Archit **Rungta**

Sophomore Undergraduate Student

(+91) 8084207992 | archit120@iitkgp.ac.in | architrungta120@gmail.com | archit.me | archit120

Education

Indian Institute of Technology, Kharagpur — *Kharagpur, India*

Integrated M.S. in Mathematics and Computing | Cumulative GPA : 9.32/10 — *Expected May 2023*

- Achieved a **top 0.1 percentile rank** in Joint Entrance examination taken by **1.6 million aspirants**.

Delhi Public School, Patna — *March 2004 - May 2018*

High-school | Senior-Year Board : 96.4%

- Overall School Rank 3/150 with Rank 1 in Computer Science.

Projects

3D-Graph

3D Projection/Game Engine — *2016, November 2019 - Present*

- Working on a custom **perspective rendering engine** from scratch. The current capabilities are **ray tracing**, basic triangle projections and **user input for movement in world frame**. The project depends on no external libraries and has been coded from scratch using C++. Compatible on both **Windows and Linux** systems. Work on faster **shaders and texture support** is in progress.
- Under Kharagpur Winter of Code, **mentored over a dozen students from different universities** to **contribute** to this project and increase the feature base. Among contributions mentored is support for different operating system and support for triangle rendering.
- **Github**

Kharagpur Pool

Point to Point pool-riding user discovery app — *September 2019 – Present*

- Working on an app that lets users select their origin and destination along with time of departure and then automatically pairs them up with other people on the same journey. Extremely useful in university as the nearest airport is 130 KM away. The app prefers to pair users with friends while minimizing the time any person has to wait from their ideal departure time. The **combinatorial optimization problem is approximated using ideas from Minimum Spanning Tree**. Server is written is Node.JS with MongooseDB backend. Client is written with Angular and Ionic. Planning for a spring 2020 launch.

Virtual Hand

Reconstruction of hand in 3D space — *December 2017 – March 2018*

- Made a **glove that used multiple IMU sensors to map a hand with all its motions**. The sensors were connected to a Raspberry Pi which ran C++ code and interacted with a display computer using TCP socket over local network. A Python script running on the computer in Blender displayed the captured hand. As a sample use, created NEAT (Neuro Evolution of Augmenting Topologies) neural networks to learn sign language symbols and interpret. The project was coded in C++ and Python. **Project was chosen by Government of India under Atal Innovation Mission for further development.**
- **Youtube**

arcMiners

GPU cryptocurrency miners — *March 2014 - April 2016*

- Made the **first GPU crypto-currency miner** for the **keccak (SHA-3) POW algorithm**, and Protoshares momentum POW based on existing miners utilizing CUDA for Nvidia GPUs and OpenCL for AMD. Later, made a new miner from ground up focusing on modularity and abstraction. The miners were cross-compatible on Windows and Linux operating systems. Programmed in C++, CUDA and OpenCL.**Github**
- **Cumulative profit in fees is over USD 100K**.

Monero Pool

Cryptocurrency Mining pool — *May 2014 - July 2014*

- **One of the first two mining pools for Monero**. Wrote a Server application with a Redis based data storage system as well as a HTML front end. The server application was responsible for difficulty re-targets, dispatching blocks. processing correctly solved Proof-of-Word and payouts. Uses TCP sockets from the Mono Framework. Cross-compatible on Windows and Linux. Designed for maximum utilization of multi core CPU by sharing work among hundreds of threads at once. Abandoned now because of major changes in the currency's protocol. Written in C#, C++, PHP and JS.
- **Github**

Charge Field

Drawing field lines of electrical charges — *June 2016 - July 2016*

- Created a classical physics model of static charges with forces and collisions. Rendered to screen using custom library built on top of Windows API. Software drew the field lines and their interaction in real time. **Computation was offloaded to GPU using CUDA** to achieve realtime frame-rates even in the case of high number of particles. Written in C++.

Honors & Awards

2019	**42nd**, Rank in Amritapuri ICPC Regional. Only sophomore team from university.	*Coimbatore, India*
2019	**1st**, International Micro Aerial Vehicle Indoor Competition	*Madrid, Spain*
2019	**528th**, World Rank in Google code jam 2019 round 1A	*Online*
2018	**Top 10**, IBM hosted NLP news classification challenge	*Bangalore, India*
2017	**9th Place**, at IOI Training Camp (Final Stage) in India	*Chennai, India*
2016	**Youngest**, at IOI Training Camp in India	*Bangalore, India*

Skills

Programming Languages

In order of familiarity

- C# • Python • C++ • PHP • C • HTML • PHP •Javascript• • SQL • Android • LaTeX • Shell • Assembly

Frameworks and Libraries

In weak order of familiarity

- numpy • pandas • keras • sklearn • pyTorch • TensorFlow • ROS • CUDA • OpenCL

Competitive Programming

- Codeforces : **1804** (Primary) • Codechef: **1915**

Relevant Coursework

- * Randomized Algorithms • * Discrete Mathematics • * Probability and Statistics • Design and Analysis of Algorithm • Natural Language Processing • #Machine Learning • #Convolutional Neural Networks for Visual Recognition • Programming and Data Structures
  (#) Completed online Course with assignments (*) Currently studying

Research

Aerial Robotics Lab, Kharagpur

IIT Kharagpur, India

Perception Undergraduate Researcher — *February 2019 – Present*

- Working under **Prof Somesh Kumar** on various autonomous drone navigation related challenges.
- Currently working on detecting and **countering turbulent wind regions** generated by a mutlirotor's own propellers while landing **for stabler landing**. Using simulations to train a neural network to approximate region of turbulent airflow.
- Designed an algorithm based on KNN and other traditional image processing techniques to find dense navigable spaces.
- Part of team whose technical description was selected for special oral session at **International Micro Air Vehicle Competition and Conference 2019**

Kharagpur Learning Imaging and Visualization Group

IIT Kharagpur, India

Undergraduate Member — *October 2019 - Present*

- Working under **Prof Debdoot Sheet** on sparsification of deep neural networks.
- Extending previous work on usage of **expander graphs** in fully connected layers and convolutional layer. Currently trying to re-implement convolutional layers of Resnet to sparse layers while preserving performance with the help of multiple skip connections.
- Working in Pytorch.

Inter IIT team

IIT Kharagpur, India

Vision Team — *October 2019 - December 2019*

- Worked on detecting green cuboids in rough grass fields using a **swarm of drones**. Final solution involved use of **Kalman filters, image segmentation and KNN**.
- Created different algorithms for ROI detection at large height and confirmed detection on smaller heights.
- Implemented and tested using **ROS on Odroid** systems.

Extracurricular Activity

Debating Society

Kharagpur, India

Member — *August 2018 - Present*

- Participate in parliamentary debates on-campus.

Kharagpur Data Analytics Group

Kharagpur, India

Member — *September 2019 - Present*

- Organize and conduct workshops and info-sessions on data anayltics and machine learning on structured data.
- Had the **first rank in University-Wide kaggle competition** conducted for selections to the group.