Parallel Activities

- Design Process
  - System Design

- Planning Process
  - Preliminary Plan
    - Define Work
    - Develop Schedule
    - Estimate Resources
    - Estimate Costs
  - Project Plan

- Detailed Design
- Design Management
Requirements Specifications

- Requirements Analysis
- System Design
- Detailed Design
- Implementation and Verification

Requirement Specification
Two-stage approach for developing a requirements specification

- customer needing a solution to a problem

  assess needs

  statement of problem

  specify design requirements

  requirements specification

  describes what is to be specified
Illustration:
Digital Logic Probe
(go to Acrobat)
AGMC

manufacturer/marketer acoustic guitars

Lynn Strum
Director of Technology

Sarah Defoe
Systems Design LTD
Senior Engineer

Rob Sullivan
consulting engineer

30 September 2004
Statement of Problem

- Background
- The Design
  - blah
  - blah
- Deliverables of Design Project

Requirements Specification

- Background
- The Deliverables
- Principle of Operation
- User Interface
  - Input
  - Output
    - User's Manual
    - Acceptance Tests
      - Tuning
      - LED Brightness and lighting sequence
    - Product Cost
    - Dispute Resolution Mechanism

30 September 2004
Input: Rob does tests

5th string A below middle C

30 September 2004
Specification of Input

Device placed 1 to 2 feet from the center of the hole at any angle from 0 to 30 degrees off the perpendicular. Measurements have suggested that these levels can vary from 70 to 84 dB. The background noise levels during tuning should be less that 60 dB and relatively broad band in nature.

<table>
<thead>
<tr>
<th>String</th>
<th>Note</th>
<th>Fundamental (Hz)</th>
<th>Deviation of 6 cents (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>E</td>
<td>82.41</td>
<td>0.286</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td>110.00</td>
<td>0.382</td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>146.83</td>
<td>0.510</td>
</tr>
<tr>
<td>3</td>
<td>G</td>
<td>196.00</td>
<td>0.680</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>246.94</td>
<td>0.857</td>
</tr>
<tr>
<td>1</td>
<td>E</td>
<td>329.63</td>
<td>1.144</td>
</tr>
</tbody>
</table>
Specification of Output

LED output

• With no input, both LEDs off.

• If the string is sharp by more than 6 cents, the top LED should turn on within one second of the plucking and stay on for one to two seconds. The bottom LED should remain off.

• If the string is sharp by 2 to 6 cents, the top LED should turn on within one second of the plucking and stay on for one to two seconds, as above. The bottom LED may remain off or act as the top LED.

• If the string is within 2 cents of the true pitch, both LEDs should turn on within one second of the plucking and stay on for one or two seconds.
System Design

Guitar tuner
pp. 147 - 156

System block diagram
.assignment #3
Reading Assignment

Section 4.1 – 4.4
Section A.4.1 – A.4.8

All-course meeting next week
7 October 2004