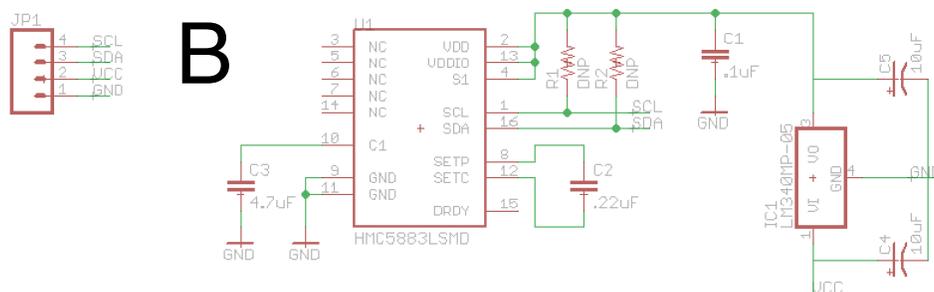
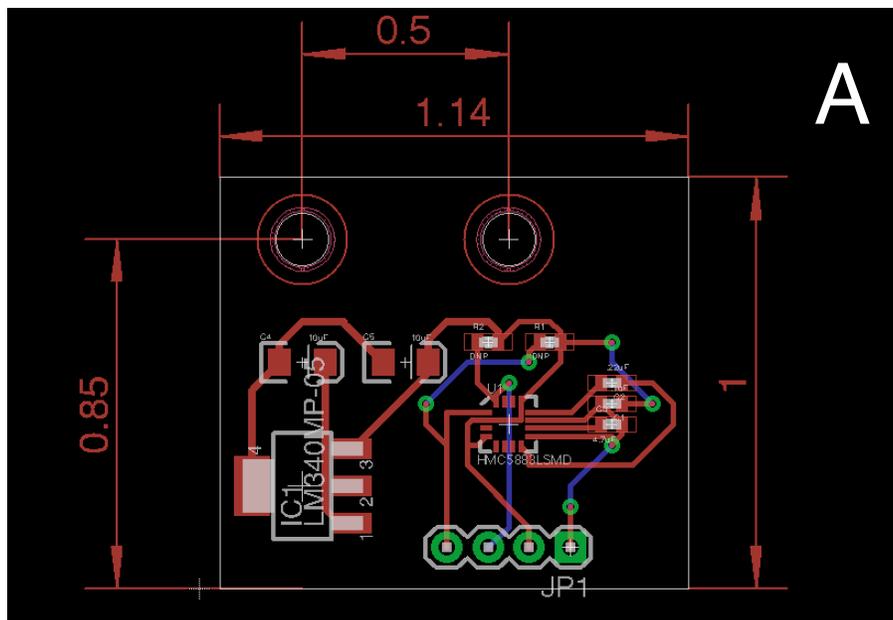


Vex compass module

The Vex Compass module is a three axis magnetometer that is designed to interface with the I2C port on the Vex Cortex. We decided that the compass module would be a great addition to the current sensor collection as it is an accurate way to know your robots orientation in any point in space. Our team currently uses a gyroscope sensor to position in autonomous. When programming, we noticed that the sensor was sometimes inaccurate and hard to work with. The compass module fixes these issues as it is more accurate, has three axes and has a robust enclosure to decrease the likelihood of the PCB(Printed Circuit Board) fracturing.

In the process of designing this part, we used both Autodesk Inventor to design the enclosure and Eagle PCB Design for the circuitry. Both of these programs helped accelerate the process of designing these components. Below you can see both a schematic design of the compass module(B) and a board design which lays out specifically where all of the components go on the board(A).

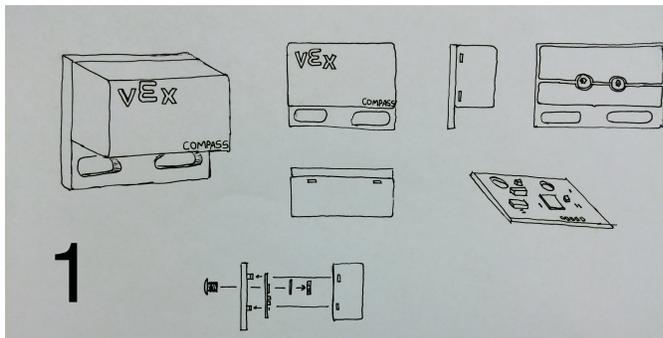


In the process of designing this part, we also used Autodesk Inventor to create the enclosure. We started with a base from the limit switch module and modified it to work with the size and shape of the new PCB. This also allows for the part to seamlessly fit with other VEX parts and our robot design.

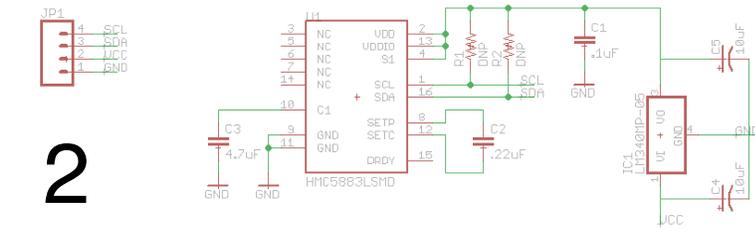
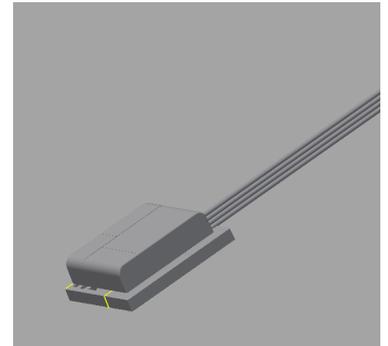
The part is designed to be simple and easy to use. The I2C port that the sensor uses allows the Cortex to communicate with the sensor and the sensor to communicate with the Cortex. The schematic design is as simple as possible including a simple compass IC(integrated circuit) and a simple voltage regulator that steps the 5v output of the cortex to the 3.3v of the sensor. The board layout is made to be small and efficient as well to make it easier to attach and use on the robot. The board layout also is made to use only two layers to make it easier to manufacture and more cost effective.

Our robot utilizes this sensor to decrease error in programming and autonomous routines. Unlike a gyroscope, which is only relative to the starting position, a magnetometer is relative to the earth. This is very useful for navigational purposes when a simple timer error can set the whole program off. The compass self corrects which makes it reliable and repeatable. The robot itself is an X drive which adds to the maneuverability and speed. It has holonomic motion meaning that it can move in any possible 2 dimensional direction.

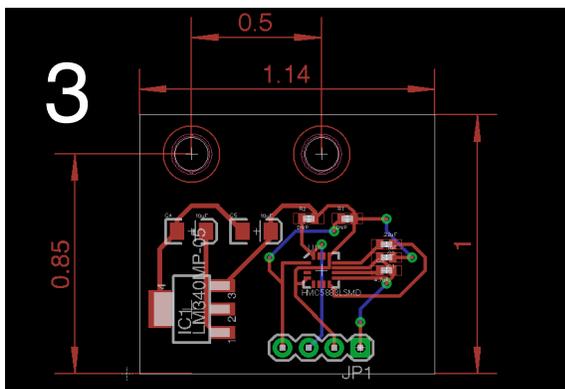
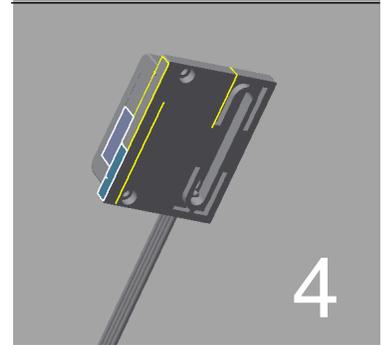
Design Process



Preliminary Design Sketches

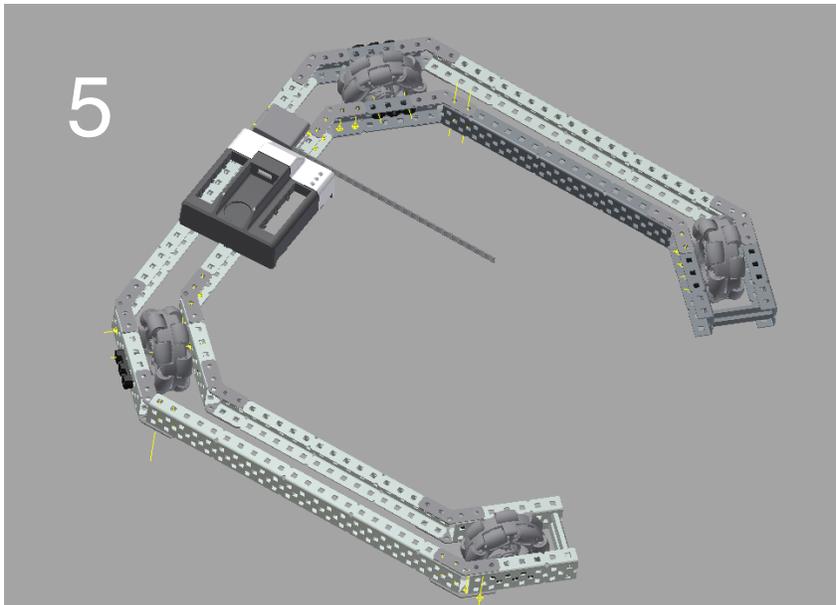


Circuit Schematic Design

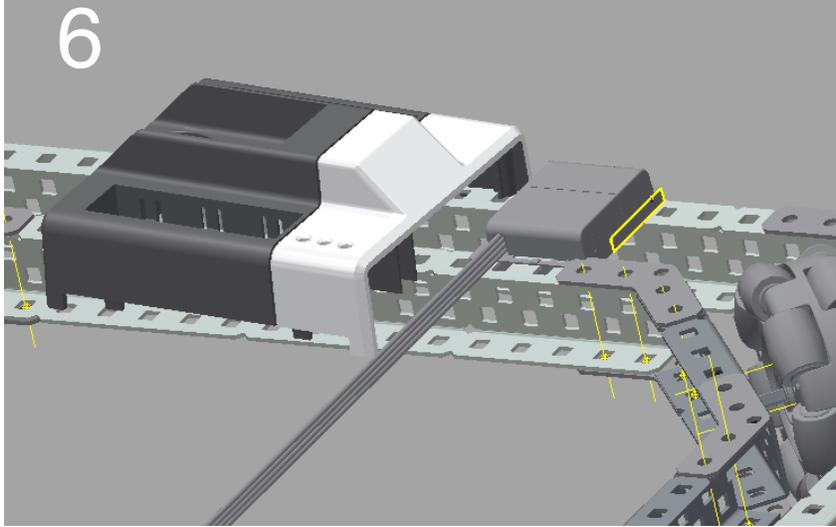


Circuit Board Design (PCB)

Enclosure CAD



Compass
Robot CAD



Compass
Robot CAD