

Periodic measurement of nighttime weight change while asleep

Week: November 3 – November 9

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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

- Gain access to ECB labs
- Obtain materials to build test stand
- Build test stand
- Hook up waveform generator to ADC

Accomplishments

- We met Friday during class time and filled out the necessary forms to gain access to the electronics lab, the machine shop, and the biomedical labs in ECB. We picked up our access cards on Monday and can now work in these labs whenever we see fit
- We met on Monday night to prepare to build the test stand. We found the materials necessary in the scrap metal and scrap materials areas on the machine shop. We also found that we will need two bolts and nuts to secure the load cell to the test stand
- Tuesday Kyle went to the police department to get the access card to ECB and also went to a hardware store and purchased the nuts and bolts. Tuesday night Eric and Ben built the test stand. We are now ready to begin hooking the load cell up to the ADC
- On Thursday night we will meet at ECB and hook up a waveform generator to the ADC. We will see what kind of manipulations we can do with the data.

This Week's Goals

- Hook up load cell to ADC and see if we can get a reading on the computer
- Continue construction of prototype

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
- The test stand may require some complex construction
- The serial cable of the ADC is not compatible with all computers

Successes

- We have purchased parts to build a prototype

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| Notebooks | | | | | | | | | | | | | | |
| MEETINGS | | | | | | | | | | | | | | |
| Team Meetings | | | | | | | | | | | | | | |
| Client Meetings | | | | | | | | | | | | | | |
| Advisor Meetings | | | | | | | | | | | | | | |
| BSAC Meetings | | | | | | | | | | | | | | |
| OTHER | | | | | | | | | | | | | | |
| Web Page | | | | | | | | | | | | | | |
| Special Lectures | | | | | | | | | | | | | | |

Expenses to Date: \$83

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