

Umn Robotics RI3d Prototype Concepts For Charged Up

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Abstract—This white paper summarizes the prototypes constructed by the team for FIRST Charged Up. This includes strategy, prototypes, and programming.

I. STRATEGY

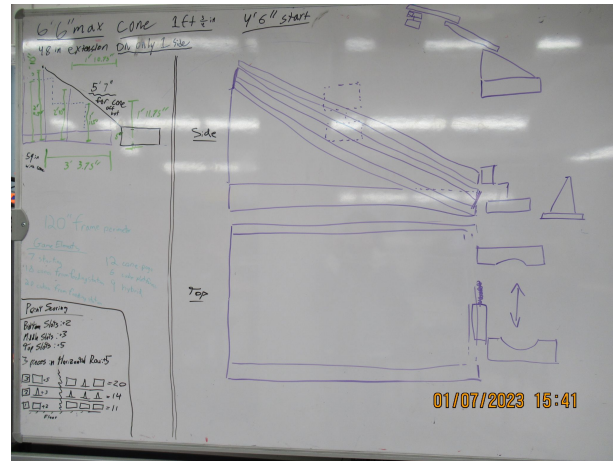
Being able to place both cones and cubes is important. To score 5 links and get that ranking point (the sustainability bonus), as well as obtain the most amount of points, requires teams to score both cones and cubes. Obtaining the coopertition bonus will also be something all teams should be able to strive for in order to reduce the link amount to 4 to obtain the sustainability bonus.

Additionally, picking up from the ground is more beneficial than trying to pick up from the double substation portal. More game pieces will end up on the ground from misplacements and robots.

We also found rule G109 to be advantageous to us. You can extend on multiple sides of your robot as long as the robot is fully contained within your alliance loading zone and community (G109). Otherwise, you may extend up to 48 inches beyond your frame perimeter on one side(G107).

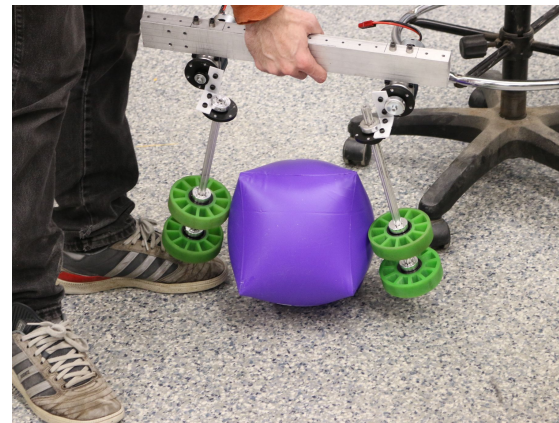
Lastly, the activation bonus is an important ranking point that teams can work on throughout autonomous and endgame. Since there are two opportunities to earn points towards this ranking point, we predict alliances will for sure be going for that ranking point.

For autonomous, docking and engaging the charge station during auton allows teams to gain more points than they would score a cube or cone. Additionally, it allows teams to get 12 out of the 26 points they need for the activation bonus. However, being able to have multiple autons, even just scoring a preloaded cube or cone, will be necessary for working in an alliance as only 1 robot maximum can score the auto charge station points.

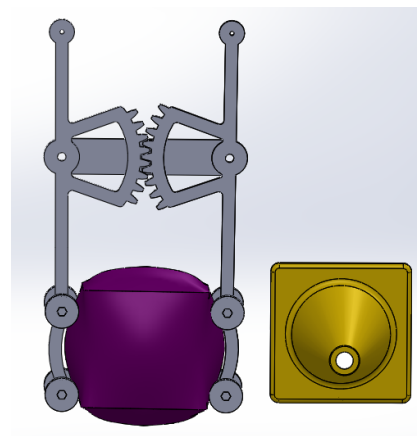


II. INTAKE/OUTTAKE

This mechanism is able to pick up both cones and cubes. Outtaking the cones and cubes (dropping them) will be onto the poles to score. The prototype included wheels using compression to pick up both the cube and cone.



Since then, we have changed our initial design in CAD to make it more efficient, simple, and lasting.



III. PROGRAMMING

Using the Apriltags is more important for us than the reflective tape. It is more affordable for teams to purchase a USB camera and connect it to a raspberry pi than to use a limelight and reflective tape. Additionally, we have been working on driving with gyro to aid us during the autonomous period. Our current goal is to have the robot drive onto the charging station and self-balance using pitch in gyro so that the 12 auto points can be obtained.



CONTACTING THE AUTHORS

UMN Robotics may be reached in order to ask questions on our Chief Delphi thread, on Twitter (@UMNRobotics), or via our Twitch stream during the three-day build. After the build, we will still be answering questions on the thread and via email (robotics@umn.edu). We are doing this for you, the FRC community, and are happy to answer questions and discuss our designs with you.