Tirthankar Mittra

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# EDUCATION

Research-Based master’s in computer science ***Aug 2022 – Present.***

University Of Colorado Boulder ***CGPA: 4 / 4***

Bachelor of Engineering (Electronics & Telecommunication) ***Aug 2014 – May 2018.***

Jadavpur University (West Bengal) ranked 9th in engineering in India ~ 2017 HRD ministry report. ***CGPA: 8.9 / 10***

# RELEVANT GRADUATE LEVEL COURSES

# Neural Networks & Deep Learning, Deep Reinforcement Learning, Advanced Robotics, Data Center Scale Computing-Methods Systems & Techniques, Chaotic Dynamics, Numerical Linear Algebra, Foundations of Quantum Engineering, Advanced topics in Computer Vision, Linux system administration, Computer Security and Ethical Hacking.

# RELEVANT UNDERGRADUATE COURSES

Computer Language & Data Structures, Programming Lab, Numerical Analysis Lab, Data Structures & Algorithms, Computer Organization & Architecture, System Software, Computer Comm. Networks, Neuro-fuzzy Control, Operating Systems, Computer Architecture & System Software Lab.

# PROFESSIONAL EXPERIENCE

***Qualcomm (Interim Software Engineer) Summer 2023 Intern.*** Created a verification environment for testing the 5G Base station’s MAC layer and establishing a prototype unit test and a test development workflow. This experience deepened my proficiency in Python modules such as Pytest framework, logging, and subprocess. Additionally, I expanded my expertise in utilizing Gerrit and Git for seamless collaboration.

***Samsung R&D Bangalore (Lead Software Engineer***) ***2018 – 2022.***

Designed, implemented, and tested Uplink Control Channel for 5G Base Stations. Provided frequent guidance, feedback &

communicated project goals to new team members. Also, read & researched new topics in 5G Networks, and tried to improve existing

algorithms, often by introducing machine learning (ML) techniques. Published patents.

***Achievements***

* Cleared Samsung professional software competency exam, in 2018.
* Was awarded the Samsung Citizen Award for my contributions to the 5G project.

<https://github.com/tirthankar95/CompletionCertificates/blob/main/SamsungCitizenAward.jpg>

# SKILLS AND AWARDS:

1. Following are the various skills that I have honed over the years.

Advanced Skills

* Python, C, C++, Algorithm & Data Structure - Regularly use online coding platforms like LeetCode and Code Chef.
* Deep Learning, Computer Vision, NLP, Reinforcement Learning, Machine Learning.

Intermediate Skills

* Operating Systems - Books read, “operating system concepts by Galvin”.
* System Design - Books read, “System Design Interview by Alex Xu”, and “Designing Data-Intensive Applications by Martin Kleppmann”.
* Computer Organization, DBMS - NPTEL Video Lectures, Hadoop, PySpark, Kubernetes, Docker.

Beginner Skills

* HTML, CSS,JS -

Built my version of the famous Google T-Rex Dinosaur game.

[Code Link] <https://github.com/tirthankar95/T-Rex-Run>

[Website Link] <https://tirthankar95.github.io/T-Rex-Run/>

Built a dummy restaurant website for both PC & mobile users. (Coursera’s Assignment)

[Code Link] <https://github.com/tirthankar95/HTML-CSS-JS-WebDev>

[Website Link] <https://tirthankar95.github.io/HTML-CSS-JS-WebDev/>

2. My “Test Scores” on various important national exams.

[JEE MAINS - 99.2 percentile | JEE ADVANCED - 99.5 percentile | WBJEE - 99.7 percentile]

3. Participated in social work and created study materials for underprivileged children in collaboration with IIM Calcutta. <https://github.com/tirthankar95/CompletionCertificates/blob/main/SocialWorkCertificate.pdf>

4. Participated in a marketing management internship, conducted by IIM Lucknow. I was awarded a special certificate of excellence for my performance.

<https://github.com/tirthankar95/CompletionCertificates/blob/main/MarketingManagementCertificate.pdf> <https://github.com/tirthankar95/CompletionCertificates/blob/main/MarketingManagementSpecialCertificateOfExcellence.pdf>

5. Sometimes I participate in Competitive Coding (Best Code Chef Global Rank ~ 314 out of 11809 [April Challenge 2019]). <https://www.codechef.com/users/tirthankar_95>

# TECHNICAL PAPERS/PUBLICATIONS

## Modelling the learning of numbers in children using reinforcement learning ( Independent Study | CU Boulder )

## <https://github.com/tirthankarCU/NLP_RL_Docker_Version>

## In this ongoing project, I'm utilizing state-of-the-art Neural Networks, including BERT and ResNet, to develop a deep reinforcement

## learning PPO model. The focus is on investigating the role of language in children's number learning and its potential transferability to

## other tasks. My aim is to present this research at prestigious machine learning conferences like ICML, NeurIPS etc.

## Multi agent collaborative reinforcement learning using novel attention mechanism ( Independent Study | CU Boulder )

## I am currently developing a novel attention-based algorithm for multi-agent reinforcement learning, aiming to demonstrate its

## superior performance in collaborative tasks, such as object collection in a warehouse. The project is ongoing, and I also intend to incorporate (EKF SLAM) for state estimation in the presence of noise.

## Optimal LDPC Decoder

<https://github.com/tirthankar95/Patents-Papers/blob/main/LDPC_.pdf>

Optimized LDPC decoder algorithm with gradient descent on piecewise linear approximations & Deep Neural Networks. Tried to publish my work at the GLOBECOM conference.

## Reinforcement learning enhancements on Layered LDPC Decoder

<https://github.com/tirthankar95/Patents-Papers/blob/main/LDPC_RL.pdf>

Spearheaded research on how Reinforcement Learning(RL) can be deployed with a Layered LDPC decoder to improve its performance.

## Optimal Harq Chase Combining

[https://patents.google.com/patent/WO2021075888A1/en?inventor=Tirthankar+Mittra&oq=inventor:(Tirthankar+Mittra)](https://patents.google.com/patent/WO2021075888A1/en?inventor=Tirthankar%2BMittra&oq=inventor%3A(Tirthankar%2BMittra))

Proposed an intelligent scheme for combining data packets thus reducing re-transmissions & saving time-frequency resources and **was awarded an A2 grade patent.**

Traffic Balancing & maintaining other KPIs in 5G systems: An open-ended intelligent search approach.

<https://github.com/tirthankar95/Patents-Papers/blob/main/TrafficBalancing_AI.pdf>

Implemented a form of deep RL(open-ended search) to solve load/traffic balancing among several (UAV)-mounted base stations while maintaining different system KPIs (optimal throughput, the transmission of data with less power, etc.) for dynamically changing traffic & channel conditions.

# RELEVANT PROJECTS

***Smart Energy Meter, Jadavpur University.*** J***une 2016 – July 2016.***

Headed a four-member team in an inter-college start-up competition. An Arduino-based prototype of an energy meter

was built. It would send periodic power consumption data to a mobile device via Bluetooth and a customized android app.

would display interesting statistics (user’s energy consumption patterns, etc.).

[Certificate] <https://github.com/tirthankar95/CompletionCertificates/blob/main/StartupCompetitionParitcipationCertificate.pdf>

***Data Analytics, IIM Lucknow. May 2017–June 2017.***

In this internship, I learned about hypothesis testing, central limit theorem, adjusted R-squared test, chi-squared test, Fischer’s

score, data visualization techniques, and various machine learning models like linear/logistic regression, decision trees, etc. Finally,

solved a case study by using a random forest model.

[Certificate] <https://github.com/tirthankar95/CompletionCertificates/blob/main/DatatScienceCertificate.pdf>

***Mind Driven Typewriter (Final Year Project), Jadavpur University. Dec 2017–March 2018.***

Worked as part of a 3-member team, where a typewriter was built for deaf, dumb & blind people, it would work on EEG signals from the

brain. Wavelet transform was used for feature extraction, LDA & Neural Networks were then used on extracted features for classification.

<https://github.com/tirthankar95/Mind-Driven-typewriter/blob/master/FinalyrReport.pdf>

# INDEPENDENT LEARNINGS

1. Neural Networks and Deep Learning, Coursera **2019 (1 WEEK).**

<https://github.com/tirthankar95/CompletionCertificates/blob/main/CourseraDeepLearning.pdf>

## Mathematics for Machine Learning: Linear Algebra, Coursera **2019 (1 WEEK).**

<https://github.com/tirthankar95/CompletionCertificates/blob/main/CourseraMathematicsForML.pdf>

1. Camera and Imaging, Coursera **2022 (1 WEEK).**

<https://github.com/tirthankar95/CompletionCertificates/blob/main/Camera%26ImagingCertificate.pdf>