



## JUDGES

Name	Role
 Berry, Carlotta	<b>Head Judge/Master Scorekeeper</b> -Records time, distance, obstacle hits, calculates score and resolves scoring discrepancies
 Voltmer, Dave	<b>Timing/Distance/Obstacle Judge</b> Use the stop watch to time path execution, count the number of obstacle hits, measure the distance from the goal cell center.
 Mihaela Radu	<b>Timing/Distance/Obstacle Judge</b> Use the stop watch to time path execution, count the number of obstacle hits, measure the distance from the goal cell center.

## TECHNICIANS

Name	Role
 Gary Meyer	Arena setup, maintenance, break down and judge support
 Benjamin Webster	Arena setup, maintenance, break down and judge support

**Thank you all for your support!**



The Backyardigans



Traxter II

**It's Racing Day!**  
**The Robot Rampage**

ECE 425 – Mobile Robotics  
 Final Project Competition  
 Robot Localization and Navigation  
 Thursday, 5/19/11  
 Kahn Room, 4<sup>th</sup> – 5<sup>th</sup> hours  
 Refreshments will be served

**Instructor:**  
 Dr. Carlotta A. Berry  
 berry123, 812-877-8657  
 Moench, D- 211

## Overview

The goal of the mobile robotics final project competition is for each team to use localization, path planning and execution to rescue a lost (or kidnapped) robot and drive it home. The kidnapped robot will be placed in the world at an unknown position. The robot should then use a localization algorithm such as Partially Observable Markov Decision Planning with an a priori map to identify its place in the world. Once the position is identified, the robot should use a path planning algorithm such as wavefront propagation to move the robot to the given home position. All home positions will be a gateway in the world such as a dead end, corner, hallway or T-junction. The team's score will be based upon the robot's ability to localize, plan a path and then efficiently and accurately execute the path.

## The Race

Two robots will be placed in the world at symmetrically opposite positions. When the round starts, both robots localize and head to the same goal position. They will be scored on the path execution time, number of obstacle hits and accuracy. **Once the round starts, the robot and laptop cannot be touched!**

## World Map and Arena

The competition maps (.txt format), topological and occupancy grid, will be uploaded onto Angel and accessible no earlier than **10 am on Thursday, 5/19/11**. The map will be a 16 x 16 array of integers encoded to represent the presence or absence of walls and obstacles. This map will represent a 12' x 12' arena with 9" x 9" cells. The robot's start position will be marked with a "Δ" and the goal location will be marked with an 'X', both provided at run time. The robot's center of rotation will be placed in the unknown cell location at run time. Although the position and orientation of the robot will be unknown, it will not be placed facing a wall. Thus, it is possible for the robot's first movement to be an unobstructed move forward.

## Heats

The time trials for the competition seeding will be on Tuesday. In round 1 of the competition, the heats will be in order: 1-4, 2-5, 3 - 6. The top four teams will go on to the round 2 semifinals in the order: 1-3, 2-4. Finally, the top 2 teams will compete in the finals. Each subsequent heat will have an increasing level of difficulty based upon the robot's start and stop goal positions. The top 3 teams will receive bonus points on their final project grade (10 pts for first place, 7 pts for second place, 5 points for third place).

## Set Up Time

Once a heat has concluded, the next 2 teams have exactly 2 minutes to get their robots in the arena and set up their laptop. Any team not in the ring at the bell forfeits that round.

## Scoring

The team score for each round will be based upon the number of obstacle, wall or robot hits, distance the robot stops from the goal and the localization and path execution time. Each team will start each heat with a score of **1000**. Each wall or obstacle hit will be a **5 pt** deduction. After the robot stops moving, there will be a **25 pt** deduction for every full inch between the robot and the center of the goal. For example if the robot is 4.5 inches from the goal that will be a 100 point deduction. The distance will be measured from the center of the goal cell to the robot's center of rotation. The sum of the time, hits and distance deductions values will be deducted from an overall score of **1000**. Therefore the formula for the score is

$$1000 - \text{execution time (seconds)} - 5 \times \text{number of hits} - 25 \times \text{distance (inches)}$$

The team with the most points at the end of the heat wins. If there is a tie at the end of the heat, the two teams will start the round again with a new start position and goal location and continue this process until the tie is broken.

## **TEAMS**

<b>Name</b>	<b>Role</b>
Bart	Alex Gumz, Rick Chelminski, Leif Nelson
Homer	Jasmine Browne, Annmarie Stanley
Lisa	Nathan Jackson, Jon Nibert
Marge	Matt Runchey, Trenton Tabor
Millhouse	Derik Sikes, Tim Wentz
Moe	Matt Behling, Megan Chann