NeIC AHM'16 – Teamwork Challenge

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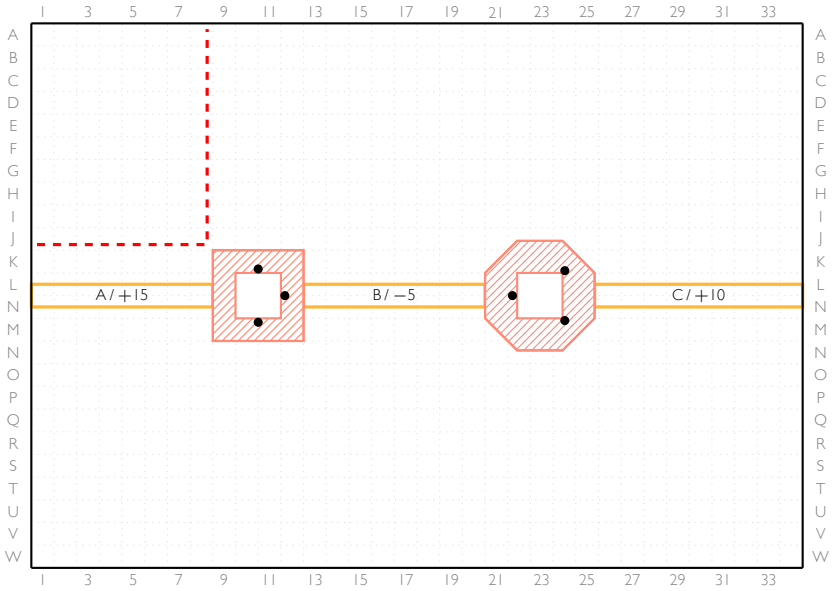
`http://ahm16.neic.nordforsk.org/sessions/challenge/`

We apologize that people have been lead to Skeikampen under false pretenses, but it was of the utmost importance to keep this a secret to prevent panic in the general public. *We show a paper which predicts closing of the gulf stream and return to a new ice age in the Nordic countries, and explain this is why we are here today.* Some of us were already on an expedition the day before, others have learned how to build igloos. Once the snow and ice starts to cover the Nordic countries, we need ski tracks to keep communication open to prevent breakdown of our civilization. Some have even suggested that politicians might get lonely when they can't reach the outskirts of their countries, and, well lets stress that this is completely hypothetical at this point, they could create a new Nordic union. This is the so-called Kalmar 3 scenario.

Today we take the first steps to create autonomous vehicles to keep the tracks open while avoiding hitting igloos. We will of course take these first steps with a idealized model. To start with the simplest region, we use a flat floor, which of course is an almost exact scale model of Denmark, and a few igloos modelled in paper.



Track: The track is about 136 cm × 96 cm in size and framed by solid wooden slats of about 10 cm height. Certain areas of the track are marked (see below for a description). Inside the track are two boxes of 10 cm height and different shape: square of 16 cm × 16 cm, and a regular octagon with each side being 8 cm long. Each box contains a quadratic hole of 8 cm × 8 cm. On each of the boxes, three places are marked with black circles. The track's floor is marked with three bands A, B and C, and a red-dashed area in the upper left corner. **Note, the track must not be changed in any way. If there is a problem with the track, ask one of the session chairs to fix it.**

Robot construction: Your team will get all the materials to construct the robot (including some basic designs you may start with). Only the supplied electronics may be used, but you can add any mechanical parts you find useful. In addition you'll need a computer with an Arduino development environment to program your robot. You can test the robot on your own track.

Challenge: Let your robot autonomously explore the terrain. It will receive points by crossing orange bands and by pushing balls from the black circles into the boxes. A referee will note the sequence of crossings, e.g., A,B,C,C,A,A,A,C, and prune it by removing any direct repetition of letters, resulting in, e.g., A,B,C,A,C. If a ball falls onto the floor outside of the boxes, you may stop your robot, place the ball again on one of the black circles, and restart the robot in the red-dashed area. Balls which fell into a box must not be removed from them. Each crossing A, B and C of the pruned sequence receives 15, −5 and 10 points, respectively, e.g., 45 points. Each ball in a box receives 5 points. All points of your team are counted to make up the final score.

Start/Restart: Your robot starts in the red-dashed area in any direction. If your robot gets stuck or leaves the track, turn it off, place it into the red-dashed square, and turn it on again.

Overall challenge schedule:

- **15:00** Brief introduction by session chairs
- **15:05** Start constructing your robot in your room (red-Olav1, yellow-Olav2, blue-Skeikampen, green-Prestkampen)
- **17:55** Stop construction and come to competition room Olav1 bringing your robot and track
- **18:00** Present your robot in 1 minute, order of teams: red, yellow, blue, green
- **18:05** All teams prepare for the first competition round (using their own tracks, placing robot into start area, placing balls)
- **18:10** Competition between teams red and yellow starts (competition ends 18:12)
- **18:15** Competition between teams blue and green starts (competition ends 18:17)
- **18:20** Competition between teams red and blue starts (competition ends 18:22)
- **18:25** Competition between teams yellow and green starts (competition ends 18:27)
- **18:30** Winner ceremony