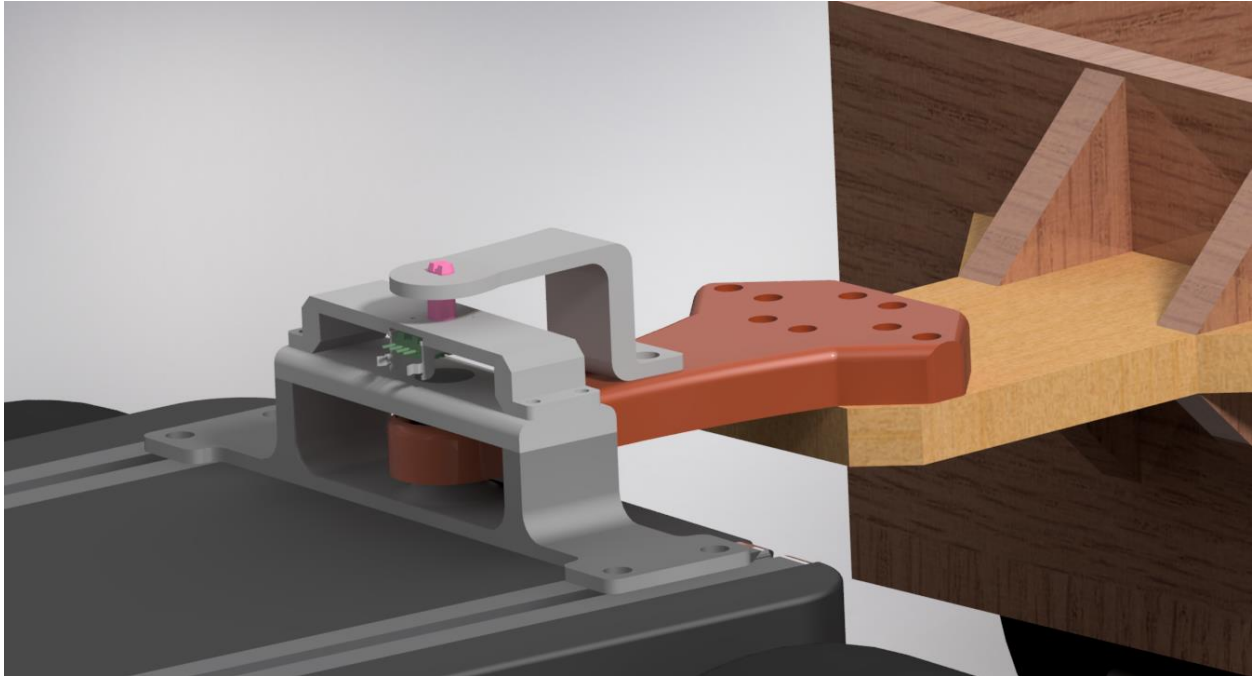# MINI Trailer | Encoder Unit Assembly

Purpose

While a simple hitch solution may be adequate for manual control of the trailer, any sort of autonomous program will need some way of knowing the trailer's position. For this reason, we opted to install a potentiometer-based encoder system onto the trailer to track its motion. The controller board presented in this iteration is very basic and only reports when the trailer has reached its maximum angle in either direction, but with a different circuit, you can easily read the trailer's orientation at any angle.

Methods

The installation of the encoder requires only two additional 3D-printed parts, which can be found in this folder. Any potentiometer could be used for this system, but the specific one that the plates were designed to receive is the CT3219-ND, which can be found on Digikey's website. To ensure secure mounting, we also used some two-part epoxy to secure the sensor.

To process the data from this sensor, we designed a custom perfboard that uses a window comparator circuit. This board could also easily be replaced with an aftermarket microcontroller if you don't feel like working with a custom board. Listed below is the basic logic of the board.

As represented by the table, the board will output a HIGH signal to the rover whenever the trailer has reached its max angle in either direction. By keeping track of its current direction, the rover can use this data point to determine which way the trailer is facing. Since its max angle is a known value, we can then use this information within a program to correct the position of the trailer and prevent a potential collision.

Trailer Encoder Board Logic	
Trailer Angle	Output
Max Left	1
Working Range	0
Max Right	1
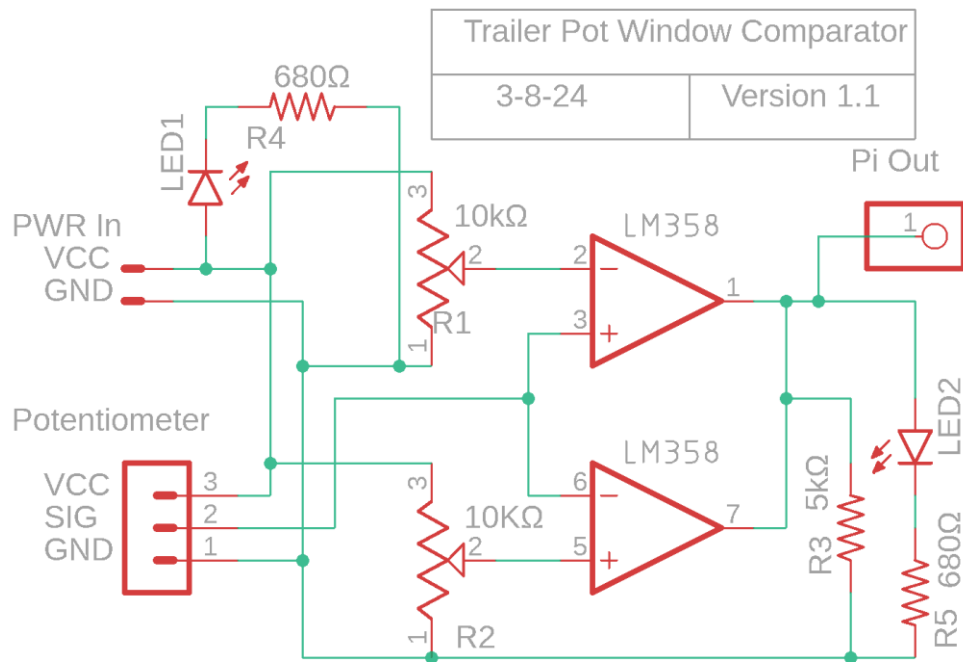
Shown above is the schematic, which we have powered using the Pi's onboard 5V rail. The output pin goes to GPIO pin #14, but this address can be easily changed in software if necessary. There is a separate plate that can be printed to secure the custom board to the frame of the rover.