

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

- Team:** Jeremy Glynn – Team Leader
Jeremy Schaefer– Communications
Andrew Dias – BWIG
Andrew Bremer – BSAC
- Week:** April 24 – April 30, 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

- Complete manufacturing of spirometer immediately
- Perform flow and volume testing using anemometer and standardized syringe
- Adjust ZMD signal conditioning chip coefficients to correlate sensor output to known airflows
- Edit A/V filming clip
- Prepare for poster presentation

Accomplishments

- Initial spirometer prototype was built
- Testing performed, prototype design modified
- New prototype tested using known flows
- Calibrated prototype with industry standard 3L syringe
- Met with team MedeCal to discuss the improvements of their device
- Scheduled meeting for 5/6 with client to discuss future work
- Edited A/V filming
- Prepared poster presentation

This Week's Goals

- Deliver poster presentation
- Develop final design report
- Establish firm plans for design future with client
- Prepare for poster presentation

Difficulties

- It was difficult to generate and measure a constant airflow to test our device with. The apparatus we used was sufficient for initial testing, but a more advanced system will be needed in the future.

Team Effort

Team Member	Accomplishments	Time (Hrs)	Running Total (Hrs)
Jeremy Glynn	Class time, testing, poster design	12	56
Andrew Bremer	Class time, BSAC, A/V editing, testing, poster design	12	56
Jeremy Schaefer	Class time, testing, poster design, materials research	12	56
Andrew Dias	Class time, website development, testing, poster design, materials research	12	56

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
- PVC materials for spirometer and test apparatus construction - \$3.50
- Skywatch Explorer II Anemometer - \$65.00