Internship Talk
EESS 2022

Timeline: Industry Internship

Time for prep :
Summer Vacation (~2 months) are enough

June-July   August - September

May   Mid   February
                    August

Companies to target

Frequent visitors:
- Texas Instruments
- Qualcomm
- Nvidia Hardware

Less Frequent visitors:
- Google Hardware
- Analog Devices
- Samsung semiconductor

New visitors:
- Micron Technology (Memory Design)
- Silicon Labs
- Jaguar Land Rover (Powertrain Intern)

What to prepare- Analog

- Network Theory Concepts: RC, RL, LC and RLC circuits with voltage source and current source. (Problems to start)
  - Finding poles and zeros etc. and frequency response. (Basic concepts) Links: [1], [2]
  - Develop intuitive understanding to plot direct response w/o solving it using Laplace. (most frequently asked in TI interviews).
- Op-AMP Basics and Circuit Topology for different Applications
  - Op-Amp Applications and Oscillator lectures. (Resources)
  - Concept of negative feedback and deciding signs of Op-Amp for the same. [Video Links]

- For studying Analog basics:
  - Topics: Single-Stage Amplifiers, Cascaded Topologies, Differential Amplifiers, Current Mirrors, Frequency Response of Amplifiers (concept of miller capacitance etc.) and Feedback.

  - Book: Fundamentals of Microelectronics by Behzad Razavi [Link]
  - Or Lectures by Behzad Razavi on Youtube (Electronics 1 and 2 - 90 lectures total)
  - Or Consider Lectures by Shanthi Pavan. [Videos Link]
  - Do problems after readings the topics. [Link]

- Must Do problem Sets [Link]

- Do the problems uploaded by seniors in their feedbacks in Channeli. [1] (Check others too).

What to prepare - Computer Architecture

- Follow topics from slides or [Slide link].

- CPU Performance ques, Amdahl's law, Memory Hierarchy, Assembly language basic, MIPS instructions, Difference between multi-cycle, single cycle and pipelined architecture. (Basic info is enough)

- Addressing mode(Imp)

- Basic understanding of 8085 and 8086 architecture.

- Read about cache thoroughly. (Most Imp)

What to prepare- Digital

- Digital Logic Design (Morris Mano) [Book] Chapter: 1 to 6
    - Moore and Mealy Machine Design for different type of problems. (Logical Design as well as Verilog Implementation) (Imp).

- Digital Integrated Circuit (Rabaey) [Book] Chapter: 5 (CMOS Inverter)

- Static Timings Analysis: STA by vlsi-expert ,Video links: [1], [2] . Questions: [1], [2].

- Miscellaneous Digital Ques (Must do and solve it thoroughly): [1]

- SRAM and DRAM Basics. [Link]

- Basic of 555 Timer (anyways covered in analog).

- Quick go through of Digital CMOS circuits (Razavi chapter 15)

What to prepare - Verilog

- Go through videos 1-24 of NPTEL series : [1] , For practice: [1]

- Normal Syntax Practice: [1], [2]

- For interviews: basic syntax is asked and design flow for Moore and Mealy Machine in Verilog. Elaborated Design for simple latches might be asked.

Miscellaneous

- Basic of semiconductor theory. (Few ques only in Samsung Semiconductor Analog test).

- Some programming i/p and o/p ques.

- Feedback (Control system). Already written in analog section.

- Basic signal processing. (Sometimes asked in TI).

Interviews

- Prepare the topics well and try to clear tests for most of the companies.

- Consult regularly with immediate seniors of test and interview patterns over the recent years.

- Prepare resume thoroughly,your contribution is what they want to listen .

- [TI interview questions](#) (2021)

- It's ok not to know the answer of any ques. But speak what you are thinking. Interviewer will help.

- Be curious but don't show yourself over-excited. Talk normally.

- If you know the solution of a problem, describe it such that you are solving it lively in front of interviewer.

- HR round is not an eliminator, but prepare the general HR ques asked to immediate seniors companies interviews.

General Advice

Try to do work with a professor in the summers to have some experience. It is not mandatory to do it

- Spark
- Project under any professor
- Certified Courses
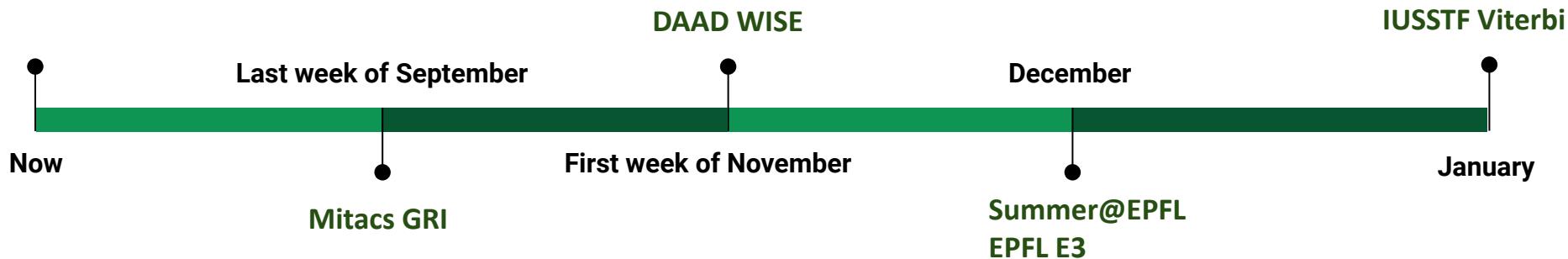
Timeline: Research Internship

Time for prep :
Nothing is ever enough!

1 Good Project >>>>>>> 10 Superfluous Ones

DAAD WISE

IUSSTF Viterbi

Last week of September

December

Now

First week of November

January

Mitacs GRI

Summer@EPFL
EPFL E3

Programs to target

Main Programs:
- Mitacs Globalink Research Internship
- IUSSTF Viterbi India Program (USC Viterbi)
- EPFL E3 / Summer@EPFL (Both are different Programs)
- DAAD WISE
- ThinkSwiss
- CHARPAK
- NTU India Connect

Universities to target (Electrical & Electronics)

- EPFL Switzerland (Through EPFL Programs or Emails)
- University of Toronto (Canada - MITACS)
- University of British Columbia (Canada - MITACS)
- University of Southern California (IUSSTF Viterbi)
- Georgia Tech (Through Emails)
- TU9 Universities (DAAD WISE)
- IIT Madras (Through Emails)
- IIT Bombay (Through Emails)
- IISc Bangalore (Through Emails)

I am not a 9 pointer, can I do research?

Common misconceptions :

- Research is only meant for the "machau" toppers !!
- It is very tough and time consuming.

So what is the reality ?
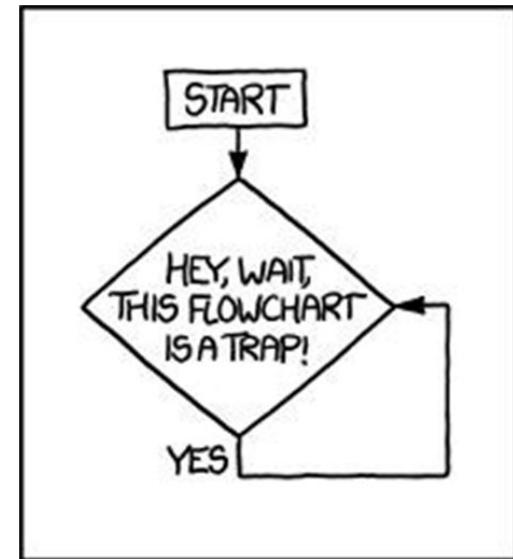
- Everybody can do research at IITR.
- Judicious use of time is the key .
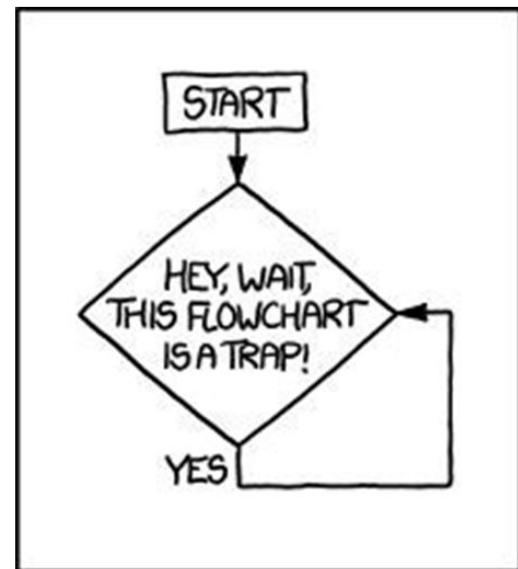- It is quite interesting unlike the lectures !!

How to apply through Emails

1. Pick Prof
2. Apply
3. Wait for response

   a. If positive, Chapo!
   b. If negative, figure out why and if it is something you can improve
   c. If no response for a week, send a reminder mail
   d. If no response after 1/2 reminder mails, move on XD

4. If you are not yet satisfied, go to step 1

How to apply through Programs

1. Pick a Program
2. Upload all necessary details like Letter of Recommendations (some may even need 2 or 3 LoRs depending on program), Transcripts, SoP
3. Wait for Response
4. Wait for Response
5. Wait for Response
6. After all your friends get sorted, one day you will hopefully receive your ticket to abroad.
7. If No, apply to a different program or start emailing profs

How to get started with Profs

Google Scholar

Research Interests

Department Website –
Faculty Profiles

What do you need to apply?

Resume

- ○ Not more than 2 pages and *precise*
- ○ **Don't pad it** with unnecessary info
- ○ LaTeX (Use OverLeaf, its super easy!)
- ○ Use your IITR Emails ID
- ○ What sections do I put?

Interests, Publications, Projects, Education/CGPA, Achievements and Awards, Skills, Teaching Experience, Extracurriculars, References

LoRs

- ○ "Build a good rapport with a Professor, he/she might help with an LoR someday"
- ○ Ask for LoRs from only those profs under whom you have done some project!!

How to work at IITR?

- There are a plenty of ongoing **sponsored projects** in all the departments.
- **IOPs and BTPs** are compulsory projects at IITR, the time spent in these projects can be utilized to do a lot of quality research.
- Apart from your compulsory projects, you are always **free to venture** out various projects in all departments.
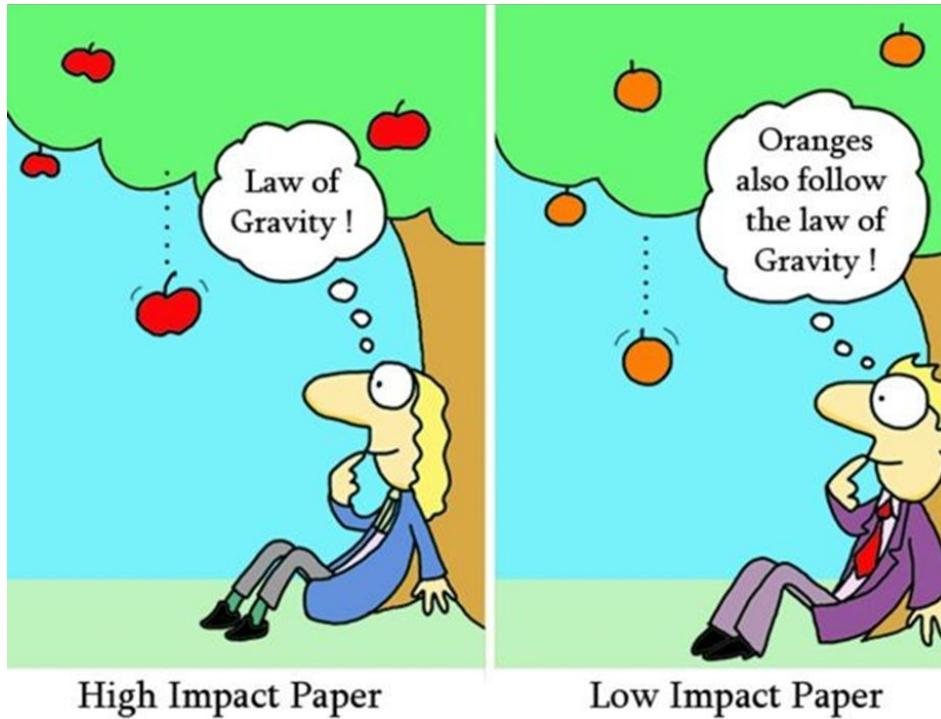
Problems that one might face !!

- At early stages many professors **do not trust UG students** with serious research projects !
- Getting **access to the Labs** might become a painful task.
- Finding the **right mentor**.

After you get the access!!

Some Insights: Quality vs Quantity work

Combinatorial Research