Computer Aided Design (CAD)

Lecture 1

Introduction

Dr.Eng. Basem ElHalawany

Course Info

Title	Computer Aided Design (CAD)
Lecturer:	**Dr. Basem ElHalawany**
Lecturer Webpage:	**http://www.bu.edu.eg/staff/basem.mamdoh**
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Teaching Assistant (TA)	**Eng. Shimaa Sayed**
Course Webpage	**http://www.bu.edu.eg/staff/basem.mamdoh-courses/....**
References	**Multiple references will be used**
Software Packages	**Matlab/Simulink - Xilinx ISE - OPNET**
Assessment 100/50	1. **Final Term Exam (100)** 2. **Mid Term Exam** 3. **Assignment** 4. **Project**

Main Topics

1. **Matlab as a software Environment for Modeling, Simulation, and Design.**

2. **Programing FPGA using VHDL Modeling Language**

3. **Network Simulation using OPNET**

Schedule (Draft)

Topics	Estimated Duration (# Lectures)
Introduction	1
Introduction to Matlab Environment	1
Matlab Programing (m-files)	5
Modeling using Matlab Simulink Tool	4
Communication Systems Simulation (Applications)	3
Midterm	8th Week
Introduction to FPGA + Review on Digital Logic/Circuits	2
VHDL Modeling Language	4
VHDL Application	2
Introduction to OPNET Network Simulator	3
Course Closeout / Feedback/ project (s) Delivery	1

CAD/CAM

- Computer-aided design (CAD) is the use of computer systems to assist in the creation, modification, analysis, or optimization of a design.

- Computer-aided manufacturing (CAM) is the use of computer systems to plan, manage, and control the operations of a manufacturing plant through direct or indirect computer interface with plant's resources.

Major Benefits of CAD

- **Productivity (=Speed) Increase**
  - Automation of repeated tasks

  - Insert standard parts from database
- **Supports Changeability**
  - Don't have to redo entire drawing with each change

  - Keep track of previous design iterations
- **Communication**
  - With other teams/engineers, e.g. manufacturing, suppliers
  - With other applications (CAE/FEM, CAM)
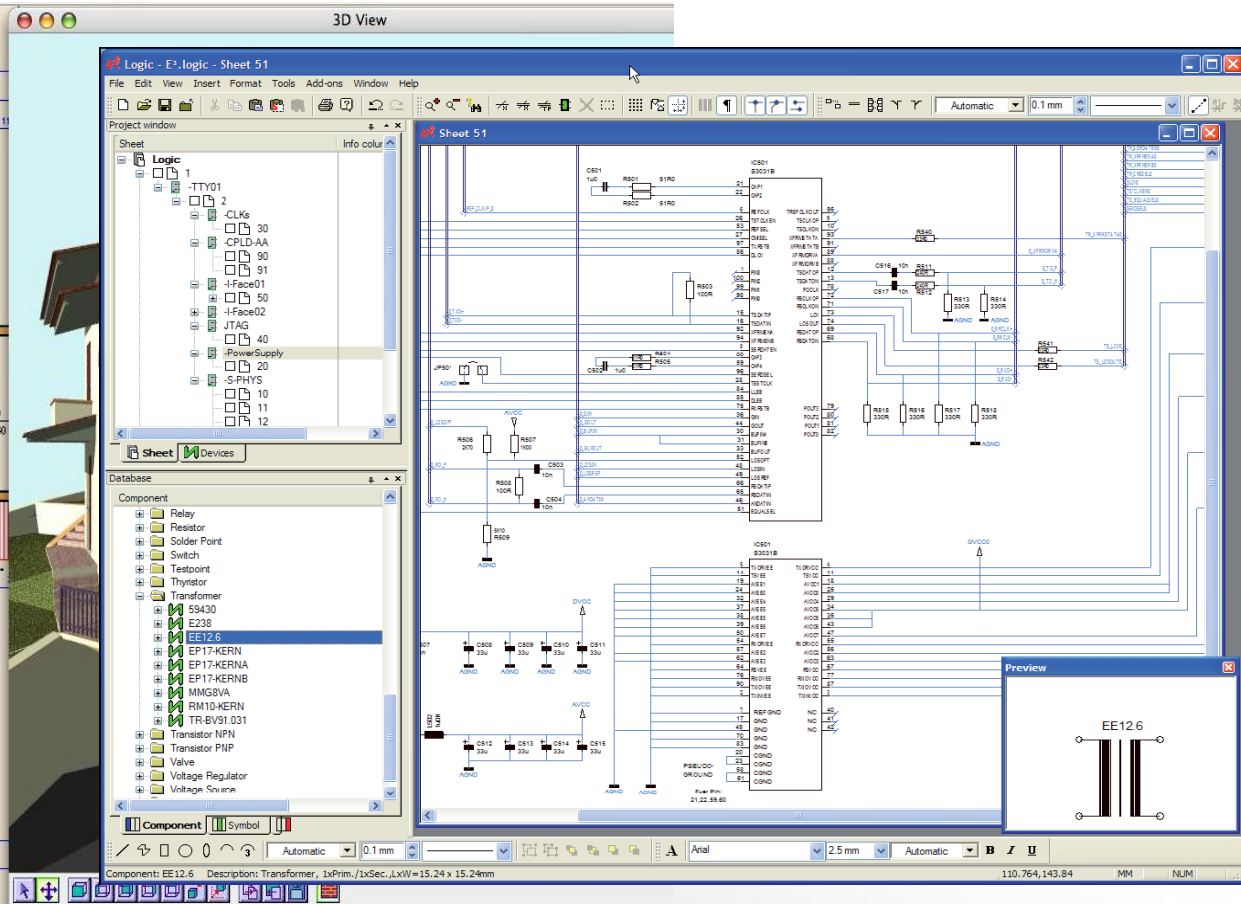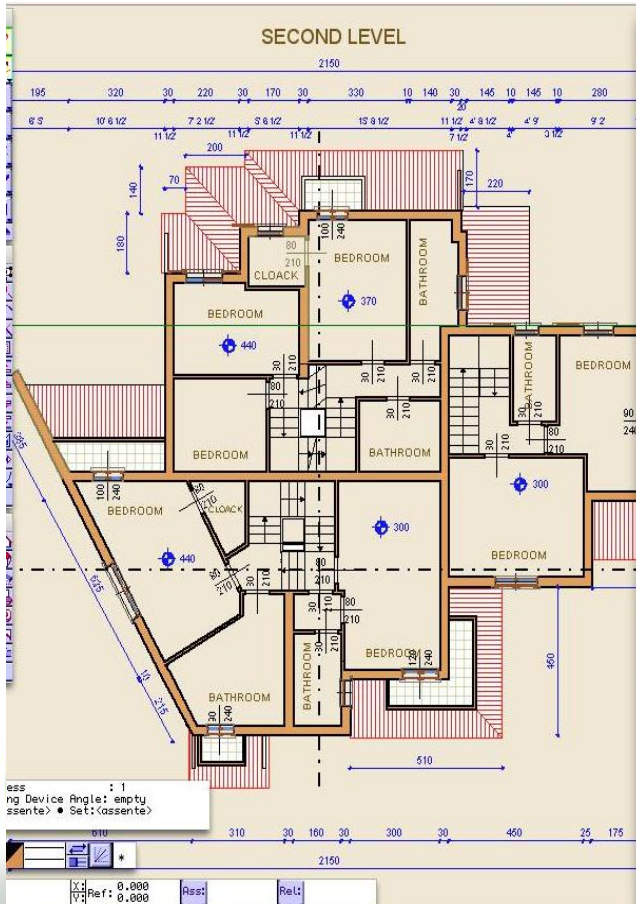 - Marketing, realistic product rendering
 - Accurate, high quality drawings

Uses of CAD

> CAD is used to design a variety of products for a variety of fields such as:

- ✓ Architecture
- ✓ Automotive engineering
- ✓ Industrial Design

- ✓ Machinery
- ✓ Medical Design
- ✓ Electronics & Communication

Electronic design automation (ECAD)

- CAD can also be used to design electronic systems such as printed circuit boards and integrated circuits.

- As well as designing the layout of a circuit the user can also list logic gates for the circuit.

- These designs can be used for hundreds of electronic products and machinery.
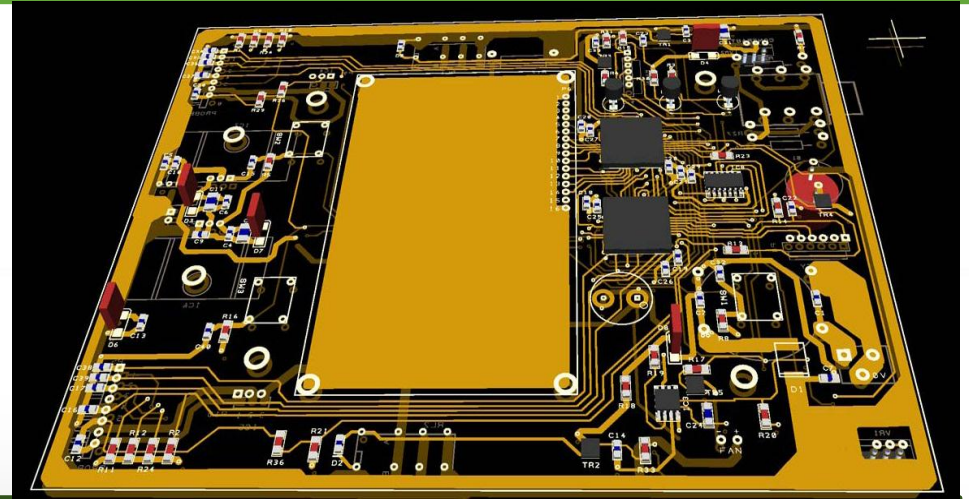
Top-Down / Bottom-Up Design Approaches

- **A *top-down design*** proceeds from an abstract, high-level specification to a more and more detailed design by decomposition and successive refinement

- **A *bottom-up design*** starts with detailed primitive blocks and combines them into larger and more complex functional blocks

- Designs usually proceed from both directions simultaneously

  - Top-down design answers: What are we building?

  - Bottom-up design answers: How do we build it?

First Part
References

A. Matlab by Example: Programming Basics, Munther Gdeisat
B. Essential MATLAB® for Engineers and Scientists
C. Introduction to Simulink with Engineering Applications, Steven T. Karris

The List will be updated regularly ☺