The FRC Challenge Encyclopedia

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FIRST Inspires Archived Game Documentation

The Unofficial FIRST Mechanism Encyclopedia by Team 5985

FRC Trivia Kahoot

3140 Robot Research Spreadsheet

NEW AND UPDATED FRC CHALLENGE ENCYCLOPEDIA

Challenges

Maize Craze

1992

- *Game Piece:* Tennis Balls
    - 2.7” diameter
    - 3 variations of balls: High-Value, Medium-Value, and Per-Low-Value
        - There were 3 High-Value balls and 2 Medium-Value balls scattered around the field on top of posts
        - There were 150 Low-Value balls that could be found on the floor
- *Field Size:* 16’ by 16’
- *Endgame:* None
- *Field Elements*
    - Field covered in a ½” layer of corn kernels
    - Posts
- *Scoring Methods*
    - Collect balls
        - High-Value ball= +25 pts
        - Medium-Value ball= +10 pts
        - Per-Low-Value ball= +1 pt
- *Goal:* Collect tennis balls, then bring them back to “home base” and protect them from other robots trying to steal them
- *No Alliances*: This game was played with four robots on the field at a time, and no alliances
- Finals Match

Rug Rage

1993

- *Game Piece:* Large and Small balls
    - Large balls were Kick Balls
        - 13” diameter
    - Small balls were “water-filled balls”
        - 6” diameter
- *Field Size:* 12’ by 40'
- *Endgame:* None
- *Field Elements*
    - Goal
- *Scoring Methods*
    - Collect large balls= 5 pts per ball
    - Collect small balls= 1 pt per ball

- *Goal:* Collect large and small balls. Bring them to your goal, then defend them from other robots
- Played by 4 robots; no alliances
- Game Rules
- Rug Rage Match

Tower Power

1994

- *Game Piece:* Soccer Ball
- *Field Size:* The field is a dodecagon (12 sides; each side 4') that spans 34' across
- *Endgame:* None
- *Field Elements*
  - Goal
    - High Goal
    - Low Goal
- *Scoring Methods*
  - Place ball in high goal= 3 pts per ball
  - Place ball in low goal= 1 pt per ball
- *Goal:* Place 12 balls of alliance color into either high or low goal
  - Note: although the word "alliance" is used they were not alliances in today's sense of the term. There were also only 2 robots on the field at the time.
- Game Rules
- Tower Power Finals Match

Ramp N' Roll

1995

- *Game Piece:* Small and Large Balls
  - Large balls 30" diameter
  - Small balls 24" diameter
  - Made of vinyl
- *Field Size:* One end is a 12' by 30' rectangle. Then it narrows to a 12' wide rectangular lane that is 28' long. I recommend just looking at the illustration in the rules if you really want to know.
- *Endgame:* None
- *Field Elements*
  - Speedbump
  - Raceway

        - 5 sided ramp leading to the platform the goal is on. At the bottom of the ramp is a lane with a speed bump.
    - Goal
        - Looks sort of like a football goal
- *Scoring Methods:*
    - Score small ball= 2 pts per ball
    - Score large ball= 3 pts
- *Goal:* Race down raceway, retrieve balls, carry balls back up raceway, push/shoot ball through/over goal.
- Game Rules

Hexagon Havoc

1996

- *Game Piece:* Small and Large balls
    - Small balls 8” diameter
    - Large balls 24” diameter
- *Field Size:* Hexagon shape that spans 27.7’ feet across
- *Endgame*
- *Field Elements*
    - Goal
        - Hexagonal base with triangular top
- *Scoring Methods*
    - Small ball in/above hexagonal goal= 3 pts per ball
    - Large ball in/above hexagonal goal= 10 pts per ball
    - Large ball in/over triangular corners= 5 pts per ball
- *Goal:* Get small and large balls in the goal
- Game Rules
- "Hexagon Havoc- 121 in 1996" video

Toroid Terror

1997

- *Game Piece:* Tubes
- *Field Size:* Hexagon shape
- *Endgame:* None
- *Field Elements*
    - Goal
        - Spinning triangular rack?

- *Scoring Methods*
    - Place tube on rack- 1 pt per tube
        - Each tube on top of the rack doubles a the team's score
        - Each vertical row of tubes will double the team's score
- *Goal:* Robots try to place tubes on the rack or on top of it. Human players may hand tubes to robots or try to throw them onto the rack themselves.
- Finals Match Video

Ladder Logic

1998

- *Game Piece:* Balls
- *Field Size:* Hexagon shape
- *Endgame:* None
- *Field Elements*
    - Side and central goals
        - Central goal has 3 rails extending outward from it- the side goals
- *Scoring Methods*
    - Balls in the center goal are doublers
    - Balls in outer third of rail goal= 3 pts
    - Balls in middle third of rail goal= 2 pts
    - Balls in inner third of rail goal= 1 pt
- *Goal:* Place/throw balls into the central goal and the rails extending from it
- Semi-Finals

Double Trouble

1999

- *Game Piece:* Floppies
    - Floppies are round pillow-like objects with velcro around it's center perimeter
- *Field Size:* Rectangular
- *Endgame:* Get on the puck
- *Field Elements*
    - Pucks
        - Large octagon on wheels
- *Scoring Methods:*
    - Score tripled if a robot is on the puck
    - A floppie is 2"-8" above the floor= 1 pt per floppie at height
    - A floppie is >8" above the floor

- *Goal:* Position floppies as high up on/in a robot as they can, and position the puck around the field- then get on it by the end.
- Finals Pt 1
- Champs Video

Co-Opertition FIRST

2000

- *Game Piece:* Balls
    - 13” Diameter
    - Rubber playground ball
    - Yellow or black
- *Field Size*
- *Endgame:* Get on the ramp or hang from the Clearance Bar
- *Field Elements*
    - 2 Goals (one for each alliance)
        - An upside down tetrahedron on stilts 6’ up
    - Ramp between the two goals
    - Clearance Bar
- *Scoring Methods*
    - Scored yellow ball= +1 pt per ball
    - Scored black ball= +5 pts per ball
    - Robots on ramp at the end= +5 pts per bot
    - Robots hanging from Clearance Bar at the end= +10 pts per bot
        - If a robot is being held off the floor by a hanging bot an additional 10 points is given
- *Goal:* Score balls then hang from the Clearance Bar
- *Alliances:* Alliances in this game consisted of four teams
- Match
- Finals Match

Diabolical Dynamics

2001

- *Game Piece:* Balls
    - Small balls 13” diameter
    - Large balls 30” diameter
- *Field Size:* Rectangle
- *Endgame:* Return to end-zone

- *Field Elements*
    - Goals
        - Can be moved by robots
        - 7’ tall
    - Bridge (tilts)
    - Stretcher
        - One robot can be on the stretcher, if a robot uses the stretcher the stretcher must be returned to it’s original position by the end of the match
- *Scoring Methods:*
    - Small balls in the goals= 1 pt per ball
    - Large ball on top of goals= 10 pts
    - See *Goal*
- *Goal:* Score balls, move the goals onto the bridge (and must balance it), then return to the end zone
- *Alliances:* Alliances of four robots
- Match Video

Zone Zeal

2002

- *Game Piece:* Soccer Balls
    - Size 5 (27”-28” diameter)
- *Field Size*
- *Endgame*
- *Field Elements*
    - 5 Scoring Zones
    - Goals
        - Can be moved by robots
- *Scoring Methods:*
    - Ball in goal= 1 pt per ball
    - Put a goal in your goal zone= +10 pts per goal
    - Get robots in your robot zone= +10 pts per robot
- *Goal:* Get balls into goals and position robots/goals into scoring zones at the end of the match
- Game Manual
- Champs Video

Stack Attack

2003

- *Game Piece:* Plastic Boxes
- *Field Size:* 24’ by 54’
- *Endgame:* Move to the top of the ramp
- *Field Elements*
    - Ramps
    - Scoring Zone
- *Scoring Methods*
    - Place boxes within scoring zone
        - Stacked boxes multiply score
- *Goal:* Move boxes into alliance scoring zone and stack them; knock over opponent’s stacks
- Game Manual: The Arena
- Game Manual: The Game
- Game Animation

FIRST Frenzy

2004

- *Game Piece:* Balls
    - Small
        - 13” diameter
        - Playground balls
    - Large
        - 30” Diameter
- *Field Size:* 24’ by 48’
- *Endgame:* Hang from the pull-up bar
- *Field Elements:*
    - Ball Release
        - Stores 18 small balls above the alliance station wall
    - Pull Up Bar
    - Goals
        - 2 variations: Mobile/Stationary
            - Mobile can be moved by robots
    - Ball Chute
        - Chute in corner for robots to deliver small balls to human players

- *Scoring Methods:*
    - Score small balls in goal= 5 pts per ball
    - Hang on pull up bar at endgame= 50 pts per bot
    - Capping a goal doubles the points from that goal
- *Goal:* Deliver balls into goals, capping goals with larger balls, then have robots hanging from the Pull-Up Bar during endgame
- Game Manual: The Arena
- Game Manual: The Game
- Game Animation

Triple Play

2005

- *Game Piece:* Tetras
- *Field Size:* 27’ by 54’
- *Endgame:* Return to End Zone
- *Field Elements*
    - Goals
    - Loading zones
        - 2 variations: Auto and Manual
        - Robots were temporarily disabled whenever they were loaded at the manual loading station by a human player
    - End Zones
        - Each alliance had a small section of the field in front of their alliance station
- *Scoring Methods:*
    - Place tetra on goal
        - Bonus points for Vision Tetras
    - Place tetra in goal
    - Get all three bots in end zone at the end of the match
- *Goal:* Place Tetras on top of goals or inside them on yellow triangle floor patterns
- This is the year in which bumpers were introduced
- Game Manual
- Game Animation

Aim High

2006

- *Game Piece:* Balls

- *Field Size:* 26’ by 54’
- *Endgame:* Both alliances get to play offensive; return to alliance platform
- *Field Elements*
    - Central Goal
        - Circular hole above the alliance station wall
    - Corner Goals
        - 2 goals on each side of the alliance station wall on the floor
- *Scoring Methods*
    - 25 pt bonus for returning to alliance platform at end of match
    - Earn points by scoring balls (**not enough info**)
- *Goal:* Score balls into your alliance’s goals and prevent opponents from scoring, then return to alliance platform
- *Roles:* Throughout the game, one alliance plays the offensive role, and the other plays the defensive roles. Halfway through the round the roles are switched.
- **No Game Manual Available**
- Aim High Wiki
- Game Animation

Rack N Roll

2007

- *Game Piece: Inflatable Tubes*
    - 30” outer diameter
    - Center hole has 13” Diameter
    - 9.5” Height
    - 3 variations
        - “Keepers” placed during auto (blue/red with white details); “Ringers” placed during tele-op (blue/red solid coloration); “Spoiler Tubes” (black) negate points of Ringers
- *Field Size:* 27’ by 54’
- *Endgame:* Return to home zone (bonus points for being elevated)
- *Field Elements*
    - The Rack
        - 10’ tall structure with an octagon base and 3 levels of “spider legs” protruding from it to place the tubes on
            - The “Spider Legs” hang from chains so can move freely if impacted
    - Home Zone

        - Location where bots can receive tubes from Human Players
- *Scoring Methods*
    - Return to Home Zone during endgame
        - Robots can lift each other or stack on each other to be “Elevated” and get bonus points
- *Goal:* Place keepers/ringer in horizontal or vertical rows on The Rack
- Game Manual
- Game Animation

Overdrive

2008

- *Game Piece:* Track Balls
    - 40” Diameter
    - 7.3 lbs
- *Field Size:* 27’ by 54’
- *Endgame:* Place trackballs back on top of the truss
- *Field Elements*
    - Overpass
        - A beam 6.5’ above the floor that spans the field. At the beginning of the match, the track balls sit on top of it.
    - Finish Line
        - A line white/black checkered line under the truss. Each alliance had a side that was outlined in their color and that was “their finish line”
- *Scoring Methods*
    - Robots cross their finish line
    - Pass under the truss with a trackball= 2 pts
    - Pass under the truss but pass the trackball over it= 8 pts
    - In endgame balls are placed back on top of the truss, any that remain their by the end of the match earn a 12 pt bonus for the alliance
- *Goal:* Circle around the track, crossing the finish line and moving your alliance’s track balls (push, roll, or grab)
- *Note:* This game introduced a new drive team role: the “Robo Coach”- during the “Hybrid Period” the robot can either operate autonomously or off of signals from the robo coach
- Game Manual
- Game Animation

Lunacy

2009

- *Game Piece:* Balls
    - "Moon Rocks"; "Empty Cells"; "Super Cells"
        - 9" diameter
        - Made of braided strips of fabric-covered polymer
        - Commercially available as "orbit balls"
- *Field Size:* 27' by 54'
- *Endgame:* Try to score super cells in opposing robots' trailers
- *Field Elements*
    - "The Crater"
        - The entire field is referred to as "The Crater"- it is not one specific element of the field
            - The field is covered in a polymer material (Gasliner FRP) called "Regolith." It was very low-traction.
    - Outpost
        - Area from which payload specialists can deliver fuel cells to robots
    - Fueling Station
        - Robots bring fuel cells and moon rock to the fueling stations for payload specialists (human player) to use
            - *Note:* Human players can attempt to shoot moon rocks and fuel cells into opponent bots' trailers
    - Launchpad
        - Starting location for robots
- *Scoring Methods*
    - Get Moon Rocks and Super Cells and Empty Cells into opponents' trailer
        - Moon Rock= 2 pts
        - Empty Cell= 2 pts
        - Super Cells= 15 pts
- *Goal:* Get Moon Rocks and Super Cells into opponent's trailer
- *Trailers:* Robots drag around a "trailer" (hexagonal base with various heights of poles protruding from it making a grid. A tall pole in the middle has a vision target on top of it to help with targeting.)
- Game Manual
- Game Animation

- Finals Match Video

Breakaway

2010

- *Game Piece:* Soccer Balls
- *Field Size:* 27’ by 54’
- *Endgame:* Climb the tower, get on tower platform, or go underneath tower
- *Field Elements*
    - Tower
        - Underneath tower is tunnel between zones
        - Location where balls are returned to the field
    - Tunnel
    - Bump
        - Divide field into 3 zones
    - Zones
    - Goal
        - Rectangular gap in alliance wall at floor level
- *Scoring Methods:*
    - Score ball into the goal= +1 pt
    - Hang from the tower at endgame or get on the platform (be “elevated)= 2 pts
        - Bonus points for hanging from partner (being suspended)= 3 pts
    - Get on top of top platform or underneath it in endgame
- *Goal:* Score soccer balls by rolling/pushing them then get to the tower at the end
- Game Manual
- Game Animation

Logomotion

2011

- *Game Piece*: tubes
    - 25”-30” dimension with 9.5”-12” inch hole in center
        - *Variations*: white circle, red triangle, blue square, and yellow circle (“Uber tube”- placed during Auto)
- *Field size*: 27’ by 54’
- *Endgame*: Mini-Bot Race (climb)
    - Robots deploy smaller robots made from FTC materials that race up poles
- *Field Elements*
    - Towers (4)

        - Approx. 122” tall
    - Scoring grid (formed by 3x3 arrays of scoring pegs)
        - Each peg 16” apart horizontally, vertically staggered by 8”
    - Lanes (2; one red, one blue)
        - Loading Zone
    - Zones (2; one red, one blue)
- *Scoring Methods:* Pick-And-Place
    - Placing tubes on the rack
        - Top row= 3 pts; Mid row= 2 pts; Low row= 1 pt
        - Pegs with Uber Tube on it earn 2x the points
        - Rows on which the FIRST logo is made earn 2x the points
    - Mini-Bots race up towers in endgame
        - First up earns 30 pts
        - Second earns 20 pts
        - Third earns 15 pts
        - Fourth earns 10 pts
- *Goal*: place tubes on the scoring rack; deploy mini bots
- *Fun Fact:* In this year, the human player could play one of two roles: Feeder or Analyst. Feeders put the tubes back onto the field. Analysts assisted the coaches in strategic planning.
- Game Manual
- Game Animation
- Championship Match Video

Rebound Rumble

2012

- *Game Piece*: “Compact Foam Basketballs” (25” diameter)
- *Field Size*: 27’ by 54’
- *Endgame:* Balance on bridges
- *Field Elements*
    - Bridge (3)
        - Each alliance had a bridge, and there was a “**coopertition bridge**” in the middle that could be used by either alliance
        - Bridges have 3 positions: titled towards red alliance, tilted towards blue alliance, balanced

    - Hoops
        - High (1), Middle (2), Low (1)
    - Field Barrier
        - A low barrier extends across middle of field
    - Kinetic Motion Sensor
        - Human player uses it to signal robot during auto
    - The Key
        - Safe zone for shooting
    - Alley/Loading Zone
- *Scoring Methods*
    - Balance bridge during endgame
        - Working with other alliance to balance on **coopertition bridge** earned coopertition points
    - Shooting balls into hoops
        - High= 3 pts, Mid= 2 pts, Low= 1 pt
            - (+3 point bonus during auto)
- *Goal*: Score basketballs then balance the bridge
- *Fun Fact:* This is the year the secondary driver role was introduced to the drive team
- Game Manual
- Game Animation
- Einstein Match Video

Ultimate Ascent

2013

- *Game Piece:* Frisbees
    - 11” diameter; 1.4” height
- *Field Size:* 27’ by 54’
- *Endgame:* Climb the pyramid
- *Field Elements*
    - Pyramid
        - Three rungs: low 30”; mid 60”; high 90”
        - Pyramid Goal at the top
    - Wall Goals
        - Rectangular shaped holes in the wall to shoot frisbees into (3 above driver station, one low goal to the side)
    - Loading Zone: human players return frisbees to field

        - Bots in this zone are safe from defense
- *Scoring Methods*
    - Score frisbees in the goal
        - Pyramid= 5 pt; low= 1 pt; mid= 2 pts; high= 3 pts
            - Pts doubled during auto
    - Climb the pyramid
- *Goal*: Score frisbees into goals then climb the pyramid
- Game Manual
- Game Animation
- Einstein Match Video

Aerial Assist

2014

- *Game Piece*: Exercise balls
    - 2’ diameter
- *Field Size:* 25’ by 54’
- *Endgame:* N/A
- *Field Elements*
    - Wall Goal (4 per alliance)
        - 2 large located above drivers station
        - 2 small in lower corners of alliance station
    - Truss
        - Bar spanning the middle of the field
        - 5’ above floor
    - 5 Zones
        - 3 large equal sized zones: red; white; blue
        - 2 Goalie zones at the end of the field
- *Scoring Method*
    - Alliance partners assisting each other in moving the ball through the zones will gain bonus points
    - Score balls: low goal= 1 pt; high goal= 10 pts
        - (+5 pts per goal in auto)
    - Passing ball over truss= 10 pt bonus
- *Goal:* Work together with alliance partners move the balls down the field and score them into the high or low goals
- Game Manual

- Game Animation
- Einstein Match Video

Recycle Rush

2015

- *Game Piece*: Totes, Recycling Bins, Pool Noodles
- *Field Size:* 27' by 54'
- *Endgame*
- *Field Elements*
    - Alliance Zones
        - Field divided in half into red and blue zones
        - "The Step" divides the zones
    - Landfill zone
    - Auto Zone
    - Scoring platforms
    - Chute Recycling: where robots can obtain totes and noodles from human players
- *Scoring Methods*
    - In auto, bots get points for moving themselves, recycling bins, and totes into the Auto Zone. Bonus points for stacking the totes
    - Stack totes on scoring platform; stack recycling bins on totes; pin noodles in recycling bins
        - Stacking totes= 2 pts; stacking recycle bin= +8pts; recycling litter +6 pts
    - Putting litter in the landfill= +1 pt
    - +4 points for each "unprocessed litter"
    - +20 pts for placing 4 yellow totes on scoring platform
- *Goal:* Stack totes, stack recycling bins on top of the totes, recycle away "litter" (pool noodles) into the recycling bins
- There were no bumpers in this game
- Game Manual
- Game Animation
- Einstein Match Video

Stronghold

2016

- *Game Piece*: "Boulder" (ball)
    - 10" diameter
    - Not bouncy

- *Field Size:* 26’7” by 54’
- *Endgame:* Climb the tower
- *Field Elements*
    - Castle
    - “Outer Works”
    - “Secret Passage”
    - Spy Box: Human Players signal their alliance
    - Defenses
        - *Portcullis:* Arched gateway with a door that opens when lifted up
        - *Cheval de Frise:* Tilting weighted polycarbonate platforms
        - *Moat*: U-shaped channel 2.5” deep
        - *Ramparts*: 2 side-by-side steel ramps facing opposite directions
        - *Drawbridge*: Arched gateway with a door that lowers towards the neutral zone
    - Courtyard: Area where robots retrieve boulders
- *Scoring Methods*
    - Shoot boulders into tower (low goal= 2 pts, high goal= 5 pts; in auto low goal= 5 pts, high goal= 10 pts)
    - Cross a defense= 5 pts
    - Climb the tower= 15 pts
    - Challenge the tower= 5 pts
- *Goal*: cross opponents defenses, score boulders into their tower, then capture it
- *Note*: Defense arrangement can be chosen by alliance before round starts and, as such, will be different every round
- Game Manual
- Game Animation
- Einstein Match Video

Steamworks

2017

- *Game Piece:* “Fuel” (ball) and Gears
    - Fuel is 5” diameter; polyethylene
    - Gears have 11” diameter, 2” thick, and 10 teeth. Made from polypropylene and weigh 18.4 oz
- *Field Size*: 27’ by 54’ 4”
- *End Game:* Climb a rope

- *Field Elements*
    - Loading Station ("Retrieval Zone")to introduce fuel and gears to field
    - Boiler: either shoot fuel into the top or deposit it in bottom
    - Launchpad- alliance zones on each side of the field where scoring will be. There is a neutral zone in the middle of the field as well.
    - Airship: 2 structures (one per alliance) on the field between their alliance zone and the neutral zone. Human players stand in the airship and use gears delivered by bots to get the rotors turning
- *Scoring Methods*
    - Scoring 3 fuel into the high goal or 9 into the low goal= 1 pt
    - Get a rotor turning= +40 pts
    - Be ready for takeoff= 50 pts
    - Climb the rope= +50 pts per bot
- *Goal:* Build steam pressure by scoring fuel and deliver gears so human players can spin the rotor, combined these actions will get your ship "ready for takeoff"
- *Note*: In this game some human players are *on the field* in the airship, and some are in the loading lane to deliver gears at the retrieval zone
- Game Manual
- Game Animation
- Final Match Video

Power Up

2018

- *Game Piece:* Power Cubes
    - 1'1" by 1'1"
    - Milk crate covered in yellow nylon
    - 3.25 lbs
- *Field Size:* 27' by 54'
- *Endgame:* Climb the scale via grabbing a bar on the side
- *Field Elements*
    - Switches
    - Scales
    - Alliance Zones (and 2 neutral zones)
    - Exchange Zone: used by robots to deliver power cubes to humans; cubes can be returned to the field via the Return slot slightly above the exchange slot
    - Portal

- *Scoring Method*
    - 1 pt per second when a scale/switch is titled in an alliances favor (2 pts per second during auto)
    - Climbing= +30 pts per robot fully supported by scale
    - All bot cross auto line during auto= +3 pts
- *Goal*: Place power cubes on the switches and scales to tilt them in your alliance's favor. At the end, climb the scale
- *Power Ups*: In this game alliances can use power cubes to earn power ups (Force, Boost, or Levitate). The Force power up gives the alliance temporary control of a switch or scale. The Boost power up temporarily increases scoring for that alliance. The Levitate power up gives one member of the alliance a free climb. (See Game Manual or Game Animation for more info)
- Game Manual
- Game Animation
- Einstein Match Video

Deep Space

2019

- *Game Piece*: Hatch Panels and Cargo
    - Cargo
        - 13" diameter
        - Rubber playground ball
    - Hatch Panels
        - Polycarbonate toroid that is 3/16" thick
        - 19" outside diameter
        - Round in center (6" diameter)
- *Field Size:* 27' by 54'
- *Endgame*: Return to the habitat
- *Field Elements*
    - Habitat
        - 4 levels. Level 1 accessed via small ramp; levels 2-3 accessed via stepping up steps
    - Rocket Ship
    - Cargo Ship
    - Loading Station
        - Area in which Cargo and Hatch Panels can be introduced to the field by

human players
    - Hab Zone
- *Scoring Methods*
    - Secure hatch panel= 2 pts
    - Load cargo= 3 pts
    - Return to habitat (endgame)
        - Low level= 3 pts; Mid level= 6 pts; High level= 12 pts
- *Goal*: Load cargo and place hatch panels on the rocket ship and cargo ship, then return to the habitat.
- *Optional Auto*: During the first 15 seconds of the match, drivers will not be able to see the field. Robots can either operate autonomously, or have some sort of vision system (i.e. camera) allowing the drivers to operate them manually.
- Game Manual
- Game Animation
- Einstein Match Video

Infinite Recharge

2020

- *Game Piece:* Power Cells (balls)
    - 7" Diameter
    - Dino-Skin foam ball
- *Field Size:* 26' by 52'
- *Endgame:* Climb the generator switch
- *Field Elements*
    - Trench Run
        - Lane going from the alliance side of the field to the Control Panel
        - Safe zone
    - Power Ports (low, outer, and inner)
        - The Outer and Inner ports are both at the top of the alliance station. The Outer Port is the hole on the outside, and inside of that is a smaller hole- the Inner Port.
        - Directly in front of the Low Port is a small safe zone known as the Targeting Zone
    - Loading Bay
        - Directly in front of the Loading Bay is a small safe zone known as the Loading Zone

    - Control Panel
        - A rotating disk split into 8 slices (2 red, 2 green, 2 yellow, 2 blue) located at the Trench Run
    - Rendezvous Point
        - Zone underneath the Generator Switch to park
        - Only a safe zone during endgame
    - Generator Switch
        - A tilting beam shaped like a clothes hanger
- *Scoring Methods*
    - Score power cells
        - Low Port= 1 pt; Outer Port= 2 pts; Inner Port= 3 pts
    - Rotate Control Panel a specified number of time= +10 pts
    - Position Control Panel to a specific color= +20 pts
    - Raise onto Generator Switch= +25 pts per bot
    - Level Generator Switch= +15 pts
    - Park at Rendezvous Point= +5 pts per bot
- *Goal*: Score power cells to charge the shield generator
- Game Manual
- Game Animation

Rapid React

2022

- *Game Piece:* Cargo (balls)
    - 9.5” diameter
    - Oversized tennis ball
    - 9.5 oz
- *Field Size:* 27’ by 54’
- *Endgame:* Climb the hangar
- *Field Elements*
    - Hub
        - 2 hoops, one low and one high (see game manual/game animation for more info)
    - Hangar
        - Inclined monkey bars (low, middle, high, and traversal rung)
    - Launch Pad
        - Safe zone against front truss of the hangar

- *Scoring Methods*
    - Score cargo into the hubs
        - Lower Hub= 1 pt; Upper Hub= 2 pts
    - Climb the Hangar
        - Low rung= 4 pts; Mid rung= 6 pts; High rung= 10 pts; Traversal= 15 pts
- *Goal:* Score cargo into the hub then climb the hangar
- Game Manual
- Game Animation
- Einstein Match Video

Charged Up

2023

- *Game Piece:* Cones and Cubes
    - Cones
        - 8.375” square base
        - 1.75” ∅ at the top & 6.625” ∅ at the base
        - 12.8125” tall
        - Rubber
    - Cubes
        - 9.25” long/wide/deep
        - Made of inflated PVC fabric
- *Field Size:* 27’ by 54’
- *Endgame:* Balance the Charge Station
- *Field Elements*
    - Grid
        - 3 layers (like stairs) of vertical pegs and shelves to place game pieces on
            - Top row was 3’10” tall and 3’3.75” deep
        - Bottom row was just the floor, but the middle and upper row alternated between a column of pegs then a column of shelves
        - 12 pegs, 6 shelves, 9 floor spots
            - Pegs had a diameter of 1.25”
        - Grid divided into 3 3x3 sections with the middle being the Cooperation grid
    - Substation
        -

    - Charge Station
        - Two ramps leading up to a 8’x4’ platform on a double hinge
        - Ramps were 34.5° when balanced
        - When unbalanced one ramp is 11° and the other is 71.5°
    - The Coopertition Grid
        - The middle grid section
        - If each alliance placed 3 game pieces within their coopertition grid then the threshold to reach the Sustainability Bonus (1 ranking pt) was lowered by one link for both of them
- *Scoring Methods*
    - Score a cone or cube onto nodes
        - Hybrid Node (bottom row) = 2 pts
        - Middle Row = 3 pts
        - High Row = 5 pts
    - Create Links (3 nodes in a row with scored game pieces) = 5 pts
    - Dock to the charge station = 6 pts per bot
    - Balance the charge station = 10 pts per bot
- *Goal:* Score points on the grid by creating links, then balance the charge station.
- Game Manual
- Game Animation
- Einstein Match Video

Game Pieces

Balls

- Maize Craze (1992)
    - 2.7” Diameter
    - Tennis Balls
- Rug Rage (1993)
    - Large Balls (Kick Balls)
        - 13” diameter
    - Small balls filled with water
        - 6” diameter
- Tower Power (1994)
    - Soccer Ball
- Ramp N’ Roll (1995)

    - Large balls 30” diameter
    - Small balls 24” diameter
    - Made of vinyl
- Hexagon Havoc (1996)
    - Small balls 8” diameter
    - Large balls 24” diameter
- Ladder Logic (1998)
- Co-Opertition FIRST (2000)
    - 13” Diameter
    - Rubber playground ball
- Diabolic Dynamics (2001)
    - Small balls 13” diameter
    - Large balls 30” diameter
- Zone Zeal (2002)
    - Size 5 soccer ball
    - 27”-28” diameter
- FIRST Frenzy (2004)
    - Small
        - 13” diameter
        - Playground balls
    - Large
        - 30” Diameter
- Aim High (2006)
- Overdrive (2008)
    - 40” Diameter
    - 7.3 lbs
    - Inflatable plastic bladder with a fabric covering
- Lunacy (2009)
    - 9” Diameter
    - Braided strips of fabric-covered polymer
    - Commercially available as “Orbit Balls”
- Breakaway (2010)
    - Soccer Balls
- Rebound Rumble (2012)
    - 25” Circumference
    - 11.2 lbs

    - “Compact Foam Basketballs”
    - Bounce a decent amount
- Aerial Assist (2014)
    - 2’ diameter
    - Exercise balls
    - Very Bouncy
- Stronghold (2016)
    - 10” Diameter
    - Not bouncy
- Steamworks (2017)
    - 5” diameter
    - Polyethylene
    - 2.6 oz
- Deep Space (2019)
    - 13” Diameter
    - Rubber playground ball
- Infinite Recharge (2020)
    - 7” Diameter
    - Yellow Dino-Skin foam
- Rapid React (2022)
    - 9.5” Diameter
    - 9.5 oz
    - Oversized tennis ball

Cubes

- Power Up (2018)
    - 1’1” by 1’1”
    - Milk crate covered in yellow nylon
    - 3.25 lbs
- Charged Up (2023)
    - 9.25” long/wide/deep
    - Made of inflated PVC fabric

Inflatable Tubes

- Toroid Terror (1997)
- Rack N Roll (2007)
    - 30” outer diameter

    - 13” center-hole diameter
    - 9.5” height
- Logomotion- 2011
    - 25”-30” dimensions with 9.5”-12” inch hole in center
    - *Variations*: Red triangle, blue square, white circle, yellow circle (used in auto)
    - Material info not stated in manual but seem to be just inflatable pool tubes

Pool Noodles

- Recycle Rush- 2015

Disks

- Ultimate Ascent (2013)
    - 11” diameter; 1.4” height
    - 1.4 lbs
- Deep Space (2019)
    - Polycarbonate toroid (3/16” thick)
    - 19” outside diameter
    - Round hole in center (6” diameter)

Plastic Boxes

- Stack Attack (2003)
    - 24.25” by 17.25” by 15.75”
- Recycle Rush (2015)
    - Totes
    - 26.9” by 16.9” by 12.1”

Recycling Bins

- Recycle Rush (2016)

Gears

- Steamworks (2017)
    - 11” diameter; 2” thickness; 18.4 oz weight; 10 teeth; made of polypropylene

Tetrahedrals

- Triple Play (2005)
    - 1.25” thick 30” long pvc pipe
    - Pyramid shape

Cushion

- Double Trouble (1999)
    - See “Floppie”

Cone

- Charged Up (2023)
    - 8.375” square base
    - 1.75” ∅ at the top & 6.625” ∅ at the base
    - 12.8125” tall
    - Rubber

Endgame

Mini-Bot Race

See *Mini Bots* for more information on mini bots

- Logomotion (2011)

Pyramid

- Ultimate Ascent (2013)
    - Multi-Level

Rope

- Steamworks (2017)

Tilting Bar

- Infinite Recharge (2020)
    - See “Generator Switch” under *Field Elements*

Monkey Bars

- Rapid React (2022)
    - Multi-Level

Tower

- Breakaway (2010)
- Logomotion (2011)
    - (More of a pole really)
- Stronghold (2016)

Bar

- Co-Opertition FIRST (2000)
- FIRST Frenzy (2004)

Balance

- Rebound Rumble (2012)
    - 3 bridges

- Charged Up (2023)
    - Alliance Charge Station

Field Elements

Bridge

- Diabolic Dynamics (2001)
    - tilts
- Rebound Rumble (2012)
    - Tilts
    - 44” x 88”
    - 12” off ground when level
- Stronghold (2016)
    - 4 independently tilting platforms side by side
    - Each platform 12” by 24”
    - See “Cheval de Frise” under Defenses in *Field Elements*
- Charged Up (2023)
    - Two ramps leading up to a 8’x4’ platform on a double hinge
    - Ramps were 34.5° when balanced
    - When unbalanced one ramp is 11° and the other is 71.5°
    - See “Charge Station” under *Field Elements*

Tower

That does *not* function as a goal for game pieces. For tower as a scoring goal for game pieces see *Tower Goal*. Tall pole structures and large structures are also included in this category.

- Breakaway (2010)
    - Raised base w/ pipe structure
    - 41” by 32” (wide/long)
    - Base is 21” above floor
- Logomotion (2011)
    - Base 30” diameter and 12” tall
    - Pole made of 1.5” steel metal tubing
        - Top of pole about 122” above floor level
- Steamworks (2017)
    - 101” wide hexagon
    - Platform 42.5” above ground
    - See “Airship” under *Field Elements*

- Location for end game climb as well as human players

Scoring Rack

A wall, tower, or structure with pegs, hooks, or bars for placing game pieces on.

- Tower Power (1994)
- Toroid Terror (1997)
- Ladder Logic (1998)
- Diabolic Dynamics (2001)
- FIRST Frenzy (2004)
  - 36” x 36” blue or red hexagon
  - 28” tall octogonal basket form of 2” PVC pipe
- Rack N Roll (2007)
  - 10’ tall with 8’ diameter
  - Motion of structure constrained via chains connecting to structure base
    - Rack can move about 1’ in any direction and rotate freely
  - Made of aluminum pipes
  - 24 pegs (AKA Spiders) to place game pieces on
    - 5’ long
    - Located 21”, 58”, and 92” above floor
    - Central disc on end made of aluminum plate with 10” diameter (AKA Spider Foot)
  - “Foot” of scoring peg is 2.75” diameter aluminum plate
- Lunacy (2009)
  - Hexagonal base with a face-to-face diameter of 28” surrounded by bumpers
  - Twelve 1.3125” plastic conduit pipes are arranged in a circle. The pipes have varying height from 34 inches off the floor in the back, to 42 inches off the floor in the front.
  - A pole with a diameter of 4.2” projects from the center of the platform to a high between 59” and 83”.
  - Trailers were dragged behind robots and attached via a pin-and-clevis attachment mechanism.
- Logomotion (2011)
  - Scoring grid located on drive station wall
  - Scoring pegs made of 1.66” diameter aluminum pipe
    - Spaced 30” apart center-to-center

        - Height of pegs on each of the three levels is staggered by up to 8” from it’s neighbor
- Charged Up (2023)
    - 3 layers (like stairs) of vertical pegs and shelves to place game pieces on
        - Top row was 3’10” tall and 3’3.75” deep
    - Bottom row was just the floor, but the middle and upper row alternated between a column of pegs then a column of shelves
    - 12 pegs, 6 shelves, 9 floor spots
        - Pegs had a diameter of 1.25”

Alliance Zone

A zone on the field that typically restricts in some way the ability of the opposing alliance to interfere with the alliance the zone belongs to or just a way to divide the field. This section will not have dimensions listed.

- Stack Attack (2003)
- Logomotion (2011)
- Rebound Rumble (2012)
    - “The Key”
- Aerial Assist (2014)
    - 2 goalie zones, red zone, white zone, blue zone
- Recycle Rush (2015)
    - Field divided in half into red and blue zone
- Steamworks (2017)
    - See “Launchpad” under *Field Elements*
- Power Up (2018)
- Deep Space (2019
    - See “Hab Zone” under *Field Elements*
- Infinite Recharge (2020)
    - See “Rendezvous Point” under *Field Elements*
- Rapid React (2022)
    - In the last 30 seconds of the game each’s alliance’s “Hangar” was protected by penalty
- Charged Up (2023)
    - Community around Grid and Charge Station

Alliance Lane

A path going from one end of the field to the other side (may not span the entire length of the field) for a specified alliance (may be a safe zone). This section will not have dimensions listed.

- Logomotion (2011)
- Rebound Rumble (2012)
    - See "The Alley" under *Field Elements*
- Infinite Recharge (2020)
    - See "Trench Run" under *Field Elements*

Field Barrier

Any sort of bump, wall, or obstacle that cannot be interacted with by robots and serves the purpose of making it more difficult for robots to traverse the field. For obstacles that can be interacted with by robots or changed see *Defenses*.

- Ramp N' Roll (1995)
    - See "Speed Bump" under Field Elements
- Breakaway (2010)
    - A bump on the field dividing zones. Bots could get between zones by climbing the bump (risky) or using a tunnel
    - 13.5" tall and 12" wide at top
    - Covered with carpet
- Rebound Rumble (2012)
    - A short divider in the middle of the field. Bots could drive over it or use the bridges
    - 4" tall 6" wide steel bar
- Stronghold (2016)
    - See "Moat" under Defenses in *Field Elements*
    - "The Moat is a 2-1/2 in. high, 4 ft. 2 in. wide, and 1 ft. 8 in. deep
    - "U-shaped channel
    - "Made of vertical rectangular steel tubes" -*FRC 2016 Game Manual*
- Charged Up (2023)
    - Barrier between Red/Blue's community and blue/Red's substation

Hoops

A horizontal ring for game pieces to be scored in

- Rebound Rumble (2012)
    - Inside of hoop has 18" diameter
- Rapid React (2022)

- See “Hub” under *Field Elements*
- Upper hub has 4” diameter and is 8’8” above floor
- Lower hub has 5’1/8” diameter and is 3’5” above floor

Kinetic Motion Sensor

- Rebound Rumble (2012)

Pyramids

A pyramid shaped structure

- Triple Play (2003)
  - Game piece scoring
- Ultimate Ascent (2013)
  - Game piece scoring and climb endgame
  - Made of 1.5” steel tubing
  - 94” wide base and 120” tall at highest point
  - Slanted at 98 degree angle
  - 3 climbable levels (30”, 60”, 90” high)
  - Scoring goal on top

Wall Goal

A goal (typically a hole) located in, next to, or above the alliance wall that game pieces are somehow inserted into or through. Goals may be slightly extruded from the alliance wall and still appear in this section.

- Aim High (2006)
  - 1 central circular goal above alliance station
  - 2 rectangular side goals in the bottom corners of each alliance station
- Breakaway (2010)
  - Rectangular gap in alliance station wall on the floor
  - Dampening chains in goal entrance
  - 48” wide by 24” tall
- Ultimate Ascent (2013)
  - Rectangular shape (1 low goal, 2 middle goals, 1 high goal)
  - Low goal was 19” above ground and was 29” wide x 24” tall
  - Middle goals were 88⅝” above ground and were “54 wide by “21 tall
  - High goal was located in between middle goals 104⅛” above ground and was 54” wide x 12” tall
  - Chains hang from top of each goal to dampen disc as they enter
- Aerial Assist (2014)

    - 2 rectangular high goals 82.75” above floor were 11’6” wide x 3’1” tall
    - 2 square low goals slightly extruded from the bottom corner of alliance station have two side openings (on front and side) and a top opening.
        - Side openings are 2’5” wide x 2’4” tall
        - Top opening is 2’8.5” x 2’8.5”
- Stronghold (2016)
    - Each tower has 2 low goals and 3 high goals
    - Each goal is 1’4” wide x 2’ tall
        - Arched top
    - Bottom of the high goal is 7’1” above the carpet
    - Bottom of the low goal is 6” above the carpet
    - See “Castle” under *Field Elements*
- Steamworks (2017)
    - 2 openings: “high efficiency” and “low efficiency”
    - Base is 3’6” x 3’6”
    - High efficiency goal is a vertical cylinder with a diameter of 1’9.5” and an opening 8’1” above the floor
    - The low efficiency goal is a rectangular opening 1’6” above the floor that is 2’1” wide x 8.75” tall
    - Nets behind boiler redirect missed shots back onto the field
    - See “Boiler” under *Field Elements*
- Infinite Recharge (2020)
    - A 10’2.25” tall x 4’ wide structure extruded from alliance wall
    - A bottom port, outer port, and inner port
    - Bottom Port is a 10” tall x 2’10” wide rectangular hole 1’6” above the floor
    - Outer Port is a 2’6” hexagonal hole 8’2.25” above the floor
    - Inner Port is a 1”1’ diameter hole 2’2.25” behind the outer port
    - See “Power Ports” under *Field Elements*

Loading Zone

A specified area where Humans return game pieces to the field. Dimensions will not be listed in this section.

- Triple Play (2005)
- Rack N Roll (2007)
- Lunacy (2009)
    - See “Outpost” under *Field Elements*

- Logomotion (2011)
- Rebound Rumble (2012)
- Ultimate Ascent (2013)
- Recycle Rush (2015)
- Stronghold (2016)
    - "Secret Passage"
- Steamworks (2017)
- Power Up (2018)
    - See "Exchange" under *Field Elements*
- Deep Space (2019)
- Infinite Recharge (2020)
- Rapid React (2022)
- Charged Up (2023)

Truss

A beam or bar spanning above the field

- Overdrive (2008)
    - Made of 1.5" steel pipes
    - 6.5' above floor
    - Made up of 2 parallel rails spaced 32" apart with bars spanning them to allow trackballs to rest atop them
- Aerial Assist (2014)
    - A General Purpose 1 ft. x 1 ft. square truss made by James Thomas Engineering
    - 5'2" above field floor
    - 32' long

Scoring Platform

A raised platform that game pieces are scored on. For other kinds of raised platforms on the steps see *Steps*.

- Recycle Rush (2015)
    - Plywood base covered in white HDPE with ramps along edges
    - 1'8" wide x 2" tall x 15'7" long

Defenses

Obstacles meant to make traversing the field more difficult for robots that can be interacted with or changed.

- Stronghold (2016)
    - Change between rounds

- For specific information on each kind of defense field element used in Stronghold see *Field Elements* under Stronghold.

Scale

A balance that tilts used for the purpose of scoring game pieces. For other kinds of tilting platforms see *Bridge*.

- Power Up (2018)
  - See "Scale" and Switch" under *Field Elements*
  - Scale
    - 2 plates (3' x 4') that the game pieces are placed on are spaced 15' apart
    - Plates have 3.5" polycarb wall around them
    - When level plates are 5" above field carpet
    - The highest position a plate can reach is 6'
  - Switch
    - 2 plates (3' x 4') that the game pieces are placed on are spaced 12' apart
    - Walls around plates are 1'3" tall, the rest of the walls around the switch are 3.5" tall
    - Plates are 9" above carpet when level

Tower Goal

A tower that functions as a scoring goal for game pieces.

- Deep Space (2019)
  - 10'4" tall structure
  - Cargo is scored into 1'4" diameter Ports
  - Each rocket has 3 ports
    - Lowest port is 2'3.5" from carpet and the distance between the centers of each port is 2'4"
  - Angled ramps inside port will direct cargo out the hatch unless a hatch panel is covering the hatch
  - See "Rocket Ship" under *Field Elements*
  - For information on how the Hatch Panels were scored onto rocket ships see Placing Goal

Slot Goal

A goal in which game pieces are placed, thrown, or pushed through a slot.

- Ultimate Ascent (2013)
  - Goal on top of pyramid
  - A " polycarbonate and metal framed 'basket'"

- 23⅝” tall x 2.75” deep
- 20” tall pole in center
- Chains hanging from the top help dampen the disc as they are scored

Placing Goal

A goal in which a game piece is placed on it and stays via velcro, hooks, tape, etc. for similar structures not included in this section see *Scoring Rack*.

- Deep Space 2019
  - Hatch panels were placed over openings called “hatches”
  - Hatch panels are held in place by 2 pieces of black hook tape on each side of a hatch. The tape is 10” tall x 2” wide.
  - See “Cargo Ship” and “Rocket Ship” under *Field Elements*
    - Rocket Ship
      - Hatch openings have a diameter of 16.5”
      - A a rectangular opening extends vertically from the top and bottom of the hatch. The opening is 8” wide x 8.5” long. A backstop in the top opening limits the depth a hatch panel can be placed in a hatch to 3.25”
    - Cargo Ship
      - The center of the opening was 19” above the floor
      - Openings have a diameter of 16.5”
      - On each side of a hatch opening there are 3 posts. The posts have a diameter of ⅝” and are extruded by .75” from the cargo ship. The center of the lowest post is 13” off the ground and the posts are spaced 5.5” apart.

Steps

- Deep Space (2019)
  - 4 levels
    - Level 1 is a 3” high platform and is 3’11.255” wide x 12’6.5” long. A ramp leads onto the level at a 15 degree angle. Level 1 is placed in front of the Level 2 and Level 3 steps.
    - Level 2 contains 2 steps, one on each side of the level 3 step. Each Level 2 step is 6” high and is 3’4” wide by 4’ long.
    - Level 3 contains one step. It is 13” higher than level two and is 4’ wide by 4’ long.
  - See “Habitat” under *Field Elements*

Rotating Disk

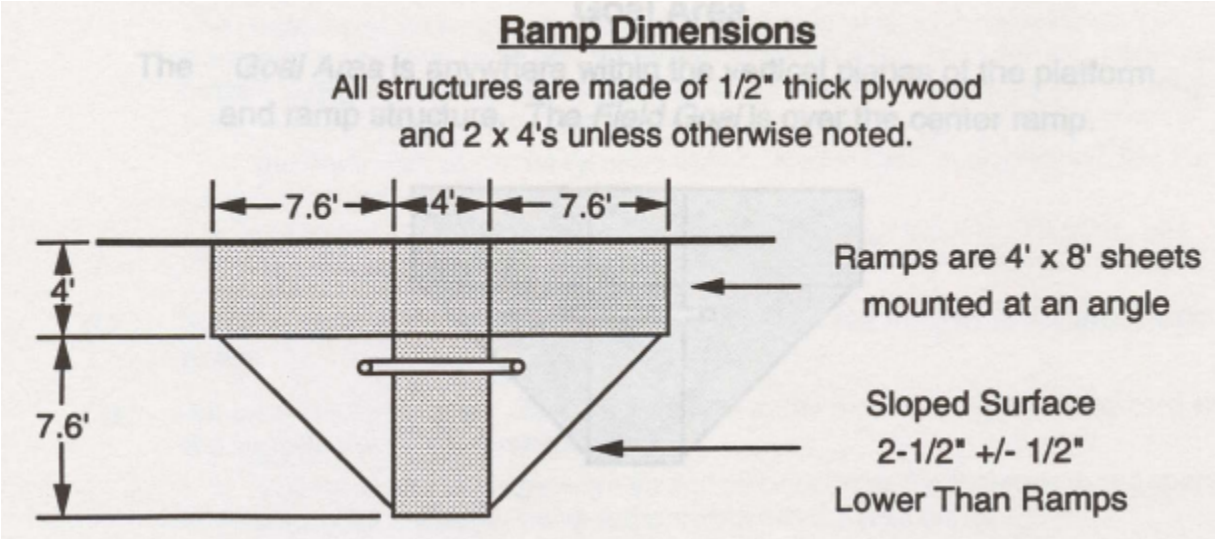
- Infinite Recharge (2020)
    - A 2” thick disk with a diameter of 2’8”
    - Located 2’6.25” above carpet
    - Divided into 8 equally sized wedges with an arc with of 12.5” (2 red, 2 green, 2 blue, 2 yellow)
    - See “Control Panel” under *Field Elements*

Arched Gateway

- Stronghold (2016)
    - Portcullis
        - Arched gateway that a door that opens when lifted up
        - Gateway is 3’8” wide and 5’2” tall
        - Door requires 5 lbs of force to lift
        - In it’s resting position there is a 5” gap between the bottom of the door and the floor
    - Drawbridge
        - Arched gateway with a polycarbonate door that lowers
        - The door is 37” tall and .25” thick
        - When fully down the doorway is 3’6” wide and 5’5.75” tall
        - When there is no weight on the door it returns to upright position
        - 2 lbs of force applied at the top of the door is enough to begin moving it but after that 5 lbs of force is required

Ramp

- Ramp N’ Roll (1995)
    - See “Raceway” under *Field Elements*



- Co-Opertition FIRST (2000)
- Stack Attack (2003)
- Stronghold (2016)
    - 2 steel ramps side by side facing opposite directions
    - Each ramp is 2’ wide x 22” long
    - Ramps are set at an 8 degree angle
    - See “Ramparts” under Defenses in *Field Elements*
- Deep Space (2019)
    - See Deep Space section under Steps
- Charged Up (2023)
    - Each charge Station has a ramp on two sides

Tunnel

- Breakaway (2010)
    - The tunnel running under the tower is 18” tall x 36” wide

Output Station

A specified area for robots to output cargo from the field for human players to use. Dimensions will not be listed in this section.

- FIRST Frenzy (2004)
- Lunacy (2009)
    - See “Fueling Station” under *Field Elements*
- Power Up (2018)
    - See “Exchange Zone” under *Field Elements*
- Rapid React (2022)

    - See “Terminal” under *Field Elements*

Elevated Game Piece Storage

- FIRST Frenzy (2004)

Football Goal

- Ramp N’ Roll (1995)

Platform On Wheels

- Double Trouble (1999)
    - See “Pucks” under *Field Elements*
- Lunacy (2009)
    - See “Trailer” under the Lunacy section of Goal: Poles On Base

Triangular Goal

- Co-Opertition FIRST (2000)
    - Upside down triangle
- Triple Play (2005)
    - See Triple Play section under Pyramids

Stretcher

- Diabolic Dynamics (2001)

Floor Goal

A goal placed on the floor in a manner that game pieces can easily be pushed into it to score.

- Charged Up (2023)
    - Hybrid Nodes (lowest grid row)

Game Styles

Shooting

- Co-Opertition FIRST (2000)
- Diabolic Dynamics (2001)
- FIRST Frenzy (2004)
- Aim High (2006)
    - Balls could be shot into center goal as well as rolled/pushed into corner goals
- Lunacy (2009)
    - Although it is classified as a shooting game, the winning strategy in Lunacy was to have an elevator of sorts inside a bot, drive up to an opposing bot, and just overflow all the cells into their trailer.
- Rebound Rumble (2012)

- Ultimate Ascent (2013)
- Aerial Assist (2014)
- Stronghold (2016)
- Infinite Recharge (2020)
- Rapid React (2022)

Pick-And-Place

Note: most pick and place games could *technically* be played with a shooter, but the games in this category are most efficiently played by picking up and placing the game pieces.

- Maize Craze (1992)
- Rug Rage (1993)
- Toroid Terror (1997)
- Double Trouble (1999)
- Stack Attack (2003)
- Triple Play (2006)
- Rack N Roll (2007)
- Logomotion (2011)
- Recycle Rush (2015)
- Power Up (2018)
- Charged Up (2023)

Misc/Both

- Tower Power (1994)
    - Balls could be shot or picked up and placed
- Ramp N' Roll (1995)
    - Balls could be shot or pushed
- Hexagon Havoc (1996)
- Ladder Logic (1998)
    - Balls can be thrown or placed
- Overdrive (2008)
    - Track balls rolled/pushed/carried around the field
- Breakaway (2010)
    - Soccer balls are rolled/pushed down the field
- Aerial Assist (2014)
    - Move balls down the field and score in either high or low goal (roll the ball or shoot it into low or high goal)
- Steamworks (2017)

    - Fuel Cells had to be shot into the boiler, and gears hat to be placed on the side of the airship for human players to retrieve.
- Deep Space (2019)
    - Cargo would be shot into the ships, and hatch panels placed on the side

Game Piece Usability

i.e were game pieces shared between alliances or were there specified game pieces for each alliance. Games without alliances are not included in this section.

Shared Pieces

- Co-Opertition FIRST (2000)
- Diabolical Dynamics (2001)
- Zone Zeal (2002)
- Stack Attack (2003)
- FIRST Frenzy (2004)
- Aim High (2006)
- Lunacy (2009)
- Breakaway (2010)
- Logomotion (2011)
- Rebound Rumble (2012)
- Recycle Rush (2015)
- Stronghold (2016)
- Power Up (2017)
- Steamworks (2018)
- Deep Space (2019)
- Infinite Recharge (2020)
- Charge Up (2023)

Alliance Pieces

- Double Trouble (1999)
- Triple Play (2005)
- Overdrive (2008)
- Aerial Assist (2014)
- Rapid React (2022)

Misc/Both

- Ladder Logic (1998)

- Rack N Roll (2007)
    - Has both alliance pieces and pieces that can be used by either alliance
- Ultimate Ascent (2013)
    - Game pieces are shared by robots, but alliance color game pieces can be scored by human players

Miscellaneous Game Elements

2-Team Alliances

- Double Trouble (1999)

4-Team Alliances

- Co-Opertition FIRST (2000)
- Diabolical Dynamics (2001)

Alliance Chooses Field Elements

*Between matches not during matches. Try *Moving Targets* or *Robots Can Move Field Elements* for field arrangement changing during matches.

- Stronghold (2016)
    - Defense arrangement chosen by alliance before each match
- Charged Up (2023)
    - Alliances chose which game piece would be staged on each staging mark before the start of the match, resulting in a variety of game piece configurations

Assigned Offensive/Defensive Roles

- Aim High (2006)

Coopertition As A Game Element

Co-Opertition First (2000) receives an honorable mention here (see *Alliances*)

- Rebound Rumble (2012)
    - See *Coopertition Bridge*
        - This instance of coopertition as a game element is different from the rest in that it was cooperation between opposing robots
- Aerial Assist (2014)
    - Bonus points for bots working together to move one ball down the field
- Charged Up (2023)
    - See “The Coopertition Grid” under *Field Elements*

Dampening Chains In Goal

- Breakaway (2010)

- Ultimate Ascent (2013)

Human Players Shoot

- Hexagon Havoc (1996)
- Toroid Terror (1997)
- FIRST Frenzy (2004)
- Lunacy (2009)
- Ultimate Ascent (2013)
- Recycle Rush (2015)
- Rapid React (2022)

Human Player Signaling

This has been a legal part of gameplay since 2008, and has most likely been used to some degree in most games since then.

- Overdrive (2008)
    - See *Robo Coach*
- Logomotion (2011)
    - **Not officially part of gameplay**; just a strategy
    - Some drive teams employed methods to signal their human player's which shape they wanted next
- Rebound Rumble (2012)
    - Robots could be controlled by human players via Kinetic Motion Sensor. In this case the human player was not signaling to alliance partners but to the robot itself.
- Stronghold (2016)
    - The human player could be a "spy" and signal to their alliance what was happening on the other side of the field
- Steamworks (2017)
    - **Not officially part of gameplay**; just a strategy
    - Human players in the Airship would signal to help bots line up withholding station, how many gears were left, and the location of hard to see gears
- Rapid React (2022)
    - **Not officially part of gameplay**; just a strategy
    - The Hub (see under *Field Elements*) obscured the view of a portion of the field, and some teams' solution to this was to have their human player at the far Terminal (see under *Field Elements*) signal the location of cargo.
- Charged Up (2023)

    - Coaches/driver signaled preferred game piece to Human Player using LED on the bot, colored gloves, signals, hand signals, etc

Human Players On Field

- Steamworks (2017)
    - Human players were station in the Airship (see under *Field Elements*)

Human Player Period

- Stack Attack (2003)

Intentional Temporary Disable

The robots are temporarily disabled intentionally as part of the game

- Triple Play (2006)
    - See “Loading Station” under *Field Elements*

Manual Loading

Human players manually load the robot during the match

- Triple Play (2006)

Mini Bots

When a separate, smaller robot is deployed on the field as well as the main robot

- Logomotion (2011)

Moving Target

- Diabolical Dynamics (2001)
    - Goals could be pushed by robots
- Lunacy (2009)
    - See *Trailer*
- Power Up (2017)
    - Switches and Scales tilted up and down

No Alliances

- Maize Craze (1992)
    - Four robots played on the field at one time; there were no alliances between them
- Rug Rage (1993)
    - Four robots played on the field at one time; there were no alliances between them
- Ramp N Roll (1995)
    - Three robots played on the field at one time; there were no alliances between them

- Hexagon Havoc (1996)
    - Three robots played on the field at one time; there were no alliances between them

Not-Carpet Flooring

- Maize Craze (1992)
    - ½" of corn kernels
- Lunacy (2009)
    - The floor is made of Gasliner FRP- a low-friction polymer material

Not Rectangular Field

- Maize Craze (1992)
    - 16' by 16' square
- Tower Power (1994)
    - The field is a dodecagon (12 sides; each side 4') that spans 34' across
- Ramp N' Roll (1995)
    - One end is a 12' by 30' rectangle. Then it narrows to a 12' wide rectangular lane that is 28' long. I sincerely recommend just looking at the diagram in therules.
- Hexagon Havoc (1996)
    - Hexagon shape that spans 27.7' feet across

Optional/Altered Auto

- Overdrive (2008)
    - During "Hybrid Period" robots could either operate autonomously or operate based on signals from the "Robo Coach"
- Rebound Rumble (2012)
    - During "Hybrid Period" robot can operate autonomously or based on signals from a Kinetic Motion Sensor
- Deep Space (2019)
    - No vision of the field from the driver station for the first 15 seconds of the match. Robots can either be autonomously operated, or have some sort of vision system on them allowing drivers to operate the robots manually.

Pattern Scoring

One of the scoring objectives of the game is to arrange game pieces in a row or pattern

- Logomotion (2011)
- Charged Up (2023)

Partner Support

Hanging from or stacking on a partner for a competitive advantage.

- Co-Opertition FIRST (2000)
- Rack N Roll (2007)
    - During end game robots return to Home Zone and can stack on each other or lift each other to be “elevated” and receive bonus points
- Breakaway (2010)
    - At end climb robots got bonus points for being fully supported in the air by another robot
- Charged Up (2023)
    - Robots were allowed to support each other in their community, presumably for the purpose of lifting each other in endgame to balance the charge station.
    - Although legal, this strategy was not widely used
        - See team 118’s robot for an example of partner support

Robots Can Move Field Elements

- Double Trouble (1999)
    - See “Pucks” under *Field Elements*
- Zone Zeal (2002)
    - See “Goals” under *Field Elements*
- FIRST Frenzy (2004)
    - See “Mobile Goals” under *Field Elements*

Robots Drag Extension

- Lunacy (2009)
    - See *Trailer*

Prominent Mechanisms

Please note the below observations are based on what kind of mechanisms seemed to occur most frequently in high gameplay and do not account for every design used in each challenge. Most of these observations pre Rapid React were also gleaned from zooming in on matchplay videos at .25x speed, so there may be some missing information. For more detailed information on different kinds of mechanisms I recommend following the link under the table of contents to The Unofficial FIRST Mechanism Encyclopedia. If anyone has more detailed information on a common mechanism from a certain game please leave a comment.

Elevator

Climber

- Ultimate Ascent (2013)
    - Multi-level climb
- Stronghold (2016)
- Power Up (2018)
- Infinite Recharge (2020)
- Rapid React (2022)
    - Multi-level climb

Scoring

- Logomotion (2011)
- Recycle Rush (2015)
- Power Up (2018)
- Deep Space (2019)
- Charged Up (2023)

Wheeled Launcher

Turret

- Rebound Rumble (2012)
- Infinite Recharge (2020)
- Rapid React (2022)

Not Turret

- Aerial Assist (2014)
    - 2 sides of rollers would launch the ball
- Stronghold (2016)
- Steamwork (2017)

Arm

Shooter

- Rebound Rumble (2012)
- Stronghold (2016)

Gripper

-
- Logomotion (2011)
- Power Up (2018)
- Charged Up (2023)

Other

- Recycle Rush (2015)
    - Arms with hooks on the end to snare and drag bins

Drivetrain

Tank

- Breakaway (2010)
    - Drivetrain was extruded below the frame to raise the robot up
- Logomotion (2011)
- Rebound Rumble (2012)
- Ultimate Ascent (2013)
- Aerial Assist (2014)
- Recycle Rush (2015)
- Stronghold (2016)
    - Slightly extruded
- Steamworks (2017)
- Power Up (2018)
- Deep Space (2019)

Swerve Drive

- Steamworks (2017)
- Infinite Recharge (2020)
- Rapid React (2022)
- Charged Up (2023)

Intake

Floor

- Lunacy (2009)
- Breakaway (2010)
- Rebound Rumble (2012)

- Ultimate Ascent (2013)
- Aerial Assist (2014)
- Recycle Rush (2015)
    - Multiple intakes on one elevator to stack bins
- Stronghold (2016)
- Power Up (2018)
- Deep Space (2019)
- Infinite Recharge (2020)

Human Feeder

- Ultimate Ascent (2013)
    - Tray
- Steamworks (2017)
- Deep Space (2019)
- Charged Up (2023)

Slot Shooter

Creator's Note: I am taking suggestions for better names for this kind of mechanism. It's a narrow (often rectangular) slot used to move game pieces through the bot and score them via shooting them or placing them.

- Ultimate Ascent (2013)
    - Adjustable angle
- Aerial Assist (2014)
- Steamworks (2017)
    - The gears seemed to be raised via belts in a narrow vertical slot, not exactly a shooter but whatever
- Rapid React (2022)
    - Lower-hub focused bots

Catapult

- Aerial Assist (2014)
- Stronghold (2016)
- Charged Up (2023)
    - Often short range

Hopper

- Lunacy (2009)
    - Balls were gathered into a large vertical slot/cavity and raised via belts to overflow into the opponent's trailer
- Steamworks (2017)

Field Manipulator

- Rebound Rumble (2012)
    - Mechanism to lower a bridge
- Stronghold (2016)
    - Lower bridges, open doors, etc (see field elements under stronghold)
- Infinite Recharge (2020)
    - Spin the control panel