

## **Delivery of Aerosol Drugs through Continuous Airway Positive Pressure (CPAP) Progress Report 11/01/2009 – 11/07/2009**

### **Names**

Patrick Kurkiewicz, leader  
Joe Decker, BSAC  
Steve Welch, BWIG  
Annie Loevinger, Communications

### **Clients**

Dr. Mihai Teodorescu

### **Problem Statement**

The CPAP system is most commonly used nightly in the homes by patients who struggle with sleep apnea. A method is needed for automated delivery of respiratory anti-inflammatory drugs, like albuterol, while using the CPAP device. Delivery of the necessary dose of such drugs should either be continuous or at timed intervals over a patient's sleep cycle.

Side Project Suggested by Dr. Teodorescu: Create an ultrasonic nebulizer from an ultrasonic humidifier.

### **Last Week's Goals**

- 11/4/09 Patrick and Joe meet at ECB to modify mechanical components of prototype
  - Work on solving condensation problem
- Annie and Steve will meet at a different time
  - Begin programming DAQ board
- 11/6/09 Meeting with Professor Webster
- 11/6/09 Team meeting at ECB
- Patrick – Divide up tasks for final report
- Patrick – Brainstorm ideas for solving condensation problem
- Joe – Find 1.5" I.D. clear piping
- Joe – Order necessary circuitry components

### **Summary of Accomplishments**

- Met with Professor Webster
- Brainstormed ideas for 2 tests needed prove the Albuterol is making it to the mask.
- Divided up tasks for final report
- Removed blower fan from US nebulizer circuit
- Completed LabVIEW program
- Acquired DAQ board
- Acquired power source
- Utilized cap to block splashing of liquid out of reservoir
- Tested microphone... a one-sided amplifier is needed for proper functionality

### **This Week's Goals / Schedule**

- Meet with Dr. Teodorescu 11/12/09
- Meet with Professor Webster 11/13/09

- Team meeting at ECB 11/13/09
- 1 hr team meeting at ECB 11/09/09
- Annie – Order clear piping, 1.5” I.D. as well as a smaller T-joint DUE 11/13/09
- Annie – Find out Albuterol particle size after solvent dries. You could do this on 11/13/09
- Steve - Find correct amplifier necessary to power microphone DUE 11/13/09
  - Have all necessary components to run program ordered by 11/13/09
- Joe – Write Procedure for Spectrophotometer test – Be prepared to execute on 11/13/09
- Patrick – Write Procedure for Filter Test DUE 11/13/09

### **Project Difficulties/ Reason for Missing Goals**

- A lot of water condenses on the sides of the tubing
- Clear 1.5” I.D. plastic tubing is yet to be found
- There’s not a clear way to remove the magnetic switch from the humidifier circuit

### **Activities**

#### **Team**

11/04/09      Lab work... replaced blower fan with 120 K $\Omega$  resistor (Pat, Joe)  
 11/06/09      Met with Professor Webster  
 10/06/09      Lab Work with prototype, programming

#### **Patrick**

- Wrote progress report
- Allotted team roles

#### **Annie**

- Correspondence with client
- Worked on acquiring other circuitry components

#### **Joe**

- Researched fluid dynamic properties
- BSAC meeting

#### **Steve**

- Wrote LabVIEW program
- Updated web page

### **Budget**

Dr. T gave team \$40 on 10/01/09

- \$40 given to Patrick on 10/01/09

Dr. T gave team \$200 on 10/29/09

- \$120 given to Annie on 10/29/09
- \$40 given to Patrick on 10/29/09
- \$40 left over for future expenses

### **Costs**

- Patrick - Ultrasonic Humidifier – From Wal-Mart \$30.56
- Patrick - Ultrasonic Humidifier – From Home Depot \$31.64
- Patrick - PVC piping – From ACE Hardware \$6.50
- Annie - DAQ board – From \_\_\_\_\_ \$111.99
- Annie – Microphone – From RadioShack \$4.00
- Joe – PC tubing 1.25” I.D – From McMaster-Carr - ~\$10

Project Schedule																
Task	September				October					November				Decem		
	4	11	18	25	2	9	16	23	30	6	13	20	27	4	11	
<b>Deliverables (Date Due)</b>																Key
Website																Team
PDS																Patrick
Progress Report																Annie
Notebook																Joe
Midterm Presentation																Steve
Final Presentation																
Final Poster																
Final Report																
Client Evaluation																
Peer and Self Evaluations																
<b>Meetings</b>																
BSAC																
Team																
Client																
Advisor (in class)																
Dist. Entrepreneur Lec.																
<b>Project Research*</b>																
Current Devices																
CPAP System																
How a Nebulizer Works																
Aerosol Delivery Methods																
Albuterol/ related drugs																
<b>Project Development</b>																
Select Project																
Brainstrom Ideas																
Narrow Ideas																
Select Idea																
Work on Design																
Buy Necessary Parts (no later than)																
Work on Prototype Fabrication																

\*After this, research will be done on an as-needed basis.