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The Robot

FRC Team 1987 The Broncobots

Lee's Summit North High School

Lee's Summit, Missouri

Apollo

Highlights:

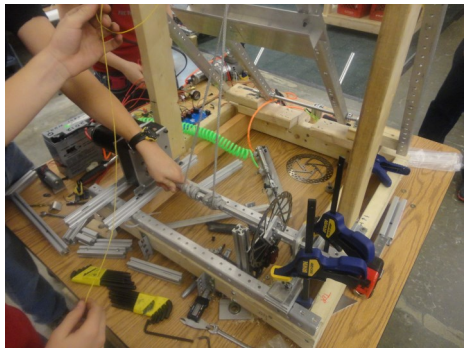
-Drive System
-Catapult
-Collector
-Winch

Apollo can…

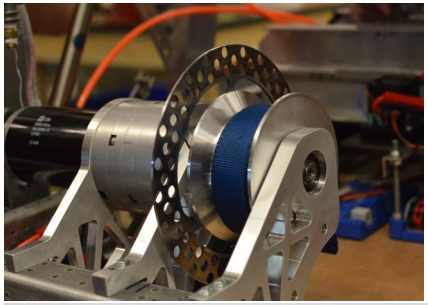
- **Shoot over the truss**
- **Shoot into the high goal**
- **Detect the Hot Goal in Autonomous**
- **Mobility in Autonomous**
- **Shoot into the Hot Goal**
- **Pass and Receive**

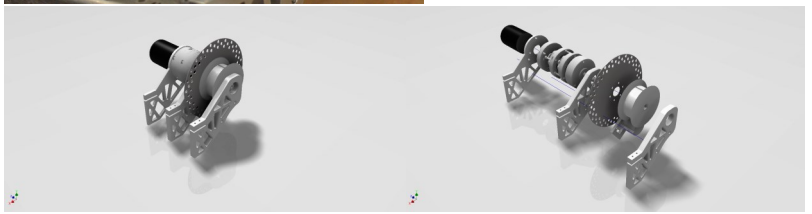
Winch

The brake is powered by a CIM and three stage GEM gearbox. This assembly drives a spool that winds the tether attached to the torsion bar. A bicycle disc brake is also part of the assembly, allowing us to remain primed for launch for long periods without straining the motor.

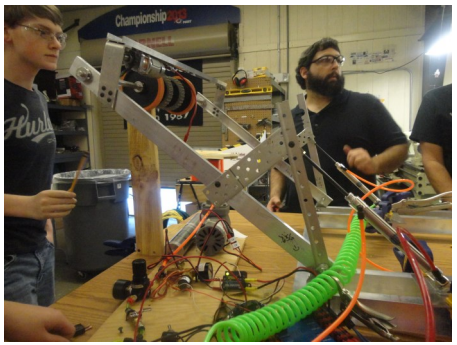


Once a ball is in range, the brake disengages and the winch primes to shoot. After priming, the brake re-engages to prevent backdriving. Once we are ready to launch, the latch on the torsion bar re-leases. The winch then unwinds to re-turn the torsion bar



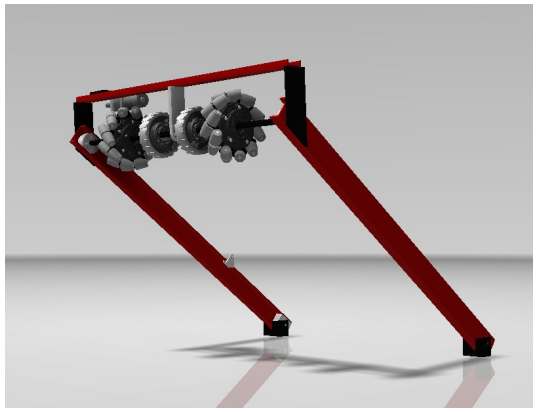


Collector

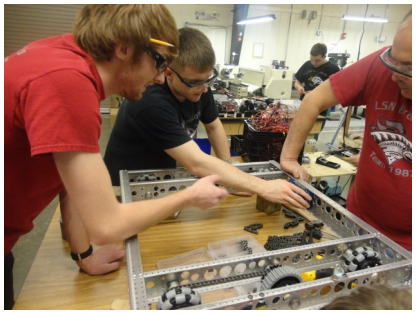


The collector uses wheels to roll balls into Apollo's possession. We use both VersaWheels and Mecanum Wheels on the assembly to guide the ball between the support struts. The collector wheels are overhead, using pressure against the floor and bumper to remain in control throughout the maneuver.

The assembly is deployed using pneumatic cylinders. The rollers are powered using a BaneBots 550 on a 16:1 planetary gearbox with a 15:54 open gearbox.



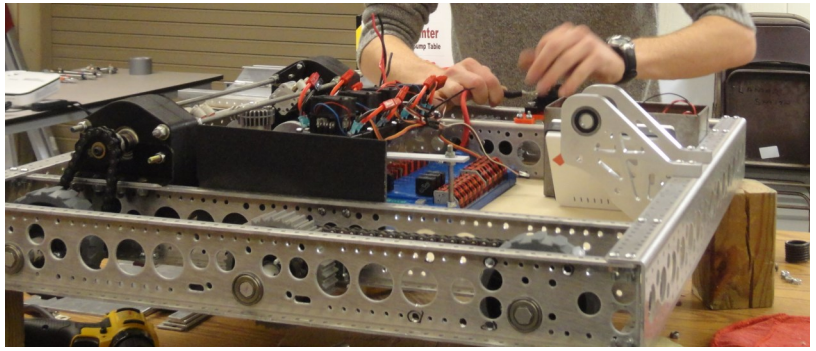
Drive System



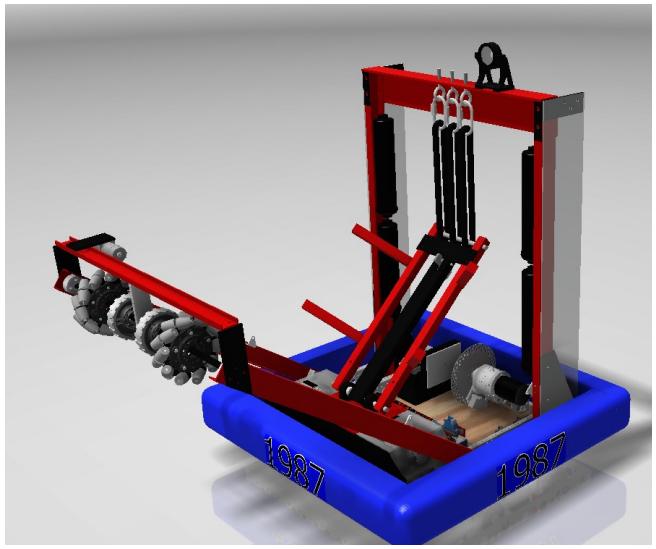
Apollo drives on the 2014 Drive-in-a-Day Square Chassis from Vex Pro. This system offered us flexibility in terms of mounting and area.

We used four inch wheels in a 6-wheel drop configuration. The outer wheels are diamond tread and the inner wheels are W-tread.

The wheels are chain driven from Ball Shifters. The shifters sit forward on the robot to balance the weight of the winch and catapult



Catapult



The catapult system consists of a complex series of mechanisms. In cooperation with the winch, detailed on page 7, the catapult consists of a launcher and a torsion bar.

The launcher is a frame of aluminum tubing made to cradle the ball. The bottom is attached to a hinge, and the top to surgical tubing. When under tension, this tubing pulls the launcher upward, propelling the ball (hopefully) into the goal.

Catapult

In prototyping, we found that the catapult expended much of its launching energy to unwind the winch. To counter this, we added the torsion bar with a latch on it. This allows us to use all of the energy from the surgical tubing to launch the ball.

Once a ball is in our possession, the winch winds back the entire assembly. When we are ready to fire, the pneumatic latch on the torsion bar releases the launcher. We then unwind the winch, and the torsion bar retrieves the launcher. The latch re-engages, and the cycle begins again.