# Chicago Robotics Invitaitonal

CRI 2022 Rules

For FREIGHT FRENZY℠

The following rules are in addition or modification to the most recent version of the *FIRST* Tech Challenge 2022 Game, FREIGHT FRENZY℠ presented by Raytheon Technologies, and its listed Game Manuals 1 and 2 for traditional events. Refer back to Game Manuals 1 and 2, and the Field Setup and Field Assembly Guides for rules and details not explicitly listed here.

Chicago Robotics Invitational 2022 Field Diagram
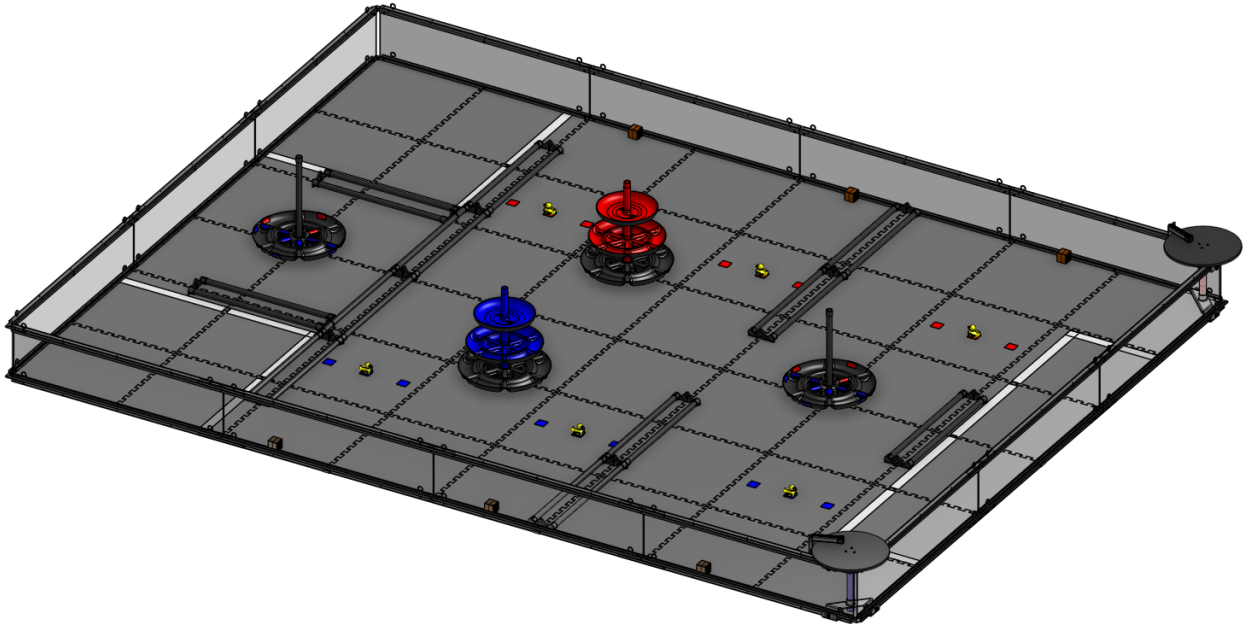
[Onshape CAD Link](#)

Field and Scoring Achievement Changes

The *Field* has been extended in length to be a "long" *Field*. This means that an extra *Field Wall* segment is placed on the sides, with two rows of gray *Tiles* accordingly added. The field is now approximately 6 *Tiles* by 8 *Tiles* long, for a total area of approximately 12' x 16'. A majority of the field on the "back half" of the field is completely unchanged. The two original *Warehouses* (now referred to as *Far Warehouses*), the *Shared Shipping Hub*, *Alliance Shipping Hubs*, and existing *Barcodes* relative to the back of the *Field* are completely unchanged.

Mid-Field Barriers

Another set of *Barriers* has been added between the *Alliance Shipping Hubs* and the *Carousels*. Each side of the *Field* has two Horizontal Barrier Assemblies (28 inches each) that extend from each wall towards the center of the field. This results in an approximately 26.35" gap between the two sets of Mid-Field *Barriers*. These *Barriers* are aligned with the front-most edge of the *Tile* gap that is three *Tiles* from the front of the *Field*. These *Barriers* are assembled and setup in the same manner as outlined for other *Barriers*, with under *Tile* plates and cable ties.
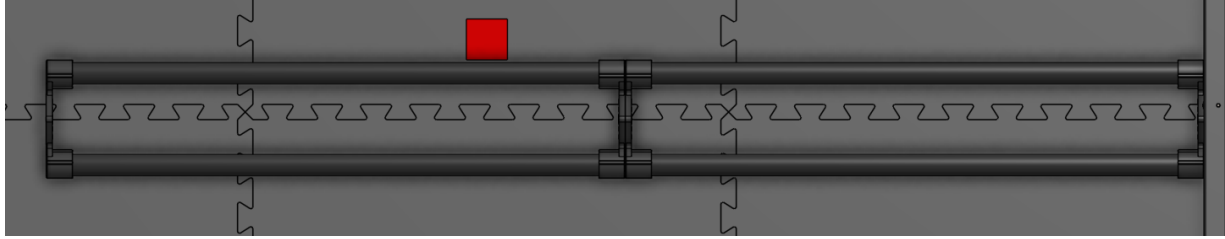
Cooperative Shipping Hub

The *Cooperative Shipping Hub* is similar in construction to the *Shared Shipping Hub* with the exception of a 1" spacer placed between the molded base and the lower tray to make it more difficult for the hub to be *Balanced* when *Freight* is scored on it. This spacer will be 3D Printed using a PETG filament at approximately 20% infil. The total *Cooperative Shipping Hub* height (i.e. the top of the pole) is maintained at approximately 20.25", with the base height increasing from 3" to 4". The *Cooperative Shipping Hub* is centered between the red and blue *Alliance* walls and placed on the second *Tile* intersection from the front of the *Field*.

All achievements are *Scored at Rest*.

Autonomous Points:

- Each *Freight Scored Completely On* the *Cooperative Shipping Hub* earns six (6) points for the *Alliance* that corresponds to that side of the *Hub*. Freight In two *Alliance Specific Areas* has zero *Score* value.

Driver Controlled Points:

- Each *Freight Scored Completely On* the *Cooperative Shipping Hub* earns four (4) points for the *Alliance* that corresponds to that side of the *Hub*. *Freight In* two *Alliance Specific Areas* has zero *Score* value.

End-Game Points:

- If the *Cooperative Shipping Hub* is *Balanced,* both *Alliances* receive an additional four (4) points per *Freight Completely On* either *Alliance's* side of the *Cooperative Shipping Hub*, regardless of which *Alliance Specific Area* that the *Freight* is *In*. *Freight In* two *Alliance Specific Areas* has zero *Score* value and does not count towards this bonus.
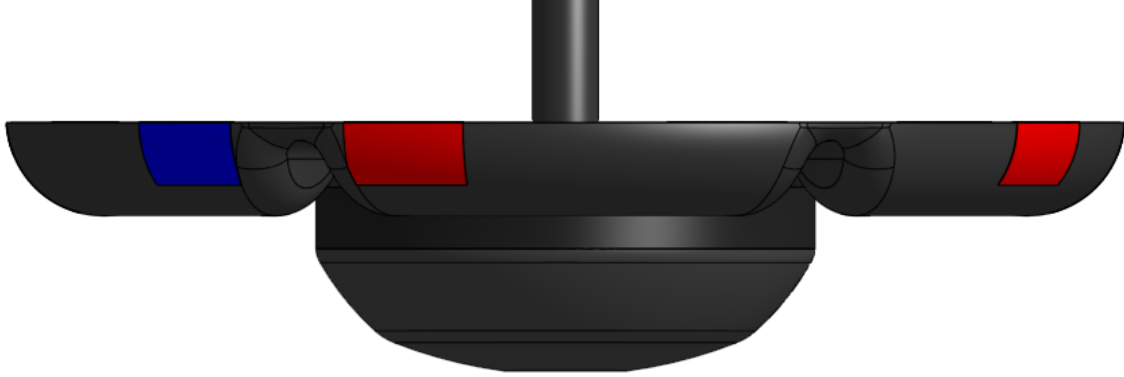
Near Warehouse

There is a third *Warehouse* added at the front of the field, referred to as the *Near Warehouse*. The two *Warehouses* at the rear of the field that were present in the original Freight Frenzy *Field* are referred to as *Far Warehouses*.

There is a single section of a vertical *Barrier* assembly (29.5 inches), setup horizontally across the *Field*, centered on the field that is directly next to the *Near Warehouse*. These *Barriers* are assembled and set up in the same manner as outlined for other *Barriers*, with under *Tile* plates and cable ties. This is located on the side of the *Tile* tabs closest to the *Field Border*. The closest edge of these *Barriers* is approximately 19.75 inches from the front *Field Border*. There is a gap of approximately 55 inches between the end of the barrier and each Alliance Wall. The 2 inch wide white tape around the *Near Warehouse* is 93.5 inches long, located 19.75 inches from the front *Field Border.* In addition to two (2) strips from each end of this tape to the front *Field Border*, there are two (2) marked black tape lines that the outside of the edges are 26 inches apart, centered on the center tab strip. All of the *Freight* placed in the *Near Warehouse* at the start of each *Match* will be *Completely In* the *Area* defined by the inside of this black tape and the *Near Warehouse* tape.
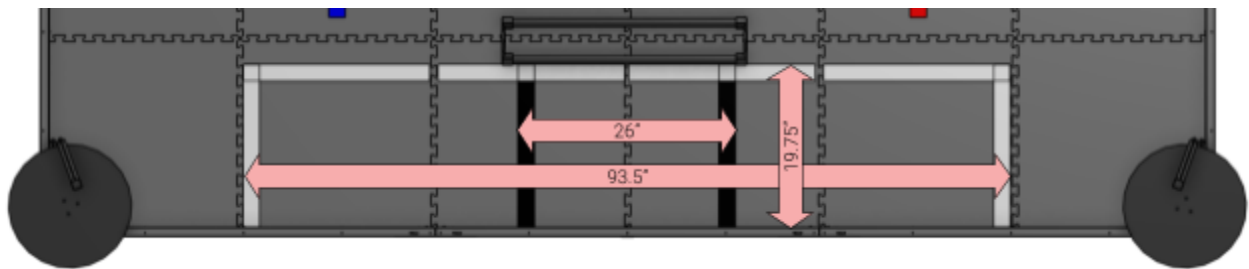
All achievements are *Scored at Rest*.

Autonomous Points:

Navigating –

- *Robots Parked In* the *Far Warehouse* or the side of the *Near Warehouse* closest to the *Robot's* corresponding *Alliance Station* earn five (5) points.

- *Robots Parked Completely In* the *Far Warehouse* or the side of the *Near Warehouse* closest to the *Robot's* corresponding *Alliance Station* earn ten (10) points.

End Game Points:

Parking –

- *Robots Parked In* a *Far Warehouse* earn three (3) points.
- *Robots Parked Completely In* a *Far Warehouse* earn six (6) points.
- **Note:** *Robots Parking In* the *Near Warehouse* will not earn points

Third Barcode

A third *Barcode* for each *Alliance* is added to the Field markings. The front two (2) *Barcodes* are marked according to the Freight Frenzy Field Setup Guide on the second and fourth *Tiles* from the *Front Wall*, starting at 25.75" and 73" from the *Front Wall*, respectively. A third *Barcode* is marked in the same pattern on the sixth *Tile* from the *Front Wall*, starting at 120.25" from the *Front Wall*.

Navigation Images

There will be no *Navigation Images* on the *Field Walls*.

Field Removals

To accommodate the *Near Warehouse*, the *Storage Unit* has been removed. As such, all potential scoring in the *Storage Unit* is not possible, and any rules that may apply to the *Storage Unit* do not apply.

Alliance Stations

Alliance Stations will be 16 foot x 4 foot, in line with the longer *Field*.

Field Set-Up Changes

A *Pre-Load Box* is placed in front of each of the two new *Barcodes* located near the *Near Warehouse* for a total of six (6) *Pre-Load Boxes* on the *Field*.

The *Freight* that does not have distinct *Setup* locations (*Ducks, Pre-Load Freight*) will be mixed, divided approximately into thirds and approximately evenly distributed in each corner tile square next to the back and side walls in each Far Warehouse, and in the center of the Near Warehouse.. Most *Freight* has been doubled, although the number of *Ducks* per *Alliance* has not changed from 10, which means fewer *Ducks* may be located *In* the *Alliance Loading Dock* when teams do not place their *Team Shipping Elements* on the *Barcodes*. The total number of *Freight* on the field is now forty (40) *Cargo*, six (6) *Pre-Load Boxes*, fifty-four (54) *Light Boxes*, forty (40) *Medium Boxes*, twenty (20) *Heavy Boxes* and twenty (20) *Ducks*.

Definitions

Backup Team - A *Team* who can be chosen to be a fourth member of an *Eliminations Alliance* in case of *Robot* failure.

Cooperative Shipping Hub - An approximate 18-inch (45.7 cm) diameter *Game Element* where *Robots* from both *Alliances* place *Freight*. The *Cooperative Shipping Hub* is divided into two semi-circular *Alliance Specific Areas*.

Championship Points - Used for rankings during the round robin semifinals, each *Alliance* receives two (2) *Championship Points* for a *Win,* one (1) for a *Tie*, and zero (0) for a *Loss* in the *Elimination Bracket.*

Round - A subdivision of the *Elimination Matches* which will eliminate certain *Elimination Alliances*. For the purposes of CRI, there are two *Rounds*: the *Round Robin*, and the *Finals*.

Round Robin - The first *Round* of the *Elimination Matches* wherein each *Eliminations Alliance* plays each other *Eliminations Alliance* exactly once. Each *Eliminations Alliance* is ranked by *Championship Points, Ranking Points,* and *Tiebreaker Points* from the *Round Robin Matches*, and the two highest ranked *Alliances* advance onto the *Finals.*

Series - A subdivision of the *Round Robin* in which each *Elimination Alliance* plays exactly once.

Warehouse - An *Area* of the *Playing Field* bounded on all sides by white tape or the *Playing Field Wall*. There are two (2) *Far Warehouses* and one (1) *Near Warehouse.*

   a) **Near Warehouse** - A *Warehouse* that is located near the front of the *Playing Field* that is approximately 19.75" deep and four tiles wide. It is bounded on the front by the *Playing Field Wall* and on all other sides by white tape. This *Area* is approximately 19.75 inches by 93.5 inches.
   b) **Far Warehouse** - A *Warehouse* that is located near the rear of the *Playing Field*. It is bounded on two sides by the *Playing Field Wall* and all other sides by white tape. This *Area* is approximately 43.5 inches by 43.5 inches.

Tournament Rules

Alliances & Ranking

Each *Alliance* for CRI 2022 is made up of three (3) *Teams* in each *Qualifying Match*. *Competition Rankings* from *Qualifying Matches* are calculated per Game Manual Part 1 - Traditional Events, Section 5 (also see definitions).

Alliance Selection

Following *Qualifying Matches*, the *Alliance Selection* will occur to form four (4) *Alliances* of three (3) *Teams* each for the Elimination Matches. *Alliances* will be selected using a standard draft, in 1-4, 4-1 order (i.e. a snake draft).

Of the remaining eligible *Teams*, the highest ranked *Teams* must either accept or decline to be included in a pool of available *Backup Teams* until there are four (4) *Teams* that accept to be added into the *Backup* pool. *Field Staff* will coordinate the assembly of this *Backup* pool immediately after *Alliance Selection* has been finalized. If a *Team* is not available to accept inclusion in the *Backup* pool, it will be assumed they have declined the invitation.

Backup Teams

In the *Elimination Matches*, it may be necessary for an *Alliance* to replace one (1) of its members due to a faulty *Robot*. Examples of *Robot* faults include, but are not limited to: mechanical damage, electrical issues, and software problems. In this situation, the *Alliance Captain* has the option to bring in only the highest seeded *Team* from the pool of available *Teams* to join its *Alliance*. The team whose *Robot* and *Drive Team* replaces another *Robot* and *Drive Team* on an *Alliance* during the *Playoff Matches* is called the *Backup Team*.

The resulting *Alliance* is then composed of four (4) *Teams*. The replaced *Team* remains a member of the *Alliance* for *Awards*, but cannot return to *Gameplay*, even if their *Robot* is repaired.

Each *Alliance* is allotted 1 *Backup Team* coupon during the *Elimination Matches*. If a second *Robot* from the *Alliance* becomes inoperable, then the *Alliance* must play the following *Matches* with only two (2) (or even one (1)) *Robots*.

An *Alliance Captain* may choose to call up a *Backup Team* by submitting their *Backup Team* coupon to the *Head Referee* while there are still at least two (2) minutes remaining before the next *Match* is scheduled to start, whether a *Timeout* has been called or not. After that point, they will not be allowed to utilize the *Backup Team*.

In the case where the *Alliance Captain's Robot* is replaced by a *Backup Team,* the *Alliance Captain* is allowed as an extra *Alliance Drive Team* member. This additional representative may only serve in an advisory role and is considered a *Coach*.

The *Head Referee* will not accept the *Backup Team* coupon unless it lists the number of the *Team* whose *Robot* is being replaced and is initiated by the *Alliance Captain*. Once a *Backup Team*

coupon is submitted and accepted by the *Head Referee*, the *Backup Team* coupon may not be withdrawn by the *Alliance*.

Elimination Matches

The *Elimination Matches* are when the *Alliances* compete to decide who the winning *Alliance* is. The *Matches* are played in the following *Rounds*:

- Round Robin Round
  - There will not be standard Semi-Final rounds, instead being replaced with a four (4) team *Round Robin*. In this format, each *Alliance* plays 1 *Match* against each of the other *Alliances*. This *Round Robin* format will be run in the following order:

Series	*Match*	*Field*	Red *Alliance*	Blue *Alliance*
1	1	1	1	4
	2	2	2	3
Field Time-out (5 min)				
2	3	1	2	4
	4	2	1	3
Field Time-out (5 min)				
3	5	1	1	2
	6	2	3	4

  - Each *Alliance* participating in the Round Robin round will earn *Ranking Points* and *Tiebreaker Points* just like in *Qualification Matches*. In addition, each *Alliance* will receive *Championship Points* for each *Match* in each *Round*.

    - The winning *Alliance* receives 2 *Championship Points*.
    - The losing *Alliance* receives 0 *Championship Points*.
    - In the event of a tied score, each *Alliance* receives 1 *Championship Point*
    - An *Alliance* that receives a *Red Card* in a *Match* has disqualified their *Alliance* and will receive 0 *Championship Points* as well as 0 *Ranking Points* and 0 *Tiebreaker Points*.

  - Each *Alliance* participating in the *Round Robin* will be ranked based off of the following criteria:

Order	Criteria
1	Total *Championship Points* (high to low)
2	Total *Ranking Points* (high to low)
3	Total *TieBreaker Points* (TBP1) (high to low)
4	Total *TieBreaker Points* (TBP2) (high to low)

- ○ Based on this *Round Robin Ranking*, the top two (2) ranked *Alliances* will advance to the *Finals Round.*

- Finals Round
  - ○ The highest ranked *Alliance* from the *Round Robin Ranking* will be the *Red Alliance* in the *Finals Matches*.

  - ○ The second highest ranked *Alliance* from the *Round Robin Ranking* will be the *Blue Alliance* in the *Finals Matches*.

  - ○ *Finals Matches* are played to decide which *Alliance* wins the event. The event winning *Alliance* is the first *Alliance* to win two (2) *Matches*. Any tied *Matches* are replayed until one *Alliance* has two (2) wins.

<C10> Time-Outs

b) During the *Elimination Matches*, each *Alliance* will be allotted one (1) Time-out of no more than three minutes (3:00). Time-outs must be called at least two minutes (2:00) before their next *Match*'s starting time. The time-out begins at the time their Match was going to start.

Note: The next *Match*'s starting time includes any *Field* time-outs that may be a part of the schedule.

Gameplay Rules

Changes to already existing rules and points are highlighted.

<G12> Playing Field Access

    c)   Violations of this rule outside of normal *Match* play that are not sanctioned by the event will result in a *Yellow Card*, such as scheduled practice times and *Robot* calibration.

<G13> Pre-Match Robot Placement – At the beginning of a Match, each Alliance Robot must be set up on the Playing Field according to section 4.5.1 Pre-Match. After Robots are set up on the Playing Field, Drive Teams must stand Inside their respective Alliance Station.

    b)   During the *Elimination Matches*, the lower seeded *Alliance Robots* are set up on the *Playing Field* first, unless the higher seeded *Alliance* waives their right to set up on the *Playing Field* second. *Alliance* color doesn't change the seeding of a *Team* during the *Elimination Matches.*

    c)   ~~During *Elimination Matches*, three *Team Alliances* may only place two *Robots* that are intended to compete in that *Match*. After the *Robots* are placed, the *Alliance* cannot swap in the 3rd *Alliance's Robot* for a *Robot* already placed.~~

<GS2> Descoring - *Robots* may not remove *Freight* or *Team Shipping Elements On* or *In* the opposing *Alliance's*:

    e)   Section of the *Cooperative Shipping Hub*. Each violation results in a *Major Penalty* per *Scoring Element.*

<GS3> - ***Shipping Hub* Constraints** - The following are constraints placed on the *Robots* with respect to the *Shipping Hubs*:

    b)   iv. A *Robot* interfering with the *Cooperative Shipping Hub* at the *End of the Match* will result in the *Cooperative Shipping Hub* being considered *Unbalanced* such that neither *Alliance* will get the additional points for the *Cooperative Shipping Hub* being considered *Balanced.*

    d)   *Robots* may not intentionally relocate or rotate the *Shared Shipping Hub* or *Cooperative Shipping Hub*. Inadvertent and Inconsequential contact is allowed but intentional movement that affects gameplay is assessed a *Major Penalty*.

    e)   *Robots* cannot Interfere or interact with the opposing *Alliance Shipping Hub*, the opposing *Alliance* section of the *Shared Shipping Hub*, or the opposing *Alliance* section of the *Cooperative Shipping Hub*. Each violation of this rule will result in a *Major Penalty*.

    f)   *Robots* may not intentionally place *Freight* on the opposing *Alliance* section of the *Cooperative Shipping Hub*. Each violation of this rule will result in a *Minor Penalty* per *Freight*.

<GS4> *Team Shipping Element* **Constraints**

a) *Robots* may not intentionally place a *Team Shipping Element* on the *Shared Shipping Hub* or *Cooperative Shipping Hub*. Each violation of this rule results in a *Major Penalty*.

<GS9> - *Delivery* **Constraints** - The following are constraints placed on the *Robots* with respect to *Delivery*:

f) Ducks or Team Shipping Elements on the Carousel must be in contact with the Sweeper Plate before a Robot can rotate the Carousel. Each violation of this rule results in a Minor Penalty. Repeat or Flagrant violation may escalate to a Major Penalty at the discretion of the Head Referee.

g) Once the Carousel begins to move; the Drive Team can no longer touch a placed Duck or Team Shipping Element unless it falls off on its own outside of the Field. Each violation of this rule results in a Minor Penalty. Ducks that fall outside the Field will be placed back in the Loading Dock by the Drive Team or by Field Personnel if out of reach by the Drive Team. Repeat or Flagrant violation may escalate to a Major Penalty at the discretion of the Head Referee.

<GS10> - *Autonomous Interference* - Robots may not Interfere with the opposing *Alliance's Scoring* attempts during the *Autonomous Period*. A *Major Penalty* will be assessed for each occurrence.

Note: In *Autonomous*, a *Robot* that causes *Freight* to move from the center section of the *Near Warehouse* into the opponent's side of the *Near Warehouse* or a *Robot* that *Parks* in the opponent's side of the *Near Warehouse* will be subject to <GS10>.

Scoring Summary

Scoring Achievement	Autonomous Points	Driver-Controlled Points	End Game Points
Carousel: *Delivering A Duck*	10		
Parking: *Completely In Warehouse*	10		
Parking: In Warehouse	5		
Freight Completely On Alliance Shipping Hub	6		
Freight Completely On Cooperative Shipping Hub	6		
Pre-Load Box Completely On randomized *Level* using *Duck*	10		
Pre-Load Box Completely On randomized *Level* using *Team Shipping Element*	20		
Freight On Alliance Shipping Hub Level 1		2	
Freight On Alliance Shipping Hub Level 2		4	
Freight On Alliance Shipping Hub Level 3		6	
Freight On Shared Shipping Hub		4	
Freight On Cooperative Shipping Hub		4	
Duck or *Team Shipping Element Delivered*			6
Alliance Shipping Hub Balanced			10
Shared Shipping Hub Unbalanced			20
Bonus per *Freight on Cooperative Shipping Hub* when *Cooperative Shipping Hub Balanced*			4
Parking In Far Warehouse			3
Parking Completely In Far Warehouse			6
Capping per *Team Shipping Element*			15