# Vibhor Porwal

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**EDUCATION**

**Indian Institute of Technology Kanpur** Jul 2016 – Present
*B.Tech. in Computer Science and Engineering*
- Cumulative GPA: 9.4 / 10.0

**Sir Padampat Singhania Education Center**, Kanpur, India Apr 2015 – May 2016
*Class XII*
- Percentage: 95.0%

**RESEARCH INTERESTS**

▪ Graph Streaming Algorithms ▪ Information Retrieval ▪ Computational Complexity

**RESEARCH EXPERIENCE**

**Adobe Research**, Bengaluru, India May 2019 – Jul 2019
*Research Intern | Supervisor: Dr. Vishwa Vinay*
- Worked on offline evaluation of a search ranker using behavioral data collected by the search engine.
- Proposed and implemented novel offline evaluation methods which can be classified into counterfactual and regression based methods.
- These methods are scalable and do not suffer from the problems associated with online evaluation.
- Used Adobe Stock and Yandex search engine dataset for experimentation.
- Submitted our work in the European Conference on Information Retrieval (ECIR), 2020.

**Lower Bounds for Graph Streaming Algorithms** Aug 2019 – Present
*Supervisor: Prof. Raghunath Tewari*
- Building upon the work of Assadi Sepehr, Yu Chen, and Sanjeev Khanna titled *Polynomial Pass Lower Bounds for Graph Streaming Algorithms*.
- Working on ways to apply the techniques presented in the paper to other graph streaming problems.
- Surveyed the current state of the art bounds for graph-theoretic problems like Min-Cut, Directed Connectivity, Set cover, etc. in the streaming model.

**SCHOLASTIC ACHIEVEMENTS**

▪ Received Academic Excellence Award thrice at IIT Kanpur for outstanding academic performance.
▪ Country Rank 120 in JEE(Advanced)-2016 among 150,000 candidates.
▪ Country Rank 277 in KVPY-2015 conducted by IISc Bangalore.
▪ Global Rank 18 in Simon Marais Mathematics Competition-2018.
▪ Received Senate scholarship twice at IIT Kanpur awarded to a few meritorious students from each batch.

**RESEARCH PROJECTS**

**Smallest Enclosing Circle** Jul 2018 – Nov 2018
*Supervisor: Prof. Surender Baswana* Presentation
- Reinvented an incremental randomized algorithm with expected $O(n)$ time complexity for finding the smallest enclosing circle of $n$ points in a $2D$ plane.
- Implemented this algorithm in C++ using LEDA library.

**Motion Planning with Probabilistic Guarantee** Jan 2019 – April 2019
*Supervisor: Prof. Indranil Saha* Book Chapter
- Studied the problem of designing a control strategy for a robot to maximize the probability of satisfying certain specifications formulated as LTL or PCTL formulas.
- Surveyed the current state of the art algorithms for this problem in discrete as well as continuous time dynamic environments and co-authored a book chapter on this topic.

**Depth lower bounds for monotone circuits solving connectivity** March 2019 – April 2019
*Supervisor: Prof. Raghunath Tewari* Presentation
- Reviewed the paper of Mauricio Karchmer and Avi Wigderson titled *Monotone Circuits for Connectivity require Super-Logarithmic Depth* as part of the Computational Complexity course.

**Quantum Non Local Games** Jan 2019 – April 2019
*Supervisor: Prof. Rajat Mittal* Report
- Reviewed the work of Richard Cleve, Peter Hoyer, Ben Toner, and John Watrous on *Consequences and Limits of Nonlocal Strategies* as part of the Quantum Computing course.

**Logic and Boolean Games** Jul 2018 – Nov 2018
*Supervisor: Prof. Sunil Easaw Simon* Report

- Studied $\omega$-automata, the connection of Linear Time Temporal Logic with $\omega$-regular languages and how to model finite state reactive programs such as an operating system using this abstraction.
- Surveyed a wide variety of literature on boolean games and investigated the hardness of various problems related to these that arise in the literature.

## OTHER PROJECTS

**Compiler for GoLang** Jan 2019 – April 2019
*Supervisor: Prof. Amey Karkare*

- Implemented a compiler for a fully functional subset of Go programming language in Python.
- Used Python Lex-Yacc to obtain the parse tree and implemented the assembly code generator which outputs the assembly code using the parse tree.
- Incorporated advanced features like compile time polymorphism, efficient register allocation policy, multiple return values for functions, etc.

**Building GemOS** Jul 2018 – Nov 2018
*Supervisor: Prof. Debadatta Mishra*

- Extended various functionalities of GemOS operating system.
- Implemented a four-level page table radix tree for a new context.
- Implemented a FUSE based filesystem at a single directory level.

## OTHER WORK EXPERIENCE

**New York Office**, IIT Kanpur May 2017 – Jul 2017
*SDE Intern | Supervisor: Prof. Manindra Agarwal*

- Worked on a scalable application with an extensive technology stack.
- Implemented the functionality for logging-out a user from all devices using Redis in-memory database.
- Added constraints to prevent unauthorized access to the system.

## COURSEWORK

- Data Structures and Algorithms
- Logic in Computer Science
- Machine Learning Theory
- Quantum Computing
- Advanced Algorithms
- Theory of Computation
- Compiler Design
- Abstract Algebra
- Randomized Algorithms
- Computational Complexity
- Stochastic Processes
- Number Theory

## TEACHING EXPERIENCE

**Counselling Service**, IIT Kanpur Aug 2017 – Apr 2018
*Academic Mentor*

- Helped academically deficient students by taking remedial classes and providing one to one mentoring.

**Association of Computing Activities**, IIT Kanpur Jan 2018 – May 2018
*Project Mentor - Spectral Graph Theory*

- Taught advanced graph algorithms and applications of the adjacency matrix to first-year students.

**Association of Computing Activities**, IIT Kanpur Jan 2019 – May 2019
*Project Mentor - Randomized Algorithms*

- Mentored a group of six students, covered probability theory and analysis of Randomized methods.

## TECHNICAL SKILLS

- **Programming**
  *Proficient*: C, C++, Python
  *Familiar*: Scala, GoLang
- **Utilities**
  Git, Vim, LEDA

## REFERENCES

- **Dr. Raghunath Tewari**
  Asst. Professor, Dept. of CSE, IIT Kanpur
  rtewari@cse.iitk.ac.in
- **Dr. Vishwa Vinay**
  Senior Research Scientist, Adobe Research
  vinay@adobe.com