* Progress Report 11

* Title: Measurement of Pulse Transit Time

* Names: Blake Hondl (Team Leader)
    Anna Karas (Communications)
    Zak Cohen (BWIG)
    Meghan Olson (BSAC)

* Client: Christopher G. Green, M.D.

* Advisor: Mitch Tyler

* Date: 11/11/05 – 11/17/05

* Problem Statement: Develop a device/method to measure pulse transit time (PTT) in pediatric patients using signals from an ECG monitor and an oximeter. This will allow a physician to monitor whether a patient is being aroused from REMS sleep and help the physician determine if the patient has obstructive sleep apnea.

* Restatement of Team Goals:
  - Amplify ECG and plethysmograph to appropriate levels for DAQ module (7.5V<signals<10V)
  - Interface DAQ to Labview or Matlab
  - Determine method to interface DAQ module to PC
    - Acquire drivers to interface with Labview
  - Create program to display ECG and plethysmogram waveforms
    - Also use PTT algorithm to calculate and display PTT

* Summary of Accomplishments:
  - ECG signal amplified to between -4V and 8V
  - Labview program displays ECG data continuously
    - Must connect DAQ via USB before starting Labview

* Statement of Team Goals:
  - Determine appropriate wiring to connect oximetry wires to oximetry circuit
  - Test oximetry circuit
    - Need waveform generator
  - Modify Labview program to display plethysmogram
  - Modify Labview program to calculate and display PTT
  - Divide up sections of Final Presentation
  - Acquire patient or ECG simulator to facilitate testing/demonstration

* Project Schedule:

<table>
<thead>
<tr>
<th>Week</th>
<th>Activities</th>
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<tbody>
<tr>
<td>1</td>
<td>09/02/05 Assign team roles, contact client to set up meeting</td>
</tr>
<tr>
<td>2</td>
<td>09/09/05 Research design topics, define questions for meeting with client, start PDS</td>
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<tr>
<td>3</td>
<td>09/16/05 Meet with client, continue research on design topics, complete PDS</td>
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<tr>
<td>4</td>
<td>09/23/05 Meet with sleep lab neurophysiologist, establish possible design</td>
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solutions

5 09/30/05 Choose the best design solution, research resources to help in the implementation of the design, start detailed design specification

6 10/07/05 Complete detailed design specification, possible work on prototype, work on midsemester presentation,

7 10/14/05 **Midsemester presentation**

8 10/21/05 Begin work on prototype

9 10/28/05 Build ECG and oximetry circuits
   Software code to take in .edf file

10 11/04/05 Test ECG and oximetry circuits
    Software code to calculate PTT

11 11/11/05 Software code to display PTT to user
    Research hardware for extra circuit capability

12 11/18/05 Complete prototype:
    Hardware appropriate for presentation
    Complete software for displaying PTT from .edf file

13 11/25/05 Work on poster presentation
    Minor modifications to hardware and software
    Thanksgiving

14 12/02/05 Complete poster presentation
    Work on final report
    **Final poster presentations**

15 12/07/05 Complete final report
    **Final report and notebooks due**

15 12/09/05 **Final meeting with advisor**

* **Difficulties:** None

* **Activities:**

  **Group:**
  Team meetings: 4.0 hrs

  **Individual:**

  * **Blake Hondl**
    Labview research/programming: 2.0 hrs

  * **Anna Karas**
    Oximetry wire research: 1.0 hr

  * **Meghan Olson**
    Updating notebook, testing leads from ECG wires, working on Labview QRS detection: 5.0 hrs

  * **Zak Cohen**
    MatLab interface research 2.0 hrs

  Weekly Total: 24.0 hrs
Semester Total: 189.75 hours

* Expenses:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Fall 2005</td>
<td></td>
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<tr>
<td>ECG and oximetry circuit components</td>
<td>$25.23</td>
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Total $25.23