Open-source, low-cost, web-guided spirometer

Team: Jeremy Glynn – Team Leader
Jeremy Schaefer– Communications
Andrew Dias – BWIG
Andrew Bremer – BSAC

Week: March 27 – April 2, 2009

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Problem Statement

Spirometers are used to diagnose many pulmonary diseases including chronic respiratory diseases that affect approximately 300 million people. Many of these people do not have access to a spirometer because current models are expensive and operation requires the presence of a trained technician. The purpose of this project is to develop a low-cost spirometer capable of measuring lung flows and volumes that can be used by patients without the aid of a trained technician. The project includes the physical design of the spirometer, software development, and designing a universal interface. We envision a first generation device that connects to a computer via a USB port and guides and coaches patients through the testing using digital audiovisual clips. As the procedures are performed, a combination of client and server software will graphically display flow and volume data, monitor and evaluate the quality of the maneuver, and instruct the subject when their performance needs to be corrected. The software should also carry out some rudimentary analysis and interpretation using algorithms that are freely available from the American Thoracic Society. Overall, we hope to develop a tool that would be widely affordable and would standardize pulmonary function measurements by delivering the same instruction and coaching across sites for the first time.

Last Week's Goals

- Make plans to move circuitry from breadboard to developed circuit board
- Hold meeting with Charlotte and David Hubanks
- Investigate costs and production time of rapid prototyping.

Accomplishments

- Ordered new sensor to improve circuit response
- Set up meeting on 4/3 with Charlotte to discuss A/V materials
- Contacted Engineering Media Services regarding filming
- Set up meeting on 4/3 with David Hubanks of ZMD to discuss circuitry options and output.
- Received price quote for rapid prototyping of device
- Responded to international inquiries about our design
- Updated openspirometry.org wiki

This Week's Goals

- Correlate distinct output voltages to the pressure recorded by the sensor
- Move circuitry to a through-hole mounted board
- Begin manufacturing of spirometer body
- Film a portion of the A/V material

Difficulties

- The current sensor we were using only had a very small output voltage for the pressure range we were interested in. To remedy this, we have ordered a new sensor and will be implementing it in our circuit this week.

Team Effort

Team Member	Accomplishments	Time (Hrs)	Running Total (Hrs)
Jeremy Glynn	Class time, client meeting, circuitry design and testing, wiki updating	3.5	33
Andrew Bremer	Class time, BSAC, A/V coaching design, circuitry testing	3.5	33
Jeremy Schaefer	Class time, client meeting, A/V coaching design, circuitry testing	3.5	33
Andrew Dias	Class time, website development, client meeting, circuitry design and testing	3.5	33

Project Schedule

PROJECT TASKS AND PROGRESS	Jan.	February				March				April					May	
	29	5	12	19	26	5	12	19	26	2	9	16	23	30	7	14
WORK																
Brainstorming																
Research																
Designing Prototype																
Selecting Prototype																
Obtaining Materials																
Building Prototype																
Testing Prototype																
Modifications																
DELIVERABLES																
PDS																
Mid-Sem. Report																
Mid-Sem. Presentation																
Final Report																
Final Presentation																
Weekly Reports																
Notebooks																
MEETINGS																
Team Meetings																
Client Meetings																
Advisor Meetings																
BSAC Meetings																
OTHER																
Web Page																
Special Lectures																

Expenses to Date:

- STMicroelectronics KEIL STARTER KIT $189.70
- Pressure sensor order (Mar 1, 2009) – Freescale Semiconductor - $63.03
- Pressure sensor order (Mar 30, 2009) – Mouser Electronics - $40.83