RIT Dubai Engineering Competition
2016

Organized by RIT-Dubai Electrical and Mechanical and Industrial Engineering Departments

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Introduction: what is RIT-Dubai Engineering Competition?

Rochester Institute of Technology – Dubai Engineering Competition is an annual competition that is intended for high school students (grade 11 and 12) who are interested in Computer, Electrical or Mechanical Engineering Studies. Students will participate and compete in a friendly, informative and professional atmosphere where they will be able to test their ideas and explore other ideas that will broaden not only their knowledge but also their conception.

Where: Rochester Institute of Technology – Dubai campus.
Techno Point, Dubai Silicon Oasis
More info on: https://www.rit.edu/dubai/about/directions-to-campus

How can I participate?

Interested students can’t participate as individuals. They have to get schools permission and supervision. Any team of at most three students has to be formed under the supervision of at least one school official (teacher or administrator).
Competitions

There is one main competition which is the Robo-Cup Competition. All the information about this competition will be described in the following chapter.

Furthermore, there are three On-Site competitions:

- Mechanical Engineering Competition
- Math Competition
- Programming Competition

Information about the On-Site Competition will be provided at the last page of this manual.
The RoboCup-Competition General Description

The Theme
This year we will have a RoboCup Competition, the challenge is to design a football (soccer) robo-player that will compete with another robo-player from another participating team to score a “Golden Goal”.

The Participants
There will be only eight schools participating in this contest, where each school can participate with only one team for each competition (Robocup, Mechanical, Math, and Programming). A maximum of three students are allowed in the Robocup competition. All teams must be under the supervision of a teacher or school official.

The Playground
The playground will be a circular shaped ring with a 4-meter diameter surrounded by a black strip of 0.5-meter width that stands for the goal. After that, another 0.5-meter red strip is located as a boundary to the playground (no robot land). The edge between the black strip and the red strip will be taped with a 5 cm silver mirror tape.
The Game Ball

All the information about the Game-ball that will be used for this competition, which will be the organizers' responsibility to provide on the day of the competition, can be found on the following webpage:

http://www.hitechnic.com/cgi-bin/commerce.cgi?preadd=action&key=IRB1005

The Robot

The robot maximum size should be within the following dimensions: width: 25cm, length: 30 cm and height: 40cm. Robot must be completely self-contained and must receive no outside assistance.

Furthermore, all Robots should be fitted with:

- An infrared sensor (to track the game-ball, and as suggestion only, you can find such a sensor that is compatible with the Game-Ball on the following webpage:
  http://www.hitechnic.com/cgi-bin/commerce.cgi?preadd=action&key=NSK1042
  - A light sensor (to avoid the field line (or the silver tape)).
  - A Beeper (to trigger when scoring a Goal)

Moreover, the robot must be able to function for at least 20 minutes without the need to recharge (or refuel!!).

Game Life Scenario

- Place the robot on your team base. (no physical contact after this point)
- Robot should remain ideal until jury trigger a loud peep (Using Sound Sensor) at which it should start moving autonomously.
- Robot should search for the ball and approach it autonomously (Using IR sensor).
- When the Robot catches the ball, It should search for the black strip and place the ball anywhere over it and trigger a peep (Using the Beeper) to identify task completion.
Competition Rules:

- Eight teams (Robots) from eight different schools will participate in the competition.
- Each team will be placed on the Competition Chart by Draw on the day of the competition.
- Each match will be between two Robots from two different schools.
- Each match will be for Ten minutes.
- The Chart:

  The Loosing Robot in any match will be disqualified. **Except in:**
  - The looser in the Quarter-Final will play to determine the 3rd place winner.
  - In case of a tie: an extra 3 minutes will be given to the match (where first team to score a goal will directly win. If both teams still fail to score, both teams will be disqualified.
  - A Goal is counted for the Robot that can place the game-ball on the black strip at which 10 points will be counted for that team.
  - If a ball reached the red strip it will not count as a goal.
  - 5 points will be reduced from the team for each physical contact between any team member and the robot.
  - Contestants may use any programming language to program their robot
The Poster

As part of the competition, each team must present their robot to the jury and explain the design specifications in a poster. The poster session takes on a considerable weight because it is a factor in making sure that the students themselves were highly involved in the design of the robot.

The poster session will be examined by the judges. Each poster will be evaluated by the judges and upon their own discretion and depending on the performance of the students, a score of maximum 20 points will be given to the team. So, it is crucial to have a good poster and to make sure that all the students understand all the different aspects of the design to be eligible to participate in the contest.

Poster Guidelines:

- The poster presents the design of the team’s robot.
- Teams will register for the poster session as part of the contest.
- The limit on poster size is A1. Poster stands will be provided to each team.
- Each team will give a 5-minute, focused oral presentation to the judges. The presentation schedule will be available at check-in time. Teams must make their presentation in front of their poster at the assigned time.
- All posters and teams must use English as the official language.
On-Site Competition General Description

- Each one of on-site competition will be for 2-hour.
- The questions will be revealed on the day of the competition.
- Only One team (maximum of three students) is allowed for each competition.
- Mechanical Engineering Competition
  - Students from different high schools will compete against one another in an exciting Mechanical Engineering design contest. The students will be given the same raw material, the competition objective, the constraints, and the evaluation metrics.
- For Math Competition:
  - One Competition Manual will be provided for each team.
  - The problems will be of different level of difficulty and hence different number of points will be allocated for each one.
  - Calculators are not allowed.
- For Programming Competition:
  - Teams should bring their own laptops.
  - Any Programming Language is allowed.
  - The competition consists of 6 questions divided into 2 sections of 3 problems each. The problems in each section are of varying level of difficulty and hence, have been allocated different frytes (the coding currency). The questions in each section are worth 50, 100 and 150 frytes.
    - **Section A**
      - Prove your worth in these logic-based problems.
    - **Section B**
      - “It's not just about finishing the race, but about doing it quickly”. You have to display the output for these problems within about 4 seconds.
      - For every 2 questions you solve, 1 from each section, you become eligible for a bonus question.
      - The bonus questions will test your innovative thinking abilities rather than your coding ones and are worth 20 frytes each. Single attempt is allowed for each of these questions.
      - The time of your last correct submission will be noted. In case of a tie, the team which has submitted the problems taking lesser time will be declared the winner.