ENGR 310

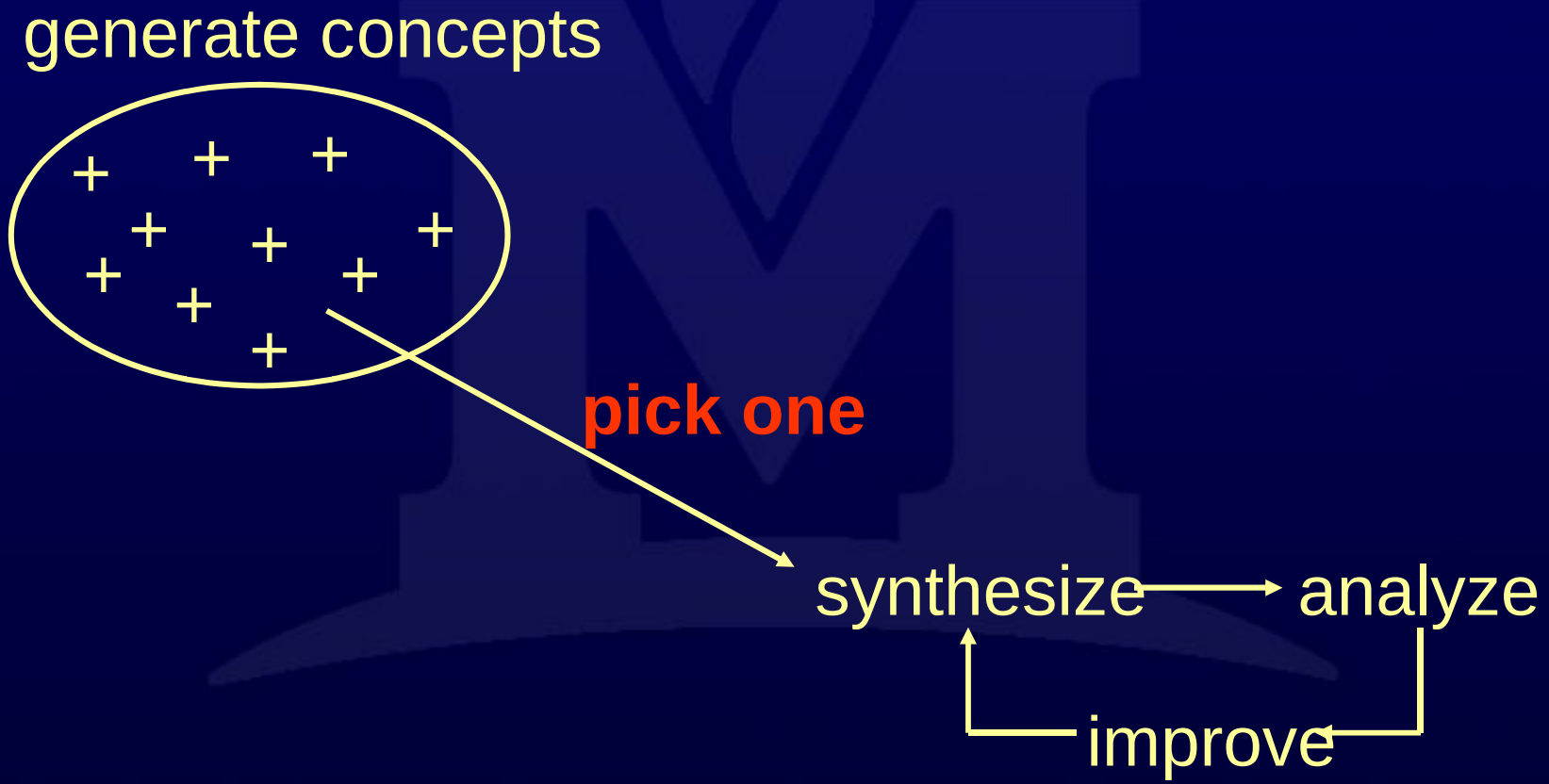
Lecture 16

17 Mar 2008

Announcements

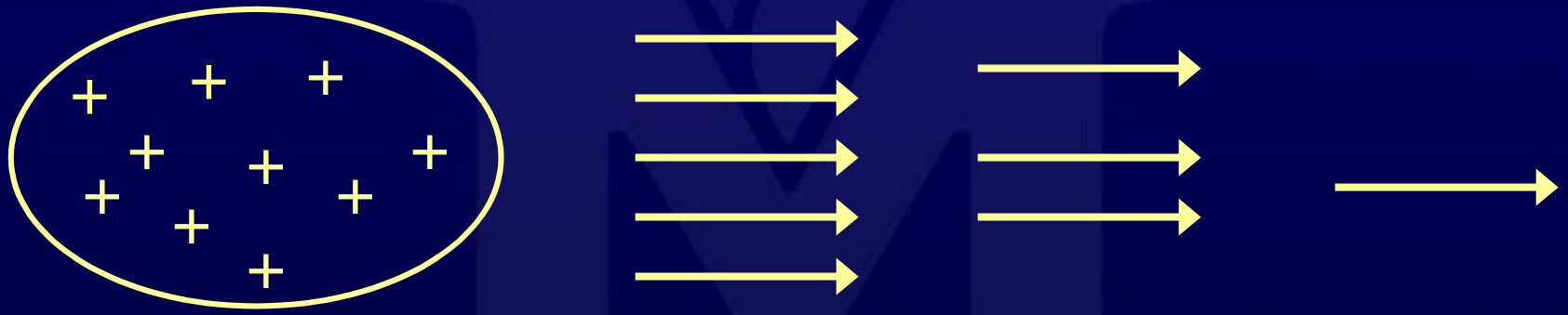
- No class Friday.
- Recitations meet this week
- Assignment 5 due next week
  - convergence process
  - system architecture plan

Review: What's the problem with this approach?



Review: Controlled Convergence Approach

generate concepts



Look at sets of design ideas…

…and eliminate the worst.

(rather than pick the best)

Design Convergence…

…isn’t usually smooth.

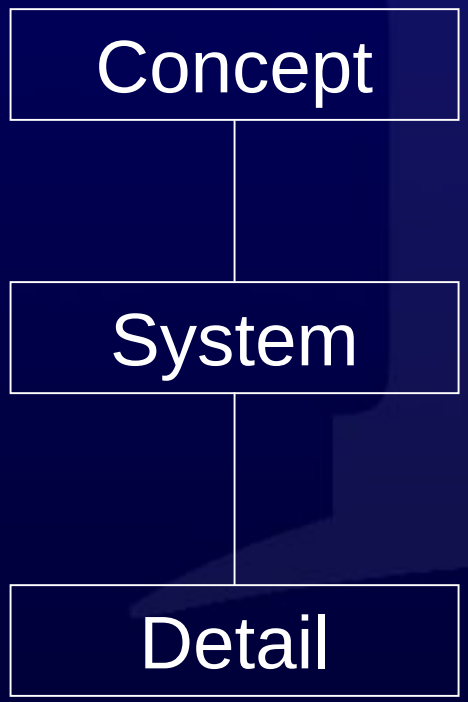
Example

Design Thinking class at Stanford

http://www.youtube.com/watch?v=JZH70qhmEso

(already watched first 3:45)

Review:
System-level design bridges conceptual and detailed design



- **Identify Subsystems**
- **Configuration**
- **Interfaces**

We also explore ideas here!

Recommended Design Approach

1. Lots of ideas!
2. Narrow through elimination, not selection.
   - Pugh evaluation matrix
3. Eliminate only when you have enough knowledge to do so.
   - additional research
   - engineering analysis
   - system architecture design

Recommended Design Approach

4. Combine and revise ideas to generate improved designs.
5. Plan system architecture before doing detailed design work.
6. Establish feasibility before commitment.

Why do design projects fail?

1. Misunderstanding what the customer needs.
2. Committing to a solution too early.
3. Lack of teamwork: esp. communication & conflict resolution, and across disciplines.
4. Poor system architecture, especially interfaces.
5. Poor planning.

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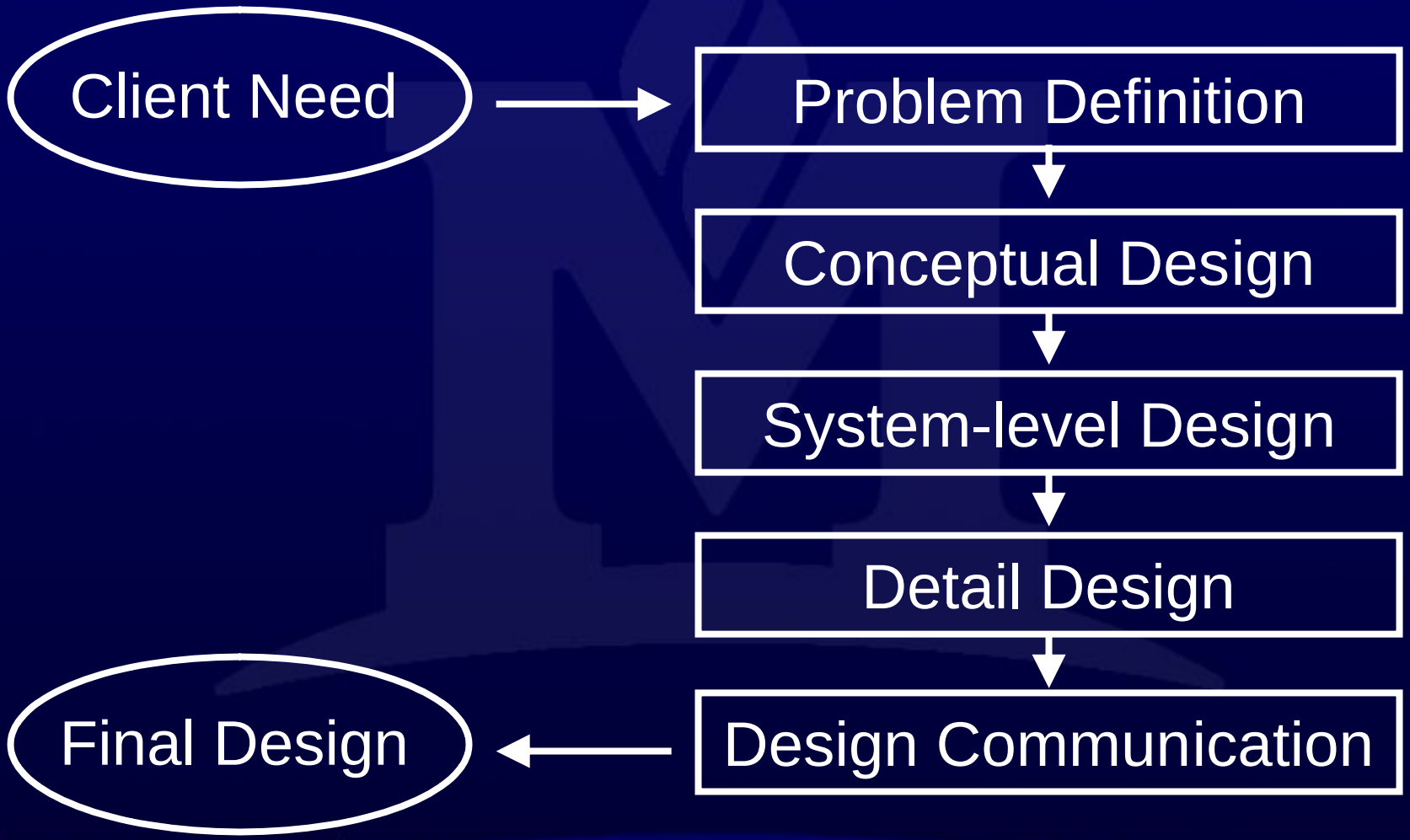
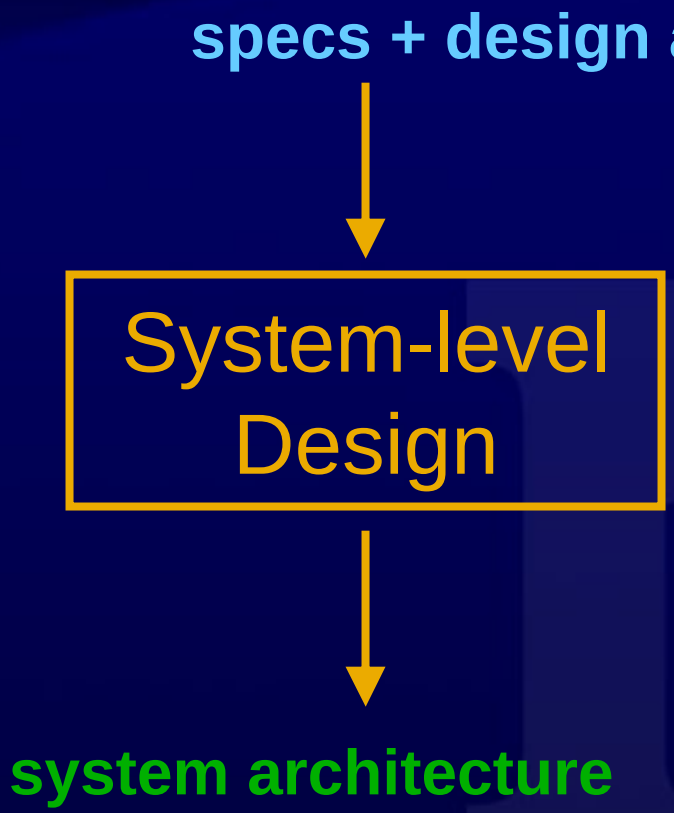
An Engineering Design Process





Identify principle attributes of leading design concepts:

7. Establish system architecture
8. Model and evaluate alternatives
9. Converge to best alternative

System-level Design

- Identify subsystems of the concept
- Investigate alternative configurations
- Think through interface issues
  - between subsystems
  - with user
  - with environment

System-level Design, cont.

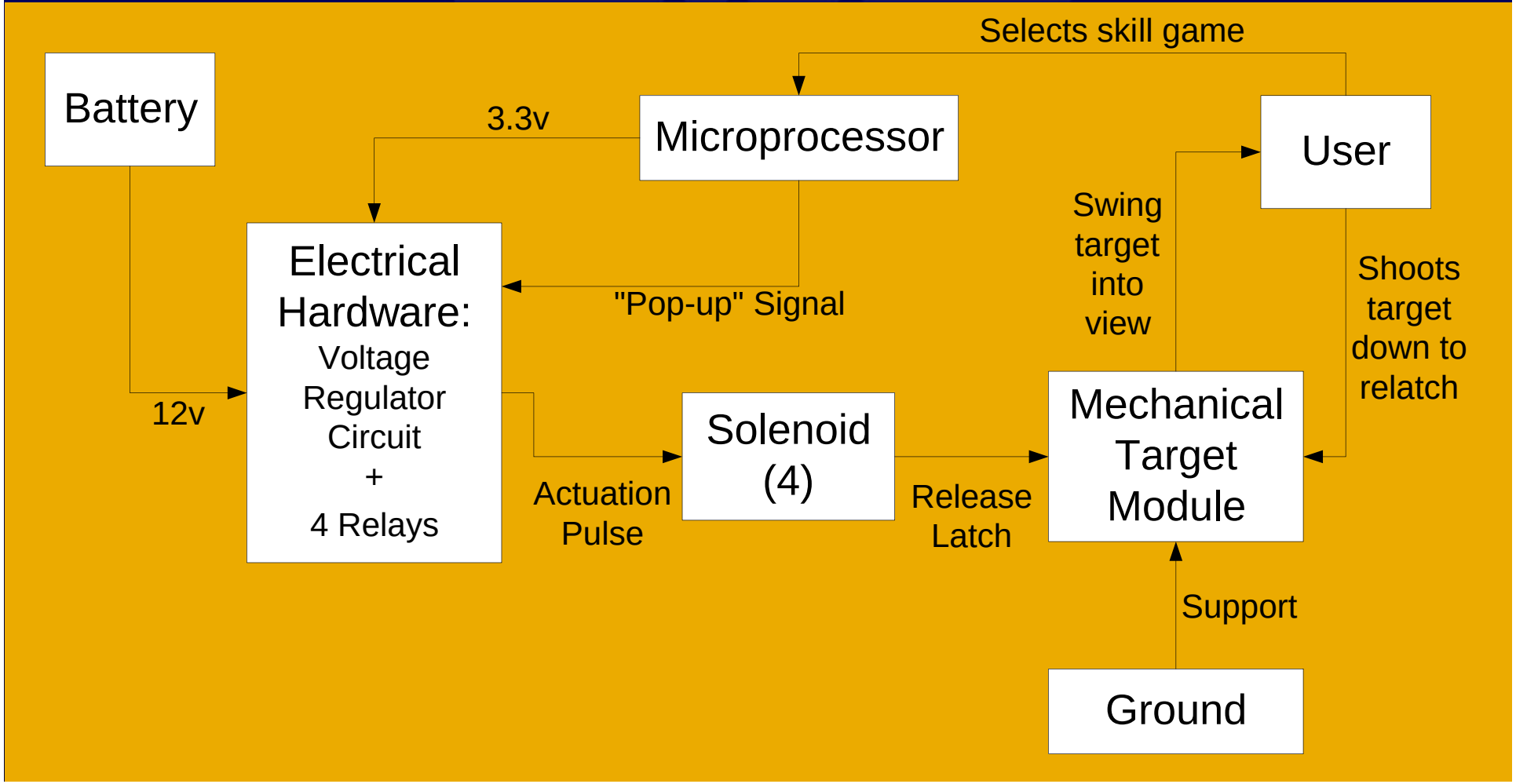
- Choose configuration based on the best interfaces
- Plan the system architecture
  - subsystem configuration / layout
  - interface design / specifications (detailed!)

Example

http://www.youtube.com/watch?v=8J6gv0vtdVk

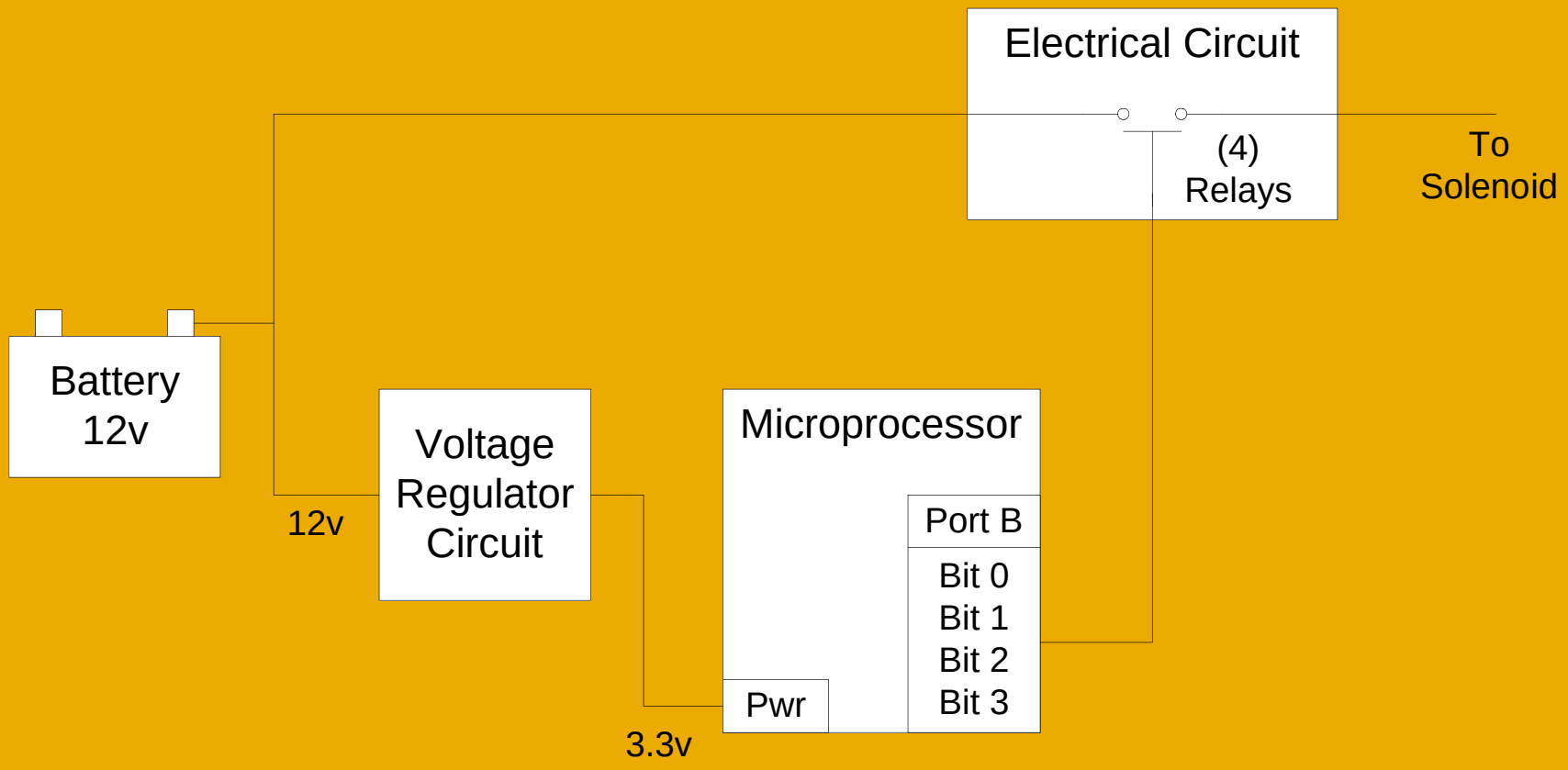
Block Diagram

- Identifies key subsystems and interfaces

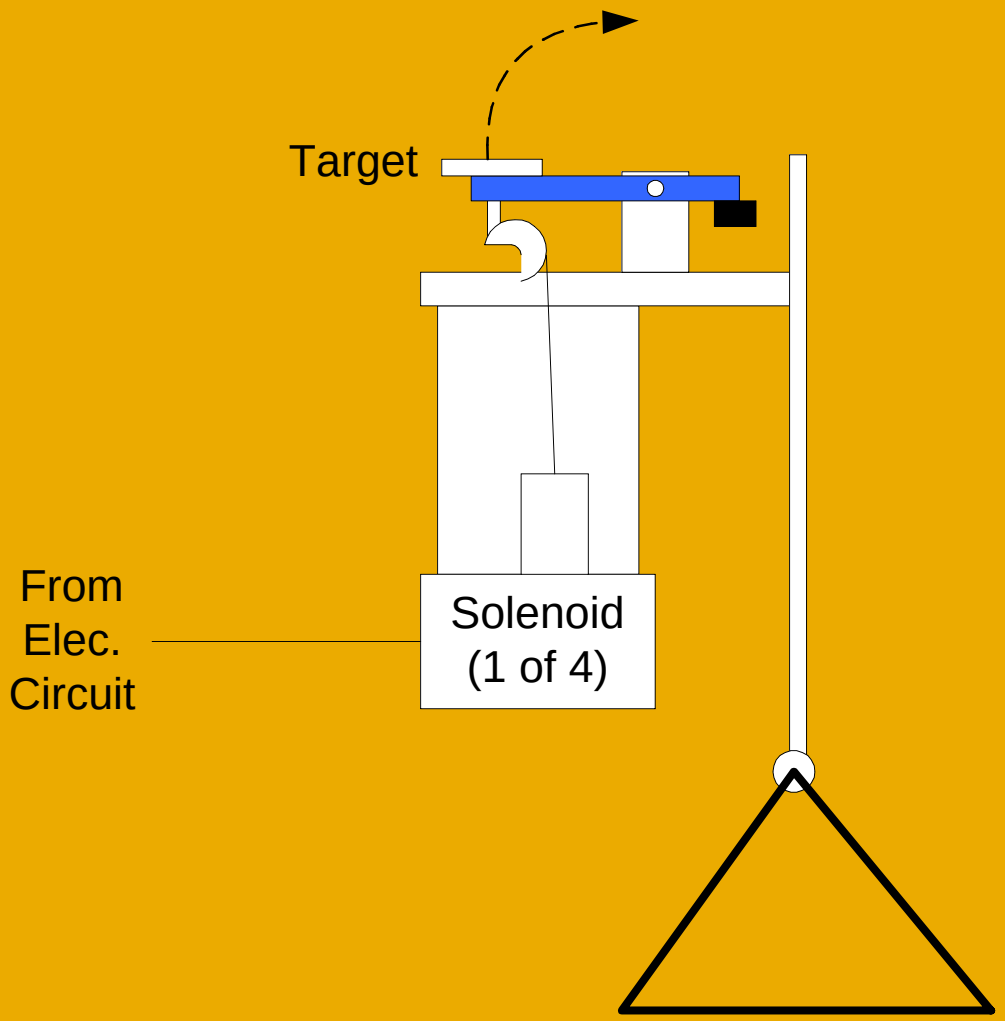


System Architecture Plan

- Adds interface details to block diagram



System Architecture Plan



Exercise

In your teams, for one of your top concept alternatives:

- Create a block diagram
- Brainstorm the best way to interface:
  - between subsystems
  - with users
  - with environment