

Vipul Harsh

Curriculum Vitae

IIT Bombay

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Interests

Cryptography, High Performance Computing, Theoretical Computer Science

Education

2011–2015 **B.Tech & Honors in Computer Science**, *Indian Institute of Technology*, Mumbai, **9.18/10** after 6 semesters.

2011 **Higher Secondary Examination**, *Delhi Public School*, New Delhi, **90.80%**.

2009 **Matriculation Examination**, *Ramkrishna Mission Vidyapith*, Deoghar, **95.60%**.

Internships and Research Experience

Ongoing **Lattice Based Side Channel Attacks on DSA**, *Undergraduate Dissertation*.

Guide: *Prof. Bernard Menezes*

- Working on a cache based Lattice Attack on the Digital Signature Algorithm
- Experimenting with various parameters of the attack to figure out the most suitable one for the attack

[\[Report\]](#)

Ongoing **Lower Bounds on Special cases of Arithmetic circuits**, *Undergraduate Research Project*.

Guide: *Prof. Nutan Limaye*

- Surveying lower bounds on special cases of Arithmetic circuits for particular algebraic polynomials

Summer 2014 **Georgia Tech**, *A Fast Multipole method for the RPY tensor for polydisperse particle systems*.

Guide: *Prof. Edmond Chow*

- Came up with two fast methods for doing large scale simulations for polydisperse particle systems involving hydrodynamic interactions and RPY tensor
- Extended the 4 call method for polydisperse systems to 5 calls to the harmonic FMM
- Used the parallel version of the Kernel Independent FMM to run the simulations with multiple cores and achieved a decent speedup [\[Code\]](#) [\[Report\]](#)

Summer 2013 **Revisiting the Karp and Miller Algorithm**, *LaBRI*, France.

Guide: *Prof. Jerome Leroux*, *Prof. Gregoire Sutre*

- Researched on the Karp and Miller algorithm to compute the coverability set of a Petri Net and other improvements namely the MP algorithm and the buggy Finkel algorithm
- Built a tool that implements the above mentioned algorithms. The code can be found here : [\[Code\]](#)

Honors and Awards

- Achieved an **All India Rank 49** in IIT-JEE 2011 among 5 lakh students conducted by Indian Institute of Technology (Top 0.01%) 2011
- Achieved an **All India Rank 41** in ISAT 2011 conducted by Indian Institute of Space Technology (Top 0.03%) 2011
- Achieved **Rank 1** in 3rd International Mathematics Olympiad, 2009 conducted by Science Olympiad Foundation
- Certified as among **Top 1%** (300 students) in India, to appear for the following Indian National Olympiads: Maths(INMO) 2011; Astronomy(INAO) 2009, 2011
- Awarded an **AP grade** in courses - Numerical Analysis and Differential Equations for exceptional performance
- Achieved an **All India Rank 115** in All India Engineering Entrance Examination(AIEEE) 2011 conducted by CBSE (Central Board of Secondary Education) 2011
- Certificate of Merit and Gold Medal by CBSE for securing 100% in **Sanskrit** in AISSE 2009
- Secured an all round rank 13 and an all round rank 11 in ACM ICPC Kanpur regionals and Amritapuri, India regionals respectively

Seminars and Presentations

- Sept. 2014 **Ladner's Theorem**, [\[Slides\]](#).
- June 2014 **Bot Nets**, [\[Slides\]](#).
- Sept. 2014 **A Fast Multipole Method for Rotne-Proger-Yamakawa(RPY) tensor for poly-disperse particle systems**, [\[Slides\]](#).
- March 2014 **Applications of Kalman Filters in Robot Localization**, [\[Slides\]](#).

Projects

- Spring 2014 **Virtual Memory for Experimental OS**.
Guide: *Prof. Dhananjay M. Dhamdhare*
We designed and implemented effective data structures and algorithms for handling process memory allocation, swap space management, with process swap in and out on Input Output Operations for Pranali, a virtual OS built on top of Linux. [\[Code\]](#) [\[Report\]](#)
- Autumn 2013 **TeamFlow: Team Management Webapp** .
Guide: *Prof. Umesh Bellur*
Developed webapp to manage teams that supports calendar view of tasks, blogs & reminders. We conceptualized the ER model, normalized the 70+ relations and deployed the system on a Django framework after rigorous testing and optimization using additional indices.[\[Code\]](#)
- Autumn 2013 **Sequence Alignment on GPU's**.
Guide: *Prof. Bernard Menezes*
Implemented a Sequence Alignment problem on GPU's with parallel version of Needleman-Wunsch algorithm. Investigated Parallel Prefix and Diagonal based approach to solve the problem. Achieved $O(n)$ complexity as compared to $O(n^2)$ in the Serial Version.[\[Code\]](#) [\[Report\]](#)

Autumn 2012 **N Body Simulation.**

Guide: *Prof. Varsha Apte*

Designed a simulation showing the interaction between different particles under the effect of intermolecular forces like gravity, electrostatic and nuclear. We used the famous Barnes-Hut Algorithm to optimize computation.[\[Code\]](#)

Teaching & Positions of Responsibility

2013 **Teaching Assistant.**

Discrete Mathematics

Teaching Assistant for the course Discrete Mathematics for Autumn Semester, 2013

2013 **Teaching Assistant.**

GPA-2014

- Among few undergraduates to be a TA for GPU Programming and Applications Workshop (GPA)-2014.
- Guided over 300 enthusiastic learners in a 3 day long hands-on workshop conducted by NVIDIA in association with CUDA Center of Excellence, IIT Bombay

Extracurricular Activities

Technical

- Represented the hostel in the inter-hostel programming general championship, contested by 16 hostels, IIT Bombay
- Built a line following robot for an intra-college competition

Non-Technical

- Successfully completed an year long course in **Squash** offered by the National Sports Organisation
- Made a group record attempt to solve Rubiks cube which became a part of the **Guinness** and the **Limca** Book of World Records
- Passed Prarambhik, Part-A in **Tabla**, 1st division from Pracheen Kala Kendra, Chandigarh, 2005

References

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