

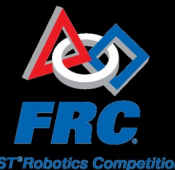


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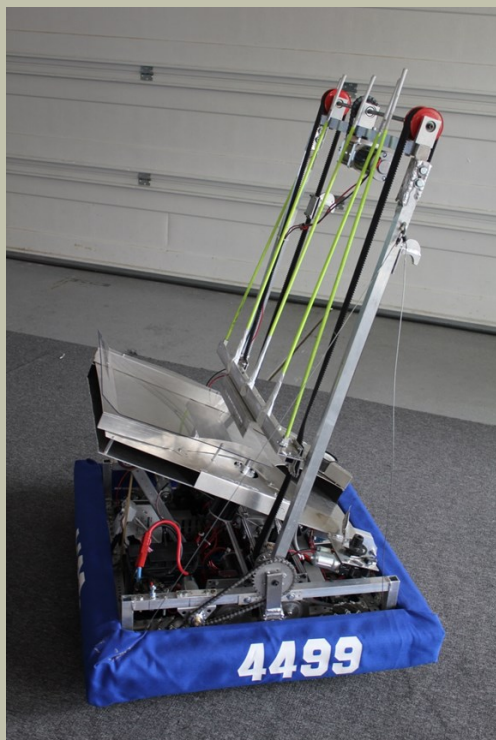
www.highlandersfrc.com

# The Highlanders

Robotics Team



“It’s not about the game, it’s about the journey”



## Team 4499’s 2013 Season Came To a Close at the World Championships in St. Louis

Team 4499 had a great time at the World Championships in St. Louis. One of 400 (!) FRC teams there, we were able to meet people from many other countries. We also got to see how many teams followed other paths to a solution to the challenge and how well they did it! Our long weekend went very well. We operated very well as a team, and our experience was beginning to show!

**Who Are We?** The Highlanders FRC Team 4499 out of Fort Collins, CO is a team in the FIRST Robotics Challenge. We had a great first season! We competed in the Hub City Regional tournament in Lubbock, TX in March, and again in Denver at the CO regional. We won awards in both tournaments which allowed us to go to the championship event in St. Louis, MO April 24-28. What a blast!

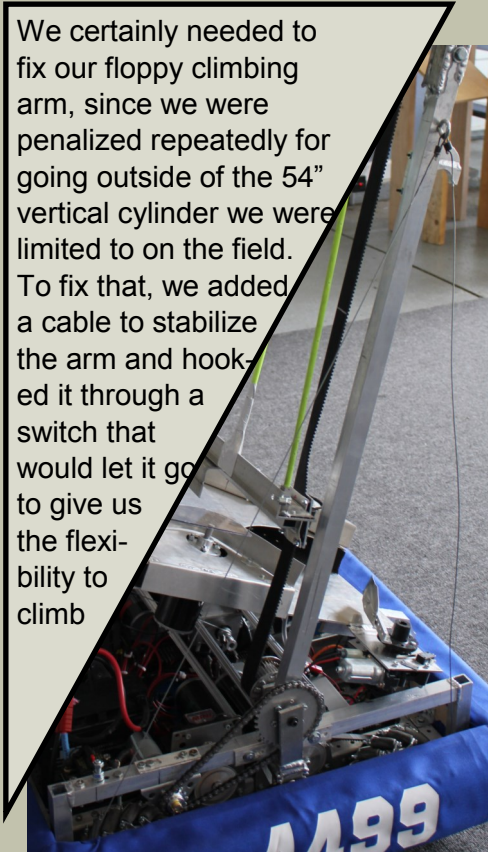


## Preparing for the Championships

If you followed us through the season, you'll know that we wouldn't be able to resist working on the robot in between Colorado and Worlds!

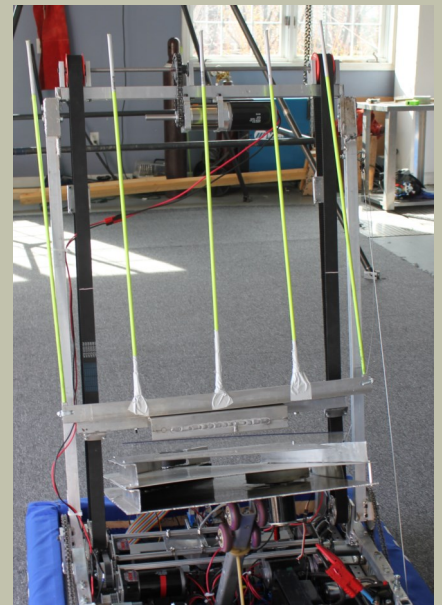
We certainly needed to fix our floppy climbing arm, since we were penalized repeatedly for going outside of the 54" vertical cylinder we were limited to on the field.

To fix that, we added a cable to stabilize the arm and hooked it through a switch that would let it go to give us the flexibility to climb



**Faster climb:** We replaced the belt motor with one that was bigger and faster. In doing so we decreased the climbing time from 45 second to 22 seconds! The motor wasn't strong enough to hold the robot up after power was cut, so we added hooks onto the arm to maintain the height through and beyond the required 5 seconds after the end of the match.

**Blocker:** Because we believed that full-court shooters would be a force in St. Louis, we wanted to have the capability to block them. A full-court shooter is one who can sit in a protected feeder station and shoot the full length of the field, scoring non-stop 3-point goals. Because of the specifics of the rules, we were allowed to be 80" tall in front of their 60" robot, but had to shrink back to 60" ourselves if we left the immediate area. Our solution: add neon green fiberglass poles to the belt, allowing us to raise and lower them as necessary.



World Championships was a blast! This was our field, one of 5 set up for FRC competitions. With 400 teams there, it was a very different experience than our regional competitions.

## So, what did we learn in our rookie season?

Practice, practice, practice! This season we tended to push the mechanical and software changes all the way to the 11th hour before a competition (OK, actually midnight, but who's counting?). We have definitely realized that the drivers need hands-on practice before a competition, maybe even more than they need the next cool change to the robot. We did get some time in before worlds, but more would certainly have been better.

**We promise to end our revisions earlier next year, to have time to run the bot. Really!**

Efficiency is often about parallel paths, not multi-tasking. At the beginning of the season, we would have one person working on many things, or many people working on one thing. We've discovered over the season that it works best for us to have 1-2 people working on one part, hopefully start to finish. This allows us to focus better, and speed up our timeline a bit.

**Streamlining is a goal for next year.**



### **Communicate Clearly. Enough Said.**

We're not in Lego Robotics anymore! Everything in FRC is bigger - the field, the challenge, the robot and the budget. **Fundraising is in progress!**

Cohesive teams take time. Before this season, we were two separate teams, and it was pretty clear that we still were when the season started. The interaction eased a bit over time, and by bag-n-tag day everyone knew everyone else VERY well. After another 6 weeks of tournaments and build improvements, you'd be hard-pressed to tell who came from where anymore. Turns out you can give grief to anyone after 12 weeks of just about living together! **Here's to another year of grief!**

The definition of a 'rookie mistake.' This phrase has a more personal meaning for all of us after our rookie season! We made a few mistakes, but worked through them, and are raring to go!

Accuracy is important. Whether we call this 'measure twice cut once' or 'cut once curse twice,' we've learned that taking our time and doing it right is worthwhile. We've seen everything from Swiss cheese - drilling the hole in the wrong place, drilling it again, and possibly repeating this several times before getting it right - to bars cut the wrong length needing to be welded and re-cut.

**We promise we're getting better, but still have a ways to go.**



Expertise isn't always the answer. We have realized we need to broaden our skills; experts aren't always available to CAD a part or weld something. If we can get more people to learn these (and other) skills, we will be better off.

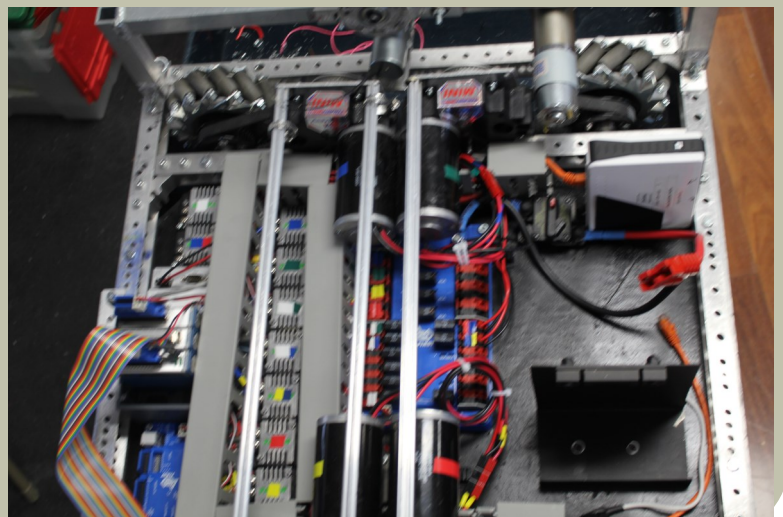
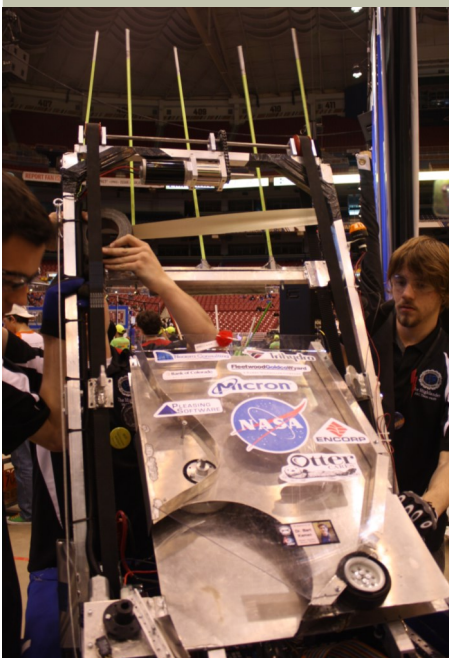
**We'll be spending the fall cross training.**

Materials have failure points! Turns out that aluminum bars and steel rods can be pushed past their failure points. Our biggest problem at Worlds was breaking the top bar of the climbing mechanism: a slot cut in the aluminum was too close to one side, and the part (and the weld) failed.

Duct tape saved the day! This was topped with a second lesson - when we swapped the motor to a replacement 1/4" steel axle, we realized that the excessive torque had managed to twist the bar 1/4 turn. Yikes!

Organization isn't a dirty word. We managed to misplace a few parts along the way, losing track of them just long enough to have to remake them. We are coming up with ways to improve this!

**It may be time to implement a 'system'??**



## Our Summer 'Off'

If you know us, you know we don't do 'Off'! True to form, we were meeting as a group once a week, with members coming in to work on things at different times. We were also very involved in the community in a variety of ways.



Space Explorers Week at the Fort Collins Museum of Discovery gave us a chance to demo our robot. While people found watching the robot shoot Frisbees in front of the building cool, they liked catching the Frisbees even more.



We volunteered at the Fort Collins Kids Triathlon for the 2nd year in a row.



We are mentoring a new FLL team. Over the summer we got them going with a tailor-made robotics

camp. They were up and running with programming and building before their season began. We look forward to continuing to mentor, and to seeing how much they grow this year!

Now that we're in September we've started back up with school and a few practices each week. We're working on skills and playing with new ideas. Early January will bring the 2014 season kickoff, and the new challenge. Then we start all over again.

We Can't Wait!

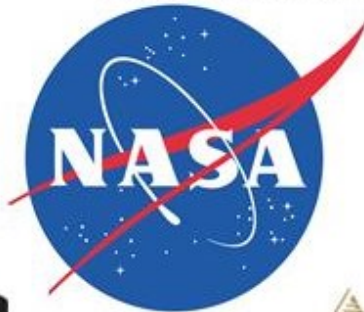
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2013 Ultimate Ascent

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**Go Highlanders!!**