

EELE 461 / EELE561 – Digital System Design
Final Project Description
Presentations: 4/23/12 – 4/27/12 (last week of class)
Paper Due: 5/2/12

Summary

You are to complete a digital system design project. This project will incorporate all of the theory that you've learned in the course into an experiment in which you will fabricate, model, and characterize a modern signal integrity issue. This project is worth 25% of your overall class grade. The project grade will be based on the quality of work (50%), a written paper (40%), and an in-class presentation (10%).

Project Selection

You will need to choose a project in consultation with the course instructor. The project should investigate a signal integrity issue that is covered in this class. The issue must be something that can be analyzed by hand and also characterized using an experiment conducted on a PCB with a TDR scope.

Project Content

Each project will need to consist of the following:

- (1) A theoretical explanation of your signal integrity effect
- (2) Fabrication of a custom PCB containing a experiment to investigate the signal integrity effect
- (3) TDR/TDT measurements illustrating the signal integrity effect
- (4) A correlated SPICE circuit model of your measurements (TDR/TDT)
- (5) A performance simulation of your de-embedded SPICE model (Eye Diagrams, Zin, S-parameters, etc...)
- (6) EE561 Only
- (7) An Agilent Momentum simulation of your signal integrity effect
- (8) References of relevant literature regarding your signal integrity effect (at least 3 different publications)

You will need to deliver a copy of all your design files in electronic format. You will turn in a zip file containing an organized folder structure containing your PCB design, SPICE model (in either ADS or DxDesigner), Momentum simulation (if applicable), and paper.

Project Paper

Your paper should be formatted in the IEEE Journal (2-columns). There is a template and reference paper on the course website. All of your figures/photos should be clean and readable. EELE461 papers are limited to 3 pages. EELE561 papers are limited to 6 pages. The sections of your paper should be:

- I. Abstract
- II. Introduction
- III. Motivation
- IV. Theoretical Analysis
- V. Design of Experiments
- VI. Measurement vs. Model Correlation
- VII. Model Performance
- VIII. Conclusion

EE561 Only

Sections I-V will be the same as listed above; however, you will have the following additional sections:

- V. Finite Element Analysis
 - VI. Measurement vs. Model Correlation
 - VII. Model Performance
 - VIII. Conclusion
- References
Biography (w pictures)

The expectation of your paper is that it should be in a format that is ready to be submitted to a journal for publication.

Project Presentation

You will be given an opportunity to present the details of your project in an in-class presentation during the final week of the semester. Your presentation should last around 10 minutes with 2-3 minutes for questions. You will NOT use power point. Instead, you will use the whiteboard to describe your work. By the end of the presentation, everybody in the audience should have an idea of what your project was, how you accomplished it, and the overall results of your work.

Final Project Grading Sheet

Project Title: _____
Name: _____
Grade: _____ / 100

Points Earned / Points Possible

1) Quality of Work (50%)

Analytical Analysis (30%)

- application of theoretical principles to problem
- building a complete model of the system
- realistic values for electrical parameters and performance

Effective use of CAD Tools (20%)

- accurate use of CAD tool
- realistic results from CAD tool
- organization and readability of CAD data
- delivery of design package in requested format

2) Written Report (40%)

Technical Quality (20%)

- concise description of problem, approach, and experiment

Appearance (10%)

- figures, formatting, general look of the paper
- use of figures to support word description

Spelling & Grammar (10%)

- each error will cost 2%

3) In-Class Presentation (10%)

Content (5%)

- description of technical details
- ability to apply class theory to the design

Q & A (5%)

- ability to answer questions about the project
- ability to remain calm when asked tough questions
- ability to keep composure when approach is challenged
