

“Engineering Design” – brief overview

- Senior Design is:
 - Culmination of EE/CpE Education and Training
 - Solving a () or meeting ()
 - Design *experience* that requires adequate consideration of
 - ()
 - ()
 - ()
 - () related to the ~~ECE discipline~~
 - *Process* to final product
 - Team-based problem solving.
- Senior Design is NOT:
 - Further expansion of a class project
 - Final product only



“Engineering Design” – Full Definition : **ABET**

- “A () of devising a system, component, or process to () desired needs,”
- which involves “a () process to convert resources optimally to meet the stated needs” by applying (), () and (),
- with adequate consideration of (), (), and () in the subject related to the electrical/computer engineering discipline.”

“Engineering Design” – Full Definitions: **Industry**

- “Determine that a () exists with customers for specific goods or services and how much those customers are able and willing to () for it.
- Then determine if the product or service is () with the competencies of the company and if it can be manufactured at a () that is less than the customers will pay.
- If so, proceed by designing to match the company’s () to manufacture,
- Finally, prior to full implementation, prepare a pilot ()”

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“Engineering Design” – graphics

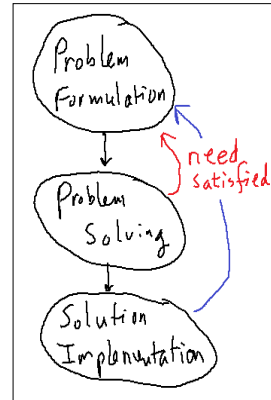


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Engineering Design in 3 phases

- **1. Problem Formulation**
 - Recognition of
 - Formulation of
 - Determine the
- **2. Problem Solving**
 - Know the
 - Generate
 - Generate
 - Analyzes
 - Makes Decision
- **3. Solution Implementation**
 - Creates an
 - Follows the
 - Evaluates
 - Agile Development:



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Characteristics of Design

- Design is (rather **“Should be”**):
 - A (**Process Cycle**) through the 3 phases of
 - (),
 - (),
 - and ().
 - (), not trial-and-error
 - (), not a recipe (nor a cookbook)
 - (), not an event or product
 - (), back to earlier phases
 - (), to faithfully execute planned activities

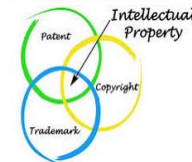


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Characteristics of Design

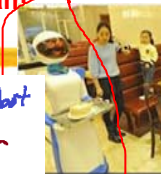
- Design should: (Focused on **External Factors**) (cf. **Previous page – internal and design itself**)
 - () with regulation, codes, rules, standards, etc
 - Work under multiple and sometimes contradictory ():
 - Money, time, socio-cultural, etc.
 - **Perform with () behavior and responsible action**
 - Understand and exercise () **Rights**



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Elements of *Unsuccessful* Design Projects: Lessons from Past Design Teams

- **Same skill sets of team members → Multidisciplinary Team**
 - Only EE or CpE students in a team
 - No balanced H/W and S/W experience
 - Slow in learning new skills
 - Did not overcome technical difficulties
- **Weak Team Dynamics → Team Playing**
 - Failure in Relationship building – a subject of next lecture
 - Leadership Problem
 - Lack of commitment
 - Tasks not achieved
- **Frequent Changes in Design → System Integration in mind**
 - Sought **easier path** for implementation
 - Focused only on each component - Did not consider the entire system - System Integration
 - Frequent design/component change



purchased RC car Demo

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Timeline and Milestones

