Project Identity

Biomechanics Gait Analysis Lab
Week 5
October 5, 2006
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Work Completed

On Friday, September 29, 2006 we bought batteries for the LINX TXE/RXE 418 testing kit to get a feel for telemetry but unfortunately, the circuit boards were not working. We also had a meeting with Bill Prueshner about programming or PIC16F874A with the National Instruments LabVIEW™ Embedded Module for ADI Blackfin Processors instead of having to program it with assembler or C++. However, we are not sure if the LabVIEW microprocessor programmer only works with Blackfin processors.

Bill Prueshner also suggested that we try to use just an A/D converter instead of a microprocessor but after speaking with a few faculty in electrical engineering they informed me that it is actually simpler and more efficient to use a microprocessor because it will bundle all of the information for us and send it serially to the transmitter.

Angela spoke with Mike Ozog from Tekscan’s technical support and obtained the answers to our questions.

I. What input voltage and resistor will be required to extend the 100 pound force limit?
   a. Due to variations in sensors during manufacturing and different interfaces, each sensor must be tested individually for the appropriate $V_{REF}$ (input voltage) and $R_G$ (reference resistor to extend the pound limit).
1. Sensor must first be placed into the packaging or material in which it will be used (finished product, such as an insole).

2. Attach the circuitry to ohmmeter or oscilloscope. Circuitry should have a voltage supply (start at -5V) and a variable resistor (potentiometer starts around 20kΩ).

3. Place 10% above the maximum weight (10% above to allow for conditioning) onto the product and allow the read out to stabilize (which should be saturated due to being well over the allowed weight).

4. Gradually decrease the potentiometer and the input voltage (going in the more positive voltage direction). Adjust until the read-out is no longer saturated and write down the resistance and voltage level.

5. Repeat for each FSR. Note: it should only require relatively small changes (toward zero) to reach 350 pound force, since the FSR can be adjusted up to 1000 pound force.

II. What type of actuator can be used to calibrate the FSRs?

   a. Can use an actuator (with appropriate ranges of pound force) or a set of weights.

III. What type of thin elastomer could be used to help absorb error from inconsistent force distribution?

   b. They use a medium durometer urethane, but neoprene should be fine. Make sure that there is an additional pad of elastomer on either side of the FSR ring that fits within the silver ring, as this is necessary to absorb the error without damaging the FSR or causing error.
On Monday, October 2, 2006 we figured out that we will need to use two separate frequencies to send the data from both the left and right feet in order to send the data simultaneously. Unfortunately, the transmitters and receivers with built in encoders and decoders only come in 315, 418, and 433 MHz frequencies and after talking with the tech support at LINX Technologies they informed me that the frequency difference is not great enough between the 315 and 433 MHz for the telemetry to work properly. Therefore, we are going to have to purchase the 916 MHz transmitter, receiver, and antenna as well as an encoder and decoder to make everything work. We will purchase the transmitter, receiver, encoder, antenna, encoder, and decoder from LINX Technologies. These are the part number and prices.

Transmitter – TXM-916-ES - $11.95

Receiver – RXM-916-ES - $13.95

Antenna – ANT-916-SP - $1.75

Encoder – ENC-MS001 - $3.10

Decoder – DEC-MS001 - $3.10
The Transmission layout is shown in Figure 1 below.

![Figure 1: Transmission Layout for Telemetry](image)

**Future Work**

On Friday, October 6, 2006 we need to connect the FSR’s and footswitches to the NI DAQ box and use LabVIEW to analyze the data so that we can get started with the program. We also need to use the diversified PIC training board to input the signals from the FSR’s and program the microprocessor to convert the data from analog to digital. We need to get all of our parts in as soon as possible so that we can analyze the circuit and design the board.

We also did some overview on the excitation circuit for our FSR’s and we found out that we need to order a 3pin connector and a MC34071AP operation amplifier.
Project Review

We are definitely far behind in the timeline considering the fact that we had to start from scratch with this whole design project but I am optimistic that with extra time and effort we can catch up and finish this project before the deadline.

Hours Worked

Kim – 15 hours  Omar – 13 hours  Angela – 14 hours