2013 KIPR Open
Autonomous Robot Tournament
Game Specification
# Version 1.1

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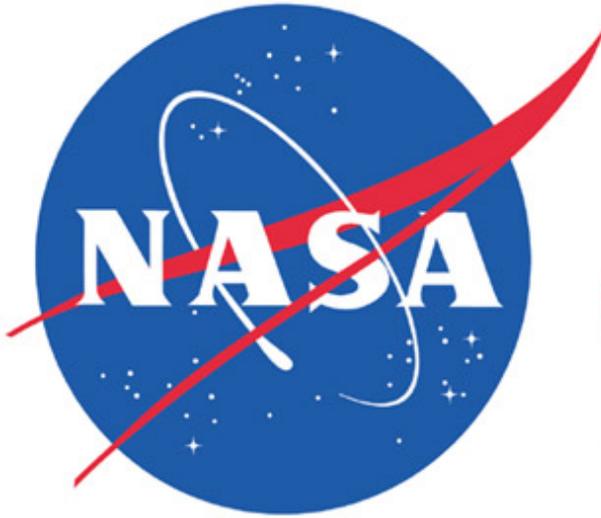
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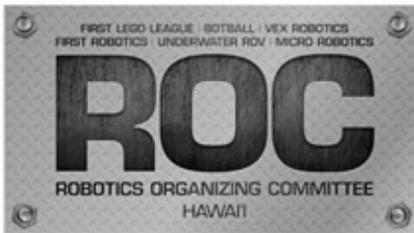
Update History

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International KIPR Open Tournament

KIPR produces the International KIPR Open Autonomous Robot Tournament each year at the Global Conference on Educational Robotics. The 2013 Global Conference on Educational Robotics will be held at the Embassy Suites Hotel and Conference Center in Norman, Oklahoma July 6-10, 2013. For more information on GCER, please see http://www.kipr.org/GCER

KIPR Open Game

The KIPR Open Game is an autonomous robotics challenge designed and distributed each year by the KISS Institute for Practical Robotics (KIPR) to encourage ongoing robotics education beyond the high school level. This document presents the official game rules for the KIPR Open Game. These game rules are free for educational use and are used in college courses and robotics events throughout the world. For the latest information on the KIPR Open Game and the International KIPR Open Tournament, including updates to this rules document, go to http://www.kipr.org/kipr-open.

For information on KIPR's Botball Educational Robotics Program for students in middle school and high school visit http://www.botball.org.

This Year's Game: Lift and Stack

The objective of this year's game challenge is to lift and stack, installing heavy tubes on posts and/or filling randomly ordered elevated funnels with color matching poms.

The Game Board
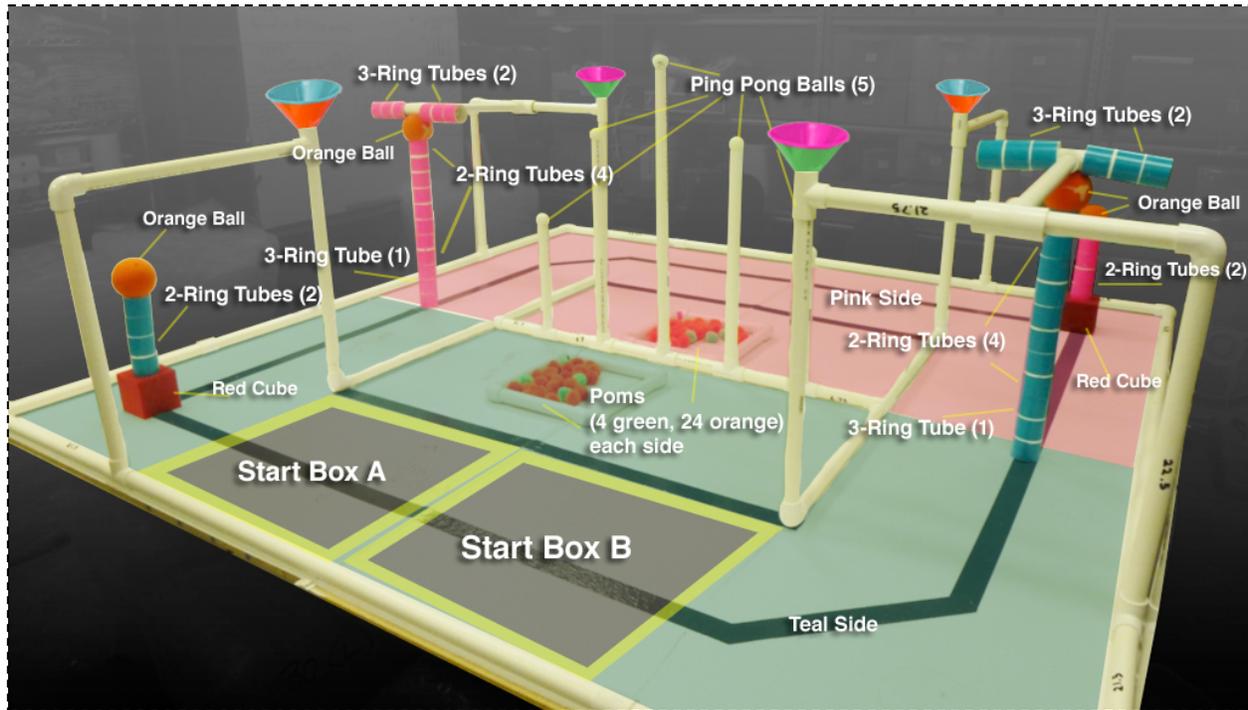
Team Identification

For each round, the team will be identified as the Pink or the Teal team, depending on which side they set up on (set up is in one of Start box A or Start box B, but not both).

Scoring

Scoring Areas

- Short post x 2
- Medium Post x 2
- Tall Post x 1
- Funnels x 4 – marked pink/orange, pink/green, teal/orange, and teal/green
- Pom Container x 2 – one marked as pink and one marked as teal

Scoring Items

48 – orange poms

8 – green poms

5 – white pong balls, international standard size (40mm)

6 – 3-ring tubes (3 teal and 3 pink)

12 – 2-ring tubes (6 teal and 6 pink)

4 – orange poof balls

2 – red foam cubes

Scoring Summary

	Tubes scored per ring	Mixed color poms	Orange poms only	Green poms only	Orange Poof Ball	Red Cube
Short Post	5					
Medium Post	10					
Tall Post	20					
Your Orange Funnel		1	2	1		
Your Green Funnel		1	1	10		
Your Pom Container					5	10

Scoring: General

1. Teams score points by putting objects into a scoring area.
2. Judges score the game after the end of the match.
3. Each game piece that scores will only be scored for its highest scoring position, no matter how many areas it might otherwise score in.
4. Scoring areas are marked by the inside edge of the PVC surrounding them.
5. Objects only score in the pom container if they break the volume of the pom container.
6. Ring tubs score on a post if the post is in the volume of the ring tube. Each ring on the ring tube is scored if the ring tube is in scoring position.
7. Points are doubled for any post that still has its ping pong ball in place at the end of the game.
8. The electricity rule states that a scoring object touching a scoring object in scoring position scores
9. The electricity rule applies to orange poms.
10. Poms only score in a funnel if they break the volume of the funnel.

Tie Breaking

In the event of a tie, the following tie breakers will be applied to determine the winning team (in order):

1. Team with the most points from ring tubes
2. Team with the most points from green poms
3. Team with the most points from orange poms
4. Team with the most points from orange poof balls
5. Team with the most points from red foam cubes
6. Team with a robot power switch closest to the tall post

Game Board Construction

Game Surface Materials

To build the Game Board surface, you will need:

- 4 pieces of 4x4' MDF (122cm x 122cm)
- 2 pieces of 4x8' Fiberglass Reinforced Panels (FRP) (122cm x 122cm) [Home Depot Store SKU# 121586]

These are the same materials used for the surface in last year's game.

Game Board Layout

The KIPR open board is modeled off of the 2013 Botball board with the following changes:

- Skycrane head is rotated 90°
- Removed botguy
- Removed all 1 ring booster sections
- Added 4 plastic funnels colored with:
  - Pink duct tape/green electrical tape
  - Pink duct tape/orange electrical tape
  - Teal duct tape/green electrical tape
  - Teal duct tape/orange electrical tape
- Added 5 white ping pong balls (40mm)
- Added 4 2-ring tubes (2 pink and 2 teal)
- Added 1 red foam cube
- All measurements on official boards whose uncertainty is not otherwise specified will be as specified within +/- 1/2 inch (12mm) or 1%, whichever is greater. Deal with it.

Robot Construction Rules

The following rules apply to all robots to be entered in the KIPR Open Robot Game:

1. A team's entry (all materials placed on the game-board) must mass less than 10kg (22 pounds).
2. A team's entry (all materials placed on the game-board) must fit within their (virtual) starting areas without restraint (other than pressing against interior edge of any game board PVC bordering the starting area).
3. The team's entry may not contain or release pressurized materials at greater than 7 bar (100 psi).
4. The team's entry may not release any liquids during the game, or before, during, or after the game while the team is at the game table.
5. The team's entry may not release any gasses while at the game table that are considered hazardous by the judges, or are at a temperature below 0^oC (32^oF) or above 50^oC (122^oF).
6. Robots may not contain features (manipulators, protrusions or materials) that are designed to, or are deemed by the judges likely to, cause damage or destruction to the game board, or to game pieces, or to a reasonably constructed opponent robot.
7. A team's entry may not contain features (manipulators, protrusions or materials) that are designed to, or are deemed by the judges likely to, cause jamming or entanglement of a reasonably constructed opponent robot. Blocking and containing of opponent robots is allowed; strategies likely to entangle or damage opponents or the board or game pieces are not allowed.
8. Robots must operate autonomously (no external power or control from outside of the game board area will be allowed).
9. Each team may only have a maximum of five independent structures on the game board at a time.
10. Each robot must have a name suitable for broadcast over a PA system.
11. Team entries may NOT contain parts that may reasonably be confused with game pieces (entries may not contain mirrors, lights, colored objects, or tape designed to confuse an opponent).
12. A team's entry may be made out of any materials or parts (including Botball and non-Botball kits) as long as the entry conforms to the construction rules above.
13. No projectiles can be used other than light game pieces (poms and ping pong) which may be launched by the team's robots with no restrictions.
14. For any robot whose safety is in question, judges will decide whether or not the robot is allowed to compete. All judging decisions are final.

KIPR Open Tournament Rules

Team Membership

- At least one team member must be beyond High School in their educational careers.
- College students, professional engineers, hobbyists, poets, and anyone else fulfilling the criteria above are all encouraged to participate.

Seeding/Performance Rounds

1. S/P Rounds take place before the double elimination rounds
2. S/P rounds consist of best two out of three, unopposed rounds
3. Scoring = (your points) - (their points)
4. Scores of less than -1 will be counted as 0
5. Passing on a round gives a score of -1 for that round
6. Seed Score = average of best two rounds

Double Elimination Tournament

1. A team is out of the tournament when it has lost two games
2. Initial matches are decided by seeding round
3. Matches are arranged using KIPR tournament software
4. Judges' decisions are final

Double Elimination

1. A team's entry must have broken the border of a starting box sometime during the 180 seconds of game play or that round will be forfeit.
2. Robots must stop all motors and other actuators at the end of the round. Failure to do so will result in loss of round (unless the other team never broke out of the starting box).
3. If neither team's entry manages to break the border of a starting box during game play, the round will be replayed once. If it happens again during the replay, the round will be decided by coin toss.
4. At least one robot from a team must be outfitted and programmed to respond to the starting light. A robot team that operates exclusively on a timer triggered by a hand operated switch is not allowed and will automatically cause that team to forfeit that round.

Tournament Logistics

1. Side assignment is determined by the scoring software. During seeding teams can play the side of their choice. A team can set up in either of the two start boxes on their side, but not both.
2. Teams shake hands and visually inspect each other's robots before calibration.
   a. If either team wants to challenge the validity of the robots they are facing, they have to do it then.
   b. Inspection is limited to a max of 1 minute unless a specific challenge is made.
   c. Challenges have to be of the form:
      i. That robot contains high explosives
      ii. That robot's hardened steel spike is designed to damage other robots.
   d. Judges will be the final arbiter.
      i. Judges can dismiss what they believe to be spurious challenges
   e. Teams found in violation will (unless the judge decides there have been extenuating circumstances) forfeit that round or at the judge's discretion, be allowed to remove the offending pieces before the round begins.
   f. In no case will a robot that is determined before the beginning of the round to be in violation of the construction rules be allowed to play while in that state.
2. If the judges determine that a robot violates the construction rules, whether or not a challenge has been made, that robot will not be allowed to run until it has been modified to meet the rules.
3. Construction rules apply only to what is brought to the game table
4. Teams cannot use wireless links to program their robots within 10 yards of the game board.
5. During setup teams may adjust starting lights:
   a. Starting lights may not be in physical contact with any robot
   b. Starting lights may not be aimed to disrupt an opponent or blind anyone (judge's decision)
   c. Starting light cords will be taped down where indicated on the Layout, and will not be moved before or during game play
6. During setup teams perform any necessary calibrations needed by their robots.
   a. Setup time should be two minutes or less.
   b. **For each minute or fraction thereof in excess of 2 minutes the team's score will be reduced by 20%.**
7. When both teams are ready, or judges decide adequate time has been allowed for calibration, teams activate their robots and then -- Hands off!
   a. After hands off, no part of a team's robot(s) may leave the starting box until the starting lights turn on.
      i. If this happens, the judges will call a fault on the team.
      ii. If a team receives a 2nd fault in a round, they forfeit the round.
   b. After hands off, judges will finalize game board setup - the 2 possible funnel positions for each side are set randomly (there are 4 combinations, so the final arrangement of funnels may or may not be symmetrical).
   c. After hands off, judges will turn on the starting lights to signal game start.

        d. After hands off, teams may not broadcast ANY physical or electromagnetic signals to their robots.
        e. When the starting lights turn on the robots must autonomously start.
8. Game duration is 180 seconds.
9. Lights will remain on for 5 seconds, turn off for 170 seconds and flash the last 5 seconds.
10. Once the starting lights are turned on, the round counts unless a judge rules outside interference.
11. Robots must cut power to their motors and turn off or stop issuing motion commands to servos by the end of the round or risk forfeiting the round.
12. Scoring is based on the location of pieces at the end of the round, not how the pieces got there.
13. There are no instant replays, and attempts to use videos to question a decision will be ignored.
        a. If a team is unhappy with a judge's decision, they should challenge it then and there.
        b. Challenges to scoring after the teams have left the table, will not be considered.
14. Teams cannot touch, borrow equipment, modify robots or computers, or beam commands to another team's stuff (including their pit table) without the permission and presence of a member of that team.

Advice for Tournament Participants

Test your robots from start to end:
        a. Go through the entire starting sequence
        b. Test your robot on both sides of the game table
        c. Make sure you can calibrate to the starting light
        d. Make sure the robots stop when they are supposed to: verify with a stop watch!
        e. Does the starting sequence work with very different lighting conditions? (tournament tables may or may not have lights above them)
        f. Test the shielding of your sensors!

Check http://www.kipr.org/kipr-openregularly for rules updates.

Check out the KIPR Open Robotics Game discussion board and FAQ at http://community.botball.org

Good Luck!