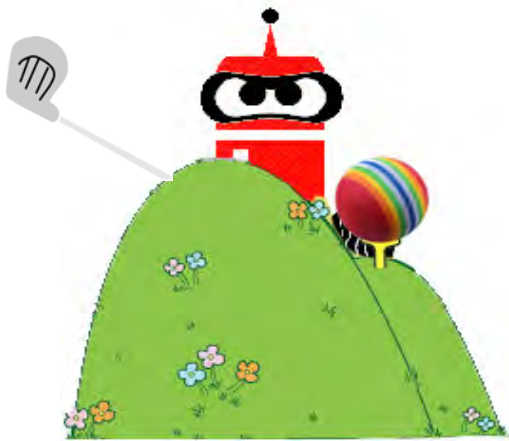


2017 KIPR Open

Autonomous Robot Tournament Game Specification Version 1.0



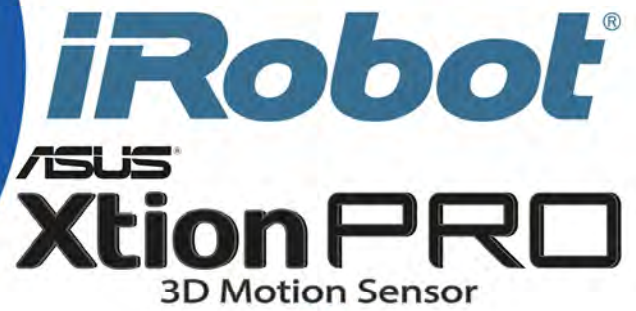
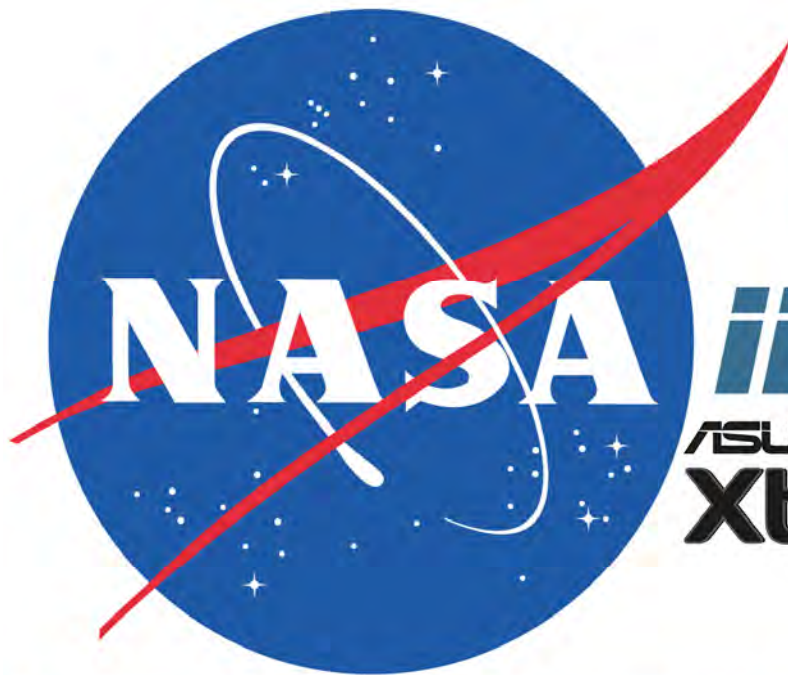
BotGolf II

© 2017 KISS Institute for Practical Robotics. All rights reserved.

BOTBALL®, BOTGUY, and the BOTGUY design and character are trademarks and/or service marks of KISS Institute for Practical Robotics and may not be used without express written permission.

LEGO, iRobot, and iRobot Create are registered marks of their respective owners.

The KISS Institute is a 501c3 nonprofit organization. Our mission is to improve the public's understanding of science, technology, engineering, and math; develop the skills, character, and aspirations of students; and contribute to the enrichment of our school systems, communities, and the nation.



Update History

Version 1.0: October 26, 2016

Table of Contents

2017 KIPR Open	1
Update History	3
International KIPR Open Tournament	5
KIPR Open Game	5
This Year's Game: BotGolf II	5
Team Identification	5
The Game Board	6
The Game Board Layout	7
Game Board Construction	8
Differences from the Botball 2017 Game Board	8
Location of Game Board Elements	8
Scoring	9
Scoring: Overview	9
Scoring: Areas	9
Scoring: Game Objects.....	9
Scoring: Item Layout	10
Scoring: Rules.....	10
Scoring: Penalty situations.....	11
Scoring: Points.....	12
Scoring: Points Grid.....	12
Scoring: Tie Breaking.....	12
Scoring: Team Briefing	12
Robot Construction Rules	13
Game Play	14
KIPR Open Tournament Rules	15
Team Membership.....	15
Game Length.....	15
Seeding/Performance Rounds	15
Double Elimination Tournament.....	15
Double Elimination.....	15
Tournament Logistics.....	15
Overall Winner Calculations	17
Advice for Tournament Participants	17

International KIPR Open Tournament

KIPR produces the International KIPR Open Autonomous Robot Tournament each year at the Global Conference on Educational Robotics. The 2017 Global Conference on Educational Robotics (GCER) will be held July **8, 2017** - July **12, 2017** (pre-conference on July **7**) at the Embassy Suites Norman - Hotel and Conference Center located in Norman, Oklahoma. 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 2017 KIPR Open Game, subject to modification and adjustment in response to errata, oversights, or participant queries. The KIPR Open Game rules may be used free of charge for educational purposes. They are regularly used in conjunction with collegiate coursework and in educational robotics events around the world. For the latest information on the KIPR Open Game and the International KIPR Open Tournament, including updates to this rules document via posted notifications and FAQs, go to <http://www.kipr.org/kipr-open>.

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

This Year's Game: BotGolf II

BotGolf returns as the KIPR Open challenge! The objective for this year's game challenge is the second edition of the golfing challenge known as BotGolf. The objective is twofold:

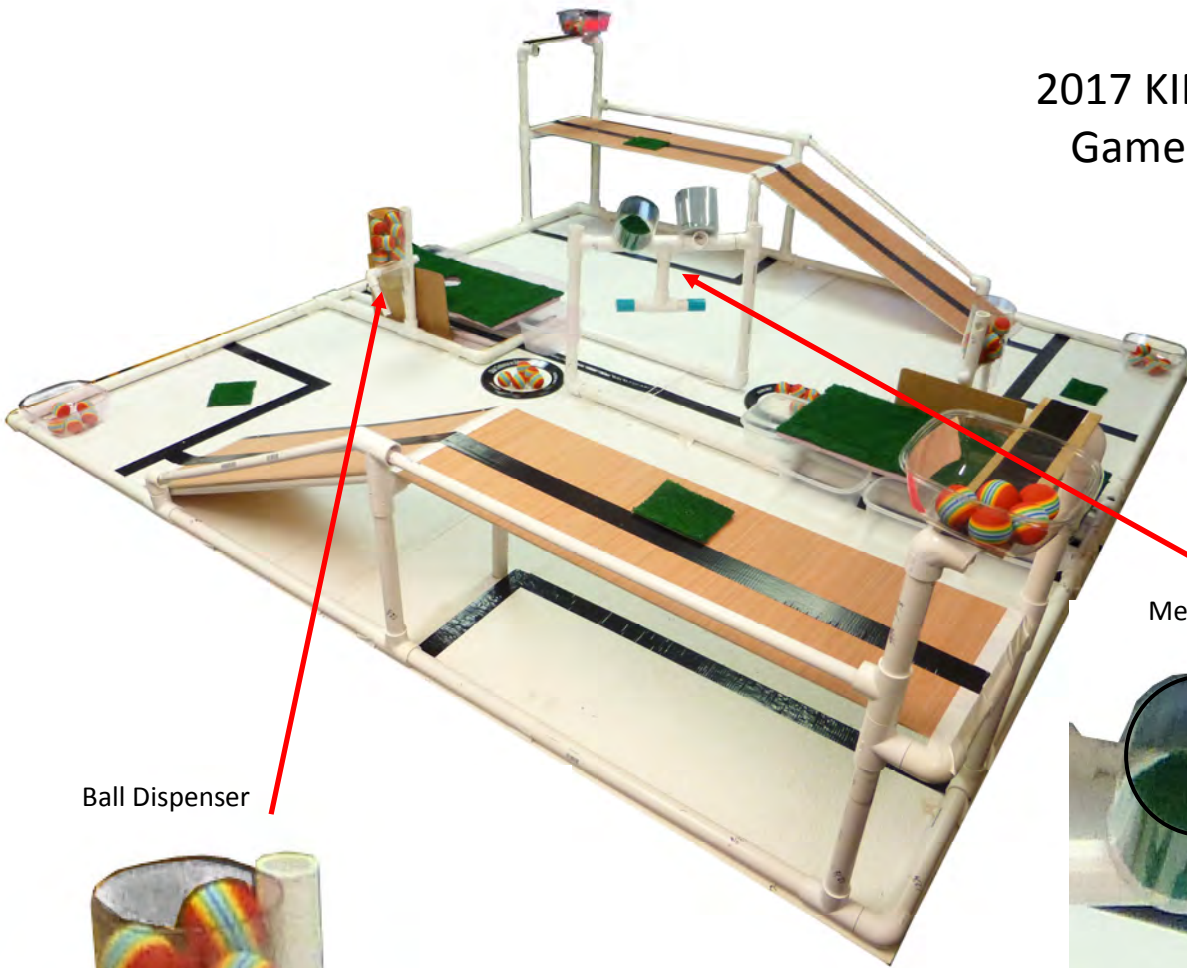
1. tee off golf balls from tees to land as many as you can in the "fairway", on the "green", in the "bunkers", in the "hole", or in the "mega-points challenge".
2. collect golf balls from a pond or ball dispenser and return them to a tee, from where they can be teed off again (or alternatively, dropped in a scoring area).

Team Identification

For each round, a team will be identified as the A team or the B team, depending on which side they set up on. For seeding rounds a team selects the side to play on. For double elimination, the KIPR scoring software determines each team's side. Scoring is on the team's carpeted area (the "green"), in its green's "hole", in the bins guarding its green ("bunkers"), in its elevated cup in the center ("mega points challenge"), or on the surface identified as its "fairway". A team can take balls from the storage bin on each tee to put in play (one at a time). A team can transfer balls to a tee's storage bin that are off the table or from a robot returning them to the tee.

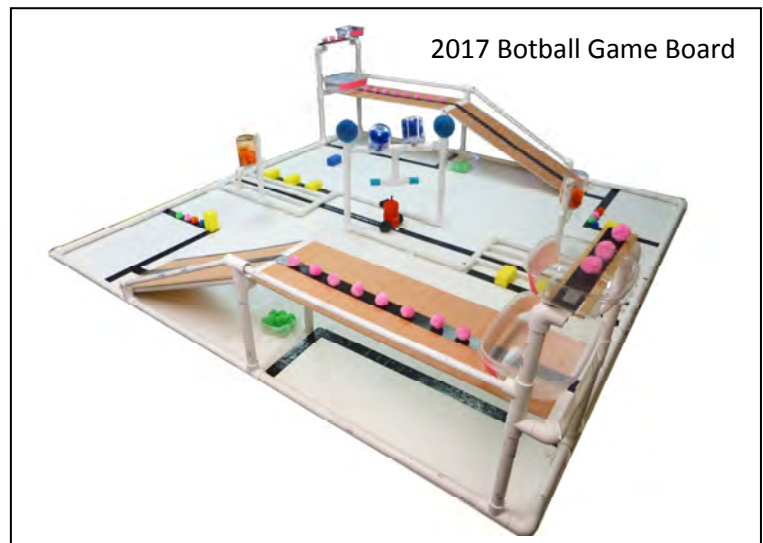
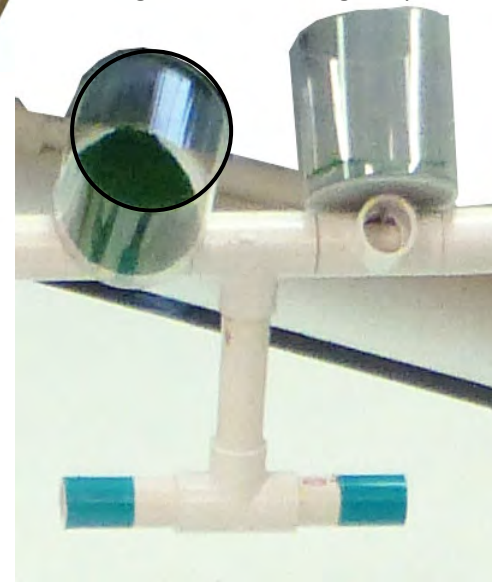
The Game Board

2017 KIPR Open
Game Board



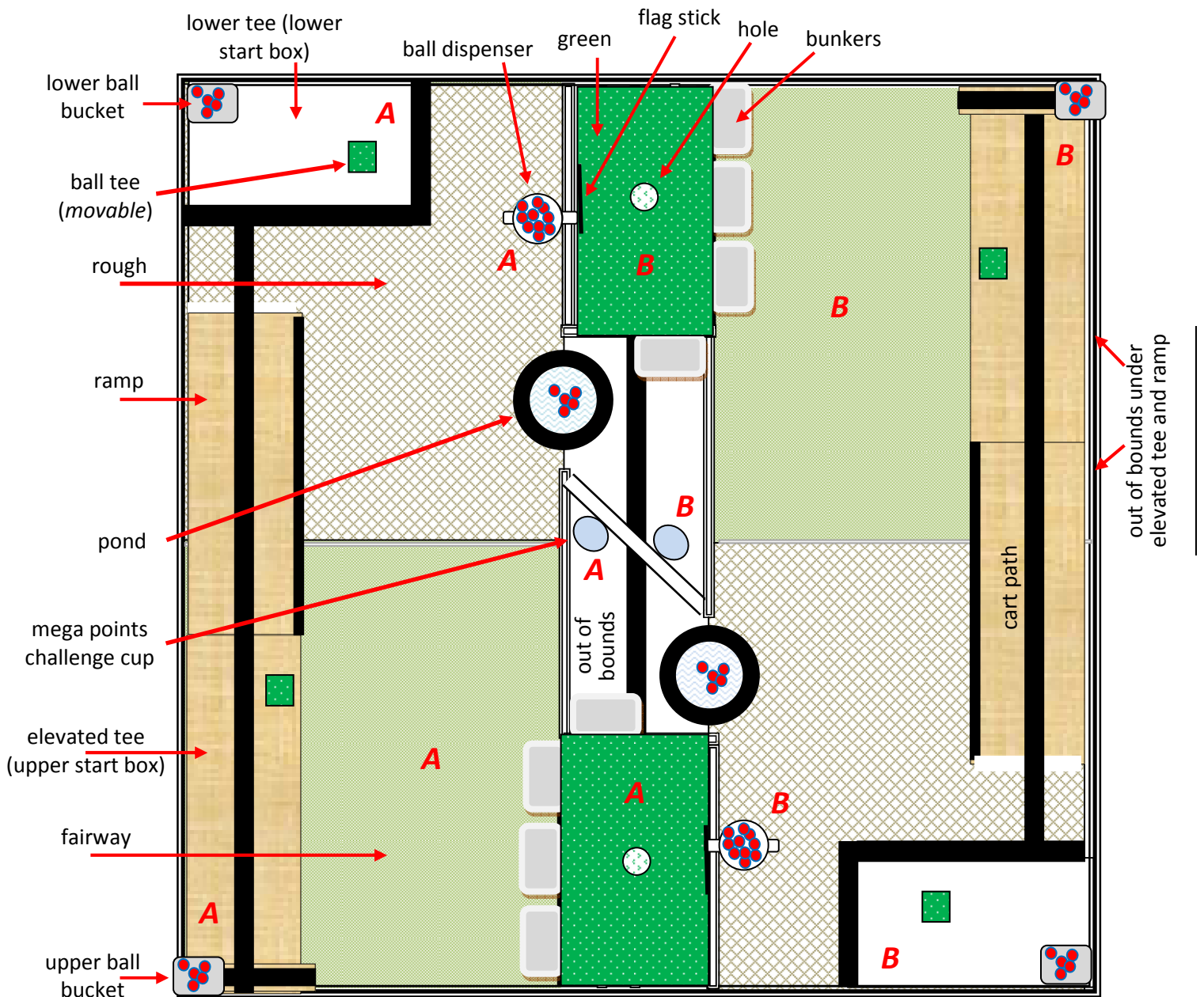
Ball Dispenser

Mega Points Challenge Cups



2017 Botball Game Board

The Game Board Layout



The **out of bounds** area is the surface of the game board in the center between the greens plus the surface under the greens, the elevated tees, and ramps (including tape). The **elevated tees** are the long platforms on each side of the game board. The **lower tees** are the interior of the taped off corner areas of the game table. The **golf balls** are indoor practice sponge foam balls. **Ball tees** are moveable patches of grass, one for each tee, which can only be placed on their tee's surface. A **divot** is a ball tee knocked off a tee. The **greens** are the raised "grass" surfaces, each with a **hole** cut in it. The **bunkers** are the (fixed) bins guarding the greens. The **ponds** are (movable) frisbee rings containing golf balls. The **rough** extends from each lower tee to include the surface center divider. The **fairways** are the surface of the remainder of the game board. The fairways do not include panel join, PVC, tape, or vertical projection of a (moved) pond perimeter. Each side has a (fixed) **ball bucket** for each of its two tees. A (fixed) **flag stick** (horizontal clip board or similar sized) is centered behind each hole.

Game Board Construction

Differences from the Botball 2017 Game Board

The game board uses the same structure as the 2017 Botball game, although with different game board elements and objectives. The 4" hopper used for Botball is replaced with a 6" ball dispenser (which may be opaque) to accommodate the size of golf balls. In addition to the materials for building the Botball board and for the modification of the hopper, the game uses

- 2 pieces of fiberboard (3mm) or similar material, each 12" x 28"
- 2 pieces of indoor/outdoor carpet to glue to the surface of the plywood (the tournament table will use Home Depot Vantage Ivy Green, product part T27-2700, SKU 925845)
- 2 carpet circles with 4" diameter
- 4 carpet tile samples, 4" square, to serve as moveable tees
- 8 plastic bins, 64 Oz. available in 3 packs from most grocery stores (6" x 8" x 4" deep, same as used for Botgolf I in 2016)
- 4 smaller plastic bins (the tournament will use the smaller of the two types of bins that are used in the Botball game) to serve as ball buckets for each tee
- 2 flat black frisbee rings (9-5/8" diameter - the tournament will use the KIPR versions)
- 50 foam practice golf balls (same as used for Botgolf I in 2016)

It will be necessary to use a hole saw, a saber saw, or something similar to cut a 4" circular hole dead center in the fiberboard/carpet pieces that make up the green. The ball tees at the tournament will be square 4" carpet samples (free at Home Depot), or you can manufacture your own, so long as it consists of the carpeting mounted on nothing thicker than 1/2" and is no more than 4" square. The flag sticks will be clip boards (or similar) installed horizontally and centered on the green, flat side towards the hole (with clip removed if necessary).

Location of Game Board Elements

The KIPR open board is modeled off of the 2017 Botball board with the following changes:

- A green (with 4" hole dead center) is installed on 4" piers over each set of Botball field rows.
- A ball bucket (6" x 6" x 4" bin used in the Botball game) is attached in the outside corner of each lower tee (the bin attached to the upper shelf for Botball is the ball bucket for the upper tee)
- Bunkers (the 64oz bins) are velcro'd to the surface with four guarding each green (three on the facing side and one around the corner). The height of the underside of each green is just sufficient for the lip of each bunker to fit under the edge of the green by using piers measured to be bin height).
- Hoppers with 6" barrels replace the hoppers with 4" barrels used for Botball (the construction otherwise is identical, although the barrels for the KIPR Open may be opaque).
- A 4" carpet circle is placed in the bottom of each of the two elevated/angled cups in the center of the game table to reduce the likelihood of balls bouncing out.
- A clip board (or similar sized board) centered behind each green is mounted horizontally to each ball dispenser pole to serve as a back stop (flag stick) for the hole.
- A pencil line is added to mark the out of bounds area under the ramp and elevated tee as necessary.
- Frisbee rings (ponds) are placed on the game board in marked locations.
- The fifty practice golf balls are distributed 5 in each ball bucket, 5 in each pond (random arrangement), and 10 in each hopper.

Scoring

Scoring: Overview

1. Teams score points by having a driver robot "tee off" light weight foam practice golf balls from a tee to try to land them in a scoring area on their side.
 - a) There can be one driver robot on each tee (also see Game Play below).
 - b) Only a ball taken from a tee's ball bucket can be teed off from that tee (and only one at a time).
 - c) At game start a ball bucket on each tee holds a supply of balls to be teed off, which can be replenished by a team member capturing balls that are off the table, or by a team member transferring balls to the tee's ball bucket that have been returned by a robot to the tee (also see Game Play below).
 - d) A ball can be transferred from a robot to a tee's ball bucket only if it intersects the vertical projection of the tee.
 - e) A ball off the table can be returned to either tee, on either side.
2. Robots for retrieving golf balls from around the course must operate autonomously, whether for scoring points or returning balls to a tee to be teed off.
3. After game start, a team member can manipulate the team's ball dispenser, which will be initially set with its lever pointing down.
 - a) The team member cannot touch a robot that is outside the Start Box in any way, including with the dispenser's lever.
 - b) It is permissible for a robot to manipulate the dispenser independent of the team member, including the one on the opponent's side.
4. A ball has to touch a green or a fairway to score there. To be in the hole the ball must be in the volume of the hole with its center below the surface of the hole. For a ball to score the mega points challenge, the center of the ball must be inside the (tilted) cup.
5. Judges score the game after the end of the match, so a team's score is determined by balls in the fairway, on their green, or in their bunkers.

Scoring: Areas

- The fairways
- The greens
- The holes in the greens
- The bunkers guarding the greens
- The mega points challenge cups

Scoring: Game Objects

50 –practice golf balls

Specifications for game objects will be on the KIPR Open web site at

<http://www.kipr.org/kipr-open>.

The balls used at the tournament will be indoor practice sponge foam balls which come in a bag of 50 available from

http://www.amazon.com/gp/product/B001MYMAU4?p_sc=1&redirect=true&ref=oh_aui_search_detailpage



Scoring: Item Layout

Before the start of the round the judges will reset each side (putting balls in each ball bucket, each pond, and each ball dispenser, all random arrangement).

The bunkers may have a material such as sand, foam, or carpet to reduce the likelihood of balls bouncing out. The bottom of each mega points challenge cup will have a 4" carpet piece in it to serve that purpose.

Scoring: Rules

The official scoring rules for the 2017 KO Game are made up of this 2017 KO Game Review document and any updated scoring rules posted via the KO web site as responses to FAQs or other issues raised prior to the start of the tournament. If rule adjustments so warrant, an updated version of this document may be posted to provide changes and adjustments, notated on the update history page above and by a revised version number. Rule changes may occur as late as the team briefing held with the judges at the tournament venue prior to the tournament.

The objective for the game is to get as many balls as possible onto a team's fairway and/or green, and/or in the team's bunkers, hole, and/or mega points challenge.

Each team is permitted to have up to two robot designated as driver robots for hitting golf balls, but no more than one on each tee. Limited team interaction and manipulation for driver robots is permitted as detailed below (Robot Construction Rules/Game Play). All robots fielded must operate autonomously within the limits of team interaction, and cease all powered movement by game end (excepting the slight wiggle of an enabled servo holding position).

Autonomous robots cannot be manipulated by a team member after lights on, but may be communicated with while in the Start Box by a single (non-wireless) button press to start or to stop (but not trigger any other action). The signal cannot be used to provide any other form of command to the robot. If a robot returns a ball to the Start Box (defined by breaking the vertical projection of a tee or touching a ball that is OK for removal), a team member may remove the balls and put it in the tee's ball bucket. Note that it is permitted to signal the robot when this task is completed (by pressing a button) so long as the action does not adjust the robot or independent structures in any way (see Robot Construction Rules/Game Play below).

Manipulation of a driver robot, ball tee, or balls during game play cannot be used as means for manipulating other independent structures the team may have on the field.

The Start Box for this year's game consists of two rectangular volumes, each with a (virtual) height of 15" and designated as the elevated tee and the lower tee:

- a. The upper start box is the 15" high volume with the elevated tee as its base.
- b. The lower start box is the 15" high volume with the lower tee as its base.
- c. At game start, all robots must be within the Start Box.
- d. The ball bucket for the elevated tee is anchored on the shelf at the end of the tee.
- e. The ball bucket for the lower tee is anchored to the floor of the game table in the outside corner of the lower tee.
- f. After game start, a robot or independent structure intersecting the volume of a tee cannot extend more than 12" over the fairway (this does not apply to the rough or the out of bounds areas).
- g. Teams may use either the supplied 4" square carpet sample or one of their own design so long as it is no more than 1" high and will fit in a 4" x 4" square.

- h. Any team member interaction with a robot, driver or otherwise, can only take place within the volume of the Start Box or within its horizontal x-y projection of up to 6 inches off the game table.
- i. Once the tee is set and a ball placed on it, the team may reposition the driver robot but not otherwise manipulate the robot (e.g., cock an arm). After positioning the driver robot, the team may signal it to perform by a single button press or visual signal.
- j. When a driver robot has ceased all movement, the team can reset the ball tee flat anywhere on the tee and position a ball from the tee's ball bucket on it.
- k. Any balls on a tee other than one placed on the ball tee must be returned to the tee's ball bucket unless doing so would require manipulating an independent structure (remember that positioning a ball or ball tee cannot be used for manipulation); i.e., only one ball at a time can be in play on a tee. This does not apply to a ball in the Start Box being carried on an independent structure, from which it can be removed to the tee's ball bucket so long as doing so doesn't manipulate the structure.
- l. An autonomous robot that returns to a tee can be signaled by a team member to stop by a button press that doesn't manipulate the robot otherwise, at which point any golf balls it is carrying can be removed to the tee's ball bucket. A button press can then be used to signal the robot to resume autonomous motion. (Keep in mind: the signal has to occur within the volume of the Start Box or from within 6 inches of the tee's exterior perimeter).
- m. Any balls removed to a ball bucket have to be accessed without reaching over the game table outside the Start Box; if a ball of its own volition enters the Start Box by removal of another ball, that ball can be removed to the ball bucket as well.
- n. All robots, including driver robots, must have ceased all movement by game end.
- o. Balls off the table are fair game by either team and once retrieved must be placed in a ball bucket.
- p. In the event of a divot, only table judges are allowed to recover the ball tee and return it to its tee.

The only scoring objects are golf balls:

- 1. A ball must touch the fairway or the green to score on it.
- 2. A ball must project into the interior of the bunker to score in it.
 - a. Each bunker may have sand or some other material on its bottom to lessen bounce.
- 3. For a ball to be in the hole, the center of a ball must be in the hole and below the surface of the hole.
- 4. For a ball to be in the mega points challenge cup, the center of the ball must be inside the cup.
- 5. The so-called "electricity rule" does not apply in scoring balls.
- 6. Judges are not concerned with how balls ended up in scoring position since scoring is based on where balls are located at the end of the match.

Scoring: Penalty situations

- 1. Only robots operating autonomously or independent structures can bring balls from the game table to a tee (including ball dispensers and ponds) or place a ball in scoring position.
- 2. If team member action puts a ball in a scoring position (e.g., by some manipulation of the ball dispenser or adjustment of a driver robot while in the act of hitting a ball) all balls in that scoring area will be returned to the team's ball dispenser.
- 3. If the driver robot reaches more than 12" beyond the elevated tee, the ball bucket will be emptied into the pond by the table judges.
- 4. If a ball is illegally returned to a ball bucket by a team member, the ball bucket will be emptied into the pond by the table judges.
- 5. Unless ruled incidental by a judge, an action that manipulates a robot other than the (very) limited allowed interaction specified in the Robot Construction Rules or elsewhere will result in disqualification.
- 6. A penalty may be assessed as specified in the tournament logistics below for teams taking excess time for setup.

Scoring: Points

Mega Points Challenge: 10 points per ball

The center of the ball must be in the volume of the cup.

Hole: 5 points per ball

The center of the ball must be in the volume of the hole.

Bunker: 3 points per ball

The ball must intersect the interior of the bunker.

On the green not scoring in the hole: 2 points per ball

The ball must be touching the surface of the green.

Fairway: 1 point per ball

The ball must be touching the fairway surface.

Scoring: Points Grid

	Mega points Challenge cup	In the hole	In a bunker	On the green	On the fairway
Ball	10	5	3	2	1

Scoring: Tie Breaking

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

1. Team with the most balls in a mega points challenge cup
2. Team with the most balls in the hole
3. Team with the most ball on the green
4. Team with the the ball closest to the hole
5. Team with the most balls in bunkers
6. Team with the most balls on the fairway
7. Team with the fewest balls in the pond
8. Team with a robot power switch closest to the center of the board

Scoring: Team Briefing

The judges will conduct a briefing with the teams in advance of the tournament to clarify (and possibly adjust) game rules or board setup ; e.g., a change in how to manage the ball buckets, penalties, or driver robot adjustments during game play.

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) Start Boxes without restraint (other than pressing against interior edge of any game board PVC bordering a Start Box). Each team has two start boxes on their side as specified (each with a 15" virtual height) and can use either or both, but for starting can only use the two lights provided.
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 gases 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).
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; in particular, things like needles serving to penetrate game objects or otherwise, or the use of a sticky substance to pick up game objects are prohibited.
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. Each team is limited to a maximum of five independent structures on the game board at a time.
9. Each robot must have a name suitable for broadcast over a PA system.
10. Team entries may NOT contain parts that may reasonably be confused with game pieces or table elements (entries may not contain mirrors, lights, colored objects, or tape designed to confuse an opponent).
11. 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.
12. No projectiles can be used other than game pieces and once collected may be launched by the team's robots with no restrictions.
13. 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.
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.

Game Play

1. The game starts when the starting lights come on.
2. Robots cannot be powered on after game start.
3. Robots are expected to respond to the starting light or a button press from within the Start Box (whether a driver robot, which can be adjusted in a limited manner, or an autonomous robot, which cannot).
4. Robots cannot use external power or wireless control from outside of the game board area. During the game, teams cannot take any action which breaks the vertical projection of the game table with the exception of the allowed actions inside the Start Box and those for ball dispenser manipulation.
5. Other than the allowed means for signaling robots, robots must operate autonomously, with only limited interaction during a game permitted for a driver robot and robots returning balls to a tee.
6. When the driver robot is static (not moving), the team can reset the ball tee flat on the surface of the upper start box and place a ball on it. The driver robot can be repositioned, but not manipulated otherwise. During this activity, the ball tee, ball, or driver robot cannot be used to push clear any object.
7. Once the driver robot's position has been reset, the team is permitted a single button push on the driver robot's controller to reactivate it, which must have a sufficient delay to allow the team to pull clear of the upper start box before the robot resumes action.
8. Only one ball is permitted on a tee unless removing any extra balls to the tee's ball bucket would interfere with an independent structure other than the driver robot.
9. If the driver robot causes a divot (described above), the table judges will retrieve the ball tee and return it to the team. Only the judges are allowed to perform this kind of action and will be held faultless for any issues that result.
10. An autonomous robot can be signaled by action within the Start Box, limited to a button press a team member that does not otherwise manipulate the robot. This applies to both starting and stopping the robot.
11. During the game, a team member can turn the lever on the ball dispenser to release golf balls, whether to fall to the surface or to an independent structure, robot or otherwise. This action cannot touch or manipulate a robot in any way, and cannot be done in any manner designed to manipulate how the golf balls come out of the dispenser other than to drop out the bottom.

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.

Game Length

Game duration is 180 seconds.

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. Teams choose which side to play unopposed, A or B.
4. Scoring = (your points) - (their points)
5. Scores of less than 0 will be counted as 0
6. Passing on a round gives a score of -1 for that round
7. 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 score
3. Matches, including which team plays on which side, are arranged using KIPR tournament software
4. Judges' decisions are final

Double Elimination

1. If a team's entry fails to break the border or drive a ball out of a Start Box sometime during the 180 seconds of game play, 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 failed to break the border or drive a ball out of a Start Box).
3. If neither team's entry manages to break the border or drive a ball out of a Start 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.

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 or both of the two start boxes on their side.
2. Teams will give a friendly nod, wish of good luck, and visually inspect each other's robots **before calibration**. Inspection is limited to a maximum of one (1) minute unless a specific challenge is made. Teams must notify table judges **before the end of "Hands Off"** if they believe the table is not set up

properly. 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!**

- a. Judges will be the final arbiter.
 - i. Judges can dismiss what they believe to be spurious challenges.
 - b. 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 offending elements before the round begins.
3. If the judges determine a robot violates the construction rules, whether or not a challenge has been made, that robot will not be allowed in a game until it has been modified to meet the rules.
 4. Construction rules apply only to what is brought to the game table.
 5. Teams cannot use wireless links to program their robots within 10 yards of the game board and cannot use wireless links to send information or commands to a robot during a game.
 6. 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 lights may not be turned on by the team after game start.
 7. During setup teams perform any necessary calibrations needed by their robots.
 8. Setup time should be two minutes or less.
 9. **For each minute or fraction thereof in excess of 2 minutes the team's score is subject to being reduced by 20%.**
 10. When both teams are ready, or judges decide adequate time has been allowed for calibration, teams activate their robots and then -- Hands off!
 11. After hands off, no part of a team's robot(s) may leave its Start Box until the starting lights turn on.
 - a. If this happens, the judges will call a fault on the team.
 - b. If a team receives a 2nd fault in a round, they forfeit the round.
 12. After hands off, the team cannot access the activation button on a driver robot or their start/stop button for an autonomous robot until the lights come on.
 13. After hands off, judges will activate the game table controller to turn on the starting lights signaling game start.
 14. After hands off, teams may not broadcast electromagnetic signals to robots.
 15. When the starting lights turn on the robots must be powered, whether or not they leave their start boxes at lights on.
 16. Lights will remain on for 5 seconds, turn off for 170 seconds and flash the last 5 seconds.
 17. Once the starting lights turn on, the round counts unless a judge rules outside interference.
 18. 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.
 19. Scoring is based on the location of pieces at the end of the round, not how the pieces got there.
 20. 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.
 21. 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.

Overall Winner Calculations

A team's overall score is calculated as the sum of their Seeding and Double Elimination scores. The overall score is between 0 and 2.

Seeding Scoring Formula

$$\text{SeedScore} = \frac{3}{4} \left(\frac{n - \text{SeedRank} + 1}{n} \right) + \frac{1}{4} \left(\frac{\text{TeamAverageSeedScore}}{\text{MaxTournamentSeedScore}} \right)$$

Double Elimination Scoring Formula

$$\text{DoubleEliminationScore} = \left(\frac{n - \text{DERank} + 1}{n} \right)$$

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

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 lights
- 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!

Clarifications and adjustments to the game or game rules will be made via the KIPR Open web site <http://www.kipr.org/kipr-open> and may appear in the form of notifications or answers to FAQs.

The KIPR Open Robotics Game discussion board and FAQ are accessed via <http://www.kipr.org/kipr-open>.

Check <http://www.kipr.org/kipr-open> regularly for rules updates that may or may not appear with an FAQ answer or as updates to this document.

Good Luck!