

## Robotics Challenge – Spring 2012

Saturday, April 28 - San Diego City College

### *Competition Guidelines*

#### Timeline:

1. **March 22, 2012** - Guidelines and kits released to students. Teams cannot begin working before this date.
2. **April 28, 2012** – Robotics competition at City College cafeteria.
  - Registration: 8:30 – 11:00 am
  - Competition: 12:00 noon – 1:15 pm
  - Physical modifications to the robots will not be allowed after the team is registered.
  - Only programmatic** changes will be allowed on the day of the competition.
  - No laptops will be provided. Each team is responsible to bring a fully-charged laptop with the LEGO Mindstorm software. Assume that electrical outlets are not available in the competition area.
  - Remember to install fresh batteries before the start of the competition. Robots with dead batteries will be disqualified.

#### Team rules:

1. Each MESA Center may sponsor a maximum of 3 teams.
2. Each team must be made up of 3 to 4 MESA students.
3. The robotics competition will consist of 2 separate missions. Each robot must compete in the 2 missions or be disqualified.
4. Only 1 team member will be allowed in the competition area during each mission.
5. Once the robot is in competition, no member of the team can manipulate the robot until the mission is completed or the robot fails.
6. Poor sportsmanship, cheating, or negative attitudes will result in a disqualification.

#### The Champion:

A Robotics Challenge Champion team will be determined from the combined results of Missions 1 and 2. Points will be awarded for each mission, i.e. first **place** will receive the most points and last place will receive the least points. The team with the most points from Missions 1 and 2 will be declared the overall champion. Results from Mission 1 will be used to break any ties.

#### Materials:

The only materials that may be used to construct the robots are as follows: \*

1. LEGO Mindstorms NXT 2.0 kit (provided by MESA Centers)
2. Remote controls may NOT be used.

\* Permanent alterations cannot be made to the robot kits. These kits are the property of the MESA Centers and must be returned as a complete set for re-use next year.

## **Missions**

### 1. **Robot Slalom** (timed event)

**Mission:** In 3 minutes or less, race from a HOME area through a slalom course (around cones as shown in Figure A) and return to the HOME area. Each team will have 2 individual attempts. The fastest time to complete the course wins.

**The Slalom:** The course will be a flat surface with cones 1, 2, 3 and 4 positioned as shown in Figure A. Each cone has a square base of 5½ inches and a height of 9 inches.

**Challenge:** Each robot must follow the slalom course as shown. If a robot passes on the wrong side of a cone, it must backtrack and correct the error before passing another cone. Failure to correct the error will end the attempt, and the distance correctly covered through the slalom course will be recorded. For robots that do not complete the slalom, the “distance covered” will be used to determine the final standings for this mission.

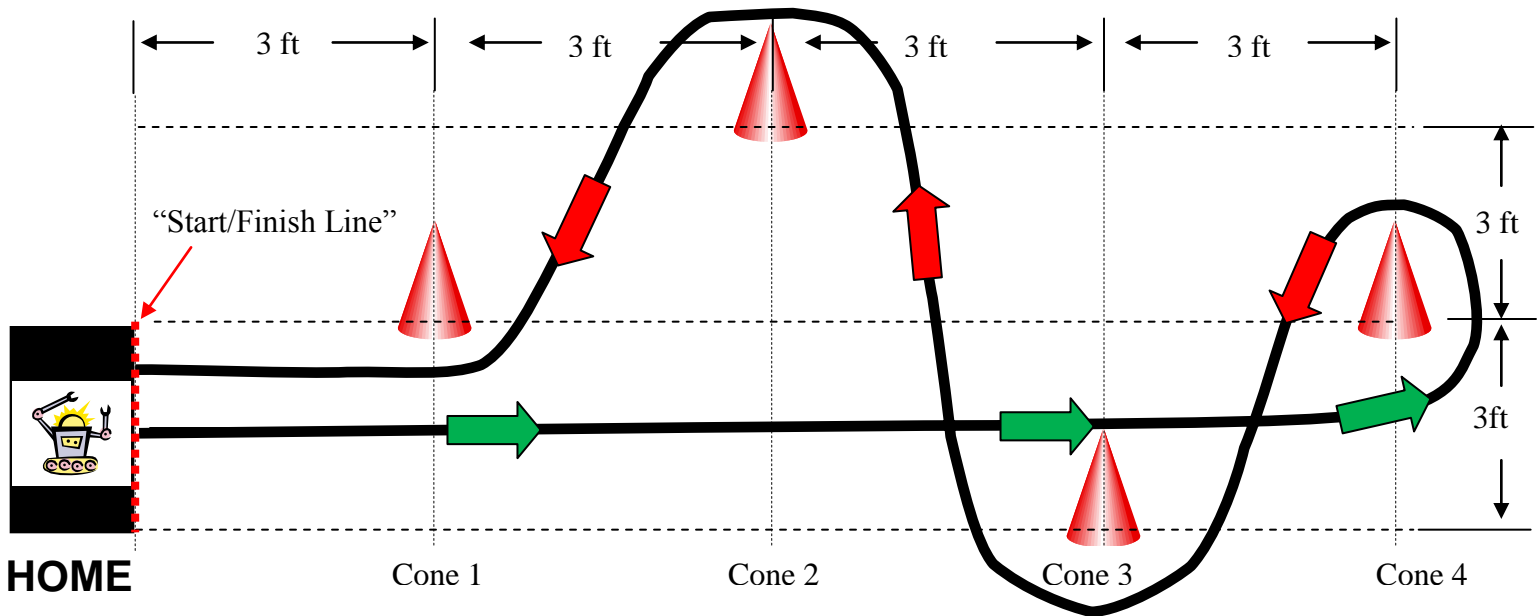
### 2. **4 Color Slam** (combination control and head-to-head event)

**Mission:** In a 5 minute time period, race to collect Legos and return them to your HOMEBASE. A maximum of four robots will compete at the same time. The robot that collects a set of colored Legos (Red, Yellow, Green & Blue) in the shortest time will win this event.

**The Arena:** The arena will consist of 4 bases and four HOMEBASES (numbered 1-4), each 1-ft square. All squares will have a border consisting of black electrical tape. See Figure B for the arena layout.

**Challenge:** Each robot will begin from a HOMEBASE and race to collect 1 Lego of each of 4 color (Red, Yellow, Green & Blue). Each Lego collected must be successfully delivered to the robot’s HOMEBASE area (Note: A Lego is correctly “delivered” when it is resting inside a team’s HOMEBASE and it is NOT touching a robot). Legos that fall outside of their “color square” and are not in a HOMEBASE will be returned to their “color square”. The HOMEBASE is a safe area. There is no penalty for collecting more than 1 Lego of the same color. Only 1 team representative will be allowed in the area behind each team’s HOMEBASE. Robots can only be handled when they are in the HOMEBASE area. A team can request to have their robot returned to their HOMEBASE (without Legos) at any time (Note: A robot will be returned to the HOMEBASE if it becomes stalled at any time during the competition.) No robot may enter another robot’s HOMEBASE. If a robot enters another robot’s HOMEBASE, then it will be returned to its HOMEBASE. Ties will be broken based on the results from Mission 1.

If there are more than 4 robots in the competition, then additional heats will be held. If necessary, teams may be required to compete as wildcard teams in order to get into the final competition. If it is necessary to have wildcard teams, then the lowest place teams from Mission 1 will be assigned as wildcard teams. For example, if 5 teams are registered for the competition, then the 2 lowest ranked teams (4 and 5) from Mission 1 will compete head-to-head as wildcard teams. The winner between teams 4 and 5 will compete in the final 4-team competition.



**Slalom Course:**

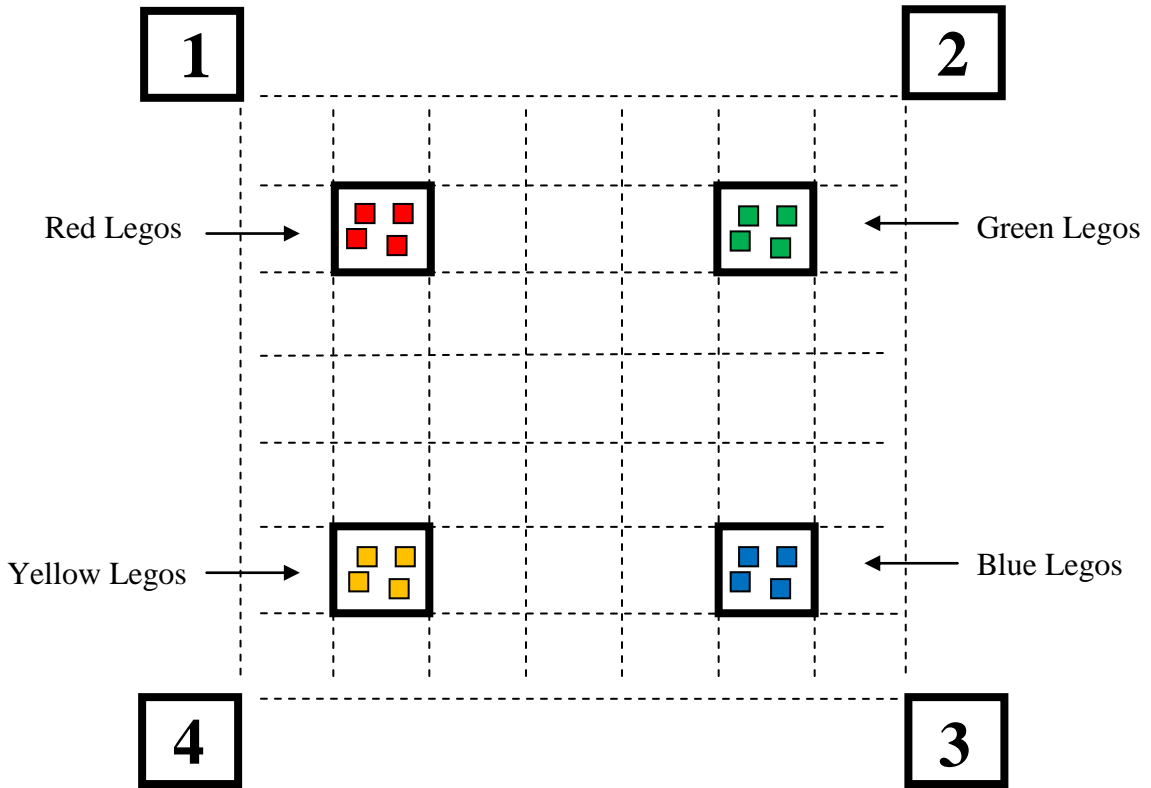
Robots must pass the cones “slalom style” - as shown above.

Robots must BEGIN and END in the HOME area. The HOME area measures 1 ft x 3 ft and it will be located as shown. Starting position: All parts of the robot must be behind the “start/finish line” (note: the robot may extend beyond the rear of the HOME area).

Each cone is centered at 3 ft intervals as shown. Each cone has a square base of 5½ inches and a height of 9 inches.

If a robot passes on the wrong side of a cone, it must backtrack and correct the error before passing another cone. Failure to correct the error will end the attempt, and the distance correctly covered through the slalom course will be recorded. For robots that do not complete the slalom, the “distance covered” will be used to determine the final standings for this mission.

**Figure A. Mission 1 – Robot Slalom Course**



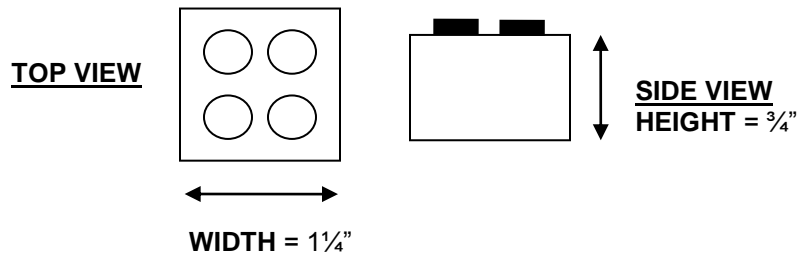
**The Arena:**

The arena will consist of 4 bases and four HOMEBASES (numbered 1-4), each 1-ft square. All squares will have a border consisting of black electrical tape.

Each robot will begin from a HOMEBASE and race to collect 1 Lego of each color (Red, Yellow, Green & Blue).

Only 1 team representative will be allowed in the area behind each team's HOMEBASE. Robots can only be handled when they are in the HOMEBASE area. A team can request to have their robot returned to their HOMEBASE at any time.

**Lego Design**



**Figure B. Mission 2 – 4 Color Slam**