Corte Madera Robotics Team 99922 A

FUTURE Foundation Robot Construction Challenge

Acknowledgements

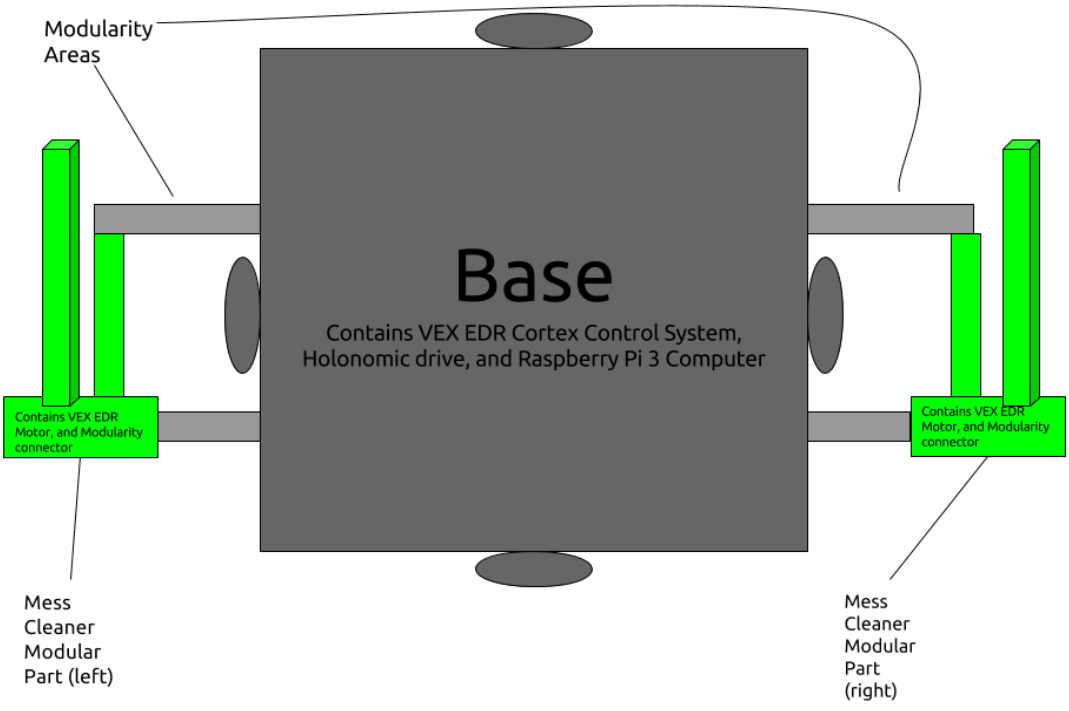
Team 1666 for assisting us with the holonomic chassis

Design Process

When we first designed our FUTURE Foundation online challenge robot, we made sure to make it's chassis compact. As soon as we got building in our design, we started to add key features such as the holonomic drive and modularity late in the building process. The robot has two "floors." The bottom 1st floor would contain the holonomics as well as the VEX EDR Cortex control system. The top 2nd floor would contain a ARMv8 credit-card sized computer called the Raspberry Pi 3 with a 12V battery and a 12V to 5V converter to power the pi. The lower floor drives the robot while also have two modularity areas, where, with a couple of screws, you can make the robot pick up a drink or help clean up messes using ~~modular parts~~ made 100% from vex parts.

I do not understand what you are saying here

I would say modules instead



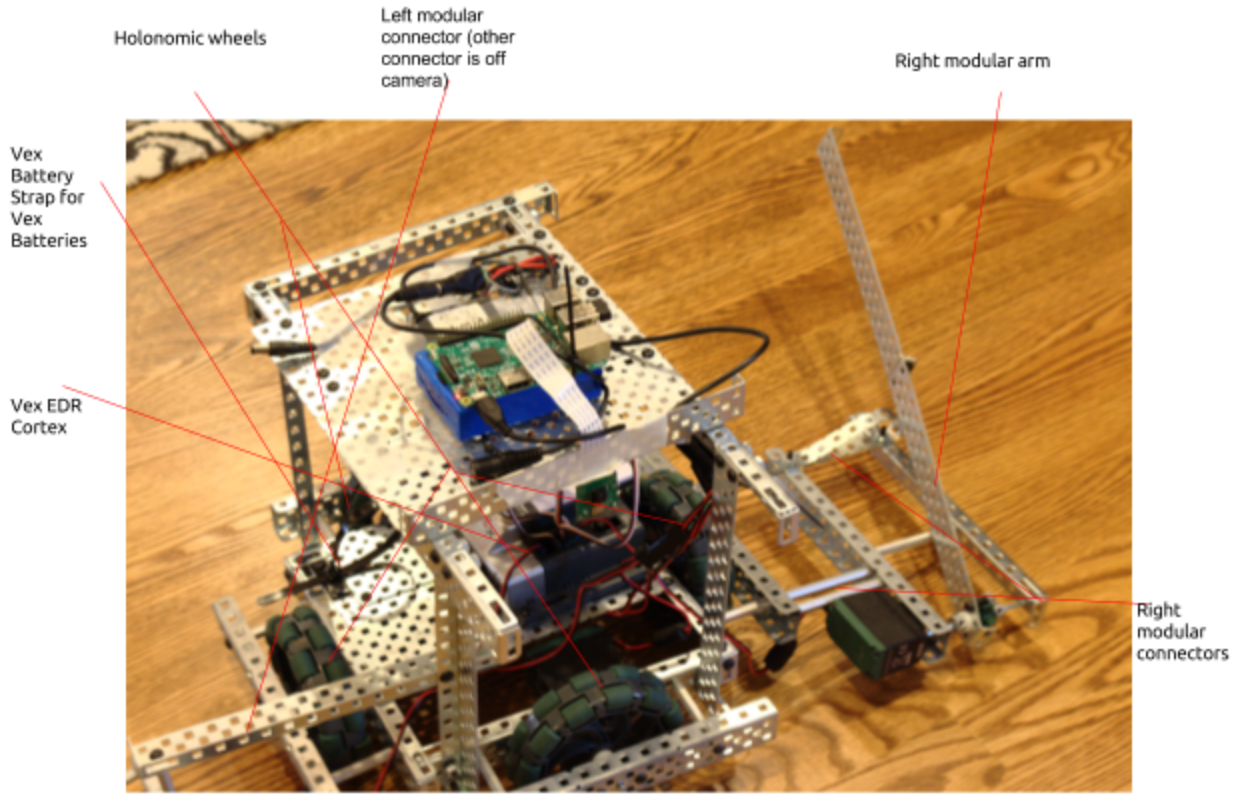
Build Process

I first built the 11 ½ x 11 ½ x 10 inch (base module only) chassis designed to be compact. The chassis was mostly built from c-channels as well as various bars in order to act as a floor for the Vex EDR Cortex control system as well as housing a compact VEX EDR battery to power the Cortex control system.

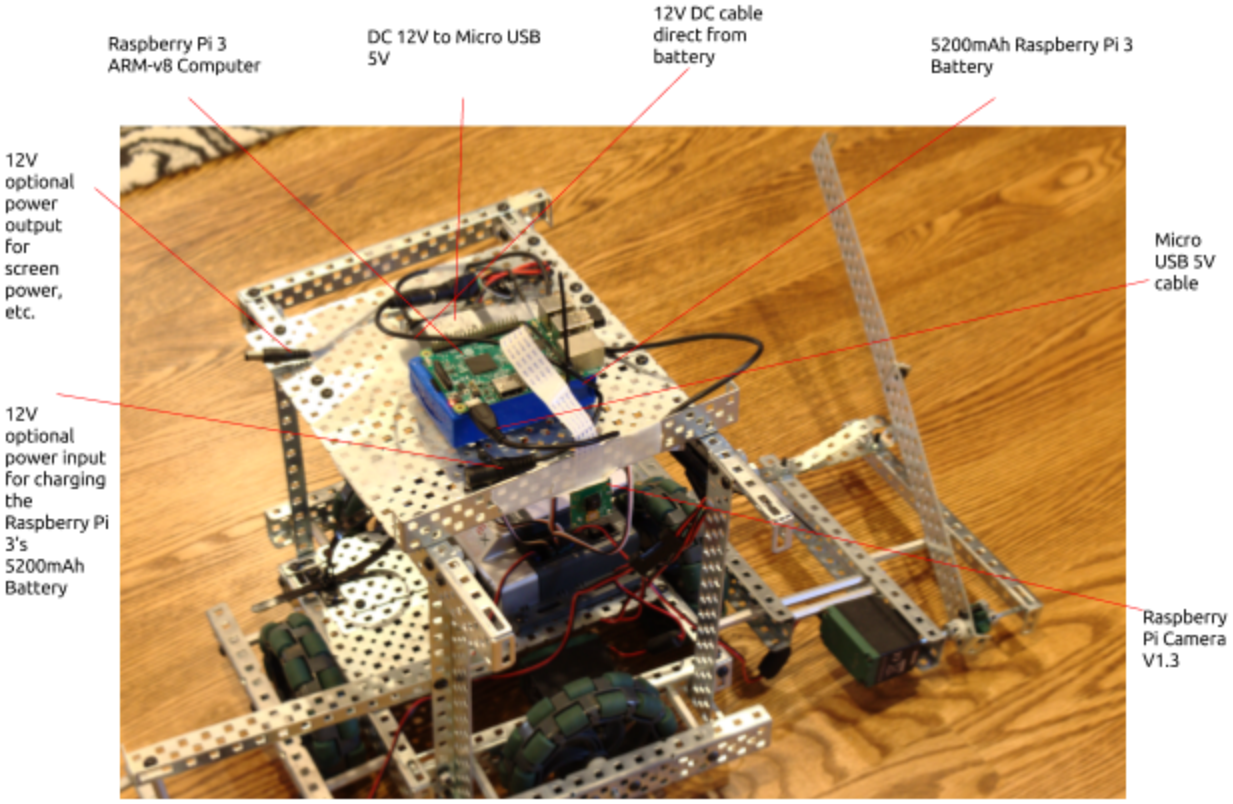
After that, using various c-channels I created the 4 connections between the first floor and the second floor. The actual 2nd floor, like the 1st floor was also constructed with c-channels.

When I finished building the base chassis without any sort of module or wheels, I decided to install the VEX EDR Cortex into the 1st floor as well as installing the Vex EDR battery into the 1st floor. The non-vex parts, the Raspberry Pi 3, it's 12V 5400mAh battery, it's 5MP camera as well as the power converters needed to convert the battery's voltage to the 5V the pi 3 could handle.

Me is confused



"Floor 1"



“Floor 2”

The holonomic chassis was probably the most difficult and time-consuming part of the entire robot. This was our team’s first holonomic chassis and I needed assistance from Team 1666, a more experienced VEX robotics team, in order to assist me. In order to ensure a perfect holonomic drive, I needed to first put the motors in a perfect 45 degree angle from each other. This proved to be a mild challenge because I had trouble measuring the 45 degree angle and had to remove and reposition a motor since I put it in the wrong place. After that, I put on the wheels which was yet another challenge. Since I had never worked with motors and wheels before, I learned how to put them on to a robot which was quite tedious. I needed to put a certain amount of spacers in different places in order for the robot to move at all. I also sometimes forgot to put them in a certain space, which meant that I needed to unscrew and re screw in the wheel with the spacers in all places.

Finally, when I had all the wheels in place a functioning, I found out that it was hard to program the holonomic correctly. I had to try all these motor combinations, switching the

top left, top right, bottom left, and the bottom right's motor numbers until I found a solid combination that I was able to drive my robot with.

After our holonomic chassis could move, I built the modularity connectors in the left and right sides of the robot while also building two modules where a rail would be moved up (to be retracted for portability) or moved down(when in use) by a motor. The rails on both side would be controlled separately. When both rails are moved down, the robot can pick up and clean stuff for you. While building the modules were mostly straight-forward for me, at first I did not know how to hook on a rail to a motor. I assumed it could be done like a wheel, as that what I previously learned. However, in order to move a rail I learned that you need to screw on the gear which moved the entire rail instead of just not moving the rail.

Finally, I added a Raspberry Pi camera V1.3 in order for surveillance aspect of our video. In order to connect to the Raspberry Pi camera, I needed to enable a special VNC mode on the raspberry pi that allowed us to control the camera and write a simple python script that controlled the camera for us allowing us to take the recording of the fake robber.

Overall, I think the content is good. There are a couple of areas (highlighted yellow) that I think need clarification, and one area where I would phrase it slightly differently. Overall, good job!