ENGR 310

Lecture 11

22 Feb 2008

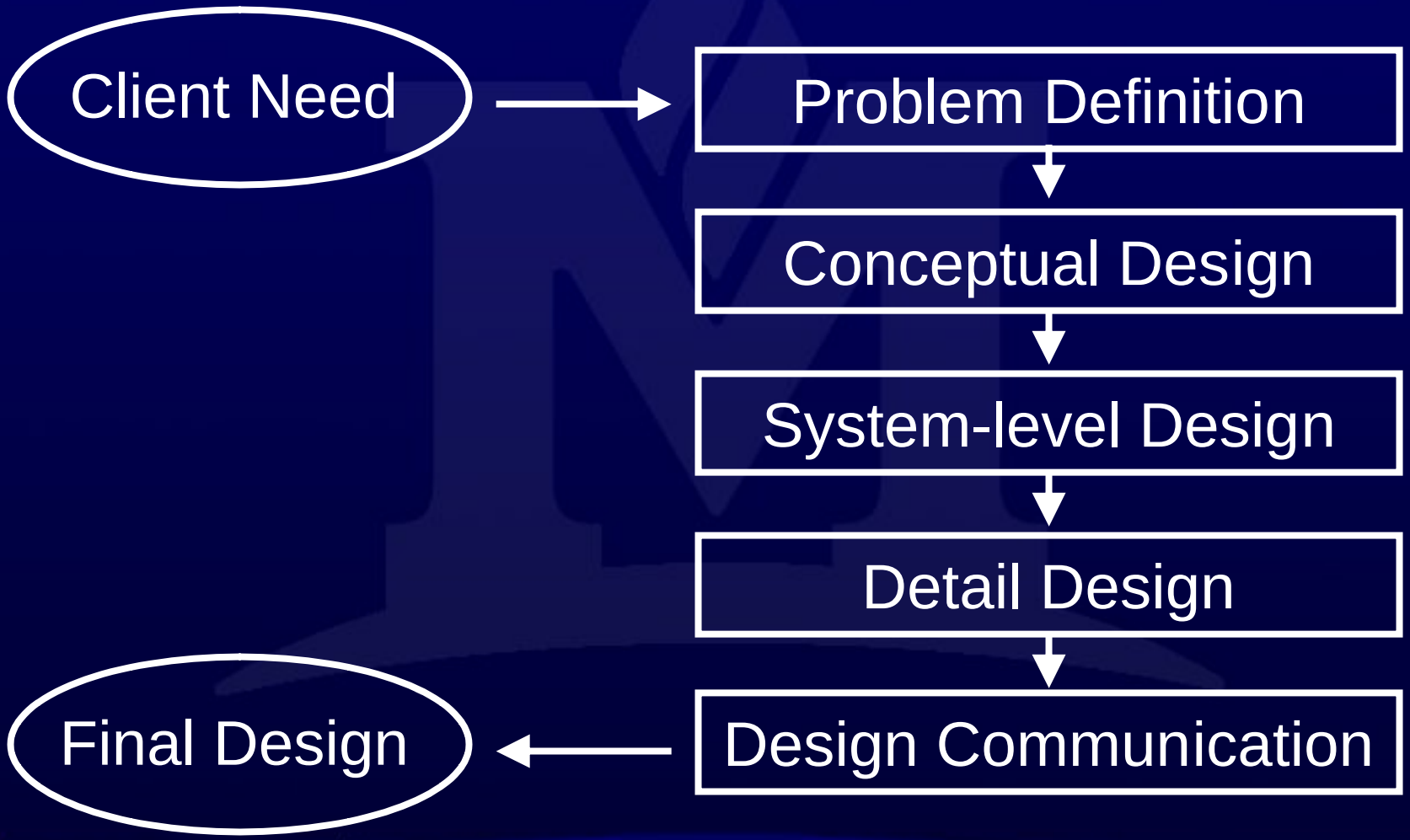
Texas A&M student project: The Creative Process

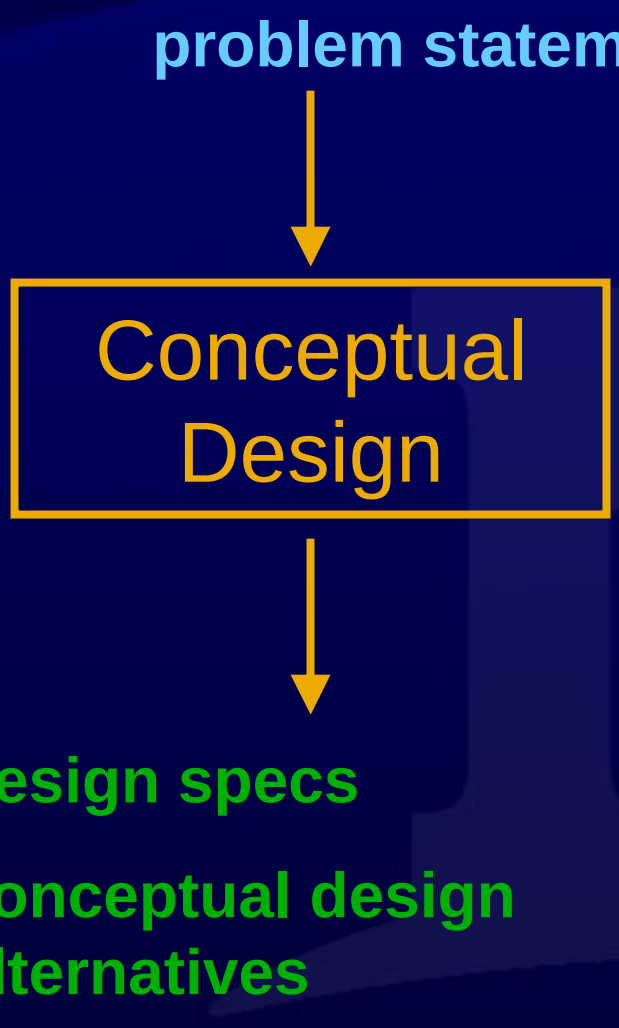
http://www.youtube.com/watch?v=JiM2j0z72GU

Announcements

- Assignment 4 due the week after next
- Journals
  - integrate them into your work
  - review the instructions
  - improve

An Engineering Design Process





Generate concepts of candidate designs:

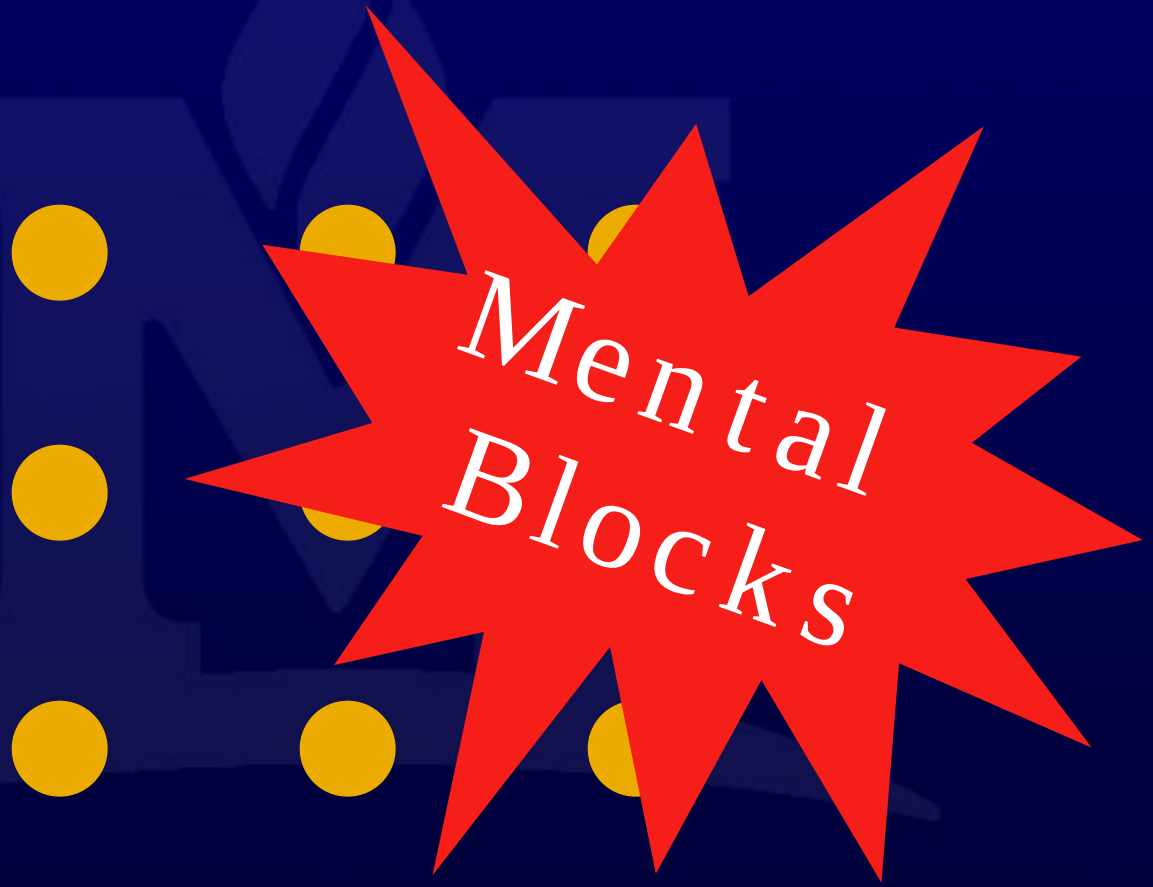
5. Establish design specifications
6. Generate ideas

Questions

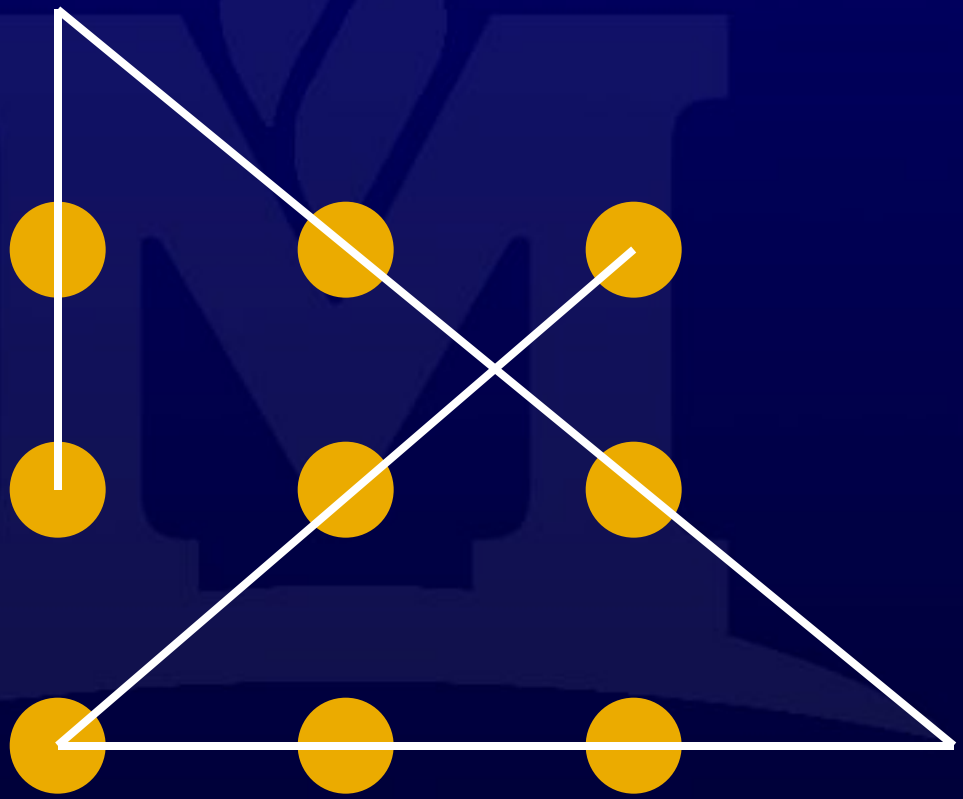
- What is creativity?
- Are some people born naturally creative?
- Should the rest of us be resigned to the mundane?
- Where do great ideas come from?
- What keeps us from being more creative?

Draw four straight lines that pass through all the dots, without picking up your pencil.

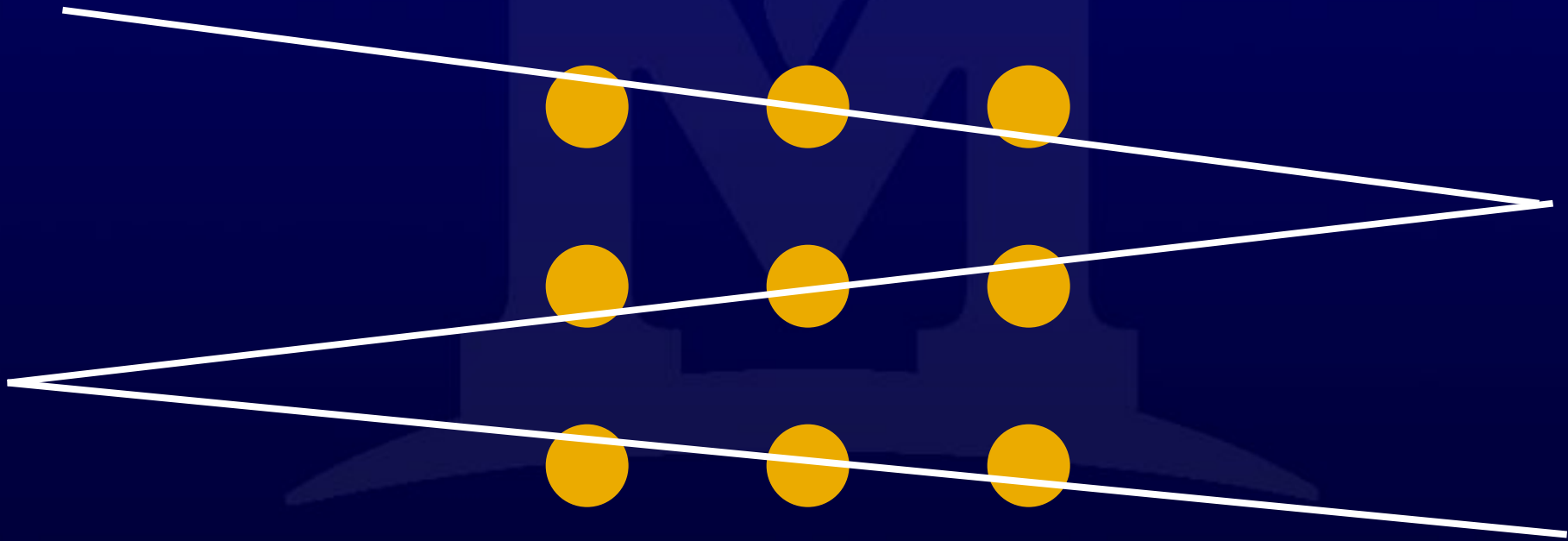
Why is this hard?



Did you limit yourself unnecessarily?



Did you limit yourself unnecessarily?



Common Mental Blocks

- Perceptual: define problem too narrowly
- Fixation: can’t get past one idea
- Emotional: anxiety, fear of failure, frustration
- Cultural: social patterns that blind us to possible solutions
- Environmental: distractions, poor atmosphere

Conceptual Blockbusting

- First step is to recognize them.
- Second, use structured techniques to break out of your current thinking pattern

Idealistic Learning Curve

Realistic Learning Curve

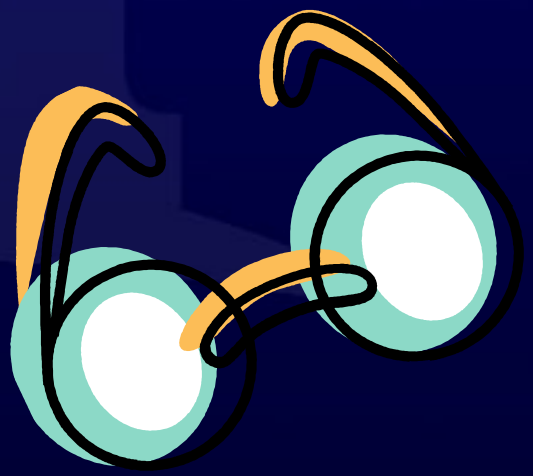
Where do ideas come from?

Stanford Professor on Creativity

http://www.youtube.com/watch?v=yPLxf2ynmMU

Where do new ideas come from?

- Adaptations of existing ideas to new contexts
  - Generalize the problem, look for others' solutions
- Combining existing ideas
- Analogy



Technique 1: Brainstorming

- List all ideas
  - individually first, then as a group
- No criticism or evaluation!
  - encourage crazy, outlandish ideas
  - have fun!!

Build on Ideas by Asking…

- Adapt?
- Modify?
- Magnify?
- Minimize?
- Substitute?
- Rearrange?
- Combine?

Lateral Thinking

- Stimulate thinking by picking a random word, and free associate.

Technique 2: Morphological Chart

	1	2	3	4
Function A				
Function B				
Function C				
Etc.				

Example

	1	2	3	4
Accept Beans	Lid	Door	Gravity chute	…
Contain Beans	Canister	Bag	Vacuum	…
Grind Beans	Rotating blade	Mortar & pestle	Opposing discs	…
Etc.				

Example

	1	2	3	4
Accept Beans	Lid	Door	Gravity chute	…
Contain Beans	Canister	Bag	Vacuum	…
Grind Beans	Rotating blade	Mortar & pestle	Opposing discs	…
Etc.				

Example

	1	2	3	4
Accept Beans	Lid	Door	Gravity chute	…
Contain Beans	Canister	Bag	Vacuum	…
Grind Beans	Rotating blade	Mortar & pestle	Opposing discs	…
Etc.				

Exercise

- In your teams, identify the 5 or so primary functions of your design problem.
- For each function, think of 4 or more ways that function could be accomplished.
  - Ignore all other functions!!
- What combinations of ideas look interesting?