

Sleep Lab Monitor - Progress Report 12

4/11/09-4/17/09

Project Title:

A combined Thermistor, Pressure, and CO₂ device for use in the Sleep Laboratory

Team Members:

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Problem Statement:

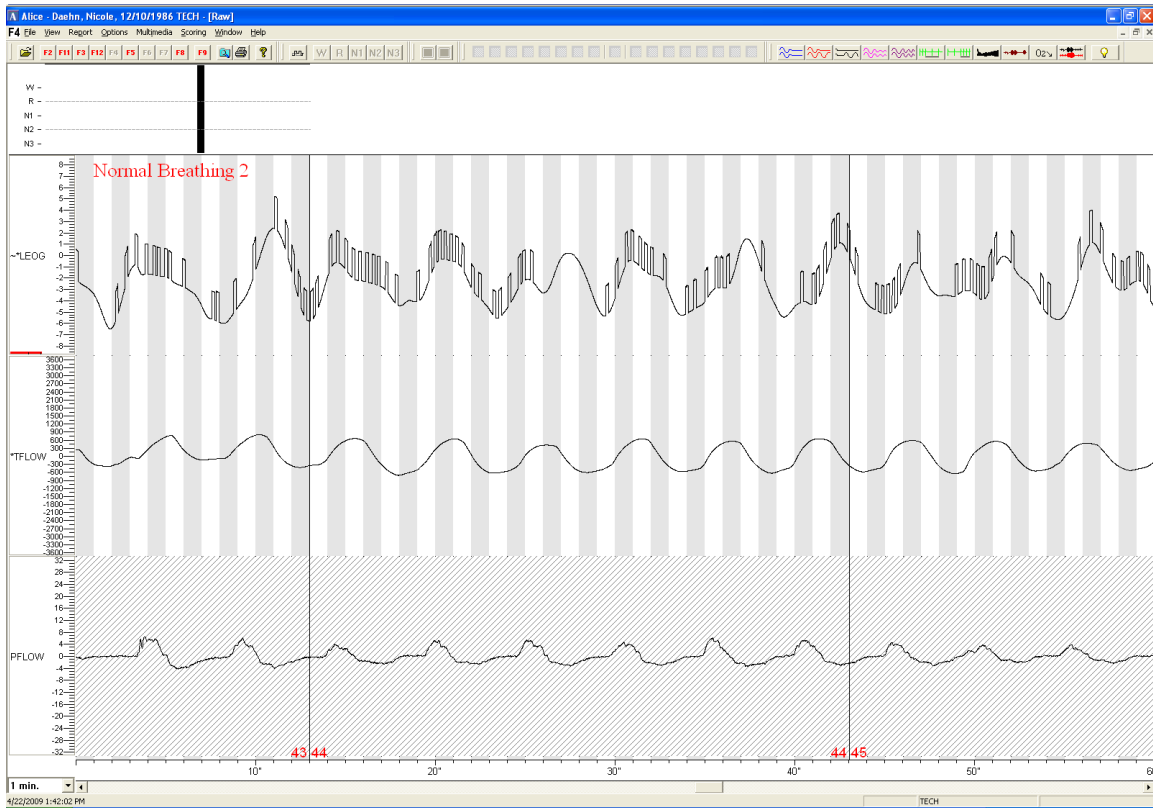
There are three measurements taken from each breath during polysomnography. The following devices are used: a thermistor to detect temperature difference between inhaled and exhaled air, pressure sensors that show a flattening pressure profile during upper airway narrowing, and CO₂ sampling tubes to sense End Tidal CO₂. These three measurements are taken from two different devices placed under the child's nose, with two prongs going into each nostril. This method can be inaccurate if a nostril was to become obstructed, and each device may not sample from both nostrils as well as the mouth. Moreover, the current apparatus may be uncomfortable for the child as well as insecure on the child's face. This could cause a disruption of sleep and a possibility of the devices becoming unfastened during the night. To solve these problems, the goal is to design and develop a prototype that combines these three measuring devices into one apparatus that samples from both of the nostrils as well as the mouth, and attaches to the child in both a durable and comfortable fashion.

Reinstatement of Team Goals from Last Week:

1. Attend the Sleep Lab on Wednesday, April 22 at 1:30pm
2. Solder Connectors onto new prototype Monday, April 20th at 4:00pm
3. Planning to attend a client meeting at 3:30pm on Wednesday, April 22nd (time permitting)
4. Finalize the WARF form
5. Work on final presentation and poster on Sunday, April 25th
6. Have all sleep labs and surveys done by Friday, April 24th
7. Contact Dr. Green about journal to model our paper from
8. Begin working on final paper

Summary of Team Accomplishments:

1. Soldered connectors onto to new prototype on Monday, April 20th at 4:00p
 - a. We decided to use the same small red connectors as the old prototype because we know that they work in the sleep lab
 - b. We took the larger connectors with us to the lab just to see if they fit too and will solder those on later
2. Attended the Sleep Lab Wednesday, April 22nd at 1:30pm
 - a. First, we hooked up our prototype and make sure it worked on the Alice system
 - i. We used the LEOG channel for our thermistor because it has DSP settings and a 0.5 Hz low pass filter was used
 - ii. The signal had many square pulses on it every few milliseconds, the technicians thought it was a cold solder joint problem
 - iii. Another lab technician thought it was a grounding issue and so we tried a reference electrode connected to the hip area
 - b. We performed the breath test
 - i. This involved comparing different breath rates and amplitudes of breathing for each thermistor
 - ii. We did normal breathing, slow and shallow, fast and shallow, deep and slow, deep and fast
 - iii. The time constant still seems to be a little faster on their current thermistors but ours has less of a delay than our previous prototype
 - c. We performed the distance test
 - i. The distance away from the upper lip was measured for 10mm, 7mm, 3mm, and 0mm
 - d. One graph of the results is shown below so you can see the glitches in the signal



3. Attended Client meeting Wednesday, April 22nd at 3:30pm
 - a. We discussed the hypothesis of the glitches in the signal, he agreed with the cold solder joint problem
 - b. We discussed the progress of this semester, and although we were disappointed with results, the client was still satisfied with the work that we have done
 - c. Client will send us information on what journal to model our paper off of
4. Finalizing WARF form
 - a. Jason found a patent that was similar to ours and we will discuss as a group how we should move forward with the WARF form
 - b. After peer review, Nicole sent the WARF form to both our client and advisor
5. Contacting sleep labs
 - a. So far, Nicole was able to get a hold of 2 of the sleep labs
 - b. Lindsey has been calling her three sleep labs and has not been able to talk to anyone yet

Statement of Team Goals for Upcoming Week:

1. Discuss and finalize the WARF form
2. Work on final presentation and poster on Sunday, April 25th
3. Begin working on final paper

Project Schedule

1/23/09-1/30/09: First client meeting, background research for modifying current prototype
1/31/09 – 2/6/09: Perform background research
2/7/09 – 2/13/09: Background research, modification alternatives
2/14/09 – 2/20/09: Continue to brainstorm for modification ideas, test current prototype
2/21/09 – 2/27/09: Work on design and choose design modification alternatives
2/28/09 – 3/6/09: Complete Mid Semester Presentations
3/7/09 – 3/27/09: Develop modifications and build new prototype
3/28/09 – 4/24/09: Test modified prototype
4/25/09 – 5/1/09: Complete and give Final Presentation, submit notebooks and paper

Team Difficulties:

The results we were expecting at the sleep lab for our second prototype were not what we had expected. The prototype was tested using a multi-meter during and after assembly and it was working satisfactory. The prototype was also tested using a LabVIEW program and was working satisfactory as well. It wasn't until we got to the sleep lab, that the problems arose. After a discussion with our client, we decided since we can't get out to the sleep lab again, we will not re-test our second prototype.

Expenses:

Honeywell 112-103FAJ-B01 Thermistor: \$43.56

Activities and Individual Accomplishments:

Sleep Lab Testing-2 Hours: Lindsey, Nicole and Robyn attended. The breath and distance test were performed

Nicole – 5 hours: Continued to contact sleep labs, attended sleep lab testing and client meeting, sent WARF form to client and advisor, soldered connectors onto 2nd prototype

Jason – 3 hours: continuing to contact sleep labs, looked up other patents that involved our project

Lindsey – 5 hours: Continued to contact sleep labs, soldered connectors on to 2nd prototype, attended client meeting and sleep lab testing

Robyn – 4 hours: continuing to contact sleep labs, attended client meeting and sleep lab testing

Total hours for this week: 19

Cumulative hours to date: 209.5

Sleep Lab Monitor Gantt Chart Spring 2009												Completed:			
												In Progress/Planned:			
	1/23	1/30	2/6	2/13	2/20	2/27	3/6	3/13	3/20	3/27	4/3	4/10	4/17	4/24	5/1
Background research	█	█	█	█											
Test Current Prototype					█										
Client Meetings	█		█		█	█				█			█		
Meetings with Professors/Tech															
Brainstorm design		█	█	█											
Design Modification alternatives/mat				█	█										
Midsemester presentation					█	█	█								
Finalize design ideas							█								
Ordering materials							█	█	█						
Construct modified prototype								█	█	█					
Test modified prototype & Materials									█	█	█	█			
Plan final poster presentation													█	█	
Write final paper												█	█	█	
Final advisor meeting															█

