

2011 Botball Game Review

Version 1.6

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Table of Contents

National Sponsors	4
Regional Sponsors	6
This Year's Game	8
Botville Airport Renovation!.....	8
The Game Board.....	8
Game Board Picture	9
Game Board Areas.....	9
15 Second No Pass Zone.....	10
The Opposing Team's Starting Boxes	10
Game Piece Location	11
Luggage Cart Initial Placement	11
Biofuel Initial Placement	11
Scoring	12
Scoring Table	12
Scoring Items.....	14
Scoring Rules	14
Tie Breakers.....	15
Construction Rules	15
Kit Rules.....	15
Robot Logistics	17
Safety.....	18
External Communication	18

Game Play	19
Setup (before “Hands Off”)	19
Before the Game Begins (after “Hands Off”)	20
After the Game Begins (after Lights on)	20
End of Game	20
Challenges	21
Seeding Rounds	21
Double Elimination	21
Alliance Matches	22
Alliance Logistics	22
Alliance Scoring	22
Overall Winner Calculations	23
Documentation Scoring Formula	23
Seeding Scoring Formula	23
Double Elimination Scoring Formula	23

National Sponsors



Regional Sponsors



Grandville
Academic
Team
Boosters



This Year's Game

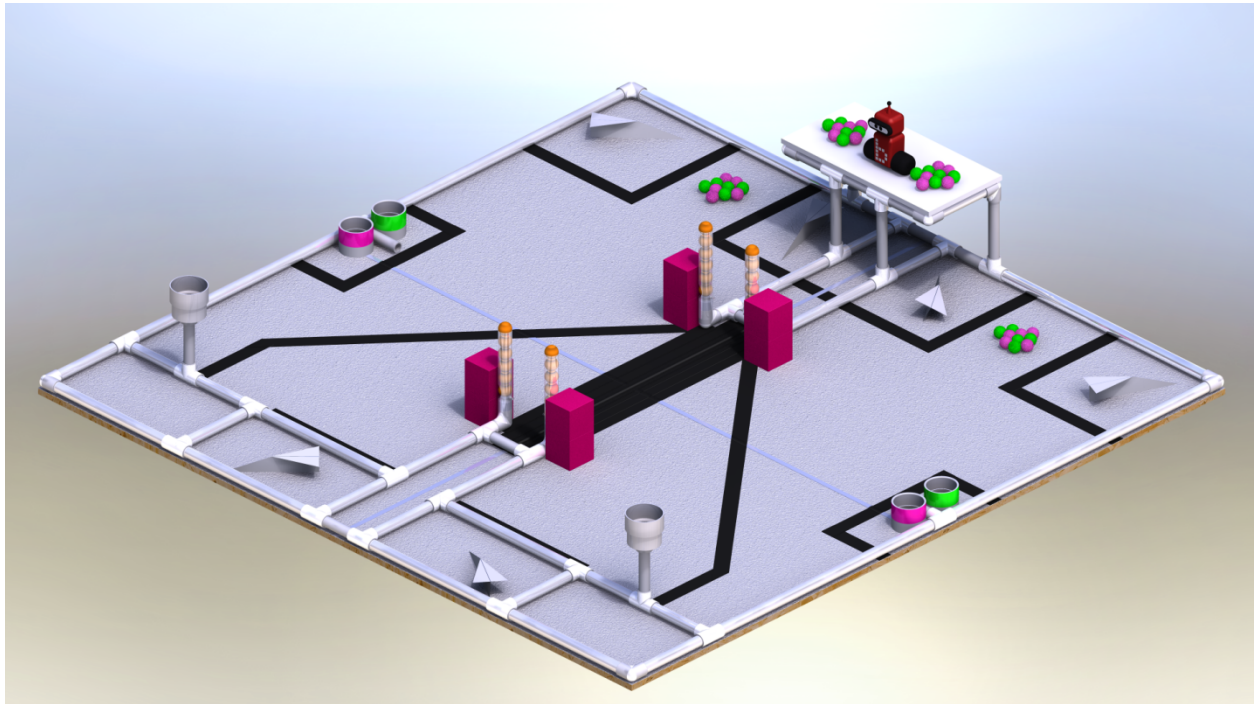
Botville Airport Renovation!

Botville international airport is experiencing massive growth due to the green energy plan instituted 2 years ago. Now the airport is joining in. The planes currently at the airport need to leave for safety reasons during the upgrades. All of the unclaimed luggage must be loaded into the matching baggage carts and moved to the hangar for storage. All of the airplanes need to be taxied to the runway in preparation for takeoff. All of the bio-fuels need to be moved from the manufacturing facility next to the runway to the fuel tanks on the tank farms located near the hangars. Finally the new control tower needs to be erected on the tarmac and air traffic controller Botguy needs to be moved from the terminal to the top of the tower to direct flight patterns.

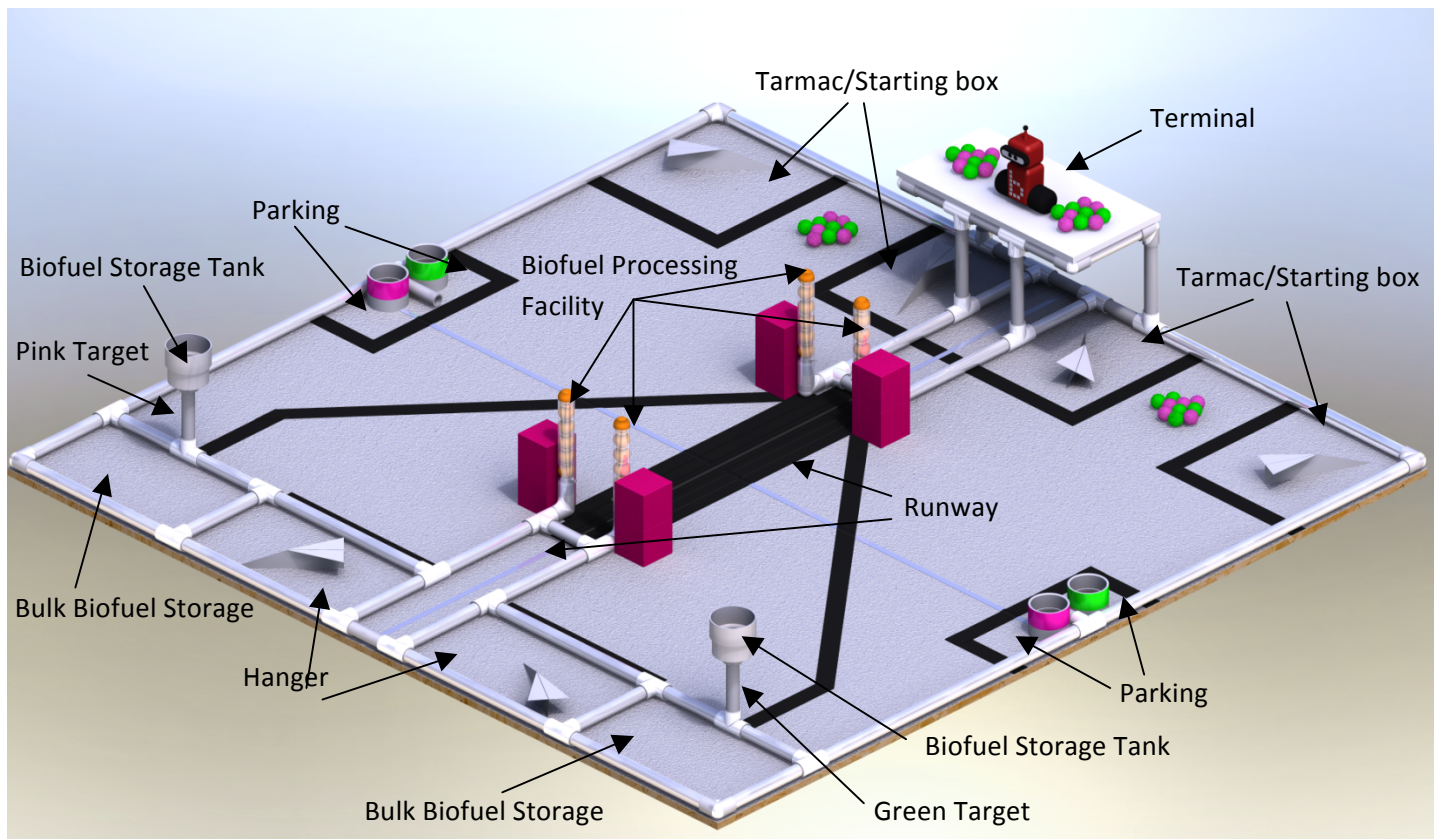
The Game Board

The game board is composed of 4' x 4' (reusable) modules whose surface is a pebble grain white fiberglass panel. A panel channel (rounded side up) closes the seam where modules abut. Botguy and the luggage start on the raised platform on the end. The colored luggage carts are randomly placed prior to the start of the game. Two airplanes will start inside of the team's starting boxes (one in each), the other one will be placed in the hangar for retrieval. Official game board specifications are on your workshop flash drive – all parts are available at Home Depot or Lowes (samples of the surface and colored tape are in your game piece set).

Game Board Picture



Game Board Areas



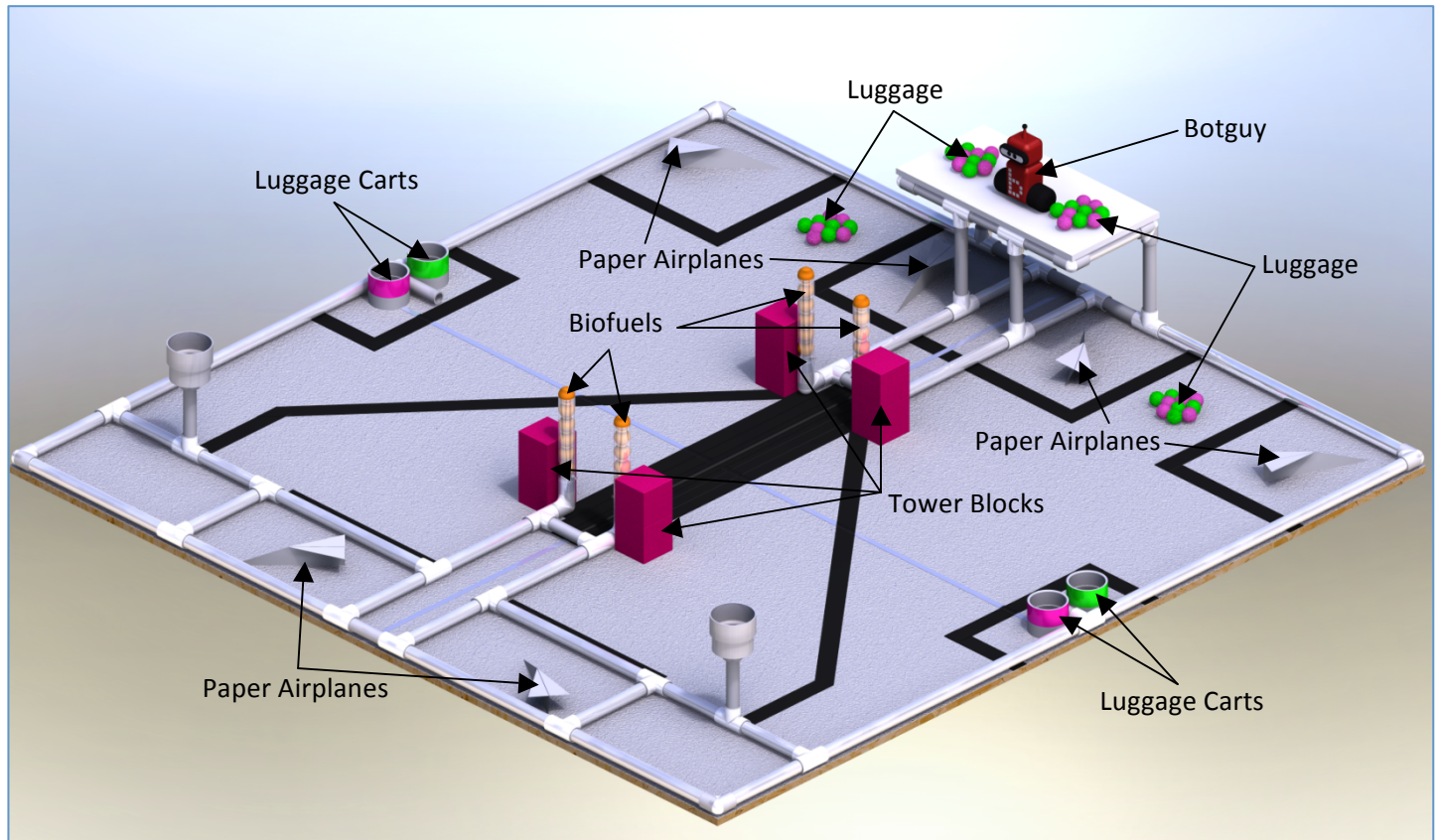
15 Second No Pass Zone

The 15 Second No Pass Zone is the infinite vertical projection up from the table defined by the inner edges of the PVC pipe and black tape that surrounds the opposing side of the board or the vertical projection of the terminal. Neither team's entry may enter the volume of the opposing side during the first 15 seconds. A team that enters the No Pass Zone in the first 15 seconds during the seeding round will score a 0. A team that enters the No Pass Zone within the first 15 seconds of a Double Elimination round will immediately forfeit to the opposing team, and the game will end.

The Opposing Team's Starting Boxes

A team may never enter into the volume of any of the other team's Starting Boxes. A team that enters the opposing team's Starting Boxes during the seeding round will score a 0. A team that enters the opposing team's Starting Boxes during a Double Elimination round will immediately forfeit to the opposing team, and the game will end.

Game Piece Location



Luggage Cart Initial Placement

Each Cart potential location is marked on the board. The four carts will be randomly placed in their locations after the “hands off” (defined later). The **assignment** is the same on both sides.

The color of the luggage cart in the parking area determines the color of the parking area. If a cart is removed from a parking area, that area becomes color neutral and scores the same as your side.

Biofuel Initial Placement

The Biofuels initially start in the clear tubes on each side. The Tower Cubes will be positioned as to hold the bio fuels in the clear tubes. The cubes will start centered on the clear tubes, and as close as possible. Bio fuels may be exposed from the dispersal holes, but will not be moving when the match starts.

Scoring

Scoring Table

Locations Items	On Runway	In Pink Luggage Cart	In Green Luggage Cart	In Pink Parking	In Green Parking	In Starting box	In Hangar	In Bulk Storage	In Storage Tank	On Terminal	On Side	On stacked blocks
Pink Luggage	-	5	Cancels Green	2	Cancels Green	-	-	-	-	-	-	-
Green Luggage	-	Cancels Pink	5	Cancels Pink	2	-	-	-	-	-	-	-
Biofuel	-	Cancels Pink	Cancels Green	1	1	1	-	5	10	-	1	-
Blocks	-	-	-	-	-	$20n_1$	-	-	-	-	$10n_1$	-
Botguy	-	5	5	5	5	5	5	5	5	-	5	Tower $\times 2_2$
Planes	10	-	-	-	-	-	-	-	-	-	-	-
Pink Baggage Cart	-	-	-	-	-	-	$\times 2_3$	-	-	-	-	-
Green Baggage Cart	-	-	-	-	-	-	$\times 2_3$	-	-	-	-	-
Team's Robot	Cancels Runway $_4$	-	-	-	-	-	-	-	-	-	-	-

1. Per Stack of blocks three or more tall without touching robot. n = number of stacked blocks
2. If Botguy is touching the top of the top stacked block without touching robot he doubles the score from blocks for that tower.
3. Touching black line in front of Hangar.
4. If any portion of a team's entry that is touching the surface of the runway at the end of the game, that team's runway points are canceled and their opponent's runway score is doubled ($\times 2$).

Scoring Items

- Botguy x 1
- Pink Luggage (1.5" poms) x 20
- Orange Luggage (1.5" poms) x 20
- Biofuels (40mm orange ping pong balls) x 24
- Foam Tower Cubes (5" x 5" x 5" dark red) x 8

Scoring Rules

The official scoring rules for the 2011 Game are made up of this 2011 Botball Game Review document and any posts on the 2011 Team Home Base in the Game Rules Question area.

The boundary of the *Starting Box* is defined by the inside edges of the black tape and PVC that surround the *Starting Box*. A scoring object with any part within the vertical projection of the *Starting Box* is scored as in the *Starting Box*. The boundary of *your side* is defined by the inside edges of the PVC surrounding *your side* and it also includes the entire *Starting Boxes*, *Parking* (for scoring items) and your side of the black tape *runway* up to the bump in the middle of the board. Items score if any part of them is within the vertical projection of *your side*. *Luggage* scores in the vertical projection of *Parking* and in the volume of the *Luggage Carts*. *Fuel* scores in the *Biofuel Storage Tank* if any portion of a piece of *Fuel* is within the volume of the tank. *Fuel* scores in the *Bulk Biofuel Storage* if a *fuel* is touching the surface. Any *Fuel* touching a *Fuel* in scoring position in the *Biofuel Storage Tank* or the *Bulk Biofuel Storage* also scores. *Airplanes* must touch the surface of the *Runway* to count as scoring.

An object scoring in more than one area only scores in the area yielding the higher score. Block stacks must be at least 3 blocks tall and touching the table to score. Height is measured as the blockwise length from the table to the highest block. Robots may not be touching the tower at the end of the game. *Botguy* must be touching on the top of the tower, without touching a robot to score. *Botguy* only scores on one tower.

Your score is determined only where objects finish up, and not how they got there. The parking areas and the starting boxes are defined by the inside edge of the tape and PVC. Judges will wait until any objects still moving have come to rest. If your team does not agree with the calculation of a round score they must immediately notify the table judge(s) **before** the team leaves the table and **before** any items have been moved on the table. Teams will be required to initial a score sheet before they leave the table – this signifies that they agree with the score.

Tie Breakers

If one team never breaks any border of the starting box, they lose the round. If both teams start and one team's robot does not shut down their motors or does not stop their servos at the end, they lose the round. In the case of a tie score, a team wins if none of the above apply **AND** is the team with (first condition to apply):

- 1) Botguy on their Stack of cubes
- 2) The tallest cube stack in their starting box
- 3) The tallest cube stack on their side
- 4) The most points from luggage
- 5) The most points from airplanes
- 6) The most points from biofuel
- 7) Botguy touching their side
- 8) The most luggage touching their side
- 9) The robot with the closest CBC power switch to Botguy

Construction Rules

The official construction rules for the 2011 Game are made up of this 2011 Botball Game Review document **and** any posts on the 2011 Team Home Base the Game Rules Question area.

Kit Rules

1. Robots may be constructed out of any or all of this year's kit parts except: the boxes, bags, wrapping or packing material, the chargers, download cables (including the white iRobot Create cable), wrenches, screwdriver and color stickers. Materials supplied at the workshop for creating your game board (e.g., Botguy, poms, etc) are not part of the kit and cannot be used on your entry. The included camera and camera extension cable are the only USB devices that may be plugged into a robot during the game.
2. Twelve square inches of UGlu have been supplied in the kit and additional UGlu may be used as desired (at team's expense). It may only be used for construction purposes; it may not be exposed for sticking things otherwise in any manner. *In particular, this means you may **not** use UGlu to contact the game board, game elements, or the other team's entry.* **Note that hot melt glue or any other adhesives are not allowed.**
 - Spare UGlu may be purchased through the Botball Store or the retailers listed at:
<http://www.ugluit.com/index.php?id=73>
3. Judges may require excessive UGlu to be removed. You should always try to come up with a mechanical means for construction and only resort to UGlu as a last resort!

4. Supplied servo accessories such as grommets, screws, etc may only be used to mount pieces to the servo horn.
5. Servos and motors may be mounted to structural pieces using the supplied machine screws.
6. You may trim the connector potting material as needed to ease insertion or mounting of sensors.
7. Servo horns may be trimmed as desired.
8. You may add 36 square inches of paper (max 20lb) or foil. The paper/foil may only be held in place through the use of other kit parts (including UGlu). **Paper may only be black or white; only gray scale may be used for printing including official logos for sponsors of your team.**
9. The paper for use in paper airplanes is an full uncut sheet of 8.5" x 11" paper (max 20lb), must be folded along the dotted lines and be clearly labelled with your team code.
10. Paper airplanes must **NOT** be permanently attached to your robot (no UGlu).
9. You may add 100cm of thread or line or cable (max diameter 1mm), for use ONLY as tensile elements in winches and pulleys.
10. Up to 10 standard office rubber bands of maximum size #19 may be used (#19 is 3.5" x 1/16" x 1/32"); rubber bands may not be glued or melted. Rubber bands may be cut, but only a total of ten rubber bands or five pieces of rubber band (or any combination therein) may be used on a single entry.
11. Soda straws, paper, electrical tape and/or foil may be used as light guides for the sensors (light guides may be shielded by using tape, but not in a fashion that is for structural purposes or for manipulation). Light guide materials are in addition to the allowable parts.
12. You are limited to ten (10) 4" white zip ties (included in the kit), and they may be used for any purpose. You may replace damaged ties with ones of equivalent size (black or white).
13. Lego parts cannot be physically modified.
14. Metal parts may NOT be cut, or broken to a smaller size. Straps and plates may be bent if desired.
 - Warning: KIPR will not provide replacements for metal parts that have been altered or damaged. Replacements may be purchased from the Botball Store.
15. Optional Create parts are the rear wheel, the drive wheel clips, and the rear cargo bay wall. These parts may be used as desired as kit parts. The rear cargo bay wall may be removed, disassembled and loaded with standard pennies for added weight, in which case it must be re-installed on the Create. The Create may not be assembled/disassembled otherwise. The optional parts, if installed, must be fully installed and may not be used otherwise.

- The green battery box may only be used as a substitute battery.
16. Teams are limited to the number and size screws as follows: eight - #6 silver screws (packed with the Create), 25 - #8-32 quarter inch, 50 - #8-32 half inch, and 40 - #8-32 three-quarter inch screws. All #8-32 screws are black. There are 10 silver M3 x 14mm screws and six silver M3 nuts.
- Only the #6 machine screws should be used in the mounting holes on the Create.

Robot Logistics

17. Each robot must have a name (G rated) approved by an adult team leader before the tournament.
18. Multiple processors (such as two CBCs) may exist on a single robot.
19. It is not necessary to use all the parts in a kit.
20. The starting boxes are 15 x 15 inches (38 x 38 cm)
- The starting box boundaries are given by the interior edge of the PVC and tape that delineates it.
 - The starting box under the terminal extends vertically to the top plane of the terminal (about 13.125").
 - The starting box in the corner extends vertically 15 inches.
21. **All elements (multiple robots and other structures) being used by a team for a round must be within the volume of starting box at game start**
- After game start, robots are allowed to expand in size.
 - Starting light sensors should be shielded as demonstrated in the workshop slides and may not extend outside the starting box
22. All Independent structures **must** be clearly marked with the team's number. Maximum label size is 1" diameter (Avery #5410), or you may use permanent marker directly on the structure.
23. Robot teams can have a maximum of 4 independent structures on the field at a time
- All components together must fit in the starting box **without any external restraint** (the starting box floor and border PVC is not an external restraint) at game start.
 - Each structure must be large enough so that it does not, in the judge's opinion, constitute a jamming or entanglement hazard.
 - Examples of structures include: robots, barricades, detachable baskets, etc.
 - A team's entry can contain as many robots up to the structures limit that can be constructed from the parts in a single kit.
 - Items intentionally ejected from a robot count (judges judge intention); there are special rules regarding projectiles, discussed later.

24. No electrical modifications may be made to any CBC, the Create, any sensors or any motors, except you may substitute a different battery in the Create (i.e., the green battery pack filled with alkaline batteries – an expensive alternative!)
25. No wire extensions may be used except those provided in the kit (foil may **not** be used as wire!)

Safety

26. Human & Robot Safety:

- No untethered projectiles, other than **game** pieces, LEGO balls or paper airplanes are allowed
- No tethered projectiles containing metal pieces are allowed
- No metal pieces are to be used in effectors that move or rotate at high speed
- No metal protrusions are to be used that are likely to cause electrical short risks for other robots
- Judges will judge safety. Teams may alert judges to a potential safety or entanglement hazard, but judges will interpret whether or not a robot is safe, needs to be modified, or is not allowed to run.

27. Electrical tape (either black or white) may be used (or required to be used by judges) to cover metal pieces that are deemed to otherwise be a safety risk to robots or humans. NOTE: tape still may not be used structurally.

28. If a robot is not considered safe, as decided by the Head Judge, then the robot will not be allowed to run until it has been modified.

External Communication

29. No external communications (e.g., IR, blue-tooth, wireless, or semaphores) may be used during tournament play:
- The serial cables & chargers may not be used during tournament play
 - Non-radio communications among the robots forming your team's entry is allowed

Game Play

Setup (before “Hands Off”)

Up to two students from a team bring the team's robot(s) to the tournament table and perform the set up. Teams will place their robot(s) and the two paper airplanes (with their team code) within both of their starting boxes as desired (**the planes may be placed anywhere within the team's starting boxes even on/in their robots!**). **Paper airplanes without a team code will not score for either team!** Prior to the start of the game, teams may position either or both of the starting lights on their side as they wish, provided:

- Starting lights must be attached to the outside edges of the game board around your starting boxes.
- Starting lights may not be in physical contact with any part of your entry or game pieces.
- Starting lights may not be aimed to disrupt an opponent or blind anyone (judge's interpretation).
- There are two starting lights for each team so each robot can have its own starting light, and both lights will turn on and off at the same time and cannot be controlled individually.

During setup, teams may position their airplane in the hangar, provided that this airplane is touching the game surface inside the hangar.

If a team chooses not to place their airplanes, judges will place them for the team. During Seeding rounds, there will be no opposing paper airplanes on the game board.

Teams shake hands and visually inspect each other's robots before calibration. Inspection is limited to a max of 1 minute unless a specific challenge is made. When both teams are ready or judges decide adequate time has been allowed for calibration, each team positions/activates its robots and then -- **Hands off!**

If the judges feel a team is taking too long to calibrate, they will issue a 30 second warning. At the end of the 30 seconds, if either team is not ready for 'hands off', that team will be assigned a fault, and the setup clock will be reset. The target setup time (may be extended at judges' discretion) is 90 seconds.

Before the Game Begins (after “Hands Off”)

After *hands off* the judges randomly select the position of the baggage carts. The starting lights are initiated by the judge and signal to the robots that the round has begun. No part of a team’s robot(s) may leave the starting box until the round has begun (movement is OK so long as the starting box boundary isn’t violated). If this happens, the judges will call a fault on the team. Team members may not move the starting lights anytime after hands off, however robots may. If a team receives a 2nd fault in a round, they forfeit the round. Team members may not signal to their robots after “hands off”, in any way, to start their robots. Each team will be given a single, red Timeout Card labeled with their team number when they register at the tournament site. At any time before ‘hands-off’ a team may turn in their timeout card and get a 3 minute timeout. The team may spend that time in the pit or at the table, but not to practice at the table. Only a single timeout per team is allowed for the tournament.

After the Game Begins (after Lights on)

Once the starting lights have turned on, the round counts unless a judge rules otherwise. At the start of the game the starting lights turn on and robots are allowed to leave the starting box as soon as the lights turn on. The round lasts two minutes (120 seconds). The lighting Sequence is:

- 0 seconds: lights turn on; robots can leave start boxes
- 15 seconds: lights turn off
- 115 seconds: Lights blink for five seconds
- 120 seconds: lights turn off; game over; robots must turn off motors and freeze or power down servos.

Judges may at any time, while a robot is on the table, decide that a robot is in violation of construction rules, or that team members are guilty of interference and then disqualify that robot for that round.

End of Game

Robots must **cut power to their motors (including those on the Create) and stop servo motion** by the end of the round or that team will lose the round in all situations except against a team that does not break the boundary of the starting box (in seeding this condition will give a score of 0). Scoring is based on the location of pieces at the end, not how the pieces got there. Scoring takes place when items come to rest.

If all motion has stopped before 120 seconds, the judges may ask teams if robots are done and if they are then the judges may end the round at that time (if both teams agree).

If teams do not agree with a score calculation they must notify the judges **immediately**. Do not be afraid to talk to the judges about your score. Any scoring issues must be addressed while both teams are at the game table. Once both teams agree with the judge’s score and a team member from each team initials the score sheet, the score is **final**.

Challenges

Judges will not accept challenges to robots from the peanut gallery. Challenges must come from the judges and team members at the table. If either team wants to challenge the validity of the robots they are facing, they have to bring it to the table judges' attention during the inspection period. Teams can bring the list of parts to the table to aid in the inspection. Challenges have to be of the form of "That robot has way too many X", or "That robot is using an illegal part" (eg: "That robot is using welding instead of UGlu", or "That robot has nail gun duct taped to it").

Judges are the final arbiter. Judges can dismiss what they believe to be spurious or irrelevant challenges. Teams determined by the judges to be in safety or performance changing violation will have a minute to remove the offending parts or forfeit that round. A robot that is determined before the beginning of a round to be in a safety or performance changing violation of the construction rules will not be allowed to play while in that state. A robot ruled not human safe will not be allowed to run until modified.

There are no instant replays; we do not want to see videos to question decisions; if a team is unhappy with a judge's decision, they should politely challenge it then and there; **challenges to scoring or robot construction after the teams have left the table will not be considered.**

Seeding Rounds

Seeding rounds take place before double elimination. Each team will get three Seeding rounds and teams will play unopposed during the Seeding rounds. Each round is scored and the Seeding round score is (your side score) - (opponent side score). During Seeding rounds your opponent's score will always be zero unless your team scores points on your opponent's side.

Seed scores of less than 0 will be counted as 0, except for passing on a round gives a score of -1 for that round. A team's Seed Score is equal to the average of the best two rounds.

Double Elimination

A team is out of the double elimination tournament when it has lost two games. Initial matches are decided by seeding round scores. Matches and table sides are arranged using KIPR tournament software. The two teams will play each other and the highest score at the end of the game wins. Judges' decisions are final.

Alliance Matches

Alliance Logistics

If a team is eliminated from the Double Elimination tournament before the Finals of Double Elimination play, that team may sign up to play in Alliance Matches. Alliance Matches will pair up two teams. Each team will bring one robot to the table to run simultaneously. The teams will place their robots in any of the starting boxes (i.e. both on the A side, both on the B side, or split between the A and B side).

Alliance Scoring

Alliance rounds will follow all of the same scoring rules as a regular Botball round. The total Alliance score is (Your side score) + (Allies side score). The Alliance team with the highest combined score from a single run will win the Alliance Tournament.

Overall Winner Calculations

A team's overall score is calculated as the sum of their Seeding, Double Elimination, and Documentation scores. The overall score is between 0 and 3.

Documentation Scoring Formula

$$\text{Doc Score} = \frac{3}{10} (\text{Period 1 Doc \%}) + \frac{3}{10} (\text{Period 2 Doc \%}) + \frac{1}{10} (\text{Period 3 Doc \%}) + \frac{3}{10} (\text{Onsite Doc \%})$$

Seeding Scoring Formula

$$\text{Seed Score} = \frac{1}{2} \left(\frac{n - \text{Seed Rank} + 1}{n} \right) + \frac{1}{2} \left(\frac{\text{Team Average Seed Score}}{\text{Max Tournament Seed Score}} \right)$$

Double Elimination Scoring Formula

$$\text{Double Elimination Score} = \left(\frac{n - \text{DE Rank} + 1}{n} \right)$$

Note: For all formulas n = Number of Teams at Tournament