

EE2015: Electric Circuits and Networks

Introduction

Nagendra Krishnapura
Dept. of EE, IIT Madras

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nagendra@iitm.ac.in

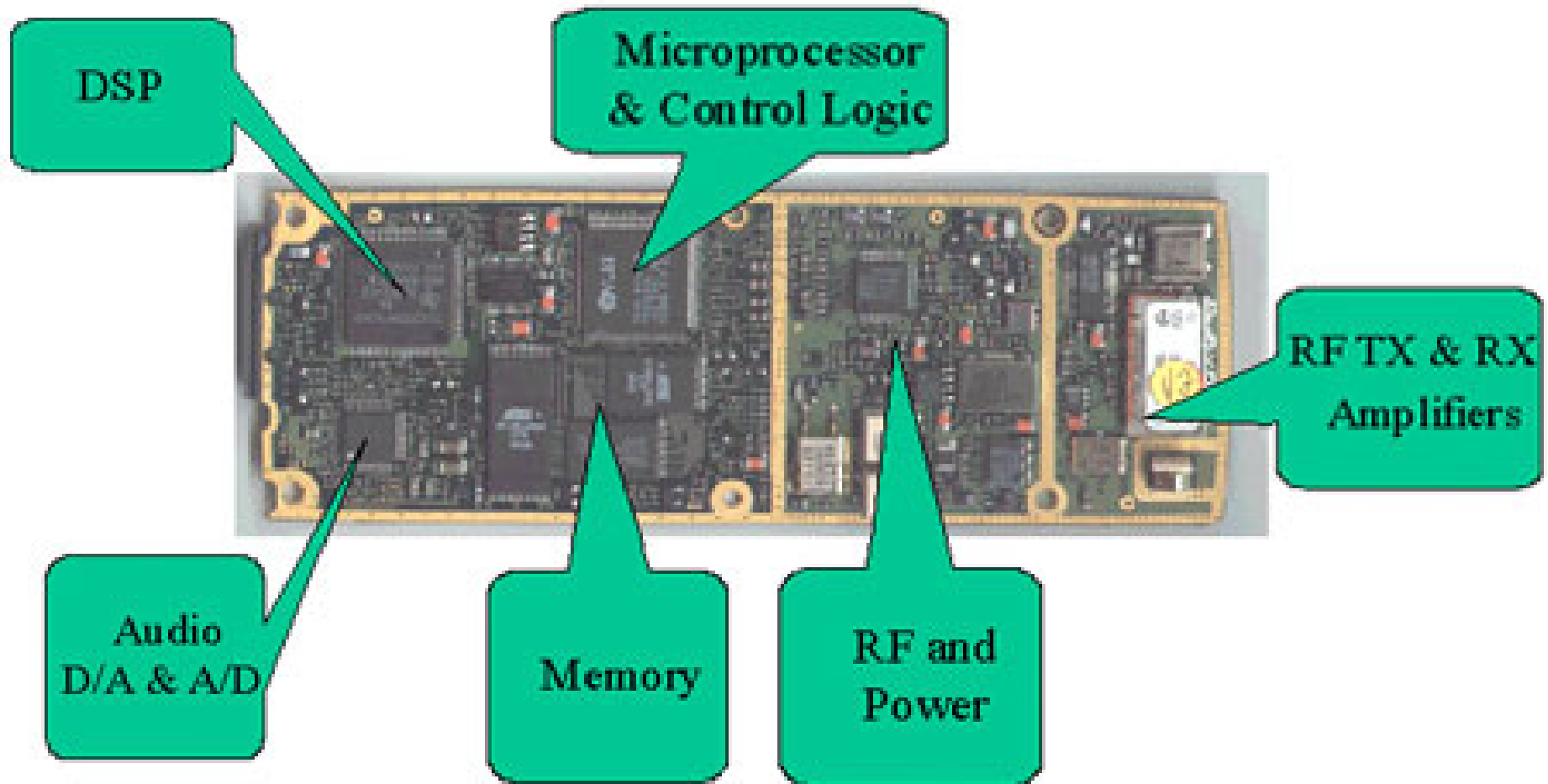
EE2015: Moodle page

www.ee.iitm.ac.in/courses/ee2015_2017/start

What are Electric Circuits?

- Interconnection of Electrical Components
- All electronic and electrical gadgetry
- Absolutely everywhere around us!

Mobiles, Laptops, Music players, ...



[<http://static.ddmcdn.com/gif/cell-phone-inside.jpg>]

Mobiles, Laptops, Music players, ...



[<http://smartech.blogetery.com/files/2008/04/asus-eee-pc-900-inside.jpg>]

Transformers, Generators, ...



[http://i01.i.aliimg.com/photo/v0/110482299/Power_Transformer.jpg]

[<http://media.digikey.com/Renders/Johanson%20Tech%20Renders/2.45GHz%20Balun6.jpg>]

What is EE2015 all about?

- Analysis techniques applicable to **all circuits**
- Not about any particular circuit
- One of the two most important EE courses (the other being Signals and Systems)
- Pre-requisite for understanding of:
 - Analog circuits, Digital circuits
 - Electrical machines, Power systems
 - Placements in core EE companies!

Course topics

- Electrical quantities and elements
- Electrical circuit analysis; Theorems
- One and two port networks; Transformations
- Negative feedback and ideal opamp
- RL, RC, RLC circuits
 - Solving differential equations
 - Forced and natural response
 - Sinusoidal steady state; Phasors
- Polyphase circuits
- Laplace transforms

Course goals

- Learn circuit analysis and learn it well!
 - Practice, practice, and practice problem solving
 - Understand every step of problem solving
- Learn about linearity and its implications
- Learn rudiments of nonlinear circuit analysis

Logistics

- Time table:
 - C slot(Mo 10am, Tu 9am, We 8am, Fr 1pm)
 - Extended tutorial in T slot(2pm-440pm)
 - Classroom: ESB128
- Evaluation
 - 4 quizzes (total of 50%; 23 Aug., 13th Sep., 11th Oct., 1st Nov.)
 - End sem (40%)
 - Tutorials (10%)

Tutorials

- ~ 12 tutorials over the semester
- Problem sets will be posted in advance
- Must solve problems before the tutorial session
- Use extended tutorial sessions for clarifications and understanding difficult concepts

Classroom etiquette and expectations

- Mobile phones off
- 85% attendance
- Don't enter the class if more than 5 minutes late
- TAs take attendance in the first 5 minutes
- **Must solve problems** given in class
 - Bring your pen, notebook, calculator and **use them**
- **Participate** in classroom Q&A

Classroom participation

- Get your doubts cleared
- Improve your understanding
- Develop (technical) communication skills
 - Poor communication skills-a constant complaint from prospective employers

“Learning” or “Knowing” something

- What does it mean?

“Learning” or “Knowing” something

- Make quantitative predictions about similar or slightly different situations
- Practice solving a variety of problems...
- ...while understanding every step
- Will not happen without your active participation both inside and outside the classroom

Some inspiration

- <http://teachingexcellence.mit.edu/inspiring-teachers/amar-bose-6-312-lecture-01-introduction>
- <http://teachingexcellence.mit.edu/inspiring-teachers/amar-bose-6-312-lecture-27-personal-reflections>

Resources

- Class homepage
 - EE2015 page on moodle-Use the forum!
 - http://www.ee.iitm.ac.in/vlsi/courses/ee2015_2017/start
- Lectures recorded in the classroom:
 - <http://www.ee.iitm.ac.in/~nagendra/videolectures/>
- Reference books
 - Hayt, Kemmerly, and Durbin, *Engineering Circuit Analysis*, 7th Edition, McGraw Hill 2006.
- Extras: NPTEL(<http://nptel.iitm.ac.in>)
 - SC Dutta Roy, *Circuit Theory*,
<http://nptel.iitm.ac.in/video.php?subjectId=108102042>

Resources: TAs

- Visiting hours, venue: TBA
- Use moodle forum to reach the TAs

Videlectures page



A banner for the "Video lectures from the iCS group @ IIT Madras". The banner features a dark background with a collage of images related to VLSI, including circuit boards, microchips, and diagrams. On the right side of the banner is a search bar with a "Search" button. Below the banner is a green navigation menu with the following items: "IITM courses", "NPTEL/Online courses", "Other presentations", and "Miscellania".

VLSI group, IIT Madras-Video lectures

Welcome to the video lectures page of the [VLSI group](#) of the [Department of Electrical Engineering](#) at [IIT Madras](#). You can find recorded lectures from our courses at the links below. For recordings of our other courses or presentations, choose from the menu bar above.

Our recorded lectures will now be available on our [YouTube channel](#). They will continue to be available here.

Online courses starting 24th July 2017

Online courses [Basic Electrical Circuits](#) and [Analog circuits](#) will be run on NPTEL starting 24th July 2017. Click on the respective links to register. Registration deadline is 24th July.

Courses

Most recent editions of the courses are shown here. To see older versions, click [here](#).

- EE1001: Electrical and Magnetic Circuits
 - [Jan-May 2015](#): Aniruddhan S
- EE2019: Analog Systems and Laboratory
 - [Jan-May 2017](#): Nagendra Krishnapura

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- [Online courses starting 24th July 2017](#)
- [Courses](#)

- <http://www.ee.iitm.ac.in/videlectures/>
- <http://10.21.17.5/videlectures/>

Course page on VLSI group site



www.ee.iitm.ac.in/vlsi/courses/ee2015_2017/start

CharMap

Integrated Circuits and Systems group, IIT Madras

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EE2015: Electric Circuits and Networks(Aug.-Nov. 2017) ■

About the course ■

We find electrical circuits everywhere, from tiny ones in integrated circuits in mobile phones and music players, to giant ones that carry power to our homes. This course deals with analysis techniques that can be applied to all such circuits. We'll first discuss electrical quantities-voltage and current-relevant to such circuits and learn about basic elements(R, L, C, controlled sources) and their properties. We'll then move on to general analysis techniques that can be applied to arbitrary circuits. These will be first carried out for resistive circuits which obey algebraic equations and then extended to circuits with energy storage elements(C, L) which obey differential equations. We'll learn about phasors and Laplace transforms which ease the analysis of circuits with memory elements(L, C). Along the way, we'll discuss general theorems applicable to these circuits. We'll also discuss the rudiments of negative feedback circuit using the opamp. After taking this course, one should be able to analyze any linear circuit.

Instructors ■

- [Debdutta Ray](#)
- [Nagendra Krishnapura](#)

Classrooms ■

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- <http://www.ee.iitm.ac.in/vlsi/teaching/start>
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My homepage

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Nagendra Krishnapura

Dept. of Electrical Engg., IIT Madras

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Co-ordinates:
Office : ESB 246B
Phone : +91-44-2257-4444
Fax : +91-44-2257-4402
e-mail : nagendra AT iitm.ac.in
www : <http://www.ee.iitm.ac.in/~nagendra/index.html>
Snail mail : Department of Electrical Engineering
Indian Institute of Technology, Madras
Chennai, 600036, India

Quick links

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On this page

[About Me](#)
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About me

I am an associate professor in the VLSI group of the department of [Electrical Engineering](#) of the [Indian Institute of Technology, Madras](#). I work in the area of analog and mixed-signal integrated circuits and signal processing.

I graduated with a Ph.D. from [Columbia University](#), New York in Oct. 2000. I worked at the [Columbia Integrated Systems Laboratory](#) under the guidance of [Prof. Yannis Tsividis](#) in the area of nonlinear analog signal processing for low power integrated circuits. I obtained my B. Tech. degree in electronics and communications engineering from the Indian Institute of Technology, Madras, in 1996. Between 2000 and senior design engineer at Celight, Inc. and Multilink(later Vitesse Semiconductor) where

www.ee.iitm.ac.in/~nagendra/personal.html

- <http://www.ee.iitm.ac.in/~nagendra/>

Announcement

- No class tomorrow, 2nd August
- No extended tutorial this week(2-440pm, Friday)