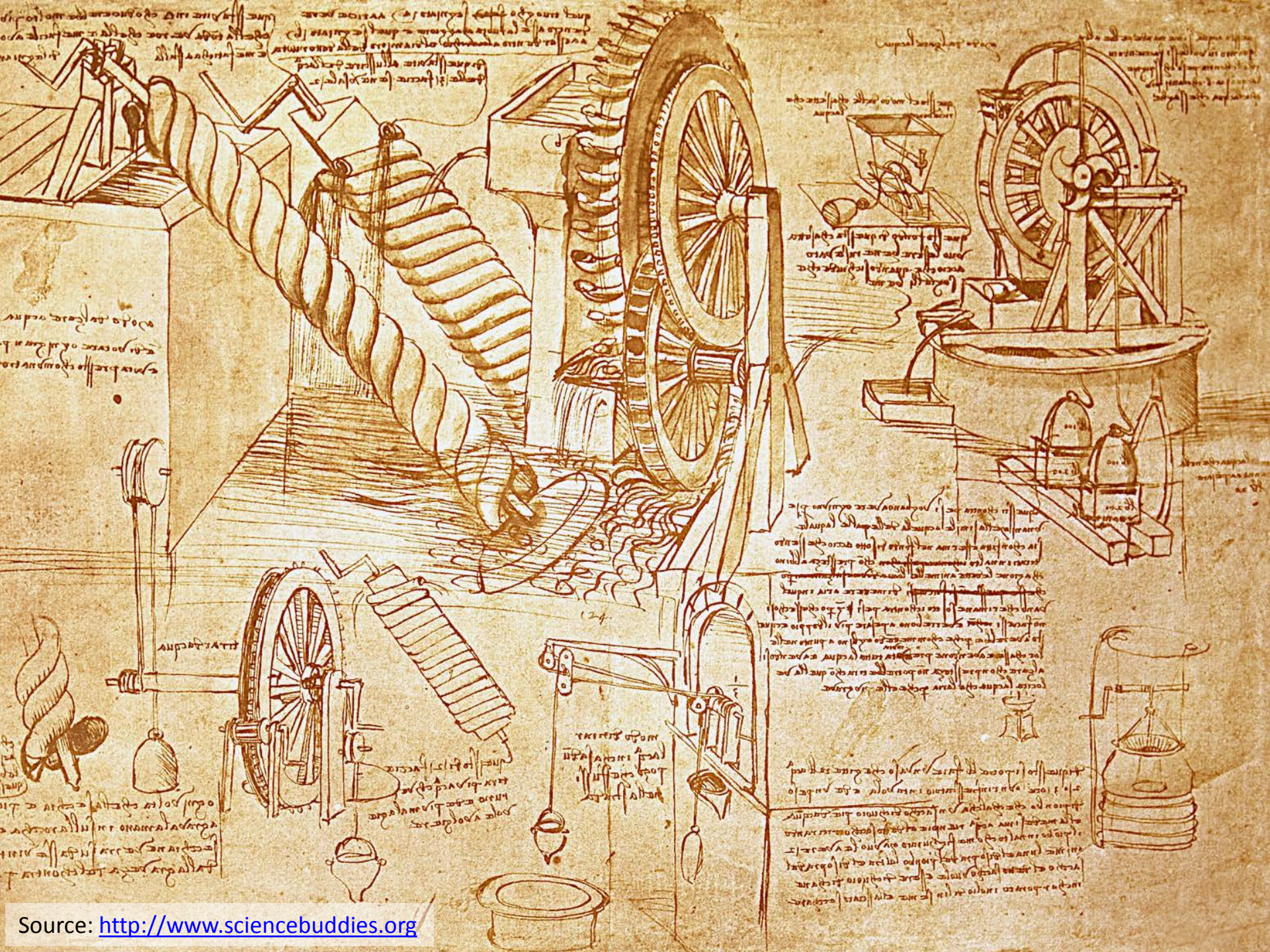


The capstone design notebook

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What is a design notebook?

Think of the notebook as your “think pad”

- The notebook helps you
 - Recall ideas you developed
 - Support decisions you made
- You are the main audience of your notebook

Records all activities relevant to the project

- Information acquired (inputs)
- Ideas developed (outputs)

Why keep a notebook?

For legal reasons

- Notebooks serve as official documents for patenting (if used properly)
- In the case of a dispute, it establishes the time when the idea originated and the history of its development
- Thus, good time keeping is essential

Why keep a notebook?

For practical reasons

- A useful resource to prepare reports
- Helps you remember what you did months/years earlier
- Provides continuity
 - Your notebook stays if you leave the team
 - Serves as a starting point for new team members
 - Prevents them from making the same mistakes you made

Contents

A notebook should capture ALL details of a project

- More informal than the final report
 - Final report documents your design
 - The notebook documents how you got there

The four basic elements

- Information
- Sketches
- Results
- Thoughts

Contents: information

Reference materials

- Background research and literature/patent searches
- Sources of information (URLs, books)
- Contact information (name, phone number, emails)
- Parts lists, specs, cost, assembly instructions

Meeting notes

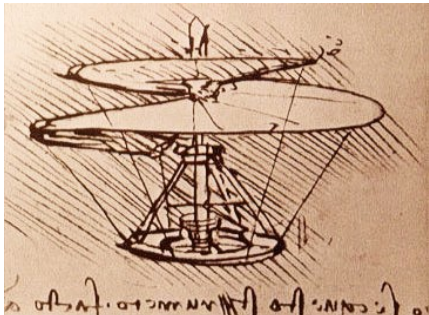
- Time and date, individuals present
- Items discussed and action items
- Questions/comments from team members/advisors

Periodic assessments of the state of the project

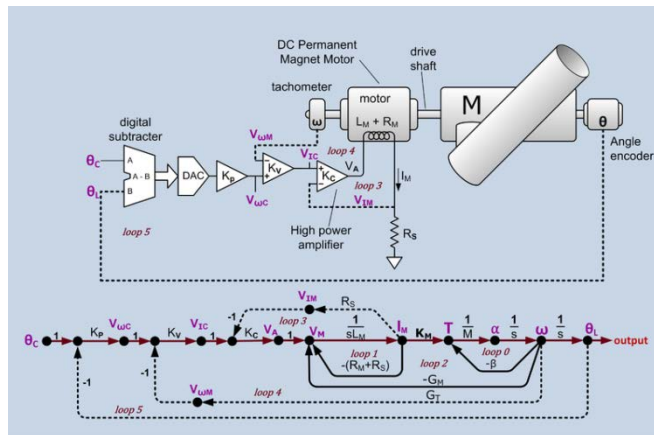
- Are you on schedule or behind?
- What potential problems concern you the most?

Contents: sketches

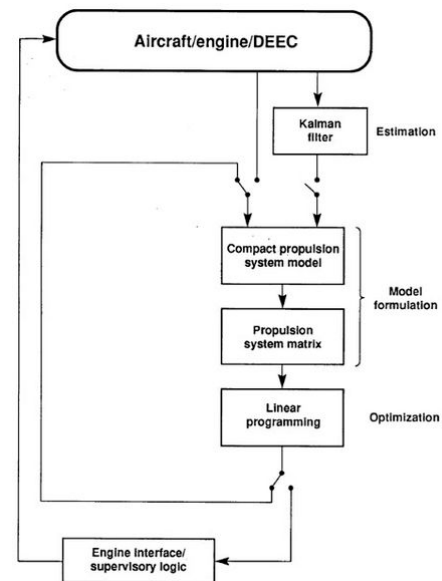
Sketches



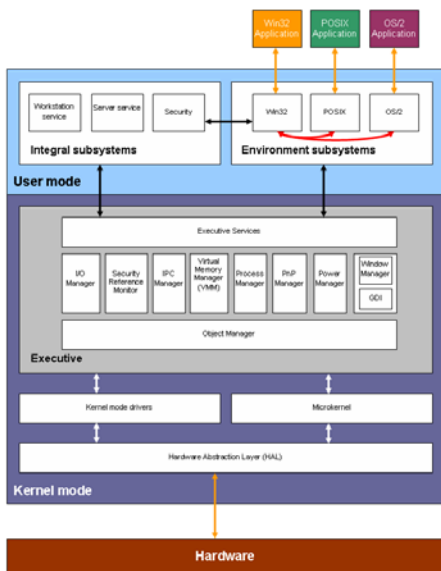
Data flow diagrams



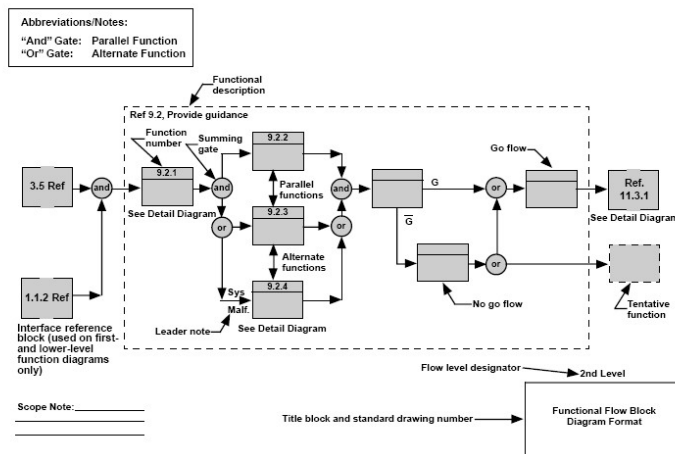
Control flow diagrams



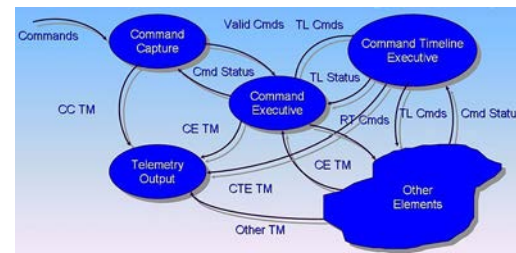
Block diagrams



Functional flow diagram



Data flow diagrams



Contents: results

Testing procedures

- Plans for collecting data (date, location, resources needed)
- Purpose of the experiments, expected results
- Experimental conditions during tests
- Lists of variables and measurements

Results

- Calculations, statistics
- Tables, charts and graphics

Discussion of results

- Causes and effects, correlations, outliers, trends
- Significance of the results
- Implications for future work

Contents: thoughts

Problems you've encountered

- Dead ends, design flaws, problematic data/experiments
- Legal and ethical issues

Potential solutions

Future work

- Limitations of your work
- Implications and applications
- Relationship to other projects

Other

- Questions for team members and instructor
- Management issues (scheduling, budget, division of labor)

Contents: other considerations

Emphasize visual elements

- Sketches of your concepts and designs
 - These should become more specific as the project progresses
- Block diagrams, data/signal flow, functional flow...
- Graphs, waveforms, tables...

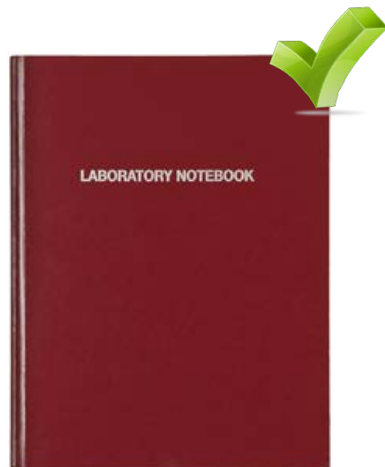
Document thoroughly

- Make entries readable for others to understand
 - Explain why decisions are made
 - Include narrative explanation of calculations, not just data
 - Also explain sketches, graphics, charts, tables
- Go for volume: average of 5 pages/week

Format

Type of notebook

- Permanently-bound composition or lab notebook
- Spiral-bound notebooks, loose-leaf binders not allowed



Record directly into the notebook

- Do not use a separate “scratch pad”
- Do not keep separate pieces of paper
- Glue extra documents (e.g. printouts); no tape or staples, please

Write in ink, not in pencil

- Put your name, contact and course # on the front cover
- Number each page
- Do not erase or remove pages; instead, cross out any mistakes
- Cross out large blocks of blank space

Date ALL entries

- Title, date and time, location, people present, purpose, results...

Keep it neat

- Write legibly
- Don't use it as a drink coaster or a food plate

Grading

Your notebook documents your work in 482/483

- Therefore, it carries a lot of weight on your final grade

Grading criteria

- Project work
- Process
- Critical thinking
- Formatting

Grading: project work

Entries that show work accomplished on the project

- Results of research (prior work, alternatives, etc.)
- Calculations, formulas, derivations
- Sketches, drawings, diagrams
- Test procedures
- Test setups
- Experimental results
- Discussion of results
- Citations of documents/code created

Grading: process

Entries that show evidence of the design process

- Plans for project work
- Identification of tasks
- Distribution of work
- Design decisions
- Problems encountered and overcome

Grading: critical thinking

Entries that show in-depth thinking

- About the project
 - Customer needs and requirements, and how they evolve
 - Intellectual property issues
 - Maintenance and feasibility issues
- About your team
 - Division of labor, team issues
 - Your role within the project and team
- About society
 - Safety, ethics, environment

Grading content: formatting

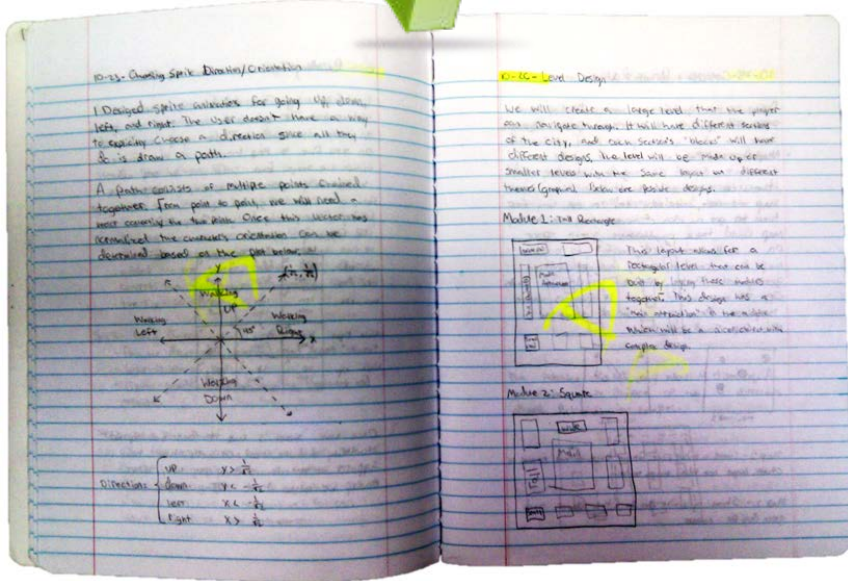
Evidence of proper use of the notebook

- Readability and clarity
- Entries for group meetings
- Dated entries, pages numbered
- Loose pages attached, entries in ink

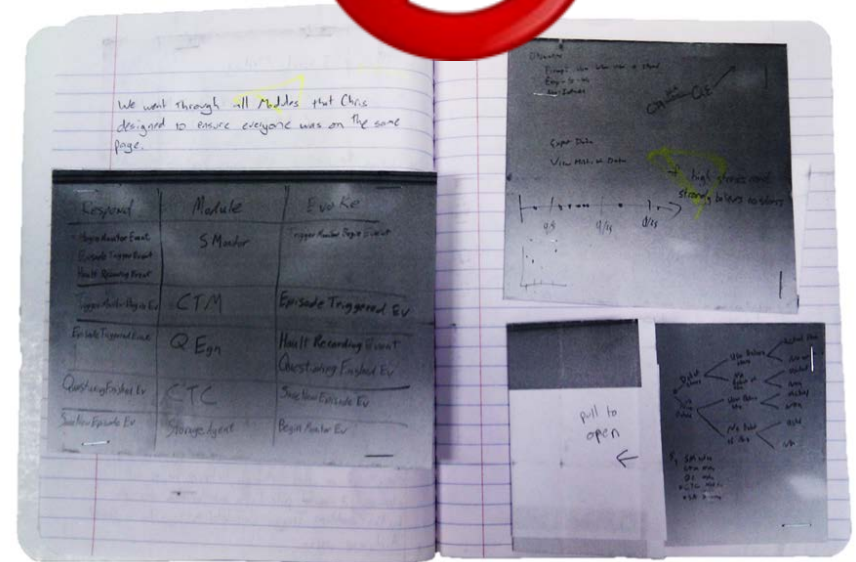
References

Materials for this presentation were assembled from on-line sources at the following institutions

- University of California at San Diego ([URL](#), [URL](#))
- Colorado State University ([URL](#))
- University of Wisconsin ([URL](#))
- Purdue University ([URL](#))



A good notebook page: dated entry, narrative included, good use of graphical elements, clarity



A bad notebook entry: items were copied from the board with a cell phone camera, printed, cut and stapled onto the notebook