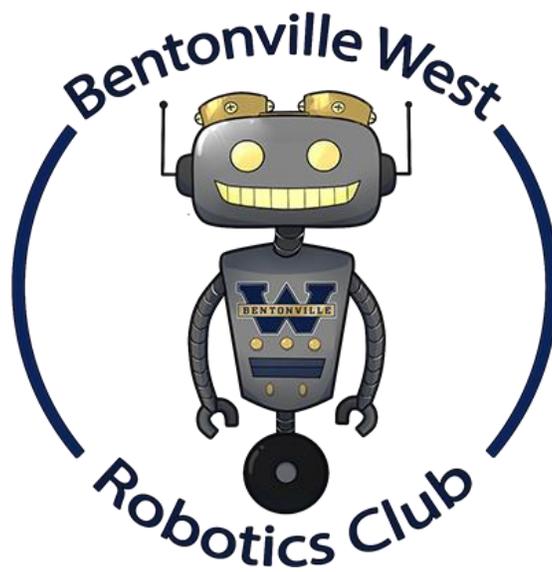


# Texas Instruments Electronics Online Challenge

## Vex Cortex Breakdown



Team 33619B – Navy Knights  
Bentonville West High School Robotics Club

## Decision

When we first looked at this challenge, we immediately decided to take apart the Legacy Vex Cortex. Due to our teams obtaining V5 systems for every team, the cortexes were not in use. Another benefit was the fact that this particular cortex was broken, meaning that by dismantling it we would not be causing any damages to said device. It would also be interesting to view the insides of a system that has been with our robotics careers for many years.



*Vex Legacy Cortex from above*

## Disassembling

The cortex was easy to disassemble since it only has 4 screws on the back that hold the cover. Upon removing the screws and lifting the cover, we could see the motherboard with all of the different semiconductors.



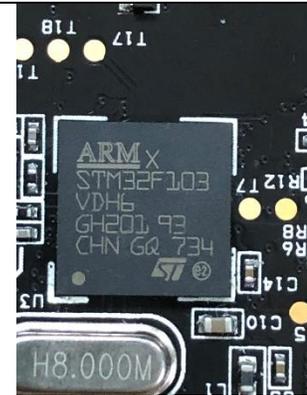
*Cortex with its cover removed.*

# Components List

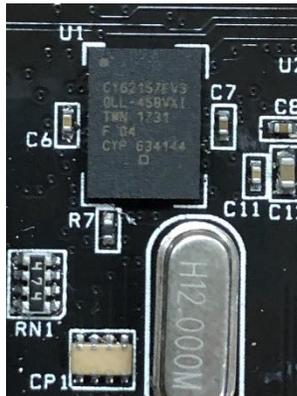
Semiconductor Name	Company Name	Document
LPC2458FET180	NXP Semiconductors	<a href="#">NXP</a>
STM32F103 ARM Cortex-M0	STMicroelectronics	<a href="#">STM</a>
CY62157EV30	Cypress	<a href="#">CY</a>
L5973D	STMicroelectronics	<a href="#">STM2</a>
LM2940CS-5.0	Texas Instruments	<a href="#">TX</a>
IRF8313PbF	International Rectifier	<a href="#">IR</a>



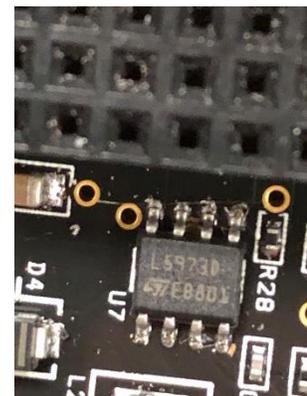
*NXP Semiconductor's  
LPC2458FET180  
Microcontroller*



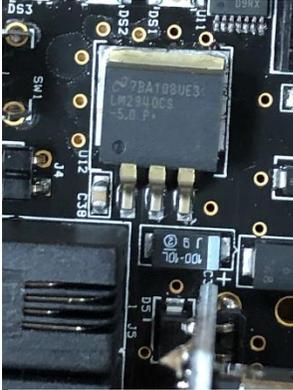
*STMicroelectronic's  
STM32F103 ARM Cortex-M0  
Microcontroller.*



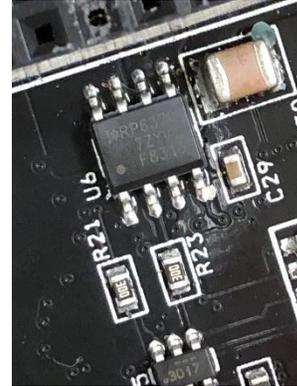
*Cypress's CY6215EV30  
Semiconductor*



*STMicroelectronics  
L5973D Step down  
Regulator*



*Texas Instrument's  
LM2940CS-5.0 Low Drop  
Down Regulator*



*International Rectifier's  
IRF8313PbF*

Out of all the components, there were 3 that stood out.

## Component Information

### LPC2458FET180

Originally apart of Phillips, founded in 1953, NXP is one of the 5th largest semiconductor manufacturers. They helped with the first words transmitted from the moon.

The LPC2458FET180 has

- 512 kB of on-chip high-speed flash memory
- 32 bit ARM and 16bit Thumb instructions.
- Multi-purpose communication applications with 10/100 Ethernet Media Access Control
- A USB full speed controller,
- Two Controller Area Networks
- External memory interface.

Based on the information, I believe that the component is used to store information, respond to inputs, and communicate with external pieces. Its role is most likely to communicate with the joystick due to the ARM and Thumb capabilities and hold the system firmware due to the memory capabilities.

### STM32F103 ARM Cortex-M0:

STMicroelectronics is an Italian-French company that was founded in 1987 as a merger between 2 companies, SGS Microelectronics and Thomson Semiconductors.

The STM32F103 spars

- 64 or 128 Kbytes of Flash memory
- 20 Kbytes of SRAM
- up to 80 fast I/O ports
- debug mode

- sleep, Stop and Standby modes
- 72 MHz maximum frequency
- USB 2.0 Interface.

The item is another information storing conductor with the ability to be rewritten on, similarly to the LPC2458FET180. In the system the most likely use is to store the code information based on the USB and debug capabilities.

## LM2940CS-5.0:

Founded in 1951, Texas Instruments was the first company to manufacture transistors and introduce the first commercial silicon transistors. The LM2940CS-5.0 is a Low Dropout Regulator used to regulate electricity. Advantages include

- Smaller than most DC regulators
- Doesn't make switching noise due to it not having to switch
- Internal Short Circuit Current Limit

I think it is used to convert a specific amount of volts into a smaller amount in order to make sure the amount of electricity is not too high that it blows out a component.

## Conclusion

This challenge has provided us a way to view how the previous system works. We learned about how many different companies' semiconductors are used in a single system and are able to work together so efficiently. It gave us a better understanding how electrical systems work.