



BONDS Week One Newsletter

January 4-11 2025

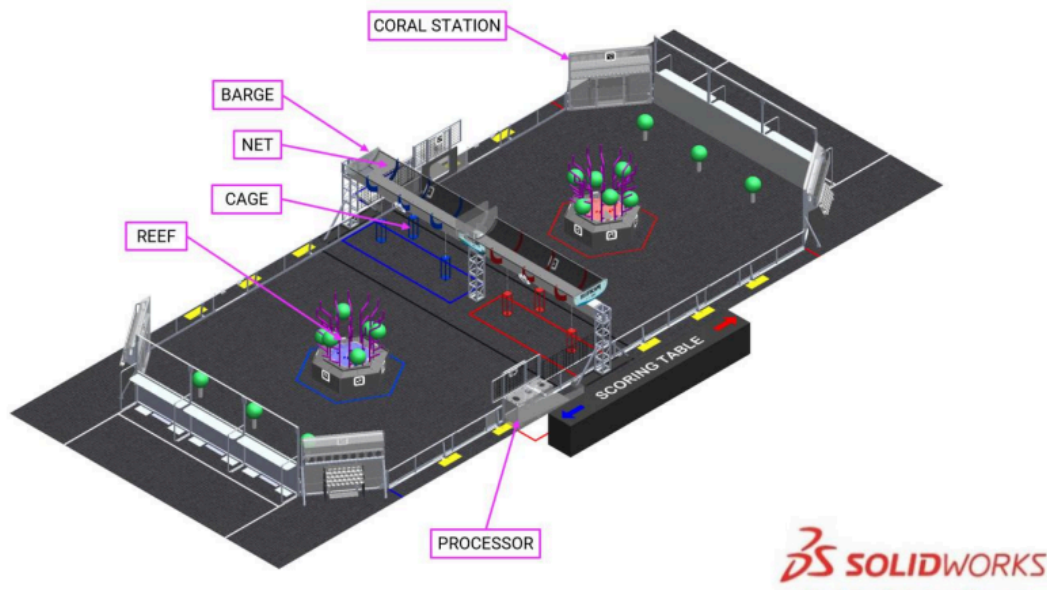
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Introduction

Welcome to the First Weekly BONDS Status Report! In this entry, we'll introduce our challenge for the season and the first steps we've taken to solving it.

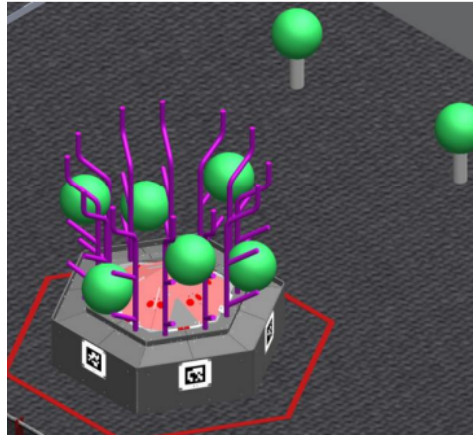
The Official Rules of Reefscape

This year, two alliances of three teams will have two minutes and thirty seconds to harvest algae, score coral, and attach to the barge.



Coral is a PVC pipe game piece that is eleven inches long and four inches in diameter. Algae is the other game piece, and it is a sixteen inch diameter kickball. Each half of the field has a hexagonal reef structure in the center of it, made up of angled pipes at different levels, and coral can be scored on four levels of the reef. The higher the coral level, the higher the points. Each reef also starts with six algae in the branches.

Teams can receive coral from the coral station, where human players can put coral down a shoot either axially or width-wise. There are also three starting coral and algae on each half of the field that teams can intake. If a coral touches an algae, it is worth zero points. Therefore, for certain strategies, knocking algae off of the reef becomes a critical action.



Once a robot has algae, there are two options for what to do with it. One option is to shoot it into the barge, which is a net holder that spans midfield. The other option is a low goal on the side of the field, called the processor. The ball rolls through the processing sensor and to the other alliance's human player, where they can score in their barge. Scoring in the processor counts towards cooperative competition points, termed *coopertition* in FIRST.

Lastly, teams can climb at the end of match. The climbing field piece is a steel cage hung from a chain - the higher cage is worth less points than the low chain, which is only roughly three inches from the floor. Teams can also park their robot in the barge zone amongst the cages.

The first 15 seconds are autonomous, where the robot is doing pre-programmed actions. In qualifications, robots can get a ranking point if all robots leave their starting zone and one coral is scored on the reef. The next two minutes and fifteen seconds are teleoperated, where students are driving the robot and competing in a hands-on way

Ranking points, which can be earned in 5 different ways during a match, determine teams' ranks. The top eight teams select their alliances for playoffs from the remaining teams.

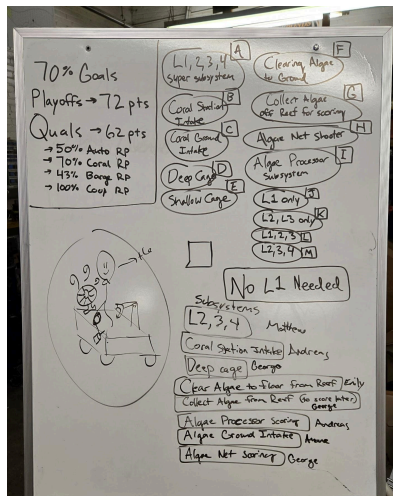
Kickoff

On Saturday, January fourth, roughly 12 students from our team went to Lakota Robotics' shop in West Chester Township for the game reveal. We ate lunch, watched the game reveal, and broke out into mixed-team groups to ensure that everyone understood the new rule set. After these groups, our team sat together and talked about the point system and how long we thought each cycle would take.



Strategy

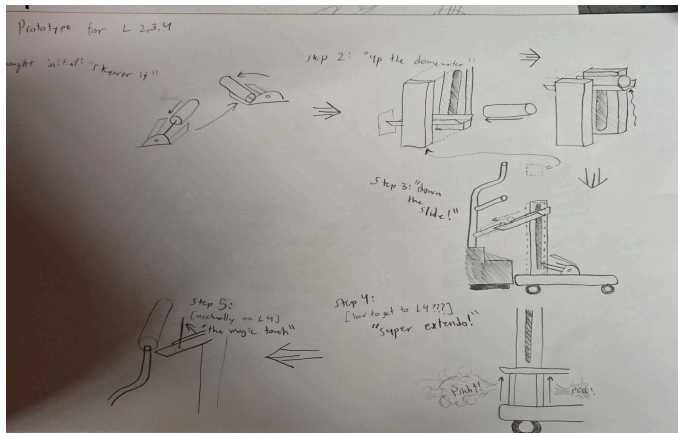
A Dutch Team, Team Rembrandts #4481, uses a strategy selection process that mentors thought would be a good tool to use for adapting our own strategy. Mentors gathered the needed data and templates to walk us through the process, and by Thursday, we had a rough strategy and priority list of what subsystems were most important to them. First, we agreed on a common language for field places and pieces. Next, we made a list of every action a robot could do. Beside every item, we wrote down what level of prototyping (sketch, CAD, physical prototype) would be required to test that piece of robot action.



A small group within the team watched old championship matches to determine timings for the robot actions, and then those timings were plugged into a point-scoring calculator. We used the calculator to determine how many points different strategies could accomplish within the timeframe. From there, we were able to narrow down what we wanted our strategy to be, which is a coral robot that climbs the lower barge cage. If there's enough time, we may add on an algae intake/scorer afterwards, but the controls team gets high priority this season, as a great coral scoring robot needs a great control system.

Starting Prototyping

On Saturday, January 11, we started practice by brainstorming and then prototyping for coral intake and placement. Students worked in small groups to create their prototypes, and they worked mainly in scrap lexan, polycarbonate, and wood.



Next week, our goal is to continue prototyping in order to get ready for our preliminary design review (PDR) presentation on Monday, January 20. This allows us to show off our ideas and get feedback about what we've done well and things we might be missing. Typically, the team tries to bring in outside professionals and team alum to give new feedback.

We also want to give a big thank you to all of our sponsors! Our team can compete because of your support, and none of this would be possible without our sponsor's help. Our team, BONDS, will keep improving and continue learning STEM skills and values this season.

To see our season's progress, please follow us on Instagram, Youtube, Tiktok, and our official website for weekly newsletters.

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