2019 STEM
Design Asia Invitation Tournament

Content

I. Introduction

A. The Overview of this Tournament:

This is a regional STEM-Design Asia Invitation Tournament targeted at students between the ages of 6 to 16 years of age. It combines different elements including management, hands-on constructions and interactive programming within an exciting competitive environment. Each team would consist of members with different expertise and skill-sets (such as Team Leadership, Research & Planning, Design & Analytical Thinking, Coding, etc…).

The theme for the tournament will be formally announced in April each year. Teams will make use of SAM Labs suite of products (SAM Blocks & SAM Space App.) to realize their work. Elements such as operational planning, research, design, assembly and coding will be criteria of judging.

In order to complete the challenge, teams will have to use a wide variety of resources to carry out their research including (but not limited to) the library, internet, as well as seeking advice from practicing experts. This will emulate real life research and build real-world problem-solving skills.

B. Our Objective for STEM:

When students undertake a challenge; they are in fact managing a project - conceiving new ideas, solving multiple issues and overcoming technical difficulties. STEM encourages students to build an in-depth knowledge of science and technology. At the same time, curiosity and creativity are indispensable for driving innovation. Therefore, we strive to consolidate and strengthen the students' positive attitude and encourage them to learn in new ways to face the challenges of tomorrow's world.

II. Definition

A.The Tournament

The Tournament (a.k.a Challenge) consist of:

The Challenge consist of Design & Build:

Each team is required to design and build a prototype most relevant to the theme of this year's challenge. They must be able to clearly articulate the problem, how it affects the society and their proposed solution.

B.Age Restriction

1. Elementary Category, Age 6 to 11 : The participant must be born between January 1, 2008 and December 31, 2013
2. Senior Category, Age 12 to 16 : The participant must be born between January 1, 2003 and December 31, 2007

● Remarks:

- The organizer strictly prohibits students whom exceed the age limits from participating in the tournament.
- If a student is younger than the stipulated age in the category, he/she must obtain the prior approval of the organizer.
- If the majority of the team's students are younger than the stipulated age category, the team must participate in the corresponding age category.

C.Definition of the Team

Students can only participate as part of a team. A team consists of 1 coach and 3 - players. Hence, for example, 1 coach and 2 players or 4 players will not be recognized as a team.

D.Definition of Coach

A coach must be at least 20 years old at the point of time when the team submits their registration/ application documents for the tournament. In the case where a coach works with more than one team; each team must then have an assistant coach. The assistant coach must also meet the same age criteria of 20 years and above. The coach can provide advice and guidance before the start of the competition; but all workings during the tournament must be undertaken only by the students.

III. General Rule and Regulations

1. The rules and regulations are set by the tournament organizers (hereinafter referred to as the organizers.

2. Equipment

2.1. Design & Build Challenge allows only the SAM Labs STEM Maker Kit to be used for electronics components; the number of SAM Blocks used is unlimited.

2.2. Each team is allowed to bring the necessary portable power banks for charging the SAM Blocks. No power points will be made available on site and power generators are not allowed on site.

2.3. There are no restrictions on the structural building materials used. Participants are allowed to use all available materials including paper, metal, 3D printed models; as well as building blocks from any brands readily available in the market place.

2.4. Each team will have a display space of 2m x 2m x 2m.

2.5. All material used for the project must fit within the allocated to the 2m x 2m x 2m space; unless otherwise agreed by the organizers. However, the team can conduct their final presentation outside of this range.

2.6. The organizer will provide a 120cm x 60cm (or as close as possible) table and three chairs; tables and chairs must be placed within the allocated space.

2.7. The project can be pre-assembled and programming/ coding can be pre-written.

3. The Tournament

3.1. The Design & Build Tournament is as follows:

- Assembling and testing
- Display area layout (including posters)
- Preliminary review to check compliance
- Final adjustment (to ensure compliance)

3.2. Presentation to the Panel of Judges (including Q&A) and exhibiting to the public. Team registration must be accompanied by a written description that describe in detail how the design concept and its relevance to the main topic of theme. The document must demonstrate your understanding of the subject matter; by illustrations, tables, photos (from various angles) and the final codes written. Submission must be in PDF form and file size limit to below 1GB.

3.3. Teams can (and highly encouraged to) use video to showcase their work and it's relevance to the theme. Contents in the video will not be included in the scoring process, but will allow the judges to have a better visualization of the project, and will also allow them to better structure the questions for the Q&A.

3.4. Each team must have at least one poster with a minimum size of 120 cm x 90 cm.

4. Presentation

4.1. The teams must complete the booth layout and prepare for the presentation to the judges within the specified time allocated (the time-table will be announced by the organizer before the competition).

4.2. During the tournament, the teams must be ready to present at any time. The teams will only be notified 10 minutes before the judges arrives.

4.3. Each team is allocated 10 minutes: 5 minutes to do a presentation and 2~5 minutes for Q&A.

4.4. The official language for presentation is English; there cannot be translators present.

4.5. The organizers recommend that the video be produced in English (or with English subtitles). The team must also add keywords to the clip to facilitate indexing of the database. The video should be in the format of avi, mpeg, wmv, mp4 ; and the size is limited to 1GB. The organizers will provide a cloud drive for video submissions.

5. Scoring (100 points total)

- Any significant deviation from the official theme will result in a disqualification

Construction	Subtotal:	50
1	Relevance to the Theme	25
2	Creative use of Materials	25
Coding	Subtotal:	20
1	degree of automation	20
Presentation	Subtotal:	30
1	Technical understanding	10
2	Team Work	5
5	Clear Articulation of the solution - did it solve the problem, quantify the impact	15
Report presentation	Subtotal:	100

5.1. The Core value: The core value is the most important lesson in this event. Within the core values, we strive to demonstrate that healthy competition and mutual benefit can go hand-in-hand. Helping one another is the foundation of all teamwork. We encourage every student to discuss what this core value means to you with your team-mates. Through the understanding of these values, communicate the spirit of sportsmanship and competitiveness.

- Explore: explore new technologies and ideas
- Innovate : solve problems with creativity and a persistent attitude
- Impact : apply what you learned to improve your world
- Tolerance : respect and accept differences (diversity)
- Teamwork: togetherness makes us stronger
- Fun: enjoy your efforts and celebrate success

5.2. About the Poster: The poster is meant to help the team tell a unique story. This poster is a key component in the tournament.

- Making of the poster
  - Talk about how the core values impacted the process and outcome
  - Show an example that highlights the core values below. This core value posters can help your team organize the presentation more effectively

a. **Explore:** share what your team gain in this exercise; other than the tournament.

b. **Explain:** to the judges how your team strike a balance between core value, research program and implementation.

c. **Combine:** how the core values can be applied outside of team activities. Show the judges ways to incorporate the new ideas, techniques and solutions into real live.

d. **Inclusive:** describe how your team respects each other's ideas so that everyone feels that they are part of the team. Demonstrate to the judges how a team can do more than what an individual can.

e. **Cooperation:** describe how sportsmanship transpire in the tournament; examples of different teams helping each other in times of trouble.

f. **Others:** use the posters to showcase any other aspect of the core values.

5.3. About the Research Project

- In-depth study of Your Theme research project
- Where to start?
  - Identify a topic that you want to research and improve on; or a known issue that you want to find a solution for.
  - Ask yourselves: Why is this problem exist today? Why is the current method of addressing it not good enough? Where are the areas that can be improved?
- Design a solution: Any solution is a good start. The ultimate goal is to find a creative-innovative approach by improving on the existing method; or creating a totally new solution to tackling the problem

Some areas to think about:

- What can be improved? What needs to be done in a different way?
- Once the team finds a solution, the next step is to share it with others! Think about who can benefit from your solution.
- Chances are that your solution can help yourself as well as people around you.
- Who can provide you with feedback in your community? Although the Theme
- Is a big topic, however many of the problems you encounter in real life could very well be resolved?
- How can you share your ideas with people whom can advise and improve your idea?
- o share your findings with scientists and engineers in person?
- To send your thoughts via email or skype?
- To talk to classmates, teachers, or people in the community whom you would not normally talk to regarding topics?
- Take full advantage of everybody's talent when preparing for the presentation. Do explore new and creative ways to do the presentation. However, be mindful that it is absolutely critical to focus on the stated problem and solutions. The presentation can be simple or detailed; solemn or comical. No matter what you decide, everyone has to have fun doing it.

5.4. Research plan presentation:

- Any inventor must present their ideas clearly and effectively to people whom can help make it into reality; people like engineers, investors, or manufacturers.
- Treat the presentation as your team's report-out to your stake holders (the judges).

6. Judging Criteria:

6.1. The identified problem is consistent with the theme.

6.2. Able to explain the solution.

6.3. Explain how they engage others outside the team.

6.4. All teams are required to present in person to the judges.

6.5. All team members must be present during the presentation.

6.6. Preparation and delivery of the presentation must not involve non-team. members.

- We encourage the teams to talk about their source of information (referencing), problem analysis, current solutions, elements of innovation, etc. during the presentation

7. Judging Methods and Awards:

7.1. Organizers will put together a panel of judges comprising e xperts from different fields. Winners will be selected based on the judging criteria communicated prior to the start of the tournament.

7.2. Awards: The number of Awards depends on how much teams involving in and may not be fixed every time.

- Grand Jury Prize (Highest Score): 1.
- Performance Award: 1.
- Design Award: 1.
- Coding Award: 1.
- Research Quality Award: 1.

8. Bonus Competition: Every year, the organizing committee will announce a fun and entertaining game to let teams have an opportunity to score bonus points. This type of bonus competition for this year will announce at section V.

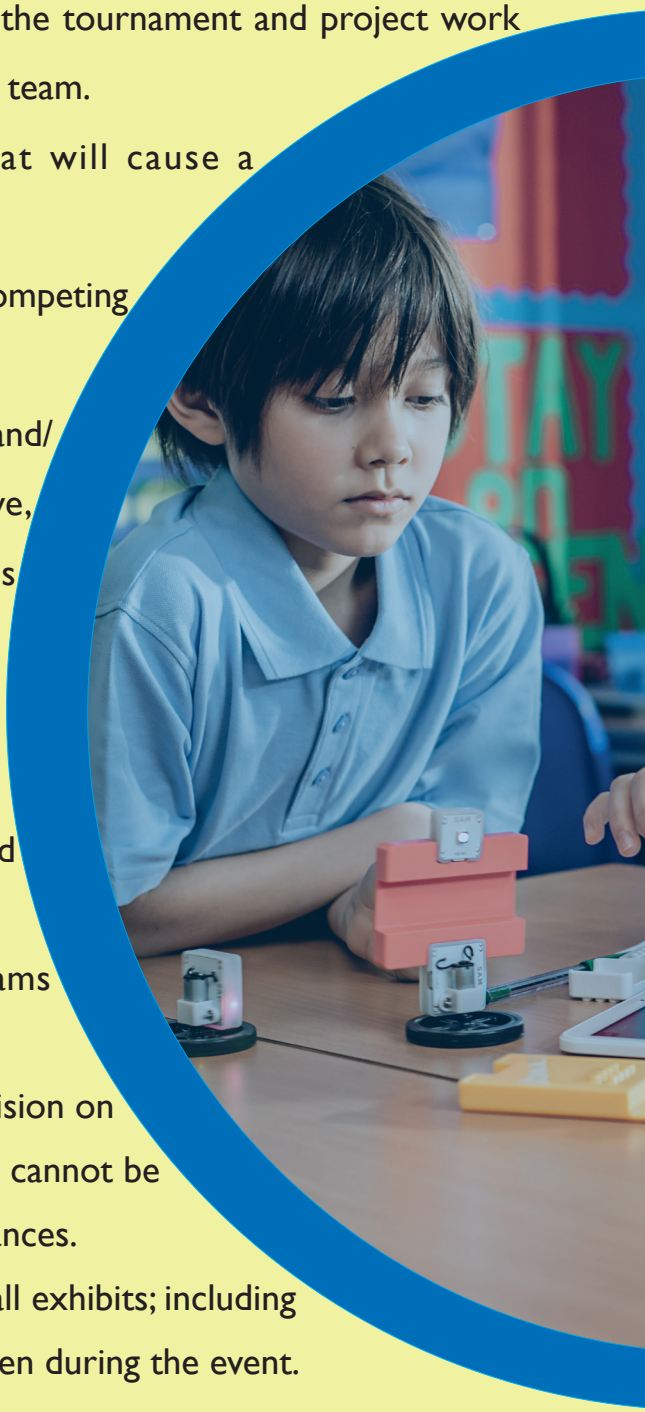
9. Behavior or Items Strictly Prohibited:

9.1. Damage of public property, facilities used for the tournament and project work from (and properties belonging to) competing team.

9.2. Use of hazardous materials or items that will cause a disruption to the tournament.

9.3. Inappropriate behavior or language towards competing teams, spectators, judges and general staff.

9.4. Any other behavior that the Panel of Judges and/or organizers deem inappropriate, insensitive, rude, offensive or contravene the spirit of this tournament.



10. Others

10.1. Teams with a score of zero will not be entitled to a prize.

10.2. The results of the competition winning teams will be announced on our website.

10.3. The Panel of Judges has the absolute final decision on the outcome of this tournament. This decision cannot be over-ruled or overturned under any circumstances.

10.4. The organiser has the right to use images of all exhibits; including but not limited to videos and photographs taken during the event.

10.5. In case of dispute or unforeseen circumstances, the Panel of Judges have the final decision on the interpretation of the rules and regulations.

IV. Official Theme of this Tournament

2019 Techopedia explains Smart City

There is no definitive explanation of a smart city because of the breadth of the technologies that can be incorporated into a city in order for it to be considered a smart city. Mark Deakin defines it as a city that utilizes ICT to meet the demands of its citizens, and that community involvement in the processes is a necessity for a smart city. From the definition given by Husam Al Waer and Mark Deakin[1] in their research publication "From Intelligent to Smart Cities," the factors that contribute to a city being classified as smart are:

- The application of a wide variety of digital and electronic technologies to the city and its communities
- The application of a wide variety of digital and electronic technologies to the city and its communities
- The application of ICT to uplift life and the working environments in the region
- The embedding of such ICT within government systems
- The territorialization of practices that bring the people and ICT together in order to foster innovation and enhance the knowledge that they offer.

[1]Reference : https://www.techopedia.com/definition/31494/smart-city

A. The Challenge :

Identify one problem in the city you are living in, clearly explain it's impact to future society (health, economy, social, … etc) if left unresolved. These sub-category are for your reference only :

- health : water, food, air, quality control, pollution
- economy : transport, efficiency, wastage, recycling, automation
- social : elderly, youth, disadvantaged, poor, housing, education

Your job is to propose a solution to the problem you identified (and researched on), build a prototype of your solution and explain to the panel of judges :

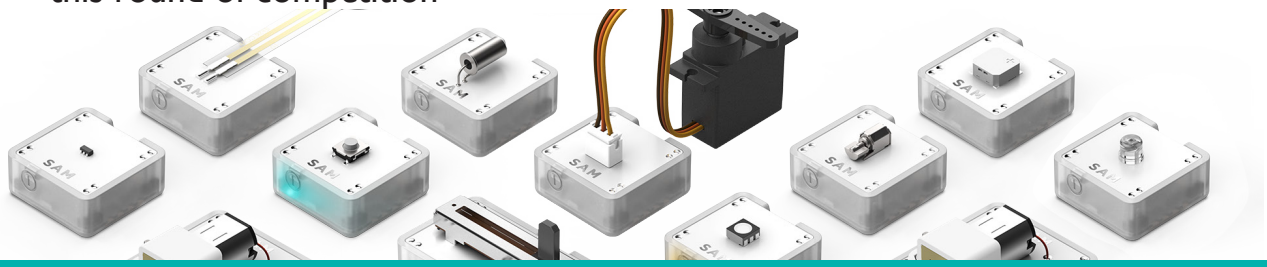
- how it will resolve the problem
- the technology involved
- it's impact (quantify) to your city
- various cause and effects (pros & cons)

V. Bonus Competition

2019 Bonus Competition: Fastest Fingers Contest

A. The Challenge of Bonus Competition

- Each initial round (a.k.a. first round) will consist of 5 teams
- During this initial round 5 questions will be asked
- Each question will be allocated a maximum of 5 minutes
- Each team will use the SAM Blocks (provided) and SAM Space App (on an iPad from the team) to find the answer to the question
- The highest scoring two teams will proceed to the finals
  - In the event where two or more teams share the highest score, the team that used the least number of Behaviour Blocks in their correct answers will be declared the winner
  - The runner up will be the team with the next lowest number of Behaviour Blocks
- The final round will consist of 5 questions
- Each question will be allocated a maximum of 5 minutes
- The bonus points awarded to the contestants of the final round will be as follows: 1st place (5) , 2nd place (3) , 3rd place (2)
- All other contestants will not be eligible for bonus points
- All mobile phones or communication devices cannot be present or used during this round of competition



B. Scoring Method for each question:

- The solution must be functional (i.e. it works !)
- The team that completes in the fastest time (and meets criteria 1) gets the point
- In the event where two or more teams comes in with the same timing, and meeting criteria (1)
- The team using the least Behaviour Blocks on SAM Space gets the point.
- In the event where two or more teams used the same number of Behaviour Blocks, these teams will share the points equally
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  - In the event where two or more teams used the same number of Behavior Blocks, these teams will share the points equally