



Projects Class

More on the Engineering Method

Requirements

- A requirement is a list of specific characteristics the product or service being designed must satisfy
- Requirements are written to meet the goals of the project
- The requirements provide guidelines on how the project is designed
- The project is ultimately judged by how well it meets the requirements

Example: Digital Camera

- Suppose you are asked to design a new digital camera for a young technologically connected target market
 - It must be small and light-weight
 - Available in several colors and styles
 - Support wireless downloads to computer, cellphone
 - Allow easy viewing of pictures on a TV
 - Easy to use
 - High performance
 - Mid-priced

Example Technical Requirements

- Req. 1 – The camera must support the Bluetooth Core Specification Version 2.1 [*For communicating with PC, cellphone*]
- Req. 2 – The camera must support the IEEE 802.11g specification [*For wireless networking*]
- Req. 3 – The camera must be no more than 4" wide, 3" tall, and 1" deep
- Req. 4 – The camera resolution must be at least 10 megapixels
- Req. 5 – The camera's shutter lag must be less than 0.2 s.
- Req. 6 – The camera must support thin plastic skins that change the appearance of the camera

Background Research

- The research you do is dependent on several things. Ultimately, you must research what you need to know to do your project
- You could do research for any of the following reasons
 - Learn about a totally new (to you) area
 - Learn about new techniques or advances in an area you are familiar with
 - Learn of promising results that you could help advance
 - Learn what's not known in an area. This may be where you can add something new

Design Approach

- Break up the projects into smaller pieces and design each piece separately
- Plan out your design on paper before you build it
 - Especially important if the project is expensive to build
- Build and test as you go along
 - It's better for find problems early

Types of Designs

- Proof of concept
 - For cutting-edge projects
 - Shows that the theory could work
 - Not a practical product; technical advances needed before it can be generally used
- Prototype
 - An inexpensive version of the final product
 - Used to play around with the design
- Production product
 - Final product
 - Meets or exceeds the requirements
 - Suitable for mass production and general use

Testing

- You need to test your project to make sure it works
- Test against the requirements
- There may be different stages of testing
 - Testing of piece-parts during the building of the project
 - Prototype testing
 - Testing of production-candidate version
- Testing, design, and building is iterative
 - Test results may lead to design changes
 - New designs must also be tested
- There may be different types of testing
 - Functional Testing – Make sure the project works
 - Performance Testing – Determine how well it works