Work Completed

During the past week, we found that the footswitches we have don’t calculate the force as we expect. These footswitches designed to record foot-floor contact and calculate all the gait parameters necessary to diagnose how well the subject walk.

It could calculate the velocity of the subject, which is the average speed expressed in meter per minutes. It also could calculate the cadence, which represent the number of steps per minutes using the following formula:

\[ \text{Cadence (step/min)} = \frac{2 \times 60}{\text{Gait cycle (sec)}} \]

The gait cycle represent the time in second from the first toe off to the last toe off. These footswitches could also calculate the stride length, which is the average distance in meter from one heel strike to the next heel strike on the same side. The formula is:

\[ \text{Stride length (m)} = \text{velocity (m/min)} \times \frac{\text{gait cycle (sec)}}{60} \]

Another parameter these footswitches could also calculate is the swing and stance. The swing is the average percent of the gait cycle when the foot is not in contact with the floor, where the stance is the average percent of the gait cycle when the foot is in contact with the floor.

Adding to these parameters, the footswitches could also calculate the initial double support when both feet are in contact with the floor. There are two periods of double support in each gait cycle. The initial double support starts at initial contact and ends when the opposite foot leaves the floor.

During the past week, we were also researching the National Instrument™ devices that we already have in stock in order to determine if they have any kind of receiver inside of it.
We found that none of the one we have include a receiver, so we contact national instruments company, and we found that they do have a card that we could implant it into the PXI 1031 that we have, but this device was very expensive and out of our budget. For that reason we decided to search for a microprocessor that includes a transmitter/receiver in it. For that reason we contacted the Microchip Company and we found 4 different microprocessors that they have transmitter/receiver inside of them and the difference between four of them is as follow:

<table>
<thead>
<tr>
<th>Microprocessor</th>
<th>Memory size (Kbytes)</th>
<th>RAM(bytes)</th>
<th>I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td>PIC16F884</td>
<td>7.2</td>
<td>256</td>
<td>36</td>
</tr>
<tr>
<td>PIC16F887</td>
<td>14</td>
<td>368</td>
<td>36</td>
</tr>
<tr>
<td>PIC16C745</td>
<td>14</td>
<td>256</td>
<td>22</td>
</tr>
<tr>
<td>PIC16C74B</td>
<td>7</td>
<td>192</td>
<td>33</td>
</tr>
</tbody>
</table>

During the meeting with our TA, he suggested that we could possibly get some force sensitive resistors and attach them to regular shoe insoles and build the circuit needed in order to be able to calculate the force of the subject striking the floor.

For this purpose, we did some research and we found a FlexiForce® force sensors that are versatile, durable and comes in different sizes, shapes and a wide range of forces. These force sensitive resistors could hold up to 100 pounds but we could make it hold up to 1000 pounds by applying a lower drive voltage and reducing the resistance of the feedback resistor.
Future Work

Our future plan is to determine which microprocessor is the best for our project and purchase the items and start building the circuit and program the microprocessor, which is going to take time since none of our team members have any experience with it. Another issue we need to solve after the meeting with our client Dr. John Enderle, is determine if we are going to built another circuit and use the force sensitive resistors or not.

Project Review

At this point I think we still a little confused regarding what exactly we are going to build. Until now, a lot of issues were solved after the past two meetings with our client. I believe that tomorrow’s meeting will be very helpful so we can start building our circuit by next week and hopefully finish programming the microprocessor within the next three weeks.

Hours Worked

12 hours