

*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](mailto:Balgemann@wisc.edu)

Lucas Vitzthum  
Communicator  
[lvitzthum@wisc.edu](mailto:lvitzthum@wisc.edu)

Josh White  
BSAC  
[jbwhite2@wisc.edu](mailto:jbwhite2@wisc.edu)

Sarah Offutt  
BWIG  
[offutt@wisc.edu](mailto:offutt@wisc.edu)

February 25<sup>th</sup> to March 5<sup>th</sup>

**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:**

- Start and complete the mid-semester presentation.
- Gather supplies to begin constructing several new finger holders to test how well they detect the finger resistivity.

## **Summary of Accomplishments:**

- Determined that the sample and hold transistor may not be operating in the region that we want it to be. This could be the source of a lot of the problems encountered.
- Purchased supplies necessary to construct new fingerholder prototypes.
- Made the mid-semester presentation and video taped Josh's part because he will be absent.

## **This Week's Goals:**

- Practice and participate in the mid-semester presentation
- Finish work on the mid-semester paper
- Determine correct operating range for the sample and hold transistor

## **Difficulties:**

No difficulties thus far

## **Activities:**

**Tim Balgemann:** 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 hr  
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																			