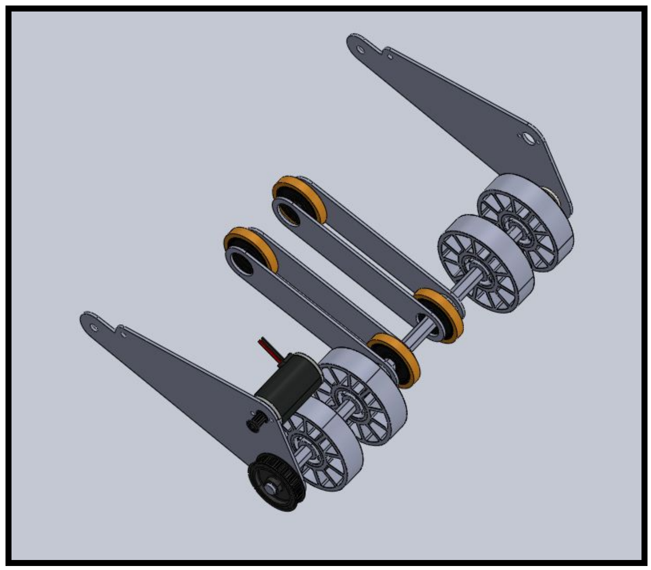
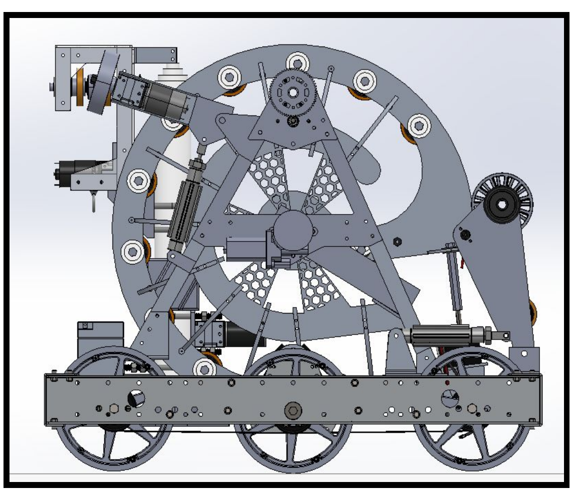
BONDS Robotics Status Report: Week 3

The critical design review is upon us! With the approval of a committee of engineers the team may begin manufacturing final parts of the robot. The team is trying to get as much of the robot CAD done as possible while the build team is testing and improving on their designs.

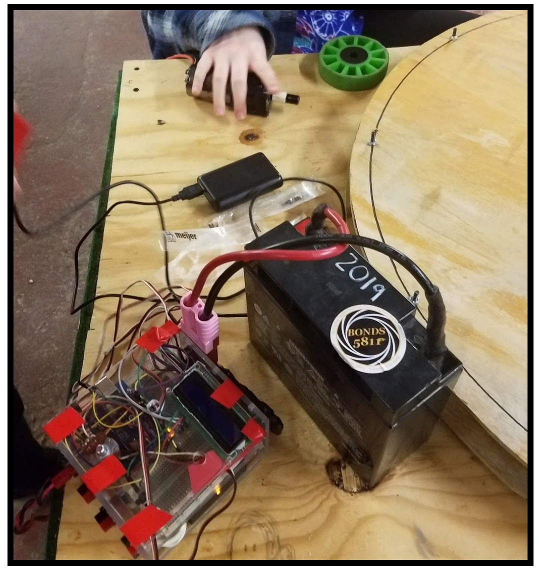
CAD



The CAD team is working on the "snail" final model. This new design makes the arches on the side of the mechanism pull in more than before, so our pulleys now have room for belts. The middle of the design is now opened for the wheels and making the piece symmetrical. The team also finished the intake. The intake is deployed using a piston and hangs by a hinge. Once the ball rolls into the intake the whole mechanism will apply force down on it so it stays in our control. This implementation of the weight laying on the ball for a short duration of time reinforces our "touch it, own it policy" meaning if we merely touch a ball it gets pulled into the robot unless the system is turned off. The control panel model was based on the prototype that build has been using for their testing. The spinner is on a piston toward the top so it can deploy higher than the rest of the robot. Once the piston deploys we will drive under the control panel to spin it. Once each element of manipulation was locked in, the CAD team moved around the climber, spinner, snail, and intake to ensure that all of the parts fit together. The snail was the most difficult when it came to having enough room to rotate next to the spinner and lift. Once the overall assembly was ready to go the CAD team worked on their slides with the rest of the team Friday.



Spinner



Part of the build team worked on the spinner for the control panel. We tried multiple compressions for the wheels. We planned to use a 10:1 Versaplanetary motor and found that a straight on approach for contact was the best position. Once the motor was working and we had our wheels ready to test we hooked it up to a motor control box we had from last year. After testing we learned that compliant wheels were more reliable and accurate than a rigid counterpart.

Shooter

The shooter prototyping team is taking final notes and making sure they are at their best. The team attached the shooter to the old robot Goldeneye and worked with the programming team to run the motor at certain speeds. The shooter couldn't angle its shot in its current state so we found a folding chair to prop up the shooter. It was the most effective and easy way of changing the angle of the shot. After some testing we found that going at 95 percent power gave us the most reliable yet fast results. The reason for going for 95% instead of 100 is so we can make the motors catch up to each other. For example if one motor is worn down, 100% for it is slower than 100% for a brand new one. We make the slower motors speed up just barely so they shoot at the same speed. We also tested different lengths for the space in between the flywheels. Using Neo motors and bane bot wheels we agreed on 4 inches being the most suitable. 4 inches was perfect because any closer and the balls would grab one wheel too much and curve to one side while too much of a gap would send off too slowly. The final composition was able to make 4 out of 5 balls hit the target in under 3 seconds.

Programming

The Programming team completed a basic shooter program, however, this program only had limited functionality as the speed could only be adjusted via two joysticks. This method was very inaccurate and wouldn’t allow us to precisely test the accuracy of balls that could make it into the goal. The joysticks also didn't tell us the exact speed in which the motors were running. We were able to add two sliders that can remotely change the speed of the two motors separately, which was a useful feature as we learned we can speed up one greatly and keep one slow to curve the shots, which could be useful when shooting from the trench run as it could potentially allow us to not have to align ourselves before shooting. We ended the week working with the CAD team to figure out the general structures of the robot. This was so we could outline general subsystems, states, and commands we could break our code down into. We are also working on using the LIMELIGHT, a tiny computer similar to a Raspberry Pi, to potentially use vision tracking to better align shots with a machine like precision and accuracy.

Critical Design review

Saturday morning was the critical design review. This was the final wall between us and beginning to manufacture final parts for the robot. This is because without the engineers’ approval we cannot begin working on our final product. The review was similar to its practice equivalent. We presented to a group of professionals from the stem community, but this time the presentation was much more fleshed out. We showed videos of our results and our full assembly that was near CAD lock. The committee probed the team with questions, comments, and concerns. Once the presentation was done we earned approval and spent the rest of Saturday building.

BONDS 5811

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