

EECE456: Embedded Systems Design Lab Spring 2012

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System Design Process: Top-Down Design Approach

1. Customer (project) Requirements
2. Top-Level **Specification** (“Design Requirements” “Problem Definition”)
 - From the Customer Requirements
 - What the system is to do in response to all possible inputs
 - Set out any restrictions on the design of the system – physical size, weight, power consumption, or operating temperature limits
 - Man-machine Interface: how a user interacts with the system
 - System Block diagram
 - Identification of all inputs and outputs
 - The Specification must be approved as a correct expression of requirements
3. Technology Choice (“Solution Generation”)
 - What types of solution is suitable for the task?
 - o Electronic solution --- analog, digital, or mixture of techniques?
 - o Appropriate device technologies – discrete components, standard IC, PLD, FPGA, uP ?
 - o Appropriate development environment of S/W and H/W
 - Detailed knowledge on the characteristics of the various components and devices
 - o Speed and Cost
 - o Analog/Digital I/O
 - o Power Consumption
 - o Operating voltage
 - o Noise levels
 - o Physical size
 - o Temperature range
 - o Development cost
4. Top-Level Design
 - System Partitioning: Split the works into a number of modules to produce tasks of manageable size and determine the techniques to be used in each module to achieve its required functions.
 - Hardware/Software Trade-Off: Which parts of the system will be implemented in H/W and which in S/W (for uP based system).
 - Block Diagram form of system description
5. Detailed Design
 - Detailed circuitry, H/W/, and S/W design
 - Implementation of various features and characteristics of the specification

6. Module Construction and Testing (“Implementation”)

- Construction of modules
- Testing of individual modules to ensure they conform to the specs
- Revision of design and construction of the design

7. System Testing (“Verification and Evaluation”)

- Assembly of modules and complete a system
- Verification and assessment to ensure that it meets the top-level specs
- Modification of the system if necessary