

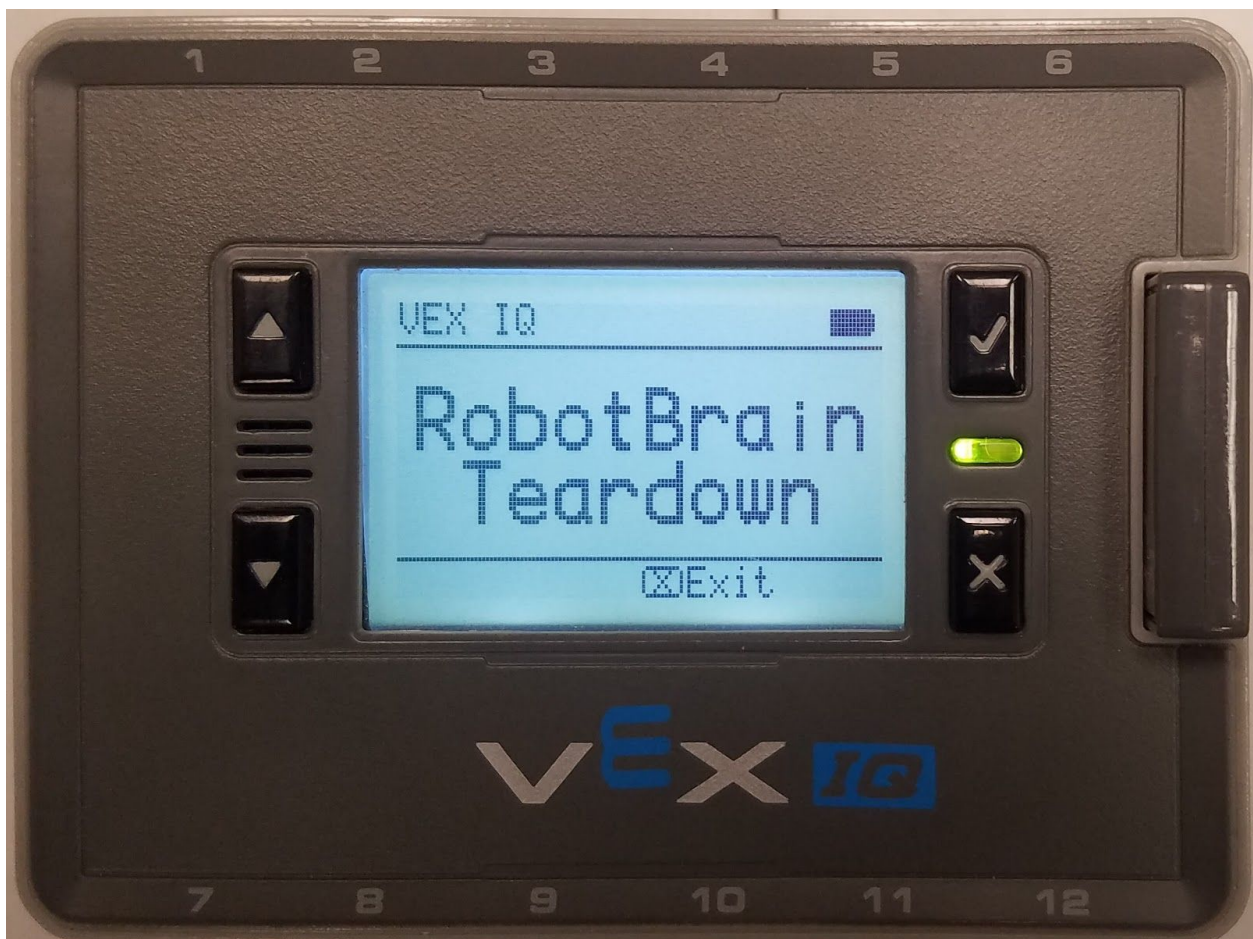
VEX IQ Team 10700A Fellowship of the Rings

Great Minds Robotics

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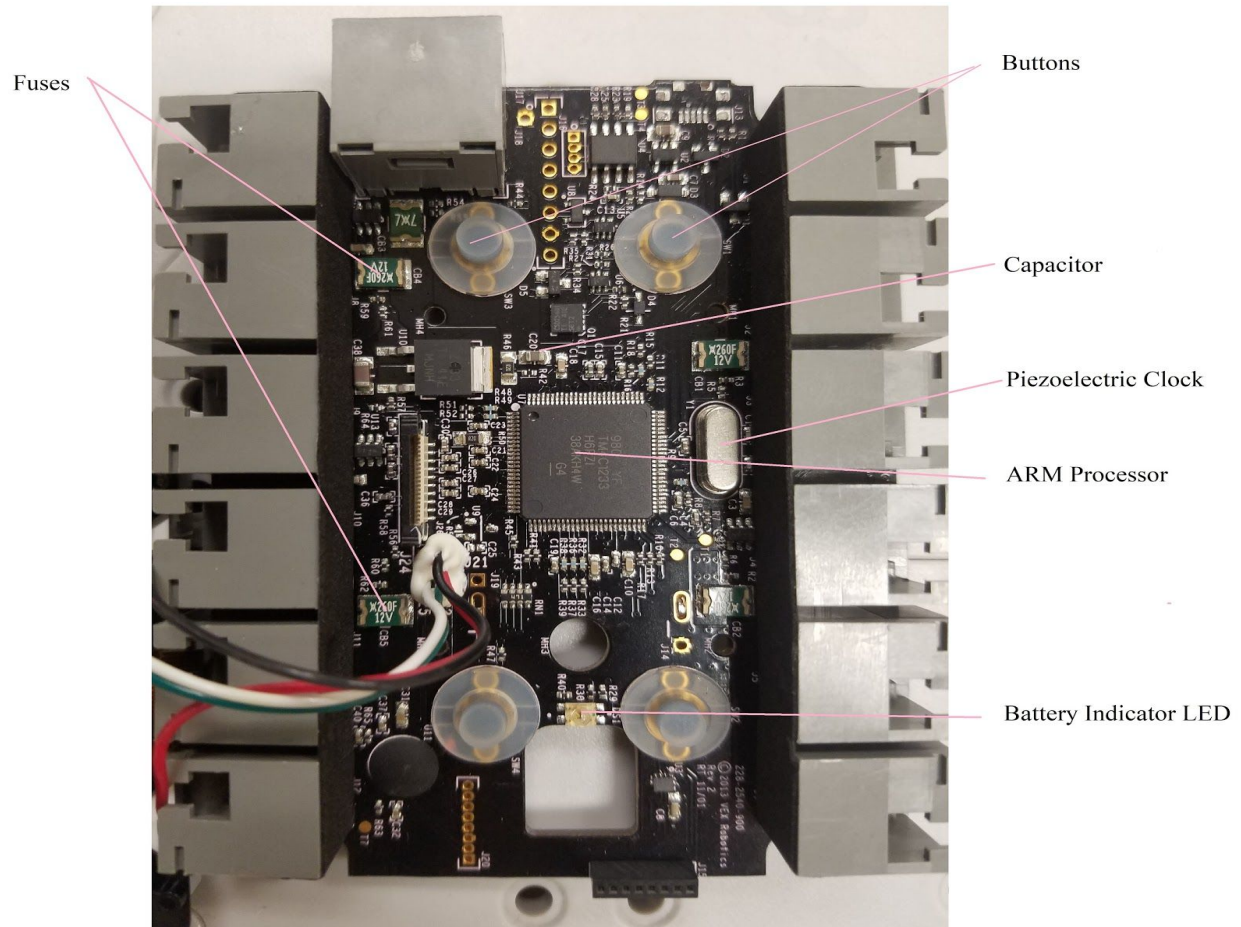
Electronics Online Challenge



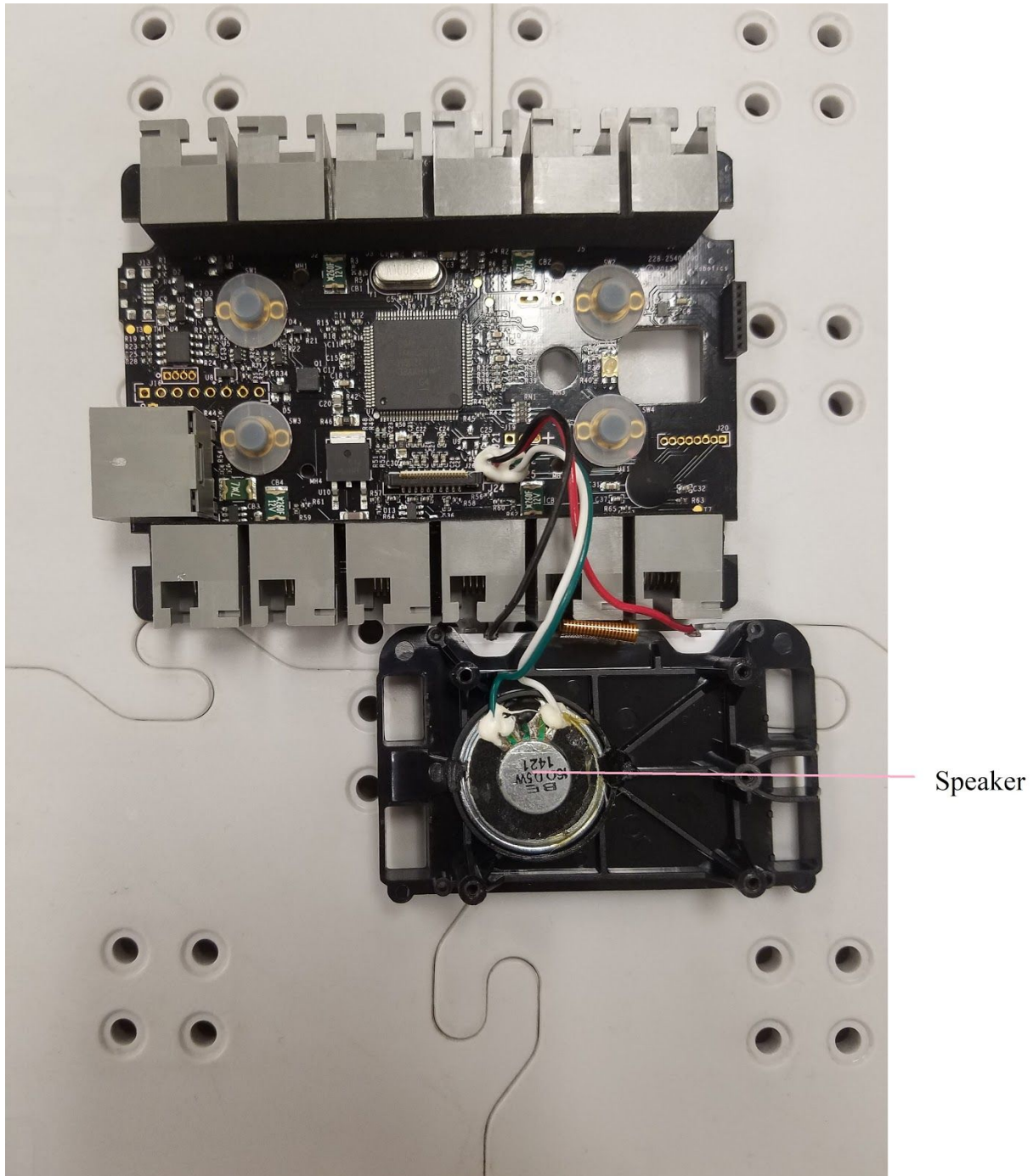
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We chose to disassemble a VEX IQ brain because we were interested in how a device that we use frequently works. The brain additionally contains many components used in modern computers, but on an easier to understand scale.



Picture of opened brain



Opened brain showing back of screen

Upon removing several screws from the bottom, the screen and speaker assembly could be removed to reveal the motherboard of the VEX IQ brain. The motherboard contained a main

ARM Cortex processor made by Texas Instruments, a crystal oscillator, and other components of electronic circuits like resistors and fuses. Additionally, four buttons are located under holes in the casing.



The TI ARM Cortex is a processor designed to operate quickly at the cost of complexity. ARM processors use less electronic connections for calculations, so they consume less electricity and produce less heat; both of which make them ideal for battery-powered applications like VEX brains.

The crystal oscillator takes the shape of a metallic oval near the ARM Cortex. By using the piezoelectric effect of crystals, the processor applies a current to a crystal to create vibration at a precise frequency. This vibration is used as a clock signal for RAM and other components that require synchronous operation.



Other components in the circuit include resistors, which reduce electrical current for use in different parts of the circuit like LEDs or the processor. Green capacitors, devices that store energy and then release it all at once, are used in the circuit to smooth out changes in current level. Resettable fuses in the brain prevent current that is too strong from destroying components. One LED, an

electronic component that permits electricity in one direction and emits light when used, is placed under a gap in the case to indicate battery level and controller connection when running programs.

The four visible buttons on the VEX IQ brain are just rectangles that push force sensitive buttons on the motherboard. By pushing down these buttons, two contacts are connected to complete the flow of electricity.

Through this experience, my team learned the basics of many electronic components and systems. We learned about how to identify parts based on product number and how to decode information on the components. This knowledge will help us in future opportunities to learn about electronics.

Works Cited

TM4C Microcontrollers Overview <http://www.ti.com/lit/sg/spmt285d/spmt285d.pdf>

ARM Architecture Explanation <https://www.arm.com/products/processors>

Button Information <https://www.adafruit.com/>

Basic Components <https://www.sparkfun.com/>