

Tirthankar Mitra
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EDUCATION

Research-Based master's in computer science
University Of Colorado Boulder

Aug 2022 - Present.
CGPA: 4 / 4

Bachelor of Engineering (Electronics & Telecommunication)
Jadavpur University (West Bengal) ranked 9th in engineering in India - 2017 HRD ministry report.

Aug 2014 - May 2018.
CGPA: 8.9 / 10

RELEVANT GRADUATE LEVEL COURSES

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

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-

1. 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, python logging, and python subprocess. Additionally, I expanded my expertise in utilizing Gerrit and Git for seamless collaboration.

2. Samsung R&D Bangalore (Lead Software Engineer)

2018 - 2022.

Designed, implemented, and tested Uplink Control Channel for 5G base station's network protocol stack. Provided frequent guidance, feedback & communicated project goals to new team members. Gained deeper understanding of writing code in C and testing code using Google Test Framework in C++. Also read and conducted extensive research on new topics in 5G networks and machine learning, improved existing 5G algorithms by introducing machine learning and deep learning techniques, and 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, Large Language Models.

Intermediate Skills

- System Design - Books read "System Design Interview by Alex Xu", and "Designing Data-Intensive Applications by Martin Kleppmann", Hadoop, PySpark, Docker Container, Kubernetes, Google Cloud Platform, REST, PyCuda, ROS, OpenCV, JIRA(Agile), Redis, MinIO object store.
- Computer Organization, DBMS(NPTEL Video Lectures), Computer Networks, Ethical Hacking.
- Operating Systems - Books read, "operating system concepts by Galvin".

Beginner Skills

- RabbitMQ, Flask, gRPC.
- 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. Sometimes I participate in Competitive Coding (Best Code Chef Global Rank - 314 out of 11809 [April Challenge 2019]).

RELEVANT PROJECTS

Datacenter Scale Computing, CU Boulder

Oct 2022-Dec 2022.

<https://github.com/tirthankarCU/SpeedyBotFlag>

Built a cloud-hosted service with low-latency text classification and flagging capabilities for social media platforms. The rest front end would do low latency risk averse text classification using simple NLP models like bag of words. The backend workers would use large models like BERT, pop out the texts from MinIO object store and once the classification is done it would notify the user and the post would be deleted from the user's feed if it violated platform guidelines. User authentication and posts are tracked using Redis key value store.

Datacenter Scale Computing, CU Boulder

Sep 2022-Oct 2022.

<https://github.com/tirthankar95/demucs-kubernetes-tirthankarCU>

Implemented a Kubernetes cluster to create a REST API-driven music separation service. Managed API requests, MP3 analysis, and data retrieval through a Redis queue system. Employed cloud object storage (e.g., Min.io) for result caching.

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>

TECHNICAL PAPERS/PUBLICATIONS

1. 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. The aim is to present this research at ML conferences like ICML, NeurIPS etc. Also used docker containers and google cloud

2. 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.

3 .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+Mittra&oq=inventor:(Tirthankar+Mittra))

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

INDEPENDENT LEARNINGS

1. Neural Networks and Deep Learning, Coursera

2019 (1 WEEK).

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

2. Mathematics for Machine Learning: Linear Algebra, Coursera

2019 (1 WEEK).

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

3. Camera and Imaging, Coursera

2022 (1 WEEK).

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