

Periodic measurement of nighttime weight change while asleep

Week: November 24 – November 30

Client: Timothy Juergens, M.D.
UW/VA Hospitals
Geriatric psychiatrist/sleep specialist
Phone: 239-3030 (cell)
E-mail: timothy.juergens@med.va.gov

Advisor: Wally F. Block
Tel: 608/265-9686
E-mail: wfblock@wisc.edu

Team: Kyle Herzog – Team Leader
Ben Engel – Communications
Joe Ferris – BWIG
Eric Printz - BSAC

Problem Statement

We would like to be able to measure this weight change accurately on people who are in hospital beds, and be able to view and record the weight changes over various intervals through the night (such as weighing a person who agrees to lay in bed all night at intervals of every 10-15 minutes). This is important from a research perspective on numerous potential variables that may affect this weight change, such as medications as well as sleep stage changes. We would also use this to potentially track and eventually predict those at higher risk of developing obesity, correlate with body fat measurements, activity, and assess for metabolic changes when we do things to improve/correct sleep problems. There is popular concern in the most recent sleep literature about various sleep stages, insomnia, and their impact on obesity. This scale would likely have to support a hospital bed, which sits on 4 legs, and read at an accuracy ideally around 0.02- 0.05 lbs (many scales on the market record to such accuracy, the more accurate the better). I'm not sure how the zeroed weight of the bed would affect this. Ideally it would be a device we could move to a different bed without too much difficulty (such as in 1-2 hours time), without too complex recalibration.

Last Week's Goals

- Begin work on final poster
- Purchase amplifier
- Research amplifier construction
- Begin building amplifier

Accomplishments

- In class time last Friday before Thanksgiving break we spent some time researching amplifiers for our load cell signal. We found a website that has the schematics for an amplifier that looks like it will work. We purchased the amplifier for \$5 and it arrived later that week.
- Eric and Ben met with Professor Block just before break and were able to hook up the load cell properly so that a change in signal can be seen when force is applied, but an amplifier will be needed due to the extremely small signal.
- We met at ECB to begin construction of the circuit for the amplifier, but were unable to find any available bread boards on which to build it. I emailed professor Block and asked him if he will be able to provide us with one or if we should buy one ourselves.
- We will spend Friday and this weekend building the amplifier circuit, and then hopefully calibrating and testing the load cell.

This Week's Goals

- Finish building Amplifier circuit
- Hook up entire prototype
- Complete work on the poster

Difficulties

- The price of a precise enough load cell continues to be a problem
- The circuitry may be very intricate and require help from someone who is knowledgeable with circuits.
- A prototype may have to be built that does not have the accuracy desired by Dr. Juergens
- We were unable to find a bread board
- The serial cable of the ADC is not compatible with all computers

Successes

- We have purchased parts to build a prototype
- Purchasing a load cell this early will give us plenty of time to deal with the computer programming and circuitry aspect of the design

Final Presentation														
Weekly Reports														
Notebooks														
MEETINGS														
Team Meetings														
Client Meetings														
Advisor Meetings														
BSAC Meetings														
OTHER														
Web Page														
Special Lectures														

Expenses to Date: \$88

- DATAQ computer software: \$25
- Aerocon 44 lbf load cell: \$25
- Digital Scale: \$25
- 9-V Battery: \$4
- Nuts and bolts: \$4
- Amplifier \$5