



Reverse Engineering Online Challenge

Dismantling and Investigating the VEX IQ Remote Controller

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Table of Contents

Summary Report	3
Controller Problem	5
Joystick	6
Circuit Board	7
Parts	8
Conclusion	10
Citations	11

Summary Report

For this project, our team had many ideas on what piece of technology to dissect. Our ideas included a damaged printer, an old Ipad, a PS3, and a Vex IQ controller. The first decision we made as a group was to take apart the printer. This printer was fully intact, but it had a problem. The printer's system did not realize that it had ink in it. Our teacher gave us full permission to use it for this challenge. After we took apart most of the printer and the parts inside, we realized that the printer we had already taken apart was way too large and intricate to do a report on. We also had not been taking notes on the things we have been doing so if we were to write a report we wouldn't even know what to write. So after we discussed all of the different possibilities, we decided to start fresh and take apart something a little less complicated.

We found that the most simple thing that we could do in the short amount of time that we had, and it was the VEX IQ Remote. We also had the thought that if it was smaller, we could do a closer and more detailed investigation. After we thought about all the pros and cons, we decided to go for it. During our deconstruction process, we made sure to take very careful attention to taking a picture whenever of whatever seems to be important. We also took several pictures, with different angles, of every little thing we took off of the controller. We also found that there were only a minimal amount of parts that were inside of the entire remote control, which could benefit us, or not.

The deconstruction process of the remote was, as we presumed, very simple, but enlightening. From this experience we learned to have patience taking apart and being cautious with every single piece. We

realized that every person in our team has a different and special part in taking apart the remote controller for this project, and that everyone should be included. Sometimes our team members had different opinions on what to do, but in the end we always came together to get the job done successfully. We did have a lot of decisions to make, including changing our whole project idea, but when we came together and thought about it logically we were all able to figure it out as a team.

To sum up the entirety of working on the controller there was a total of 37 separate pieces, and 13 different categories of pieces.

Word Count : 436

Controller Situation



Before deconstruction, we initially knew what the problem was, but we didn't know how it was created. The problem was that the charging port wasn't working so that made the controller unable to be used. Whenever we picked up or worked on the remote at all we heard an object moving inside, meaning that it was loose. Once we got to the part where the loose object was, we realized that it was the charging port that "wasn't working".

The photo you see below is a VEX IQ different remote control that is fully operational.



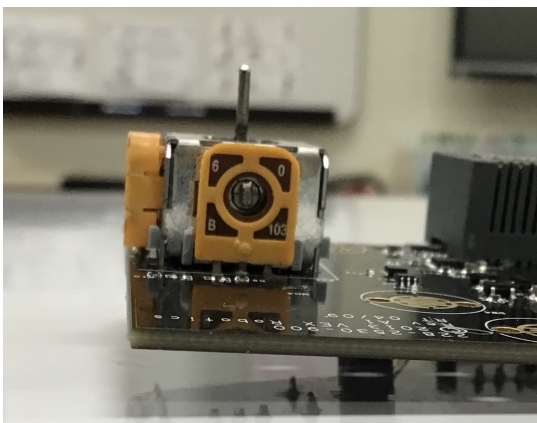
Joystick

Inside of Controller



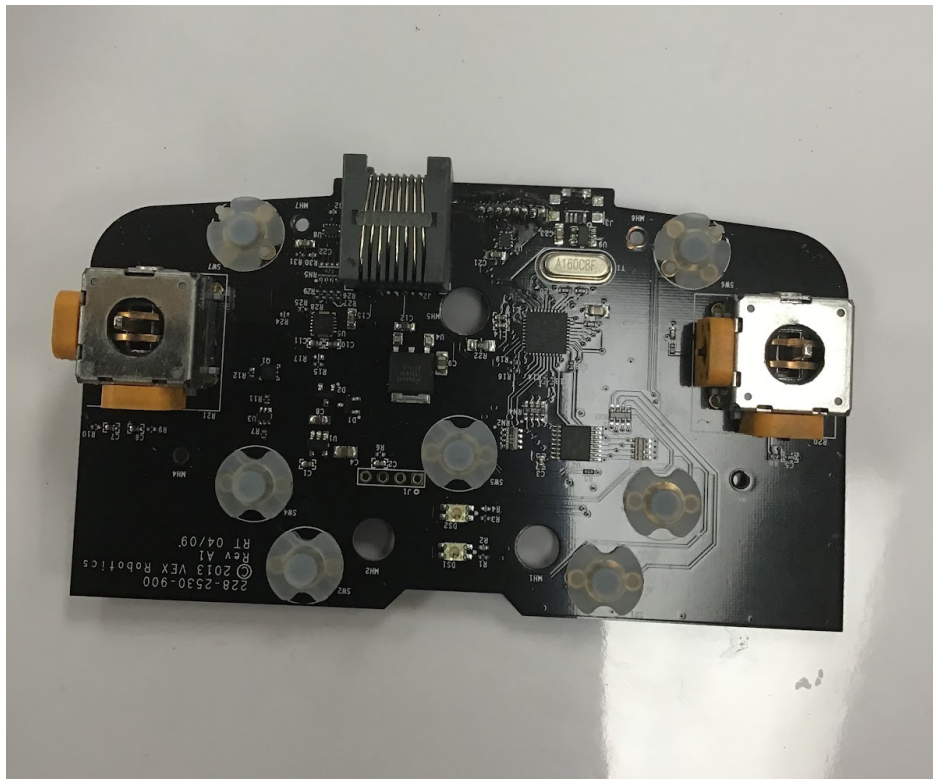
To the left, you can see, the covers are still on the remote. In the Photo below, it shows what the the joystick looks like it is without the joystick covers.

The joystick without the cover is connected to the circuit board. When the rod that connects to the joystick cover moves, there is a metal piece that indicates which direction it's rotating. The metal piece is located in the orange square, to be more specific, the hole on the orange square that is in the shape of a circle.



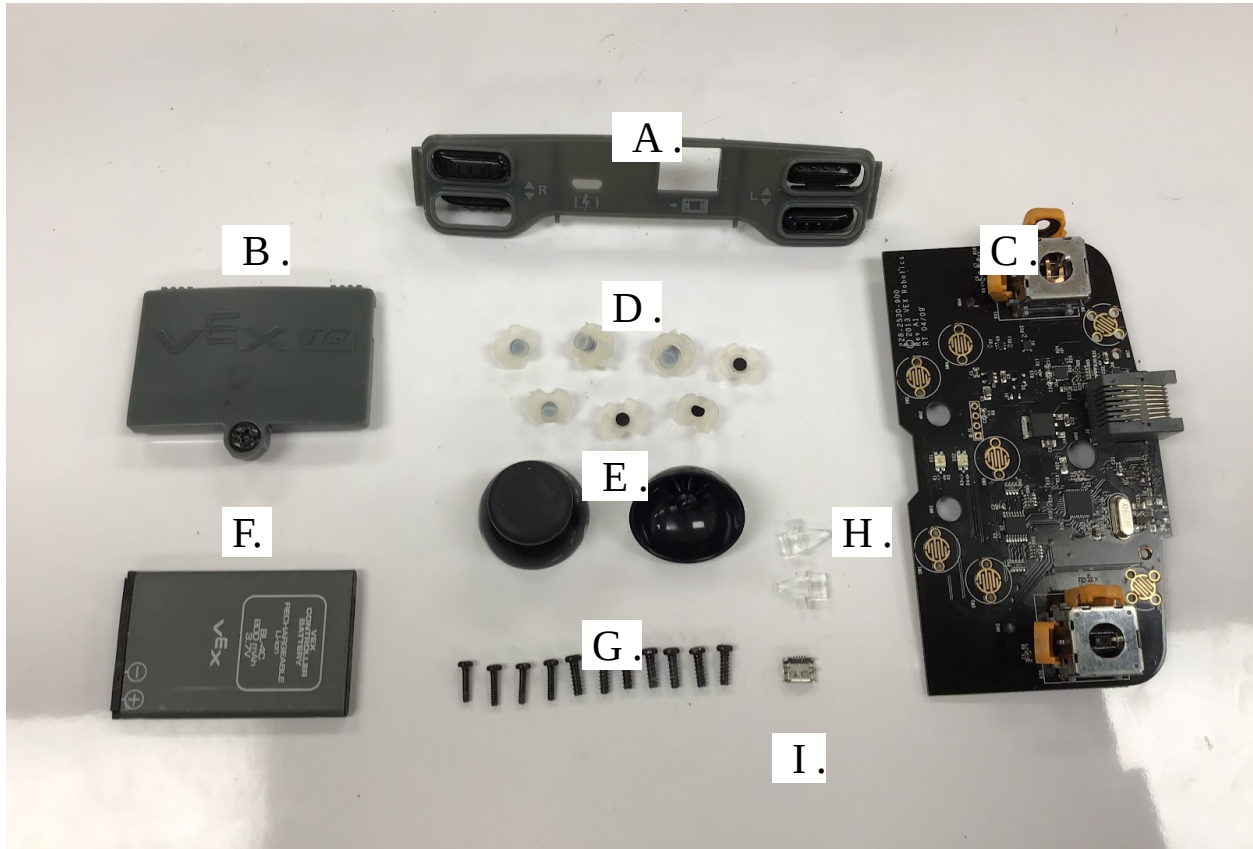
When the joystick rod moves, either the X or Y axis coordinates the movement by having the little metal piece move in the same direction. There are two orange squares, one is for the Y axis, and the other is for the X axis. The Y axis only moves when the joystick moves up or down. The X axis moves when the joystick goes left or right.

Circuit Board



The way the circuit board corresponds with the buttons is by sending electric waves through whatever conductor connects the two. Every single button has a piece of metal below it, and when the button is pressed down, the rubber contact pad is pushed against two conductive strips on the circuit board, completing the circuit. Once the controller becomes aware of the completed circuit it transfers that data to the brain of the robot. Then, the brain compares the data of the program to respond with the action matched to the button pressed. Completing the action.

Parts



- A. **Top Bumper with Buttons** - protects controller when impacted
- B. **Cover for Battery** - protects the battery from being damaged
- C. **Circuit Board** - sends electronic signals to other components of an electronic device
- D. **Rubber Contact Pad Button** - what is under the buttons that transfers information to the circuit board
- E. **Joystick Cover** - improves comfort while driving and protects the axis beneath it
- F. **Battery** - transmits energy/electricity through the circuit board and makes controller function
- G. **Screws** - holds components together
- H. **Light Cover** - the piece that is located above the light source that indicates when the battery is low or high
- I. **Charging Port** - the piece that stopped the controller from working because it was stuck on the inside
- J. **Faceplate and Backplate** - the two covers on the front and back that protects the inside parts of the controller

Conclusion

This project helped our team grow. Every single part of this project strengthened our friendship, teamwork skills, and decisive skills. We definitely had to sharpen our ability to make decisions and include everyone's opinions. When we came across any obstacle, we would always work together as a team to reach a solution. We had many ups and downs, but in the end we had a great time. Our team is very proud of what we came up with, and we are all greatly appreciative to be presented the opportunity to do this project.

Citation Credits

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