

Call for Participation

2013 RoboPlay Competitions

Early registration deadline: March 8, 2013

Final registration deadline: March 22, 2013

Video submission deadline: April 26, 2013

C-STEM Day: May 4, 2013

<http://c-stem.ucdavis.edu>



Objectives

The goal of the RoboPlay Competitions is to broaden student participation in computing, science, technology, engineering, and math (C-STEM) education with positive youth development for all students. The teamwork involved in the RoboPlay Competitions will engage all students including those who are inclined to pursue careers in the arts or humanities.

RoboPlay is designed for K-12 students to play with robots while having fun and exploring their creativity in writing, art, music, choreography, design, and film making and at the same time seamlessly learning C-STEM subjects. The necessary robot coordination to match the movement of multiple modules to music requires not only teamwork in designing a well-organized visual performance, but also the math and programming skills to produce the desired actions. The competitions enable students with different interests to explore the basic concepts of C-STEM in conjunction with their artistic and music talents.

The Mobot, a breakthrough educational modular robot developed by Barobo Inc., a UC Davis spin-off company and C-STEM industrial partner will be used for RoboPlay. A single Mobot is a fully functional robot. It can roll, crawl, stand, tumble, etc. In addition the Mobot can also be used as a building block to create a snake, tank, trunk, humanoid, and any system that can be imagined. Each building block is fully programmable, which makes the combined system extremely flexible and versatile. Programming a single Mobot and multiple Mobots can be easily accomplished by students in grades 5-12.

There are two categories for *RoboPlay Competitions*: *RoboPlay Video* and *RoboPlay Challenge*. The RoboPlay Video Competition is completed within the classroom and submitted online. The RoboPlay Challenge Competition is held on UC Davis C-STEM Day. These robot competitions are open-ended design challenges that integrate math and computer programming with music, choreography, and design for practical real-world problem solving. The rules and guidelines for these competitions are provided below.

Contact: Kevin Gucwa
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Rules for RoboPlay Competitions

1. RoboPlay Video Competition:

A RoboPlay Video shall present a creative video starring Mobots. Videos can feature human-robot interaction, but the robots must be the focus of the video. For example, if the robot ends up just being a trivial prop the video may get disqualified. On the other hand if the robot is a character that is being interacted with, it should be ok.

Divisions:

- Junior Teams with students from middle schools
- Senior Teams with students from high schools

Rules for Video Competition

- All team members must be students in K-12 schools
- Each team must use one or more Mobot.
- Each video must be within 2-5 minutes long. Videos that are longer or shorter will be subject to disqualification
- The video should have a title
- All elements of the video, except music, must be produced originally by the students
- Backgrounds, sets, and costumes are recommended and encouraged, but not required
- Submissions are encouraged to be creative. Award categories will be as follows:
 - Best Storytelling – Video that tells the best story involving the Mobots
 - Best Choreography – Best synchronization of robots to music or best dance video
 - Accomplishing an Interesting Task – Best demo of robots completing a task (such as making coffee)
 - Best Use of a Custom Designed Part – Given to the group that completes an interesting task or performs an interesting motion through the use of an original designed and built part. Videos hoping to win this award must submit CAD files, or documentation of how the part was built.
 - Best Overall Video – Awarded to the video that the judges feel like was the overall best submission. This may be awarded independently or in addition to any of the other awards.
- Additional Rules for the Design Competition
 - To enter a part into the design competition, documentation of the part must be submitted in addition to the video
 - If the part was rapid prototyped/3D printed, the CAD file must be submitted
 - If the part was constructed, blueprints, drawings or sketches must be submitted
 - At least a paragraph summary describing the function and use of the part must be submitted as well
 - Have all part documentation and detail ready when submitting the video
 - Missing any of the above information may result in disqualification for the design award

- Each team must submit a software copy of their well-documented Ch code for controlling robots with a standard heading that includes:

1. Name of the school the students are currently enrolled in
2. Name of each student participant
3. Name of teacher advisers

A sample on-line document is shown below

```
/* This program is for the 2013 RoboPlay Competition (Video) http://c-stem.ucdavis.edu  
Video Title: This is a Wonderful Robo Story  
School Name: Wonderful Middle School  
School District: Wonderful Unified School District  
Student Names: Cindy Clark, Mary Smith  
Teacher Advisor: John Doe  
*/
```

Failing to do so may result in disqualification.

- Upload video submissions to YouTube and submit a link with the Ch code to the C-STEM Video Submission website. The description of your YouTube should be

This video was created by the Computing and Robotics Club at your- school-name in your-school-district-name, California, USA for the 2013 RoboPlay Competitions.

<http://c-stem.ucdavis.edu/roboplay/>

If you have not created a YouTube account, please follow the instructions in the video at <http://www.youtube.com/watch?v=3PFYeXb7fPw> to create one.

Team Registration for Video Competition

- Each team can have as many members from one school as necessary
- Teams must register before the deadline
- Each teacher can sponsor up to 5 team videos
- The registration fee is \$10 for each video submission before the early registration deadline; \$15 for late registration
- Up to three student representatives will be able to receive the trophy for the winning team
- All team members will receive certificates of participation
- T-Shirts and Lunch Tickets may be purchased separately for \$15 a piece

2. RoboPlay Challenge Competition:

The RoboPlay Challenge Competition is designed for students to showcase their real-world problem solving skills in a competitive environment. This competition simulates an unexpected problem occurring at a remote location such as a space station or planetary habitat, where a robotic solution must be quickly developed and deployed, using only existing resources. The competition challenges students to creatively use modular robots and accessories to complete various tasks. The competition arena and specific challenge will be kept secret until the day of the competition. Using their math, programming, and problem solving skills, students try to most efficiently get the highest score for each task.

Divisions:

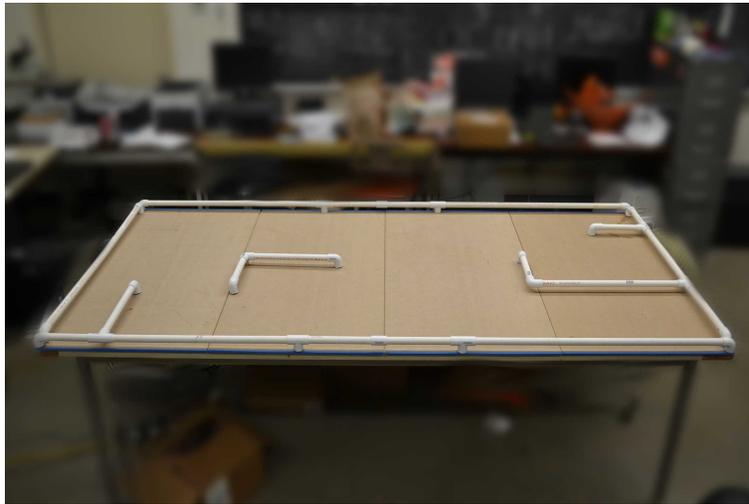
- Junior Teams with students from middle schools
- Senior Teams with students from high schools

Rules for Challenge Competition

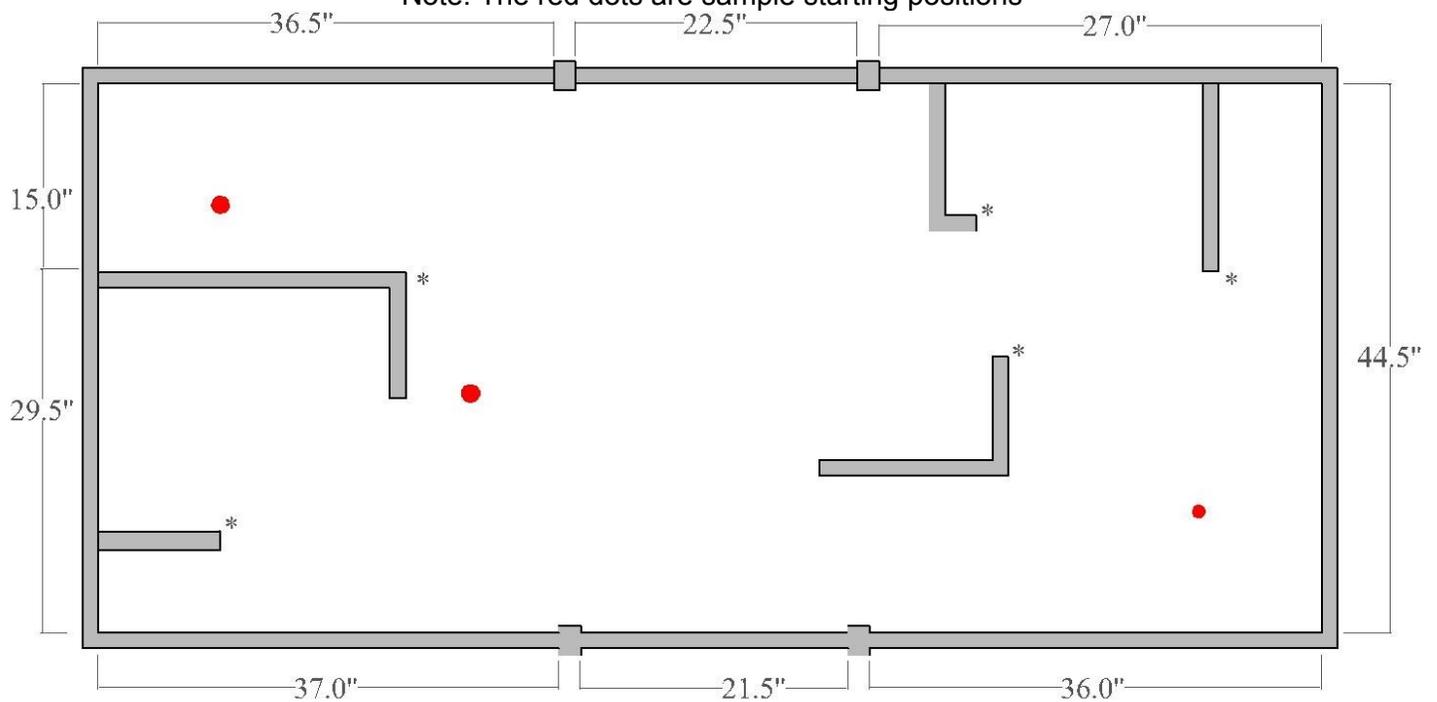
- All team members must be students in K-12 schools
- Each team must use Mobot, a reconfigurable modular robot available from [Barobo, Inc.](#) for the competition. In this year's competition, all tasks can be accomplished by either three Mobot-A, or six Mobot-I and Mobot-L. On the competition arena, a team can use either three Mobot-A, or six Mobot-I and Mobot-L at the same time.
- Each team must bring its own Mobots and accessories for the competition
- Each team must use their own laptops. Each member can have one laptop. Use of other electronics during the competition, including other computers, calculators, cell phones, and other computing devices is not allowed.
- There will be no internet access during the competition. If a team is caught using the internet during the competition, the team will be disqualified.
- Once the competition has begun, the teams may speak to the Judges for clarification on problems, but should not talk to anyone else outside of their team.
- The Competition will last six hours split into two portions.
 - a) The first three hours are for students to build and program their robots to complete the challenges presented at the start of the competition. The solutions must be completed during the first three hours.
 - b) The last three hours are for teams to compete against each other to determine the winners of the Competition.

The Arena for Challenge Competition

A possible competition arena for Autonomous Competition is described below. Each team should build their own competition arena for practice in school and bring it with you for use in the morning from 8:30am-12:30pm on the day of the competition. Note: The competition board shown below will not be the one on which the actual competition will occur. Keep in mind, this example board is given to allow students to get a feel for the surface the competition will take place on. The real competition board will have many other things and obstacles for each challenge task.



Below is a schematic diagram of the above board with dimensions:
Note: The red dots are sample starting positions



*Dimension not relevant. The inner walls should allow students to practice navigating the arena floor in non-trivial paths, exact dimensions are not necessary.

- The estimated cost for building this competition arena is \$60.
- List of Materials (Can all be bought at your local Home Depot or equivalent):
 - 4 (2 by 4 ft) mdf boards

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- 26 ft of 3/4 in pvc (should buy an extra couple of ft just in case)
- 15 corner pvc connectors
- 7 pvc "T" connectors
- 2 pvc sraight connectors (sometimes referred to as couples)
- 18 wooden pegs (cut from a 1/2 inch douglas fir dowl) (cut 1 inch long)
- 2 packets of epoxy glue to glue down the pegs to the board, can also use velcro here as well

Instructions for Constructions:

As with the large pvc segments, it would not hurt to have a few extra pieces of the connectors as well. Also bear in mind that the boards are actually 2 ft by 4 ft 1 inch , so you should measure out 1/2 of an inch on both sides and tape it off to show the true 4 by 8 area. As for construction the easiest way we found was to start with the outer walls first. The basic construction is as follows : The longer walls, that span 8 ft , will be placed flush with the edge of the boards, along the 8 ft length on both sides. They will hug the corners on both sides, and will have connecting points with pegs located on each of the boards. These pegs are cut from a wood dowel, 1/2 of an inch thick, either is fine as long as the couplings of pvc can fit in them. They are glued down with epoxy and can be made thicker with duct tape, to ensure a snug fit. The walls that would span the 2ft sides are going to be flush up against the 2 ft wall as well, but they will be inside the two 8 ft segments, meaning they will be slightly shorter, about an inch on both sides. A key point here in the construction is that because the end of two walls will sort of meet in the corners, the pegs put in place to hold them should be positioned properly, so that the walls are placed in the right position, but not to close that when the pvc couplings slide on top of them that the couplings of both walls will hit each other. Drawing outlines of where these pvc couplings make contact with the board is the best way to approach this, and then centering the pegs in the center of the holes drawn, or moving them towards one side of the outline, if the other side intersects with the other outline. After the outer walls are established, all other sections made should be measured from these walls, as long as they are in their proper positions and all measurements must be taken from the center line of the pipes and/or connections. When adding connectors to the wall it's important to note that although the pvc goes about an inch into the connectors, there is a segment in the middle of the connector that adds length, roughly 1/2 inch. This is why when building the outer walls, all connectors that will be located in the wall in the future should be introduced in the construction of the walls, to avoid more work than is needed later. Cuts done by hand might not be straight so as long as enough is cut to fit in the connections, you can connect them without the pvc going all the way in the connections. Likewise, if the wall seems to long, there might be excess room in the connector that requires extra force to insert the pvc fully. No glue is necessary in the connections.

At the moment these instructions seem complete to us, but if anything is unclear or if there are any other problems in the construction, please let us know and we would be happy to help. Our construction lead's email is jgonza@ucdavis.edu. Please email if you have any questions about construction.

Team Registration for Challenge Competition

- Each team can have 3 to 5 students
- Each teacher can sponsor up to two teams
- Teams must register before the deadline to assure that there is enough time and space for all teams on the day of the competition
- Teams that register before the early registration deadline must pay a registration fee of \$60 per team
- Teams that register before the final registration deadline must pay a registration fee of \$80 per team
- T-Shirts and Lunch Tickets may be purchased separately for \$15 a piece

Organizer

UC Davis Center for Integrated Computing and STEM Education (C-STEM)

Co-organizer

UC Davis Integration Engineering Laboratory
UC Davis Computing and Robotics Outreach Club

Contact

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