

BunnyBot 2014 Rules

PANdemonium

Version 1.4 12/1/14

BunnyBots 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 (yocumd@catlin.edu) of Team 1540 know if you are interested in doing this so we can share logistical details.

REGISTRATION

Registration for BunnyBots 2014 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 online at www.team1540.org/bunnybots. You'd then send a check:

Dale Yocum

Catlin Gabel School

8825 SW Barnes Rd.

Portland, OR 97225

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

Revision History (changes since last edition in red)

This is a living document. The recent rule modifications or edits will be noted here

9/1/14 v1.00	Initial Release
9/8/14 v1.1	Match time added. Widgets and devices cannot jam communication with widgets.
9/12/14 v1.2	Teleoperated widgets can contain no more than one motor or solenoid or servo.
9/18/14 v1.21	Clarification that humans cannot physically interact with widgets during a match and details of who places widgets when during setup.
10/16/14 v1.3	Pinning rule removed for last 30 seconds of the match. Clarification that 180 degrees around widgets must be accessible during the 30 second endgame. Clarification that there must be at least 2' <u>between</u> widgets at the beginning of the match and that each alliance must place exactly 15 widgets at the beginning.
10/21/14 v1.31	Clarification that the 180 degrees of widget exposure during the endgame are <u>continuous</u> and cannot be split into multiple pieces.
10/23/14 v1.32	Graphical examples added to obscuring rules and clarification that every point on a widget must be accessible for 180 degrees on a plane parallel with the floor assuming it's above the 1" lip of the pan.
10/28/14 V1.33	Clarification that widgets should only be held on their pans by gravity during the endgame. Also clarification on the rule that widgets cannot leave the field of play during the match if they are to count. The rule defines the field of play as a virtual box around the inside border of the field extending to the ceiling.
12/1/14 V1.4	Robot alliance identification changed from flags to a requirement that there be at least 24 sq in of the alliance's color on at least three sides of the robot. See Robot Rules #18.

GAME SUMMARY

PANdemonium is played by two alliances of three robots each. The goal of the game is to place as many team-provided “widgets” as possible onto the “pans” of the team’s robot, or their alliance partners, while simultaneously attempting to de-score the widgets on the robots of the opposing alliance.

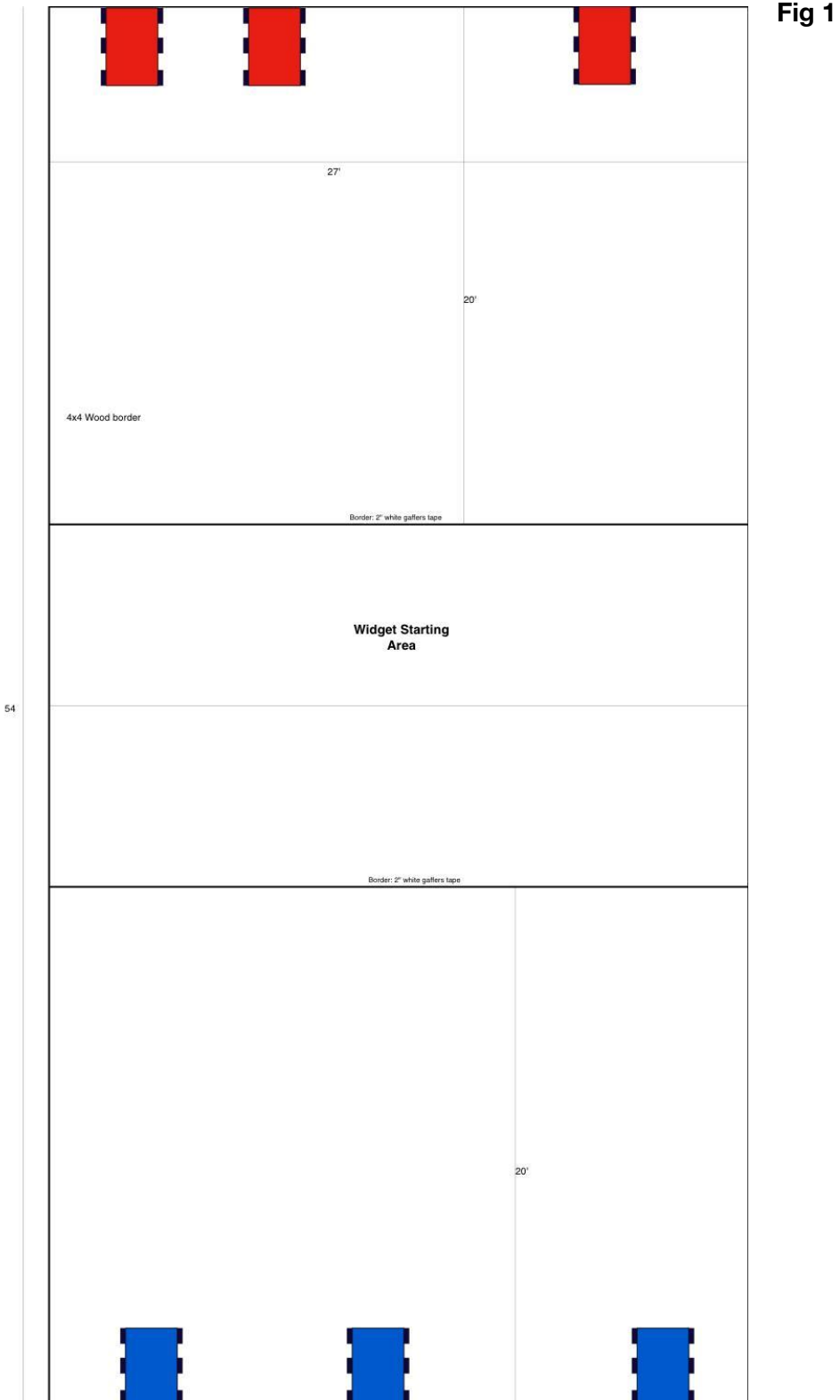
GAME DETAILS

As seen on Fig. 1, three robots form an alliance against three other robots on a full size 27’ x 54’ field. The field surface is standard industrial carpet identical to that used at FIRST competitions.

1. Each team brings five scoring objects of their own choice and design called “widgets.”
2. These are placed by the team during the setup period on the carpet within the field’s widget start area 2’ from any other widget.
3. Widgets score for 1 point each if, at the end of the match, they are fully supported by a robot and have not been obscured. See "Obscuring Rules."
4. Any robot can score with any widget from any team.
5. Teams can bring as many widgets as they like to the competition. They can only place five widgets on the field for a given match. Teams will have only a short time to place their widgets on the field so selecting them in advance is advised. Teams can loan widgets to other teams.
6. During the last 30 seconds of the game (the endgame), all of the widgets in possession of a given robot must be unobscured (again, see “Obscuring Rules”.) Robots can add de-scored widgets to other robots or their own collection (see “De-Scoring”.) There will be a ten second audio countdown to the start of this 30 second endgame.
7. The base of the pan on which the widgets rest must never be more that 32" off the ground.
8. The surface supporting widgets must not use magnets, adhesive or Velcro exposed to widgets.
9. Matches last 2.5 minutes including the ten-second autonomous period.

ROBOT STARTING LOCATIONS

Robots must start the match with some portion of the robot is touching the 4x4 wall nearest their operators.



INITIAL WIDGET PLACEMENT

When teams come to the field, they place their five widgets anywhere within the widget start area. Widgets must start out at least two feet from any other widget. Referees will use a 2' stick to verify that at least that much space is present between widgets. Teams have one minute to place their widgets. During qualification matches, the red alliance has one minute to place their widgets when loading their robot on the field followed by the blue alliance for one minute. During elimination matches, a coin toss will determine which alliance goes first. Team Members of an alliance can't move the widgets of the opposing alliance. Widgets that aren't placed in that one-minute span will be randomly placed by the referees. Each alliance must place 15 widgets to the field.

WIDGET RULES

1. Must not exceed 18" in height, width and length. In other words, widgets should fit within an 18" cube at all times. If it extends outside of this 18" cube even momentarily it will not count.
2. Must be at least 2" in height, width and length at all times.
3. Widgets must not have a tacky surface.
4. Must weigh at least .1 lbs and cannot exceed 5 lbs
5. Cannot contain liquid, especially liquid battery acid.
6. Widgets can be active or passive. Active widgets can be autonomous or externally controlled. They can be controlled by any student, not just the drive team.
7. Widgets (or robots for that matter) cannot incorporate electro or permanent magnets except as they are used in the normal operation of motors, solenoids, relays, etc.
8. Hazardous materials are not allowed in widgets. Lead, gas compressed over 30psi, and gunpowder are examples of things that should not be found in widgets! Batteries that don't contain liquid are not considered hazardous for the purposes of this rule. No combustion is allowed on robots or widgets.
9. All of the widget's parts must remain connected to one another. If they don't, the fragmented widget doesn't count. Other widgets that are resting on this fragmented widget will count as long as it is obvious that they would have counted were the broken widget not there.
10. Widgets may not be designed to intentionally damage or interfere with robots, the field or driver stations. That being said it IS perfectly legal to deploy widgets that interact in a non-damaging way mechanically (but not electrically) with other robots or widgets.

11. Widgets should not contain a mechanism that allows the widget to attach to robots, the field or other widgets.
12. Widgets should only be held on their pans by gravity during the endgame. To score, a widget must be able to be removed by a referee by pulling straight up without interference.
13. Avoid materials that will tend to break apart with the abuse they are expected to receive. For example, don't make widgets out of styrofoam, wall board, glass, or cookie dough.
14. Widgets that leave the field of play cannot and will not be returned to the field during the match. The field is an imaginary box formed by vertical walls that rise from the inside perimeter of the field and extend to the ceiling.
15. Widgets should have the team's number visible on multiple sides in case the referees have questions about the widget or its placement and so they can be returned to you.
16. Widgets are only considered valid if placed on the carpet at the bringing of that match in the widget starting area. They can't be introduced into play later.
17. Widgets may not operate in the 5Ghz 802.11n band used by FRC robots and can not interfere with robot communication, intentional or not. Widgets (or other devices) may not intentionally interfere with another widget's communication. Don't, for example, design widgets or devices that intentionally jam widgets. That being said, it is expected that some unintentional interference will occur. After all there are only so many frequencies available. That's part of the game. Robots can shield (but not jam) widget communication if desired.
18. Teleoperated widgets can contain no more than one motor or servo or solenoid. This should NOT be interpreted to mean they can have a single motor AND a single solenoid, for example.
19. Humans cannot physically interact with widgets on the field while a match is underway. Teams intentionally doing so will be given a red card. Interaction that doesn't involve touching a widget directly or indirectly is fine. For example, don't touch widgets on the field or poke them with a stick while a match is going on.

Widgets will be inspected before play begins for the day. Refs and other teams can call for re-inspection of widgets over the course of the day as they see fit. Referees can disqualify a widget on the spot if it doesn't meet the above criteria.

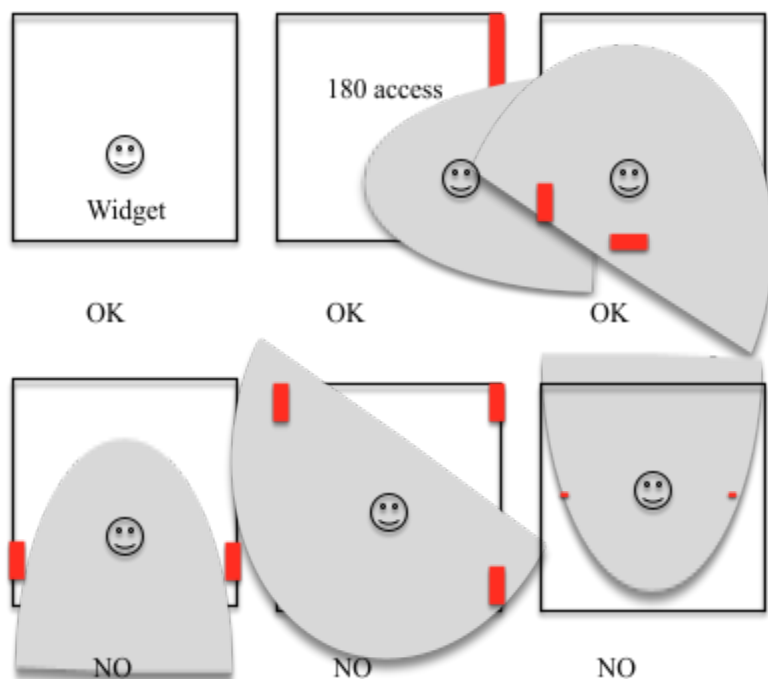
OBSCURING RULES

Read these rules carefully then read them again. Ask questions if you think something might be questioned by other teams or referees. This is the tricky part of the game.

1. To be ruled as “accessible” no part of the robot higher than 1" should be present for at least 180 continuous degrees around all points of a widget on a plane parallel with the floor and extending up to the ceiling. Picture this accessibility area as forming a virtual half (or greater) cylinder of infinite diameter into which no part of the robot can intrude. If a widget’s position does not meet any of these criteria it is defined as “obscured.”

For example, a legal widget scoring pan would be one with a 1” lip on three sides and the fourth side of any height (within the robot size constraints) with nothing overhead for at least 180 continuous degrees around any of the edges of the widgets it supports.

EXAMPLES



2. If at any point in the 30 second endgame any of the robot’s widgets are obscured, even momentarily, no widgets possessed by that robot will count for that match. The exception is widgets that were de-scored from another robot, see #3 below. The robot is free to pass its widgets to another robot or dump them on the ground but this robot will not be able to score for the rest of the match.

3. Widgets obscured as part of de-scoring (see “De-scoring rules”) are not counted as obscured for either team. Those widgets, if unobscured at the end of the match, will be scored normally even if they were obscured at times during the endgame.
4. A widget only counts as obscured if the robot supporting it obscures it. In other words, another robot cannot obscure your widgets. If other robots are in that position the referees will score the widgets as if the other robot were invisible.
5. Robots can freely store and manipulate widgets in an obscured state before the start of the 30-second endgame.
6. Driving over widgets does not cause them to be obscured. They have to first be supported by the robot. The exception is widgets that get accidentally caught up in a robot’s drive train. Those do not count as obscured unless it was obviously part of the collection system of the robot.
7. You can have multiple pans or widget resting places on your robot.

Example:

A team has constructed a BunnyBot with a rear pan for holding widgets. The pan has a 1" lip on three sides. On the fourth side is a rotating arm that picks up widgets off the ground, rotates 180 degrees, and drops the widget into its pan. Normally the arm is positioned forward over the ground so it doesn't overhang the pan. Since the arm tower is blocking only one of the four sides of the widget pan this is legal. However, if the arm rotates too far it IS obscuring the widgets momentarily so the team is careful not to do that during the last 30 seconds. The team does, on occasion, use its arm during the endgame to add widgets to their teammates pans if they either have none of their own, have de-scored them from another robot, or have somehow already invalidated their own collection of widgets by momentarily obscuring one or more of them during the last 30 seconds.

Note, while this team could use its widget loading mechanism defensively against other robots attempting to de-score the team’s widgets, they don’t because doing so would temporarily obscure their own widgets causing none of their widgets to count at the end of the match.

Picking up a widget from the ground during the last 30 seconds may cause that widget to be obscured, depending on the arm construction, potentially invalidating ALL of the team’s widgets. Teams intent on picking up widgets during the endgame will need to take great care in their arm and widget construction and operation.

DE-SCORING

Robots are allowed to remove widgets from the possession of other robots at any time during the game. Extracting a widget from another robot's pan during the endgame results in a widget immune from the obscuring rules until it is unobscured. The widget doesn't score unless it is unobscured at the end of the match.

Frame incursion IS allowed in this game. For this reason, robots should be constructed to withstand significant trauma. Teams will be penalized or disqualified for taking action they should reasonably know would significantly damage another sturdily constructed robot. Teams with robots subsystems constructed without regard for the physicality of this game play at their own risk. Robots who accidentally damage opposing mechanisms or unprotected electronics/pneumatics of other robots will not be penalized.

AUTONOMOUS PERIOD & BUNNIES

Each alliance can optionally chose from a collection of stuffed bunnies during the setup period. These must be pre-loaded on robots if used, with a maximum of one bunny per robot. It must not contact the floor at the beginning of the match. Each bunny resting at least partially in the widget start area of the field, and not in contact with a robot, at the end of the 10 second autonomous period scores 3 points for each bunny. Autonomous points will be counted by the referees at the start of the teleoperated period. After the autonomous period, bunnies are just 1 point widgets and are scored in the same manner. The bunnies are stuffed animals 12-18" high with a rough diameter of 8". If teams want to bring their own bunny that's fine as well, they just need to be inspected by Dale Yocum before being used in the competition.

Robots are also free to take any other legal action during the autonomous period. No human interaction is allowed with robots or widgets during the 10-second autonomous period. "Autonomous" systems assisted by humans using laptop cameras, IR remote controls, voice, Xbox Kinect, etc. are expressly forbidden.

ROBOT RULES

All FRC robot rules (that aren't game specific) from 2014 apply with the following modifications:

1. 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.
2. 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, Vexpro or Banebots.

3. No bumpers are required though they may be used if desired. If used, bumpers must be constructed generally along 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.
4. Robots in their starting configuration, excluding their optional bumpers, must not exceed a 112" perimeter with a maximum height of 60". See the 2014 FRC rules for more details on frame perimeters. Once started, robots may extend outside of those dimensions without limitation.
5. The base of the pan or system on which the widgets rest must never be more than 32" off the ground.
6. To score, a widget must be able to be removed by a referee (by pulling straight up) without interference.
7. Robots (or widgets for that matter) cannot contain electro or permanent magnets except as they are typically used in motors, solenoids, relays, etc.
8. Robots may not intentionally detach pieces of themselves. Accidentally having parts fall off is fine.
9. The maximum weight of a robot, without its battery is 120 lbs, excluding bumpers if used.
10. FIRST electrical rules don't apply. This allows you to use any control system you like such as the cRIO controller, VEX controllers, RC controllers, infrared, roboRIO, etc. Use common sense and follow FIRST wiring guidelines when possible. Make sure your radio system doesn't interfere with 5Ghz FRC radios if you are using something different.
11. Do not use anything that relies on normal WiFi 802.11B/G to control your robot as experience has shown that to be unreliable. If you are using the 2009-2014 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 the past. Note that all of this must be battery powered; while there is AC at the driver's stations you'll want to be connected to your robot before arriving. We will not hold the match for you. This is so teams can sync their robots and laptops while in queue dramatically speeding up matches.
12. There is no limit to the equipment used in the driver station though it must all be battery powered and quick to set up.

13. 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.
14. Any part that was legal for any previous FRC competition may be used.
15. VEX and FTC parts are allowed.
16. 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.
17. The primary power source for BunnyBots is a single FRC-legal 18Ah battery. Beyond the exclusion of liquid filled batteries, there are no rules regarding other batteries used to power widgets or non-motorized robot subsystems.
18. Each robot's alliance (red or blue) must be clearly identified on at least three sides of the robot. There must be at least 24 sq inches on each of the three sides that unambiguously identifies the robot's color. Teams must be able to switch colors in less than two minutes since the alliance isn't determined until they are on-deck. Some options:
 - a. Standard FRC bumpers
 - b. A 24 sq in surface on each side that is covered with red duct tape or equivalent. This surface is covered by blue painters tape by the team when blue is required. Teams must supply the tape.
 - c. Interchangeable velcroed or drop-in panels. Those panels might even include the team number.
 - d. Red and blue LEDs. Contact Dale Yocum for possible exemptions from the 24sq in rule if you think what you are doing will be obvious to all concerned.
 - e. Team provided "hat" for the robot.
 - f. Flags. Because this is a last minute addition to the rules, if this change creates a hardship for teams they can continue to use the flag system with 5/16" shafts. The flags do count as part of the robot, however, and thus are subject to obscuring rules.

Teams may not use red or blue bumpers, decorations, or graphics if those elements are not part of the robot's alliance identification system. The bottom line is that a casual observer, unfamiliar with the team's particular robot, should be able to easily identify the alliance color of a robot from 50 ft away.

19. 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 1234 followed by a single letter. 1234B, for example, could be announced as 1234 "Bravo" or 1234 "Bogus". It's up to you. Including your school(s) name and sponsors on the robot would be good marketing and helps the MC but is not required. The scoring system will be expecting the single letter suffix for teams with multiple robots so don't get creative with the numbering.

PENALTIES AND DISQUALIFICATIONS

1. A 5 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.
2. Unlike most FRC games, frame incursion is part of this game. There is no penalty for contacting another robot inside its frame perimeter. Robots should be designed with this contact in mind. Contact does NOT mean intentionality damaging other robots however accidental damage may occur. The long-suffering referees will do their best to tell the difference. Referees will be more likely to take claims of intentional damage seriously if the damaged robot was clearly designed to withstand significant contact. Penalties for intentional damage are up to the referees and can range from a warning to point penalties to a red card (the violating team's alliance gets zero points and forfeits the match.)
3. Ungracious behavior will not be tolerated. Penalties are up to the referees and can range from a warning to point penalties to red cards. Note that some actions, that in a different game might be considered ungracious, are intentionally a part of this game. Examples of this are penetrating the frame perimeter of an opposing robot, pinning during the endgame, and designing widgets that interfere with (but don't damage) opposing robots.
4. BunnyBots is a contact sport and this particular game is more physical than most. 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.
5. Teams should keep in mind that spectators will be standing close of the field. Robots employing strategies that might harm people will be disqualified.
6. If a widget contacts a bystander, the responsible team will receive a red card.

7. If the opposing alliance performs any action that causes a robot to violate the rules, no penalty will be assessed.
8. Except during the endgame, an alliance may not pin an opposing robot that is in contact with a field border 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. There is no rule against pinning during the last 30 seconds of the match.
9. If at any point in the 30 second endgame one or more of a robot's widgets becomes obscured, none of that robot's widgets will score at the end of the match. See the "De-scoring": section for the exception to this. The robot is free to pass its widgets to another robot or dump them on the ground.
10. Humans cannot physically interact with widgets on the field while a match is underway. Teams intentionally doing so will be given a red card. Interaction that doesn't involve touching a widget directly or indirectly is fine.

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 team 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.

Winning Alliance 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 match ups play for the winner's and finalist trophies.

THE VENUE

The remaining information applies only to the 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 <http://www.catlin.edu/map>. 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 20th 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 5:30pm and 9:00pm Friday night Dec 19th.) The field will open for teams to practice between 8:30am and 9:30am Saturday. Opening remarks and the drivers meeting will be at 9:30am. 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 4:30pm.

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 Subway about a mile east on Barnes Road.

Whatever driver 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 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 <http://amzn.com/B000NP30HC>.

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 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. Later routers may not be 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 (<http://amzn.com/B004ZEZC0U>)

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.

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.