Using Technology to Measure Adherence of Complicated Medication Regimens

Progress Report 13

Client
Timothy Juergens, M.D.
UW/VA Hospitals
Geriatric psychiatrist/sleep specialist
Phone: 239-3030
timothy.juergens@med.va.gov

Advisor
Professor William L. Murphy Ph.D

Team Members
Sujan Bhaheetharan (Communications)  sbhaheethara@wisc.edu
Cara Dunn (BSAC)  cddunn@wisc.edu
Farshad Fahimi (BWIG)  ffahimi@wisc.edu
Nipun Yamdagni (Leader)  nyamdagni@wisc.edu

Problem Statement
According to a recent study, almost 75% of patients, especially the elderly, do not adhere to their medication regimens for various reasons. This lack of adherence can prevent a patient’s recovery. Additionally, the present state of affairs is such that if a patient reports no improvement, a physician does not definitively know whether to try a different medication or whether the patient is simply not taking the medication regularly. To improve general health of patients assigned complicated medication regimens, we are to make a device that keeps a record of when a patient takes their medication.

Summary of Team Accomplishments
• Formed team and assigned individual roles
• Met with client and obtained project supplies
• Formulated problem statement
• Brainstormed possible designs
• Compile team members’ parts of the PDS and edit
• Create project website
• Meet with Professor Morrow to discuss possible solutions
• Research processors
• Obtained a microcontroller and corresponding development kit
• Narrowing down designs and design specifics
• Figured out concept of a switch matrix
• Work on mid-semester presentation
- Research specifics about a switch matrix
- Research various switches that could be used
- Ordered switches/buttons
- Figured out how to use pins P3, P4, P5 and P6
- Purchased several pill boxes.
- Build and test a sample circuit with the micro controller
- Overcome microcontroller problems

**Current Week’s Goals**

- Integrate switches and circuit into a pill box
- Finish final paper
- Print poster

**Project Schedule/Important Dates**

<table>
<thead>
<tr>
<th>Project</th>
<th>Sep 08</th>
<th>Sep 15</th>
<th>Sep 22</th>
<th>Sep 29</th>
<th>Oct 06</th>
<th>Oct 13</th>
<th>Oct 20</th>
<th>Oct 27</th>
<th>Nov 03</th>
<th>Nov 10</th>
<th>Nov 17</th>
<th>Nov 24</th>
<th>Dec 01</th>
<th>Dec 08</th>
<th>Dec 15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a Project</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Client Meeting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Literature Research</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rough Draft of PDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brainstorm designs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decide on Design Alts.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-sem. Pres.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare for Mid-sem.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pres. (Oct 20)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decide of Final Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work on Prototype</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poster Pres. (Dec 8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advisor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Meeting (Dec 15)

Current Difficulties
- None

Activities

**Sujan**
- Poster: 8 hrs
- Prototype Work: 7 hrs
- Final Paper: 1 hr

**Total:** 16 hrs

**Cara**
- Prototype Work: 19.5 hrs
- Poster: 1 hr

**Total:** 20.5 hrs

**Farshad**
- Prototype Work: 22.5 hrs
- Shopping: 0.5 hrs
- Talking to co-workers: 0.5 hrs

**Total:** 23.5 hrs

**Nipun**
- Prototype Work: 30.25 hrs
- Research: 1 hr
- Meetings with Prof Morrow: 3.25 hrs
- Progress report: 0.5 hr

**Total:** 35 hrs

**Team Total Hours for this Week:** 95 hrs
**Cumulative Team Hours to Date:** 337 hrs

**Expenses:** (approximate values)
- 2 Pill Boxes: $2.11
- 4 Pill Boxes: $9.90
- 1 AAA Battery Holder: $0.99
- 1 AA Battery Holder: $0.99
- Resistors: $1.98
- PC Board: $4.29
- 5 Switches: $13.45
- 12 Switches: $14.81
- Bread Board Wires: $6.64
- Spray Paint: $3.12
- Screws: $2.00
• Plexiglas $3.69
• 2 Pill Boxes $10.56
• 25 Switches $55.64
• PC Board $4.29
• Bread Board Wires $4.29

Total: $138.75