

BME 402: Biomedical Engineering Design
A Finger Plethysmograph to Measure Blood Resistivity

Clients:

Prof. John Webster
Dept. of Biomedical Engineering
608-263-1574
Webster@wngr.wisc.edu

Ravi Shankar, PhD
561-306-5652
Shankar4@earthlink.net

Team Members:

Tim Balgemann
Team Leader
Balgemann@wisc.edu

Lucas Vitzthum
Communicator
lvitzthum@wisc.edu

Josh White
BSAC
jbwhite2@wisc.edu

Sarah Offutt
BWIG
offutt@wisc.edu

March 26th to April 2nd

Problem Statement:

Our goal is to design a finger plethysmograph to measure blood resistivity. Impedance plethysmography may be used to measure arterial volume change that occurs with propagation of the blood pressure pulse in a limb segment. For this measurement, we assume a constant value of blood resistivity. However, blood resistivity may change under both physiological and pathological conditions. Use of an impedance plethysmograph on a finger immersed in a salt-filled beaker may yield a simple method for determining blood resistivity. This may develop into a method that diabetics can use to measure glucose level noninvasively.

Last Week's Goals:

- Finish making the new prototypes and confirm they work.

Summary of Accomplishments:

- Finished two finger holder prototypes
 - One uses the same foam stabilization and placement as the first prototype, but uses a 1 inch diameter PVC tube instead of 1.5 inch.
 - The second uses a clear PVC tubing ring to stabilize the distal phalanges, three foam supports running parallel to the outer PVC shell. These stabilize the interphalangeal joint. A ring of soft, PVC tubing with a diameter of .25inch runs the circumference of the top of the PVC shell. There are three electrodes present inside the tube: ground, V- and V+. The current in electrode will be attached directly to the subject's finger.

This Week's Goals:

- Hook up the prototypes to the circuit and confirm that they operate as assumed.

Difficulties:

No difficulties thus far

Activities:

Tim Bagemann: Advisor Meetings: 1 hr
Research 1 hrs
Client Meeting: 2 hrs
Total: 7.5 hrs

Lucas Vitzthum: Advisor Meetings: 1 hr
Research 1 hrs
Client Meeting: 2 hrs
Total: 7.5 hrs

Nick Harrison: Advisor Meetings: 1 hr
Research 1 hrs
Client Meeting: 2 hrs
Total: 7.5 hrs

Tyler Lark: Advisor Meetings: 1 hrs
Research 1 hrs
Client Meeting: 2 hrs
Total: 7.5 hrs

Timeline:

ID	Task Name	Start	Finish	Duration	Jan 2009		Feb 2009				Mar 2009				Apr 2009				May 2009				
					18/1	25/1	1/2	8/2	15/2	22/2	1/3	8/3	15/3	22/3	29/3	5/4	12/4	19/4	26/4	3/5	10/5	17/5	
1	Finalize Circuit Design and Brainstorm New Finger Holder Design	1/26/2009	2/20/2009	4w																			
2	Review Literature on Blood Resistivity	1/26/2009	2/9/2009	2w 1d																			
3	Finalize Finger Holder Design	2/9/2009	2/27/2009	3w																			
4	Begin Planning of Experimentation	2/25/2009	3/2/2009	4d																			
5	Carry Out Experiments	3/3/2009	4/3/2009	4w 4d																			
6	Redesign Finger Holder as Necessary	3/3/2009	4/3/2009	4w 4d																			
7	Mid-Semester Report	3/6/2009	3/6/2009	0w																			
8	Collect and Compile Experimental Data	3/19/2009	4/20/2009	4w 3d																			
9	Report Writing	4/20/2009	5/6/2009	2w 3d																			
10	Design and Create	4/23/2009	5/1/2009	1w 2d																			
11	Poster Presentation	5/1/2009	5/1/2009	0w																			