BunnyBots 2024

Balloon-a-Palooza

Version 1.1 - 9/2/2024

BunnyBots is an annual robotics pre-season event originally conceived by Catlin Gabel School FRC team 1540, the Flaming Chickens. Its purpose is to give new FRC students and teams a chance to familiarize with robot construction before the build season starts while giving veterans the opportunity to try new things and lead. This game is more relaxed than the official FRC competitions and all in good fun.

WHO'S INVITED

Team 1540 hosts a competition in Portland, Oregon, and team 3218 hosts a competition in Bonney Lake, Washington. 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. Contact team 1540 (robotics@catlin.edu) if you are interested in doing this so we can share logistical details.

EVENT INFORMATION

For registration and venue details, such as team capacity, maps, schedule, spectator information, webcasts, communicable disease protocols, and more, please refer to the event-specific sites below:

- Oregon BunnyBots (Portland, OR): www.team1540.org/bunnybots
- Washington BunnyBots (Bonney Lake, WA): https://www.frc3218.org/bunnybots

If you came here for Blair BunnyBots, the Chesapeake BunnyBots hosted by the Blair Robot Project FRC 449 in Maryland, you can find details here: https://robot.mbhs.edu/bunnybots

ACKNOWLEDGEMENT

The BunnyBots 2024 game was designed by the following committee:

- Dale Yocum, 1540 and 6665
- Jason Vander Hoek, 3218
- Kevin Forbes, 1540
- Kobe Cong, 1540
- Lissette Wilhelm, 4512 and 4911

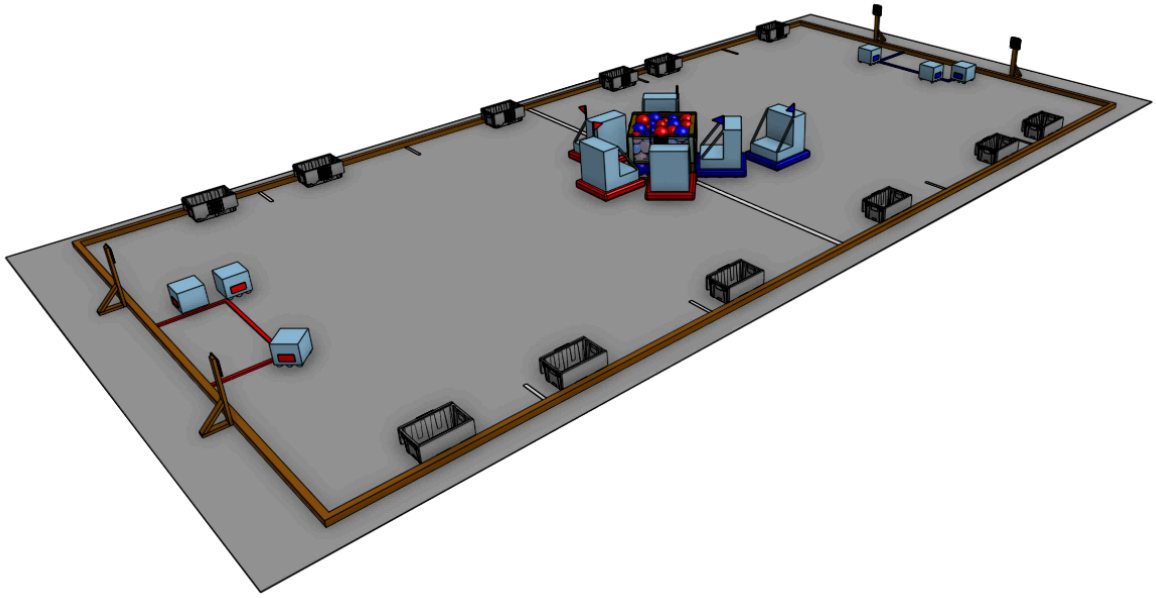
REVISION HISTORY

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

Ver	Date	Description
1.0	9/1/2024	Initial release.
1.1	9/2/2024	- Clarified in field setup that teams request balloons once corral is repopulated. [FIELD SETUP] - Clarified balloon measurement diagram. [BALLOONS] - Updated bumper rules to match FRC 2023 rules. [ROBOT RULES, 5] - Updated low zone scoring to include the field perimeter between the short rail segments. [SCORING SUMMARY] - Updated balloon scoring in totes so stacked balloons within totes count. [SCORING SUMMARY] - Added 2 second delay for bunny scoring between auto and teleop. [AUTO PERIOD] - Updated standard penalty from 4 to 6 points. [TELEOP PERIOD, PENALTIES AND RED CARDS] - Added red card for blocking access to the corral. [PENALTIES AND RED CARDS] - Updated definition of "possess" to include contact with object and that balloons must be inflated to count. [PENALTIES AND RED CARDS] - Added possession limit of 1 tote per robot. [TELEOP PERIOD, PENALTIES AND RED CARDS] - Added tote numbers to short side of tote for driver visibility and field reset. [TOTES] - Updated all AprilTag IDs to simplify field reset and normalize numbering. [APRILTAGS] - Clarified that *all* balloons, inflated or not, must be removed from corral for the Coopertition bonus. [TELEOP PERIOD] - Added red card for launching minibots. [PENALTIES AND RED CARDS] - Clarified that minibots do not require bumpers. [MINIBOT RULES]

GAME SUMMARY

Balloon-a-Palooza is played by two alliances of 3 robots each on an indoor FRC-style carpeted field measuring 27 ft. by 54 ft.



Matches consist of a 15 second Autonomous period followed by a 2 minute, 15 second Teleoperated period. Red and blue alliances collect their corresponding balloons from a central corral, carefully scoring them in various totes while minibots support their cause. Every team benefits when all balloons are cleared out of the corral.

GAME BREAKING STRATEGIES

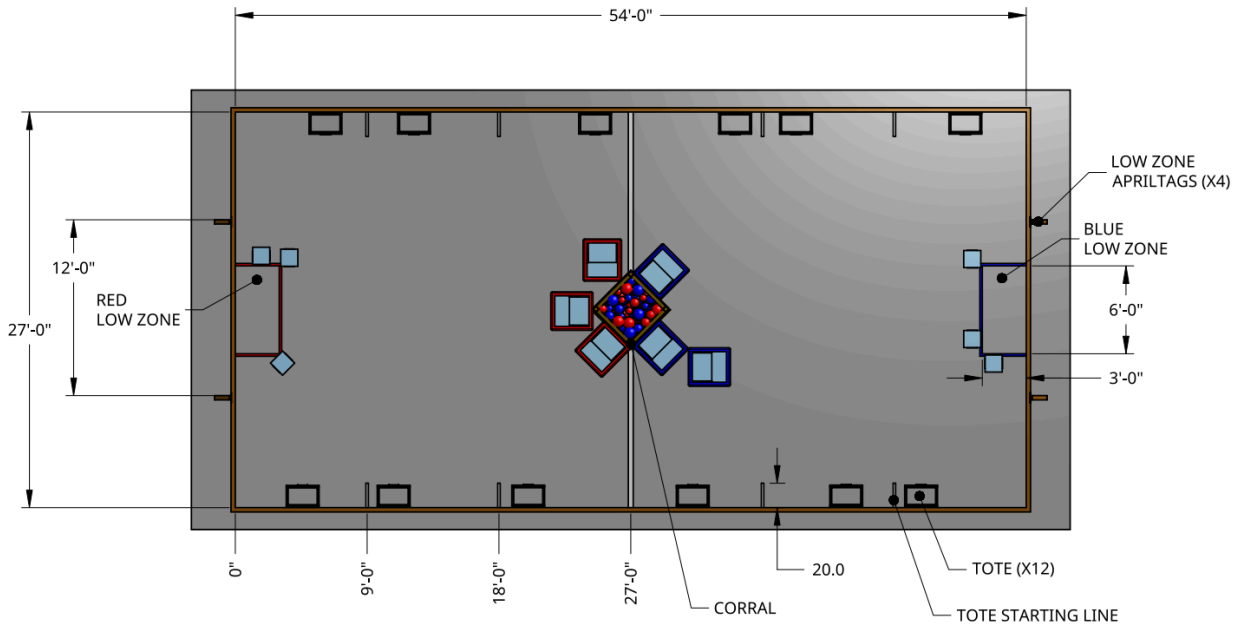
We've done our best with these rules to catch any game-breaking strategies, but if you think you've found one, please confidentially email robotics@catlin.edu for a ruling. We want this to be a fun event for everyone, not an event that celebrates the cleverness and lawyer instincts of one team. We reserve the right to plug any one of these holes in the game on game day as they develop… better to get a ruling in advance!

Q&A

If you want to ask your question in a place where everyone will see the clarification, do so on Chief Delphi here. If it needs to remain confidential, email robotics@catlin.edu.

GAME DETAILS

FIELD LAYOUT



Balloon-a-Palooza is played on an FRC-style carpeted field measuring 27ft by 54ft. The field is populated with:

- 1 Central Corral
- 12 Totes
- 2 Low Goals, one per Alliance

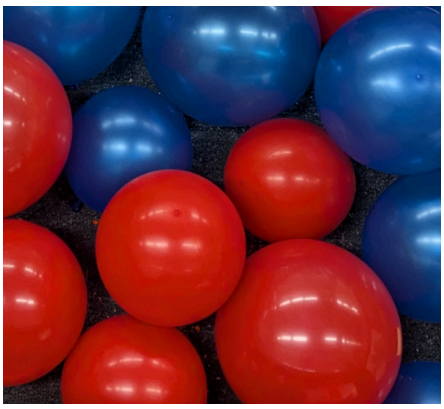
A centerline marks the separation of alliances during AUTO. Short lines along the sides of the field indicate starting ranges for the totes.

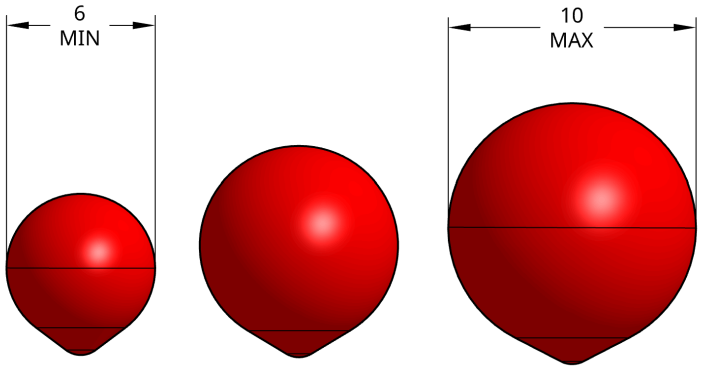
CAD

- OnShape model
- STEP model and Field Drawings

BALLOONS

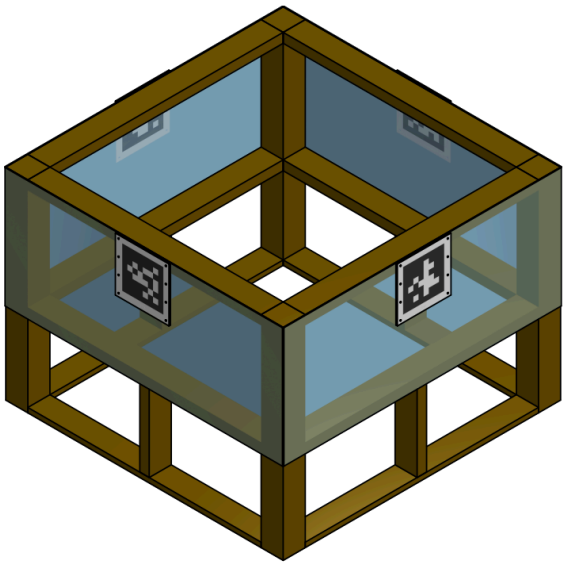
Balloons are generic red and blue rubber latex balloons with diameters varying randomly between 6in and 10in across (see diagram below for measurement). They are inflated with air, not helium (or water!) **Members with latex allergies should take measures to avoid exposure.**





CORRAL

The central corral is the source of all balloons in Balloon-a-Palooza. The corral measures 44in wide, 44in long, and 32in tall, is constructed with wood and polycarbonate, and will hold a random mix of 40 red balloons and 40 blue balloons at the start of the match.



LOW ZONE

The Low Zone is a 3ft x 6ft region centered on each end of the field and formed by a 2in wide x 1in tall lip to contain balloons within.

BUNNIES

Bunnies are crafted and supplied by teams in the form of balloon animals! Each bunny is constructed from a single 12in long balloon inflated (with standard-issue air) to at least a few inches of the end and twisted into a shape approximating a rabbit. That is, they must appear to the referees as a bunny (head, body, tail, and ears). Bunnies must have a face drawn with

felt tip markers, and a team number is recommended as well! No other materials may be used on the bunnies (Googly eyes, glitter, etc).

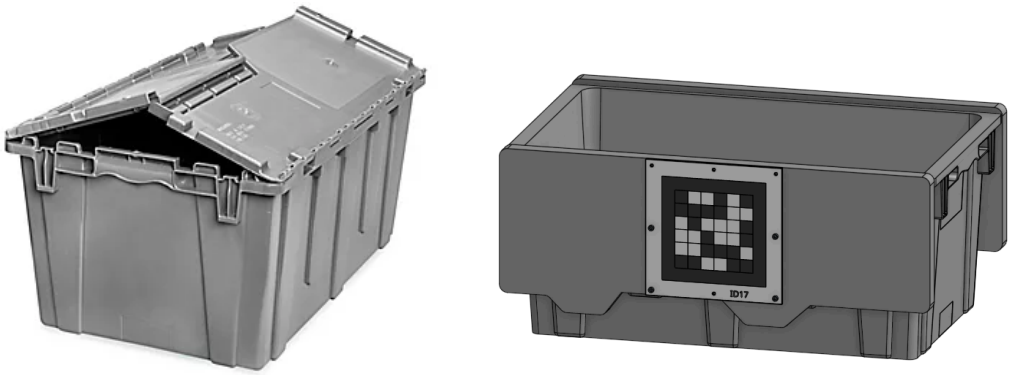
For a starting point, refer to this guide.

> **NOTE:** For the purposes of possession and penalties only, bunnies *are* balloons.

Robots optionally start with a bunny and place them in totes or the low zone during autonomous. This is the only time bunnies can be scored!

TOTES

There are 12 totes on the field at the start of the match. These are FRC kit totes which were also used for the 2015 game Recycle Rush as well as the 2023 BunnyBots game, Rabbit Roundup (ULINE PN S-9745GR or equivalent). The nominal outer dimensions are 27" long, 17" wide, and 12.5" tall. Totes weigh approx. 8 lbs each. The tote starting configuration has the lids open but they are not secured and can be manipulated.



Totes are the primary scoring location for the game. Each alliance gets 6 totes on their half of the field, which are *not* specific to an alliance and are arranged randomly by referees before the match (see FIELD SETUP below). Totes *do* have dedicated numbers corresponding to their AprilTags and will always start in the same relative positions. Tote numbers are added to the short sides for driver visibility and field reset. Robots are allowed to manipulate totes.

NOTE: These totes do have a textured bottom surface that “sticks” to the carpet. Strategize accordingly.

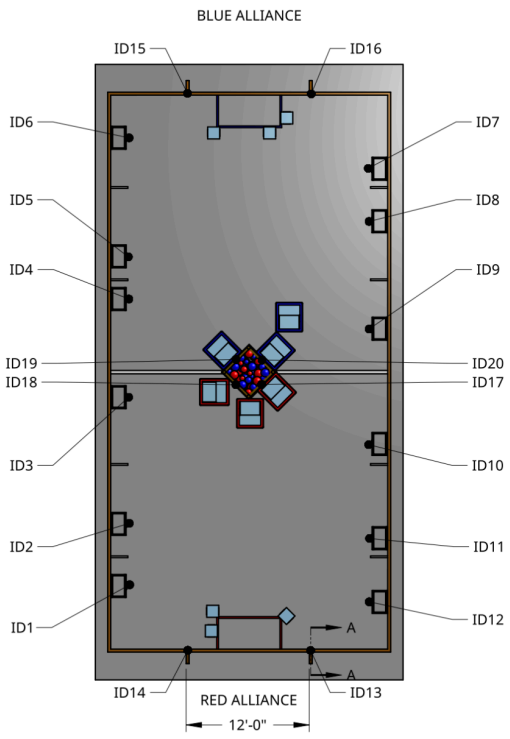
APRILTAGS

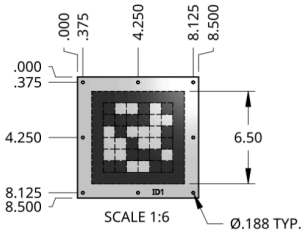
AprilTags are square targets located near the low zones, corral, and totes which aid in robot localization (determining where you are).

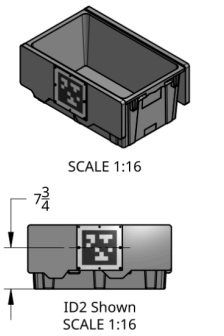
All markers are from the 36h11 tag family, IDs 1-20. The outer dimension of the black square measures 6.5in per side. Tags are placed in the following locations:

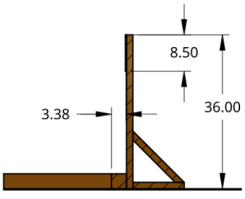
- 1 through 12 affixed to the long side of each tote
- 13 and 14 above and immediately behind the red low zone
- 15 and 16 above and immediately behind the blue low zone
- 17 through 20 affixed to the corral

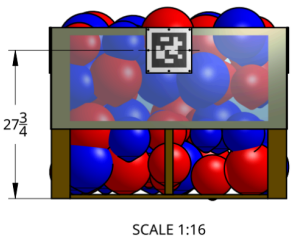
See the field drawings for further detail.











MINIBOTS

Minibots are an optional addition to the game, similar to “mechanical bunnies” from 2022 and 2023. A minibot may be fielded by a team along with its larger counterpart and is

operated separately during the match. Minibots *do not* need to have the appearance of a bunny this year. Keep in mind that minibots are playing alongside much larger machines with little regard for their health, so design accordingly. FTC robot construction techniques may not be up for the task.

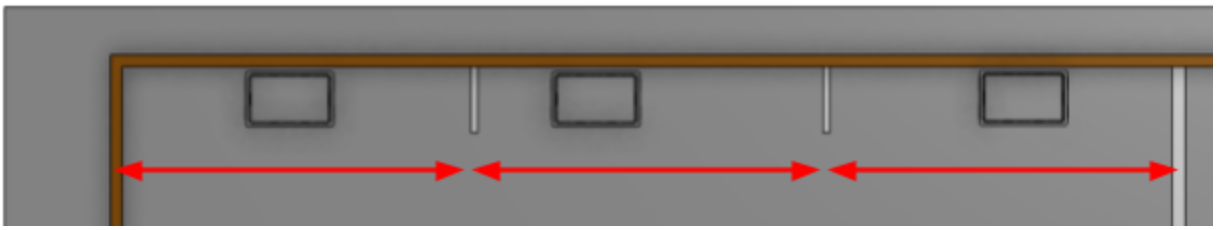
See MINIBOT RULES below for the fine print.

FIELD SETUP

There are 40 red and 40 blue balloons placed randomly in the corral. Teams set up their robots so they are entirely on their side of the field and in contact with the corral vertical projection OR in contact with a robot on their alliance which is in contact with the corral (this is *not* recursive!).

Robots (not minibots) are optionally pre-loaded with one team-supplied balloon bunny which it must be in contact with (setting bunnies on the floor or leaning against another robot or structure is fine, as long as they are touching their team's robot). Robots can also be preloaded with up to two balloons taken from the corral. Teams should ask the refs after the corral is repopulated.

After all robots have been placed, referees *randomly* place all totes such that their long edges are in contact with the long edge of the field with one tote within each zone as shown below. AprilTags are facing toward the field. Totes will be placed at least 6 inches from each other to ensure access to their sides.



See APRILTAGS above for tote placement.

Teams will be given a red or blue flag to indicate alliances.

Minibots start outside of, but in contact with, their alliance's low zone. Minibots may optionally be pre-loaded with one of their alliance's balloons from the corral.

AUTO PERIOD

During the first 15 second autonomous period, robots attempt to place bunnies in totes and low zones. This is the only time in which bunnies count! Robots and minibots cannot cross the centerline.

Bunnies can only be “scored” during autonomous. They have no value after auto.

Robots can optionally have one balloon bunny and up to two balloons preloaded.

Minibots may be teleoperated during autonomous but cannot interact with or score bunnies. They may interact with balloons in the corral, but cannot cross the centerline!

A 2 second delay will be inserted between AUTO and TELEOP for refs to verify bunny scores.

TELEOP PERIOD

During TELEOP, robots race to remove their balloons from the corral and score them in totes and low zones. Totes may be moved and manipulated as desired, including opening and closing lids. Totes are not beholden to one alliance - any balloon scored in a tote counts, and any bunny within a tote will multiply the value of all balloons, regardless of color, within. *Each* bunny in the same tote multiplies balloon values by a factor of 2. For example, two bunnies in a tote result in a 4X multiple. Balloons scored within the low zone are worth 1 point.

Robots may not possess more than 3 inflated balloons and 1 tote at a time.

If ALL balloons (inflated or otherwise) are removed from the corral before the end of the match, a 20 point bonus is awarded to both alliances (Coopertition Bonus).

Totes may not be descored. 6 point penalty per balloon, more if the tote has been multiplied by a bunny as determined by the referee. The low zone may be descored.

HUMAN PLAYERS

There are up to 2 human players per alliance. Their role is to reintroduce balloons back onto the field at the centerline during Teleop.

Human players earn a penalty if they:

- Score a balloon in a tote.
- Contact anything inside the field boundary, especially in a way that affects the game.
- Contact an opposing alliance’s balloon outside of the field boundary.
- Interfere with referees ability to do their job.
- RUN! (unless running from an unsafe robot)

The penalty value is determined by the referees on a case-by-case basis.

SCORING SUMMARY

- Each inflated balloon supported entirely by a tote or any balloon supported transitively by said tote via other balloons (inflated or not) at the end of a match is worth **3 points** for the corresponding alliance.
- Each inflated balloon supported entirely by the carpet and/or rail of an alliance's low zone and/or the short rail sethe field perimeter betweengments *and* not in contact with a robot or minibot is worth **1 point**.
- An inflated bunny within a to tote at the end of AUTO **multiplies** the point value of *all* scored balloons within that totey 2 at the end of the match. This multiplier *does* stack! For example, two bunnies in a tote multiply the contents by 4. The tote must be completely supported by the floor.
- An inflated bunny supported entirely by the carpet and/or rail of an alliance's low zone and/or the field perimeter between the short rail segments, not in contact with a robot or minibot, and intact at the end of AUTO is worth 6 points.
- If no balloons are present within the corral at the end of the match, both alliances are awarded an additional **20 points** to their final score

	POINT VALUE
Balloon in Low Zone	1
Balloon in Tote	3×2^{B}
Bunny in Low Zone (auto only)	6
Empty Corral (Coopertition bonus)	20

B = # bunnies in the same tote at the end of AUTO

ROBOT RULES

Evergreen FRC robot rules (which aren't game specific) from 2024 apply with the following exceptions:

1. The maximum weight of a robot, excluding its battery and bumpers, is 125 lbs.
2. Robots, excluding their bumpers, must not exceed 120" in perimeter at the beginning of the match. After the match has begun they may expand outside of their perimeter a maximum of 12" all sides.
3. Each robot must have a place to insert a flag that identifies their alliance color. The shaft for these flags (provided at the competition) is 5/16" in diameter with flag shafts about 3' high.
4. Robot height, as measured when resting upright on a flat floor, may not exceed 36" tall at any point in the match. The flag is excluded from this limit.
5. Due to the nature of the game pieces this year, bumpers are **required**! Bumpers must be constructed generally along FRC techniques and 2023 rules. Avoid blue or red

bumpers if possible as teams may confuse that for your alliance color. Alliances are indicated by flags, not bumpers.

6. Robots must have at least 0.5" of ground clearance at all times to avoid damaging the carpet seams. This includes bolt heads, chains, etc. It also includes intakes in their lowered position.
7. No vision trickery! Robots will not be fielded if they have anything resembling AprilTags externally visible.
8. Balloons are not a valid construction material or robot decoration and may not be brought onto the field (except for balloon bunnies).
9. There is no cost accounting for BunnyBots, but common sense would say you don't want to spend too much money on BunnyBots parts you can't use again.
10. Any part that was legal for any previous FRC competition may be used.
11. 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.
12. The power source for BunnyBots is a single FRC-legal 18Ah sealed lead-acid (SLA) battery. Power sources integral to other electronic devices, such as cameras and co-processors, are allowed. That power source just can't be involved in driving motors.

    Pro tip: Don't assume your batteries from previous years are still good. Our batteries don't appreciate being allowed to sit fully discharged for months. Test them under heavy load first!
13. Each robot must display its team number in 4" or higher characters of a contrasting color on at least two opposing sides; more sides are preferable. Numbers don't have to be on bumpers, but it's an option. The robot will be announced in the form "Team 1234" by the announcer. If the robot has a name, it may be announced 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 emcee 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.
14. No limits on types of motors, but they must be driven by no more than 12v through a single 40a breaker.
15. No limits on the pneumatics aside from the 120psi and 60psi limits, relief valve, and digital/analog switch
16. Nothing at all sharp, that is likely to pop a balloon, should be in the lower 12" of your robot. This will be an area of focus of inspectors.

MINIBOT RULES

Minibots generally follow the same rules and are subject to the same penalties as their larger counterparts, with the following exceptions:

1. Schools may not provide minibots to other schools. If your school has multiple teams and minibots, they may be used interchangeably.
2. Minibots must start within a virtual 18" cube, but may expand to any size.
3. Minibots don't need to look like bunnies this year. You're of course free to go out of your way to do so, but they won't count as "bunnies" when scoring.
4. Minibots must have a 4in x 8in red or blue patch on two opposing sides of their robot with their team number clearly visible and at least 2" high. The patch must be changeable to the given alliance color, and their team number must match a corresponding robot on the field. Velcro would be a natural choice here but the technology is up to you.
5. Minibots may not fly under their own power. RC helicopters would be fun, but.. No!
6. Minibots cannot be simple RC cars - they must be primarily constructed by teams.
7. There are no material limitations for minibots (aside from balloons, of course). Consider that they likely will be subject to more stress than an FTC robot!
8. While there are no material restrictions, minibots must still be safe to bystanders, the gym floor, and other robots in the opinions of the inspectors and referees. Be conservative here!
9. Motor and current rules are the same as for full size robots.
10. Be warned that the radio interference in the gym is heavy, especially in the 2.4GHz WiFi band. Also do NOT design anything to run in the 5GHz band where our robots are!
11. Minibots do not require bumpers, but inspectors will be looking for sharp edges.

PENALTIES AND RED CARDS

Unless otherwise noted, penalties are added to the score of the opposing alliance.
Yellow cards are warnings. Two yellow cards result in a red card.
Red cards result in no points awarded to the offending team during qualifications. In a tournament, a red card reduces the offending alliance's score to 0.

1. Robots may not pop balloons of either color! Penalty per balloon: 6 points.
2. 6 point penalty for every balloon INTENTIONALLY caused to exit the field.
3. Robots may not intentionally descore balloons from totes. 6 points per balloon of the opposing color, more at the referees discretion.
4. Robots and minibots may not fully cross the centerline during AUTO. Penalty: 10 points, red card if it impacts an opposing robot.
5. Robots may not possess more than 3 inflated balloons. "Possess" means the robot is in contact with the object and if the robot goes forward, backward, left or right, the balloon goes with it. Penalty per balloon: 6 points.
6. Robots may not possess more than 1 tote.

7. Human players may not score game pieces. Penalty: 6 points per balloon, more at the referees discretion.
8. A red card will be issued to any robot attempting to launch totes or remove them intentionally from the field.
9. Any robot that goes out of bounds or becomes high-centered on the 4x4 barrier will be E-stopped (permanently disabled) for the remainder of the match.
10. Incidental frame incursion is not penalized. Drive train vertically projected frame incursion which affects the ability of the impaled robot to play the game through damage, entanglement, or significant delay will result in a penalty or red card for the team responsible. The referees determine the penalty on a case-by-case basis.
11. Robots may not intentionally detach pieces of themselves. Accidentally having parts fall off is fine. Red card.
12. BunnyBots is a contact sport, and as such, there is no penalty for high-speed ramming. Robots should be designed robustly with this in mind.
13. Ungracious behavior will not be tolerated. Penalties are up to the referees and can range from a warning to 6 point penalties to red cards. Aggressive game play isn't ungracious as long as it's within the spirit of the rules. Being a jerk...that's ungracious.
14. Teams must take extreme care not to grind away at the carpet and into the expensive gym floor beneath it, especially during pushing activities. Red card and, if the floor itself is damaged, disqualification from the remainder of the event.
15. Teams should keep in mind that spectators will be standing close to the field. Robots employing strategies that might harm people (including aggressively pushing totes out of the field) will be disqualified.
16. If the opposing alliance performs an action that causes a team to violate the rules, no penalty will be assessed. This is up to the referees and is judged on a case-by-case basis.
17. 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.
18. Referees can modify penalties on a case-by-case basis as needed.
19. Human players may not step onto the field, though they can reach over the boundary provided they can do so safely.
20. Robots and minibots may not completely block access to the corral. Red card.
21. Minibots cannot be launched! Red card.

TOURNAMENT RULES

Teams earn points from each qualification match according to the formulas below **(*changed from prior years!*)**:

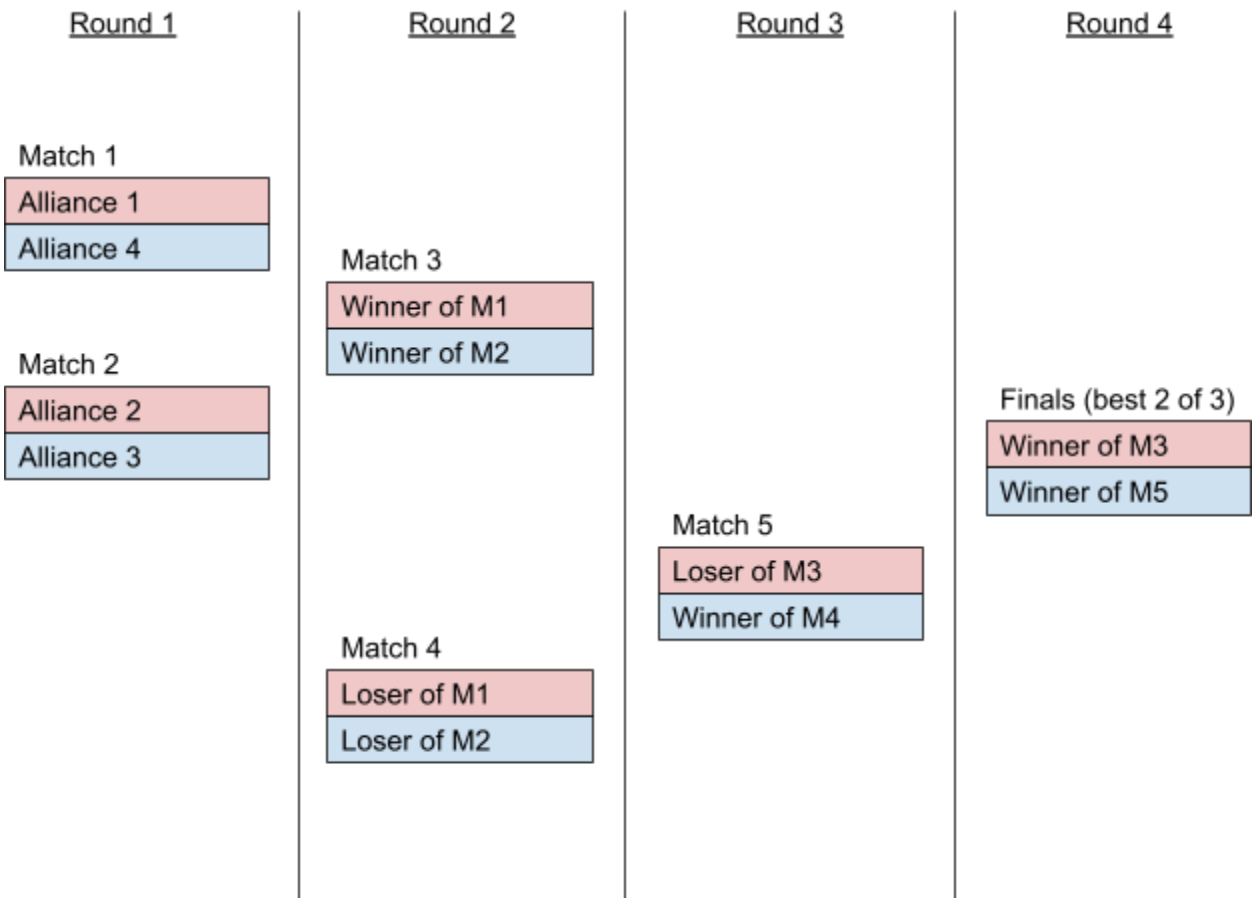
Winning Alliance Qualification Points = W

Loser Qualification Points = L/2
Tie Qualification Points= W

Where W is the winner's score (or either alliance's score in a tie), L is the loser's score.

At the conclusion of qualification matches (see event schedule, approx. 3:00pm), 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 double-elimination playoff matches. Each alliance therefore has their own backup robot. Since there is one more robot per alliance than can be fielded, one robot will sit out each match. The mix is up to the alliance captain and can change from match to match. Because there are backups on each alliance, there are no timeouts. If we don't have enough operational robots at alliance selection for each alliance to have four, we will have three team alliances with the remaining robots on standby identical to how FRC works.

The team with the most qualification points picks first. The top four teams cannot pick one another nor can a team captain from a school pick another robot from the same school in the first round. The pick order is 1-4, 4-1, 1-4. The alliances then play in a double-elimination tournament (bracket shown below). In the finals, the first alliance to win 2 matches is declared the event winner.



Double-elimination tournament bracket.