

The Academy for Math, Engineering & Science (AMES)
presents our
2021 Pre-season Robotics Competition



Pirate Plunder!

Dec 11, 2021
5715 S. 1300 E. SLC UT
10:00 a.m. to 1:00 pm
Doors open at 9:00 am
for setup and practice

This document describes the rules of the game. With the exceptions described below, requirements on robot size, weight, bumpers, safety regulations, and allowed components are the same as last year's FRC requirements. Those requirements can be found here:

<https://firstfrc.blob.core.windows.net/frc2020/Manual/Sections/Section09.pdf>

Exceptions:

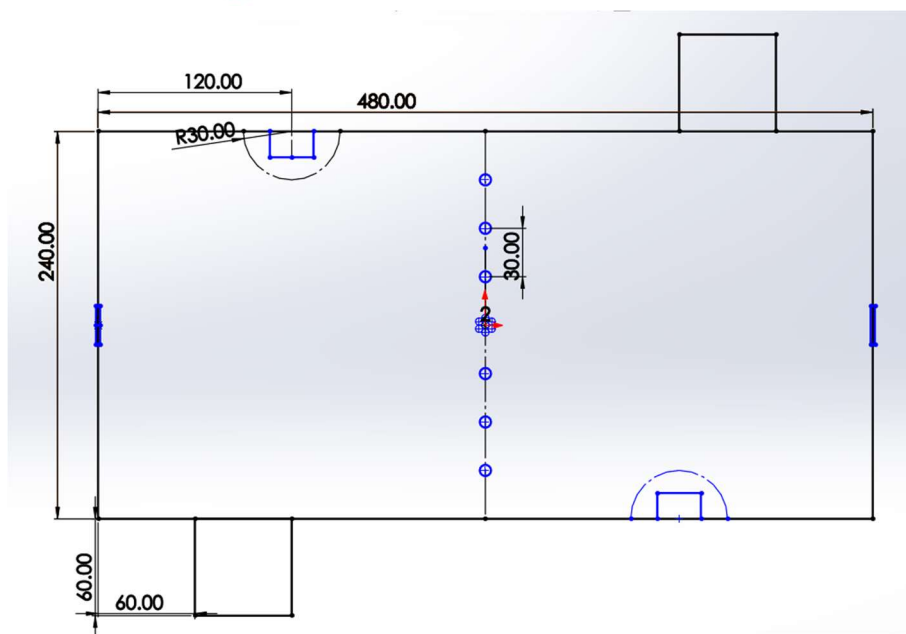
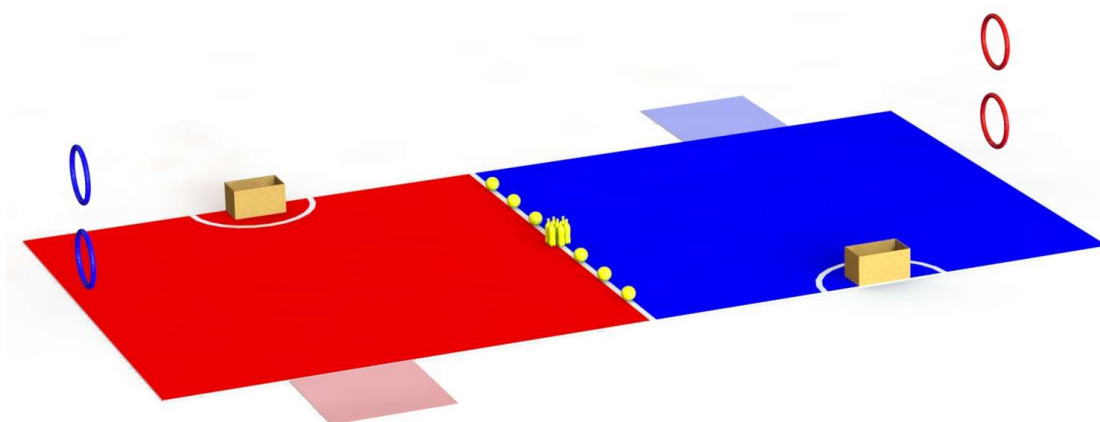
- Robots do not have to be built new from scratch, nor does the software have to be written new from scratch. You may repurpose old robots and reuse previously written code.
- It's OK if some robot parts extend beyond the frame perimeter at the start of each round. Robots still need to comply with the 12-inch limit described in rule R4 of last year's FRC manual, but rule R2 will not apply in our competition.
- Bumpers may be any color and need not have the team number written on them. In order to indicate which alliance a robot is on during any given round, teams should bring several sheets of red and blue paper (8½ x 11) with the team's number on it, which they will then tape to the robot at some easily visible location. If you bring more than one robot, check with us ahead of time to ensure that numbers assigned to each robot are unique.
- We will not be performing on-site safety inspections. You will inspect your robot yourselves and complete the FRC safety checklist before the competition. A link to this checklist is...
<https://firstfrc.blob.core.windows.net/frc2020/Manual/2020-inspection-checklist.pdf>

Brief Summary

Two opposing alliances of pirate-themed robots will compete to collect treasure (empty 2-liter soda bottles) and store it in or near their treasure chest while also shooting cannonballs (last year's yellow FRC "fuel balls") at targets to earn additional points and to release additional treasure onto the field. Depending on how many robots enter the competition, each alliance might consist of two robots, or they might consist of three.

The Field

The field is 20 ft by 40 ft, with two hula hoops oriented vertically at each end of the field as shown below. One hoop is located directly above the other. The hoops are located two feet outside of the field and are protected by a low barrier to prevent robots from leaving the field and colliding with them. Hoop dimensions and heights are given later in this document. Each half of the field has a human loading station and a treasure chest. A semicircle around the treasure chest delineates the "treasure chest zone". Locations of the various stations are shown below, with dimensions give in inches.



Driver stations are not shown on the diagram. They will be located at each end of the playing field, behind the line where the hula hoop targets are. Drivers will be protected from flying cannonballs by nets.

The Floor

A photo of the area where the game will take place is shown below. The playing field is the lower floor area. Spectators will sit in the raised areas surrounding the playing field where the steps will protect them from possible runaway robots. Note that the floor is mock cobblestone and is not perfectly smooth.



Game elements:

Cannonballs: The cannonballs are fuel cells from the 2020-2021 FIRST Infinite Recharge Competition. Robots may have up to 3 cannonballs pre-loaded in them before the game begins. There will be six additional cannonballs sitting on the floor at the center of the field before the game begins. Six more cannonballs will be available for manual loading at the loading station. A robot may only carry three cannonballs at a time.

Treasure: The treasures are 2-liter soda bottles that have been emptied of liquid and then refilled with Styrofoam packaging peanuts in order to help them resist being crushed. Robots may have one treasure bottle pre-loaded in their control before the game begins. Six treasure

bottles will be sitting on the floor in the middle of the field at the start of each round. A robot may only control one treasure bottle at a time.

Six additional treasure bottles will be stored at each loading station but they will only be made available when a cannonball passes through the upper target. One of the six treasure bottles will be made available each time this happens. At that time, a human player at the loading station may get a treasure bottle out of the reserve (located off the field) and then enter it into play as described later in this document.

Treasure Chest: The treasure chests are cardboard moving boxes, 21 inches wide, 15 inches deep, and 16 inches tall, that can be found at Home Depot using this link...

<https://www.homedepot.com/p/The-Home-Depot-21-in-L-x-15-in-W-x-16-in-D-Heavy-Duty-Medium-Moving-Box-with-Handles-HDMBX/316235446>. The tops will be open so that robots can place treasure bottles inside.

Treasure Chest Zone: The treasure chest zone is a semicircle at the edge of the field with the treasure chest located inside it. Robots that aren't able to lift bottles up into the treasure chest may just place or push them onto the floor in the semicircle to earn points. The bottle does not need to be fully inside the semicircle to score. If any portion of the bottle is on or inside the line at the end of the round, it earns a point for that alliance. If a bottle that has been placed inside the treasure chest zone somehow gets knocked out of the zone before the round ends, no points will be awarded for that bottle.

Cannon Targets: The cannonball targets are hula hoops with a diameter of 24 inches which are oriented vertically and located at each end of the field, two feet behind the line that marks the edge of the field. The center of the lower target will be 30 inches off the ground and the center of the higher target will be 72 inches off the ground. Hula hoops identical to the ones that will be used for this competition can be purchased using this link...

https://www.amazon.com/Detachable-Adjustable-Suitable-Gymnastics-Training/dp/B08P4QZ33Q/ref=asc_df_B08P4QZ33Q/?tag=hyprod-20&linkCode=df0&hvadid=507467674281&hvpos=&hvnetw=g&hvrnd=13631390513546097784&hvpone=&hvptwo=&hvgmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9052142&hvtargid=pla-1231238712934&psc=1.

Points will be earned as described later in this document, for any ball that either passes through a hoop or that hits a hoop and bounces off.

When a ball passes through the upper hoop, whether it touches the hoop or not, then in addition to earning the normal points, an extra treasure bottle will be given to that alliance's human player, as described elsewhere in the document. Note that balls which hit the upper hoop but then bounce off without passing through it will not earn the extra treasure bottle.

How the game plays out:

Starting Locations: Robots start each round sitting side by side with their alliance partner(s) with their rear bumpers even with the line at the left and right edges of the field in the drawing shown previously in this document. The hula hoop targets that robots will shoot for after the round starts will be the ones on the opposite side of the field. The treasure chests that they will place treasure bottles into or next to will be on their left side, in the same half of the field where they start out. The human loading station where they will get additional cannonballs and/or treasure bottles will be on their right side, in the same half of the field where they start out.

Teams may place their robots anywhere along the edge of the field, provided that no part of the robot may block the hula hoop targets that their opponents will be aiming for.

Starting Configurations: Robots may be pre-loaded with up to three cannonballs and/or one treasure bottle. The bottle they are controlling does not need to be inside the robot.

Stage 1: Autonomous Period (15 seconds): During the first 15 seconds of the game, robots will run entirely on preprogrammed instructions. Targets hit or treasure that is put inside the treasure chest in this stage will score double what they would score during the tele-op period. Treasure bottles that are placed on the floor next to the treasure chest (inside the treasure chest zone) during this period will not score any more than they would if they were placed there during the tele-op period.

Blocking your opponent's targets during autonomous period is not allowed. If, during autonomous period, a robot moves to a place where it gets hit by an opponent's ball that the referee thinks might have hit the target had the robot not blocked it, a five-point penalty will be assessed to that robot's alliance each time that an opponent's ball hits it.

Stage2: Tele-op Period (2 Minutes 15 seconds): During this stage of the game, robots will be controlled manually. During tele-op, robots may move to block the targets if they wish to do so.

In both stages of the game, robots and human players will do the following:

Shooting Cannonballs: Robots may shoot balls at the targets located on the opposite side of the field from which they started. They may shoot from anywhere on either side of the playing field. Judges will keep track of how many hits they score. Nets placed behind the targets will direct balls to roll back onto the field where robots may collect them off the floor and reshoot them. If a cannonball goes out of bounds in an area of the field not protected by nets, field assistants will collect it and roll it back onto the field at a place close to where it left the field.

Six additional balls will be available at each human loading station where human players may manually load them into a robot that is has moved to within arm's reach of the loading station.

Treasure Bottles: Robots may collect treasure bottles from anywhere on the floor except from their opponent's treasure chest zone and then take and place them either inside their alliance's treasure chest or onto the floor next to their alliance's treasure chest (inside their treasure chest zone).

Each time that a cannonball passes through an alliance's upper target, the human player at that alliance's loading station may take a treasure bottle out of the off-field reserve and enter it into play. They may either do this by placing it into a robot that has come within arm's reach of the loading station to receive it, or they may toss it onto the field where a robot can collect it. The human player may throw the treasure bottle anywhere they want to, including trying to get it into the treasure chest. If it goes inside the chest, that counts as a valid score, the same as if a robot had placed it there. If the human player tosses a treasure bottle onto the field but it then rolls off the field before coming to a stop, field assistants will collect it and roll it back onto the field at a place close to where it left the field.

Once a treasure bottle is on the field, any robot, including a robot from the opposing alliance, may collect it. The exception to this is that treasure bottles which have any portion of them laying inside the treasure chest zone may only be touched by a robot belonging to the alliance which owns that treasure chest.

Blocking: It is fair game for robots to block cannonballs that their opponents may shoot at the targets, as long as this is done only during the tele-op period. It is fair game for robots to block access to their opponent's treasure chest areas as long as they do not enter that zone or touch any treasure bottles that have any portion of them inside that zone.

It is not fair game for robots to block access to their opponent's loading station.

Manual Loading:

Robots may drive to within arm's reach of the loading station at any time during the round (including during autonomous period) to be reloaded with cannonballs and/or treasure bottles. The human player who loads the balls or bottles into the robot must not set foot on the playing field. They must not use any tools to extend their reach as they load the robot. It is allowable for an alliance to have two human players in their loading station if they desire... one to load cannonballs and the other to load treasure bottles.

Forbidden Areas:

Robots may not enter their opponent's treasure chest zone or touch any treasure bottle that is even partially inside their opponent's treasure chest zone. Robots may not block access to their opponent's human loading station. Any violation of these rules will result in five points being subtracted from the offending alliance's score at the end of the game. If additional violations occur later, five more points will be subtracted for each violation.

Collisions and Pushing on Other Robots:

It is expected that robots will sometimes collide with other robots and/or push on them to prevent them from blocking targets or treasure chest zones. This is allowed, but robots may not intentionally harm another robot. If a referee suspects that collisions between robots are being done on purpose with the intention of harming the other robot, the referee will give one warning by blowing their whistle and will point to the robot they suspect intentionally caused the collision. If the referee later determines that the offending robot has caused a second collision that appears intended to cause damage after having once been warned, then that robot's alliance will forfeit the round.

The rule described in the previous paragraph does not apply if a robot has positioned itself to block a target or a treasure chest zone. If a robot positions itself there, then it opens itself to the possibility that another robot might damage it when that robot tries to push it out of the way.

Robots Leaving the Field:

Other than the section of the playing field directly in front of the targets, the playing field will not have solid borders around it and so it is expected that robots will accidentally leave the playing field during a round. If this happens, the robot must reenter the playing field at the same place where it left it. Opponent robots must not block the robot from returning to the field.

Scoring:

Notes	Treasure	Target
<p>The scores shown here are what you earn if done during tele-op.</p> <p>Except as noted for treasure bottles placed on the floor, these scores are doubled if done during autonomous.</p>	<p>4 points for each treasure bottle inside the chest</p> <p>1 point for each treasure bottle that is at least partially inside the treasure chest zone at the end of the round (regardless of whether it was placed there during autonomous or tele-op period).</p>	<p>1 point for ball hitting the lower hoop, whether it passes through or not.</p> <p>2 points for ball passing through the lower hoop without touching it.</p> <p>3 points for ball hitting the higher hoop, whether it passes through or not.</p> <p>4 points for ball passing through the higher hoop without touching it.</p>

RSVP and Questions:

To register for this competition or ask questions about the rules, contact Douglas Hendricks at dhendricks@ames-slc.org.

When you register, please let us know how many robots you intend to bring and what team numbers you'd like to use to identify your robot(s). Also, please let us know if you have any extra fuel balls that you can bring to the competition or that you can lend to other teams prior to the competition.

If you're a rookie team and you need help to prepare for the competition, let us know that and we'll arrange for someone to assist you. If you're not a rookie team but you are willing to assist one, please let us know that.

We hope you will enjoy this AMES Pirate Plunder Preseason Game.

