



2023-2024

TCEA Arena Robotics Challenge

Game Manual

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SECTION 1: OVERVIEW

1.1 GAME BACKGROUND

The 2023-24 TCEA Arena Challenge is titled **Hi, Bye, Pizza Pie!** It's designed around the theme of pizza. The pizza restaurant business is a booming industry that specializes in creating tasty pizzas using a variety of ingredients. Many restaurants have convenient ways to order, provide fast delivery, and efficiently cook pizzas to ensure customer satisfaction.

Did you know there are more than 75,000 pizza restaurants all over the United States? That's a lot of places to enjoy pizza! And get this, about 13% of people in the U.S. have pizza on any given day. It goes to show how much Americans love pizza!

1.2 GAME OVERVIEW

1.2.1 The **Hi, Bye, Pizza Pie! Competition** challenges teams to design a robot to help them gather ingredients, make pizzas, and provide delivery service. This year's challenge includes 22 game elements, including a cell tower, a freezer, and two (2) fake paper bills. Each team can also add ten (10) team-provided game elements: cardboard crusts. Twenty cards from a standard deck of cards will determine pizza delivery in the neighborhood.

1.2.2 Matches consist of two periods: a 30-Second Autonomous Period followed by a 90-Second Driver-Controlled Period.

During the **30-Second Autonomous Period**, robots will move on their own to accomplish predetermined tasks and earn points. At the end of the Autonomous Period, referees will pause the match and assess points before starting the 90-Second Driver-Controlled Period.

During the **90-Second Driver-Controlled Period**, teams may remotely control their robot to accomplish tasks and earn points. At the end of the Driver-Controlled Period, referees will assess points again and calculate the total match score.

1.2.3 Teams will play three (3) Qualification Matches with alliance partners. Team alliance partners will be randomly assigned for Qualification Matches on game day before the start of the competition. Teams will likely compete with a different alliance partner in each of the three Qualification Matches. Alliance partners will work together to earn as many points as possible during the matches. Points earned in each qualification match will be awarded to both alliance partner teams. A team's score from each of its three (3) Qualification Matches will be combined to get an overall team score. After all Qualification Matches are complete and scores are calculated, teams will be ranked from first place to last place based on their overall team score.

1.2.4 Once the Qualification Matches are complete and all teams have earned an overall score and rank, the top 50% of all ranked teams will be eligible for the Finals Tournament Alliance Selection Process. A total of 16 teams will be identified at the end of the Alliance Selection Process to participate in the Finals Tournament. These 16 teams will be organized into eight (8) alliances. In the Finals Tournament, the Alliance Selection Process allows for the 16 top-ranked teams to choose their alliance partners. Alliance partners will then compete in the single-elimination Finals Tournament to determine the **Hi, Bye, Pizza Pie!** champion.

1.3 TEAM RULES

1.3.1 Teams are composed of two to four students. Students are not permitted to participate in more than one team for this competition.

1.3.2 Teams within a sponsored TCEA robotics competition must register through a sponsor with an active TCEA membership. The team sponsor will be the primary contact for communication leading up to competition day.

1.3.3 All teams are required to register for the **Hi, Bye, Pizza Pie! Robotics Competition** using a unique team name. Team names must be less than 20 characters and should be “school appropriate.”

1.3.4 Only registered team members are permitted to touch the robot and computer used to program it. Student problem solving is central to the spirit of this robotics competition.

1.3.5 Sponsors and parents may help transport equipment before and after the competition, but they are not permitted to communicate with or provide assistance to students during the competition.

1.3.6 Only registered team members will be allowed in the teams’ work area (the pit) during the competition.

1.4 TEAM MEMBERS

1.4.1 During gameplay, only two team members are allowed at the playing field. These two team members will be identified as the Robot Driver and the Safety Zone Technician (SZT). Teams may also designate team members to serve as Network Representatives (Net Reps). Net Reps are vital to gameplay but do not participate at the playing field during the matches.

1.4.2 Robot Driver

The Robot Driver is the only team member allowed to operate the robot during the match for both the Autonomous and Driver-Controlled Periods.

1.4.3 Safety Zone Technician (SZT)

The Safety Zone Technician is the only team member allowed to touch game elements during gameplay that are located inside the Safe Zone. This person can also touch and reposition the robot if it is touching the Safe Zone.

1.4.4 Network Representatives (Net Reps)

Teams may also designate team members as Network Representatives. Net Reps will serve as scouts who communicate with other teams during the competition, plan alliance strategy, and coordinate gameplay between matches.

1.4.5 All team members must remain aware of the contest match schedule and be prepared to report to the correct playing field before their match. Teams are expected to be at the “on deck” area and report to the playing field when called.

1.4.6 Team member roles may change throughout the competition. For example, if a team member is designated as a Robot Driver for the first match, it is possible to select a different team member for that role for the second and/or third matches.

SECTION 2: PLAYING FIELD AND GAME ELEMENTS

2.1 PLAYING FIELD

The **Hi, Bye, Pizza Pie! Robotics Competition** will be played on the Race Against Time mat using a standard 48” x 96” TCEA competition field. One two-team alliance will play on one-half of the table while another two-team alliance plays on the other half. This means that four teams will compete simultaneously during a match at the same table. Each team will be stationed around the playing field at one of the four Safe Zones. See **Section 7, Diagram A** for team positioning.

2.1.1 The Safe Zones are the only area of the playing field where students are allowed to touch robots or game elements.

When a **robot** is touching a Safe Zone, teams may change and restart programs, reconfigure robot elements, and reposition or reorient the robot. If the robot is repositioned or reoriented, it must be touching the Safe Zone before continuing with gameplay.

When **game elements** are inside a Safe Zone, teams may pick them up, reconfigure them, and reposition or reorient them. Game elements are considered “inside the Safe Zone” if they are inside the black line (breaking the plane) defining the perimeter of the Safe Zone.

2.1.2 There are two Safe Zones on each side of the playing field. The Safe Zones are slightly different in size and shape. Alliance teams will decide which partner team will use each Safe Zone before starting each match. Teams must be prepared to play the game from either Safe Zone. Teams are not allowed to change Safe Zones in the middle of a match.

2.1.3 The other named features of the playing field are: Kitchen, Loading Dock, Cell Tower, Center Dividing Wall, Freezer, and the Neighborhood. These features will be used to determine the starting position of game elements and to score points during the match. See **Section 7, Diagram B** for playing field features.

2.1.4 Robots must be able to handle game element and field variances, such as tolerances in the board length/width/height and slight waviness in the field mat. Teams should not rely on specific field attributes that can vary with tolerances (such as the amount of spacing under the center dividing wall, the vertical angle of the field walls, etc.) when designing their robots. Teams and/or sponsors are not permitted to touch or inspect boards prior to the competition.

2.2 GAME ELEMENTS and PLACEMENT

There are a total of 22 game elements and one freezer, one cell tower, and two fake dollar bills supplied for each team to score points. All game elements will be placed on the playing field by the referees prior to the beginning of the Autonomous Period. Each alliance will provide a total of team-provided game elements: ten cardboard discs.

See **Section 7, Diagram C** for **ALL** game element placement.

2.2.1 Checkers (Red – Pepperoni and Black – Mushroom)

There will be a total of sixteen (16) checkers in two different locations.

2.2.1.A A stack of four (4) red checkers (pepperonis) and a stack of four (4) black checkers (mushrooms) will be placed in a random location on two of the Kitchen targets (not the center target.)

2.2.1.B Eight (8) checkers, four (4) red and four (4) black, will be placed randomly on the center dividing wall for each alliance to retrieve. The checkers will be placed on the wall with the crown side up. These eight (8) checkers are a shared resource and are available to all teams on both sides of the game field table. Once a robot moves a checker from the top of the wall onto the playing field, it will remain in play only on that side of the table for the remainder of the match.

2.2.2 Nerf Blaster Darts (Pizza Rolls)

There are a total of nine (9) Nerf Blaster Darts in three (3) bundles of three (3) darts. Each bundle will be bound by one (1) loom bracelet rubber band placed in the middle of the bundle. The three bundles will be placed on the Loading Dock arrow.

2.2.3 Dice (Cheese)

There are a total of three (3) dice. These dice will be handed by the referee to the Safety Zone Technician at the beginning of the match. The alliance partners will decide which Safety Zone Technician(s) will hold the dice at the beginning of the match.

2.2.4 Pringles Snack Stack (Freezer)

One (1) Pringles Snack Stack Container will be placed on the small arrow. This arrow is closest to the center dividing wall. Two small foam adhesive circles will fasten the container to the mat. Caution is recommended in approaching the container. If the container detaches during the match play – it cannot be reset during the match. The container cannot be intentionally detached and moved.

2.2.5 Coupler and Straws (Cell Tower)

A cell tower is made up of a coupler and ten (10) straws and will be placed on the cell tower target. This target is closest to the Loading Dock.

2.2.6 Fake Dollar Bills (Tip Time)

There will be two (2) fake dollar bills available for the robots to park over. The fake dollar bills will be placed in the corners of the large rectangle, outside the Kitchen, closest to the center wall. Because the area of the corner is greater than the area of the fake dollar bill, there will be some degree of randomness to the exact placement of the two fake dollar bills.

2.2.7 Cardboard Discs (Pizza Crusts)

The ten (10) crusts are team-supplied items. The corrugated cardboard discs should be 3" in diameter and 3/16" (4.8mm) thick. The diameter and height can vary +/- 1/4". No alterations to the surface of the cardboard are allowed. (Think of a typical Amazon shipping box.) The Safety Zone Technician(s) will give the referee 10 crusts at the beginning of the match to be placed on the center Kitchen target.

2.2.8 Adjusting Placement of Game Elements

Team members are not allowed to adjust the initial placement of game elements themselves. If the team wishes to contest the initial placement of game elements prior to the beginning of gameplay, the team must request the referee to correct the placement.

2.2.9 Modifying or Altering Game Elements

Teams are not allowed to modify or alter any game element. For example, the Nerf darts may not be unbundled, broken in half, etc. There is no tape or sticky substance used during game play for any reason. This ensures that all game elements stay consistent for all matches during the competition.

2.3 INTERACTING WITH GAME ELEMENTS

There are a total of twenty (22) game elements and a cell tower, a freezer, and two (2) fake paper bills provided. Each alliance will also add ten (10) team-provided game elements, cardboard pizza crusts, between the two teams.

Teams can interact with game elements in two ways:

2.3.1 Game Elements in Playing Field

When located in the playing field, game elements can be pushed, picked up, stored, manipulated, and relocated by the team's robot. **The only way to interact with elements in the playing field is with the robot.** Team members may not touch game elements located in the playing field. Game elements are considered "in the Playing Field" if they are NOT inside the black line (breaking the plane) defining the perimeter of the Safe Zone.

2.3.2 Game Elements in Safe Zone

If game elements have been moved inside the Safe Zone, the team's SZT may touch, pick up, hold, or reconfigure them as long as they remain inside or are eventually returned to the Safe Zone. The team's SZT may pick up and hold those game elements during the match, but they must be returned to a Safe Zone. Game elements are considered "in the Safe Zone" if they are inside the black line (breaking the plane) defining the perimeter of the Safe Zone.

2.3.3 Transfer of Game Elements

To foster the spirit of collaboration, alliance partner teams will be allowed to transfer game elements (checkers, crusts, darts, and dice) between their two Safe Zones during the match. Any game element that is in a team's Safe Zone may be transferred to the alliance partner team's Safe Zone. Any game element that falls onto the playing field during a transfer are not allowed to be recovered by hand.

2.3.4 Game Element Movement

If a team member touches or moves any game element under circumstances that do not conform to the game's rules, it will be immediately returned to its previous location on the playing field by the referee. The intent of this rule is to neutralize any incentive or advantage for a team member to touch a game element that is located in the playing field.

SECTION 3: ROBOT AND SOFTWARE

3.1 ROBOT REQUIREMENTS

3.1.1 Teams are allowed to use LEGO® EV3, SPIKE™ Prime, Robot Inventor, or the VEX IQ platform to build and control their robot for the **Hi, Bye, Pizza Pie! Robotics Competition**.

3.1.2 There is no restriction or limit to using outside elements for the robot's construction as long as the control system, motors, and sensors are from one of the approved building systems listed in 3.1.1.

3.1.3 Teams are not allowed to melt, deform, cut, bend, glue, solder, or otherwise alter LEGO® or VEX IQ elements (plastic and electrical) for use in their robots.

3.1.4 The robot must be able to fit inside a 12" by 12" footprint at the beginning of each match. There are no constraints on the robot's height at the beginning of the match. Referees will check for

compliance prior to the start of every match. The robot must stand alone during referee measurement, and no team member may touch the robot during or after measurement except to start the robot once the match begins.

3.1.5 Teams are allowed to employ different attachments on the robot to be used for different game tasks. These attachments must touch the robot and fit within the 12" by 12" footprint while checking for robot compliance before each match. These attachments can be detached and reattached during the match. The attachments may not rest or touch the walls at the start of each match.

3.1.6 All parts of the robot, including all attachments, must move in relation to each other as the robot moves. Whether the robot moves as a result of an autonomous program, a remote control, or moved by a team member, all parts and attachments must move in direct relation to the control module. (This rule is established so teams cannot use an attachment as a tether or manually lay down attachments outside the Safe Zone.)

3.1.7 Parts of the robot that are no longer touching the robot (detached) are not considered part of the robot as long as they are detached. If the parts are reattached to the robot (touching the robot), they are once again considered part of the robot.

3.1.8 Teams must enter a custom name on their programmable processing unit before arriving at the competition venue. The name must match the officially registered team name. This will ensure that any wireless signal from the robot is clearly identifiable.

3.1.9 Teams are encouraged to enable Bluetooth on their robot's programmable processing unit and pair it before arriving at the competition venue. This will ensure that the unit does not show as "available" to devices belonging to other teams. Students are NOT allowed to attempt to pair/connect to any device that does not belong to them.

3.2 SOFTWARE & CONTROLLERS

3.2.1 Teams are allowed to use their choice of software to program for the 30-Second Autonomous Period of gameplay. Teams must ensure that their software choice is compatible with the LEGO® EV3, SPIKE™ Prime, Robot Inventor, or the VEX IQ platforms.

3.2.2 Teams are allowed to use their choice of driver-control system for the 90-Second Driver-Controlled Period of gameplay. Most teams will use the remote control unit supplied by the platform manufacturer (VEX IQ) or a mobile app connected to the robot using Bluetooth (LEGO EV3, SPIKE Prime, or Robot Inventor.)

3.2.3 Bluetooth is the only allowed form of remote control. IR, WiFi, or other wireless or wired connectivity modes are not allowed for this competition.

SECTION 4: COMPETITION

4.1 ALLIANCE PARTNERSHIPS

Teams will play three (3) Qualification Matches with alliance partners. Team alliances for the Qualification Matches will be randomly assigned prior to the start of the competition. Alliance partner teams will work together to accomplish as many tasks and earn as many points as possible during the match. Points earned in each match will be awarded to both alliance partner teams. For example, if the qualification match score is 220 points, both teams in the alliance are awarded 220 points.

4.1.1 In the **Hi, Bye, Pizza Pie! Robotics Competition**, there is an expectation that alliance partner teams will communicate in advance of their match to discuss tactics and plan a strategy for the match. Every team will have designed its robots to accomplish a unique set of tasks so that each team will have its own strengths and specialty. Teams are encouraged to use their time in the “pit” and “on deck” area before their match to coordinate their efforts and create a strategy for accomplishing game tasks together.

4.1.2 During the Qualification Matches, alliance partners will be randomly assigned, but in the Finals Tournament, top-ranking teams will be able to choose their own alliance partner. Because of this, teams will want to select alliance partners with abilities that complement their own strengths. Scouting during the Qualification Matches is a good way to learn the capabilities and limits of the other teams and robots at the competition. Scouting is also important to find out how you will complement other teams in your alliance and match up against your opponents.

4.2 QUALIFICATION MATCHES

During the Qualification Matches, there needs to be a great deal of communication between alliance teams and interaction between team members and their robots. Teams will play three (3) Qualification Matches with three randomly selected alliance partners.

4.2.1 Hi, Bye, Pizza Pie! Matches consist of a 30-Second Autonomous Period followed by a 90-Second Driver-Controlled Period.

During the **30-Second Autonomous Period**, robots will move on their own to accomplish predetermined tasks and earn points. At the end of the Autonomous Period, referees will pause the match and assess points before starting the 90-Second Driver-Controlled Period.

During the **90-Second Driver-Controlled Period**, teams may remotely control their robot to accomplish tasks and earn points. At the end of the Driver-Controlled Period, referees will assess points again and calculate the total match score.

4.2.2 Referees will check for robot compliance prior to the start of every match. The robot must be able to fit inside a 12" by 12" footprint at the beginning of each match. There are no constraints on the robot's height at the beginning of the match. The robot must stand alone during referee measurement, and no team member may touch the robot during or after measurement except to start the robot. **NOTE:** The only time a referee will check for robot compliance is immediately preceding the 30-Second Autonomous Period.

4.2.3 Referees will check to make sure the cardboard crusts measure three (3) inches in diameter and meet the thickness standards stated in 2.2.7.

4.2.4 Referees will have 20 cards: one set of ace–10 diamonds or hearts (red) and one set of ace–10 spades or clubs (black). The cards will be shuffled, and the Net Reps will draw five cards from the 20.

The color of the cards drawn will determine whether a pepperoni (red checker) or a mushroom (black pizza) is delivered to the neighborhood.

The number on the card will determine the location where the pizza should be delivered. For example, a two of hearts would mean a pepperoni pizza would be delivered to Address 2.

Address 1 (an ace) is the rounded rectangle closest to the double arrows, and the 10 is the rounded rectangle closest to the center wall.

Each pizza will consist of one crust and one checker.

4.3 30-SECOND AUTONOMOUS PERIOD

4.3.1 The robot must start each qualification match touching its Safe Zone. "Touching the Safe Zone" means that some part of the robot must be touching the white mat inside the black line, defining the perimeter of the Safe Zone.

4.3.2 When time begins for the 30-Second Autonomous Period, the robot may only move as a result of a program stored on its processing unit.

4.3.3 If a robot is touching the Safe Zone, the team's Safety Zone Technician and Robot Driver may change and restart programs, reconfigure robot attachments, and reposition or reorient the robot. The Robot Driver will manage the robot, and the Safety Zone Technician will manage the game elements. If the robot is repositioned or reoriented, it must be touching the Safe Zone before continuing or starting a new autonomous task.

4.3.4 If a team's robot is touching the alliance partner's Safe Zone, that team's Safety Zone Technician may reposition or reorient the robot. This must be done with the consent of the robot's team, and the robot must be touching the same Safe Zone from which it was recovered before continuing with gameplay.

4.3.5 If game elements are moved in the Safe Zone, inside the black line (breaking the plane) defining the perimeter of the Safe Zone, the team's Safety Zone Technician may touch, pick up, hold, reposition, or reconfigure them as long as they remain inside or are returned to the Safe Zone.

4.3.6 Teams must immediately stop their robot at the end of the 30-Second Autonomous Period. At the end of the 30-Second Autonomous Period, referees will assess points using the gameplay Score Sheet. Teams will not be awarded any autonomous points for tasks accomplished after the 30-second alarm is sounded.

4.3.7 Once the referees have assessed points, teams will recover their robot, move it back to the Safe Zone from which it started, and start their driver-controlled program.

4.3.8 Game elements on the playing field at the end of the 30-Second Autonomous Period will remain in position and will NOT be reset. Those game elements will remain in position for the start of the 90-Second Driver-Controlled Period.

4.3.9 Game elements in the Safe Zone at the end of the 30-Second Autonomous Period may be repositioned or reoriented by the Safety Zone Technician during the transition time between the 30-Second Autonomous Period and the 90-Second Driver-Controlled Period.

4.3.10 The transition time between the end of the 30-Second Autonomous Period and the beginning of the 90-Second Driver-Controlled Period will not exceed two (2) minutes. Teams must ensure they are able to reset their robots back to the Safe Zones and initiate their driver-control programs within this transition time.

4.4 90-SECOND DRIVER-CONTROLLED PERIOD

4.4.1 Like the Autonomous Period, the robot must be touching the Safe Zone at the beginning of the 90-Second Driver-Controlled Period. Referees will NOT re-check compliance prior to the start of the Driver-Controlled Period.

4.4.2 If the robot is not already touching the Safe Zone at the end of the 30-Second Autonomous Period, the Robot Driver will pick up and relocate/reposition the robot from its stopped location to the Safe Zone for the start of the 90-Second Driver-Controlled Period.

4.4.3 Teams will be given up to two (2) minutes to reset their robots and switch to their driver-control programs. Teams must ensure that they are able to deploy and troubleshoot their driver-control program quickly without delaying gameplay. Bluetooth is the only allowed form of remote control. IR, WiFi, or other wireless or wired connectivity modes are not allowed for this competition.

4.4.4 While teams are allowed to remotely control their robot during the 90-Second Period, it is also acceptable for teams to run a combination of autonomous programs if desired.

4.4.5 During the 90-Second Driver-Controlled Period, team members are not allowed to touch or pick up the robot while it is on the playing field. If a team member touches a robot under circumstances that do not conform to the game's rules, it will be immediately removed from play for the duration of the period.

4.4.6 If the robot is touching the Safe Zone (some part of the robot must be touching the white mat inside of the black line defining the perimeter of the Safe Zone), the team's Safety Zone Technician may change and restart programs, reconfigure robot elements, and reposition or reorient the robot. If the robot is reconfigured, repositioned, or reoriented, it must be touching the Safe Zone before continuing with gameplay.

4.4.7 If a team's robot is touching the alliance partner's Safe Zone, that team's Safety Zone Technician may reposition or reorient the robot. This must be done with the consent of the robot's team, and the robot must be touching the same Safe Zone from which it was recovered before continuing with gameplay.

4.4.8 If game elements are moved into the Safe Zone, inside the black line (breaking the plane) defining the perimeter of the Safe Zone, the team's Safety Zone Technician may touch, pick up, hold, reposition or reconfigure them as long as they remain inside or are returned to the Safe Zone.

4.4.9 Teams must take special care to stop all movement of their robot at the end of the 90-Second Driver-Controlled Period. Teams will not be awarded any points for tasks accomplished after the 90-second alarm is sounded. At the end of the 90-Second Driver-Controlled Period, referees will assess points using the gameplay Score Sheet.

4.5 SCORING FOR 30-SECOND AUTONOMOUS PERIOD

4.5.1 Gather Crusts

Alliance teams will earn points by moving the crusts from the center Kitchen target to the Safe Zones. Game elements are considered "inside the Safe Zone" if they are inside the black line (breaking the plane) defining the perimeter of the Safe Zone.

Points awarded for each crust **10 points**

Maximum points: **100 points**

4.5.2 Acquire Pepperoni and Mushrooms

Alliance teams will earn points by acquiring red (pepperoni) and black (mushroom) checkers from the Kitchen or the Center Wall. Game elements are considered scorable if they are in the playing field or Safe Zone(s) but not breaking the plane of the Kitchen.

Points awarded for each checker moved into the playing field: **10 points**

Maximum points: **160 points**

4.5.3 Cheese Pizza Production

Alliance teams will earn points by making cheese pizza. A cheese pizza consists of one crust and one dice in direct contact with each other. Cheese pizzas are considered “inside the Safe Zone” if they are inside the black line (breaking the plane) defining the perimeter of the Safe Zone.

Points awarded for each cheese pizza **5 points**

Maximum points: **15 points**

4.6 SCORING FOR 90-SECOND DRIVER-CONTROLLED PERIOD

4.6.1 Loading Dock Delivery

Alliance teams will earn points by acquiring the pizza rolls from the Loading Dock and placing the pizza rolls inside the Kitchen. To be scorable, the pizza rolls cannot break the plane of the Kitchen.

Note: The pizza rolls can be moved during the 30-Second Autonomous Period, but scoring will not occur until the conclusion of the 90-Second Driver-Controlled Period.

Points awarded for each pizza roll inside the Kitchen: **15 points**

Maximum Points: **45 points**

4.6.2 Freezer Storage

Alliance teams will earn points by transferring ingredients (checkers, darts, dice) to the freezer. Ingredients are scorable if the game elements are in the container but not touching the mat, wall, or robot.

Points awarded for each ingredient inside the freezer: **20 points**

Maximum points: **380 points**

Points will vary depending on final placement.

4.6.3 Neighborhood Delivery

Alliance teams will earn points by delivering pizza to the correct house addresses in the Neighborhood. A pizza consists of one crust and one checker in direct contact with each other. Pizzas are considered “delivered” if the crust is breaking the plane of the rounded rectangle. See **4.2.4** for specific details for this task.

Points awarded for pizza with the correct topping to the correct address: **50 points**

Maximum points: **250 points**

4.6.4 Tip Time

Alliance teams can earn points by parking their robot(s) over the fake dollar bills. “Parking their robot(s) on the fake dollar bill” means that a robot must be stopped over (breaking the vertical plane of) the fake dollar(s). The robot(s) cannot touch the dollar bill(s).

Points awarded for 1 robot: **10 points**

Points awarded for 2 robots: **25 points**

Maximum points: **25 points**

4.6.5 Cell Tower

Alliance teams must not knock down the cell tower. If at the end of the match the cell tower is not free standing, the score sheet will reflect a 20 point deduction.

Points deducted if the cell tower is not standing free at the end of the match: **-20 points**

4.6.6 Both alliance partner teams will confirm the final score before the referee submits it. Once the final score is initialed by each team and submitted by the judge, match results can not be contested. If there is a question or challenge about scoring, it can only be addressed before the score is submitted.

SECTION 5: FINALS TOURNAMENT

5.1 QUALIFICATION RANKING

A team’s scores from each of its three (3) Qualification Matches will be combined to get an overall team score. After all Qualification Matches are complete and team scores are calculated, teams will be ranked from first place to last place based on their overall team score.

5.1.1 If multiple teams are tied with the same ranking score, ties will be broken based on the highest individual match score. If a second tie-breaker is needed, the tie goes to the highest individual 30-Second Autonomous Score. If a third tie-breaker is needed, the tie goes to the team with the highest individual 30-Second Autonomous Score **first**.

5.2 ALLIANCE SELECTION PROCESS

Once the Qualification Matches are complete, and all teams have earned an overall score and rank, the top 50% of all ranked teams will be eligible for the Finals Tournament Alliance Selection Process. A total of 16 teams will be identified at the end of the Alliance Selection Process to participate in the Finals Tournament. These 16 teams will be organized into eight (8) alliances.

The Alliance Selection process is as follows:

5.2.1 The contest chair will announce the top 50% of ranked teams eligible for the Finals Tournament Alliance Selection Process. If there are fewer than 32 participating teams in the Qualification Matches, the contest chair will announce the top 16 ranked teams that will be eligible for the Finals Tournament Alliance Selection Process. If there are fewer than 16 teams participating in the competition, there will be eight (8) teams (rather than 16 teams) eligible for the Finals Tournament Alliance Selection Process.

5.2.2 Every team eligible for the finals tournament Alliance Selection Process will choose one (1) student to act as the team's representative for the Alliance Selection Process. These representatives will be called to the competition area at the appointed time to represent their teams in the alliance selection. The team representatives will be arranged, left to right (facing the audience), in order of their overall ranking score from the Qualification Matches.

5.2.3 The student representative from the highest-ranked team will be asked to step forward as an Alliance Captain to invite another available team to join their alliance. Any team is eligible to be chosen as an alliance partner as long as they are not already part of another alliance.

5.2.4 If an eligible team accepts the invitation, they are moved into that alliance for the Finals Tournament. If a team declines the invitation, the Alliance Captain from the inviting team must extend an invitation to another team until a partner is identified.

5.2.5 Once the first alliance is set, the next highest-ranked remaining team will be asked to step forward as an Alliance Captain to invite another eligible team to join their alliance. The selection process continues until eight (8) alliances have been formed.

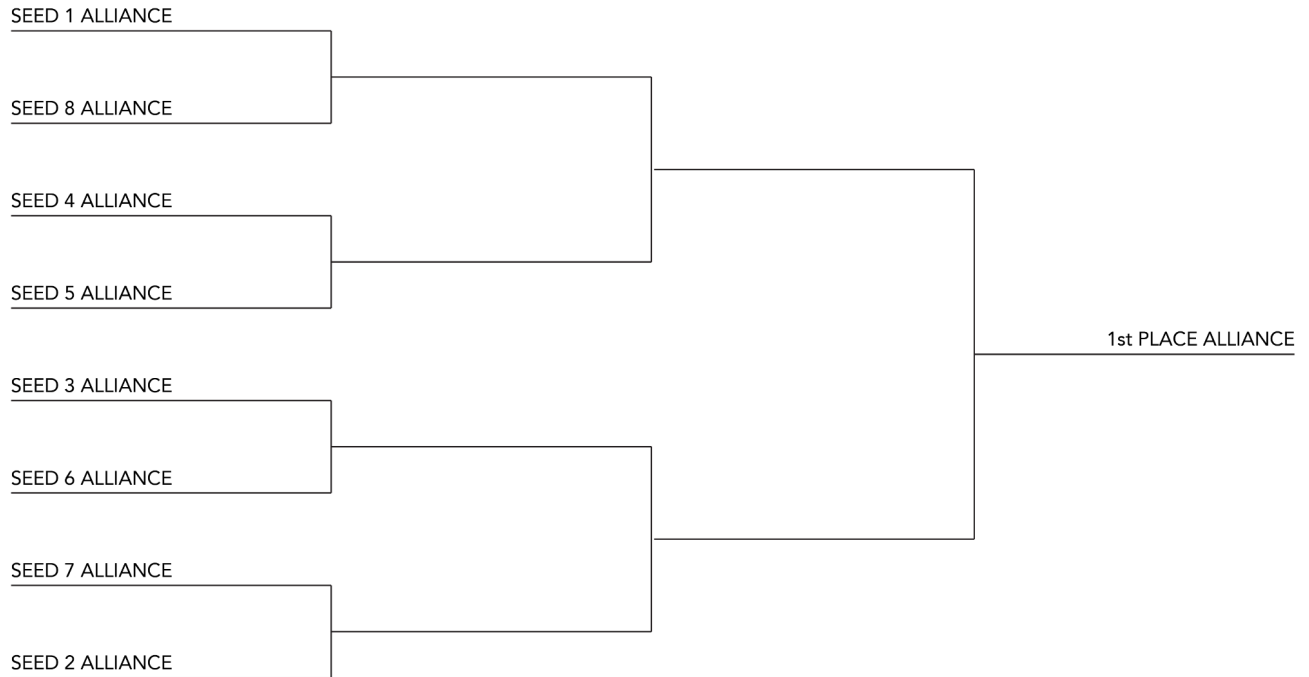
5.3 FINALS TOURNAMENT

The Finals Tournament Matches are played to determine the **Hi, Bye, Pizza Pie! Competition** champion. The matches are played in a seeded format where the top seed alliance goes up against the 8th seed; the number two (2) seed goes up against the 7th seed, and so on.

5.3.1 Matches during the Finals Tournament will follow the same format, scoring procedures, and adhere to the same rules as the Qualification Matches.

5.3.2 In the Finals Tournament Matches, teams do not get ranking points. The match score of the two alliance teams will determine the win, loss, or tie for that bracket. If an alliance wins a match, they continue to the next round of the tournament. If they lose a match, they are out of the tournament bracket. If there is a tie between two alliances, the tie will be broken by the 30-Second Autonomous Period score. If a second tie-breaker is needed, the tie will be broken by the number of ingredients in the freezer.

5.3.3 FINALS BRACKET



If a regional competition has fewer than 16 participating teams, the finals bracket will only accommodate four competing alliances (eight teams) in four rounds. See FAQ 6.14 for details.

5.4 AWARDS

The following awards will be presented at the conclusion of the **Hi, Bye, Pizza Pie! Robotics Competition**:

5.4.1 1st Place Alliance (2 teams)

All members of the two alliance teams winning the tournament's final match will receive an award recognizing them as 1st Place Alliance Winners.

5.4.2 2nd Place Alliance (2 teams)

All members of the two alliance teams losing the tournament's final match will receive an award recognizing them as 2nd Place Alliance Winners.

SECTION 6: FAQs

6.1 Can we use tape or glue for the Hi, Bye, Pizza Pie! ! Competition?

No. Absolutely no tape or glue can be used during the competition. The only exception is to use tape for labeling cables and such.

6.2 Is there a place where I can ask questions if this FAQ isn't enough?

Every sponsor can join TCEA and have access to the Robotics Contest Group in the TCEA Community.

6.3 My mats appear to have two different textures, what's up?

Mats made after the 2014 competition season are made of a different mat material than those made by LEGO® Education. The pattern printed on the mat is identical to previous years, and there are no distinguishing marks on the mat, so it may be difficult to distinguish a previous year's mat from the current mat. It is recommended that teams mark the underside of their mat as "2014+" mats immediately upon receiving them (taking caution not to mark in an area or in a way that shows through to the front of the mat).

6.4 Where can I purchase game elements?

Unlike previous years, you will not be able to purchase game pieces from TCEA. Below you will find the dimensions for the game elements TCEA recommends for Hi, Bye, Pizza Pie! Most game pieces can be purchased from a local store, online, or obtained from previous contests.

(16) Checkers: 8 red and 8 black checkers (Interlocking plastic checkers, about 1 ¼ inch diameter and ¼ inch thick)

(3) Dice 16mm (any color)

(9) Nerf Darts 7.2 cm x 1.2 cm (any color)

(3) Loom bracelet rubber bands

(1) PVC pipe coupler (Can be found at home improvement stores.. The Dura ¾" schedule-40 PVC pipe coupler is designed as a slip-slip coupler that joins two ¾" PVC pipes. A coupler is roughly 2.125" long (2 1/8" in height) and has a 1.3125" (1 5/16") outer diameter. (The height can vary +/- ¼", and the outer diameter can vary no more than 1/16".)

(10) Non flexible drinking straws 7mm x 265mm (The height can vary +/- 10 cm)

(2) Fake Dollar Bills (2 inches x 4 inches, printed on Astrobright "Gamma Green" paper)

(1) Pringles snack stack container (approx. **H** 5.3 cm **W** 7 cm **L** 9 cm)

(2) 8mm (5/16") foam adhesive circles or a small piece of tape

(1) Standard deck of playing cards

Cardboard (team-supplied game element)

6.5 Where can I purchase the "Race for Time" mat for the contest?

TCEA is the sole source for the Race for Time mat. You may purchase the mat [here](#).

6.6 Where do I find the instructions to build the wooden frame, also known as the Field Border?

Find the instructions [here](#).

6.7 Straws

TCEA is providing official game elements only to TCEA sponsored Contests. If you cannot locate this specific size of straw, a variance is allowed. A good alternative are the long red straws you can find at Sonic Drive-In.

6.8 Can a team “recover” their robot from the playing field by taking a touch penalty of 10 points?

Unlike previous contests, a team is not allowed to recover their robot while the robot is on the playing field during the match. There is a transition time between the Autonomous Period and the Driver-Controlled Period when the robot will be moved to the Safe Zone (4.4.2).

6.9 What are the highest points possible for a single match?

For the 30-Second Autonomous Period, the highest possible point value is 275. (100 pts for gathering crusts, 160 pts for acquiring pepperoni and mushrooms, and 15 pts for cheese pizza.) For the 90-Second Driver-Controlled Period, the highest possible point value is 600. (45 pts for loading dock delivery, 250 pts for pizza delivery, 280 for depositing the remaining ingredients in the freezer). No cell tower deduction. The highest possible TOTAL Match Score is 875.

6.10 Is there a difference in the game for Intermediate (INT) and Advanced (ADV) teams like in previous years?

There is no difference in the game manual and score sheets between INT and ADV teams. It's the same game for everyone.

6.11 How will the alliance partners be randomly selected for the Qualification Matches?

Once all teams have checked in at the contest site, team names will be entered into a spreadsheet and randomly sorted. The contest admin will select the first two teams on that new list to play together in Match 1; the next two teams will play together in Match 2, and so on. The contest admin will run another random sort to determine alliance partners for Round 2 and Round 3. This process is completely random, with no consideration for spacing a team's matches out. So, it's possible that a team could play the last match in round 1 and the first match in round two.

6.12 What if an odd number of teams compete at the competition?

The contest admin will give one randomly selected team an extra match if needed so all teams can play at three rounds with an alliance partner. In this case, a team would be randomly selected to play a fourth match so that all teams would have a partner. For the team that plays four matches, their lowest match score is dropped to incentivize them to play strong in their "extra" match. If there are 39 teams at a competition, there's a one-in-39 chance that your team will play a fourth match and be able to drop the lowest match score.

6.13 How are the Alliance Selection Process and Finals Bracket different for regions with fewer than 32 participating teams?

If there are fewer than 32 participating teams in the Qualification Matches, the contest chair will announce the top 16 ranked teams that will be eligible for the Finals Tournament Alliance Selection

Process. A total of 16 teams will be selected (partnered in eight alliances) to participate in the Finals Bracket.

6.14 How are the Alliance Selection Process and Finals Bracket different for regions with fewer than 16 participating teams?

If there are fewer than 16 participating teams in the Qualification Matches, the contest chair will announce the top eight (8) ranked teams that will be eligible for the Finals Tournament Alliance Selection Process. There will be a total of eight (8) teams selected (partnered in four alliances) to participate in the abbreviated (three rounds, rather than seven) Finals Bracket.

6.15 Is there a possibility of a collision of robots or elements during the match?

With four robots competing on the same 4'x8' game table, there most certainly could be some accidental collisions. While accidental contact might happen, keep in mind that the spirit of the game is all about collaboration. Teams should not act in a way that might interfere with or impede the progress of other teams.

6.16 A good rule of thumb for all

Question: Am I allowed to do xyz?

Answer: Students, coaches, and referees should ask, "Did the human do xyz or did the robot do xyz?" Please remember Rule 2.4.1: The only way to interact with elements in the playing field is with the robot.

SECTION 7: Diagrams

Diagram A

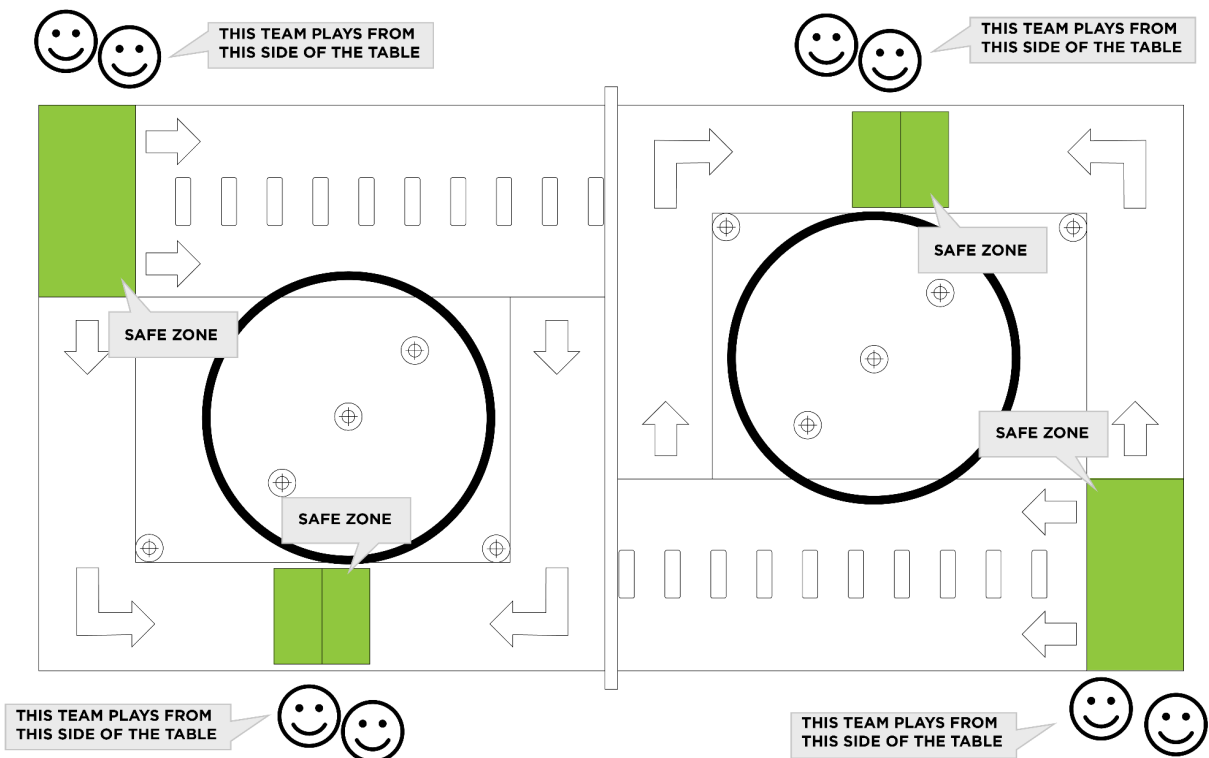


Diagram B

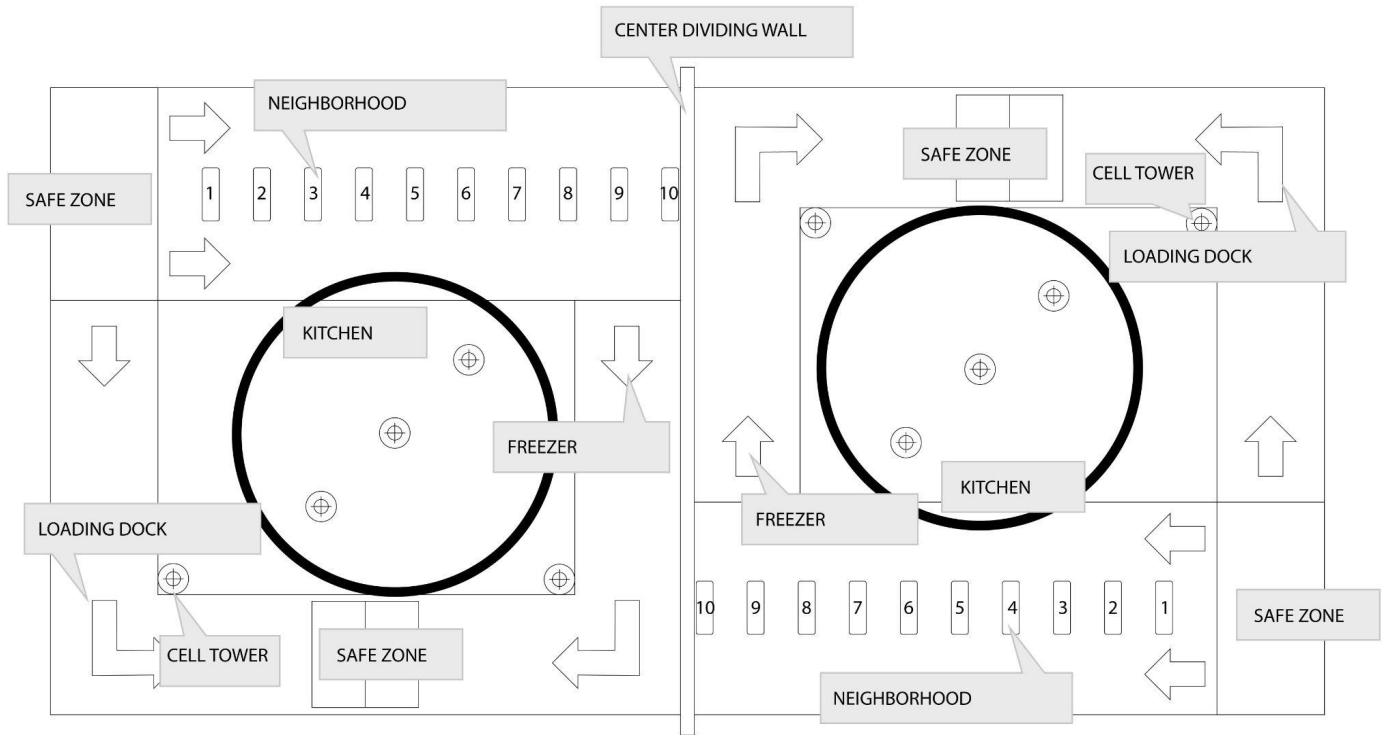
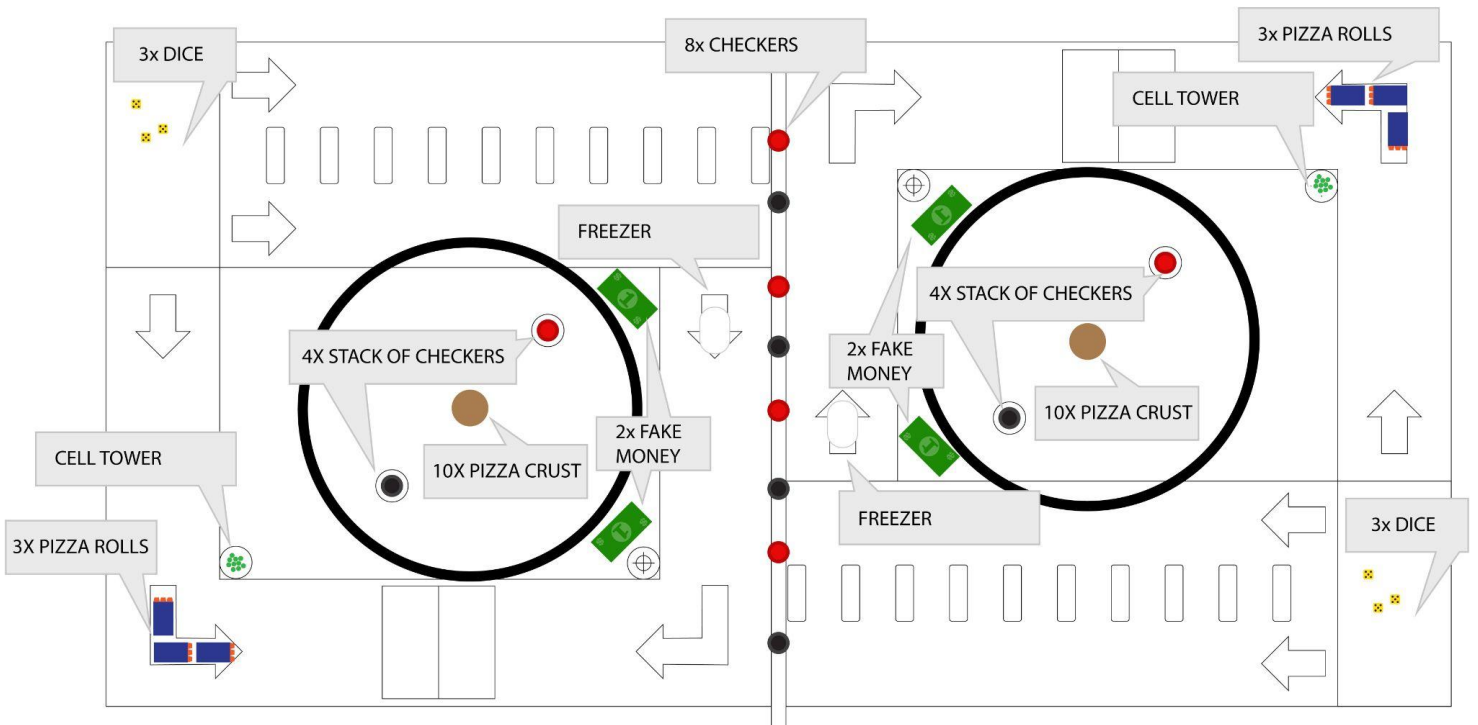


Diagram C



SECTION 8: Revision History

August/31/2023 – Original release of Game Manual V.1