Feasibility Testing Report – New Heelstrike Sensor

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Related System: Heelstrike Data

This test was to set up a prototype of the type of sensor that will be used to measure Heelstrike. The difference between this sensor and the final sensor that will be use is only the pressure level that can be applied to the sensor.

Testing Procedure

The first part of this testing was to connect the Arduino. The pressure sensor ranges between infinite to ~300k and is connected to ground and in series with a resistor that is then connected to the power supply. This can be seen in the Figure below.
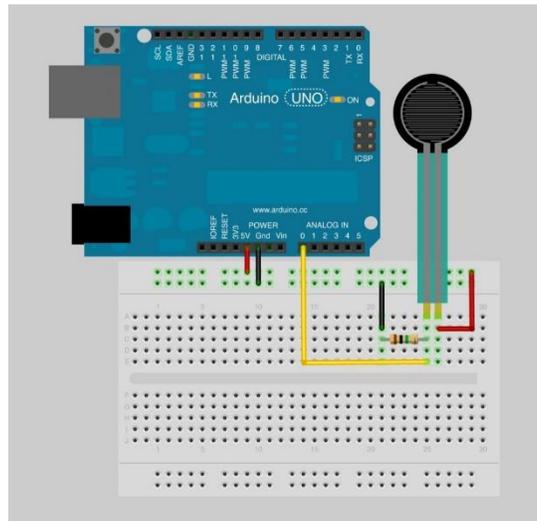
FlexiForce Sensor Code

The rest of the test was to create a function that will test the value of the ADC input and compare it to a tolerance and decide if there has been a Heelstrike.

Initialization

The code will set the ADC that is monitoring the sensor. The tolerance level that will decide if there has been a Heelstrike or not. In addition to this, serial prints enable was set.
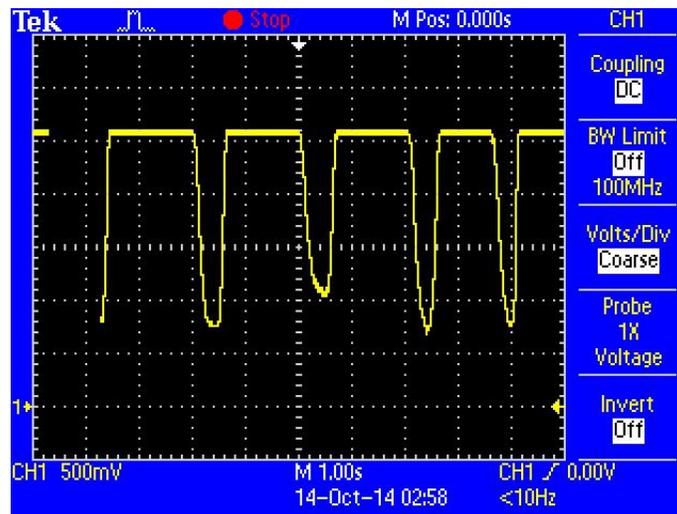
Strike

This function looks at the value of the ADC and returns a true or false of if there has been a Heelstrike. The function has no inputs and will return a Boolean.

Results

The timing of this function is important. This was found using the Arduino's on board timer. This was also done without serial writes in order to make sure that the speed is representative. The timing is recorded below.

Strike Function and a conditional statement: <1ms

The output was also monitored to see if filtering is needed. The output is seen below.

Conclusions

First and foremost, it is clear that this method of monitoring Heelstrike does work. Secondly, it is clear that this will not be not be a timing issue. However, some timing will have to be done from Heelstrike to detection. The solution might be to raise the threshold. Finally, it is also clear that there are not large spikes that will effect detection, as long as the threshold is low enough.

Next Steps

The next step would be to order then new, higher pressure limit sensor.

Reference

https://www.sparkfun.com/tutorials/389