Electronics Online Challenge

Green: casing

Red: Buttons 5 - 6

Blue: Buttons 7 - 8

Yellow: Circuitry, joystick, and button controls

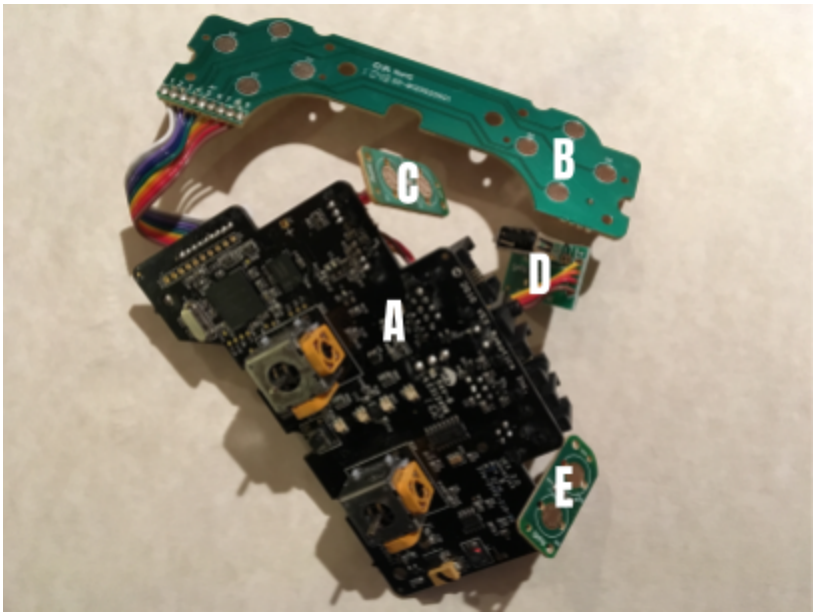
Purple:Screws

Magenta: Joystick nubs

Introduction

We decided to dismantle a VEX Joystick, as we not only have a surplus of broken controllers, but we thought that it would be interesting to find out how these parts work; after all, they are integral to the VEX competition. Also, the controller is a rather complex piece of hardware, so we thought that it would be interesting to take apart.

Components

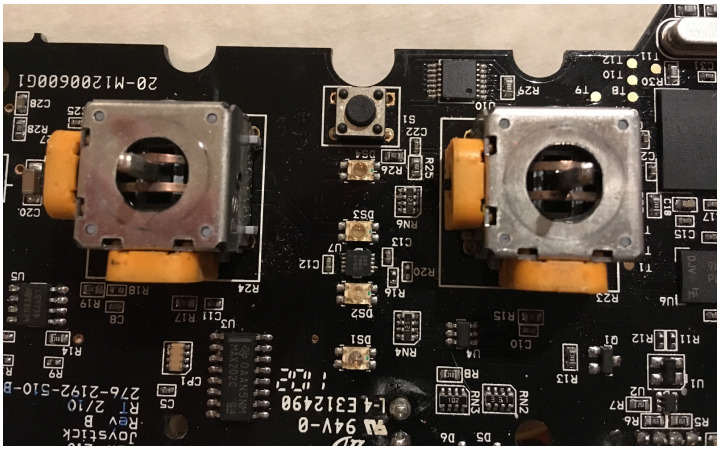


The casing was simple: it looked exactly the same as it did from the outside, except that the sides and front popped out when unscrewed. On the back was a spot to put 6 AAA batteries, which is where this controller got its power from.

In the circuitry, there were five total boards with circuits in them: there was the main lower board, A, that had a board on top of it, B,

connected by 9 colored wires. Board A was connected to the joystick by two wires, one black and one red, that were soldered on. B is solely for Buttons 7 and 8. Three boards came out the front of A: C and E are for buttons 5 and 6, respectively, where D is the USB port for the VEXnet key. There are two variable resistors on board A that are used to control Channels 1 - 4 (the joystick parts of the controller).

Board A also has four LEDs that shine different colors and are seen through the casing. It has ethernet ports that allow it to be connected to a game switch, computer, or partner controller. The power switch is located between the game switch port and the computer port.



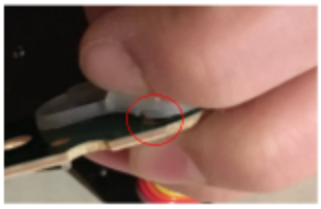
These are the variable resistors that are used for the joysticks. A current is sent through them, and based off of the angle of the little nubs sticking out of the top, the resistance changes, and the resulting current is changed to some degree. The amount of current is then translated into a value that is assigned to Ch1, Ch2, Ch3, or Ch4.

The button controls are a little bit more straightforward. Each button is made up of an incomplete circuit that is completed when a small conductible part is pushed down onto it. By completing the circuit, the user changes the value for that particular button from 0 to 1.

Unpressed button

Pressed button

The red and black wires that were soldered onto board A were what brought power to the circuits; they were attached to the batteries. The red wire is where the positive flow would be, and the black wire is for the negative.



Pressed button with circuitry showing

A few of the boards are printed with the letters “RoHS,” which we came to learn means “Restriction of Hazardous Materials.” This is a set of regulations designed to prevent harmful materials from being used in circuitry.

Conclusion

We learnt that a VEX Joystick is composed of circuits that controlled the buttons and the joysticks, which was expected, but it was interesting to see what goes on behind the scenes of what we use so much.