

RoboPlay



RoboPlay Challenge
Competition



C-STEM Day

Saturday, May 31, 2014
UC Davis



Math Programming
Competition



UC Davis Center for Integrated Computing and STEM Education
<http://c-stem.ucdavis.edu>

UCDAVIS
C-STEM Center
<http://c-stem.ucdavis.edu>

High School

Message From the Director

The UC Davis C-STEM Center aims to close the achievement gap by broadening participation of students traditionally underrepresented in computing and STEM fields and to develop students' computer-aided problem-solving skills through engagement in real-world STEM problems. Through cutting edge research with funding from the National Science Foundation, the C-STEM Center, in collaboration with our industry partners, has developed innovative educational computing and robotics technologies for K-14 hands-on learning. These technologies are implemented in classrooms and afterschool programs around the state, culminating in the annual C-STEM Day, which includes the curriculum-based RoboPlay Competition and Math Programming Competition.

C-STEM Day is an opportunity to further engage students in project based team activities and to showcase their accomplishments and creativity in not only STEM topics, but also in writing, art, music, and film productions.

The RoboPlay Competition brings together student teams to participate in a series of challenges that require the integration of creativity, programming, robotics knowledge, collaboration and critical thinking.

The Math Programming Competition provides students in secondary schools an opportunity to demonstrate their understanding of mathematics through real world programming applications.

By continuing to successfully implement the C-STEM curriculum in classrooms and after school programs and by participating in the annual curriculum-base C-STEM Day competitions, we inspire students to pursue computing and STEM related careers and post-secondary study.

I would like to thank all of our participants for their hardwork, including the teachers and students. I would like to express my gratitude and deep appreciation to all of our volunteers for organizing this event, especially our two regional coordinators, Heidi Espindola at the UC Davis site, Merry Kim in Orange County, and also Rex Schrader and other HP engineers who have worked tirelessly creating the online scoring system and the challenge tasks for the RoboPlay Challenge Competition. Thank you also to all of our sponsors for making this C-STEM Day event possible.

Dr. Harry Cheng
C-STEM Center Director

NEW! C-STEM is now an option for new undergraduate applicants to select as a UC approved educational preparation program, commencing fall 2015 for all UC campuses. C-STEM student and team awards are now recognized in the UC admissions process as achievements that have explicitly prepared students for college and career.

C-STEM Day Schedule:

May 31, 2014

Time	Event	Location
7:30am-8:30am	Registration and Setup for RoboPlay Challenge Competition	Pavilion
7:30am-8:30am	Registration for Math Programming Competition	Pavilion
8:30am-8:40am	Welcome and Introduction	Pavilion
8:40am-9:00am	RoboPlay Challenge Competition Introduction	Pavilion
9:00am-12:00pm	RoboPlay Challenge Competition Problem Solving	Pavilion
8:50am-11:40am	Math Programming Competition	2121A Bainer Hall
12:00pm-12:45pm	Lunch Break	
12:45pm-3:45pm	RoboPlay Challenge Competition	Pavilion
3:45pm-4:00pm	Break	
4:00pm-5:00pm	Awards Ceremony: <ul style="list-style-type: none"> • C-STEM Awards of Achievement • C-STEM Awards of Excellence • C-STEM Scholarship • UC Davis Math Programming Competition Winners • RoboPlay Video Competition Winners • RoboPlay Challenge Competition Winners • GIRL's Leadership Award 	Pavilion

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Schedule for **RoboPlay** Challenge Competition

Middle Schools

School	Teacher	Team #	Board	Practice Times	Competition Times
American Canyon	Lee	1	A	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
American Canyon	Lee	2	A	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
School of Engineering & Sciences	Besk	3	A	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
School of Engineering & Sciences	Besk	4	B	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
Douglass	Gonzales	5	B	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
Douglass	Gonzales	6	B	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
Riverbank	Saul	7	C	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
Bridgeway Island	Schoellhamer	8	C	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
Bridgeway Island	Schoellhamer	9	C	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
Lee	Turner	10	D	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
Elkhorn Village	Wright	11	D	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
Elkhorn Village	Wright	12	D	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
California MS	Aguilar	13	E	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
California MS	Aguilar	14	E	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
California MS	Aguilar	15	E	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
California MS	Aguilar	16	F	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
California MS	Aguilar	17	F	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20

Schedule for **RoboPlay Challenge Competition** High Schools

School	Teacher	Team #	Board	Practice Times	Competition Times
Luther Bank High School	Dagler	18	G	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
Luther Bank High School	Dagler	19	G	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
Luther Bank High School	Jennings	20	G	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
School of Engineering & Sciences	Mangan	21	H	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
Franklin High School	Akuna	22	H	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
Franklin High School	Akuna	23	H	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
Livermore High School	Johnston	24	I	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
Livermore High School	Johnston	25	I	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20
Livermore High School	Woodworth	26	I	10:40 - 10:55 11:40 - 11:55	1:25 - 1:40 / 2:25 - 2:40 / 3:25 - 3:40
Fred C. Beyer High School	Iazo	27	J	10:00 - 10:15 11:00 - 11:15	12:45 - 1:00 / 1:45 - 2:00 / 2:45 - 3:00
River City High School	Fagout	28	J	10:20 - 10:35 11:20 - 11:35	1:05 - 1:20 / 2:05 - 2:20 / 3:05 - 3:20

Overview

General Rules

1. You have 10 challenges to do in any order you like. Successful completion of each challenge earns your team points. The goal is to get as many points as possible.
2. The challenges must begin at one or more of the starting zones unless stated otherwise.
3. Teams may bring as many laptops as they have students to the competition and kept in their practice area (pit).
4. Only one laptop may be used at the competition table.
5. Use of other electronics during the competition, including other computers, calculators, cell phones, and other computing devices is not allowed.
6. Teams cannot use custom-made parts.
7. All challenge tasks must be completed using a computer program (no tilt drive or copy cat). Programs for controlling the robots must be written in Ch from SoftIntegration, Inc.
8. 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.
9. 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.

Practice Information

1. All teams will be provided a designated practice area (pit) to place their practice board.
2. You are given two 15-minute practice periods to practice on the official board between 10am and noon. (15 minute periods can be found on the RoboPlay Competition schedule page.)
3. Each 15 minute period starts and ends when specified in the schedule. You will not be given 15 minutes from when you arrive. Please be prompt.

Competition Information

1. You are given three 15-minute competition periods to compete on the official board between 12:45pm and 3:45pm. (15 minute periods can be found on the RoboPlay Competition schedule page.)
2. In between each team's run, there will be a five minute passing period.
3. No robots may be run on the competition board during the five minute passing period.
4. Any challenge that is on-going when your 15 minute period ends will be immediately stopped and points will be calculated.
5. You are allowed to attempt each challenge as many times as you like within the allotted competition time.
6. If you attempt a challenge multiple times, only the points from the highest scoring run will be kept.
7. Challenges may not be "chained together" meaning you cannot do two challenges simultaneously with the same program.
8. Teams are responsible for setting up the board for each run of each challenge.
9. Teams may not use more than five I-bots and one L-bot simultaneously.

Reminders for Students

General

- Measure everything with a measuring tape. Don't trust the given dimensions to be completely accurate.
- Read how assignments are scored to figure out the best strategy to get points.
- Ask questions if you are unclear about something.

Assigned Boards

- These will be the boards you will practice on and compete on.
- Make sure you know where your assigned board is at all times.
- Refer to diagram given or ask someone.

Practice/competition times

- 15 minute practice/competition times will be marked by a whistle being blown.
- Arrive 5 minutes early for your allotted practice/competition time and stand in the designated waiting area.
- Refer to packet if you don't know when your practice/competition times are.
- Keep your name tag on at all times. You will need it to gain access to the board during your 15 minute period as well as to your pit area.

Challenge Materials

Each team will have the following parts to complete the challenges.

Part	Quantity	Recommended/Necessary Accessories
Linkbot-I	5	Protractor
Linkbot-L	1	Writing Utensils
Snap Connector	14	Compass
Caster	2	Timer/Stopwatch
3.5" Wheel	8	String
Bridge Connector	2	USB flash drives
Gripper	1	Ruler & Measuring Tape (min. 8 feet)
Cube Connector	1	Extension Cord
Soccer Scoop	2	Skiva PowerFlow Four Port
Hacky Sack	1	USB Charger (Qty: 2)

Definitions and Common Terms

Whole Inch

A distance/measurement rounded down to the nearest inch.

Examples:

- 3.75 inches = 3 whole inches
- 1.95 inches = 1 whole inch
- ½ inch = 0 whole inches.

Nearest Point

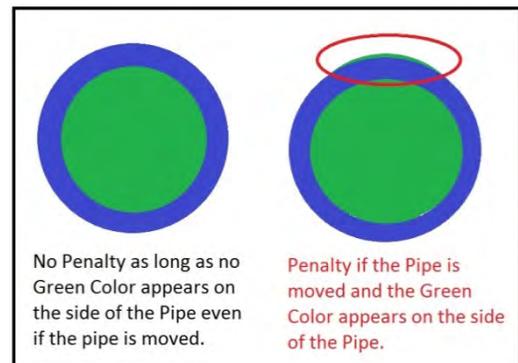
The nearest point is a measurement taken from the nearest edge of the robot to the reference point by the shortest straight line distance. The measurement will be taken by placing a measuring tape on the table under the bot and placing a pipe on top of it, against the nearest part of the bot down to the tape.

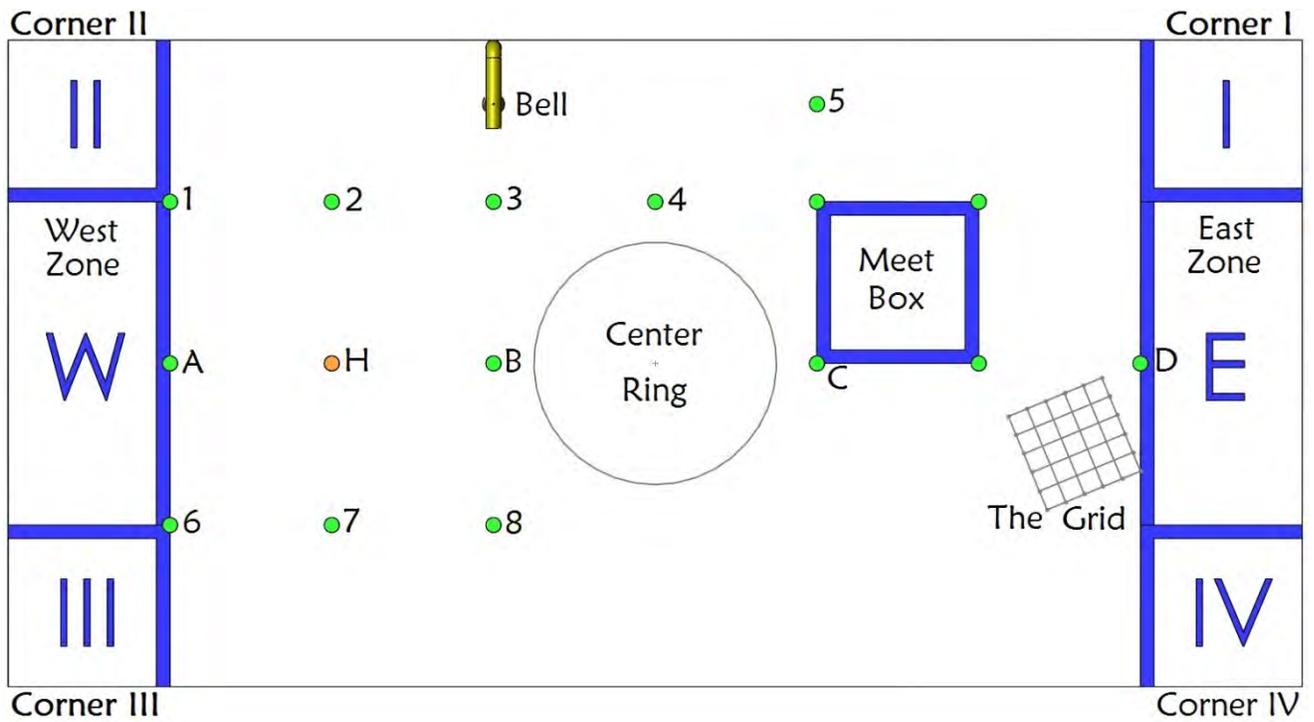
Pipe Moved

Pieces of pipe are used as obstacles and pylons for some challenges. These pipes are placed on dots on the board. A pipe will be considered moved if it is knocked over or the dot is visible around the outer edge of the pipe.

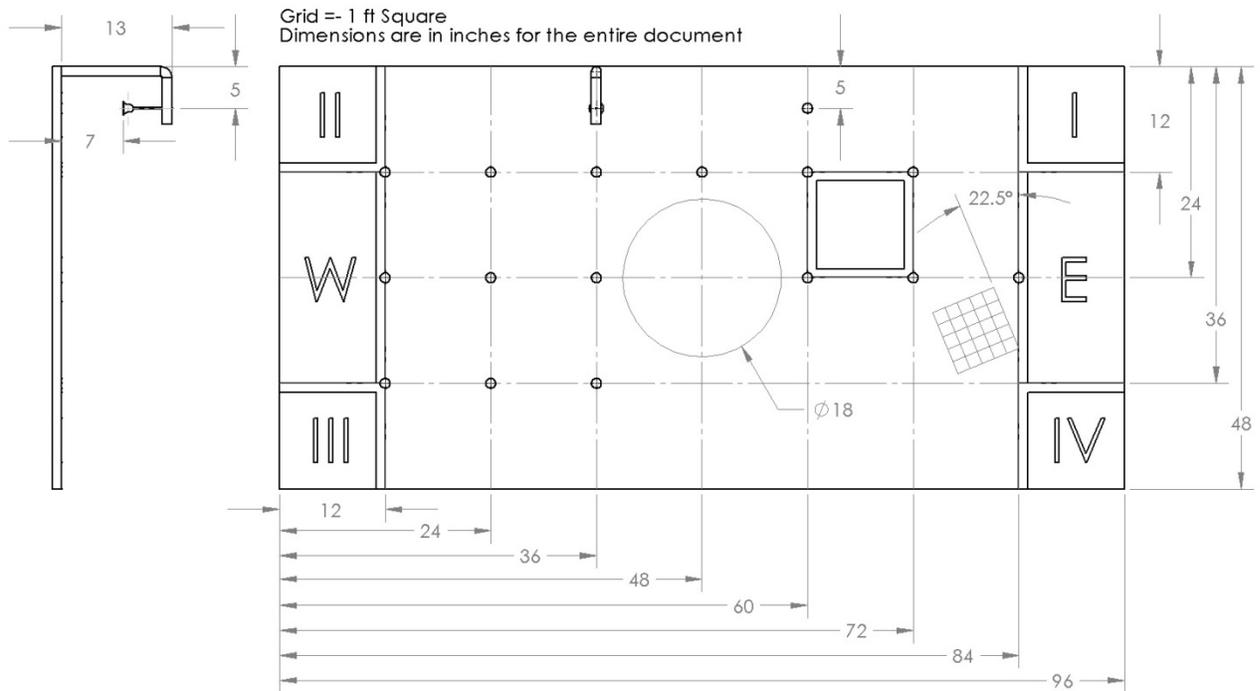
Same Time

For the purposes of scoring, events which happen within one second of each other shall be considered the same time.

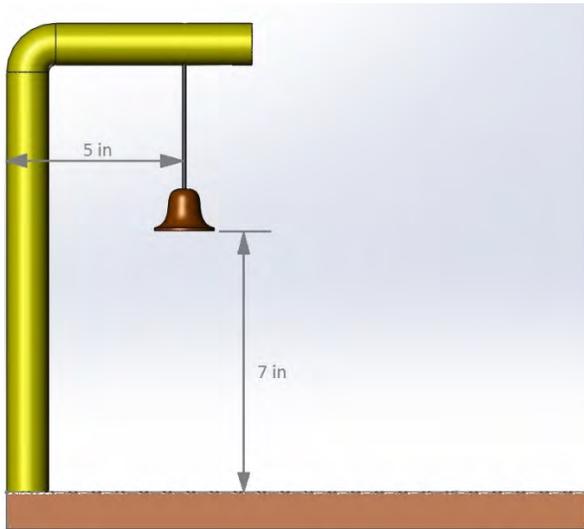




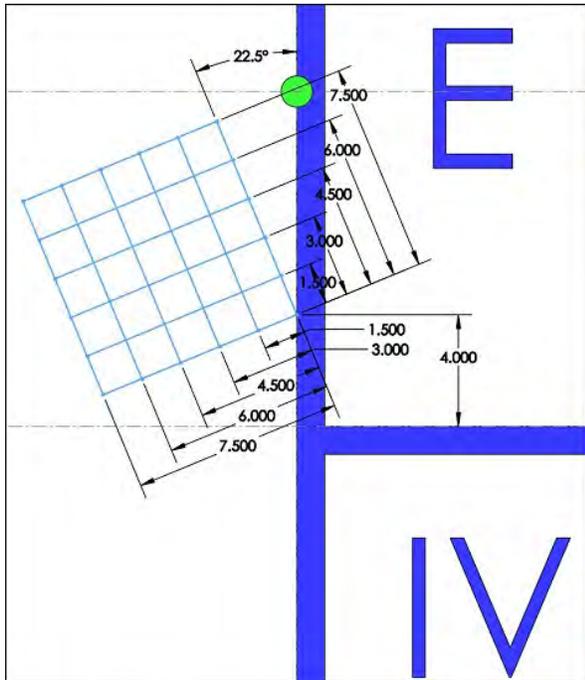
Map of the Challenge Board



Challenge Board Dimensions



Detail dimension of the Bell location



Detail dimension of the Grid pattern.

Challenges

1. Bounce

(40 Points Possible)

Starting Position

Bot starts in Corner II.

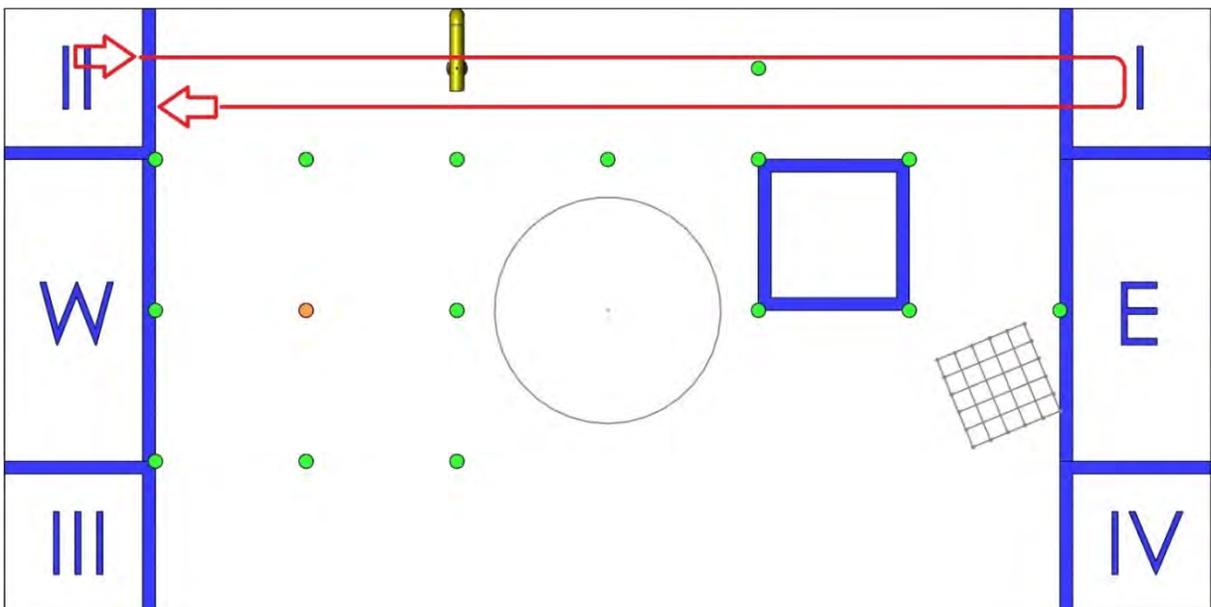
Objective

Bot moves completely within the Corner I boundary. Move back toward Corner II and comes as close to the Corner I boundary line as possible without touching or crossing over.

Scoring

Distance is measured from the nearest point on the robot to the Corner II Boundary Line.

#	Description	Points
1	Distance < 1 inch.	40
	1 inch < Distance < 2 inches.	30
	2 inch < Distance < 3 inches.	20
	3 inch < Distance < 4 inches.	10
	Distance > 4 inches.	0
2	Penalty for not completely entering Corner I.	No Points
3	Penalty for touching or crossing Corner II Boundary Line.	No Points



2. Steal the Gold

(50 Points Possible)

Board Setup

Pipes are placed on Dots 1, 2, 3, A, B, 6, 7 and 8.

The Hacky is placed on Dot H.

Starting Position

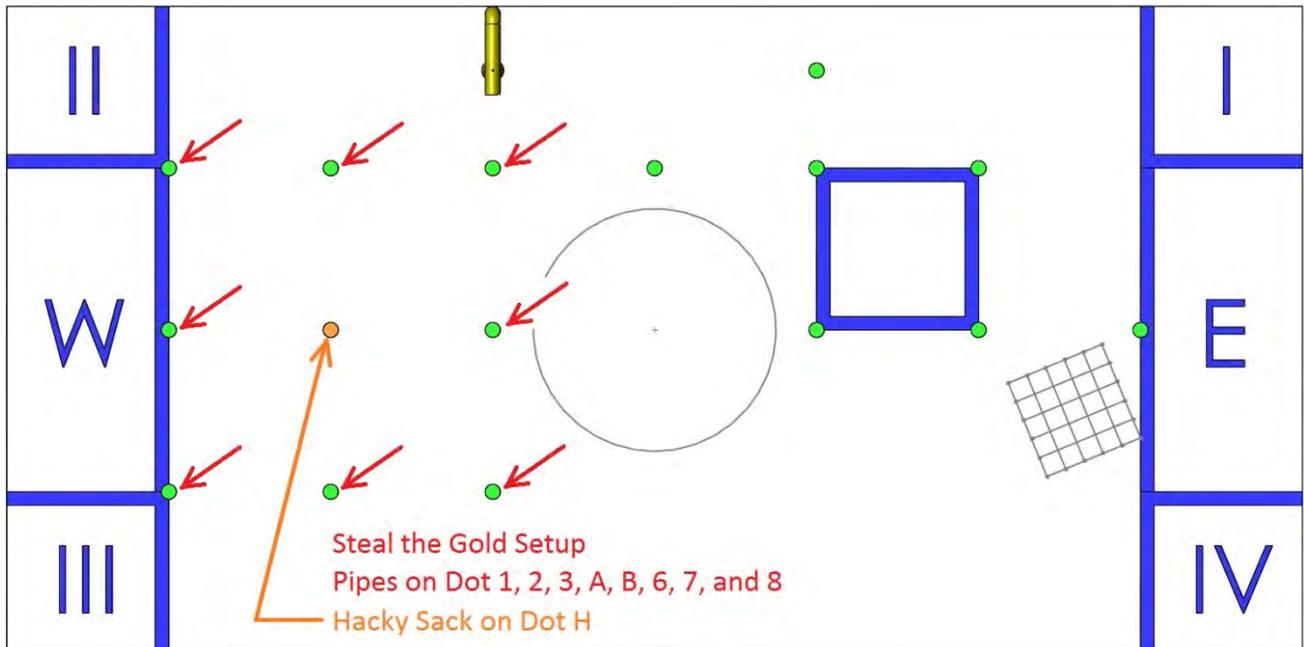
Bot is placed in Corner II.

Objective

Your bot moves the hacky from the center of the pipe array to Corner I without moving any pipes.

Scoring

#	Description	Points
1	Touching the Hacky with your bot.	5
2	Move Hacky outside the pipe array.	15
3	Hacky inside or touching Corner I.	10
4	Bot and Hacky stop completely inside Corner I.	20
5	Penalty for each pipe moved.	-15



3. Racetrack

(60 Points Possible)

Board Setup

Pipes set up to cover dots A, B, C and D.

Starting Position

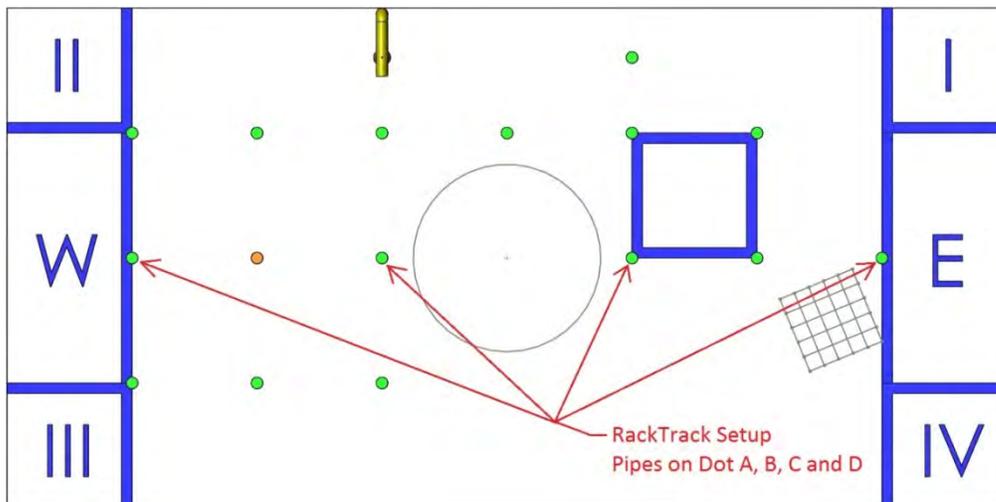
Bot starts completely within the West Zone boundary.

Objective

Bot moves, turns to cross between pipes B and C, continues to the East Zone, turns around pipe D and returns to the West Zone, crossing between B and C again and finishes in the West Zone without moving any pipes.

Scoring

#	Description	Points
1	Cross between pipes B & C, heading to East Zone.	15
2	Turn around Pipe D in the East Zone.	15
3	Cross between pipes B & C, heading back to West Zone.	15
4	Finishes completely within the West Zone boundary.	15
5	Penalty for each pipe moved.	-10



4. C U Soon

(50 Points Possible)

Starting Position

Bot 1 starts in the West Zone.

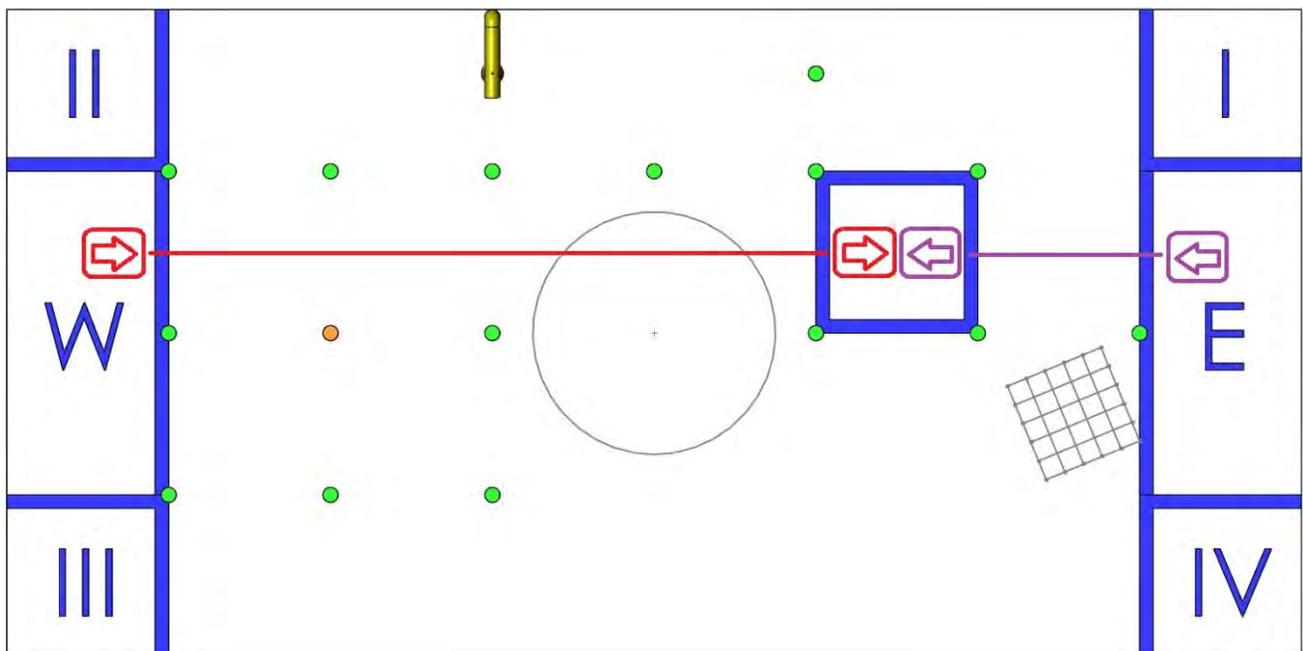
Bot 2 starts in the East Zone.

Objective

Bots start at the same time, travel to the Meet Box and stop at the same time without touching.

Scoring

#	Description	Points
1	Bots both start moving at the same time.	10
2	Bots both stop moving inside the Meet Box at the same time.	20
3	Both bots are completely within the Meet Box when stopped.	20
4	Penalty for Bots touching each other.	-10



5. High Five/Low Five

(60 Points Possible)

Board Setup

Place two pipes stacked on top of each other at Dots 2 and 4.

Starting Position

Bot starts in Corner II,

Objective

Create a bot that crosses board, knocks over at least one pipe at Dot 2, "rings" the bell, and finally knocks over at least one pipe at Dot 4.

Scoring

Touching the bell counts as "ringing".

#	Description	Points
1	Knock over at least one of the pipes stacked on Dot 2.	20
2	Ring the Bell.	20
3	Knock over at least one of the pipes stacked on Dot 4.	20

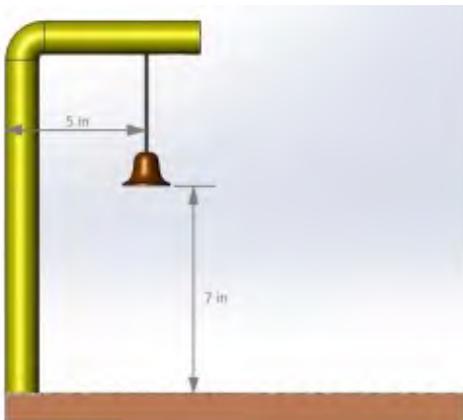
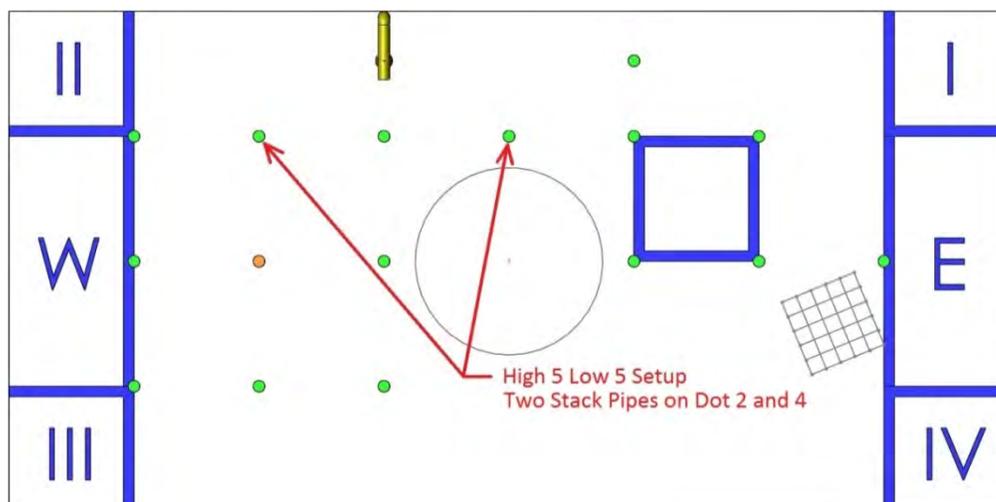


Figure 1 - Bell Tower



Figure 2 - Pipe Stack



6. Get'n Dizzy Wit It

(80 Points Possible)

Starting Position

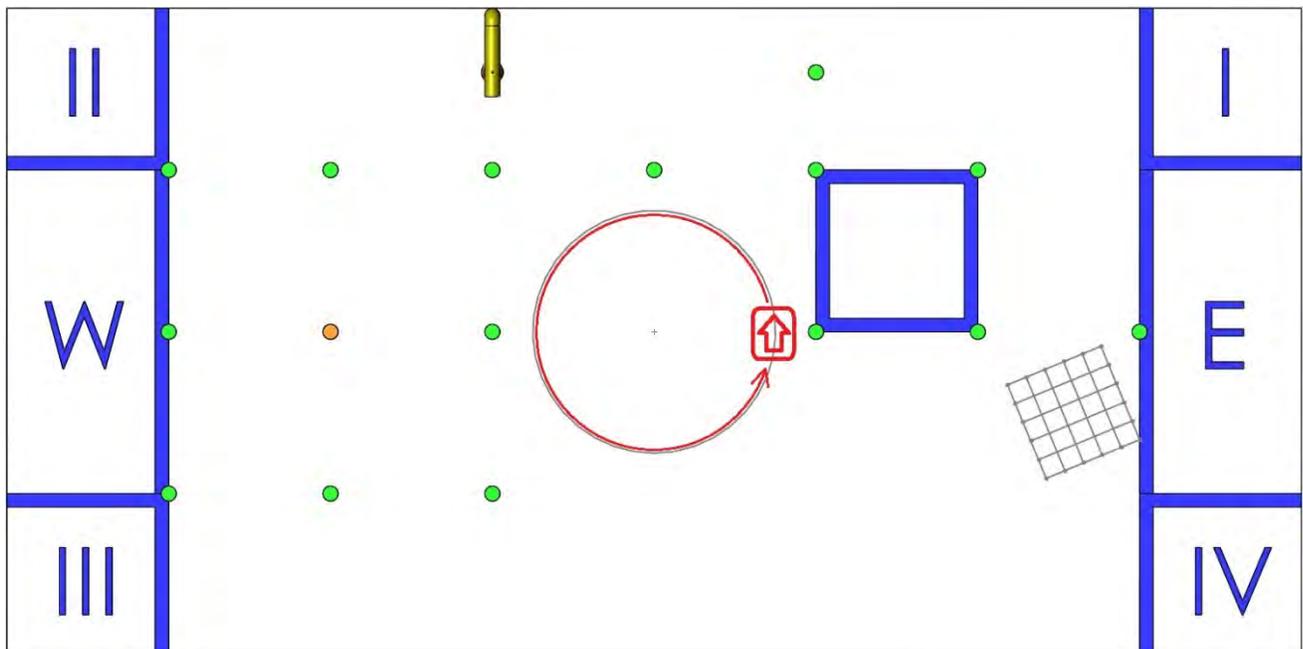
Bot starts with one wheel inside and one wheel outside the Center Ring.

Objective

Complete a trip around the Center Ring, straddling the line, and end where bot started.

Scoring

#	Description	Points
1	Each quarter of the circle completed without going inside or outside the line.	20



Starting Position

Hare Bot and Tortoise Bot start in the West Zone.

Objective

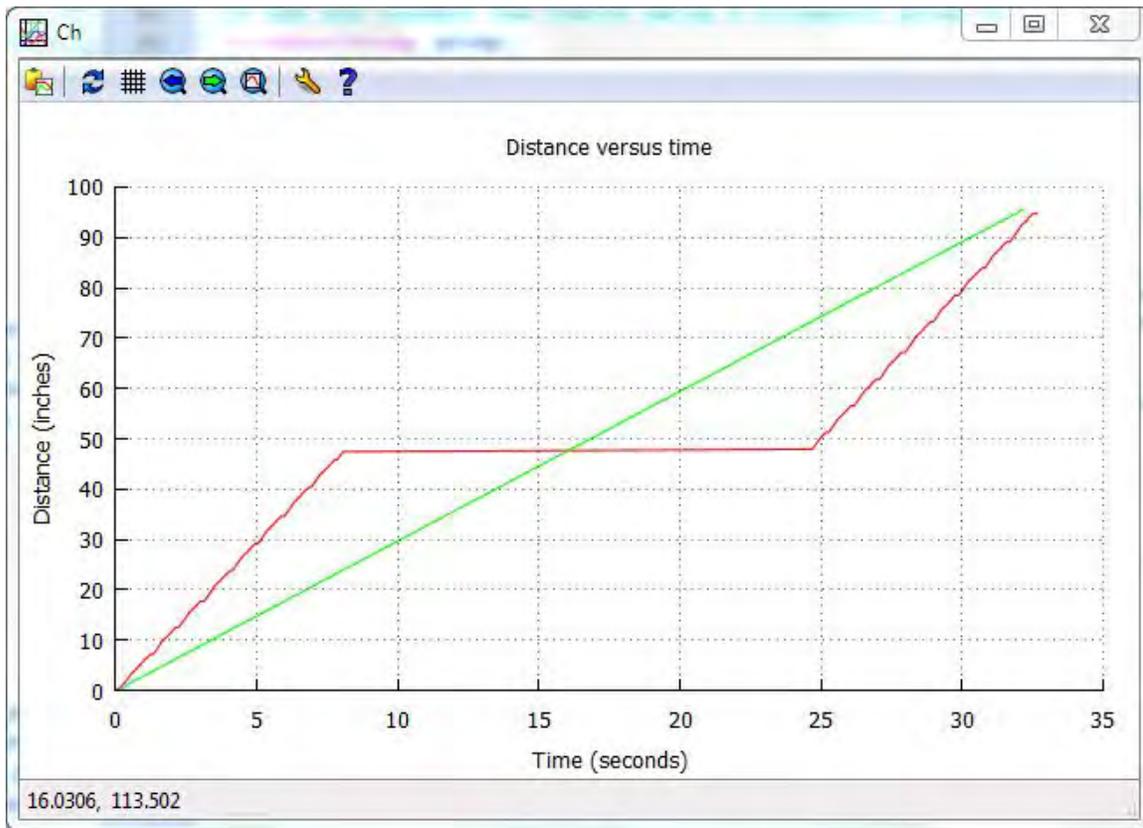
Graph both bots for Distance over Time. Label graph appropriately to be scored.

Hare Bot travels half-way to East Zone, pauses for a period of time, and enters the East Zone at the same time as the Tortoise Bot.

Tortoise Bot starts at the same time as Hare Bot, travels at half the speed of Hare Bot, does not stop, and enters East Zone at the same time as Hare Bot.

Scoring

#	Description	Points
1	Tortoise and Hare Bot start at the same time.	5
2	Tortoise and Hare Bot end at the same time in the East Zone.	15
3	Tortoise Bot graph has shape as illustrated below.	20
4	Hare Bot graph has shape as illustrated below.	40



8. The Grid

(95 Points Possible)

Board Setup

A pipe is placed where the red circle is drawn in the illustration.

Starting Position

Bot starts in Corner IV as illustrated below.

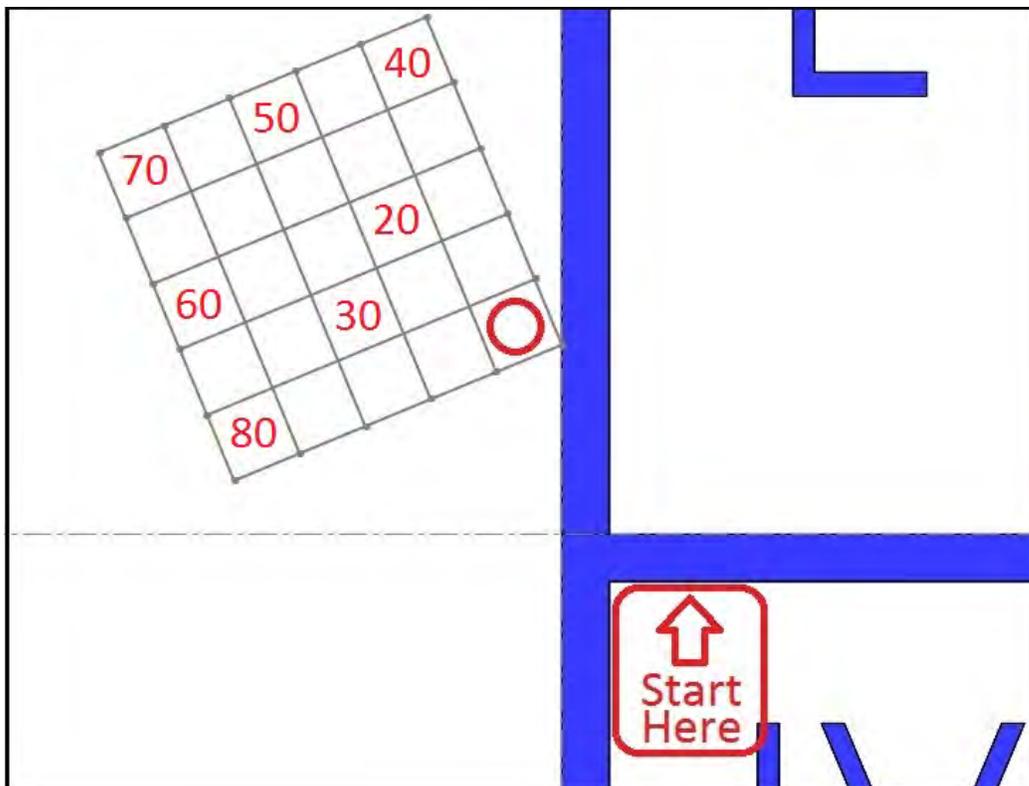
Objective

Use a bot to move the pipe to a scoring square. Then back the bot off from the pipe by at least 1 inch or run will not be scored.

Scoring

Score is taken off the diagram below.

#	Description	Points
1	The score of the square the pipe is touching.	See Diagram
2	Pipe stops completely within a scoring square.	15
3	Penalty for bot ending within 1 inch of the pipe.	No Points



9. Transport

(115 Points Possible)

Board Setup

Place an upside down cup (Pick-up Cup) over Dot B.

Place a right side up cup (Drop Cup) on Dot C.

The hacky is placed on the Pick-up cup

Starting Position

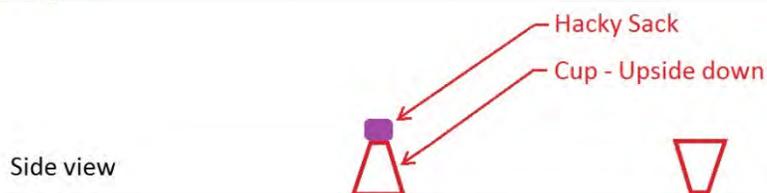
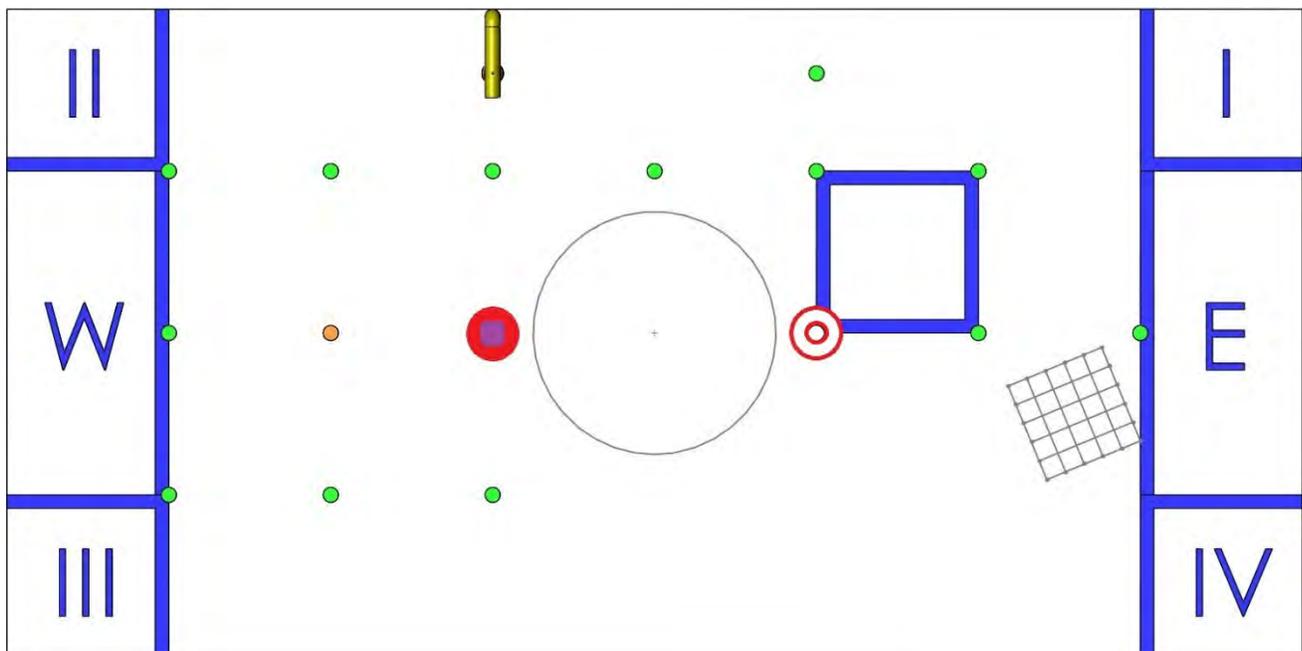
Bot starts at any position touching the West Zone.

Objective

Have a bot pick up the hacky from the Pick-up cup, and drop it into the Drop cup.

Scoring

#	Description	Points
1	Bot picks up hacky.	25
2	Bot transports hacky within a foot of Drop Cup.	25
3	Hacky touches the Drop Cup.	25
4	Hacky is put into the Drop Cup.	40
5	Penalty for each cup moved from its starting position.	-20



10. Alley Oop

(120 Points Possible)

Board Setup

Bowl is placed right side up in the Center Ring.

Hacky starts anywhere except in the bowl and must start below the lip of the bowl.

Special Instructions

The bot(s) must be built with no more than four Linkbots altogether, not including the controlling dangle.

Starting Position

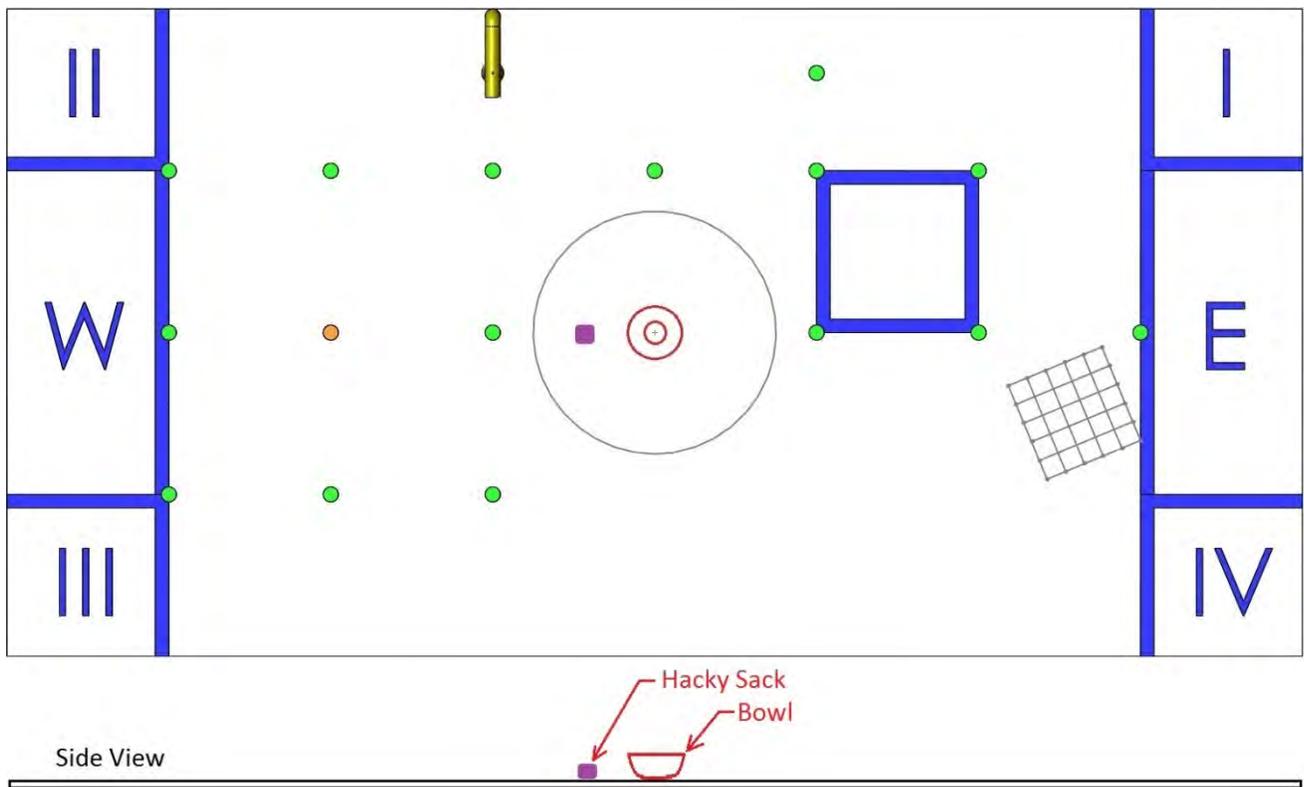
Bot(s) may start anywhere, not touching the bowl.

Objective

Construct a bot or bots to pick up the hacky and dump it into the bowl.

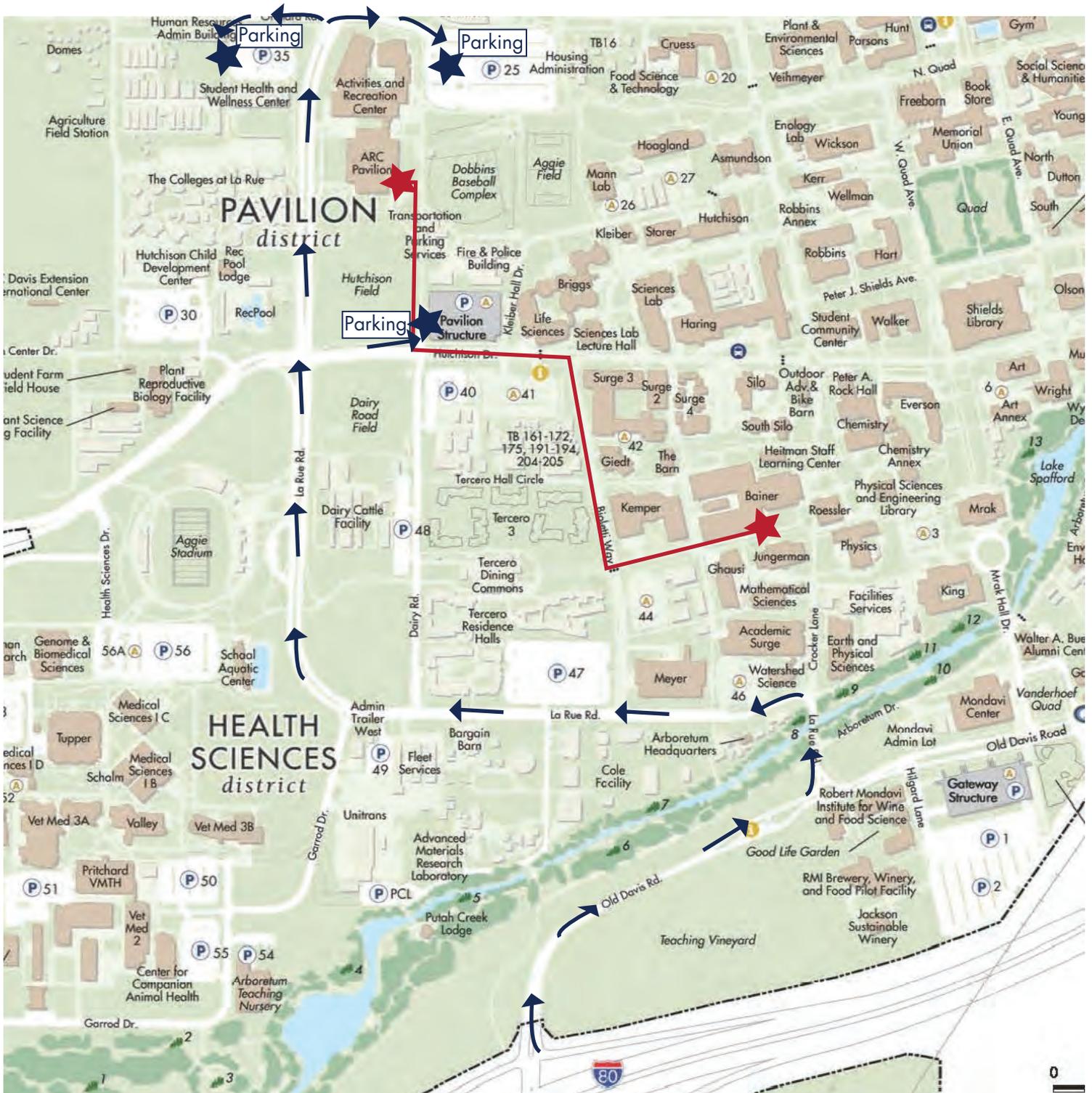
Scoring

#	Description	Points
1	Bot(s) lift hacky off ground.	40
2	Hacky ends in the bowl.	40
3	If Bot(s) started while not touching the hacky, and both other goals were completed.	40



Overview of Event Locations

- 2121A Bainer Hall: Math Programming Competition
- ARC Pavilion: RoboPlay Challenge Competition



→ : driving directions → : walking directions

UC Davis Pavillion RoboPlay Competition Team Assignments

