

Delivery of Aerosol Drugs through Continuous Airway Positive Pressure (CPAP) Progress Report 10/25/2009 – 10/31/2009

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

- 10/26/09 group meeting at ECB at 7 PM
 - Assemble PVC connection components
- 10/29/09 meeting with Dr. T at 9:30 AM
 - Get reimbursed for expenses to date
- 10/30/09 meeting with Professor Webster at 12:40 PM and lab work
 - Test prototype to see if concept works
- Steve – Order a 120 V switch Due 10/26/09
- Steve and Annie – Create block diagram for functioning of programming components. Due 10/30/09
- Annie – Brainstorm programming options. Due 10/30/09
- Joe – Order 1.25" I.D clear polycarbonate tubing Due 10/26/09
- Patrick - Divide up tasks for final report. Due 10/30/09
- Patrick/Steve – Find out if US humidifier can be run with blower disconnected. Due 10/30

Summary of Accomplishments

- 10/26/09 lab work @ ECB. Patrick and Joe assembled early prototype and successfully proved concept
- 10/29/09 met with Dr. T and received \$200 for past and future expenses
 - Viewed sleep research room
- 10/30/09 met with Professor Webster. Concept of utilizing laminar flow in tubing to reduce condensation was discussed
- 10/30/09 lab work @ ECB
- Annie purchased microphone for \$4.00 and looked into acquiring circuitry components
- Steve found voltage rating necessary for switch

- Steve and Annie wrote LabVIEW program
- Joe ordered clear PC tubing
- US humidifier should be fine if blower is disconnected
- Concept of Laminar flow introduced to solve condensation problems

This 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

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
- Sealing reservoir to piezo buzzer with hot glue results in leaks

Activities

Team

10/26/09	Assembled early prototype (Pat, Steve, Joe)
10/29/09	Meeting with Dr. Teodorescu
10/30/09	Met with Professor Webster (Steve, Annie, Joe)
10/30/09	Lab Work with prototype, programming (Steve, Annie, Joe)

Patrick

- Assembled early prototype
- Wrote progress report

Annie

- Correspondence with client
- Ordered DAQ board
- Picked up microphone
- Worked on acquiring other circuitry components

Joe

- Research
- Ordered PC tubing

Steve

- Selected a DAQ board to use for the project
- 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 _____ ~\$120
- 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	
Deliverables (Date Due)																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																
Meetings																
BSAC																
Team																
Client																
Advisor (in class)																
Dist. Entrepreneur Lec.																
Project Research*																
Current Devices																
CPAP System																
How a Nebulizer Works																
Aerosol Delivery Methods																
Albuterol/ related drugs																
Project Development																
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.