BONDS 5811

Welcome to our fourth weekly BONDS Status Report of the 2022 season, where we summarize what our team has achieved in each week of our build season! In this entry, you'll see what BONDS Robotics accomplished in the fourth week of the build season for the 2022 FRC competition, Rapid React!

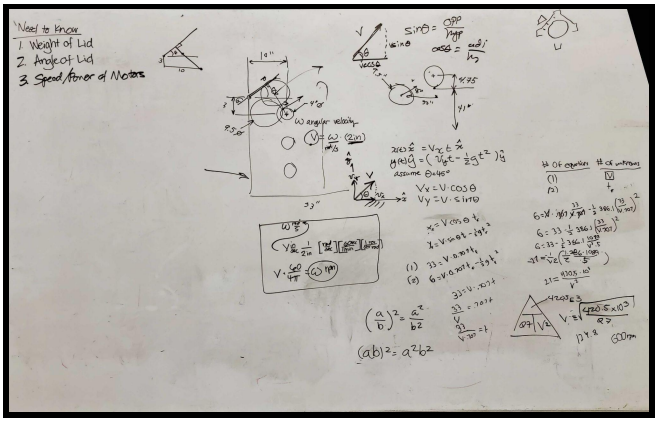
Climbing Mechanism

On Monday, January 31st, the climbing mechanism team prepared a gearbox for our climber and finished creating a climber drum with the use of Computer-Aided Design (CAD). We also got our climbing mechanism, which can extend and shorten like a telescope, to successfully work using springs. On Wednesday, February 2nd, we continued to assemble our prototype. On Thursday, February 3rd, the winter storm made it impossible for us to have an in-person meeting. But no blizzard could keep us from holding an online meeting, where we continued to work on our climbing mechanism's CAD! During the meeting, we calculated the center of gravity of our robot so far. We also found how far from the ground we want the static hooks on our climbing mechanism to be.

On Saturday, February 5th, we tested how effectively our climbing mechanism could extend and shorten while on our robot, as well as how well the mechanism itself could support our robot's weight. The results for both were successful!

Scoring Mechanism

On Monday, the scoring mechanism team examined all the critiques we had received during our Critical Design Review (CDR) and had a brief discussion on what we wanted our new ball manipulator to look like. The final design we decided on is very similar to the physical prototypes we've worked on so far, but it has a new addition. Since our cargo balls will need to shoot out of the top, we decided to put a

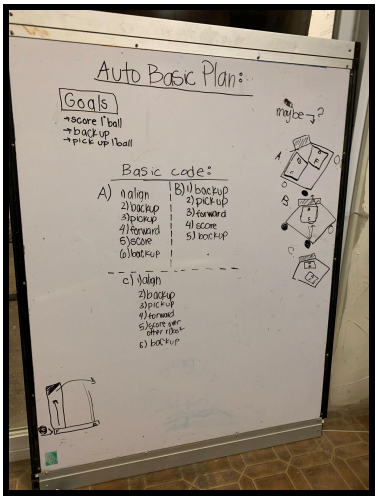


freely moving lid that lays across the top of the mechanism, covering the opening the ball shoots out of. When our ball goes through the intake and travels up the ball manipulator, it will hit against the inside of the lid, which will help guide it into the lower hub. The lid will be attached to our scoring mechanism with hinges, and will also have a stopper on the back to prevent it from opening too far. In order for us to create our lid though, there were some key factors we wanted to take into consideration. First, we wanted to find the weight of the lid, as that would affect how easily it opens once the cargo ball comes in contact with it. Second, we needed to find the best angle for our lid to open at, so it'll precisely aim the ball into the lower hub. Third, we wanted to find how fast the motors would need to move the ball up our mechanism. With the help of one of our mentors, we were able to find the answers to all of these questions using mathematics!

We also made adjustments to our scoring mechanism's CAD. Up until this point, we had been using blob CAD to plan out the placement and general design of our mechanism. Now, we are ready to adjust our CAD to reflect what materials we want to use, such as lexan and aluminum, for specific parts of the robot.

On Wednesday, we reinforced our physical prototype with better wood and drilled holes in it to place our four axles, complete with evenly spaced wheels, through. We continued to work on our ball manipulator's CAD on Thursday and Saturday. On Saturday, we also calculated how far the backboard of our ball manipulator needs to be from the climbing mechanism, as well as what distance we need between the wheels of our axles to have our cargo ball always touch two sets of wheels. This distance is small enough for our cargo ball to be indexed effectively up and down, but is also great enough for our cargo ball to not be overly compressed.

Programming Team



Our programming team met on Tuesday, February 1st, to start planning out the functions of our robot during the autonomous period, the first 15 seconds of the match. One of our top priorities for this season is to score a preloaded cargo ball into the lower hub during the autonomous period. We can only achieve this by having efficient and reliable code. The programming team listed all of the objectives we want to achieve and all the individual steps required to complete them.

Electrical Team

On Tuesday, we devised a basic layout for our robot's electrical components, which will be centered in the back of the robot. The location of our electrical components is essential, since we will need enough room to place both our climbing and scoring mechanisms on the robot. In addition to planning the placement of the electrical components, we also wired two motor controllers to connect to the climbing prototype.

We're proud of all of the progress we have made so far, and we're excited to begin the process of manufacturing our robot soon. Our students will have many opportunities in the coming weeks to utilize the various machinery we have in our shop!

We want to give a big thank you to all of our sponsors this year! None of this would be possible without you, as your support allows us to continue learning STEM values and to Bring Opportunities Near Dayton Students.

To see more of our progress throughout the season, please follow us on Instagram, Twitter, YouTube, and our official website! Stay tuned!

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