Tirthankar Mittra

Software Engineer Experience delivering products used by 100M+ users.

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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

Ranked 9th in engineering in India ~ 2017 HRD ministry report.

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, MinIO 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 May 2023 – August 2023

Interim Software Engineer

- **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 and SUBPROCESS module**s 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 the reliability of all test cases by 25%.
- Performed **data analysis with Python's PANDAS and NUMPY packages** to formulate robust pass-fail criteria for unit tests. Implemented extended test scenarios by creating bash scripts, identifying latent faults in legacy code, and fixing them, thus increasing code reliability by 5%.

SAMSUNG R&D - BANGALORE, INDIA June 2018 – August 2022

Lead Software Engineer

- **Led pioneering research** in advancing **5G algorithms through MACHINE LEARNING** 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.
- **Led the development of 5G Base Station's** physical uplink control channel's **feature releases and patches for Samsung's diverse customer base**. Also, customized features for specific clients based on High-Level Designs and 3GPP specifications, following **agile workflow**, continuous integration, and continuous development **(CI/CD) practices**. **Mentored two junior team members** in MAC-PHY software development; all these efforts reduced the team's ability to release new software features by 30%.

• **Improved log comprehension** and accessibility by developing an **HTML, CSS, and JAVASCRIPT-based parser** that was hosted on a server and could aggregate 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%.

• **Implemented PUCCH unit tests powered by Google's Gtest in C++** and set up Jenkins for nightly testing, which 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%.

RESEARCH

MODELLING THE LEARNING OF NUMBERS IN CHILDREN, DELLAB CU BOULDER January 2022 – December 2023

Graduate Research Assistant

https://github.com/tirthankarCU/NLP_RL_Docker_Version

• Implemented a **novel OPEN AI gym environment** and **state-of-the-art Neural Network & Large Language models** like **BERT, ResNet, and an ATTENTION** network to **create a deep reinforcement learning PPO algorithm** and investigate the role of language in children's number learning. The models were **deployed on the Google Cloud Platform in DOCKER containers**.

PARTICLE FILTER GUIDED MULTI-AGENT REINFORCEMENT LEARNING, CU BOULDER September 2023 – December 2023

Independent Study Researcher

tirthankar95/IndependentStudy2 (github.com)

• Developed a novel **attention-based algorithm for multi-agent reinforcement learning which uses PARTICLE FILTER for state estimation**, with the aim to demonstrate its superior performance in collaborative tasks, such as object collection in a warehouse.

OPTIMAL LAYERED LDPC DECODER, SAMSUNG R&D January 2020 – August 2021

Samsung Researcher

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

• Spearheaded research on **how Reinforcement Learning** can **be used to find a policy for selecting the order of layers in a Layered LDPC decoder** to improve its performance. Also optimized LDPC decoder algorithm with **gradient descent on piece wise linear approximations** & Deep Neural Networks.

PROJECTS

FAST BOT CLASSIFIER, CU BOULDER October 2022 – December 2022

Individual Contributor

https://github.com/tirthankarCU/SpeedyBotFlag

• **Created** a novel **cloud-hosted service** with low-latency **text classification and flagging** capabilities for social media platforms. The **REST front end would classify low-latency** risk-averse text using simple NLP models like a Bag of Words, which decreased the response latency by 35%.

• **Deployed backend workers** to use large models like **BERT** to pop out the **texts from the MinIO object store** and do classification. Workers deleted user posts if they violated the platform guidelines. **Redis key-value store** managed user authentication. This deployment removed 95% of problematic tweets.

Mind Driven Typewriter, Jadavpur University. December 2017 – March 2018

Undergraduate Research Assistant

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

• Worked as part of a three-member team, where a typewriter was built for deaf, dumb & blind people, which **worked on EEG signals from the brain**. **Wavelet transform was used for feature extraction, LDA & Neural Networks** were then used on extracted features for classification.

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