CS Research Talk

By CSEA IITG

Why do Research?

- Opportunity to explore your interests
- Chance to discover something big
- Publishing a paper
- An important addition to your application for Masters
- Recommendation Letters
- Networking with profs
- Great conversation topic during future interviews

Vedika's Experience

Duration	Institution/Company	Topic of Research
Dec'19 to Mar'20	Curtin University, Australia	Blockchain Applications to Cybersecurity and Risk Management
Mar'20 to Jun'20	PVG's COET., Pune	A Blockchain-Based Smart Grid Model
Jun'20 to Dec'20	BlockDeliver (New York-based startup)	Architecture of a global decentralised Content Delivery Network (CDN)
Mar'21 to Present	IIT Guwahati	Hardware Trojan Management for Secure Network-on-chip Design

Publications:

- Packet Header Attack by Hardware Trojan in NoC based TCMP and its Impact Analysis
  Vedika Kulkarni, Manju R., Ruchika Gupta, John Jose, Sukumar Nandi
  15th IEEE/ACM International Symposium on Networks-on-Chip

- A Blockchain-based Smart Grid Model for Rural Electrification in India
  Vedika Kulkarni, Kalyani Kulkarni
  8th International Conference on Smart Grid (icSmartGrid2020)

Divyam’s Experience

- Doing Research internship under Prof. Deepanjan Kesh, CSE Dept, IITG.
- Sent mail at the end of my 3rd semester.
- Currently ongoing.
- Working in the area of theoretical computer science, in the specialised area of Bitprobe data structures.
- Have 3-4 meetings in a month.
- Submitted paper for peer review at the WALCOM conference.

Anant’s Experience

- Working with Vivek Gupta, a Phd student at University of Utah in the field of Multilingual Tabular NLI
- Got to know about his research group through a senior from iitg who published a paper with him
- Applied by mail in the starting of summer vacations after 4th sem
- Currently ongoing
- 2 meetings a week, 1 for the entire group and 1 for my project

Milind's Experience

1. **Program in Algorithms and Combinatorial Thinking (PACT-2019)**

   Topic: Randomized Algorithms
2. **Worked under Prof. Sepehr Assadi from Rutgers University in 2020-Remote Internship**

   Topic: Quantile Estimation using Streaming Algorithms
3. **Worked under Prof. Benny George K from IIT Guwahati 2021**

   Topic: Graph Theory: Separation Dimension of Graphs
4. **Worked under Prof. David Woodruff from CMU in 2021 - Remote**

   Topic: Strategies for the Generalized Mastermind Problem.

Kousik's Experience

1. CNN's for LDR to HDR conversion
    a. SRFP - IIT Gandhinagar
2. MAP-Elites for Resource Constrained Project Scheduling Problem
    a. Dr. Shelvin Chand (CSIRO), Dr. Rohitash Chandra (UNSW)
3. Tree based Group Diffie-Hellman in M2M networks
    a. Prof. Sukumar Nandi, accepted at Indicon 2021
4. Cornell, Maryland, Max-Planck pre-doctoral Research School (CMMRS)

Aditya’s Experience

- Interned at MIST Lab, Polytechnique Montreal (through MoU program)
- Application included :
  - 1 Statement of Purpose (for each project)
  - CV
  - Grade card
- 4 Month long internship
- Worked with a postdoctoral student on a project
- Helped in developing a simulator for the lab’s drone
- Most of the time was spent in reading old code and going through older github repos
- Involved Python and C programming
- Nice experience

Applying

1. **Programs**
    a. Indian programs - **SRFP**, FASTSF, Programs by IIT's
    b. Foreign programs - MITACS, DAAD, EPFL, ETH ZURICH

A comprehensive list of both Foreign and Indian programs:
https://github.com/himahuja/Research-Internships-for-Undergraduates

2. Mailing

- Search for a prof working in your field of interest
- Read his publications
- Write a mail showing interest in his work and pitching him your ideas
- Attach your CV and recos(if any)

3. College MOU's
    a. Polytechnique Montreal, Chubu University, etc
    b. Keep looking for mails from AER on such opportunities

Tips on finding research areas

Deciding your area of interest

1. Look at courses in Coursera, EdX or course webpages.
2. Try to understand what the hot topics in the field are by looking at current research.
3. Understand problems and try to see if you can solve any.
4. Implement some algorithms
5. Work with professors in IITG.

Tips on Searching Profs and Mailing

- **How to search for a Prof?**

1. Choose the area you want to work in (Don’t worry a lot, this won’t be your area for the whole life)
2. Google to find the leading research groups in that area.
   Choose Profs from multiple groups, start mailing
3. Or Select a University, then choose a Prof from that Univ
4. Or look at papers from top conferences and journals of your topic in last 2-3 years
   Find your Prof from the authors
5. Or see universities who have collaborated with IITG, find Profs from those Univ
6. Find internships with the help of our Dept Profs

Tips on Searching Profs and Mailing

Mailing Format:

1. Starting off: One line about you - College, Department
2. 1st Para: Your interest in one of his research papers/projects
3. 2nd Para: Short description of your skills/any projects you have done in that domain
4. Last: Your interest in working with him, why you want to work with him etc (Short)
5. Attach CV

Important:

- Be polite and formal.
- Don’t mention ‘Internship’ in the mail (spam filters), Use ‘Research Opportunity’
- Send a follow-up mail if the Prof doesn’t respond (9/10 cases). Do not spam their inbox.
- Make sure your mail looks genuine & customized for the Prof. Read about their recent work. Look at their personal websites.
- Something to show you are motivated to work in the area.
- The time and day when you send the mail, their time zone.

Tips for applying to programs

- Good CPI is a plus
- Statement of purpose
  - Should be strong and targeted
  - Be specific and don’t write a broad area as your interest (ex. Machine Learning)
  - Mention projects you have done related to the field you are applying in
- Letter of recommendation
  - Some profs would be ready to give a LOR
  - Try to ask someone whose class you have interacted in or got a AA grade in.
- Look for profs in your field and mention common interests in your SOP
  - Most programs release a list of profs before application
  - Check for profs in your field
  - Mention their fields of research and write about any projects you have done in it

Other Resources

https://github.com/himahuja/Research-Internships-for-Undergraduates

CSEA Higher Education Talk

Resources for exploring CS Theory:

https://www.youtube.com/user/SimonsInstitute

Theory of Computing Blog Aggregator (cstheory-feed.org)

Thank You

Feel free to contact any of the speakers for any queries :

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