Project Management
Motivation

- Projects are king in the career of engineers!
- Middle management continues to shrink
- Industry now organizes more around projects than functions.

Engineers have led the way on project management!
The Basic Idea

To complete the project

- On-time
- Within budget
- So that it meets the **requirements**
The Work Breakdown Structure

- A WBS displays and defines the product, or products, to be developed and/or produced. It relates the elements of work to be accomplished to each other and to the end product.
- A WBS can be expressed down to any level of interest
Elements of the Project Plan

- Activities
- Responsibilities
- Timeline
- Dependencies
- Costs

HINT: THESE THINGS OUGHT TO BE IN YOUR PLAN!
Example – Thermometer Design

Problem: Create the WBS for a temperature monitoring system design
Example

There are three main tasks

1. The analog interface circuitry.
2. The LED & digital circuitry.
3. Integrate & Test.

4. Documentation

1- PCB Design
2- Packaging
3- Consult with customer
.....
<table>
<thead>
<tr>
<th>ID</th>
<th>Activity</th>
<th>Description</th>
<th>Deliverables / Checkpoints</th>
<th>Duration (days)</th>
<th>People</th>
<th>Resources</th>
<th>Predecessors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interface Circuitry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>1.1</td>
<td>Design Circuitry</td>
<td>Complete the detailed design and verify it in simulation</td>
<td>• Circuit schematic</td>
<td>14</td>
<td>Rob (1)</td>
<td>• PC</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Simulation verification</td>
<td></td>
<td>Jana (1)</td>
<td>• SPICE simulation</td>
<td></td>
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<tr>
<td>1.2</td>
<td>Purchase Components</td>
<td></td>
<td>• Identify parts</td>
<td>10</td>
<td>Rob</td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Place order</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Receive parts</td>
<td></td>
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</tr>
<tr>
<td>1.3</td>
<td>Construct &amp; Test Circuits</td>
<td>Build and test.</td>
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<tr>
<td>1.3.1</td>
<td>Current Driver Circuitry</td>
<td>Test of circuit with sensing device.</td>
<td>• Test data</td>
<td>2</td>
<td>Jana (1)</td>
<td>• Test bench</td>
<td>1.2</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Measurement of linearity</td>
<td></td>
<td>Rob (2)</td>
<td>• Thermometer</td>
<td></td>
</tr>
</tbody>
</table>
Gantt Charts

- Gantt Chart and/or Network Diagram.
  Provide a graphical representation of the project plan.
Creating a Gantt Chart

• First step is defining your project plan structure. I suggest you to use this basic structure:
  – Column A: Task ID (WBS) (an unique ID which identifies each task with a progressive number).
  – Column B: Task description (a short description of the activity).
  – Column C: Percentage of completion (0%-100%).
  – Column D: Predecessor (finish-start relationships between tasks).
  – Column E: Start date (task start date).
  – Column F: Finish date (task finish date).

http://www.editgrid.com/
Or Google Gant Chart
COSTS: Develop a tabulated list of costs for individual component, Equipment (HW & SW), material, etc.
Consider Alternative Designs

• Decision Matrix

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Cost</th>
<th>Size</th>
<th>Complexity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>B</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>20</td>
</tr>
<tr>
<td>C</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>17</td>
</tr>
</tbody>
</table>

You need to be able to justify your choices:
- Why are you using RPi?
- Why are you using XCD Camera?
- Why do you need a PIC processor?
Important Steps In Project Management

Step 1: What is your project all about?
Step 2: Does your project make sense?
Step 3: Who will determine your success... or failure?
Step 4: How will you deliver your project?
Step 5: Engage your project team
Step 6: Shift happens! Prepare for it
Step 7: Stay in control during implementation
Step 8: Close your project in an orderly way
Important Steps In Project Management

1- What are you doing?
Define it - what is / what is not your goal
Set the goals and scopes
Assumption

2- Does it make sense / commercial sense
Cost-risk analysis
Your values and your project

3- How do you tell if the project is successful
Are your stakeholders happy
Are they engaged? Do you learn from them

4- How do you deliver the project
Identify the task and duration
Responsibilities / resources / the time lines / budget

5- Engage the team

6 - Be prepared / have plan B - identify the risk
What is your plan if something did not work

7- During implementation monitor your performance -
don’t get stuck
Test everything

8- Close the project in orderly way
Deliver / handover all the documents
Make sure you document everything
Traditional Waterfall model

Agile development methodology
Homework

• Include a high-level schematic for your project
• Do a Gantt Chart for your project
• Describe 3 alternative designs (do the decision matrix for each case)
• Design test plans for 5 different functionalities – assign responsibilities to each test
• Have a web page link to your project
• Identify 5-10 risks and describe your contingency plan for each
• Identify 5-10 major technical issues and describe how each can impact the design