Rowan University 2014 IEEE Student Activities Conference for Region 2

Robot Triathlon Competition

Robot Triathlon Competition

Design Problem:

Your robot will have to traverse three separate challenges.

- There will be two scoring categories based on the control-type of the robot (see **Scoring** for details):
  - Radio Controlled (RC) robots
  - Autonomously Controlled (AC) robots

Overall course specifications:

- The entire course will be timed. One judge will monitor overall time from the start of the first challenge to the completion of the last challenge.
- While the teams robot is completing the course, one team member may follow the robot in order to determine whether the team would like to utilize their skip option as is noted below (See section 1G, 2F and 3F).
- Between challenges, the team may make as many alterations to the robot as they wish (the basic chassis must remain the same), keeping in mind that the overall course time will continue. Teams may not spend more than 5 minutes making alterations between challenges.
- If any part of the robot reaches more than 1' over the sides of the course (at the discretion of the judges) the robot will automatically be forced to restart the challenge.
- Teams may only utilize their opportunity to restart a challenge two times.

1. Line Follow
   a. Winding curve cut from 8'x4' piece of plywood.
   b. There will be no walls on either side of the path that the robot must follow.
   c. Refer to Figure 1 for the layout of the line.
   d. The start line will be at the beginning of the black following line and the finish will be at the end of the black following line.
   e. A black line (made of Gorilla Tape)will travel throughout the center of the entirety of the Line Follow.
   f. There will be a minimum 7 " space on either side of the line
   g. If the team's robot falls off the table they will have two options (See **Scoring** for details):
      i. Skip the challenge, moving the robot to the finish area at the end of the Line Follow.
      ii. Restart at the beginning of the Line Follow, in the start area.

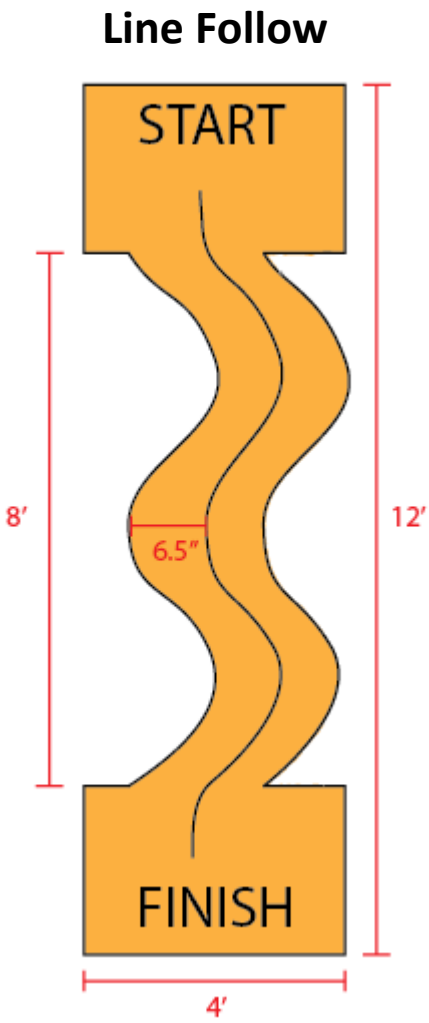

Figure 1: Line Follow Section of the Course

2. Angular Challenge
    a. There will be a variable incline with a plateaued top See Figure 2
        i. The angle of the incline will be set by the judges the day of the competition.
    b. The start line will be 4' long at the beginning of the challenge and the finish line will be 4' long at the end of the challenge.
    c. There will be (~4") walls on either side of this entire challenge made of 2" by 4" wooden boards.
    d. The team's robot must traverse the obstacle from start to finish and determine the angle of the incline. (See Figure 2)
        i. The angles on either side will be the same.
        ii. The plateau will be parallel to the ground.
        iii. Each floor board will be attached to the next with a hinge, and the support under the plateau will be variable so that the judges can set an unknown angle the day of the competition.
        iv. There will be a black line (made of black Gorilla tape) down the middle of the entire Angular Challenge course for the robot to follow.
        v. The gaps at the vertices will be a maximum of 1" wide
    e. The team's robot will display the instantaneous angle at all times while traversing this segment of the course, and will display the average angle at the end of the course for scoring.
        i. The Angular Challenge will be set anywhere from 10 to 50 degrees.
        ii. The plateau should be excluded from the average angle measurement.
    f. If at any time the team feels they need to restart the angular challenge, they have two options (See **Scoring** for details):
        i. Skip the challenge, moving the robot to the finish area at the end of the Angular Challenge.
        ii. Restart at the beginning of the Angular Challenge, in the start area.

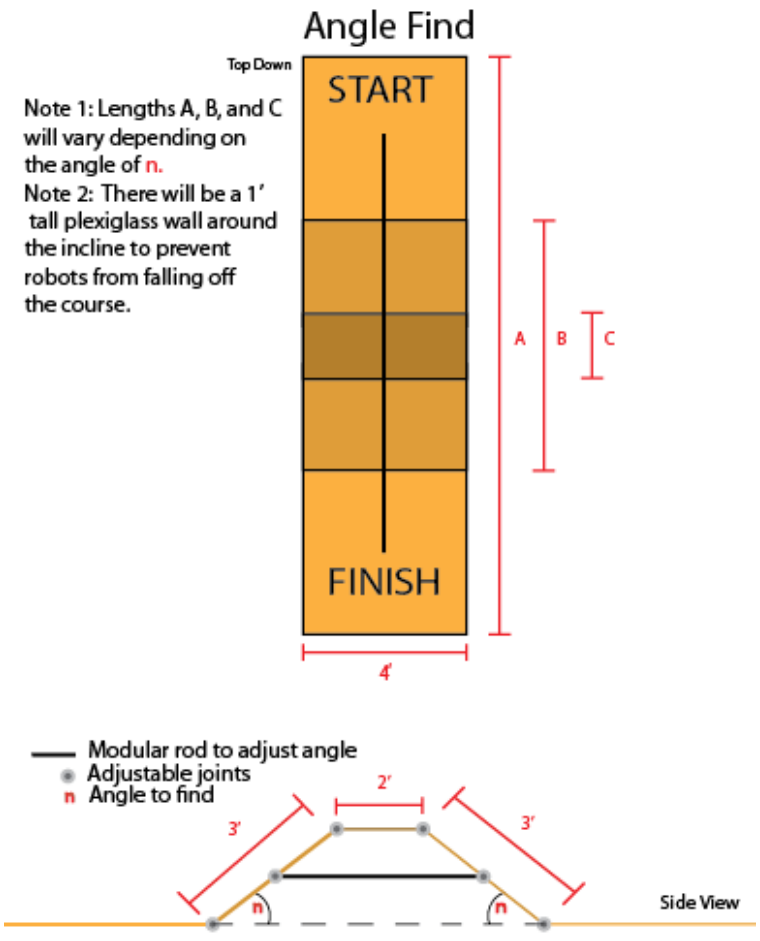

Figure 2: Angle Find Section of the Course

3. Boulder Field
    a. There will be boulders ranging from 1” to 2” in height. arranged on a 4’ by 8’ piece of plywood. The boulders will be made from different levels of plywood.
    b. The start line will be 4’ long at the beginning of the challenge and the finish line will be 4’ long at the end of the challenge.
    c. The Boulder Field will be arranged in a similar fashion to a peg board where boulders will be assembled in a unique fashion by the judges the day of the competition.
    d. The walls of the Boulder Field will be 1’ high.
    e. There will be no black guiding line on the Boulder Field.
    f. If the team’s robot is about to flip, or they feel they need to intervene in any way they have two options (See **Scoring** for details):
        i. Skip the challenge, moving the robot to the end of the Boulder Field.
        ii. Restart at the beginning of the Boulder Field.

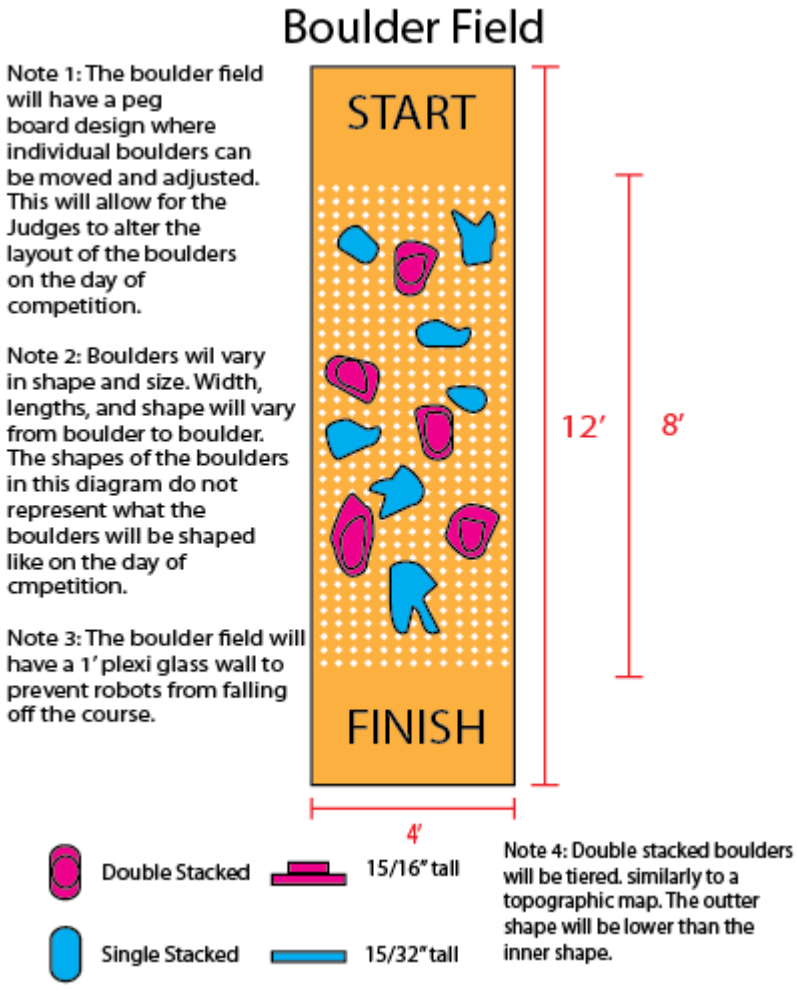

Figure 3: Boulder Field Section of the Course

Robot Triathlon Competition

Robot Specifications:

- Before the robot enters the course it must be able to fit within a 1' x 1' box, extending infinitely into the air, that will be taped onto the ground. There is no limit to size that the robot may extend to while traversing the course.
- The robot must have at least one point of contact with the ground at all times (i.e. no flying).
- No parts may detach from the robot at any time while completing a challenge (parts may be exchanged between challenges).
- The robot may be either radio controlled (RC), autonomously controlled (AC), or a combination of both, scoring will be denoted for having done a challenge while RC or AC (see **Scoring** for details).

Scoring:

The overall objective of the course is to complete it in the least amount of time. All teams will start out with zero points and have points added based on several factors listed below. Teams will have the opportunity to earn up to 600 points. In a tie-breaker situation AC controlled robots will be granted one extra point over an RC controlled robot. Judges will determine the result of an AC-AC tie by re-considering subjective scoring. The point values awarded are for AC robots; if a team's robot completes any scoring section using an RC feature, 50% of points listed are granted.

1. Speed of completing the entire course. Teams will be granted points based on the amount of time it takes their robot to complete the entire course if and only if the team's robot completed all three challenges:
    - Fastest Time …..... .....100 Pts.
    - Second Fastest Time …..... ..... 90 Pts.
    - Third Fastest Time …..... .....80 Pts.
    - Fourth Fastest Time..... .....70 Pts.
    - Fifth Fastest Time …..... .....60 Pts.
    - Sixth Fastest Time …..... .....50 Pts.
    - Seventh Fastest Time …..... ....40 Pts.
2. If a team chooses to skip a challenge they are not eligible to receive points from that challenge and will be disqualified from Scoring - Section 1(Time needed to complete the entire course). Speed of completing each individual challenge (These points will be awarded three times, once per challenge):
    - Fastest Time …..... .....50 Pts.
    - Second Fastest Time …..... ..... 45 Pts.
    - Third Fastest Time …..... .....40 Pts.
    - Fourth Fastest Time..... .....35 Pts.
    - Fifth Fastest Time …..... .....30 Pts.
    - Sixth Fastest Time …..... .....25 Pts.
    - Seventh Fastest Time …..... ....20 Pts.
3. Completing challenges:
    - Completing each challenge is defined as starting behind the start line and passing completely over the finish line. In the case of the Angular Challenge, teams must have a final displayed angle of +/- 3 degrees of the actual angle.
        - Completing one challenge..... .....50 Pts.

- Completing two challenges.....100 Pts.
- Completing three challenges.....150 Pts.

4. **Subjective Scoring** - Subjective scoring will be determined by the judges. After a robot has completed the course, the team will be assigned a 10 minute time-slot to present to the judges, at which time the judges will take notes and ask questions of clarification. The judges will then deliberate and later provide a score on the following categories:
    - Creativity of design as a whole.....1 to 50 Pts.
    - Creativity in use of materials.....1 to 50 Pts.
    - Overall professionalism of the presentation of design..... .....1 to 50 Pts.
5. Penalties
    - Damage to the course - the judges will determine the extent of the damage based on their opinion of how it will affect other competitors ability to traverse the course. (-1 to -600 Pts.)

Awards

TBD

Contact Information

For questions of clarifications regarding these course and tournament specifications, please contact the RAS Tournament Planning Committee. Feedback has been received and these specifications are finalized, all alterations will be posted to the 2014 Student Activities Conference Website (rowan.edu/clubs/ieee).

Tournament Planning Committee

President: Jeffrey Eker
- Email: ekerj53@students.rowan.edu
- Phone: (856) 535-5675

Vice President: Matthew Oldland
- Email: oldlan86@students.rowan.edu

Treasurer: Josh Wible
- Email: wiblej35@students.rowan.edu

Secretary: Maria Torculas
- Email: torcul51@students.rowan.edu

Facilities Manager: Charles Grab
- Email: grabc07@students.rowan.edu