

Beyond Botball 2008 Rules & Game Review



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Beyond Botball Tournament

- The Beyond Botball Challenge & documentation is provided free by KIPR for educational use.
- Beyond Botball is designed as a project for a robotics, programming, systems or independent study class
- The International Beyond Botball Tournament is held each year in conjunction with the National Conference on Educational Robotics
- Beyond Botball team entry forms and conference registration can be found at www.botball.org
- The 2008 Beyond Botball Tournament will be held in conjunction with GCER 2008 July 7-11, 2008 at the University of Oklahoma



Rules Update History

- v0.4: 12/05/07 Game rules first released



Robot Construction Rules

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 the starting boxes. The upper box 30.5cm by 55cm (12" by 21.75") and the lower starting box is 57cm by 57cm (22.5" by 22.5"). Both starting boxes are 38cm high (15").
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°C (32°F) or above 50°C (122°F).



Robot Construction Rules (2)

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 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.
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 four independent structures on the game board at a time.
10. Each robot must have a name suitable for broadcast over a PA system.



Robot Construction Rules (3)

11. Team entries may NOT contain parts that may reasonably be confused with game pieces (entries may not contain colored foam balls, etc)
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.

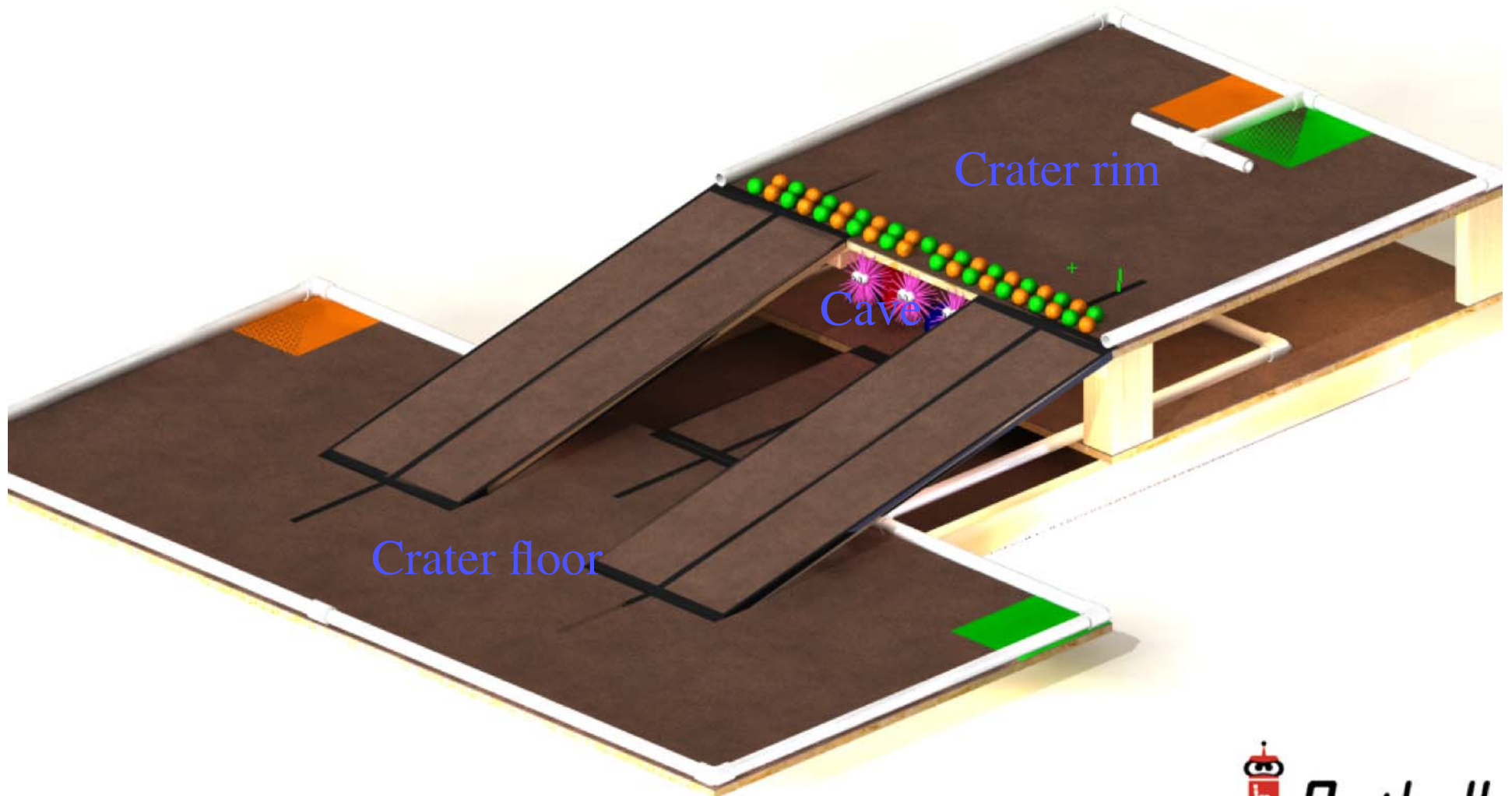


The Story

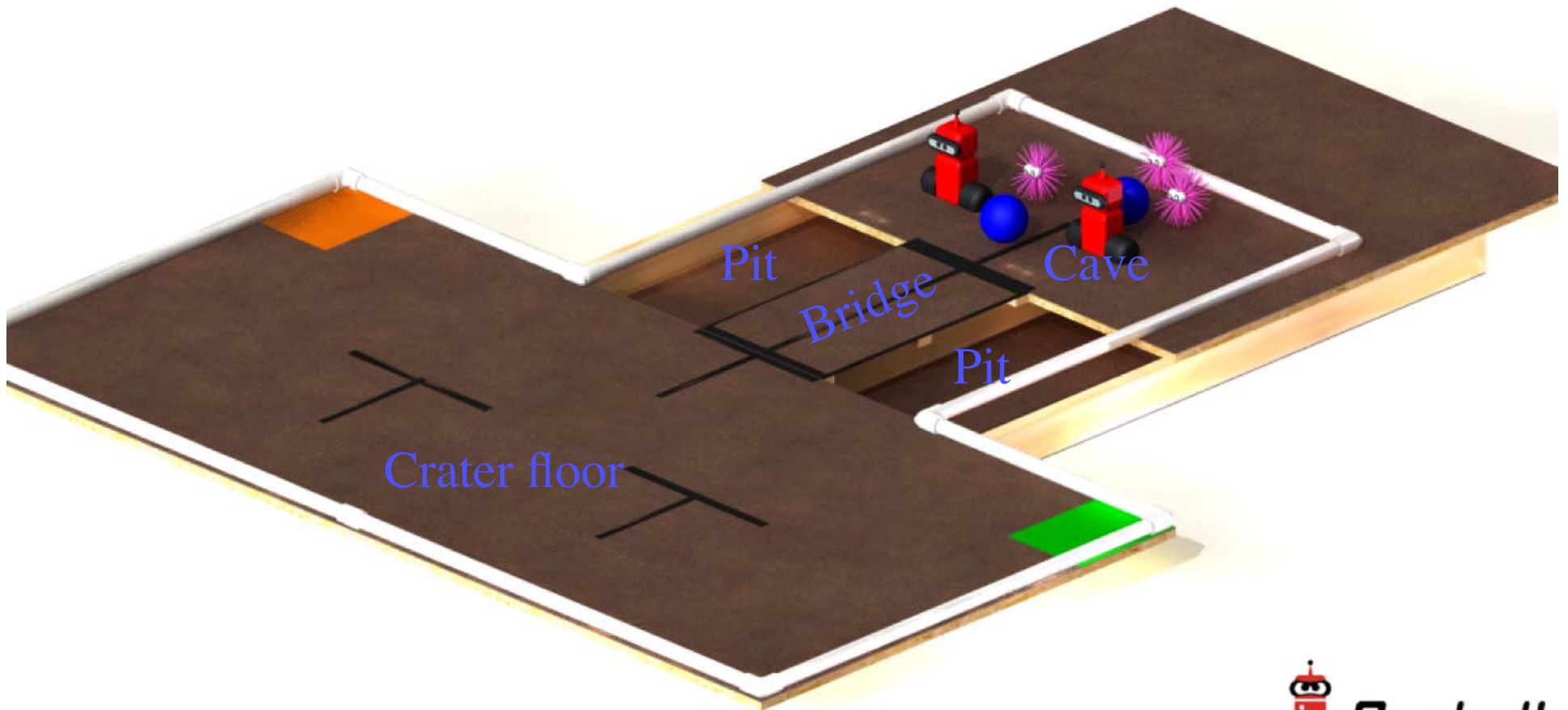
As a Google X Prize Contestant, your rovers are trying to win the bonus prizes for finding water/ice in shadowed craters on the Moon. Your mission is to make your way into the crater, depositing sponsor markers along the way. Then search along the caves in the bottom for ice. You should then bring the ice and any other interesting artifacts up to your landing site for further analysis. Be on the lookout for possible X Prize competitors trying to get the prize first, and don't forget about the aliens...



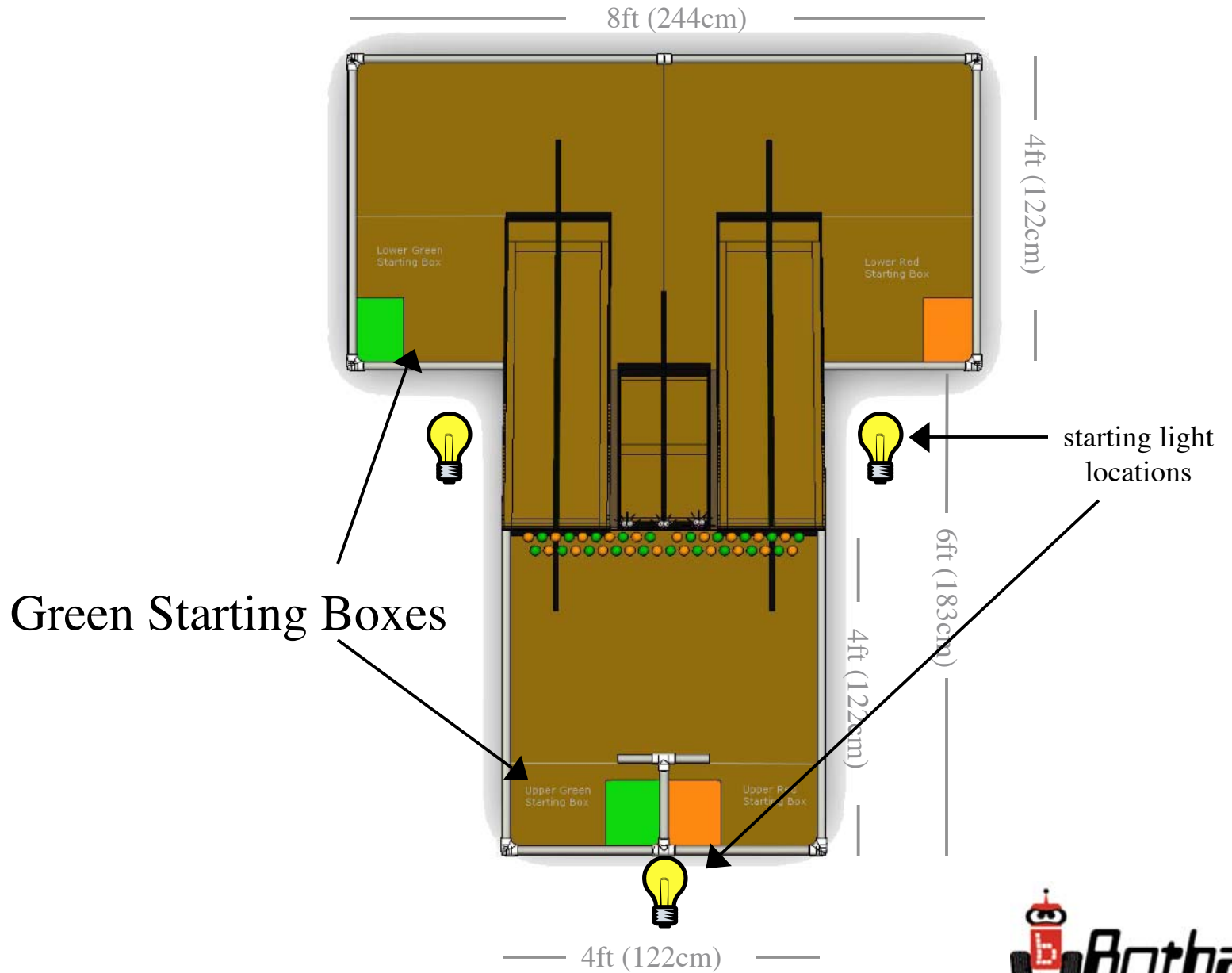
2008 Beyond Botball Board



2008 Beyond Botball Board (Crater rim & ramps removed)



Starting Boxes



Game Board Setup

- A team's entry may be placed in either or both of their starting boxes
- The upper starting boxes are determined by the inside edges of the PVC pipe and a penciled line which continues the line defined by the short piece of PVC. The lower boxes are defined by the inner edge of the PVC and penciled lines which follow the vertical projection of the ramp, and an extension of the line defined by the end of the ramp.
- The starting boxes have a virtual height of 15” (38cm).
- Game pieces on the upper board and crater bottom are placed as shown in the game board pictures.
- Game pieces within the cave are randomly placed by the judges after team setup is complete.
- 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.



Scoring Summary

	Your upper starting box	Their upper starting box	Your lower starting box	Their lower starting box	Crater Floor	Pit under ramps	Crater Cave
Your Sponsor Marker (20)		1		3	1		2
Their Sponsor Marker (20)						3	
Water/Ice(2)	15		10				
BotGuy(2)	15		10				
Alien(6)		10		7			

Max possible score: 240.



Team Identification

- A team is either red or green depending on the colored paper located in their starting area
- The red team owns the orange sponsor markers and the green team owns the green sponsor markers (poms)



Scoring: Balls

- A. There are 2 blue balls (ice). They start at some unknown location within the cave.
- B. Balls only score if they are in one of the four starting boxes
- C. A ball in your lower starting box is 10pts and in your upper box is 15pts.
- D. A ball is in your box if its center is within the positive vertical projection of the inside edge of the PVC or pencil line marking your box.



Scoring: Poms

- A. There are 20 green and 20 orange poms (sponsor markers)
- B. They start along the front edge of the upper level (crater rim).
- C. For each of your poms placed in the following areas, your team scores points:
 - 1. Your team scores 1 point for each of your poms placed in the opponents upper level starting box (if your are red, placing a orange marker in the upper level green box).
 - 2. Your team scores 1 point for each of your poms on the floor level that is not in a higher scoring area (the pits are below the floor level and do not score here)
 - 3. Your team gets 3 points for each of your poms placed in the opponents lower starting box.
 - 4. Your team gets 2 points for each of your poms placed in the cave.
- D. Your team scores 3 points for each of your opponents poms placed in the pit under the ramps.
- E. A pom not located in one of the scoring positions above, does not score.
- F. A pom is in a scoring area if any part of the pom is in the positive vertical projection of that scoring area (note that the positive vertical projection of the cave is terminated by the bottom of the upper level).



Scoring: Botguys

- A. There are 2 Botguys.
- B. Botguys start at a random location within the cave, imprisoned by the evil (or at least misunderstood) aliens.
- C. Botguys only score if they are in one of your starting areas
- D. Each Botguy in your lower starting box is worth 10 points.
- E. Each Botguy in your upper starting box is worth 15 points.
- F. A Botguy is in the starting box if any part of it is within the starting box
- G. If a Botguy is in more than one scoring area simultaneously, than the area where the bulk of the Botguy (as ruled by the judges) resides will be the area where the score counts.



Scoring: Aliens

- A. There are 6 Aliens.
- B. 3 Aliens start at random locations within the cave, guarding the captured invaders from Earth and the precious spheres of fluid.
- C. 3 Aliens start as sentries in front of the entrance of the cave (they are suspended from finishing nails).
- D. Each Alien in your OPPONENT'S lower starting box is worth 7 points to your team.
- E. Each Alien in your OPPONENT'S upper starting box is worth 10 points to your team.
- F. An Alien is in the starting box if any part of it is within the starting box
- G. If an Alien is in more than one scoring area simultaneously, than the area where the bulk of the Alien (as ruled by the judges) resides will be the area where the score counts.



Tie Breaking

Tie breaking (in order):

1. The team with the most water in their starting boxes
2. The team with the most Botguys in their starting boxes
3. The team with the fewest Aliens in their starting boxes
4. The team with the most sponsor markers, not in the pit and still on the board (in any position (scoring or not) except the pit).
5. Team with their robot's motor power switch closest horizontally to the center of the cave entrance (power switches on the upper deck will have 10 inches (25cm) added to their distances)



Seeding/Performance Rounds

- S/P Rounds take place before the double elimination
- S/P rounds consist of best two out of three, unopposed rounds.
- All teams play Green side
- Scoring = (Green points) - (Red points)
- Scores of less than -1 will be counted as -1
- Passing on a round gives a score of -1 for that round
- Seed Score = average of best two rounds



Double Elimination Tournament

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



Double Elimination

- A team's robot must have broken the border of the starting box sometime during the 180 seconds of game play or they will forfeit that round. If a team has two robots, only one is required to break the bounds of the starting box.
- 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 the starting box).
- If neither team's robots break the starting box bounds during game play, the round will be replayed once. If neither team moves out of the starting box during the replay, the round will be decided by coin flip.
- 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. No part of any non-team member, is allowed over the vertical projection of the outer edge of the pit area (with the exception of tournament staff)
2. Robots may only leave the pit to go to the game tables
3. Teams will know their side assignment (green or red) at least 1 minute before the match
4. Up to 2 members from a team bring the robot to the tournament table and set it up



Tournament Logistics (2)

1. Teams shake hands and visually inspect each other's robots before calibration.
2. If either team wants to challenge the validity of the robots they are facing, they have to do it then.
3. Inspection is limited to a max of 1 minute unless a specific challenge is made.
4. Challenges have to be of the form:
 1. That robot contains high explosives
 2. That robot's hardened steel spike is designed to damage other robots.
5. Judges will be the final arbiter.
 1. Judges can dismiss what they believe to be spurious challenges
 2. Teams found in violation will (unless the judge decides there have been extenuating circumstances) forfeit that round or at the judge's discretion, remove the offending pieces before the round begins.
 3. 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.



Tournament Logistics (3)

1. Teams will set up their robots, performing any necessary calibrations. Setup time should be two minutes or less.
2. When both teams are ready or judges decide adequate time has been allowed for calibration, robots are activated and then -- Hands off!
3. After Hands off, no part of a team's robot(s) may leave the starting box until the starting lights turn on. If this happens, the judges will call a fault on the team
4. If a team receives a 2nd fault in a round, they forfeit the round



Tournament Logistics (4)

1. After teams are set up and robots are awaiting the starting lights, judges will place objects in the cave.
2. When the starting lights turn on the robots must autonomously start.
3. Lights will remain on for 5 seconds, turn off for 170 seconds, and flash the last 5 seconds.
4. Once the starting lights have lit, the round counts unless a judge rules outside interference.



Tournament Logistics (5)

1. Teams cannot use infrared links to program their robots within 10 yards of the game board
2. Teams may not broadcast ANY physical or electromagnetic signals to their robots once the teams are in “Hands-Off”.
3. 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
4. Scoring is based on the location of pieces at the end of the round, not how the pieces got there.
5. If the judges determine that a robot violates the construction rules, that robot will not be allowed to run until it has been modified to meet the rules.



Tournament Logistics (6)

1. Construction rules apply only to what is brought to the Game Table.
2. There are no instant replays, we do not want to see videos of questionable decisions. If a team is unhappy with a judge's decision, they should challenge it then and there. Challenges to scoring after the teams have left the table, will not be considered.
3. 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

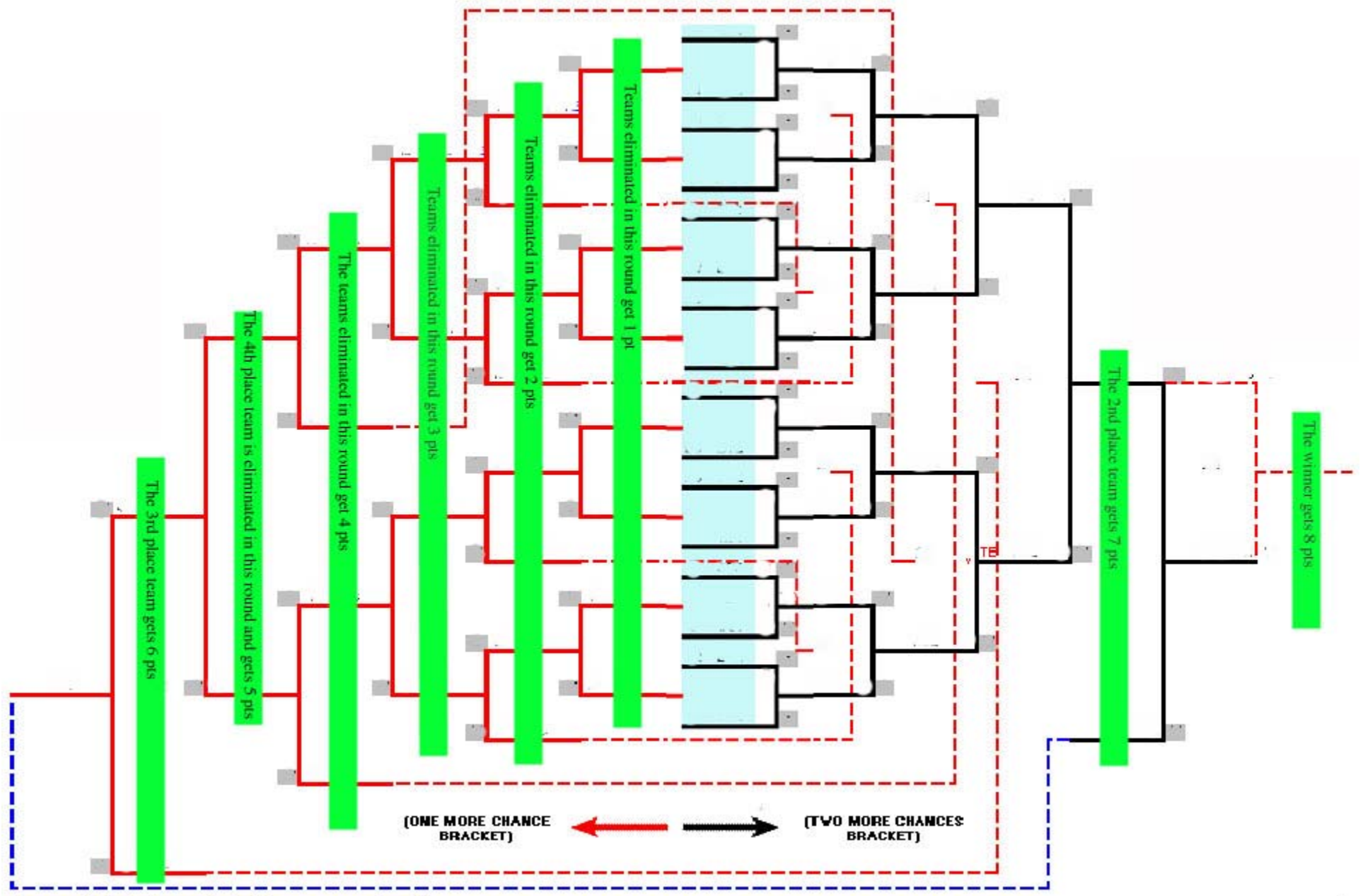


Winner

- Trophy winners will be selected by summing their points in each of the two contests ($N = \#$ of teams):
 - Seeding rounds:
 $\text{LOG}_2(N/\text{rank}) + \text{LOG}_{10}(3 * (\text{seed_score} + 2))$
 - Double elimination:
winner gets: $2 * \text{Ceiling}(\text{LOG}_2 N)$
(see next slide)



For $8 < N \leq 16$: Max score = $2\text{LOG}_2 16 = 8$



Scoring Example

- Winning the double elimination does not guarantee winning the tournament
- In a 16 team contest, a team that wins the seeding with a score of 59 gets ($4+2.66=6.66$ pts) and then finishes 7th or 8th in the double elimination (3pts) would have 9.66pts
- A team that finishes 9th in the seeding with a score of 15 ($.83+1.71=2.54$ pts) and wins the double elimination (8pts) would have a total of 10.54pts



Team Membership

- At least one Beyond Botball 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



Things to do Before You Come to the Tournament...

- Test your robots from start to end:
 - Go through the entire starting sequence
 - Make sure you can calibrate to the starting light
 - Make sure the robots stop when they are supposed to: verify with a stop watch!
- **Does the starting sequence work with very bright overhead lights** (tournament tables will have bright lights hung about five feet above the tables) - **Test the shielding of your sensors!**



Check
www.botball.org
regularly
Good Luck!

