

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

- Team:** Jeremy Glynn – Team Leader  
Jeremy Schaefer– Communications  
Andrew Dias – BWIG  
Andrew Bremer – BSAC
- Week:** January 13- February 20, 2009
- Client:** David Van Sickle, PhD  
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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**

- Create various designs and analyze them with a design matrix
- Begin SolidWorks modeling
- Write audio/visual training and coaching requirements, submit to David and media coordinator
- Experiment with incorporating the pressure sensor in basic circuits.

### Accomplishments

- Experimented with implementing our pressure sensor into simple circuits.
- Continued SolidWorks modeling
- Attended introduction to microcontrollers demonstration on 2/25
- Found potential material suppliers
- Developed design matrix and analyzed three different designs
- Set up meeting with client and media expert to discuss coaching program on 2/26

### This Week's Goals

- Create mid-semester presentation
- Continue experimenting with out pressure sensor in basic circuitry
- Work on developing audio/visual coaching program
- Refine design matrices

### Difficulties

- No team members are especially familiar with the coding for microcontrollers. Fortunately, people more experienced with coding have agreed to help out with the program design.

### Team Effort

Team Member	Accomplishments	Time (Hrs)	Running Total (Hrs)
Jeremy Glynn	Class time, client meeting, SolidWorks Modeling, microcontroller demonstration	3.0	18
Andrew Bremer	Class time, BSAC, microcontroller demonstration, A/V coaching design	3.0	18
Jeremy Schaefer	Class time, client meeting, mouthpiece research, microcontroller demonstration	3.0	18
Andrew Dias	Class time, website development, client meeting, PDS work, microcontroller demonstration	3.0	18

### 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
<b>WORK</b>																
Brainstorming																
Research																
Designing Prototype																
Selecting Prototype																
Obtaining Materials																
Building Prototype																
Testing Prototype																
Modifications																
<b>DELIVERABLES</b>																
PDS																
Mid-Sem. Report																
Mid-Sem. Presentation																
Final Report																
Final Presentation																
Weekly Reports																
Notebooks																
<b>MEETINGS</b>																
Team Meetings																
Client Meetings																
Advisor Meetings																
BSAC Meetings																
<b>OTHER</b>																
Web Page																
Special Lectures																

### Expenses to Date:

- STMicroelectronics KEIL STARTER KIT      \$189.70