



48466C

**Reverse Engineering Online Challenge
Indianapolis, Indiana**



Made by: Wisdom.



Many things we have are manufactured not from nature. They are used and tossed, But unlike nature it doesn't decompose naturally, plastic takes 500 years to decompose



Empty water bottle

Image by Racool studio on Freepik

Introduction



Such things don't always need to be thrown out, they can be reused. Taking apart something such as a Broken controller can show how we can fix things that are unusable while still saving wasted material while learning about the controller



I'll be using a Gen 1 Vex IQ controller



Image from vexrobotics.com



Problems

The Joysticks



The Joysticks have a problem of spinning in their place when they should be stationary



How To Fix It

To fix the controller we need to first know how it all works and if there are more problems





The Case is made of 3 parts

All Images shown are from vexrobotics.com

Framework

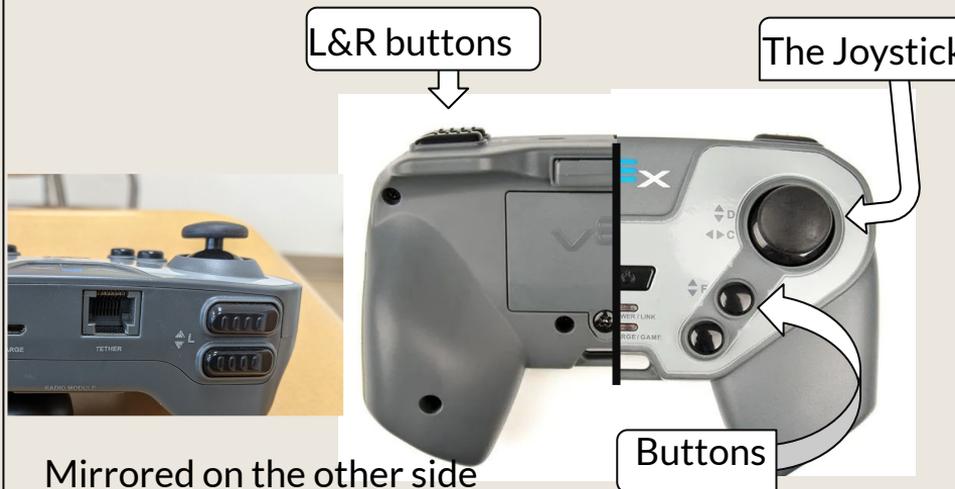


Getting into the controller was very easy



The controller has 6 screws and 1 For the battery compartment

All screws in green



Mirrored on the other side

L&R Section

The Back

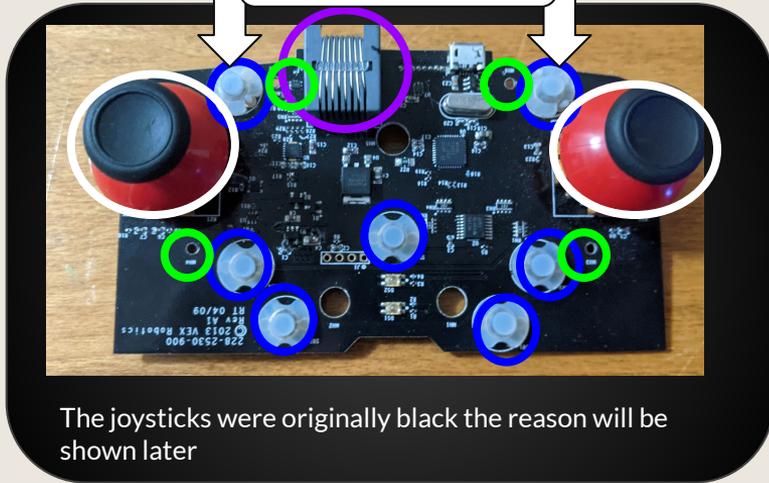
The Faceplate





Internals

There are 2 more buttons on the back



The joysticks were originally black the reason will be shown later

Once opened the PCB is exposed it has 4 screws holding it to the back

Basically the PCB would take the analog inputs from the joysticks and the digital input from the buttons to a stream of data into the radio



In Blue are buttons

The Radio is in purple

Joysticks in white

Screws in green



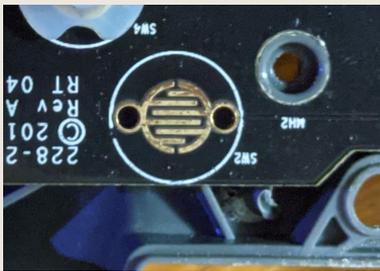
Buttons



The buttons of the controller stick out of the faceplate and sit on caps inside laying on the PCB. The buttons themselves are long



The Plastic caps are to push the buttons back up after being pushed down



Under the caps are 2 gold contacts that aren't connected. They must be bridged when the button is pressed down sending the signal

L & R Buttons

The L&R buttons use the same mechanic but are applied in a different way

When the button is pressed there is a piece sticking off it that angles into the mechanism. This is very Unique and many other controllers don't operate the same





Joysticks



The Solution

The cap of the joystick is separate, Meaning it can get damaged but still work. Since The cap was broken we could just replace it fixing the spinning



Red is new Black is old

But the new one is too small making it able to shake when assembled

The Problem

The joysticks spin when moved making it easy to mess up

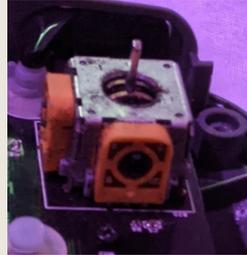
More Problems

Although this method worked to fix our problem it made more problems The old one doesn't have the right shape inside so it spins,



The Mechanism

The Controller works using a clever input



It has sets of circles inside that sit on each other. they are perpendicular making a square for the stick to move both circles, giving 2 angles using the circles. This is calculated into a vector

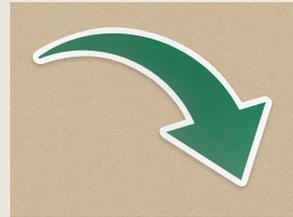


Image by rawpixel.com on Freepik



CONCLUSIONS

Now with all this analysis
I could figure out how to
improve or change
certain things for the
better

If i were a Programmer I
could program more
efficiently knowing how
it all works

Conclusively, The
controllers current
problems have been
resolved for now fixing
something that could've
ended up in a landfill

- 48466C
Jag tech



★ Thank You



For Spending Your Time
And Fully Reading



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