

1715Z Reverse Engineering Challenge



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01

What is a VEX IQ brain?

VEX IQ gen 2 brain with a gen 2 battery

INTRODUCTION

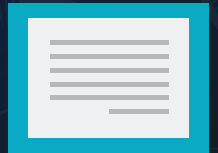
The VEX IQ Generation 2 brain, a microcontroller powering all robots, is responsible for processing and executing commands, necessitating a comprehensive understanding of its basic components.





02

Taking apart The Brain



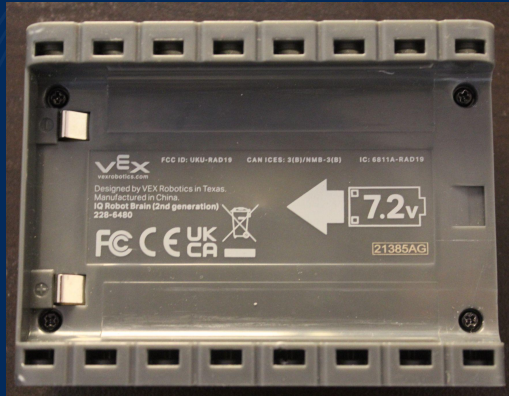
TAKING APART THE BRAIN

The image depicts the brain disassembly process, a simple and straightforward process using only a few screws, allowing for easy study of the inside.



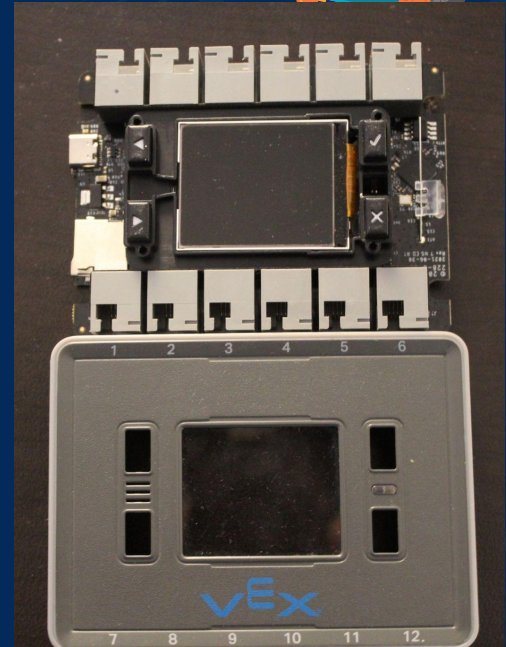
REMOVING THE BACKPLATE

Flipping the brain exposed four screws in each corner. With a matching screwdriver, we removed them, revealing a complex structure with dots, spots, numbers, two large metal objects, and a mysterious purpose."



SO WHAT'S ON THE FRONT

After removing the backplate, we flipped it around cautiously and disassembled it from the front. A protective covering guarded the screen, and our curiosity focused on the thin yellow part, deducing it as the radio antenna and the USB-C port.



FIRST LOOKS OF THE BRAIN

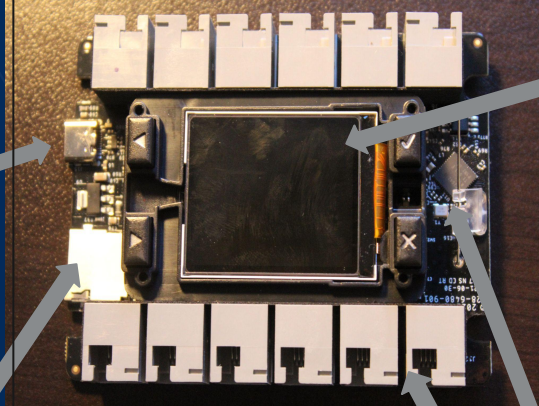
The brain's USB-C port is vital for loading driving or autonomous programs.

Micro escape cards on cameras store files efficiently and are widely utilized.

Smart connectors, numbering 12, link motors and various sensors—TouchLEDs, gyroscopes, and light sensors—to the brain.

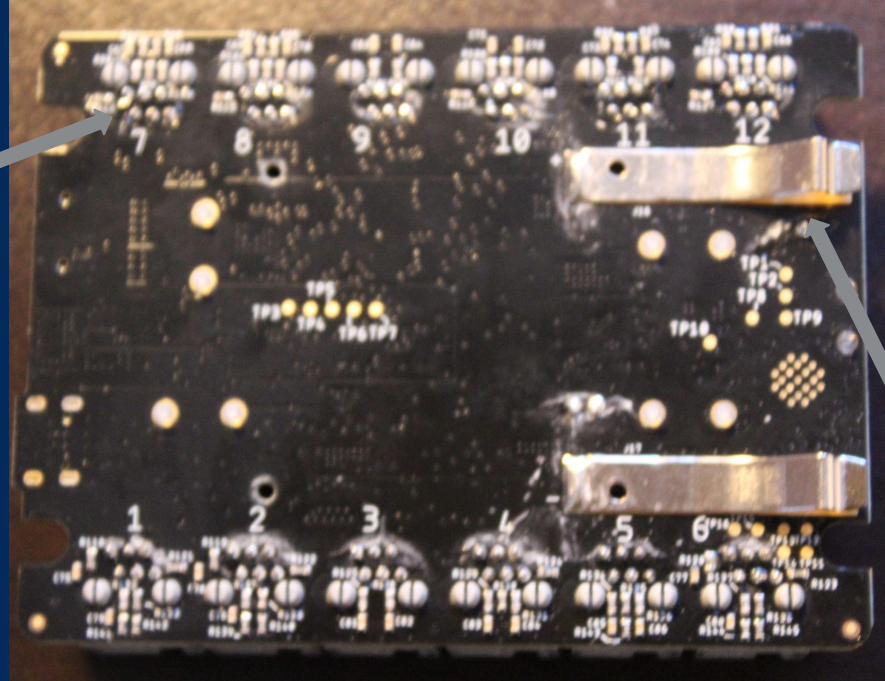
The LCD display is vital for programming and controlling robots, enabling program writing, sensor monitoring, motor control, and displaying battery life and connection status.

The new controller utilizes a radio antenna for swift Bluetooth connectivity with the brain.



What about the back?

Soldering joints connect brain and smart ports by joining metal surfaces with solder as filler material.

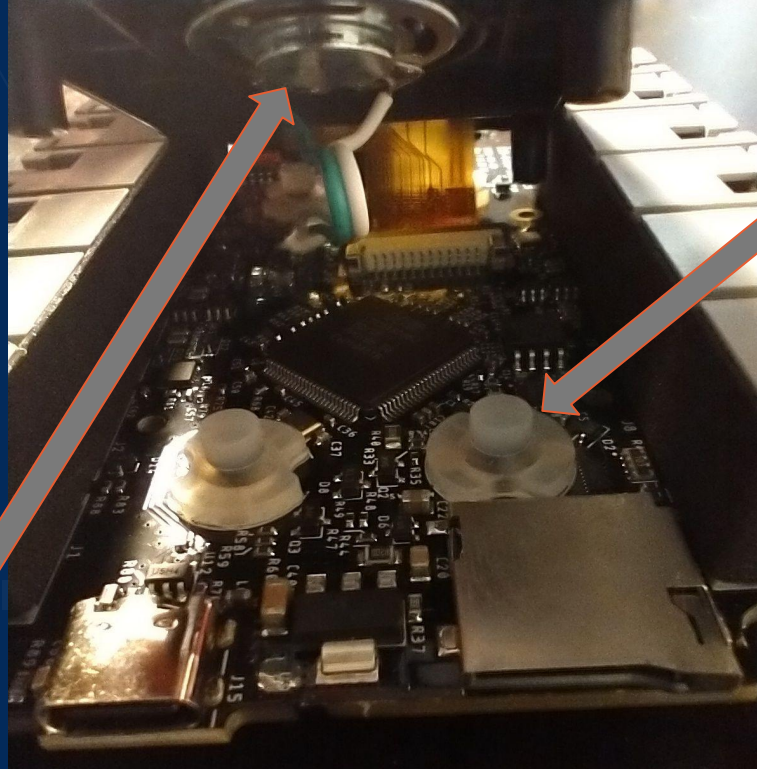


The 7.2V battery is secured with Terminal Connectors—silver items featuring a positive and a negative terminal each.



Exploring Deeper

The speaker utilizes two wires for audio, with green for input and white for output.



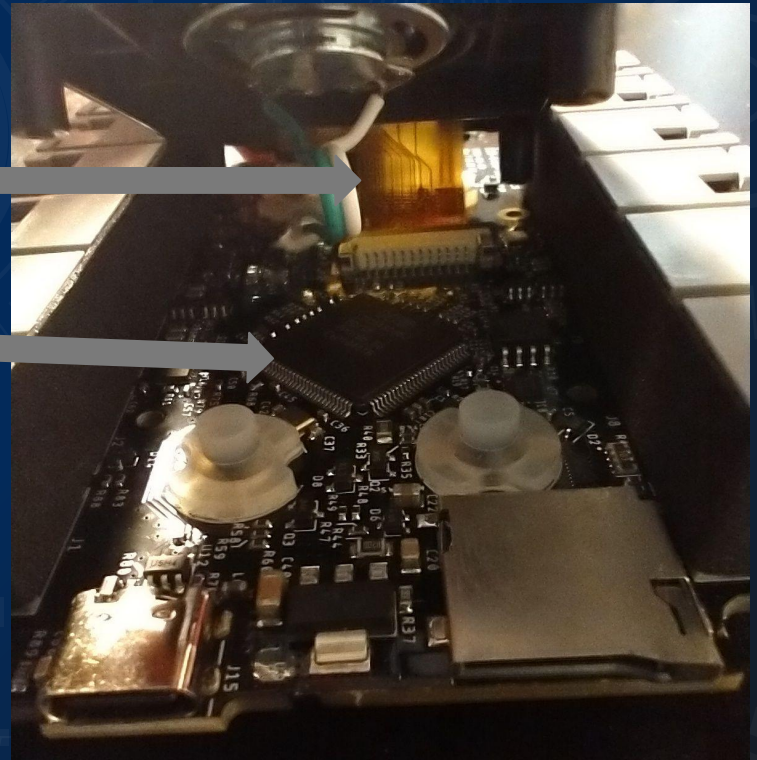
A button acts as a menu selector,, and power switch, sending current to the chip for binary code processing.



Exploring Deeper Continued

The display bus connects the brain's bottom board to the LCD, facilitating data transfer between computer components or devices.

Chips are tiny electronic devices with interconnected components like transistors, resistors, and capacitors, processing and storing information in electronic devices.

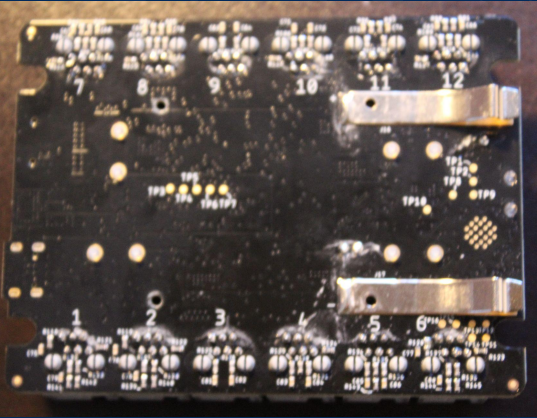




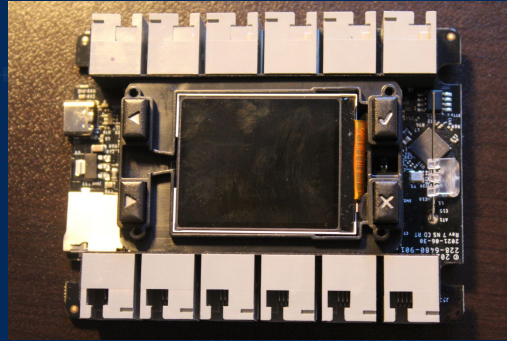
03

Analysis

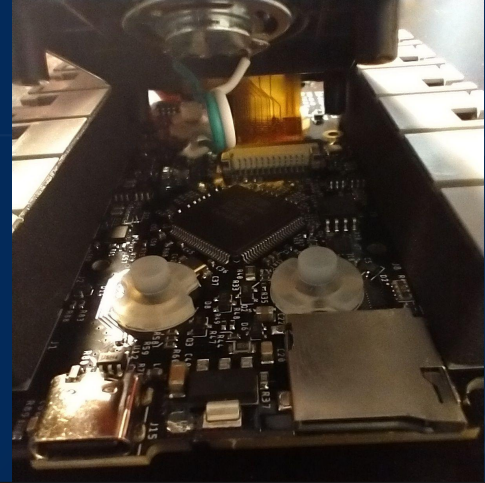
Summary of the Brain



The battery features 12 soldering joints on the back and a positive and negative terminal connector.



The device has 12 smart ports, a USB-C port for micro escape card storage, a radio antenna on the right, and an LCD screen for object display.



The LCD system includes a programming speaker, data storage chip, hotbar buttons, and an LCD screen connected to the display bus.

What we learned

Reverse engineering the VEX IQ Brain unveiled internal components, inspiring the author to optimize robots, such as 1715Z's, by reducing parts. This process deepened their understanding of technology and rekindled memories of seventh grade, fostering an appreciation for exploration and engineering.



04

What We Learned



05

CITATIONS

Resources

Websites Citations:

<http://en.wikipedia.org/wiki/Soldering>

www.futurelearn.com/info/courses/computer-systems/0/steps/53503#:~:text=As%20the%20key%20is%20pressed.

en.wikipedia.org/wiki/Integrated_circuit.

[en.wikipedia.org/wiki/Bus_\(computing\).](http://en.wikipedia.org/wiki/Bus_(computing).)

Video:

[www.youtube.com/watch?v=Mlqs7GuY.](http://www.youtube.com/watch?v=Mlqs7GuY)

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