IESL ROBOGAMES 2019

School Category - Task Specification

1. Eligibility

    ● Participants are advised to form a team of up to 5 students.
    ● Any number of teams from a school can enroll in the competition.
    ● All team members should be students of the same school at the time of their participation in the competition.
    ● Each team should provide valid identification documents from their school on the competition day to prove their eligibility to participate in the competition.
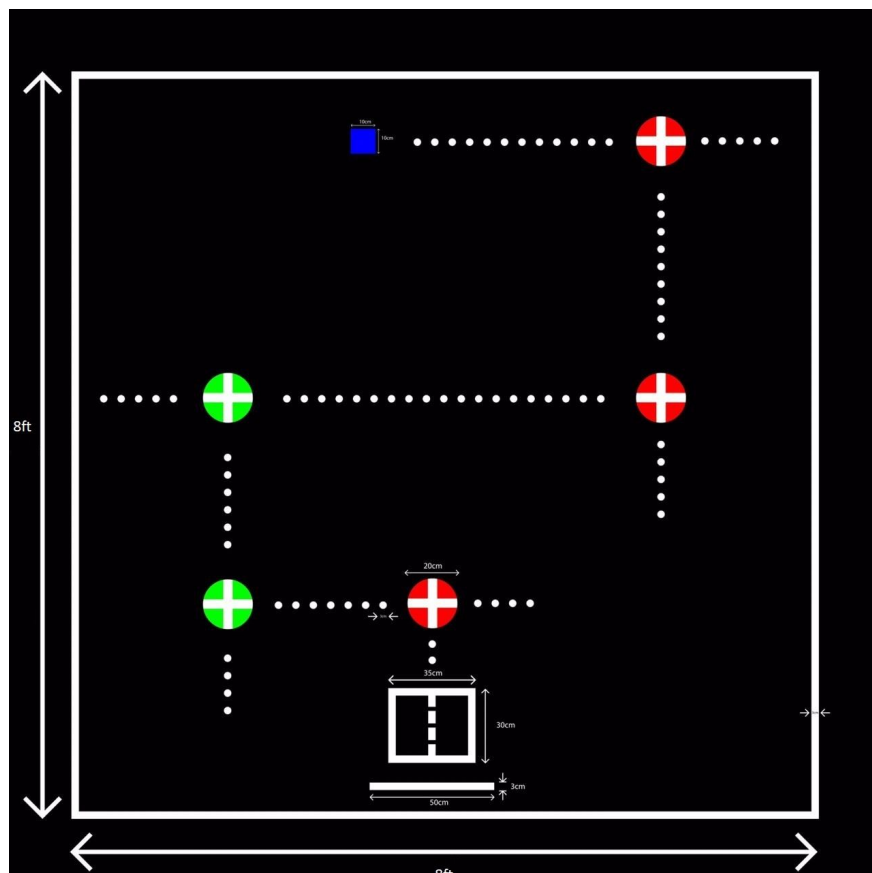   ● Students who will sit for AL examination in 2019 are eligible to participate.

2. Challenge - Hayabusa Challenge

    ● "**Hayabusa**" ("Peregrine Falcon") was a robotic spacecraft developed by the Japan Aerospace Exploration Agency (JAXA) to return a sample of material from a small near-Earth asteroid named 25143 Itokawa to Earth for further analysis. Hayabusa was launched on 9 May 2003 and landed on the asteroid in November 2005 and was collecting samples in the form of tiny grains of asteroidal material. Suddenly, all communications with Hayabusa was lost in June 2019 and there is no method to retrieve the latest set of data from the spacecraft without being on sight. Since it is assumed that another asteroid has collided with 25143 Itokawa, Hayabusa must be severely damaged and not functioning. JAXA will launch "**Ravana**" spacecraft to retrieve the lost data of Hayabusa from 25143 Itokawa.

    ● The competitors are asked to build a robot that will be landed on 25143 Itokawa to find and retrieve the blackbox of Hayabusa, in which the robot should navigate autonomously, locating the known stations and tracks of Hayabusa.

3. Robot Specification

    ● Dimensions of the robot must not exceed 25 cm × 20 cm (length × width).
    ● Robot must be completely built by the team itself with their own design ideas.

- Robot should have a clearly indicated "ON/OFF" or "START" switch.
- Once the robot is switched on, it should be self-navigating. Wireless communication and remote controlled robots are not allowed in the competition (Robot should have the intelligence to navigate without any outside help or command).
- No off-the-shelf kits (commercial robot kits) are allowed except processing boards (i.e. Arduino or equivalent, Raspberry Pi, etc.), sensor modules and drive gears. If you have any doubt, contact the organizing team.
- After starting an attempt, the only interaction of the participants with the robot should be to stop the robot if necessary.
- It is encouraged to have a landing mechanism for the robot, but not compulsory.
- Robots should be able to land on the landing zone from a height of 30cm without damaging the platform.
- Any robot with the potential threat of damaging the game platform will not be allowed to compete.
- Robots should work under any ambient light conditions.
- Calibration should be done at the start for light conditions if necessary.
- There are no height restrictions on the robot.

4. Platform Specification

Measurements

- Arena - 8ft x 8ft
- Landing Zone - 30cm x 35cm
- Lines in Landing Zone - 3cm
- Lines in Crossed Circle - 3cm
- Crossed Circles (diameter) (Known Stations) - 20cm
- Small Circles (diameter) - 3cm
- Wall at Landing Zone
  - Height - 25cm & Length - 40cm
- Black Box Square - 10cm
- Boundary Line - 3cm

- Floor has a black finished area.
- All the laid tracks will be white.
- Stations will be colored in different colors depending on the turn that the robot should take at the station.
  - Right Turn - Green
  - Left Turn - Red
- Landing zone and the wall at the landing zone will be white.
- The location of the blackbox will be of blue color.
- Though the above figure depicts straight tracks, as the surfaces are uneven they will be not the same as in the figure at the arena.
- The line lengths and curves will not be exactly the same as the figure but the overall design will be similar to the figure.

➢ Above given measurements will vary at some points in the range of ± 3mm
➢ The actual arena at the competition will not be the same as above but will have similar characteristics.

5. Arena Description

- Arena will be 8′ x 8′ and it will consist of uneven surfaces which are used to simulate and represent the real life scenario of an asteroid.
- Arena Boarder
  - The border of the arena will be marked with a 3cm thick white solid line finished with matte.
- Arena Floor
  - Matte finished floor which is black in color.
- Lines in Landing Zone and Stations
  - White lines with a thickness range of 2.7-3.3cm.

6. Task Procedure

- After your team name is called for the competition you are allowed to have one test attempt for your robot which is limited to 10 minutes.
- After the test attempt you will have 2 more attempts which are used to give you marks. Maximum score of given two attempts will be taken as the score of the current round.
- All robots will be collected by the organizers 10 minutes before the round begins and only be returned to the competitors after the round is completed.
- Steps should be followed to complete the task,
    i. Start the robot.
        - On the command of the supervisor the robot's ON switch is triggered and it's put into full autonomous mode.
    ii. Place the robot.
        - Robot will be placed above the landing zone from a defined height. (30cm)
    iii. Land the robot.
        - Landing should happen in the marked landing zone.
    iv. Locate the stations
        - Stations are located at the path to navigate towards the blackbox. Stations have to be located using the tracks left by Hayabusa. (depicted using small circles)
    v. Find the blackbox
        - The blackbox of Hayabusa is placed in the area and the robot should be able to locate it autonomously.
    vi. Retrieve the blackbox.
        - Balckbox can be retrieved using a magnet.
    vii. Return to the landing zone.
        - The robot is expected to find and retrieve the blackbox and then return to the landing zone with the blackbox.
- Crossing the boundary line will result in reduction of marks.
- Marks will be given to reaching each station.

7. Timing Measurements

- The task will be timed from the time the ON button of the robot is pressed to the time when the robot reaches the landing zone with the blackbox.
- Time taken to complete the task will be considered when giving marks.
- Time taken for the task should be less than 10 minutes and if the robot exceeds the time limit of 10 minutes your robot will be removed from the arena.

➔ Grading Criteria will be released after registration deadline.