Texas Instruments Electronics Online Challenge 2018

Component: VEX IQ Controller

Team 42037A – Rockin Robots

ROCKIN ROBOTS

Introduction

We are Rockin Robots from 5th grade in Shiloh Point Elementary. We chose the **VEX IQ Controller** for this challenge.

VexIQ Controller is the hub of what makes robots fun to build and easy to use. Pairing the Controller with the robot brain gives full control of our robot. This built the curiosity in us to understand the electronics behind the Controller and how it interacts with the brain and controls the robot.

At the heart of this controller is a Texas Instrument **MSP430 microcontroller**. On further researching the various components on the controller we found another Texas Instrument an **8-Bit Parallel Load Shift Register HC166**.

The Robot is controlled by the two analog joysticks and the eight buttons. The analog joystick provides finer control for accurately driving and turning a robot, or raising an arm with precise control. Eight buttons provide additional robot control for closing the claw, or activating a mechanism.


Off Spinner
Start Spinner
Lift Continuous
Lift 1x

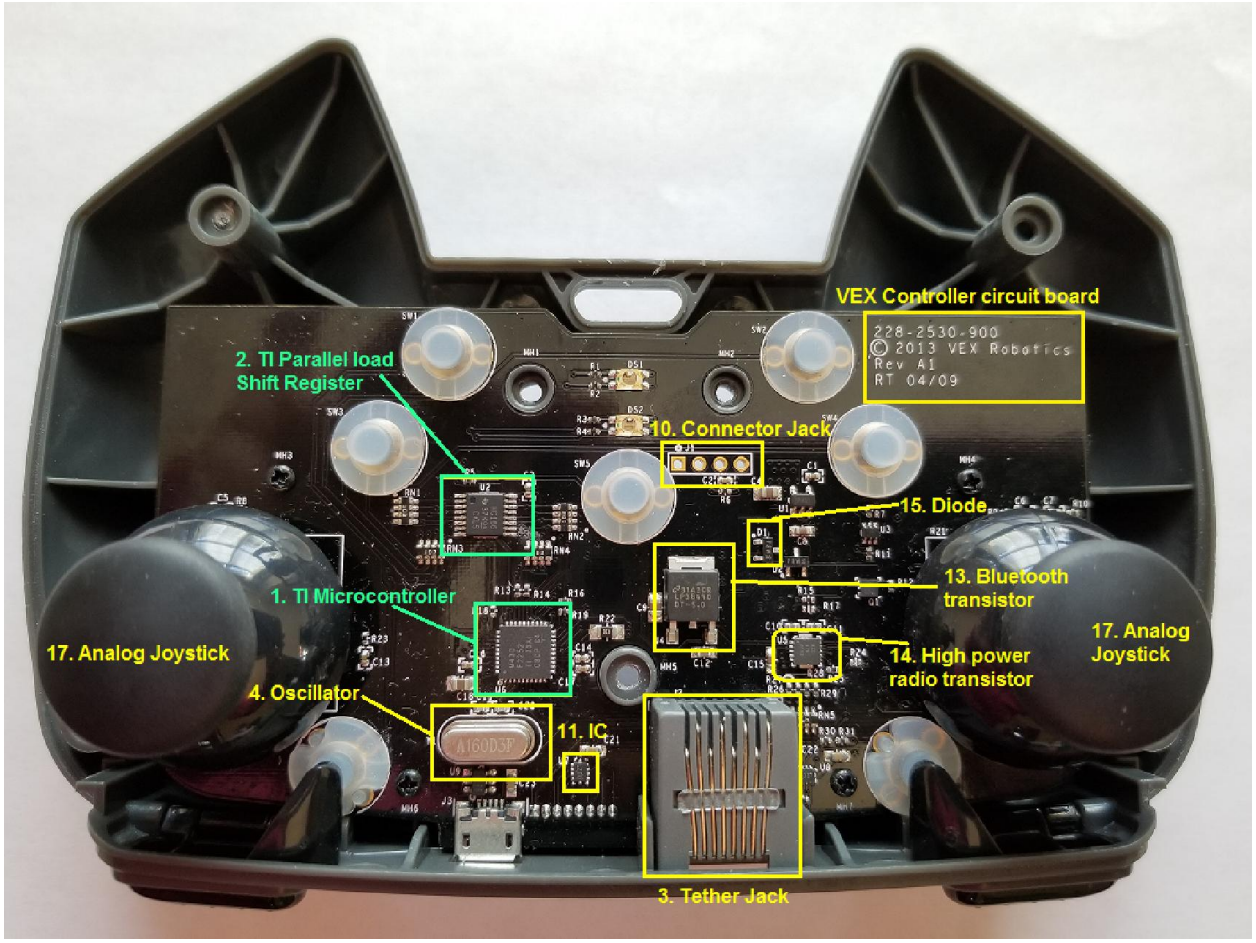

Forward/Backward
Left/Right Turn
Drive Motors Release
Reverse Ball Movers
Ramp Park LOCK
Ball Shooter
Ball Shooter OFF

Research Findings

- Disassembled View

➢ List of internal components

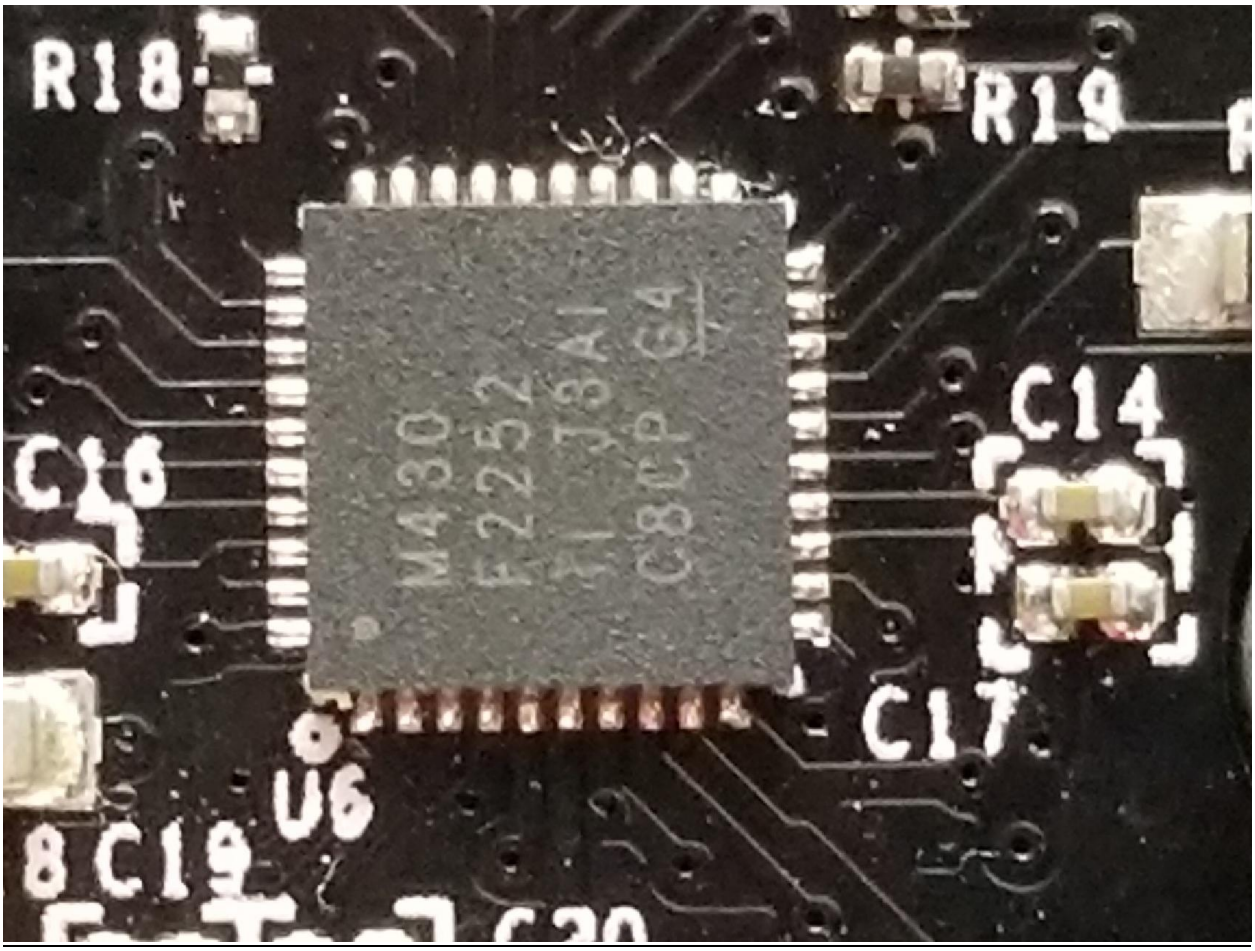
VEX IQ Circuit board (228-2350-900)



1. **MSP430 – Microcontroller**
2. **HC166 – 8 Bit Parallel Load Shift Register**
3. Tether jack
4. Oscillator - a device for generating oscillating electric currents
5. Resistor – Helps with controlling the flow of current.
6. Capacitor – Stores electric charge.
7. Switch
8. Mounting Hardware
9. Display
10. Connector Jack
11. Integrated circuit – Number of transistors, resistors and capacitors that function as Amplifier, Timer, Oscillator, microprocessor, and memory.
12. Resistor Network
13. Bluetooth transistor
14. High power radio transistor
15. Diode
16. Transistor – Regulates current and acts as switch to electronic signals
17. Analog joysticks

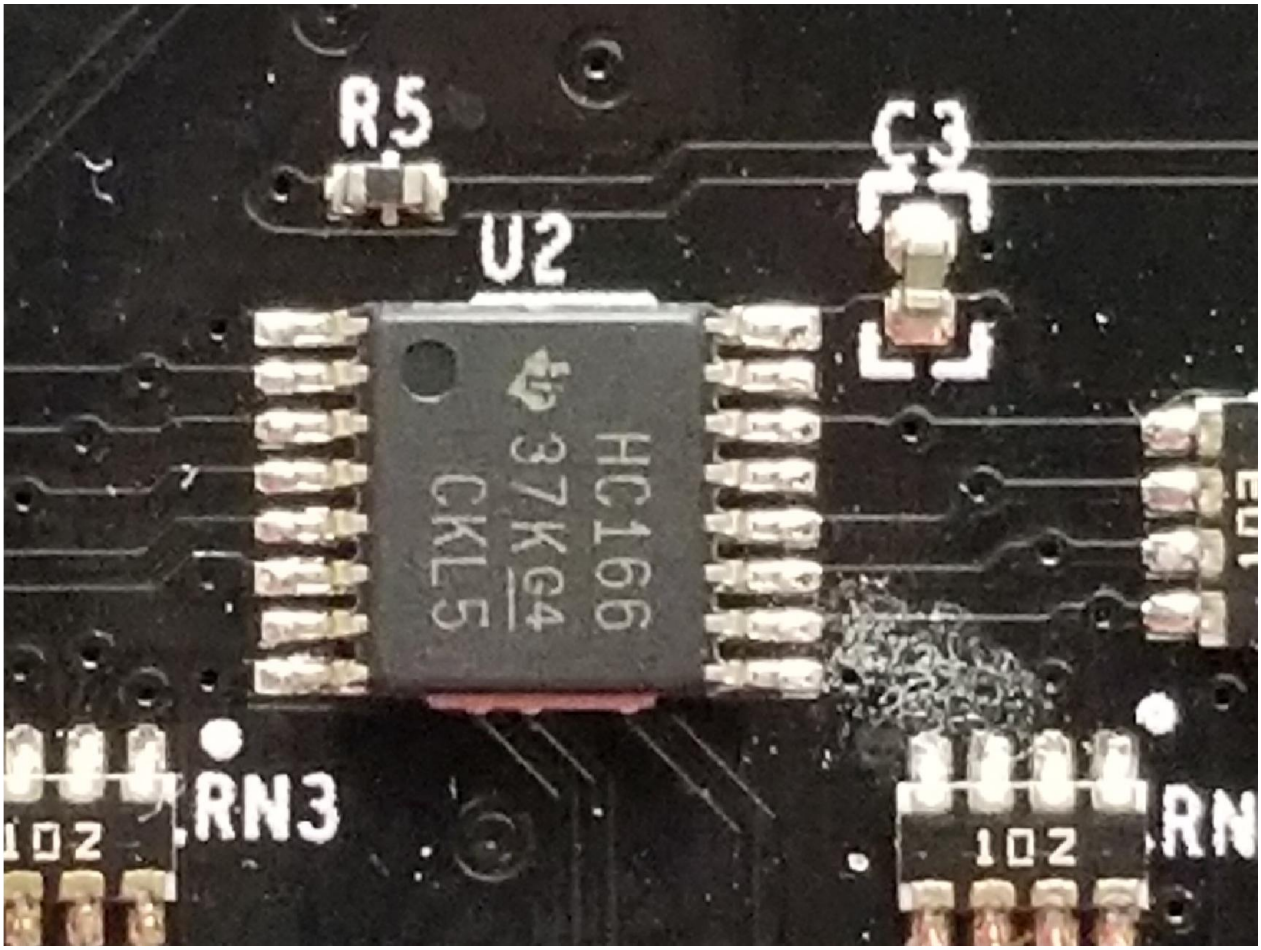
- Texas Instruments Components

MSP430 – Microcontroller



Texas Instrument “MSP430 microcontroller” reads the users inputs and transmits them wirelessly or through the tether port. The microcontroller uses ultra-low-power. The architecture, combined with five low-power modes is optimized to achieve extended battery life in portable measurement applications.

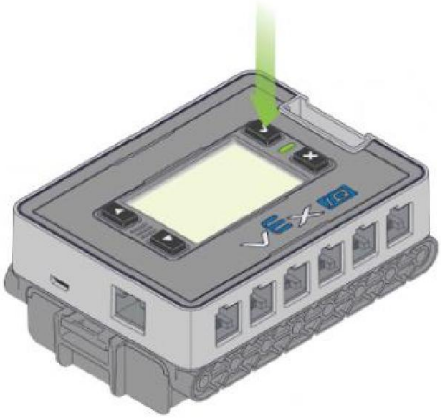
HC166 – 8 Bit Parallel Load Shift Register



On further research we found another Texas Instrument an "8-Bit Parallel Load Shift Register HC166" which shifts data to serial output. Parallel-in access to each stage is provided by eight individual direct data inputs that are enabled by low level shift/load input. It is fabricated with silicon gate CMOS technology. It consumes low power with standard CMOS IC, and can operate at speeds comparable to the equivalent low power Schottky device.

➢ Pairing the Controller to a Robot Brain

A VEX IQ robot is driven by pairing the Controller with the Brain using tether cable. On successfully tethering the communication is established through the 900 MHZ wireless Radio connection.

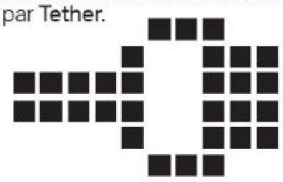


Once a Robot Brain and Controller are paired together they will stay linked even after being turned off and back on.

Une fois que le Robot Cerveau et la télécommande sont connectés, ils restent connectés même après avoir été éteint et rallumés.

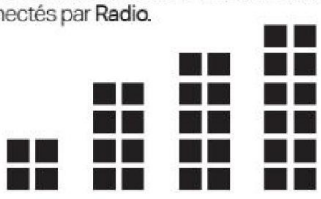
Robot Brain and Controller are **Tethered.**

Le Cerveau du Robot et la Télécommande sont connectés par **Tether.**



Robot Brain and Controller are connected by **Radio.**

Le Cerveau du Robot et la Télécommande sont connectés par **Radio.**



Conclusion

- In conducting this research project, we discovered how electronics components play a big part in VEXIQ controller.
- This research gave us insight into individual characteristics of the electronic components.
- We learnt how the controller and the brain work together to control the robot.
- This project has given us a complete different perspective of the VEX IQ challenge and the important role Texas Instruments (TI) play in the electronic components we had been using in our challenges.