
- If the robot falls off the maze before reaching the finish line, then the run is concluded, and the score received includes any portion of the maze that is completed in its entirety, **but** no **time bonus** points are awarded.
- **Time bonus** points are awarded, if and only if, the robot reaches the finish line before the 120 seconds ends. Any remaining time (integer in seconds) is then added to the maze score as a "time bonus" point value.
- The averaged score using the top 5 scores that a team posts will be utilized to determine the top 8 teams per division of the a-MAZE-ing challenge.

Scoring Matrix

	1st Straight Completed	1st Turn Completed	2nd Straight Completed	2nd Turn Completed	3rd Straight Completed	3rd Turn Completed
ES	50	100	50	100	50	100
MS	50	100	50	100	50	100

	4th Straight Completed	4th Turn Completed	5th Straight Completed	5th Turn Completed	6th Straight Completed	Total Score
ES	50	N/A	N/A	N/A	N/A	500
MS	50	100	50	100	50	800

Time Bonus: Finished required distance under 120 seconds? Remaining seconds (integer part only) are added to score.

For example - a robot finishes the MS track: 800 points for finishing + 35.8 seconds remain. Team score = 800 points + 35 seconds time bonus (integer value only) = 835 points.

Tournament Scoring

- The top eight teams from each division will compete in the final tournament.
- Advancing teams will be seeded into the tournament bracket according to their aggregate score (see bracket below).

- Runner Up is used to determine 3rd place based on outcome of semi-finals.

附件4

LAST EDIT: January 8th, 2019

RoboRAVE International
Robotics Education and Competition

2019 AlpineBot Challenge

Goal

To design, build, and program a robot that can climb an inclined plane set at **80 degrees** from horizontal to a table top (flat surface) and place a flag down in the target zone. The faster you can complete these tasks increases your overall score.

Who Can Play

Teams in this challenge compete in **separate divisions**, typically:

- Middle School
- High School + Big Kids

Required Materials

Autonomous robot, any platform, costing $1,500 USD or less, and meets the following design constraints, which will be **verified during Check-In:**

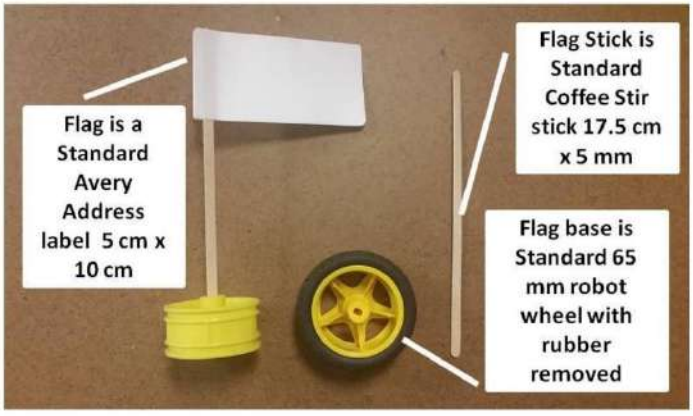
- **No** flying robots.
- Multiple sensors and processors are allowed.
- Volume of the robot must **not** exceed *65030cm*^{3}.

General Rules of Play

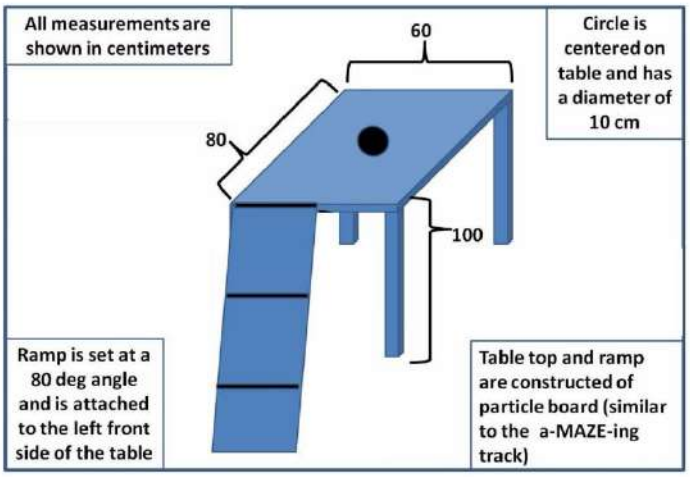
- The robot has 1 minute to complete the task.
- Only players can operate and manipulate the robot during the 1 minute heat.
- Touching the robot at any time requires it to be picked up and returned to the starting position.
- During the scoring period, simply go to any open track to compete.
- Official tracks will be available to practice on when not in use by competitors attempting an official run.
- Teams will only get 10 official scoring runs during the scoring period (your 5 highest scored runs determines your final score).

Challenge Specifications

- The table top is *60cm* x *80cm* and will be constructed from particle board.
- The table top surface will be *1m* above the floor surface.
- The *1.2m* long x *30cm* wide x *2.5cm* thick incline plane may be **one or a combination of** any of the following materials:
  - Whiteboard material
  - Particle board
  - Indoor/outdoor carpet
  - **Surprise** material (**Not** known to the public until you arrive!)
- The incline plane will be mounted to the side of the table top.
- The robot must **start on the floor**, in front of the ramp.
- There will be three *2mm* wide black lines drawn perpendicular to the ramp's length equidistant from each other located at every third.
- There is a *10cm* diameter black circle at the center of the table top.
- There is a small flag with a round base with a *50mm* diameter that will be provided at the challenge (see diagram below).



- Ramp will be at an **80 degree slope**.



All Challenge Dimensions are Approximate

Scoring

The overall score is a combination of following points earned during an attempt:

- Front wheels touch one of the three lines along the incline plane.
- Getting the **entire robot** on top of the table.
- Stand the flag, supported by only the flag's base as provided by the event, **anywhere on the table** for points plus any remaining time bonus.
- Time bonus (integer value of 60 seconds) will be added to your score, **if and only if,** the flag is standing upright anywhere on top of table. The unsupported flag must remain upright to be scored as **"placed on top of the mountain"**

See the AlpineBot Challenge scoring matrix below for details on the scores assigned during your attempt.

Scoring Matrix

<table>
<tr><th colspan="4">Point Reached</th><th rowspan="2">Total</th></tr>
<tr><th>First Line</th><th>Second Line</th><th>Third Line</th><th>Table Top</th></tr>
<tr><td>25</td><td>75</td><td>100</td><td>100</td><td rowspan="4">500</td></tr>
<tr><td colspan="4">Flag Placement on Circle (pick one)</td></tr>
<tr><td>Not Upright</td><td>Outside</td><td>Touching</td><td>Fully Inside</td></tr>
<tr><td>0</td><td>25</td><td>50</td><td>200</td></tr>
<tr><td colspan="4">Time Bonus: Clock counts down from 60 seconds and stops when the robot releases the flag on top the table and remains upright. Clock stops and remaining seconds are added for Total Possible Score.</td><td>1 - 60</td></tr>
</table>

附件5

2. LINE FOLLOWING CHALLENGE

2.1 GOAL

To design, build, and program a line following robot that can follow a black line on a white background to a tower and deliver at first at least one (1) ball and then return to its starting point. Then, in the remaining time of 3 minutes, the robot returns to the tower (as many times as needed) to deliver a set number (not over, not under) of balls as per their division's requirements.

2.2 DIVISION

- Teams in this challenge compete in separate divisions:
  - Elementary School (ES)
  - Middle School (MS)
  - High School (HS)
- Teams of 2 to 4 players

2.3 Robot and Ball Container

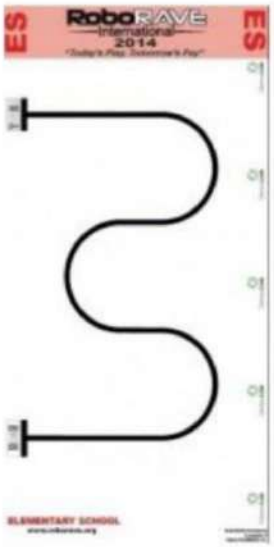
- Autonomous robot, any platform, costing $1,500 USD or less, that meets the following design constraints, which will be verified during Check-In:

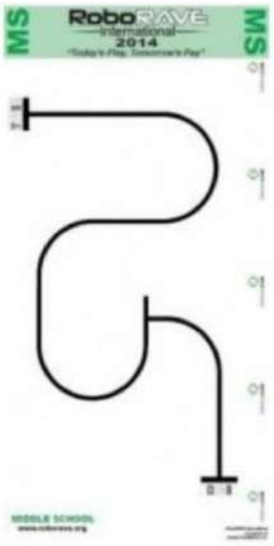
Type	Specifics
Platform	Not limited
Robot	Autonomous robot
Volume	Not exceed 65030 cubic centimeters(ball container included) Robot CANNOT be expanded after leaving start position.
Multiple Controller	Allowed
Sensor Type	Not limited
Sensor Number	Not limited
Motor type	Not limited
Motor / # of Servos	Not limited

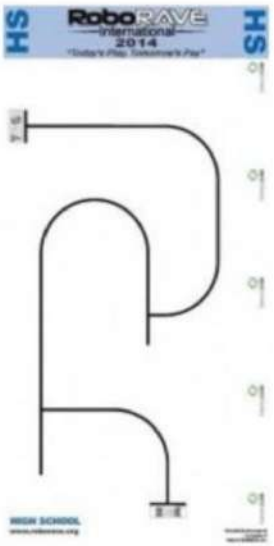
- Volume of robot and ball container must not exceed 65030 cm_3. Teams can design and build a box for fast loading.

2.4 Track , Tower, and Balls

- The white or black background PVC vinyl track dimensions are 76.0 cm x 152.4 cm.
- The design pattern changes every year and is revealed on the first day of the event. Shown below are past line following tracks for ES, MS, and HS divisions.







Division	Line Width	Intersection
ES	~1.27 cm	No T intersections
MS	~1.27 cm	One T intersection
HS/BK	~0.75 cm	Two T intersections

- All divisions use the same 20 cm tall x 10 cm wide x 20 cm long tower with a 10 cm x 10 cm opening at the top and an open back to allow the balls to roll out during delivery. There is a partition behind. The tower is held firmly to the track by a strip of tape.

- Ping pong balls will be provided at the event.

2.5 Rules and Scoring

- In Ball Scoring, you will get 8 official scored runs challenge scoring period.
- The total of your 5 highest official scores are are used to determine tournament selection. The top 8 teams will move on into the challenge tournament.
- The robot has 3 minutes to complete the tasks (basic and additional missions).
- A successful run has two different missions: basic mission HOME-TOWER-HOME (HTH) and Ball Points - Additional mission. The overall score is a combination of points earned from:
  - HTH- Basic Mission
    - The robot traversing the track from Home to the Tower, delivering at least 1 ball (number of balls beyond 1 ballis NOT important the points earned are for demonstrating the successful action of delivery) then traversing the track back home. The delivery balls are REMOVED once the robot leaves the tower for home.

- Ball Points – Additional mission
  - The robot traverses the track from Home to the Tower and delivers the required number of balls. The robot does not have to traverse the track back home.

Each division will have a set number of balls to deliver:

Elementary School - 130
Middle School –230
High School/Big Kids – 330

- Time ends OR you call a stop.

Scoring Matrix is shown below for robot: HOME to TOWER + Delivery

	Leaves Home	Turns ANY direction at 1st T	Turns ANY direction at 2nd T	Stops at Tower wheel motors OFF	Delivers at LEAST 1 ball
ES	50	N/A	N/A	100	100
MS	25	25	N/A	100	100
HS/BK	25	25	25	50	100

Continued Scoring Matrix is shown below for robot: LEAVES TOWER to HOME; POINTS for completing the HOME-TRACK-HOME circuit are given ONCE.

	Starts back home	Turns ANY direction at 1st T	Turns ANY direction at 2nd T	Returns Home	Total
ES	50	N/A	N/A	100	400
MS	25	25	N/A	100	400
HS/BK	25	25	25	100	400

- If the number of balls is under the required number of balls, then that number is your ball score. (For example: Required 130, you deliver 123…7 under required…then 123 is your score)

- A line following program must control your robot's horizontal motion at all times. If the vertical projection of robot leaves the line for any large distance, the robot must be picked up and eturned to home. Current score will be kept.
- Touching the robot at any time requires it to be picked up and returned to home. Current score will be kept.

- Robot cannot be touched when it's delivering balls to the tower.
- The tower cannot be touched during delivery.
- No ONE can reach inside the tower during delivery. If done, the judge will stop the delivery in action and end the run for the team.
- Teams cannot scoop balls out of the tower DURING the delivery.

2.6 TOUNAMENT SCORING

- The top 8 teams from each division will compete in the final tournament.
- Teams got same score in the top 8, decision match will be.
- Teams get same scorement, the faster one will be advanced.
- Advancing teams will be seeded into the tournament bracket according to their aggregate score (see bracket below).

"RoboRAVE Kaga Japan 2019" 8 Team Tournament Bracket

Tournament Placing

・The losing teams from Round 1 will place 5th through 8th in accordance with their aggregate score coming into the tournament.

・The losing teams from Round 2 will face each other in Round 3 to determine the 3rd and 4th place winners respectively.

・The winning teams from Round 2 will face each other in the Championship Round (which may be run at the same time as Round 3) to determine the 2nd place winner, and the Tournament Champion.