VEX IQ BRAIN DECOMPOSITION FOR REVERSE ENGINEERING ONLINE CHALLENGE

by MTS_Myopians, Merchant Taylors' School, Northwood, United Kingdom (HA6 2HT)

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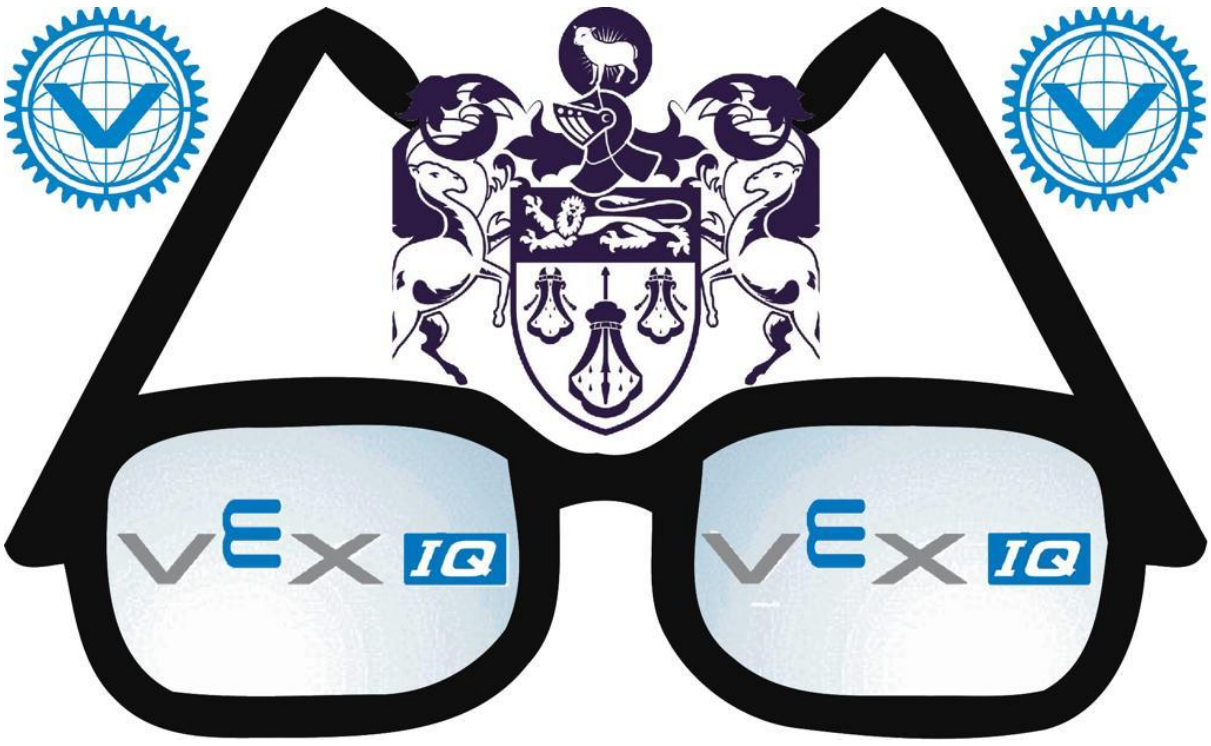
VEX IQ 13765A Reverse Engineering Challenge Video: VEX IQ Brain Decomposition



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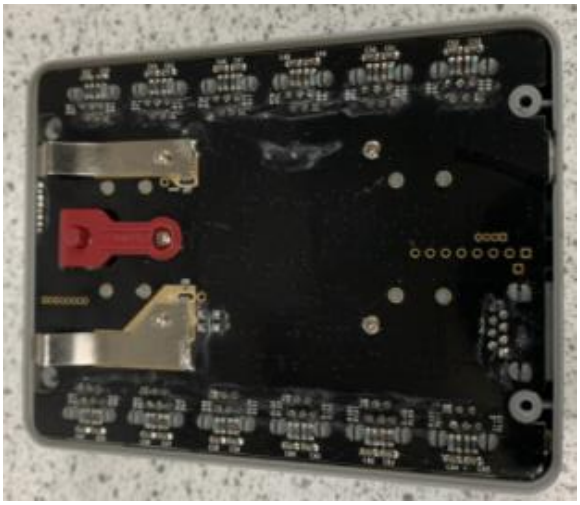
Summary Report:

For this challenge, our team decided to take part a VEX IQ Brain. We chose this as it was very relevant to our team, because we spent a lot of our time coding the brain, and driving with it, so we thought it would be interesting to see how it works. When we saw an online challenge about this, we were excited to take this opportunity to take apart a VEX IQ Brain to see what was inside.

Before even taking apart the brain itself, the first thing we identified was the radio module, this plays a crucial role as it wirelessly connects the brain and the controller which allows the robot to be driven, one of the key things needed for a fully functioning robot. After we had identified this crucial part, we removed the screws which were attached to the plastic covering at the top of the brain. This revealed metal plates which were in fact positive and negative battery connectors, the radio module ejector and the 12 connections of the different cables to the motherboard.



While decomposing the brain, we tried many different methods to try and take the components apart from each other. The most effective method we used was, apart from unscrewing, was desoldering. Once we had identified each part and its function from the top of the brain, we remove this from the plastic covering at the bottom of the brain. Underneath the plastic covering, was the motherboard which contains all the main circuits of a computer. What immediately stood out for us, was the CPU, the memory chip and wired controller connector port. The largest and most identifiable, was the CPU, where all the operations of a computer are carried out, located in

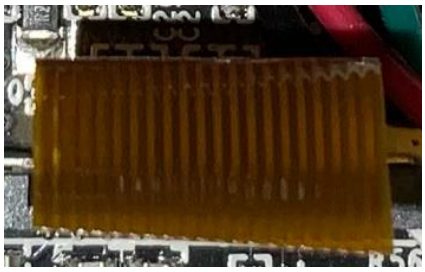
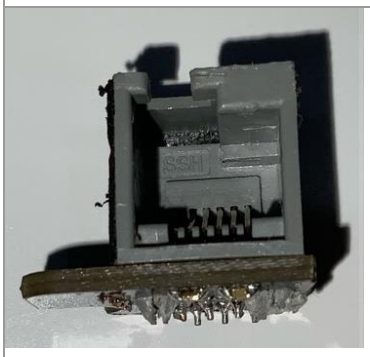
the centre of the motherboard. However, even though, these were the most identifiable pieces, we realised that every part to this circuit was crucial. Apart, from these larger components, we also identified many smaller yet still very crucial parts to the circuit such as a crystal oscillator, an FFC (flat, flexible cable) and a diode.

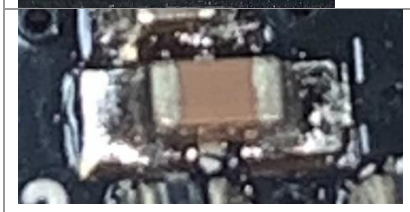
What We Learnt:

With this challenge, we all learnt many new things about the internal parts of an electrical circuit. We learnt how there are multiple parts within a computer which we had never come across before and the function of each part, how complicated a even a smaller version of a computer such as a VEX brain may be as a much larger computer and how every component within a computer is crucial and how even the smallest parts need to be placed perfectly for the computer to work. As well as learning the different and complex components which make up a VEX IQ Brain, we also learnt how to desolder materials which was new piece of equipment for us which we used to help us take apart the brain.

Parts List:

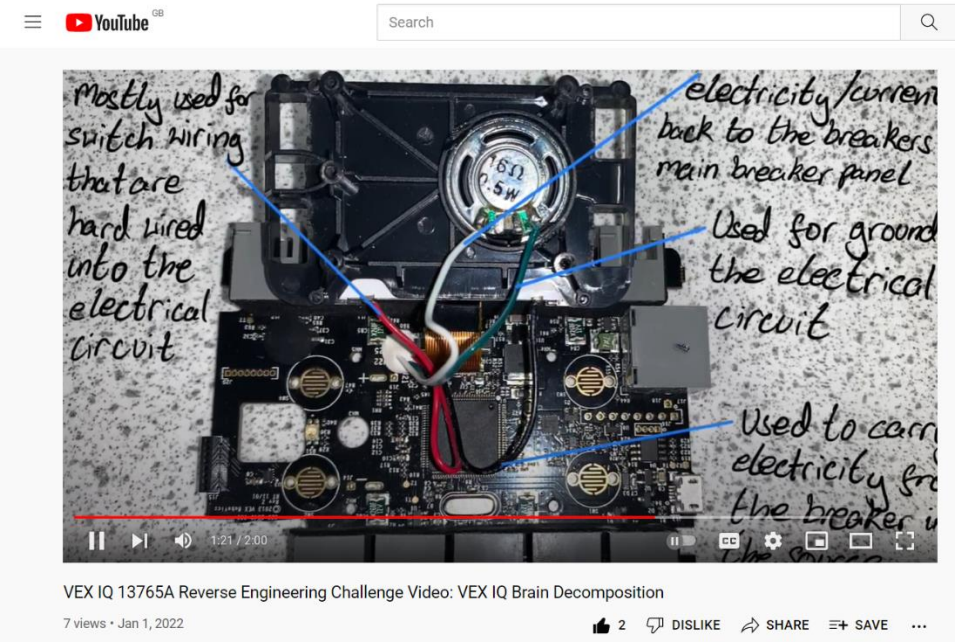
Image	Name	Function
	Radio Module	Connects brain and controller wirelessly through the 2.4GHz bandwidth.
	Micro-USB Port	Allows data transfer via a micro-USB cable. Mainly used for updating the brain and downloading code to it.
	Wired Controller Connection Port	Pairs controller and brain for the first time and allows brain and controller to connect with a wire.
	Motherboard	A board which contains all the main circuits of a computer.

	CPU (Central Processing Unit)	The part of a computer where all operations are executed.
	Memory Chip	Where all data is stored while not being used.
	FFC (Flexible Flat Cable)	It is many cables stuck together in a flexible format. In this case, it is used to transfer data to the LCD.
	Motor Connector Port	Connects motors to the brain via a wire that goes into this port. There are 12 of them in the brain.
	LCD Display	Displays information from the brain.

	Crystal Oscillator	Creates an electrical signal with a constant frequency.
	SMD Capacitator	Its primary function is to charge as well as to discharge an electrical supply.
	Resistor	To limit or control the flow of electrical current within a circuit.
	Diode	A device that allows electrical current in only one direction.

Video Link:

https://youtu.be/68eNH9FnVEE



This is a video documenting how we deconstructed the VEX IQ generation 1 brain as part of the Reverse Engineering Challenge. We identified the components and researched their functions. We have learned a lot from this process!

Enjoy the Video!