

Tirthankar Mittra

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<https://github.com/tirthankar95>

EDUCATION

UNIVERSITY OF COLORADO BOULDER, Boulder, CO

August 2022 – December 2023

Master of Science in Computer Science

• **GPA: 4**

• *Relevant coursework: 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.*

JADAVPUR UNIVERSITY, Kolkata, India

August 2014 – May 2018

Bachelor of Engineering in Electronics & Telecommunication

• **GPA: 3.6**

• *Relevant coursework: 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.*

TECHNICAL SKILLS

Functional : Agile, JIRA , Git, Gerrit, Jenkins, Perforce, Linux, Windows, CI/CD.

Technical : Python, C, C++, JAVA, HTML, CSS, Computer Vision, NLP, Reinforcement Learning, Machine Learning, Large Language Models, Deep Learning, Hadoop, PySpark, Docker Container, Kubernetes, Google Cloud Platform, PyCuda, ROS, System Design, REST, AWS, Computer Networks, Cyber Security, RabbitMQ, Flask, gRPC, Operating Systems, Algorithm & Data Structure, Redis, MiniIO object store, MySQL, Pytorch, GDB, TensorFlow, Node.js, JavaScript, Database, NoSQL, Spring framework.

Framework : Spring Boot, Pytest, Gtest.

Machine Learning : Pytorch, Tensorflow, Large Language Model, Computer Vision.

PROFESSIONAL EXPERIENCE

QUALCOMM - SAN DIEGO, CALIFORNIA

Interim Software Engineer

May 2023 – August 2023

• Led the development of a PYTEST framework verification environment for rigorous testing of the 5G base station's MAC layer. Established a prototype unit test and development workflow, laying the foundation for future test case expansions. Utilized python LOGGING, SUBPROCESS modules, and deepened expertise in GIT and GERRIT version control systems. The framework resulted in a 30% enhancement in testing efficiency.

• Collaborated seamlessly with cross-functional higher layer teams within the 5G network protocol stack, to develop MAC unit test cases. Enabled PF TRACE for unit tests to log MALLOC counts, CONTEXT SWITCHES and PAGE FAULTS, this increased reliability of all test cases by 25%.

• Used data analysis with python's PANDAS and NUMPY packages to formulate robust pass-fail criteria for unit tests. Implemented extended test scenarios through the creation of bash scripts, identifying latent faults in legacy code and subsequently fixing them thus increasing code reliability by 5%.

SAMSUNG R&D - BANGALORE, INDIA

Lead Software Engineer

June 2018 – August 2022

• Led the development of 5G Base Station's physical uplink control channel's code releases and patches for Samsung's diverse customer base. Customized features for specific clients based on High-Level Designs and 3GPP specifications, followed agile workflow, continuous integration, and continuous development (CI/CD) practices. Mentored two junior team members in MAC-PHY software development which cut down team's ability to release new features by 30%.

• During testing, comprehension of logs was limited to module experts due to real-time verbose sequential presentation on the console. Recognizing the need for accessibility, a log parser solution was proposed. This parser, developed with HTML and CSS, was hosted on a server that aggregated logs of a specific type into a downloadable Excel sheet which could then be utilized for analysis, such as calculating DOWNLINK BLER and throughput. The log parser reduced the average analysis time by 90%.

• Enhanced legacy code by optimizing PUCCH resource allocation from $O(n^2)$ to $O(n)$ through efficient hashing techniques resulting in the reduction of average runtime by 20%. Identified an issue where 'N' parallel PUCCH reports were overwritten during field tests, implemented the bakery algorithm to solve the critical section problem.

- Implemented PUCCH unit tests powered by Google's Gtest in C++. Set up Jenkins for nightly testing, which also included the logging of CPU cycle consumption per module. Automated email notifications for team-wide updates on results, enhancing overall testing efficiency. The framework reduced bugs by 50% and was also used to increase code coverage from 20% to 75%.
- Led pioneering research in advancing 5G algorithms through ML techniques. Developed an improved LDPC layered decoder using Pytorch, incorporating reinforcement learning and a dense neural network for function approximation which led to a 15% increase in decoder accuracy. Proposed innovative traffic balancing strategies in 5G systems through an open-ended intelligent search for multiple UAV base stations. Co-led a team in introducing a novel HARQ chase combining technique, for which a patent was awarded.

PROJECTS

FAST BOT CLASSIFIER, CU BOULDER

Individual Contributor

October 2022 – December 2022

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

- Constructed 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.

MUSIC SEPARATION AS A SERVICE, CU BOULDER

Individual Contributor

September 2022 – October 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.

MODELLING THE LEARNING OF NUMBERS IN CHILDREN, DELLAB CU BOULDER

Graduate Research Assistant

January 2023 – December 2023

https://github.com/tirthankarCU/NLP_RL_Docker_Version

- The focus of this research was on investigating the role of language in children's number learning and its potential transferability to other tasks. A novel reinforcement learning environment was implemented using OpenAI's gym framework and a docker container was created to improve reliability of results on different platforms.
- Implemented state-of-the-art Neural Networks, including BERT and ResNet, which were utilized to develop a deep reinforcement learning (proximal policy optimization) PPO model.

TRAFFIC BALANCING & MAINTAINING OTHER KPIS IN 5G SYSTEMS, SAMSUNG R&D

5G Researcher

August 2020 – August 2021

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

- Developed and implemented a form of deep reinforcement learning (open-ended search algorithm) , to address load and traffic balancing challenges among multiple UAV-mounted base stations.
- The implemented solution ensures the optimization of system Key Performance Indicators (KPIs), such as throughput and efficient data transmission with minimal power usage, in the context of dynamically changing traffic and channel conditions.

ACHIEVEMENTS

- Cleared the Samsung professional software competency exam in 2018, ranking in the top 16% of employees in the organization.
 - Was awarded the Samsung Citizen Award for my contributions to the 5G project.
- <https://github.com/tirthankar95/CompletionCertificates/blob/main/SamsungCitizenAward.jpg>
- Participated in Competitive Coding, achieving a Best Code Chef Global Rank of approximately 314 out of 11809 in the April Challenge 2019. https://www.codechef.com/users/tirthankar_95