EE 1130
Freshman Eng. Design for Electrical and Computer Eng.

Class 5

Signal Processing Module (DSP).

- Module Project.
  - C2. Use knowledge, methods, processes and tools to create a design.
  - I1. Identify and learn to use the tools needed in order to conduct research projects and develop independent learning skills

Project Document

- The report must include these chapters:

  - Cover.

  - Contents index.

  1. Introduction: (what are you going to do).

  2. Problem approach: (how are you going to do, what mathematical approach, equations are you going to use). Lab. Result:s (results of simulation, add block diagrams, figures, explanation of each figure and block).

  3. Conclusions: (what you have learned, future work).

  4. References: (if you copied, please reference the source).

Project Document

- COVER.
  - Title: Project DSP Module
  - Name.
  - Course and section: ee1130-
  - Trimester: Wi13
  - University.: PUPR
  - Professor: Luis Vicente
  - Date:

Universidad Politécnica de Puerto Rico
Departamento de Ingeniería Eléctrica
Hato Rey

Project Module:
Digital Signal Processing

Your name here
#est. 84810, Section
FA- 2013-09-02
Professor: Luis Vicente Ph.D.

Project Document

- CONTENTS INDEX
  - Document contents:
    1. Introduction----------------------------3.
    2. Problem approach------------------5.
    3. Conclusions.
    4. References.
    5. Appendices.

Project Document

- 1 - INTRODUCTION

1. What do you think this area of engineering is about (Signal Processing) IN YOUR OWN WORDS.

2. Search the web to describe what Signal Processing is about. What are the uses of Signal Processing.

3. Find out what kind of jobs Signal Processing Engineers will be able to do. How much is the salary

   When copy/paste from web, notes, book. Always put references starting with [1]

Project Document

2.- PROBLEM APPROACH (MOCK DESIGN PROJECT):
What to do: we will implement the engineering design steps procedure to build the filter we were talking about on previous lectures.

1st. Define the problem: what are we going to solve. One paragraph.

2nd. Generating alternative concepts:
1- Get away from the source of noise.
2- Implement a filter using Laplace Transform.
3- Search the internet for alternative solutions to this kind of problems. Faraday Cage, EMI/EMR.

Project Document
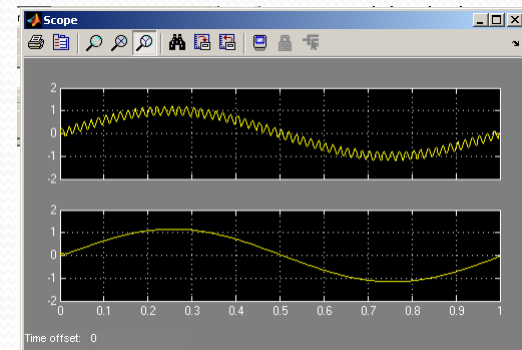
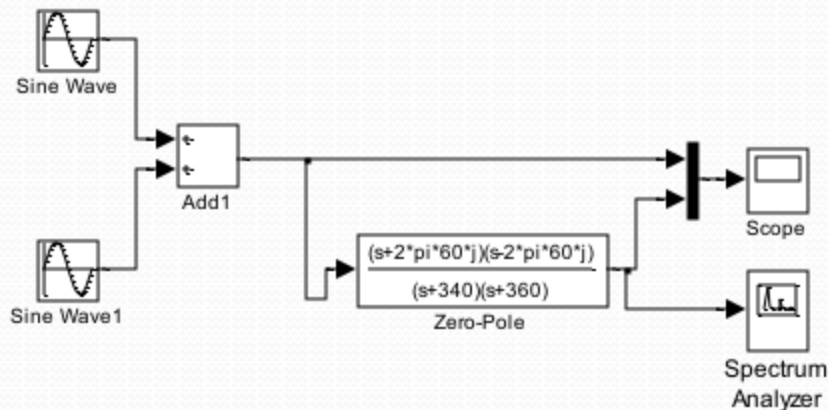2.- PROBLEM APPROACH (MOCK DESIGN PROJECT):

3rd.	Evaluating alternatives and selecting a concept: [ventajas, inconvenientes de cada una de las alternativas, y seleccionar la que consideremos mejor, justificándolo.]

Metodo	Ventajas	Inconvenientes
Alejarse de la fuente de ruido	Barato, no necesito filtro	A veces uno no puede alejarse de la fuente de ruido.
Diseño de filtro mediante Polo/Zero	Es un método conocido que funciona.	Hay que diseñar el filtro y adquirir los componentes.
Jaula de Faraday. EMI Rejection	?	?

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4th. Detailed design: here you explain how to implement/desing the filter. Using formulas etc. Copy paste from lecture notes

$$H(s) = \frac{s^2 + 4\pi^2 60^2}{(s+340)(s+360)}$$

Project Document

The Engineering Design Process

5rd.- Implementation and Testing: (escribir algo así:

- A partir de la Funcion de Transferencia H(s), se calcularán los valores de los componentes que formarán el circuito.
- Para ello hay que romper la funcion de transferencia en fracciones simples.

$$H(s) = \frac{s^2 + 4\pi^2 60^2}{(s+340)(s+360)} = \frac{R_1}{s+340} + \frac{R_2}{s+360}$$

- Cada fracción simple va a resultar en un circuito RC con un amplificador de ganancia. $\quad H(s) = \frac{-37.7}{\frac{1}{360}s + 1} + \frac{37.9}{\frac{1}{340}s + 1}$
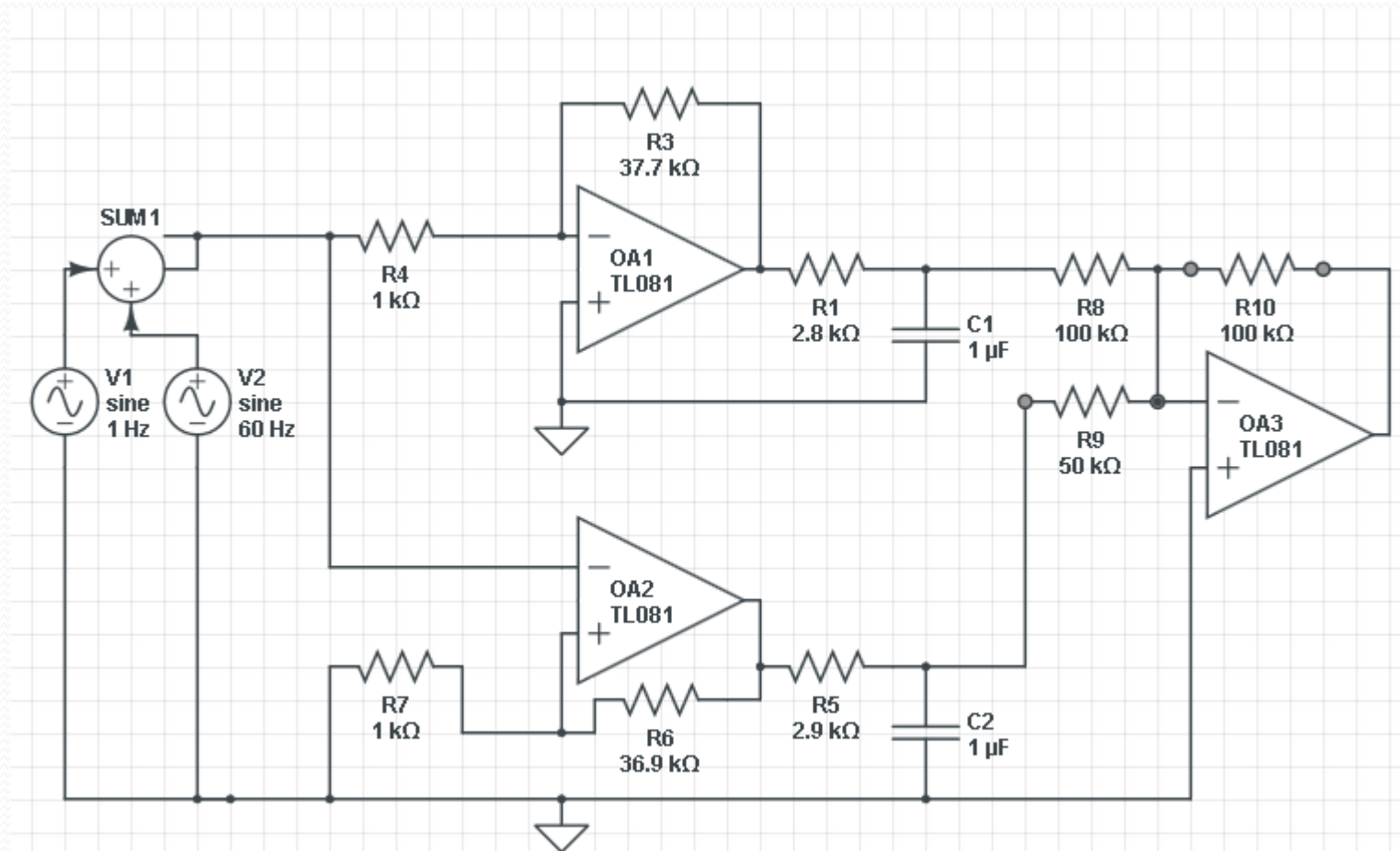
- Luego se suman los dos circuitos RC con un sumador analogico.

Project Document

The Engineering Design Process

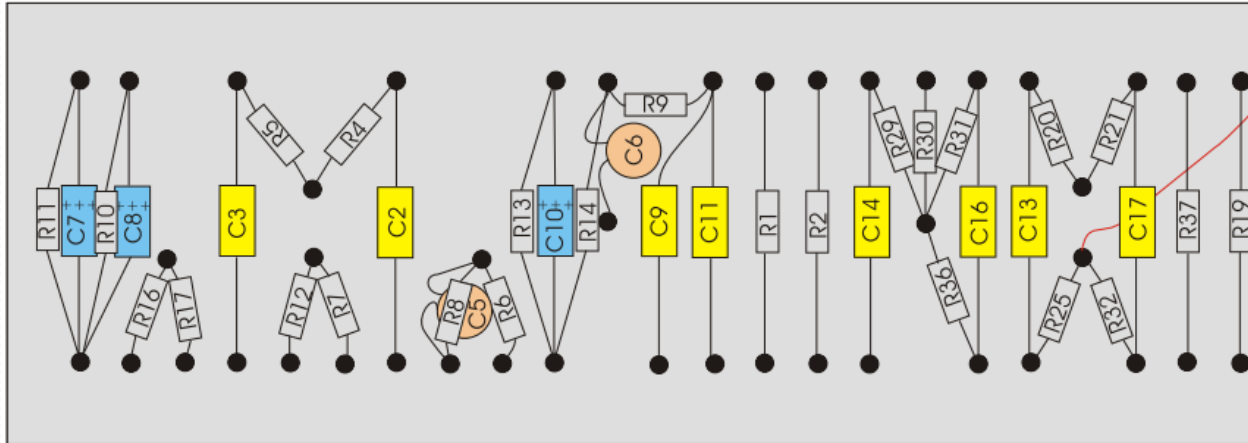5rd.- Implementation and Testing: (inventar algo así:

-    Layout electrico:

Project Document

The Engineering Design Process

- Se creará el Physical Layout del Board (ejemplo en la fig)

- este circuito se implementará en China, etc etc.)
6. We will do a: Performance Evaluation
7. We will end the project with: Presentation and Reports.

Project Document

The Engineering Design Process

5rd.- Implementation and Testing:

- (cont).
- Se construirá el board.
- Se colocarán y soldarán los componentes.
- Cada circuito se testeará.

6rd.- Performance Evaluation.

7rd.- Presentation and Reports.

Project Document

3 – CONCLUSION

que es lo que hemos diseñado y que aprendí de este proyecto.

- Summary of what we did.

- What we learn.

- What interesting aspects you found.

Project Document

- 4.- References.
  - Try to write the references in IEEE format as:
  - [1] Mitra, Sanjit KK, *Digital signal processing: a computer-based approach*, McGraw-Hill Higher Education, 2000.
  - [2] B. Klaus and P. Horn, *Robot Vision*. Cambridge, MA: MIT Press, 1986.
  - [3] L. Vicente. (2013, Apr 1). EE1130-05: Freshman Design for EE and CoE [Online]. Available: http://www.lmvicente.com/ee1130.htm
  - [4] Wikipedia (2014, Jan 13). Digital signal processing [Online]. Available: http://en.wikipedia.org/wiki/Digital_signal_processing.

Project Document

- Apendices (not applicable in this project)

  - Here we put software code (C++)

  - Copy of downloaded documents (manuals, technical sheets, etc)

Project Document

- The project should address the following issues:
  - Explain what we are designing (ex, a processing system that attenuates a high frequency component that is corrupting my signal of interest) (c,e).
  - Explain what is expected from the system (c,e).
  - Search in the web the impact of DSP engineers, what kind of problems deal with? (h).
  - Show how you did the internet search, what tools and reference documents you used? (i).
  - Search over the internet information about employments in DSP, what kind of jobs and salary.(j)

End of Class