Tarun **Raheja**

(+91)9705935445 | tarunraheja1234@gmail.com | www.tehruhn.github.io | tehruhn

Education

Birla Institute of Technology and Science, Pilani — *Hyderabad, India*

B.E. (Hons.) in Computer Science and Engineering — *Aug 2015 - Exp. Aug 2019*

- Final Year Undergraduate
- Current GPA : 8.34/10

RBDAV Senior Secondary School — *Bathinda, India*

Class XII (CBSE) — *Mar 2015*

- Percentage : 93.6

ETASI Timpany Senior Secondary School — *Visakhapatnam, India*

Class X (CBSE) — *Mar 2013*

- CGPA : 10.0/10.0

Work Experience

Indian Institute of Science Education and Research, Pune — *Pune, India*

Undergraduate Thesis — *Dec. 2018 - Ongoing*

- Broadly worked on Matrix Product States and DMRG.
- Aimed to freshly implement/extend existing implementations of DMRG to Hermitian matrices representing new types of physical systems called Potts Models.

Liveweaver Inc. (ZeroAI) — *Pune, India*

Data Science Intern — *May 2017 - July 2017*

- Developed Natural Language Processing modules for an on-device, locally available voice recognition interface.
- This entailed Morphological Segmentation of text corpora, Coreference Resolution of expressions, Sentiment Analysis of input text and hierarchical representation of concepts to compute similarity.
- Used PostgreSQL, Scikit-learn, StanfordCoreNLP, Numpy, Pandas, BeautifulSoup, ElasticSearch, NLTK and other proprietary services.

Major Projects

Novel Data Mining based approach to analyse patterns in student input to BITS Pilani — *Prof. Srinivasa Raju*

Aug 2018 - Nov 2018

- Used a combination of K-means, Fuzzy C-means and Kohonen Self Organizing Maps for clustering students based on grade-attendance data.
- Implemented a novel clustering algorithm using Data Envelopment Analysis.
- Developed a user-friendly GUI with Cluster Validity Indices implemented, and beautified output to graphs and excel sheets for usage by the college's Administrative Division to study trends in input student population, and tailor BITSAT accordingly.

Optimization of MPI Parallel code using PETSc — *Prof. N. Anil*

Aug 2018 - Nov 2018

- Used PETSc and its MPI architecture to profile and subsequently optimize large codebase for sensitivity analysis of an aerofoil for computation on GPU-CPU hyrid systems.
- Understood and applied Algorithmic Differentiation to some extent to refactor codebase.

Robust C++ Library with API for Computational Geometry algorithms with visualization — *Prof. Tathagata Ray*

Jan 2018 - Apr 2018

- Implemented several Computational Geometry algorithms such as convex hull (Graham Scan, Jarvis March, Kirkepatrick-Siedel), Polygon Triangulation from scratch in C++.
- Provided extremely user-friendly APIs for usage of library.
- Minimized floating point errors using a novel approach and provided extensive testing, documentation, formal algorithm analysis and visualization tools.
- Also implemented Joe and Simpson's point visibility algorithm with similar rigor.

Literature survey of Visibility Algorithms — *Prof. Tathagata Ray*

Jan 2018 - Apr 2018

- Explored Visibility Algorithms, read the first four chapters of the postgrad textbook by Dr. Subir Kumar Ghosh.
- Conducted in-depth literature surveys of sub-fields Point Visibility and Weak Visibility to ascertain further research possibilities.
- Implemented Suri and O'Rourke's algorithm from scratch with visualization in C++.

Miscellaneous Academic Projects *Various Profs*

Aug 2015 - Aug 2019

- Pushed to GitHub (linked here) for brevity. Details on each project can be found there.
- Includes implementations of a fully functional compiler from scratch in C++, several Recommender system algorithms (UU/II CF, SVD, CUR) from scratch in Python, Google's PageRank with optimization for sparse matrices in Python and several Machine Learning algorithms (from scratch) in C++/Java (candidate elimination, naive Bayes, decision trees with pruning).

Recent Honors & Awards

International

2018	**WorldQuantChallenge**, Achieved Gold ranking, was offered Research Consultant role by for exceptional performance.	*Online*
2018	**Magnus Quant Challenge**, Placed 82nd globally, and 4th in India.	*Online*

Domestic

2018	**ACM Summer School in Cryptology Research, ISI Calcutta**, Was among top 50 undergrads selected by ACM nationwide.	*Calcutta, India*
2015	**JEE Advanced**, Ranked among top 3% nationwide.	*Punjab, India*
2014	**Regional Mathematical Olympiad**, Qualified the first stage, was selected to attend RMOTC.	*Punjab, India*
2014	**INSPIRE Research Camp**, Was among top 100 candidates in Punjab selected by Govt. of India.	*Punjab, India*

Coursework and Skills

Computer Science

Object Oriented Programming, Database Systems, Machine Learning, Theory of Computation, Operating Systems, Information Retrieval, Principles of Programming Languages, Computer Architecture, Logic in Computer Science, Compiler Design, Design and Analysis of Algorithms, Computational Geometry, Computer Networks

Mathematics

Linear Algebra and Calculus, Probability and Statistics, Differential Equations

Languages

Python | C | C++ | Java | Prolog | VHDL | HTML/CSS | Matlab | LaTeX

Miscellaneous

College Basketball team

Member

- Participated and won in several intra-college tournaments.

Department of Publicity and Public Relations, Pearl (College Cultural Festival) 2015

Member, Public Outreach Team

- Publicised college fest among neighboring colleges. Helped dramatically increase fest foot-fall.

Rubik's Cubing

Enthusiast

- Can solve the 3x3 standard cube in around 40 seconds.
- Can also solve the 2x2, 4x4, 5x5, Megaminx, Pyraminx and mirror cubes.