

Education

- Jan 2024 onwards **PhD in CS**, *Boston University*, Boston
Working on Transport Layer Protocols for efficient file transfer
- Sep 2022 – Dec 2023 **MS in CS with specialization in Cybersecurity**, *Boston University*, Boston, 3.96
Covered courses: Distributed Systems, Computer Networks, Network Security, Advanced Algorithms, Cybersecurity, Streaming and Event-driven Systems, Object-oriented Software Principles and Design
- Aug 2006 – July 2010 **BE in IT**, *Delhi College of Engineering (now DTU)*, Delhi, 73.45%
Covered courses: Data Structures, Computer System Architecture, Operating System, RDBMS, Software Engineering

Work Experience

- Dec 2024 – Present **Doctoral Student**, *Boston University*, Boston
- Conducting advanced research on optimizing the RINA based Multi-Level Error Detection model.
 - In-depth analysis of UDP based QUIC protocol, focusing on its innovative features like connection and port migration, 0-RTT connections, and ossification protection to enhance data communication reliability.
 - Testing MLED on the FABRIC and chameleon testbed, demonstrating its transformative potential in ensuring data integrity across large-scale networks.
 - Mentored a senior undergraduate student to develop a React-based GUI webpage to simplify the creation of configuration files for running the MLED model, enhancing user experience and accessibility.
- May 2025 – Present **Research Intern**, *Google*
- Collaborated with the networking team at Google to evaluate **connection and port migration** in the QUIC protocol under varying network conditions.
 - Leveraged **QUICHE**, Google's open-source Chromium implementation, to analyze advanced protocol features for enhancing connection stability and low-latency performance.
- July 2023 – Dec 2023 **Research Assistant**, *Boston University*, Boston
- Collaborated with Prof. Abraham Matta at Boston University on the NSF-funded project "MLED: A Layered Architecture for Reducing Undetected Error Probability in File Transfer," addressing challenges in large-scale file transfers with minimal error margins.
 - Implemented a Java-based simulator to evaluate MLED's performance against the traditional checksum CRC model and further developed a C++ application to run MLED on the FABRIC testbed, demonstrating its transformative potential in ensuring data integrity across large-scale networks.
- Feb 2014 – March 2022 **Assistant Commandant (Technical)**, *Central Reserve Police Force*, India
- Spearheaded the development of high-performance Android and web applications, optimizing data collection, management, coalition, and analysis processes, resulting in increased efficiency and productivity.
 - Displayed exceptional skill in analyzing and dissecting live malware, identifying IoCs, and effectively neutralizing the latest cyber threats to ensure the safety and security of the organization.
 - Conducted thorough and meticulous security audits of systems using cutting-edge technologies such as OS forensics, Wireshark, and Nessus, providing critical insights and recommendations for improvement.
 - Developed clear and concise guidelines for the safe use of electronic devices and social media, demonstrating a commitment to promoting responsible technology use across the organization.

Projects

Research Projects

- May 2025 – Present **Connection Migration in QUIC Protocol – Google Research Internship**
- Evaluating the QUIC protocol's performance, focusing on advanced features such as connection migration, port migration, and preferred address, to optimize performance in dynamic network environments.
 - Leveraging Google's open-source QUICHE implementation to explore and analyze QUIC's advanced capabilities.
 - Conducting comprehensive analyses across various network conditions using the ns-3 simulator on the FABRIC testbed, with an emphasis on real-world performance evaluation.
 - Assessing the impact of connection migration on latency, stability, and other critical network metrics in environments with poor connectivity.

Jan 2025 – **Heterogeneity-Aware Operator Placement at the Edge Devices**

- Present
- Introduced a method to enhance the performance of stream processing systems by offloading tasks to edge systems (Raspberry Pi devices), to address latency and bandwidth constraints of WANs.
 - Identified inefficiencies in traditional systems like Apache Flink when offloading to edge systems; proposed a heterogeneity-aware operator placement algorithm. The approach dynamically shifted operators between the server and the edge device with virtually zero down time.

July 2023 – **Multi Layered Error Detection Architecture: A Layered Architecture for Reducing Undetected Error Probability in File Transfer**

April 2025

- Collaborated on the NSF-funded project “MLED: A Layered Architecture for Reducing Undetected Error Probability in File Transfer” at Boston University with Prof. Abraham Matta and Prof. Violet Syrotiuk from Arizona State University.
- Developed a highly configurable Recursive InterNetwork Architecture (RINA)-based protocol from the ground up to minimize Undetected Error Probability (UEP) during large-scale data transfers.
- Mathematically demonstrated significant reduction in UEP using in-network resources and validated the results through meticulously designed experiments.
- Designed and implemented the MLED protocol in C++20.

Skills

Languages C/C++, GoLang, Java, Python, JavaScript, SQL

Tools Nessus, Wireshark, OS Forensics, Burp Suite, Flink, Docker, Acunetix, ns-3, iperf3

Awards and Honors

- 2023 Received the **Best Presentation/Demonstration Award**, at the KNIT 7 Workshop organized by the National Science Foundation (NSF), for the implementation of project “**MLED: A Layered Architecture for Reducing Undetected Error Probability in File Transfer**” on FABRIC.