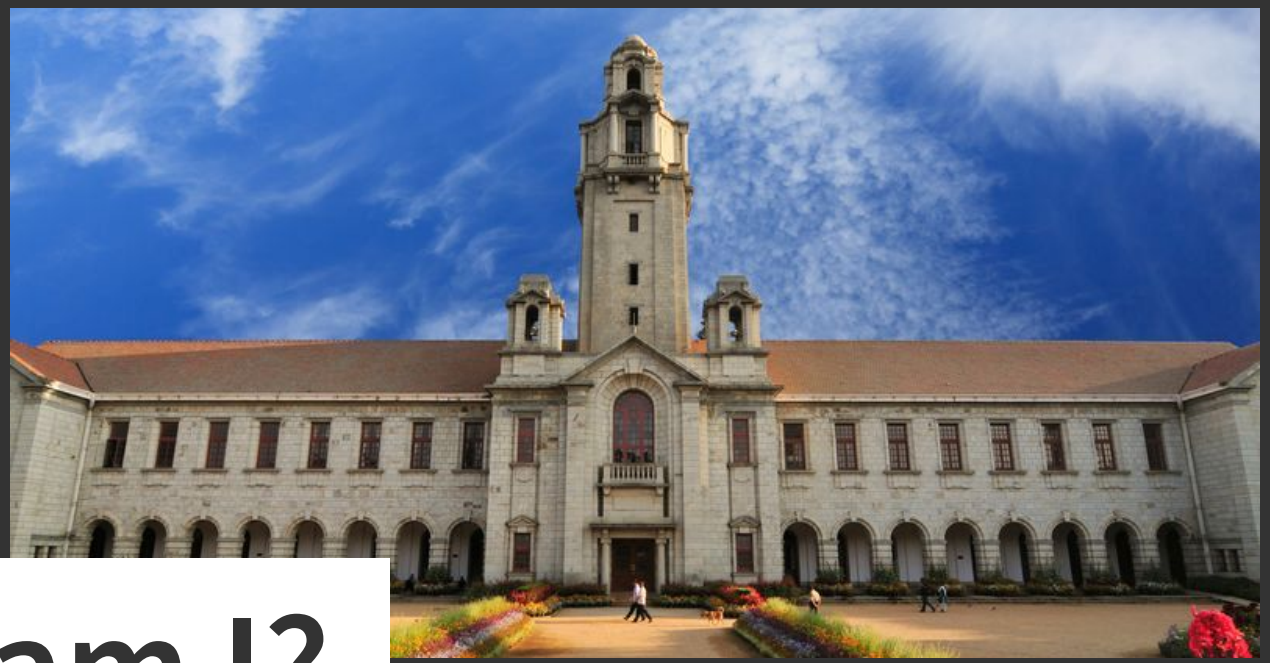
BVB IEEE

CompArch & VLSI : Getting Started

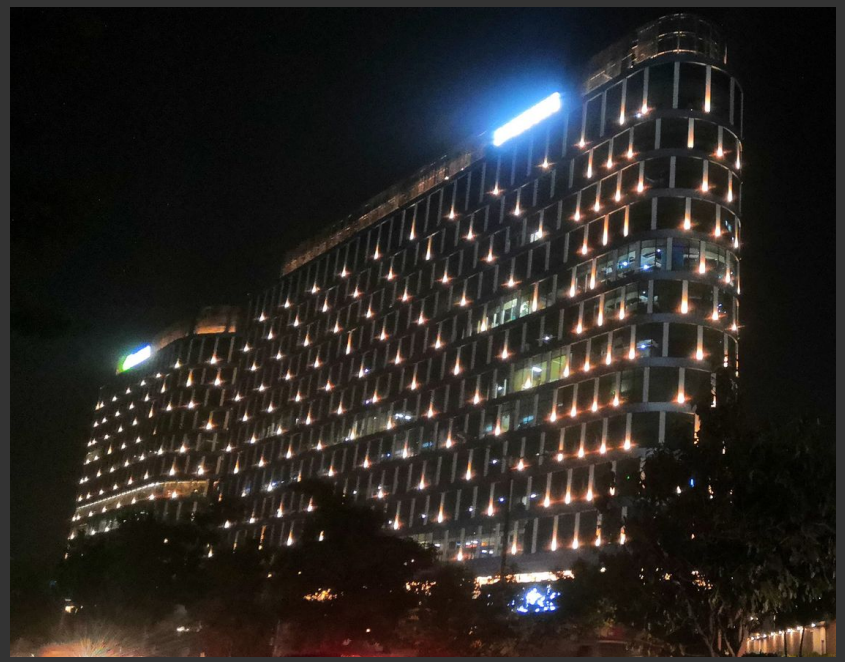
with hardware, academics, research and open-source!

Agenda

1. Who am I?
2. Hardware Engineering
3. Gaining Experience
4. General Tips
5. Questions



Who am I?



Google Summer of Code

Background

They told you already I believe :)

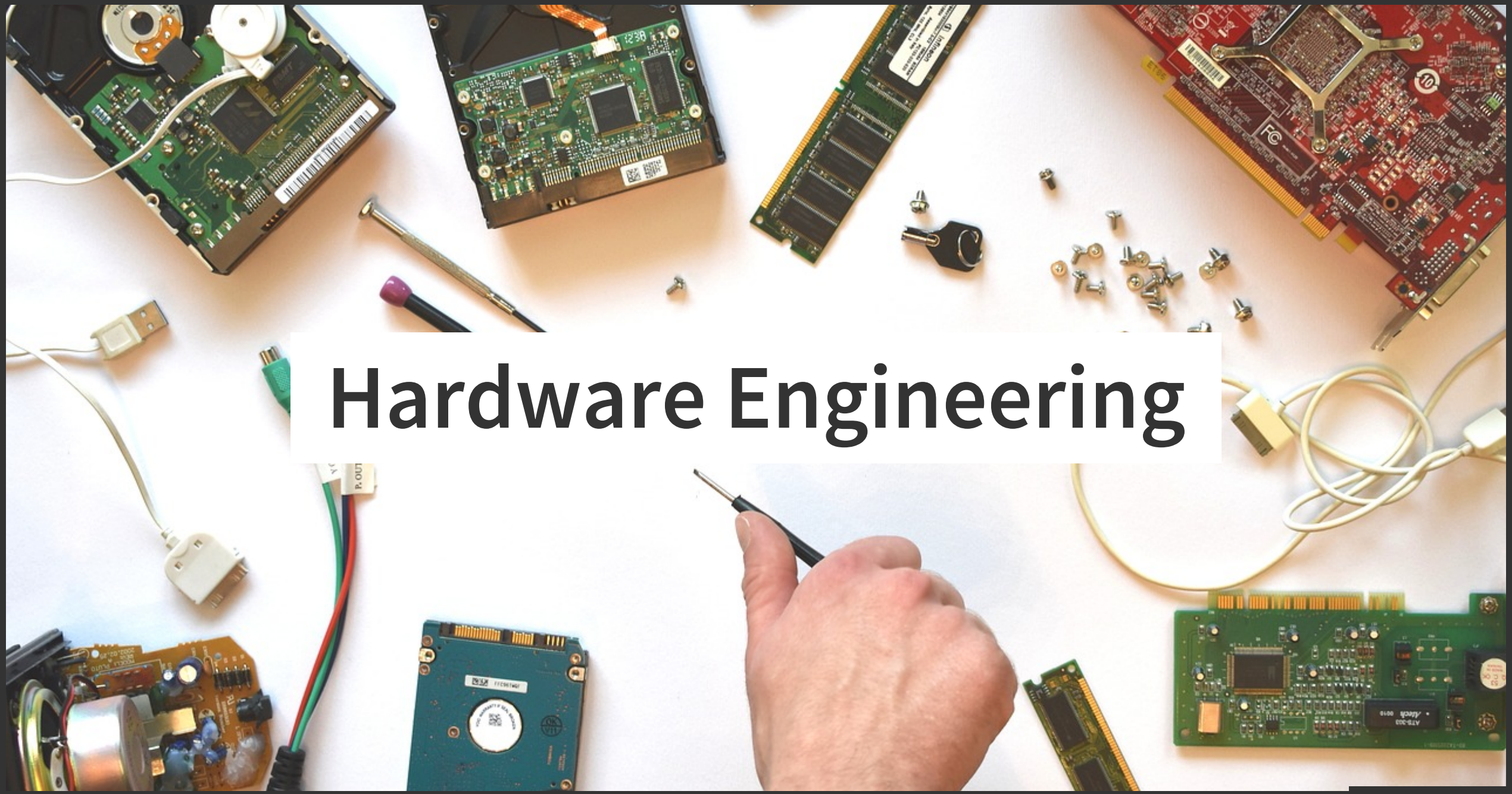
Sr. Engineer Hardware - Samsung Semiconductor (India R&D)*

Research Assistant, CAD Lab, IISc Bengaluru

Google Summer of Code '20, FOSSi Foundation

Summer Intern ('19), IIT Bombay

EEE Senior, NITK



Hardware Engineering

Fields in HW Engineering

- **VLSI**
  - Mainly classified as frontend / backend
  - RTL/FPGA Design
  - Verification
  - DFT (Design for Testability)
  - Physical Design
  - SoC Design
  - Analog and Mixed Signal etc..
- **Embedded Systems**
  - PCB Design
  - Microcontrollers etc.

Expected Skills

- **Digital Electronics**

  Logic minimization, various circuits etc.

- **Digital System Design**

  Verilog / VHDL, designing circuits with given description

- **VLSI**

  CMOS, Gates and Circuits with CMOS, Memories

- **Programming / Scripting**

  C/C++, Python, Bash, Perl

- **Computer Architecture**

  RISC is always better (ARM / RISC-V)

- **Verification**

  SystemVerilog, UVM, STA etc.

- **Non-Technical**

  Logical and Aptitude, English and lots of confidence!

Where to gain those skills?

- **Curriculum**

  At least partially

- **Books**

  (obviously!)

- **Online Courses**

  NPTEL, Coursera, Udemy

- **Workshops**

  Kunal Ghosh (VSD), EICT IITG/MNIT

- **Training**

  VLSI Training institutions

- **Blogs**

  VLSI Expert, physicaldesign4u etc.

Self-Study

- **First Year**
  - Learn Programming (C / Python)
  - Learn about Linux OS
  - Explore, read about all fields
  - Arduino / NodeMCU etc.
- **Second Year**
  - Digital and Analog Electronics
  - Can start Verilog
  - Computer Architecture
  - Strengthen programming skills
- **Third/Fourth Year**
  - VLSI, CMOS etc.
  - Digital System Design
  - SystemVerilog
  - Hands on projects
  - Online courses!

Internships

Research

- Apply to IAS SRFP and other summer internship programs in 2nd/3rd year
- Cold-mail professors in IISc/ IITs / NITs
- Work with your professors in vacations

Industry

- Startups (many new fab-less companies around)
- Use LinkedIn
- Seniors / Alumni - Referrals

Open-Source

- Google Summer of Code (GSoC)
- Contribute directly to other open-source projects related to VLSI (check my website)

Google Summer of Code (GSoC)

- **A program for students 'organised' by Google**

  You are not Google intern / employee

- **200 open source organizations**

  Software, app, web, electronics, sciences. About 9000 applications from 60+ countries

- **3 months long**

  Starting 2021 (including community bonding period), was 4 till 2020

- **Perks**

  Work from home, global connections, good stipend, public visibility

- **Start early**

  Learn about orgs, look at previous year projects, get involved!

- **Orgs of interest**

  FOSSi, lowRISC, Arduino, ArduPilot, BeagleBoard.org, Open Source Robotics Foundation, SymbiFlow etc.

Placement Preparation

- **Start early, work hard**

  Prepare a CV, get it reviewed from seniors / professors

- **Prepare on all the basics by the end of second year**

  Regardless of the role, tests might be very general in nature. Helps for GATE as well.

- **Don't restrict to campus placements**

  Regardless of how good / bad they are, keep talking to people outside

- **Study the company, find connections**

  highlight those when you converse

- **Interviews**

  are more about your approach and confidence than knowledge

- **Keep backups**
  - Prepare for GATE / GRE
  - Working at IITs / IISc as Project Staff
  - Apply for software too

Major companies in India

- Texas Instruments
- Qualcomm
- Samsung Semiconductor
- Intel
- AMD
- Cadence
- Synopsys
- Marvell
- Mediatek
- NVIDIA
- Xilinx
- NXP Semiconductors
- ARM
- Analog Devices
- STMicroelectronics
- GlobalFoundries
- Indian orgnisations like Sankhyaa, SandLogic etc.

General Tips

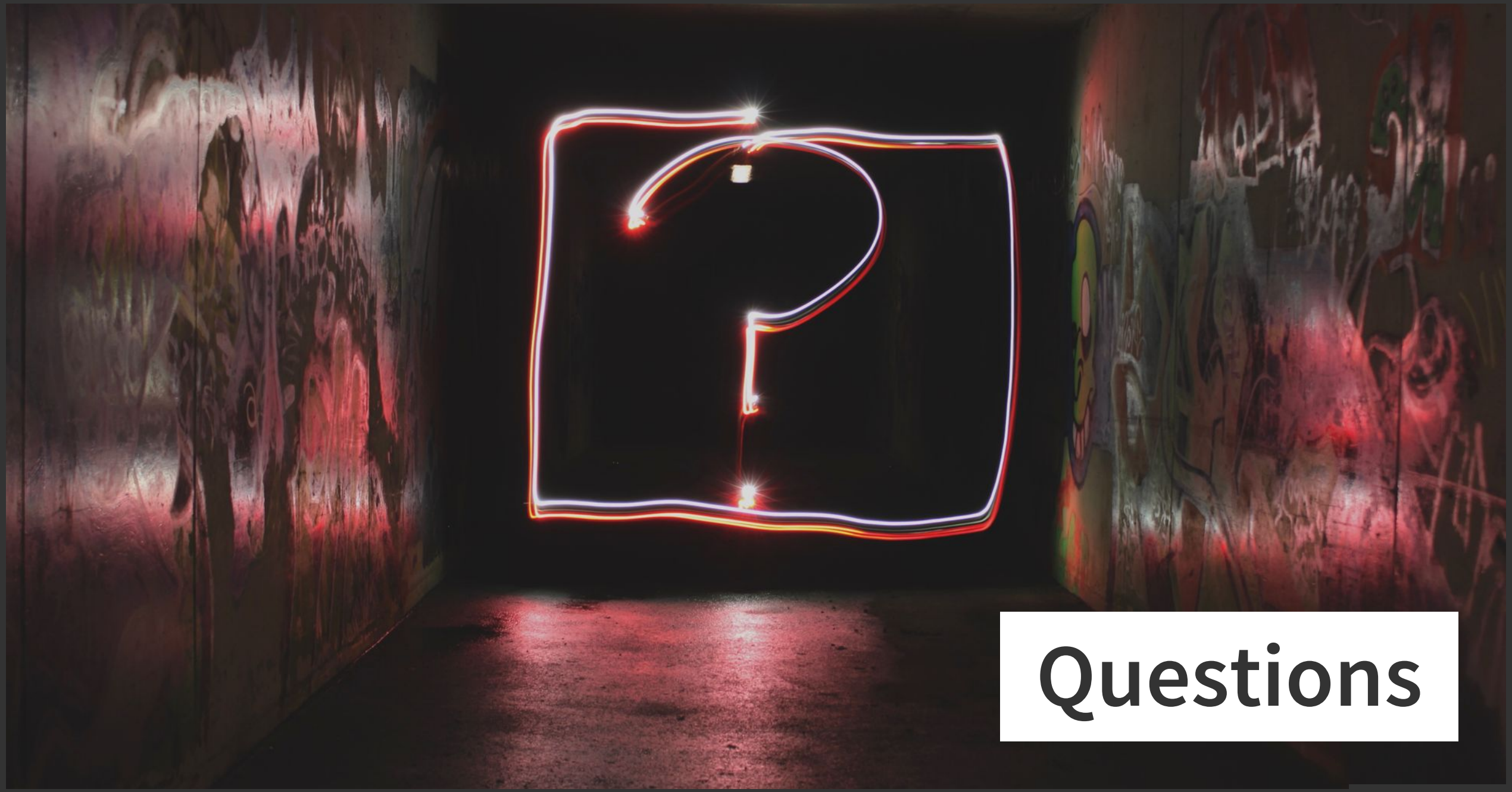
- **So many areas! What do I choose?**
  - Explore everything
- **Maintain a decent CGPA**
  - Some companies have cutoffs for screening
- **Knowledge**
  - Don't depend on university curriculum
  - Coursera, YouTube, NPTEL, edX, MIT OCW, Udemy ....
- **Experience**

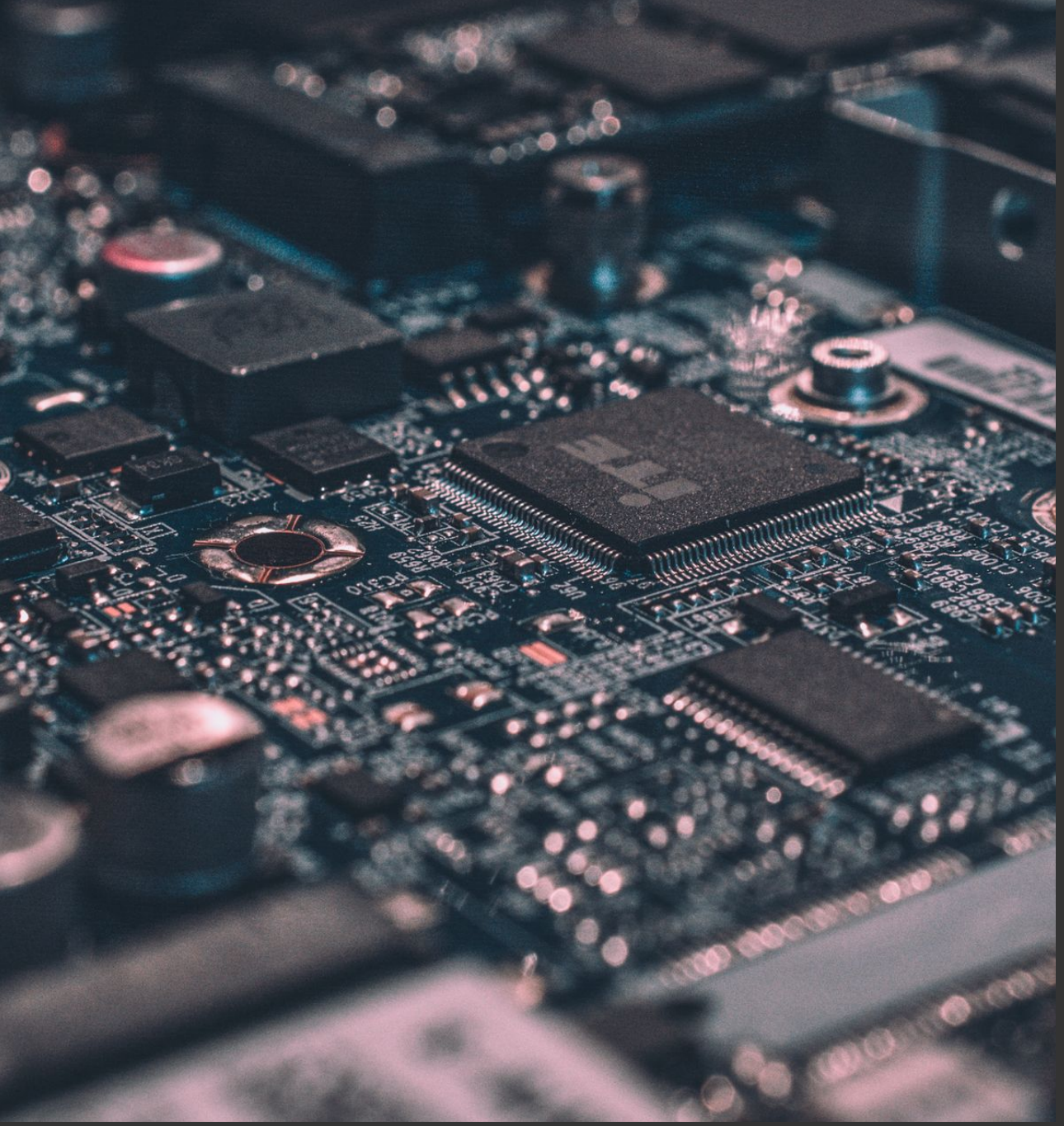
  Research or Industry? Startup or MNC? Paid or Unpaid?

  Work matters!
- **Big picture view is important**

  Know the use of the topic you are learning
- **Think Out-of-the-box**

  Always find ways of connecting things and doing what no one else does!





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Thank You!