

BunnyBot 2013 Rules

Pool Party

Version 1.21 10/31/2013

The BunnyBot Competition is an annual pre-season event designed by Catlin Gabel School FRC Team 1540, the Flaming Chickens. Its purpose is to give FRC teams a chance to get familiar with robot construction before the build season starts. This game is more relaxed than the FRC competitions and all in good fun.

WHO'S INVITED

Team 1540 hosts a competition for Northwest teams. This is, however, designed to be an easy event to stage so teams in other regions are more than welcome to host one of their own. Let Dale Yocum dale@yocum.com of team 1540 know if you are interested in doing this so we can share logistical details.

REGISTRATION

Registration for BunnyBot 2013 requires a \$100 per robot fee. We'll waive the fee if this is a hardship. Register at www.team1540.org/BunnyBots. Space is limited so it's first come first served. Your space is not held until registration fees have been received or waived.

You can register with a credit card online at www.team1540.org/bunnybots or via check payable to Catlin Gabel School, to:

Dale Yocum

Catlin Gabel School

8825 SW Barnes Rd.

Portland, OR 97225

Please include your team number and email address either on or with the check!

Revision History

9/1/13 v1.00 Initial Release

9/2/13 v1.01 Clarification on the design of the pockets

9/4/13 v1.1 Returning balls rules updated as follows to address endless loop strategies:

Balls must contact the carpet outside of a robot's current frame perimeter before they are eligible to score. That being said, balls do not score in pockets until they are first touched by a robot.

Motor limits removed from robot drive train rules. Some teams wanted to experiment with swerve drive and that rule, left over from a bygone era, was getting in the way.

Each alliance starts the match with no more than three bunnies distributed as they see fit amongst their robots.

9/21/13 v1.11 Clarification on possession. A ball that is NOT in the possession of a robot will not move if the robot were to move in one of the forward, backwards, left or right directions. For example, a robot with a three-sided cavity that also had inward facing pinball like flippers on the front that redirected the balls would generate a possession penalty any time more than one ball is inside. In that scenario, if the robot were to back up the balls would be deflected inside the robot.

10/7/13 v1.2 Clarification on returning balls to play.

Once a ball has been scored, the referee for that pocket will place it in a nearby bin well outside of the field boundary where the members of each alliance will quickly but safely walk it back to the alliance of the matching color.

Once there, a human player on the alliance can return the ball to play. This is done by tossing it over the heads of any driver or co-pilot on the alliance. Those drivers, co-pilots (and drive coach for that matter) must stand upright behind the tables on their alliance's end of the field. If it is returned through any other means, a five point penalty will be assessed per ball.

10/31/13 v1.21 Motors

In the interest of teams being able to use motors that might have around their shops or find in commercial products, teams are free to use any 300, 500 or 700 series motor in their BunnyBots.

THE GAME

As you'll see on Fig. 1 three robots form an alliance in 3 vs 3 style on a full size 27' x 54' field. The field surface is standard industrial carpet identical to that used at FIRST competitions. Vaguely similar to pool, the object of the game is to score more balls of your alliance's color in pockets than the opposing alliance.

BALLS IN POCKETS

The balls in Pool Party are 6.3" diameter foam dodge balls Champion Sports Rhino Skin Dodgeball in red, blue and black: <http://amzn.com/B000LXYKNO> (this is for the rainbow set ... the best deal for practice.) These balls are not to be confused with those used in the FRC games Rebound Rumble or Breakaway. There are 7 red balls and 7 blue. In addition there is one black eight ball. Each red or blue ball scores one point for its alliance if it goes into a pocket. (There is an exception, see "Autonomous Period & Bunny Holes".) Once scored the ball is returned to the scoring alliance to be reintroduced into play, see "Returning Balls to Play".

Pockets

Similar to pool, there are six "pockets" on the field. One in each corner and two on the sides of the field. Pockets are built with a single layer of 4" foam rubber Velcroed to the carpet as shown in fig 1. Each pocket is surrounded by an exclusion zone delineated by red 2" gaffers tape. Balls only count if:

- Some portion of the ball is momentarily or constantly in contact with the green interior portion of the goal. The green interior is made up of a single layer of green gaffers tape applied directly to the carpet.
- The ball is not in contact with the scoring robot at the time the ball contacts the green portion of the pocket.
- Once the ball touches the green area it can't score again until it has been returned to play (see "Returning Balls to Play.")
- No portion of the scoring robot is touching the area of the floor at or beyond the pocket's red exclusion zone tape. If the robot enters this area, the balls scored do not count. There is no penalty, the balls are simply returned to play.
- There is no penalty for retrieving a ball that has crossed the exclusion zone but hasn't yet touched the green area of the pocket. The ball just won't count if a robot is touching the area inside the exclusion zone when it propels the ball into the pocket.

Eight Ball

The black eight ball can only be scored when no other balls of an alliance's color are present on the field and only within the last 20 seconds of the game (known as the end game). The eight ball is worth eight points. The last alliance to propel the eight ball, either intentionally or unintentionally is the scoring alliance. If the eight ball is scored earlier than the last 20 seconds or when the scoring alliance still has balls on the field, the scoring alliance loses 8 points. Once scored, either legally or illegally, the eight ball is not returned to play.

Eight balls scored in a Bunny Hole (see below) always score for the alliance that has claimed the hole if done within the last 20 seconds. Eight balls scored in a Bunny Hole before the last 20 seconds subtract 8 points from the propelling alliance (not necessarily the alliance who claimed the Bunny Hole.)

Possession

Robots may only possess one ball at a time. Possession is defined as holding or controlling a ball such that if the robot moves forwards, backwards, left and right the ball goes with the robot. Examples of possession would be an arm that picks up the ball or a four-sided cage that lowers on top of it. Possessing more than one ball results in a five point penalty per ball. A three-sided bulldozer would not be in possession of the balls since if the robot backed up, the balls would be released.

A ball that is NOT in the possession of a robot will be stationary if the robot were to move in one of the forward, backwards, left or right directions.

This can get tricky. A robot with a three-sided cavity that also had inward facing pinball like flippers on the front that redirected or concentrated the balls would generate a possession penalty any time more than one ball is inside. In that scenario, if the robot were to back up the balls would be deflected inside the robot before eventually emerging.

Don't lawyer this rule. For example a robot with active gates on both ends that open and close as the robot moves is still in possession of the ball in the middle chamber. It's highly recommended you get an early, confidential ruling from Q&A before investing lots of time in a design. Email a sketch to Dale Yocum dale@yocum.com.

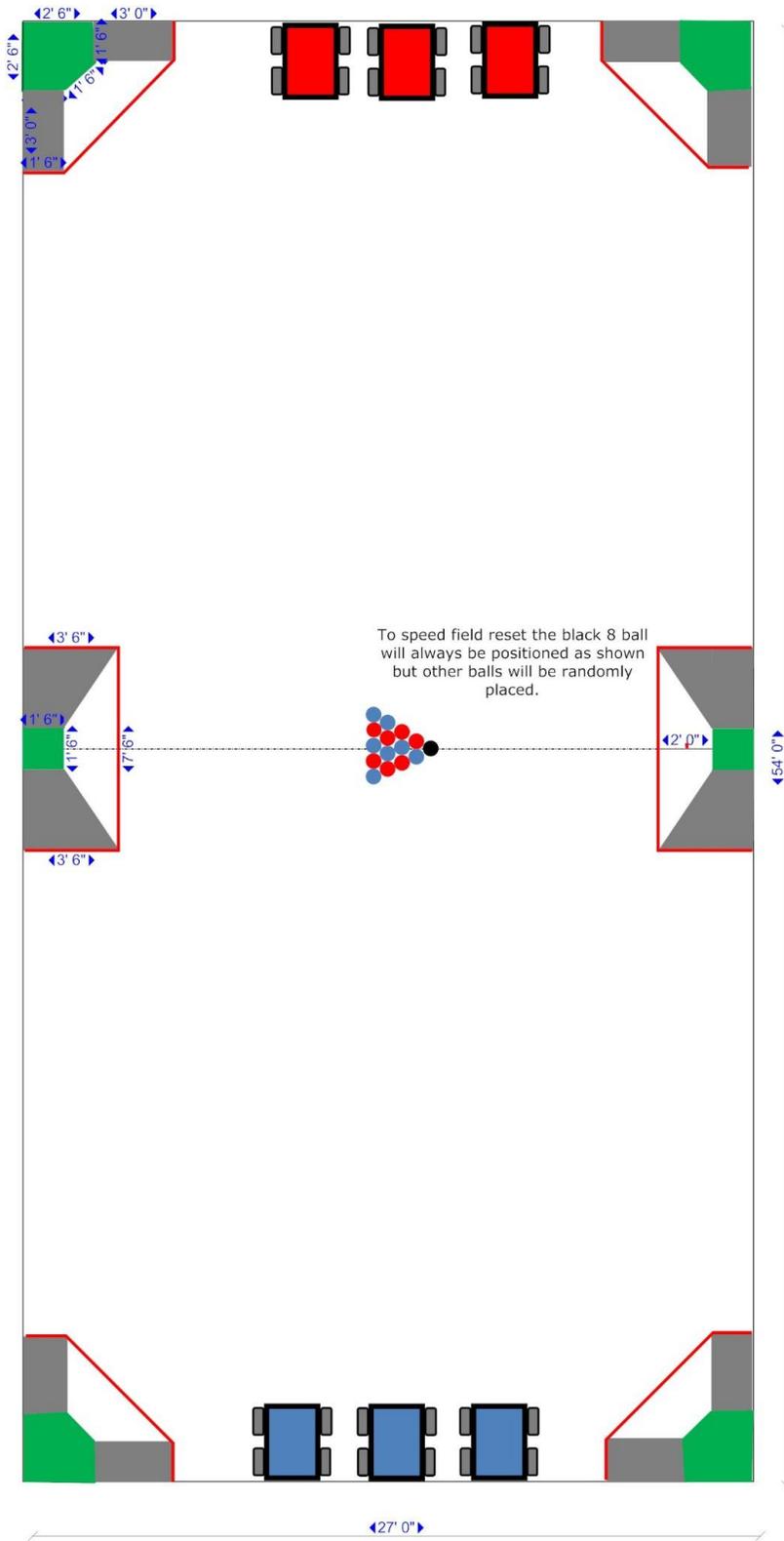


Fig 1. Field Diagram

AUTONOMOUS PERIOD & BUNNY HOLES

The first 15 seconds of the match is the autonomous period. During this period, and only during this period, robots can claim pockets for their alliance. A pocket is claimed by placing a bunny in contact with the pocket's surrounding foam rubber border by the end of the autonomous period. Once claimed the pocket is known as a "Bunny Hole."

Bunny Holes can accept balls of either color but both score for the alliance who claimed the pocket. It doesn't matter which alliance propelled the ball into the pocket or the color of the ball.

Robots can only claim center pockets or pockets at the opposite end of the field from their starting location. If two robots claim the same pocket, whoever got there last wins. In the case of a tie between alliances, neither alliance is awarded the claim.

Each alliance can make use of up to three bunnies. They can be distributed as they see fit amongst their robots.

All of this is optional, of course, but if used, the Bunnies must start off the match in contact with a robot. They can be preloaded on or in the robot or sit on the floor next to it. Bunnies that weren't successfully deployed during autonomous have no claim value after that period is over. They are not removed from the field, however, and robots can interact with them if desired.

Once the 15 second autonomous period is over, the referees will remove successfully deployed bunnies and mark the pockets as claimed with a PVC pipe wrapped with tape of the alliance's color.

A selection of stuffed bunnies are available for teams to choose from. They are roughly 9" to 13" tall and sport prominent yet stylish red or blue ribbons around their necks.

Since there is no field control system, autonomous mode is started manually by the drivers at the opening sound. The match will then proceed for 15 seconds all robots on an alliance must be at a complete stop after 15 seconds for any of their alliance's bunnies to count. Wise programmers will therefore program their autonomous modes to stop well before that so their robots can come to rest before the 15 seconds is up.

After the autonomous period, three bells will sound indicating the start of teleop play. That play will continue for two minutes, fifteen seconds.

Robots can also interact and score with balls during autonomous. Points scored with balls during autonomous are no different than those scored during teleop. If a pocket is claimed with a bunny during autonomous, then balls scored subsequently in that bunny hole during autonomous will count for the alliance that claimed that pocket.

RETURNING BALLS TO PLAY

Once a ball has been scored, the referee for that pocket will place it in a nearby bin well outside of the field boundary where the members of each alliance will quickly but safely walk it back to the alliance of the matching color.

Once there, a human player on the alliance can return the ball to play. This is done by tossing it over the heads of any driver or co-pilot on the alliance. Those drivers, co-pilots (and drive coach for that matter) must stand upright behind the tables on their alliance's end of the field. If it is returned through any other means, a five point penalty will be assessed per ball.

Balls must contact the carpet outside of a robot's current frame perimeter before they are eligible to score. That being said, balls do not score in pockets until they are first touched by a robot.

Balls don't need to be returned to play, that's up to the alliance. This strategic decision is part of the alliance's end game eight ball strategy.

Balls that bounce out of the field will be returned to the field at a random location by the referees at their earliest opportunity.

ROBOT STARTING LOCATIONS

Robots must start the match with some portion of the robot is touching the 4x4 wall nearest their operators. They may not be in contact with the foam borders of pockets.

ROBOT RULES

1. All FRC robot rules (that aren't game specific) from 2013 apply with the following modifications:
2. Since the whole point of BunnyBots is to get new team members up to speed, robots should be built from scratch for the event, just like FRC. You can't use last year's FRC robot or BunnyBot with a few tweaks.
3. There are no limits on the number of motors on a robot but they must have been legal in FRC at some point within the last five years. In addition you may use any 300, 500 or 700 series motor and any motor sold by AndyMark or Banebots.
4. No bumpers are required though they may be used if desired. If used, bumpers must be constructed according to typical FRC techniques. The bottom of the bumpers must be at least .5" off the ground and the top no more than 8.5" off the ground. There is no requirement about how much of the perimeter of the robot you protect with bumpers, just that if you use them they be mounted in this height range and constructed in the normal FRC fashion.
5. Robots in their starting configuration, without their optional bumpers, must fit within a rectangle of 28"x38" with a maximum height of 60". This is defined as the frame perimeter. Once started, they may extend outside of those dimensions as much as they'd like.
6. Robots may not intentionally detach pieces of themselves. Accidentally having parts fall off is fine.
7. The maximum weight of a robot, without its battery is 120 lbs, excluding bumpers if used.
8. FIRST electrical rules don't apply. This allows you to use any control system you like, the cRIO controller, 2008 and earlier controllers, vex controllers, RC controllers, etc. Use common sense and follow FIRST wiring guidelines when possible. Make sure your radio system doesn't interfere with FRC radios if you are using something different.
9. Do not use anything that relies on normal WiFi 802.11B/G as experience has shown that to be unreliable. If you are using the 2009-2013 FRC control system be sure you are using the 5GHz WiFi band because radio interference in the 2.4GHz band makes for very unreliable driving. Note, the standard Classmate laptop does NOT support the 5GHz band. Either use the router from 2009, a laptop that has dual band N wireless, or a separate dual band N network adapter. The TRENDnet TEW-684UB is one option for a dual-band N network adapter that has worked in testing. Note that all of this must be battery powered; there is no AC at the driver's stations. This is so teams can sync their robots and laptops while in queue dramatically speeding up matches.

10. There is no limit to the equipment used in the driver's station though it must all be battery powered and quick to set up. In particular teams may want to use a stopwatch or smartphone to time their match as there may not be a centrally visible timer.
11. There is no cost accounting for BunnyBots but common sense would say you don't want to spend too much money for BunnyBot parts you can't use again.
12. Any part that was legal for any previous FRC competition may be used.
13. Vex and FTC parts are allowed.
14. There is no requirement that parts used on your BunnyBot be available off the shelf. This allows you to use random parts you might have lying around the shop or that have been removed from other devices. The idea is for people to not spend too much money on this.
15. Batteries must have been FRC legal over the last 5 years. Only one battery can be on your robot at a time.
16. Each robot must have a place for an alliance flag to be easily inserted and removed. The flag holder should be roughly equivalent to the old FIRST design (12" ½ diameter Schedule 40 PVC pipe capped at the end). The flag shaft will be approximately 5/16" in diameter.
17. Robots need team numbers. Each robot must display the team number in 4" high or higher characters of a contrasting color on at least 2 opposing sides, four sides are preferable. Since bumpers aren't required the team number doesn't have to be on the bumpers. The robot will be announced in the form "Team 1234" by the announcer. If the robot has a name that may be announced as well if it's on the robot. If a given FRC team has more than one BunnyBot, they should be labeled 1234A (Alpha), 1234B (Bravo), 1234C (Charlie), etc. Including your school(s) name and sponsors on the robot would be good marketing and helps the MC but is not absolutely required. Colors and other graphics are up to you. The scoring system will be expecting the A, B, C suffix for teams with multiple robots so don't get creative with the numbering.

PENALTIES AND DISQUALIFICATIONS

A 10 point penalty is assessed for a robot that goes out of bounds (over the 4x4s). You are considered out of bounds if any portion of your robot touches the floor beyond the 4x4s. Once a robot is out of bounds, it must be disabled, manually returned to the playing field, and re-enabled. Wise robot designers will make sure some portion of the robot or bumper contacts the 4x4s before its wheels do.

BunnyBots is a contact sport and robots should be built to withstand significant pushing and shoving. However, a 10 point penalty will be assessed for intentionally ramming another robot at high speed.

Teams may not intentionally damage another robot or engage in unsportsmanlike behavior. Penalties for this kind of thing are up to the referees and can range from a warning to point penalties to disqualification.

Teams should keep in mind that spectators will be standing close of the field. Robots employing strategies that might harm people will be disqualified.

An alliance may not pin an opposing robot that is in contact with a field border, pocket, or another robot for more than 5 seconds. A robot will be considered pinned until the robots have separated by at least 6 feet. The pinning robots must then wait for at least 3 seconds before attempting to pin the same robot again. Violation: 5 points initially and 5 points for every five seconds thereafter.

Robots intentionally ramming or climbing on the pockets during teleop will be assessed a 10 point penalty. Repeated violations can result in disqualification. No penalty for doing this during autonomous but we really wish you wouldn't. If you continue to tear up the pockets during autonomous the referees will require you to not run that autonomous program.

RANDOM GAME DETAILS

Matches are 2.5 minutes long.

Balls on top of the foam pockets will be returned to play by the referees. Remember they do not count unless they contact with the green interior of the pocket at least momentarily.

QUEUES

When a team is ready to play, they get in the queue. Teams are on their honor that when they are in the queue, their robot is functional. Teams may not do more than trivial repairs to their robots while they are in the queue and can't use power tools. Of course the more matches you play the higher your qualification score. Building a reliable robot is critical.

Each robot will have a pit area in the adjacent area next to the arena. This is where robots go for most repairs. They are not in the queue while in the pit area nor will queue staff go looking for them there. It's the responsibility of the team to get in queue every time they are ready to play a match.

QUALIFICATION POINTS AND FINAL MATCHES

After playing a match teams earn qualifications points using the formulas below.

$$\text{Winner Qualification Points} = W + L/2$$

Loser Qualification Points = L

Tie Qualification Points= W

Where W is the winner's score (or either robot's score in a tie), L is the loser's score. If L or W is negative, it will be rounded up to zero when determining qualification scores.

At 3:00pm or as soon as the closest match is concluded, the four robots with the highest accumulated qualification points become the alliance captains for the semifinals. They choose three teams each to play with them in the final 3 vs 3 matches. Each alliance therefore has their own backup robot. Since there are four robots per alliance (IRI style), one robot will sit out each match. Usually that is the third pick but the mix is up to the alliance captain. Because there are backups on each alliance, there are no timeouts.

The team with the most qualification points picks first. The top four teams cannot pick one another. The pick order is 1-4, 4-1, 1-4. The alliances then play in typical FRC fashion; the number 1 alliance plays the number 4 alliance, 2 plays 3. The winners of each of those matchups play for the winner's trophy.

THE VENUE

The remaining information applies only to the Dec 21st, 2013 Oregon BunnyBot Competition. Competitions held elsewhere will have their own information here.

BunnyBots is played in the gym at Catlin Gabel School.. Map and directions are at www.catlin.edu/about/campus/map-and-directions . Park in the main lot when not dropping off equipment in the circle by the Tennis Court. The pit area will be in covered Tennis Court 1 next to the gym.

The doors open at 8:00am Dec 21st for pit setup and robot unloading. Teams are free to come anytime between 8:00am and 9:30am. (Teams can also drop off robots and pit equipment between 7:30pm and 10:00pm Friday night Dec 20th.) The field will open for teams to practice between 8:30am and 9:45am Saturday. Opening remarks and the drivers meeting will be at 10:00am. We'll start the matches soon thereafter. Qualification matches will be over around 3:00pm followed by alliance selection and elimination matches. Those matches will be over around 4:15pm.

Teams should bring their own lunches or they can buy pizza by the slice on site. There is no off-campus food to speak of within quick walking distance but there is a QFC Supermarket, Starbucks, and a Subway about a mile east on Barnes Road. We typically play through lunch to maximize playing time so taking lunch in shifts is advised.

Whatever driver's station solution you choose must be battery powered as must the laptop if used. This is to ensure that every robot can be turned on and synced with its driver's station while in queue speeding up the matches. Teams with laptops with poor batteries, or those using routers as their driver's station radios, may want to invest in an inexpensive inverter driven by a robot battery. A pre-made example is at www.andymark.com/product-p/am-0626.htm or you can wire your own from something like www.amazon.com/Power-Bright-PW200-12-Inverter-Watt/dp/B000NP30HC/ref=sr_1_20?ie=UTF8&qid=1320689350&sr=8-20. There is AC at the driver's stations which you are welcome to use as long as your laptop stays connected to the robot during the transition from battery power.

Teams can bring whatever tools and parts they like but they must take care not to damage the surface of the courts. Bring a tarp to put down in your pit area.

Bring as many charged batteries as you can. The rounds go quickly and the batteries sometimes don't have much time to recharge. If you are a new team, consider borrowing batteries and chargers from a team who isn't taking part or buy extras from AndyMark. The batteries do wear out after a few years so test them before putting them on the field. Bring as many 6 amp or lower battery chargers as you can to the event.

Each team should bring a 8.5" x 11" cardstock with their team number printed on it in portrait orientation. That team number should be at least 4" tall. This is used in lieu of spiffy electronic displays you'd find at a FIRST event and helps the emcee and spectators tell who's controlling

what robot. There will be a place to put that card when the team comes to the driver's table. The card could also have the robot name on it if desired.

Bring a 100' of extension cord and a powerstrip.

You will need to bring whatever remote control hardware you need. There is no field control system. Teams using the cRIO will need to operate in the 5Ghz "N" band using either a laptop with dual band N capability, the Linksys router used in 2009, or an aftermarket dual N network adapter plugged into a laptop (like the Classmate) without dual-band N. DO NOT expect to use a laptop with wireless G only as the interference will be extreme and your connection unreliable. The Classmate does not have dual band N capability. The router from 2010 is not a dual band N router, just N in the 2.4 Ghz band. It may be reliable or it may not. We have been using the TRENDnet TEW-684UB dual band N network adapter with good results (www.amazon.com/TRENDnet-Wireless-Adapter-TEW-684UB-Black/dp/B004ZEZC0U/ref%3dsr_1_1?ie=UTF8&qid=1318121725&sr=8-1) Remember, everything must be battery powered and be able to be powered up while in queue to sync the radios before entering the field.

Bring some signage to identify your team's pit area. This doesn't need to be fancy but should be something that's able to support itself that indicates your team number and name to help other teams, queue staff, and refs find you.

No tables or chairs are provided in the pit areas. If you want either, bring them yourself. There are bleachers in the gym competition arena so visitors should not bring their own seating, unlike previous years.

The pit area size will be a minimum of 10'x10'.

You'll want to bring your robot cart as the pit areas aren't in the same building as the competition arena.

Catlin Gabel's robotics lab is nearby and is available to teams with major machining needs. That means you don't need to bring large power tools. Bringing a hand drill is always a good idea.