Introduction to Electronics

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Outline

- Logistics
- Grading scheme
- Course Objective
- Topics Discussed in Course
- Reference Books
- Why this course ?

Classes and Schedule

- Classes will be held in L20
- Schedule for the classes
  - Monday, Wednesday, Friday – 8 am to 9 am
- Lecture slides will be posted on mooKIT after each class
  - https://hello.iitk.ac.in/user/login
- Notices for the course will be emailed to course email list or posted on the mooKIT portal

Tutorial Plan

- Homework Assignment sheets will be given every week
- For proper learning it is expected that you would attempt to solve all the problems prior to tutorial
- You are not required to submit homework solutions
- Solutions to homework assignments will be discussed in tutorials
- Solutions will also be posted on mooKIT after tutorial discussion
- Will not conduct any mini quiz in the tutorial
  - Used only for tutorial discussion
- Tutorial time: Thursday 8 am to 9 am

Section Information

- Tutorial/Lab sections will be updated in due course of time

The Instructors

- Overall Course Coordination

  Prof. Amit Verma amitkver@iitk.ac.in

- Lab Coordination

  Prof. K.S. Venkatesh venkats@iitk.ac.in

New Granular Grading Scheme

Grade	Grade Points
A*	10
A	10
B^+	9
B	8
C^+	7
C	6
D^+	5
D	4
E	0
F	0
I	0

Grading Scheme

- Lab component 15%
- Quiz (best two of three) 25%
- Midsem Exam 25%
- Final Exam 35%

Policy Regarding Missed Examinations/Laboratory Sessions

If you miss an examination with approved medical leave or you have your leave approved by the competent authority at IIT Kanpur, following policy will be applied.

- **Missed Quiz-1/Quiz-2/Quiz-3:** No make-up examination. Marks taken from best of two quizzes.

- **Missed Mid/End-semester examination:** You will be allowed to sit in a make-up examination. However, the makeup examination will take place within a fortnight after the missed examination. It is your responsibility to contact the instructor for the make-up examination. If you fail to appear in the make-up examination, you will be awarded zero marks. The syllabus for the make-up examination will be the material covered upto one day before the makeup examination.

- **Missed Laboratory sessions:** You will be allowed to complete the experiment in the designated make-up laboratory sessions. However, if you do not appear in the makeup laboratory sessions, you will be awarded zero marks for that experiment.

Queries related to the course

- Please use the mooKIT discussion forum
- Please refrain using mails – they get lost
- Will check the forums everyday and address your issues asap

Course Objective

- The course offers an introduction to the basic principles of electrical circuit analysis and exposes students to electronic devices and analog and digital electronic circuits
- To provide a panoramic view of the relevance and dependence on other branches of engineering and sciences with concepts encountered in electronics

Topics To Be Discussed

Electrical Circuits	– Circuit Analysis (Nodal, Mesh, Superposition, Thevenin's and Norton's Theorem) – Transient analysis of RC, RL and RLC circuits – Sinusoidal steady state analysis of RC, RL and RLC circuits – Transfer function and frequency response of RC, RL and RLC circuits.
Analog Circuits	– Diode and diode circuits – Power supply – MOSFETs and simple MOSFET circuits – Operational Amplifier circuits and waveform generators
Digital Circuits	– Logic gates, logic minimization – Combinational circuits – Sequential circuits, Flip flops, Counters, shift registers – Data convertors (ADC, DAC)

Reference Books

- Essential of Electrical and Computer Engineering, Kerns and Irvin, Pearson, Prentice Hall, 2004.
- Engineering Circuit Analysis by Hayt, Kemmerly, Durbin, 7th edition, Tata McGraw Hill.
- Microelectronics Circuits, by Sedra, Smith, Chandorkar 7th edition, Oxford University Press
- Digital Principles and Applications, by Leach, Malvino, Saha, 8th edition, Tata McGraw Hill.

My Expectations From You

- Try and enjoy the subject your are studying
  - Some initial effort is needed to start to enjoy it
  - It will well worth the effort
  - The subject matter is known to have enthralled many in the past
- We expect the highest integrity from you
  - Use the exams to gauge how much you have learnt

Acknowledgements

- Prof. Baquer Mazhari, EE department
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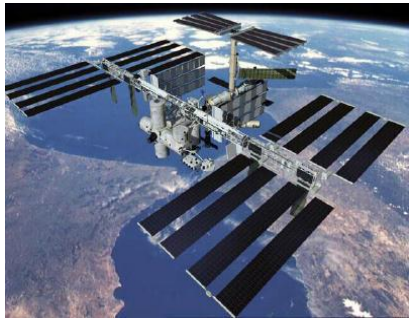
- Prof. Rohit Budhiraja, EE department
- Prof. Yogesh Singh Chauhan, EE department
- Prof. A. Banerjee, EE department
- Prof. K. V. Srivastava, EE department
- Prof. Pradeep Kumar, EE department
- Prof. Shilpi Gupta, EE department
- Prof. Ketan Rajawat, EE department

Modern world has been and is being rapidly transformed by ELECTRONICS

Essential Ingredient is …





Electricity

Electronics offers capabilities that can be exploited by almost all engineering branches

Why has Electronics Revolutionized our lives?

- Every action requires energy and Electricity is one of the most useful forms of energy
- It is easy to generate, easy to transport, can be easily converted into other forms of energy
- It can be precisely Controlled

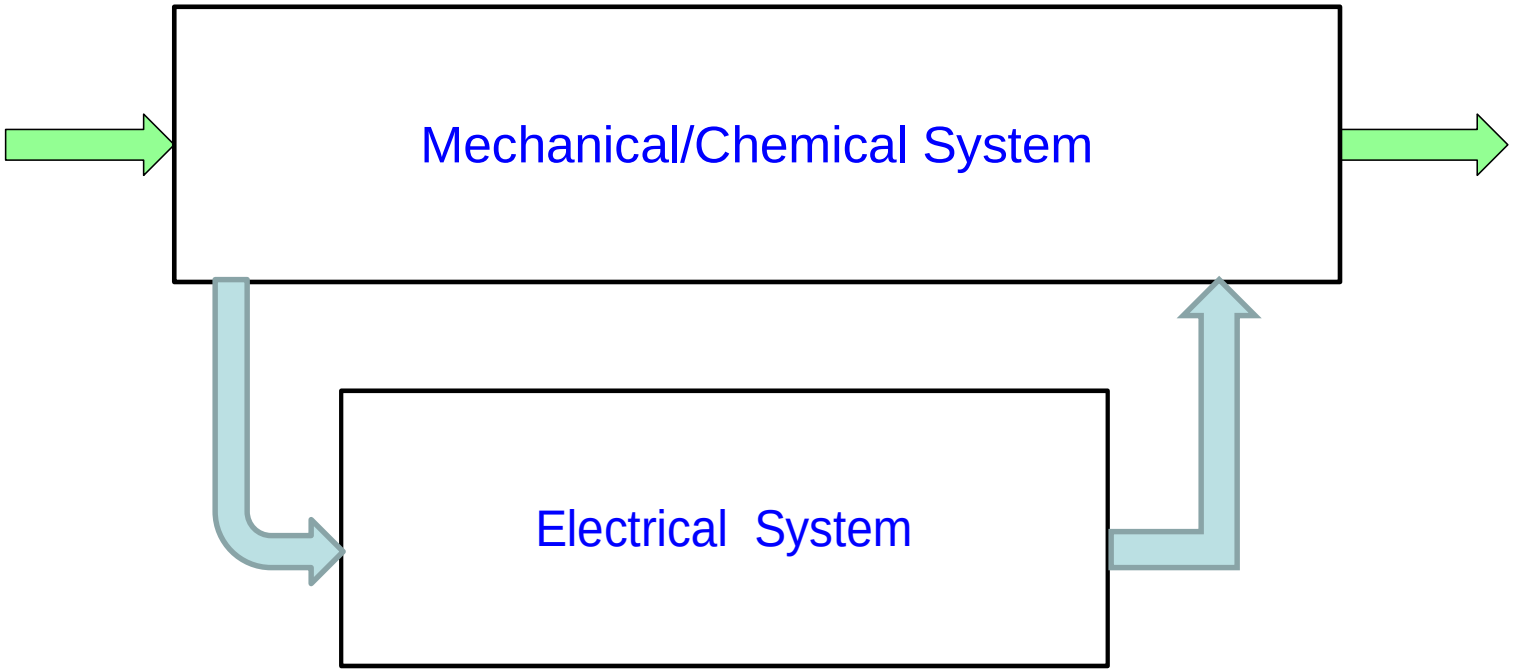
Suppose you have a form of energy which is easily available and you can make it do 'whatever' you wish!!

Only limit is your imagination

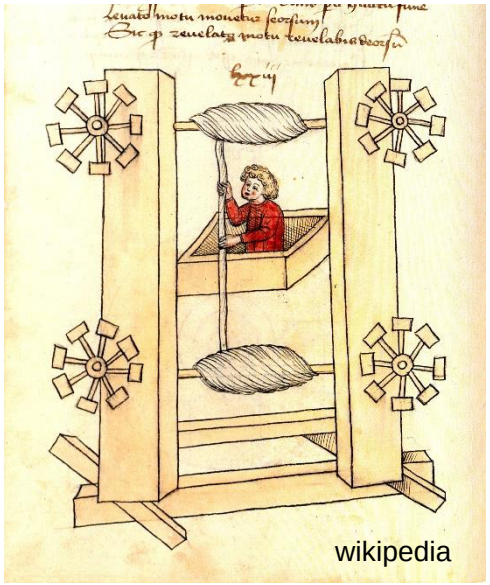
Little wonder then that control of Electricity ushered in the Electronics Revolution

Revolution?

- Add an electrical sub-system



Example



Pre-industrial era

1853

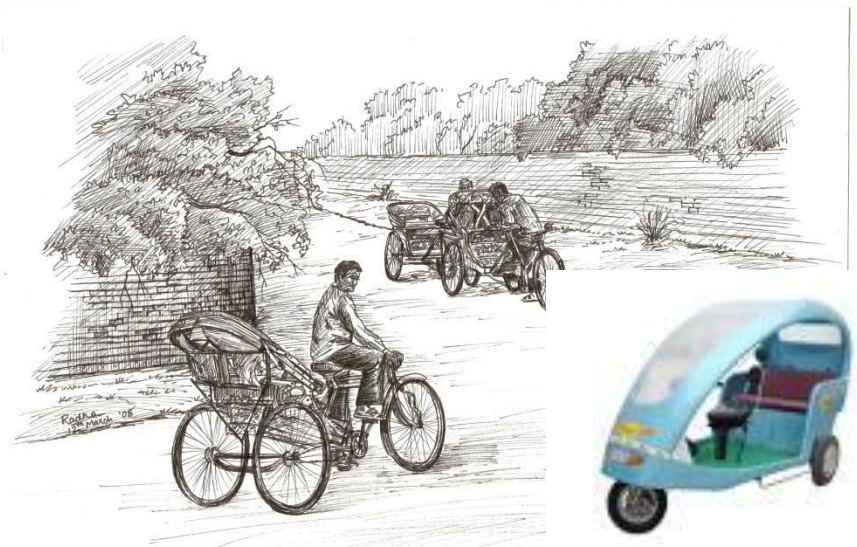
Now!

Lift/elevator used by us
- System: Mechanical
- Source of Energy: Electrical
- Controlling System: Electronics

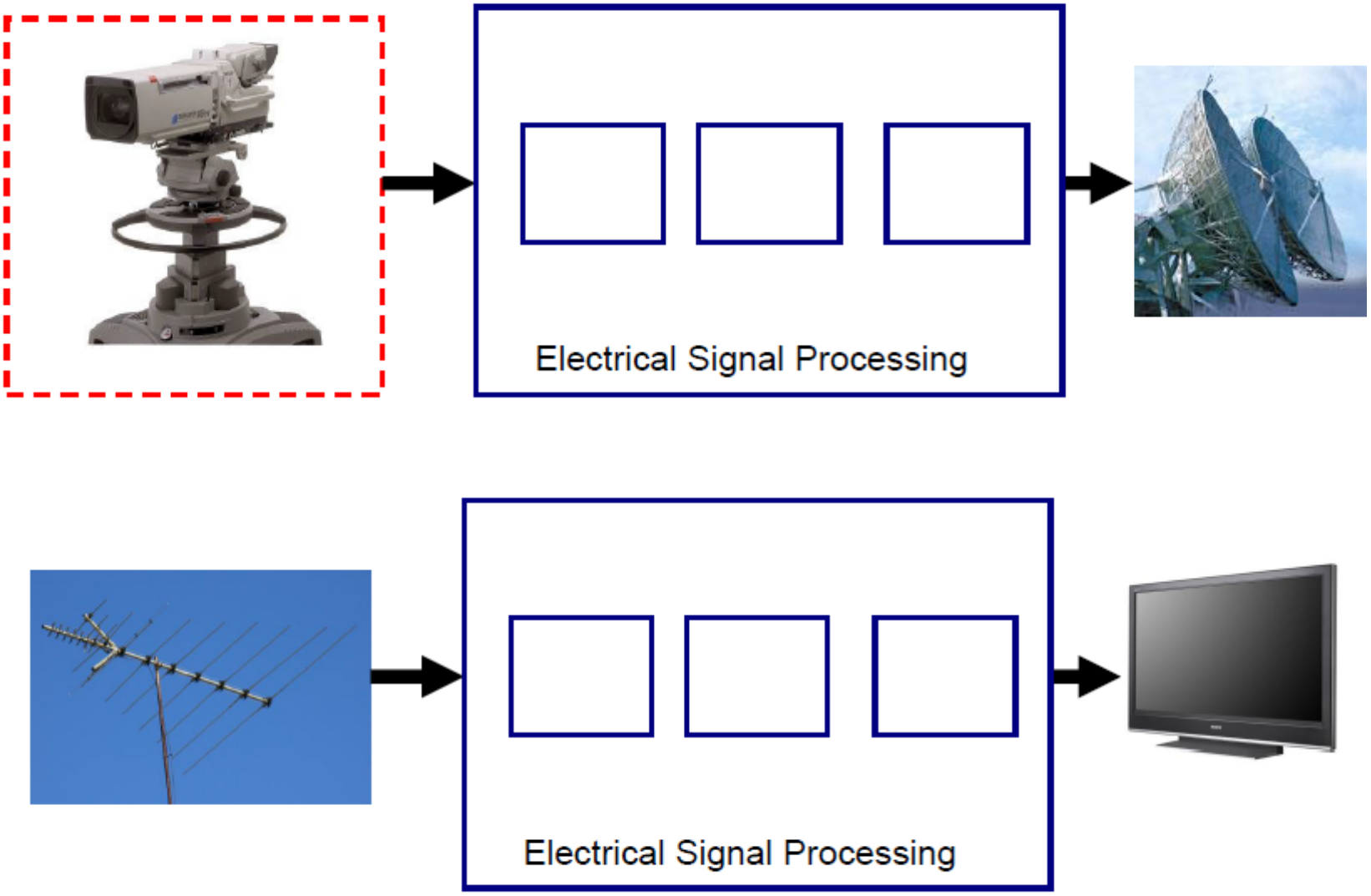
Why should non-EE students learn about EE?

Most Complex systems have an Electrical subsystem as its part

Performance Enhancement?



Communication



Let us explore …

the world of electronics