2017-18 Electronics Online Challenge Sponsored by Texas Instruments



VRC team 6210Z HCS Eagles: Danger Zone

By competing in VEX robotics, we have learned many important lessons in engineering, teamwork, and design. However, in order to increase our knowledge about the more minute and overlooked inner workings of VEX Robotics components, we decided to dissect a piece of VEX Robotics equipment. Our team consists of mostly freshmen, and as we are fresh from competing in VEX IQ and have had to take apart VRC motors on multiple occasions, our consensus was to dissect a VEX IQ Smart Motor and research our findings. As an added bonus of our selection, we were able to compile a replete collection of comprehensive information comparing the VEX IQ Smart Motor to the VRC Motor 393 which we have been using this year.



VEX IQ Smart Motor Dissected

The first chip we discovered on the circuit board of the smart motor was manufactured by Texas Instruments. The part identification number was DRV8833. This chip controls the power transmitted into the motor. We learned in this endeavor that this chip in the VEX IQ Smart Motors can actually drive two brushed DC motors, or one bipolar stepper motor. This is done with two H-bridge drivers. This chip also has internal shutdown features with a fault output pin for overcurrent, short circuit, and overtemperture protection. The VRC 393 motors uses a Positive Temperature Coefficient (PTC) for overtemperture protection. Drawing from our experiences with VEX IQ motors and VRC motors, we wish that the VRC motors included this motor driver instead of a PTC.



Texas Instruments DRV8833 Motor Driver

It just so happened, the second chip was also from Texas Instruments. The part identification number was 430G2433. This chip is used to translate the input from the brain into signals sent to the motor driver chip. After a little bit of digging, our research revealed that this is an ultra-low-power microcontroller, which acts as the brain of this VEX IQ smart motor.



Texas Instruments 430G2433 Microcontroller

Throughout our experience of tearing apart motors and comparing them, we learned so much about the VEX IQ motors that we have used in previous years. We were able to figure out what the chips actually did for us while we were competing in VEX IQ. This made for an interesting discussion topic of what we thought might be in the new VRC smart motors. Because of this experience, we have become much more interested in integrated circuit chips and what their uses might be in other electronics, but especially in next year's VRC motors.