

Instructions:

- You can have maximum of 2 student in the group on 12/1/2020 , sign in to this sheet
- https://docs.google.com/spreadsheets/d/1nVJ_5YJIHExeErCpYvjXCEll_yTadclUW0zSliPVb6M/edit?usp=sharing
- The project will be corrected F2F or in Zoom per each individual
- You will be asked to explain the design, change design and testing.
- Grade will be Per Individual and not a group :

	Grade	Student Grade
Design	5	
Power	5	
Area	5	
Speed	5	
Report (IEEE)	10	
	30	

Your task in this project is to use the skills you have been acquiring through the lectures to design a fairly sophisticated module. The project should result in a design with

- Experimental results on the efficacy of the proposed architectures, and
- **Suggestions/IMPLEMENTATION and COMPARESION for improving the DESIGN. 50% of the grade will be on improvement of existing design**

Projects can be done in groups of 2; Each one should show his contribution in planning sheet

1. Timeline

Selecting a project, you need to decide on the project topic. Although we have only covered some of the information you need to complete the project at this time in the semester, this deadline is intended to get you started. You only need to decide on what you will be designing, and you'll learn the how by the time you need to implement your project.

For the topic, I listed one topic, but you could think of interesting areas where IC chips can be applied (just focus on the digital parts of the real-world applications), or base the topic on something that interested you. You only need to turn in a sheet of paper with your topic, a brief description of what you would like to implement, and the names of the teammates at this time.

For the final project report, submit a hardcopy (one per team) before Jan 10th . The project discussion will be on Jan 12th

2. Final report

The final report should be in IEEE format with less similarity using Turnitin, the report should include the following.

- Introduction
- Specifications document
- Background-others systems
- Proposed Design document
- Testing strategy and results
- Optimization strategy and results
- Source code and layout Details of each of these items are given below
- Conclusions
- References

Details of Final Report

Introduction and background: includes introduction about the design, how it has been built and comparison to old design and advantage/disadvantage

Specifications: The specifications document should include a high-level overview of the block you are implementing; a description based on a diagram or set of diagrams is the best way to do this. It should also include the summary of the logical interface the block presents to its environment. In addition, the document should include the area, power, and performance numbers you are targeting. If you base your work on an existing design, you should be able to come up with estimates on these parameters; otherwise, back-of-the-envelope calculations are fine. It is not imperative that you meet the numbers in the specification document. The specifications document should not discuss the implementation; its focus is the functionality that you will implement, and the cost of this functionality.

Design: The design document should include a description of how you will implement the specification; a set of figures is the best way to convey this. The implementation discussion should include the basic architecture and algorithms, as well as the floorplan, and circuit technology, etc. You should also make notes on the optimization techniques you expect to use and their implications to your design, and the trade-offs they will entail. For example, if you have long interconnects, you may want to state that you intend to overcome problems resulting from noise by shielding, and hence all long nets should have enough space between them for such shielding lines. All choices should be justified, on the basis of references to portions of the book/research papers, and by logical arguments. The design document should also include an overview of the tool suite you will be using, the naming conventions for variables/modules/files, the regression control strategy, and an issue tracking mechanism (which could be just entries in a text file).

Think of the design document as something you would give to an engineer just joining the project to help him/her come up to speed. Design documents also spell out a regular system of code reviews, where designers have to explain what they have done to their colleagues, at a very detailed level.

The specifications and design documents do not have to be exactly what you turned in; indeed I would expect the design document to evolve as you discover problems and find improvements with your approach.

User document: The user document describes how end-users are to integrate the block into their designs – think of it as being like the datasheet you get with a chip. In particular, the user document

should include detailed information on interfacing to the block, i.e., the timing on the different signals. It should describe the power, area, delay numbers at various operating points, and the loading capacitance and drive strengths on the input-output signals.

Testing: In this section, you are to describe the set of tests you applied to your design to check for logical errors, and your coverage metrics. Classify the bugs you encountered, and how you corrected for them. In addition, discuss the traces you applied to determine the critical path, and compute the delays.

Optimization: Include a discussion of all the steps you took to improve performance, and the magnitude of improvements that you saw. I am interested in novel techniques that gave your better performance than the descriptions on which based your approach.

You are free to use any tool, simulations to proof your concept.

3. Project Topics

4.1 Low Power Comparator Logic circuit

Goal: In this Project we introduce new design and implementations of a comparator as shown in the attached file and compare your results to what is implemented in the paper. The target to accurately speed up computation.