

**2020
STEAM CUP CHALLENGE
GUIDE LINES**

Seoul



International STEAM CUP Challenge 2020

TWO EVENTS CATEGORIES

STEAM CUP 2020

Total Cash Prize \$10,000

TURTLEBOT3 AUTORACE

STEAM CUP Category
Perform Autonomous Mission using TurtleBot3 and ROS

Test your ability to program your TB3 to autonomously maneuver through missions!!

- Mission
 - Traffic light
 - Intersection
 - Passing obstacles
 - Parking mission
 - Stop bar mission
 - Turnet

STEAM CUP International Competition

- Date : January 18~19th, 2020
- Location : ROBOTIS Campus (Seoul, South Korea)
- Cash Prize Award
 - 1st Place \$ 5,000 USD
 - 2nd Place \$ 3,000 USD
 - 3rd Place \$ 2,000 USD

Mission topics and orders are subject to change.
For details, please contact us at contactus2@robotis.com

STEAM CUP ROBOTIS | STEAM CUP USA | STEAM CUP MALAYSIA | STEAM CUP TURKEY | ROBOTIS

TURTLE BOT 3 AUTORACE

도전하라! 즐겨라!

2020 STEAM Challenge

일정 및 종목

구분	일정						
	1차	2차	3차	4차	5차	6차	7차
랭킹 게임	6월23일	7월7일	7월21일	8월4일	8월18일	9월1일	9월22일
	1차	2차	3차	4차	왕중왕전 (1차)	5차	6차
STEAM CUP 참가자 선발전	1차	2차		3차		4차	
	스피드 스테킹	1차	2차		3차		4차
로봇코딩		1차	2차		3차		4차
	자율형 보행		1차	2차		3차	
		1차	2차		3차		

조립왕 : 준비시간 30분 이내로 무장애 환경에서 요동침 또는 비틀림(기타)을 제어하는 것!!
밀기왕 : 준비시간 30분 이내로 비장애 환경에서 장애물을 밀어 최단시간에 목표지점에 도달하는 것!!

모든 참가자
 5종류의 상
 증류액 3회 이상

명량게임
 대회 3회 이상 | 증류액 3회 이상
 공학상용품 | 문화상품권 | 포브티즈 미니

STEAM CUP 선발자
 티셔츠 / 메달

* 종목별 규정 및 차수별 접수 기간, 참여인원 등 자세한 사항은 협회 홈페이지 (<http://www.steamcup.org/ko>)를 참고하십시오.
 * 위 일정은 주관기관 사정에 따라 변경될 수 있습니다.

2020 STEAM Challenge

Competition Prize and award

RANK		1st	2nd	3rd
TB3 AutoRace		\$ 6,000	\$ 2,000	1,000US\$
Robot Craft		\$ 3,000	\$ 2,000	\$ 1,000
Robot & Coding	K1- K6	ROBOTIS Engineer kit 1&2	ROBOTIS Engineer kit 1	ROBOTIS MINI
	K7- K12	ROBOTIS Engineer kit 1&2	ROBOTIS Engineer kit 1	ROBOTIS MINI
Robot Wrestling	K1- K6	ROBOTIS Engineer kit 1&2	ROBOTIS Engineer kit 1	ROBOTIS MINI
	K7- K12	ROBOTIS Engineer kit 1&2	ROBOTIS Engineer kit 1	ROBOTIS MINI

- **Prize winner will award Trophy, Medal and Certificate award**
- **Special Award** - Award for team that upload video clips with their preparation procedures such as assembly, practice, epilogue and competition video to their own SNS or media

EVENT 1. TurtleBot 3 Autorace



STEAM CUP 2020

Total Cash Prize \$10,000

TURTLEBOT3 AUTORACE

STEAM CUP Category
Perform Autonomous Mission using TurtleBot3 and ROS

Test your ability to program your TB3 to autonomously maneuver through missions!!

Mission

1. Traffic light	4. Parking mission
2. T-Intersection	5. Stop bar mission
3. Passing obstacles	6. Tunnel

STEAM CUP International Competition

- Date : January 18~19th, 2020
- Location : ROBOTIS Campus (Seoul, South Korea)
- Cash Prize Award

1st Place	\$ 5,000 USD
2nd Place	\$ 3,000 USD
3rd Place	\$ 2,000 USD

Mission topics and orders are subject to change.
For details, please contact us at contactus2@robotis.com





- ❑ Develop Autonomous Driving Code based on mobile platform (TB3).
- ❑ Program operate by ROS and evaluate driving ability with mission solving skills.
- ❑ Test missions are categorized with 6 different missions.
 - ① Traffic Light Mission
 - ② T- Intersection Mission
 - ③ Passing Obstacles Mission
 - ④ Parking Mission
 - ⑤ Stop bar Mission
 - ⑥ Tunnel Mission

EVENT 1. TurtleBot 3 Autorace

General Rules (Participant condition)

- ❑ Team Members
 - : Each Team should be consisted of 2-4 team members.
- ❑ ROBOT Specification
 - : Team must use TB3 Burger
 - : Design and parts of TB3 Burger can be changed freely.
 - : Controller and DYNAMIXEL are restricted to Open CR and XL430
 - : As long as it does not affect the missions, there are no size and weight limit.
 - : SBC (Single Board Computer) is freely allowed.



EVENT 1. TurtleBot 3 Autorace

Competition Rules

- ❑ Time Trial based
 - : Every TEAM is given the single time trial
 - : Rank will be according to time based
 - : Practice Run will be progress on 1st day of event
 - : Time Ranking - 1st place gets 20 points and 1 point will be deducted by each rank. Note that below rank No.20 score 0 point.







- ❑ Disqualification & Deduction Points
 - : If any kind of touch from the contestants after the race start - 5 point deduction/ touch
 - : If ROBOT Stops working for more than 30 seconds - Disqualified
 - : If Race goes more than 10 minutes (preparation 5min + Mission Race 5min) - Disqualified



EVENT 1. TurtleBot 3 Autorace

Judging Standard





- ☐ Mission Score

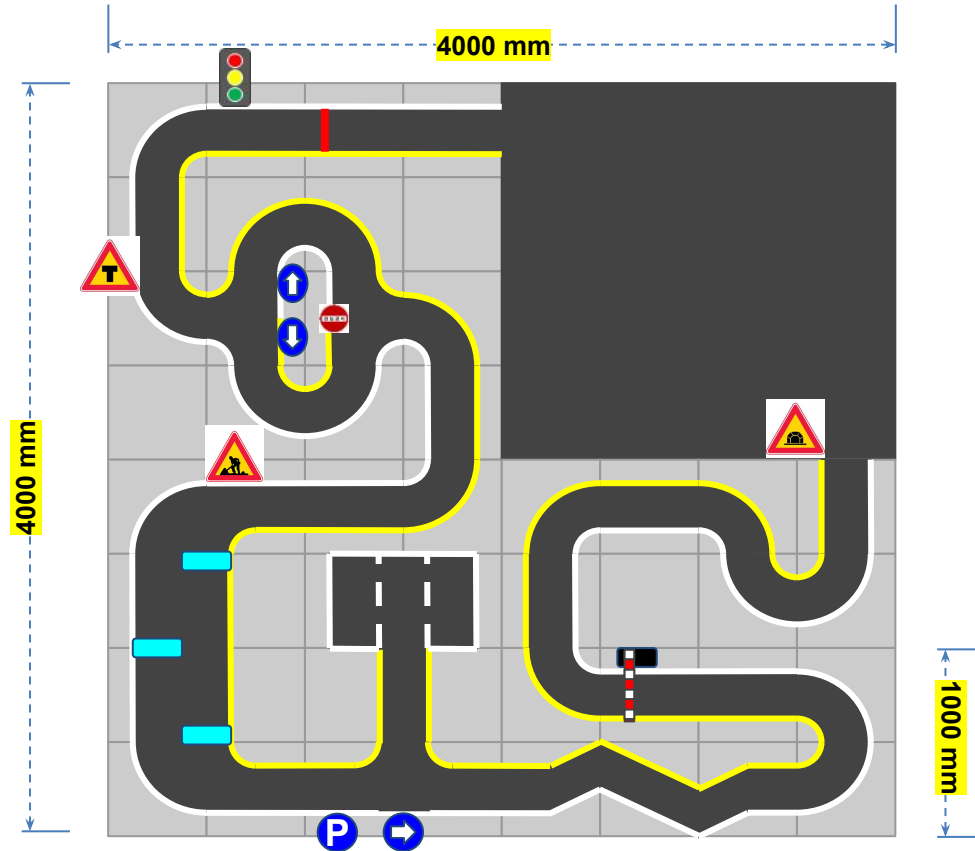
						
Traffic Light	Intersection	Obstacles	Parking	Stop Bar	Tunnel	Time Score
20 Points	20 Points	20 Points	20 Points	20 Points	20 Points	20 Points

※ Scores will judging by the mission, time record and penalty points based.

EVENT 1. TurtleBot 3 Autorace

TB3 Auto Race Map

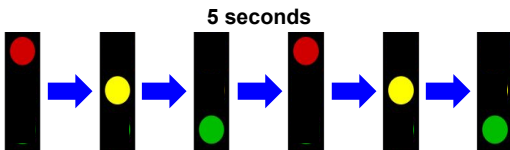
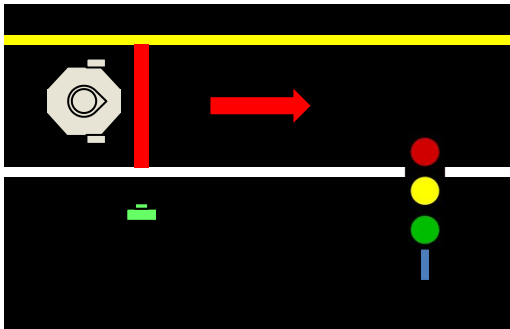
1		Traffic Mission
2		Intersection
3		Obstacles
4		Parking
5		Stop Bar
6		Tunnel



EVENT 1. TurtleBot 3 Autorace

Mission 1.

❑ Traffic Light (20 points)



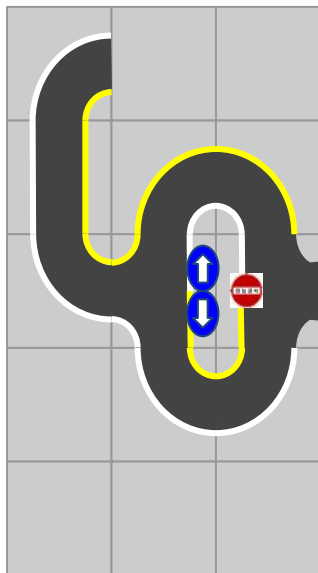
Task

- TB3 must indicate traffic light and autonomously start mission without any external help
- Traffic Light order : Red → Yellow → Green
Traffic Light conversion : every 5 Seconds (repeat)
- TB3 MUST start with Green light. Other than green light, it will be counted as mission fail.
- Total mission time is 5 minutes and mission time will be record from first green light begin.

EVENT 1. TurtleBot 3 Autorace

Mission 2.

❑ T- Intersection (20 points)



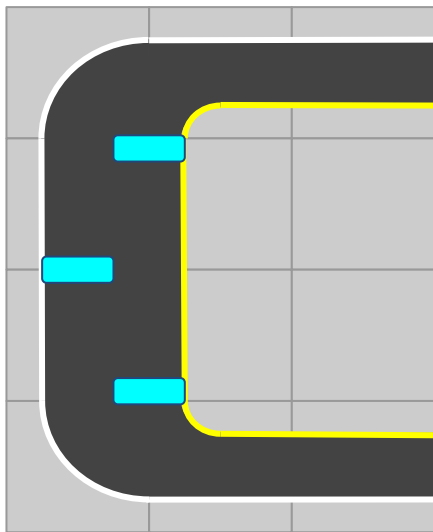
Task

- Left / Right sign will randomly come up. TB3 must drive out with correct direction.
- If TB3 goes to opposite direction against the signal, we assume as mission failure.

EVENT 1. TurtleBot 3 Autorace

Mission 3.

❑ Obstacles (20 points)



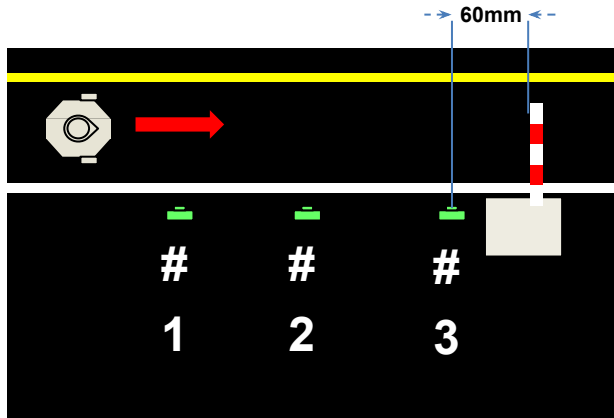
Task

- If TB3 pass through obstacle runway section, we consider obstacle mission as clear.
- Obstacles are fixed on the track
- If TB3 gets any touch during the mission, we assume as mission failure (eg. TB3 stuck in a obstacle)
- Each touch will deduct 1 point from the total score.

EVENT 1. TurtleBot 3 Autorace

Mission 5.

❑ Stop Bar (20 points)



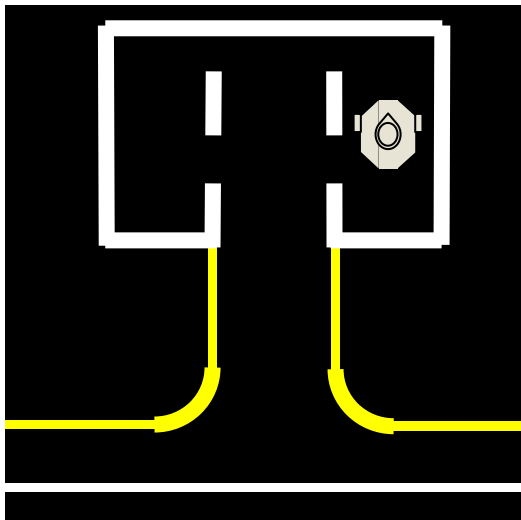
Task

- When sensor #1 detected, Stop bar will closes.
- When sensor #2 detected, Stop bar will opens after few seconds.
- If sensor #3 detected while the bar is closed, we assume as mission failure.
- Sensor #3 is located 60mm apart from the stop bar
- Location of sensor #3 is fixed but other sensor #1 & 2 can be located at any position

EVENT 1. TurtleBot 3 Autorace

Mission 4.

❑ Parking (20 points)



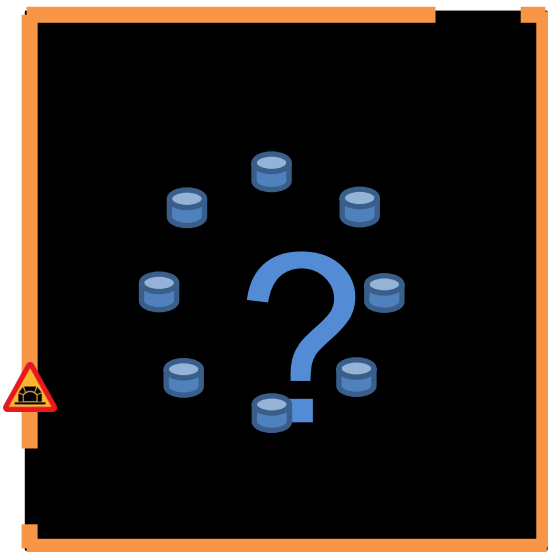
Task

- TB3 must fully entering into parking slot for 1 second parking.
- Mission task, parking for 1 second and get out from the parking and move on to next mission.
- If TB3 enters the parking lot where the dummy robot is parked, we assume as mission failure.
(Dummy robot should be randomly positioned)

EVENT 1. TurtleBot 3 Autorace

Mission 6.

Tunnel (20 points)



Task

- Mission complete, once TB3 escape from the Tunnel.
- Inside the Tunnel is dark (no light) and few obstacles are randomly set (size and location will not given)
- Entrance / Exit size : width 300mm x Height 240mm
- Sensor #3 is located 60mm apart from the stop bar
- If TB3 cannot escape from the tunnel, we assume as mission failure.

EVENT 1. TurtleBot 3 Autorace

Video



EVENT 2. STEAM CUP Challenge

도전하라! 즐겨라!

2020 STEAM Challenge



일정 및 종목

구분	일정	1차	2차	3차	4차	5차	6차	7차
		6월23일	7월7일	7월21일	8월4일	8월18일	9월1일	9월22일
랭킹 게임	말기왕	1차	2차	3차	4차	왕중왕전 (1차)	5차	6차
	조립왕	1차	2차	3차	4차		5차	6차
STEAM CUP 참가자 선발전	로봇크래프트	1차		2차		3차		4차
	스피드 스테킹	1차		2차		3차		4차
	자율형 보행		1차		2차		3차	
	로봇&코딩		1차		2차		3차	

조립왕
 준비는 브래커로, 부품을
 정렬하여
 유동성 조립을 하기
 위하여 정렬!
말기왕
 준비된 말기왕이 사라지자마자
 사자를 잡는
 참가자에게는 1:1 경기!

모든 참가자
 종목 별지
랭킹게임
 대회 3위 이상 / 왕중왕전 3위 이상
 문화상품권 / 로봇티셔츠 미니

STEAM CUP 선발자
 티셔츠 / 메달

* 종목별 규정 및 차수별 접수 기간, 참여인원 등 자세한 사항은
 협회 홈페이지(<http://www.steamcup.org/ko>)를 참고하십시오.
 * 위 일정은 주관기관 사정에 따라 변경될 수 있습니다.

- ❑ ROBOT CRAFT (Main Event)
- ❑ ROBOT & CODING
- ❑ ROBOT WRESTLING

EVENT 2. ROBOT CRAFT (MAIN)

General Rules (Participant condition)

❑ Team Members

- : Each Team should be consisted of 3 team members.
- : Each Team should be play with 3 Robots and must registered before the event. (No substitution)

❑ ROBOT Specification

- : Any types walking of ROBOTS are permitted. But must include 1 humanoid robot in each team.
- : Wheel type / Caterpillar based robots are not allowed to joint the competition.
- : Total weight of team robots should be less than 6 kg (sum amount of 3 robots).

It will be measured before the match start.

- : **Maximum working voltage** for all ROBOT is 12Vz
- : No limitation on No. of sensors or type of sensors.
- : Equipping dangerous weapons such as **drill, saw blade, knife etc. are strongly prohibited**



EVENT 2. ROBOT CRAFT (MAIN)

Tournament & Prize AWARD

❑ **Tournament**

: Participant randomly pick their participate number and attach into tournament table.

: Total of 16 teams will participate Tournament. Each team consist of 3 team members

with their robots. They are not allow to change their Registered ROBOT during the tournament

❑ **Prize Award**

1 st place: \$3,000

2nd place: \$2,000

3rd place : \$1,000

EVENT 2. ROBOT CRAFT (MAIN)

Competition Rule

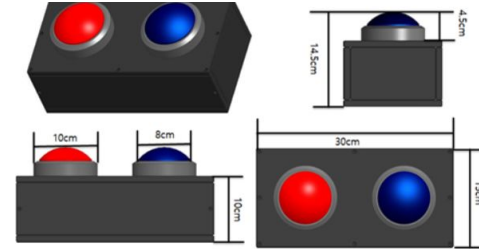
❑ How to score the points?

- : Total 11 LED switch located on 5 different area. (Blue/Red)
- : Each game, the team will be pick on their LED color and start location before the match start.
- : Team who turns more their LED color will win the match.
- : Every match plays for 3 minutes.
- : ROBOTS are freely fight / interrupt to their opponent during match.

❑ Selecting of Start Location

- : Representative team player come out and roll the dice from each team.
- : Select Positioning Location will be decide through rolling the dice
- : 6 Faces, 4 area + YOU & WE
- : YOU = Team can decide their opponent location
- : WE = Team can decide their own starting location

LED Switch Buttons



Dice



EVENT 2. ROBOT CRAFT (MAIN)



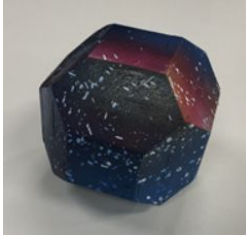

Competition Rule

❑ **Obstacle Blocks**

: **4 different types of Obstacle blocks.** Each blocks will be place into correct location.

(eg. rocks= Land, Woods= Forest, Meteors= Space, Pyramids=Desert)

: There are 3 spots for obstacle block location but participant may choose 2 location to put their obstacle blocks.

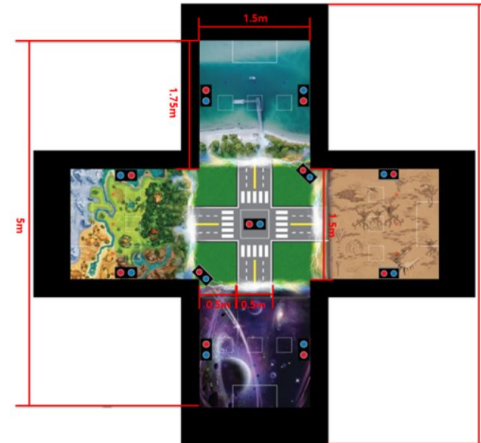
Rock	Wood	Meteor	Pyramids
			

EVENT 2. ROBOT CRAFT (MAIN)

ROBOT CRAFT MAP

MAP info.

- ROBOT CRAFT stage is a cross shaped stadium
- Stage Size : 5m x 5m x 1cm
- There is a 30 cm height clear acrylic wall to prevent robot's falling off.
- 2 number of Obstacle blocks will be located in each regional area. (Furthermore , please refers competition rules)



EVENT 2. ROBOT CRAFT (MAIN)

ROBOT CRAFT Video



EVENT 3. ROBOT & CODING (Sub event)

General Rules (Participant condition)

- ❑ **How to score the points?**
 - : Each Mission have different points upon difficulty of task
 - : Mission will be open during the competition
 - : If the there is duplicate scores, rank will judging by trial time records.

- ❑ **Ranking Method**
 - : Contestant must attempt all 3 mission tasks.
 - : Ranking is judging by the earning points
 - : If points are duplicate, it will be rank with mission completion time.
 - : Contestant final score will be select from best trial score from all 3 missions.



EVENT 3. ROBOT & CODING (Sub event)

General Rules (Participant condition)

❑ **ROBOT Specification**

: Robots are only permitted to use Dream II and STEM Kit for appropriate division. (converting or additional tools are not prohibited)

: No limits on size and weight of robots

: Required component (compulsory)

a) **Dream II** - IR sensor x 2 , LED Module x 1, Touch Sensor x 1

b) **STEM** - IR Sensor Array x 1, IR Sensor x 3, AX-12W x 2



EVENT 3. ROBOT & CODING (Sub event)

General Rules (Participant condition)

- ❑ **Programing Code**
 - : It can be programing with any types of program tools

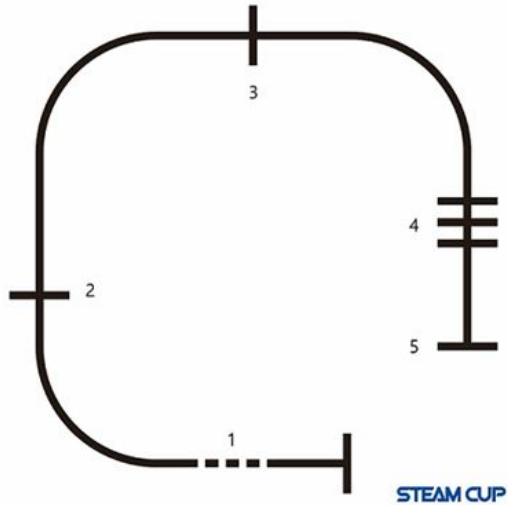
 - : If any cheating or violation to be found during the event, it will be automatically disqualified.
(eg. any involvement from coach or parents, any interference between participant)

- ❑ **Practice**
 - : Practice is allowed during the event time
 - : With in their mission time, they can practice on the track

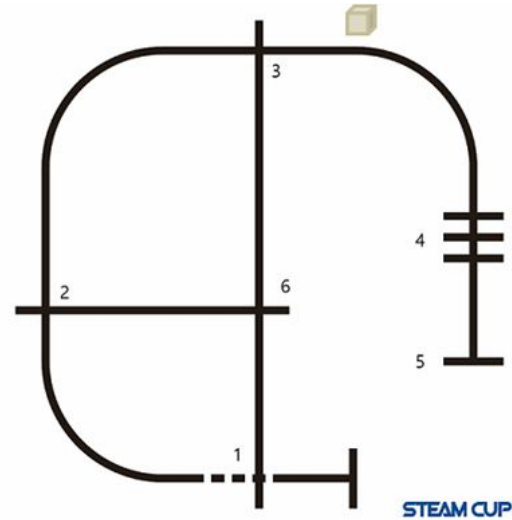


EVENT 3. ROBOT & CODING (Sub event)

Map Information



Primary School



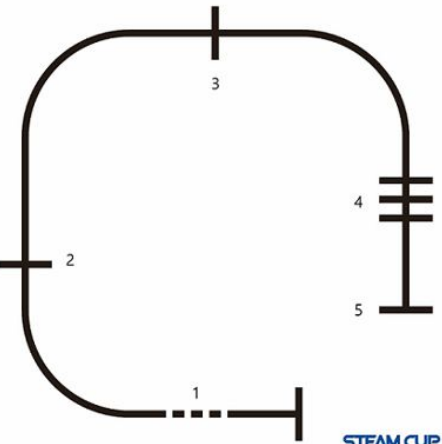
Middle/High School

EVENT 3. ROBOT & CODING (Sub event)

Division	ROBOTIS DREAM II		ROBOTIS STEM
Participant Age	~ K6 (Primary)	~K12 (Middle/High)	~K12 (Middle/High)
Award	1st : ROBOTIS Engineer Kit 1 & 2 2nd : ROBOTIS Engineer Kit 1 3rd : ROBOTIS MINI		
No. of contestants	25 contestants	25 contestants	30 contestants
Ranking method	Time Trial		
Assembly + Programming Time	1st mission : 90 min (Assembly + Coding) 2nd mission : 20 min (Coding) 3rd mission : 20 min (Coding)		1st mission : 150 min 2nd mission : 20 min 3rd mission : 20 min

EVENT 3. ROBOT & CODING (Sub event)

Mission Example

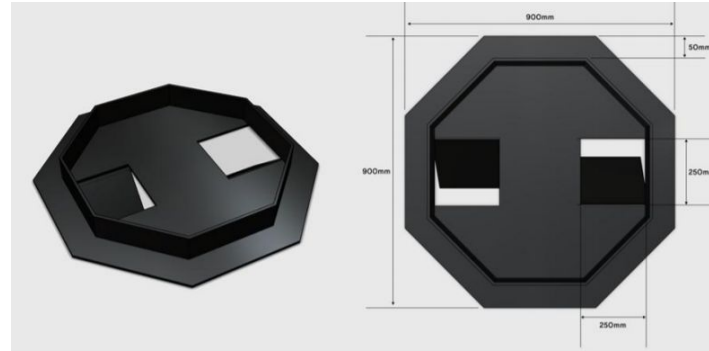
<p>STEAM CUP (1st Mission) (Primary School)</p>		Register No	
		Name	
<p>Please programming your ROBOT to complete below mission.</p>		Score	
		Time	
	Location	Mission	Score
	ALL	<p>Following line (30 points)</p> <ul style="list-style-type: none"> - Deduct 10 points when return to starting position by off track. - Disqualify the competition from 2nd trial off the track 	
	1	Passing location 1 (10 points)	
	2	Stop and Blink LED for 2 times (10 points)	
	3	Stop and altering alarm for 2 seconds (20 points)	
	4	Passing the location 4 (10 points)	
	5	Make U turn and pass location 4 (10points)	
	3	Stop and End the program (10 points)	

EVENT 4. ROBOT WRESTLING (Sub event)

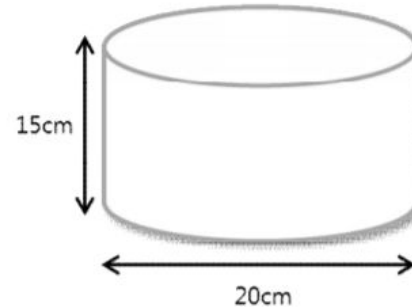
General Rules (Participant condition)

- ❑ **Participant age**
: Participant age upto K6 (Primary student only)
- ❑ **Number of Contestant**
: Total of 50 contestants
- ❑ **ROBOT Specification**
 - : Only Dream II kits are permitted to attend
 - : Freely design the robot with Kits components
 - : Limited weight - less than 300g including battery
(It will be measured before the event start)
 - : Robot size is limited (refer to Attached .1)

Stage Size



Attached. 1



EVENT 4. ROBOT WRESTLING (Sub event)

General Rules (Participant condition)

❑ League & Tournament

- : League game - 50 contestant group into A to J
- : Top 2 ranked players from each group, move on to final tournament
- : For final Tournament, each contestants will pick numbers from the random box to complete tournament table .

❑ Prize Award

- 1st : ROBOTIS Engineer Kit 1 & 2
- 2nd : ROBOTIS Engineer Kit 1
- 3rd : ROBOTIS MINI



EVENT 4. ROBOT WRESTLING (Sub event)

General Rules (Participant condition)

❑ Competition Rule

- : Each match will play for 4 minutes
 - 2 minutes for positioning fight
 - 2 minutes will Open the trap (hole)
- : Whoever put opponent's robot into the trap will win the match
- : If match does not end for 2 minutes after trap open, it will be count as drawing match
- : Re-match is only apply in final tournament if the match result as draw.



EVENT 4. ROBOT WRESTLING (Sub)

ROBOT WRESTLING Video





THANK YOU