ArmLab Competition Details
February 8th, 2012
10:10 am

OBJECTIVE: The objective of this competition is to put the whole ArmLab together into a complete system, requiring components from parts 1 through 3. The most successful teams will build upon this minimal system. Teams will be tasked with finding objects and placing them in a bucket. Evaluation metric will be based on the number of objects collected and the time taken.

BASELINE: Teams are expected, at a minimum, to autonomously collect 1 ball from an unknown location and place it in the bucket. Another way to say this is that teams need a non-zero score.

DELIVERABLES: No write-up is required for this part of the lab, but a simple GUI must be running during the competition showing 1) the arm configuration, 2) the time elapsed, 3) # of objects collected, and 4) points accrued thus far. A screenshot of your GUI is required in the ArmLab writeup.
**Competition Day Logistics**

At 10:10 am a random drawing will determine the contest ordering. To prevent any unfair advantage, all teams must vacate their workspace upon contest commencement and may not return until their allotted timeslot.

**Competition Overview**

Each team compete for points by collecting objects from somewhere on the 24” x 24” board and placing them in a bucket. Points are based on both the number of objects collected and the time taken. However, teams must weigh the trade-off between time and # of objects collected. Teams must also present a GUI showing the following:

- Elapsed time (in seconds)
- Arm configuration (forward kinematics model)
- Number of objects collected (suggest breaking it down by type)
- Current point value (equation given below)
- (subjective) What is going on with your system. For example, put a box around the current goal object and maybe draw the expected path to the object.

**Note:** Time does not ‘stop’ if a team collects all the objects; the code, not the team members, decides when to stop time (up to maximum time).

// image of table (showing bucket and allowable zone for objects)

// image of bucket

*Illustration 1: Example GUI Screenshot. Showing arm, points accrued, time elapsed, objects found, and current goal object.*
Competition Specifics

**Winner:** The team with the most points wins

**Interaction:** At no time once the run begins are teams allowed to interact with their system, except for viewing the GUI. You will be given a few minutes to setup after the previous team completes their run.

**Baseline:** As part of ArmLab, all teams are expected to find and collect at least 1 ball. The rest is for fun!

**Number of objects:** On the order of 10 (but likely not exactly 10)

**Types of objects:** The objects will consist of some combination of yellow balls and the two types of wood blocks.

**Location of collection bucket:** The bucket will be placed directly behind the arm. There are both green and blue buckets in the lab, you are welcome to use either color.

**Size of playable area (where objects could be placed):** Anywhere on the 24” x 24” board.

**Time:** Time once your team is setup

- **Absolute Time Limit:** 240 seconds
- **Time (w.r.t. points):** Whenever your system decides to stop the contest the time will stop and your points will be evaluated with the present time (in seconds). The possible times are 0-240s and the code decides when to stop (not the teammates).

**Points:** Points are awarding with the following formula; the intention is to reward both:

- $c =$ # of objects collected into bucket
- $t =$ time of completion

$$points(c, t) = \frac{c^2}{t} + 1$$

**Additional Items:** You are allowed to add 1 item (within reason) to the playing field if you think it would improve your collection abilities. (Hint: A major step in human evolution occurred when we learned to use tools, the same applies to robots)