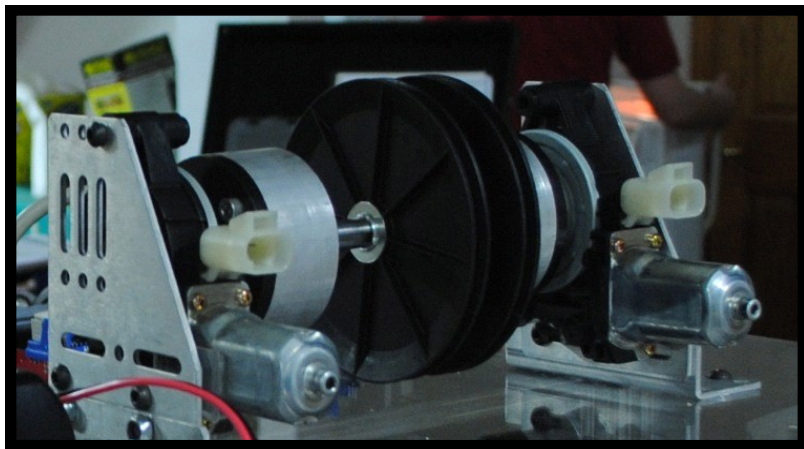
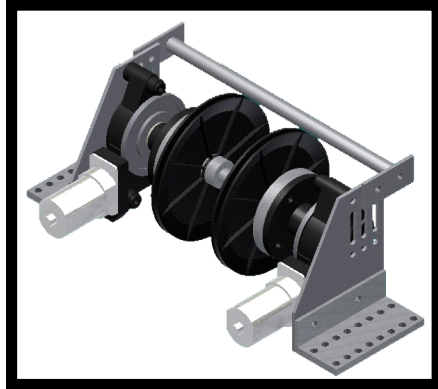


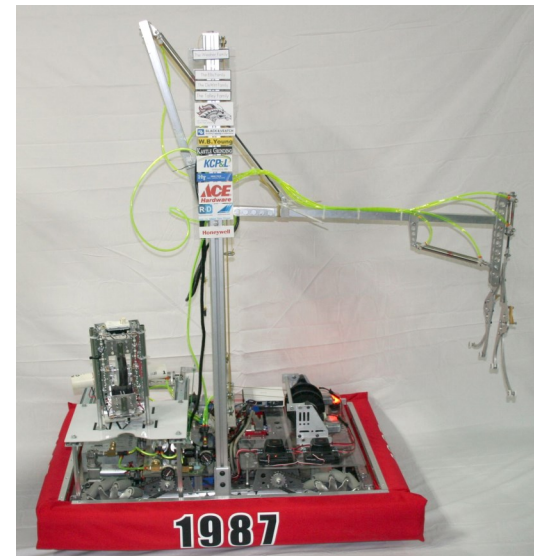
## WINCH

The elevator on Team 1987's robot is raised by a winch, which is mounted to the chassis on the robot. The winch is powered by two window motors mounted on the robot. It lifts the elevator using two pulleys (made of polymer) which hold excess cord. In this case, normal string is used. The winch allows the elevator to be raised, which allows the robot to hang tubes on the upper levels of the scoring grid.



## The Broncobots Team 1987

Lee's Summit North High School  
Lee's Summit, MO



The Robot

## OUR ROBOT

### Team 1987's robot can...

- Drive forward, backward, left, right, and strafe side to side because of its mecanum wheels
- Pick up tubes from the ground or from the feeder slot
- Score on the top two rows in autonomous
- Successfully deploy the team designed minibot
- Track lines on the playing field during autonomous mode

### This packet highlights several parts of Team 1987's robot:

- Electronics Plate
- Elevator
- Gripper
- Mecanum Wheels
- Minibot Deployment Drawer Slide
- Winch

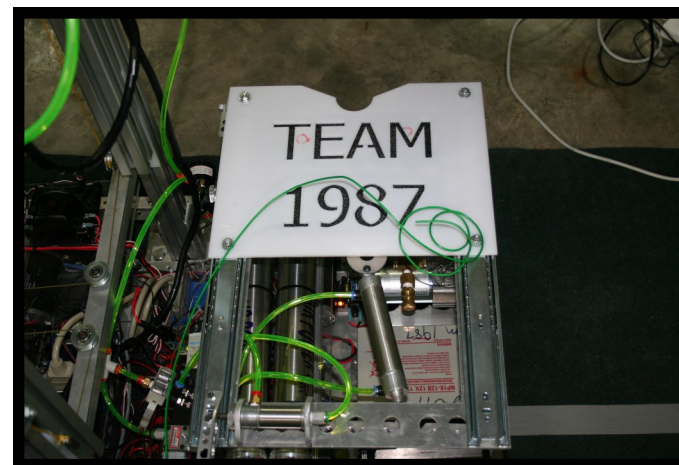
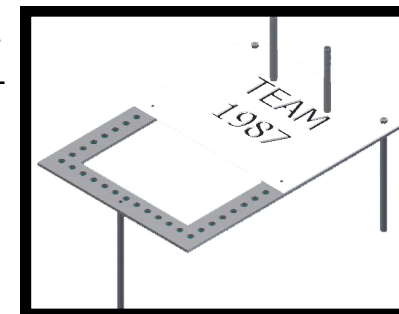


## MINIBOT DEPLOYMENT DRAWER SLIDE



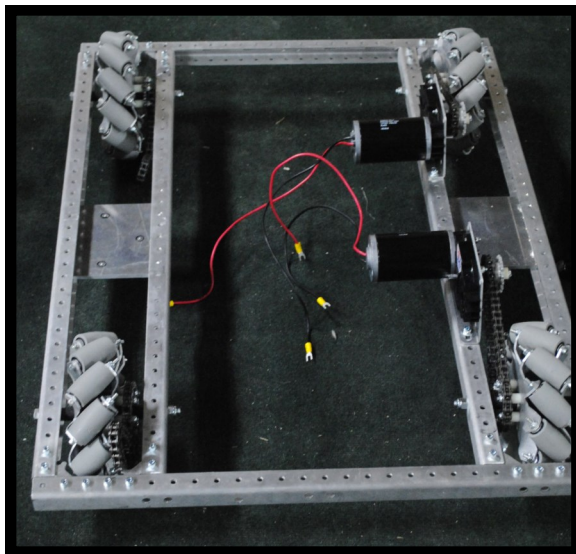
The minibot is deployed from Team 1987's robot using 20 inch aluminum ball bearing drawer

slides. The frame is also made out of aluminum and the plate is made out of polymer. It is powered by two pneumatic cylinders, one of which is used to extend the slide and the other functions as a safety catch to keep the drawer from firing until the latch is unlocked. The pneumatic cylinders are powered by two solenoids.

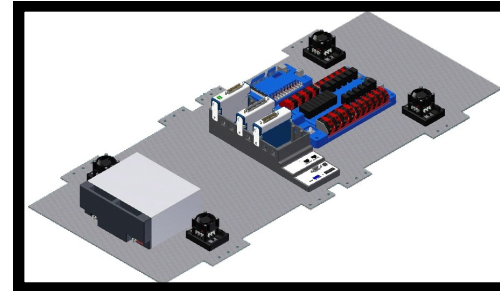


## MECANUM WHEELS

This year, the Broncobots decided to use mecanum wheels on their robot, which had not been used before by the team. Mecanum wheels are made of rubber and steel. They are capable of translating forward or reverse force into lateral motion. The decision to use this type of drive train was made after taking into consideration the game strategy the team wanted to use. It was decided that the team wanted to be able to strafe in the scoring zones of the field and the team decided that mecanum wheels were the best choice of wheels to be able to do this.

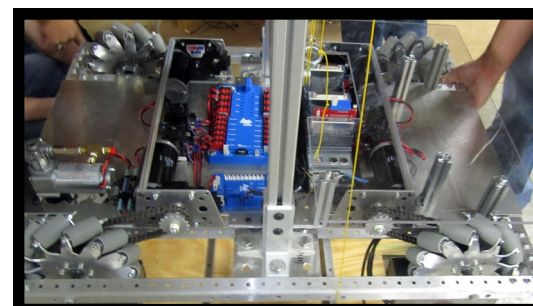
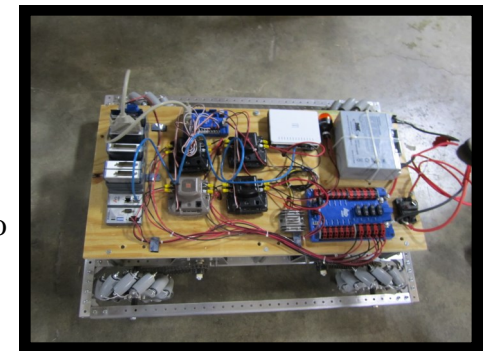


## ELECTRONICS PLATE



The electronics plate was modeled after the CAD drawn plate, which was made to match the exact profile of the robot (taking motors

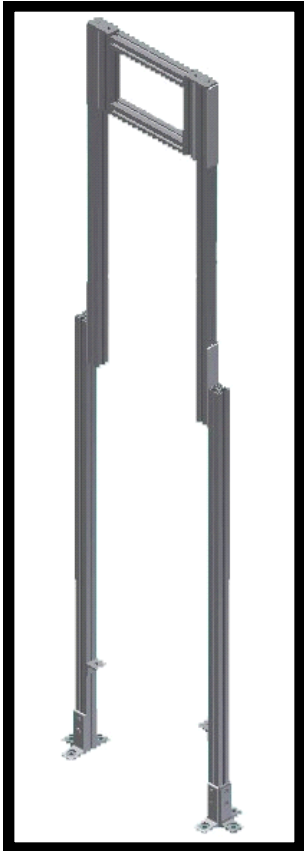
and mecanum wheels into consideration). The plate was designed to provide adequate strength to support the rest of the robot while staying within weight constraints. It is constructed from 1/8 aluminum. It is a two tier system with the Victors, Power Distribution Board, Digital Sidecar, and battery on the bottom tier and the winch and Jaguars are on the top tier, which is a



Lexan plate. Several electronics layouts were tested during prototyping to determine the best placement



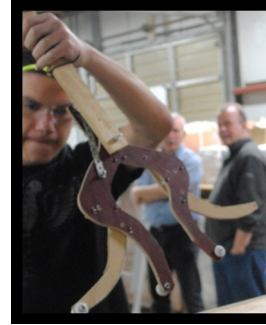
## ELEVATOR



The Broncobots' robot hangs tubes using a gripper connected to an arm and an elevator. The elevator is powered by a winch (detailed on page 8). It is constructed out of 1.5 inch T-Slots. The bottom section is 53 inches long and the top section is 43 inches long. The elevator is made out of aluminum. The middle section of the elevator is used to hook in the arm.



## GRIPPER



Team 1987 uses a somewhat unorthodox method to pick up tubes from the playing field and hang them on the scoring grid. The gripper device grabs tubes from the center rather than from the edge of the tube. The grippers are made from aluminum or a polymer

(the team has multiple sets). The gripper is powered using pneumatics. The gripper uses rubber bands to maintain constant pressure on the tube. Also, at the end of each extremity on the gripper, the team has placed sliding door rollers, which are made of polymer, to prevent snagging.

