AIRC 2017

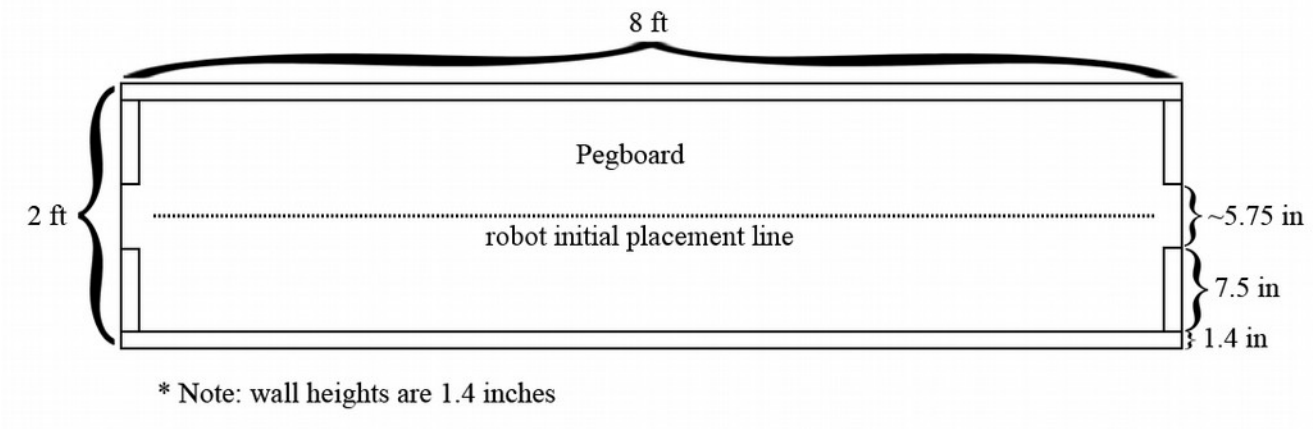
2nd Annual Augustana Invitational Robotics Challenge

1. Objective:

The 2017 challenge is to build a robot that plays with ping pong balls. Don't worry, your robot does NOT actually need to play the game of ping pong (like this one: http://bit.ly/1fRii0m).

Instead, your robot will be more of a "garbage removal" robot that saves robo-world from being overrun by ping pong balls, by knocking (or plucking, or plowing) them off the course.

Specifically, the robot course consists of a 2' x 8' sheet of brown pegboard with borders around all sides, except for a gap (approx. 5.75 inches wide) at the middle of each end (see diagram below).



Course building directions (in case you need to make a copy of this course at your school):
* *We purchased a 4'x8' piece of pegboard at Lowes and had them cut it in half.*
* *We purchased three 8' 2x2 boards, and cut four 7.5" sections from one of them.*
* *We screwed the 2x2 (which are actually 1.4x1.4) boundaries onto the pegboard, as shown above.*

The robot will be placed at an arbitrary starting location on the **robot initial placement line** (see diagram above), facing a random cardinal direction (up/down/left/right on the diagram above).

Ten (standard white) ping pong balls will be placed at arbitrary locations on the course. You will not know the exact locations ahead of time, but you can assume they will be spread out on the course, and it is likely that there will be a ping pong ball placed in front of each exit gap to make it a little easier to earn a positive score. *(Side note: since pegboard has holes punched on a regular grid, we can place ping pong balls at the same initial locations for each robot's trial without them rolling around.)*

Your robot will be given 2 minutes to remove as many of these ten ping pong balls as possible. Robots may remove ping pong balls using any method you choose (e.g. pushing them through the exits, tossing them over the walls, hitting them with a genuine ping pong paddle, or gathering them into a bin/basket that's attached to the robot.).

Each robot will be given three individual trials (no other robots simultaneously on the course). If the robot exits the course, then the trial will be terminated early.

2. Scoring

The score at the end of the trial is the number of ping pong balls removed. More technically, it will be counted as 10 *minus* the number of ping pong balls that are in physical contact with the pegboard when time runs out. (One small exception: if a ping pong ball is resting OFF the course but leaning against the edge of the pegboard, it will still be judged as "removed".)

Each robot's *contest score* is the sum of its **best two trials** (out of three). *Ties are broken as follows:*

If multiple robots tie in *contest score*, then the sum of all three trials will be considered.

If there is still a tie, then an *overtime* round will occur, where each potential champion gets another trial, and the highest score wins. If there is still a *tie*, then a second overtime round will occur. If a tie remains after two overtime rounds, then multiple winners will be crowned.

3. Robot construction and programming

- This year's contest will allow teams to use any robotics platform, but most teams will likely use LEGO-brand EV3 or NXT kits. *(Augustana teams may check out robots from the Math and CS Department. Other schools will need to provide their own robots – contact your local CS or engineering dept. to see if they have robots or are willing to purchase them for you.)*
- The robot must not exceed 18 inches in any dimension when placed on the course (although it is acceptable for it to unfold itself/become larger during operation.)
- The robot's execution should not cause any damage to the course or the ping pong balls.
- Remote-controlled robots will NOT be allowed. Once the race trial begins, the robot must act autonomously! (Bluetooth/WiFi communication with the robots is prohibited during the race.)
- If a robot is physically damaged during a trial, the team may repair it after that trial is over. However, NO changes to the robot design or programming are allowed once the contest starts.
- Teams are free to program their robots using any tools/language that they choose. The free LeJOS platform (to program LEGO robots using Java with a convenient Eclipse plugin) is recommended, but other choices (LEGO drag-n-drop, RobotC, LabVIEW) are also fine.

4. Team composition & registration

Teams must be composed of undergraduate students from an invited institution. Teams should generally consist of 3 members, and teamwork is highly encouraged. However, team sizes between 1 and 5 will be allowed to register. Each participant may only serve on ONE team, and each team is only allowed to enter one robot in the contest. Non-student (e.g. faculty) coaches may offer limited assistance, but the robot construction *and* programming must be done primarily by the students.

Teams should register **no later than April 15, 2017**. Register here: http://lovelace.augustana.edu/airc

At least one team member should be present at the actual contest, on the **evening of May 2, 2017**.

If any adjustments/clarifications need to be made later regarding the robot challenge rules, these will be posted on the A.I.R.C. website http://lovelace.augustana.edu/airc, and all registered teams will receive email updates.

Questions? Contact the AIRC coordinator: Dr. Forrest Stonedahl, forreststonedahl@augustana.edu