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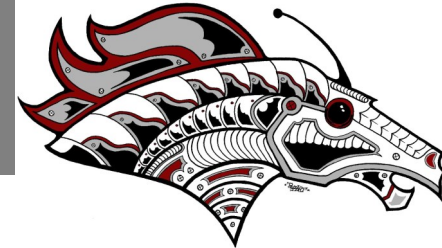
www.twitter.com/Broncobots1987

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The Robot

2016



FIRST Team 1987

The Broncobots

Lee's Summit North High School

Lee's Summit, Missouri

Knight Mare

Highlights:

-Drive Train

-Boulder Collector

-Defense Manipulator

-Shooter



Knight Mare Can...

- **Breach all defenses**
- **Score in the high and low goals**
- **Intake boulders efficiently**

Programming

“Knight Mare” is coded in command based C++, featuring fully autonomous defense crossing and shooting sequences. The autonomous functions minimize human error and improves the driver’s speed and efficiency.

View Our Code On GitHub

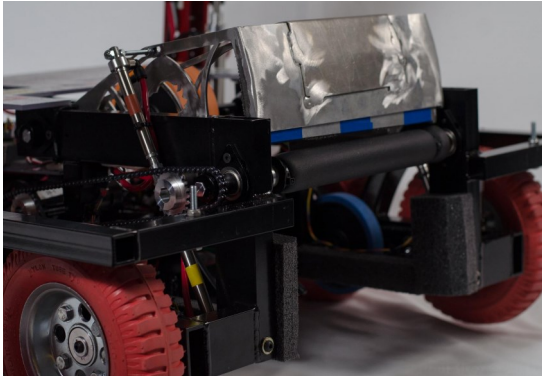


<https://github.com/FRCTeam1987/Robot2016>

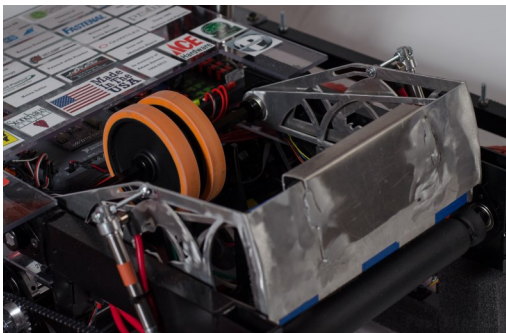
The code also utilizes PID controllers to maximize efficiency and accuracy during the autonomous period. In the autonomous period, we can collect, cross a defense, and shoot in fifteen seconds. The code uses sensors to detect field elements to allow the robot to make decisions based off its location. Sensors are also used to detect the distance traveled and the position of the robot subsystems, such as the collector arm.

Shooter

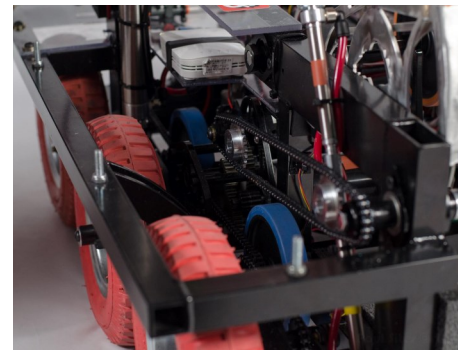
Our robot is built with an “S” shooter design. The boulder is compressed by the intake roller on the ramps that lead up to the shooter wheels while the robot moves around the field.



The boulder, after being held by the intake roller while the shooter reaches desired rpm, is launched by two orange BaneBot wheels and an aluminum flywheel. These are driven by a 3:1 planetary gearbox on a 775 Pro motor.



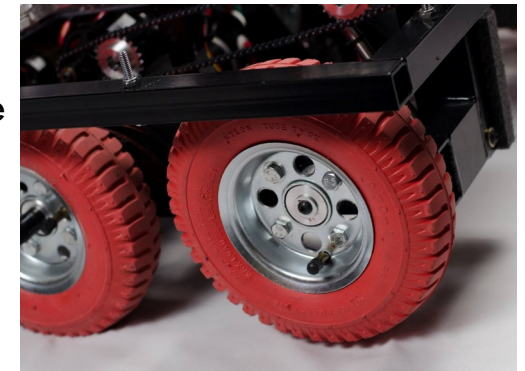
Drive Train



“Knight Mare” drives on a custom West Coast drive train utilizing 10 wheels: 6 outer eight inch diameter pneumatic wheels and 4 inner five

inch BaneBot wheels. The inner wheels prevent the robot from catching the chassis on a defense.

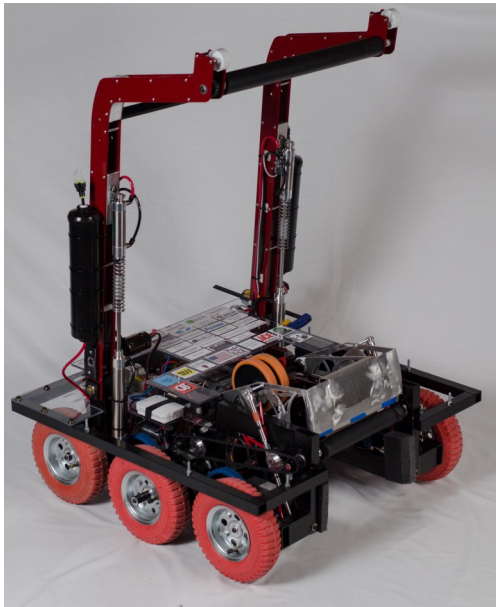
The wheels are chain driven from gear boxes.



The drive system contains encoder sensors, allowing us to know the distance which the robot has moved from a designated position.

Defense Manipulator

“Knight Mare” manipulates each defense by either the drive train or the arms. Using two pneumatic cylinders attached together, the arms move to different heights based on which cylinder is extended.



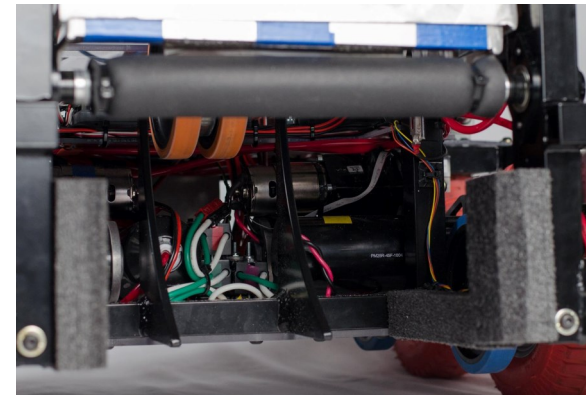
If the lower cylinder extends, the arms move up to raise the portcullis. If both cylinders are retracted, the robot will lower ramps on the Cheval-de-Frise.

Boulder Collector



“Knight Mare” collects the boulder by a chain-driven roller at the end of the Defense Manipulator.

If only the upper cylinder extends, the arms move to collect height. The roller at the end of the Defense Manipulator feeds the boulder to a inner intake roller, positioning the boulder in the robot for shooting.



A line break sensor tells the intake roller to stop when the ball is in the desired position.