Sapna Chaudhary

PhD Scholar, Department of Computer Science & Engg.
Indraprastha Institute of Information Technology Delhi
Okhla Industrial Estate, Phase III
New Delhi, India - 110020

Email: sapnac@iiitd.ac.in
linkedin.com/sapna-chaudhary-2504
github.com/sapna2504
sapna2504.github.io

Summary

PhD scholar with expertise in Internet measurement, performance analysis of next-generation transport protocols such as QUIC, and the optimization of video streaming systems across a wide spectrum of network conditions, from constrained and unstable environments to high-speed networks. My work also involves deep hands-on experience with the Chromium browser source code, enabling system-level instrumentation, protocol customization, and measurement-driven performance evaluation.

Education

- **Indraprastha Institute of Information Technology Delhi** — New Delhi, India
  Ph.D (Computer Science & Engg.) — *Aug 2020 - Present*
  - Advisor: Dr. Mukulika Maity(IIIT Delhi) and Dr. Sandip Chakraborty (IIT Kharagpur)
  - Research Topic: Design and Development of a Sustainable Video Streaming Framework over Limited Bandwidth and High-Speed Networks
  - Current CGPA: 8.8/10
- **Guru Gobind Singh Indraprastha University, USICT** — Delhi, India
  Master of Technology (Computer Science Engineering) — *2018 - 2020*
  - Advisor: Dr. Rahul Johari
  - Project: Optimized Routing in Wireless Network using Machine Learning
  - Silver Medalist
  - Percentage: 9.0
- **Inderprastha Engineering College (IPEC)** — Uttar Pradesh, India
  Bachelor of Technology, Computer Science Engineering — *2012 - 2016*
  - Percentage: 73%

Certificates/Scorecards

- **TMA PhD School** — 26 - 27 June 2023
  Certificate Link : Google Drive Link — *TMA Conference, Naples, Italy*
- **GATE** — 2019
  Score : 444

Projects

- **Optimized Adaptive Protocol Selection Mechanism for Video Streaming Application**
  Research Project

  With the advent of QUIC (HTTP/3), a recent transport layer protocol, significant improvements in performance under challenging/poor network conditions have been observed compared to TCP. However, in high-bandwidth networks, the legacy TCP (HTTP/2) protocol often outperforms QUIC (HTTP/3). Recognizing this, prior research has introduced adaptive transport protocol selection mechanisms, primarily designed for web services, relying on supervised machine learning models. Unfortunately, such mechanisms are largely absent for applications like video streaming and often fail to adapt to changing network conditions. Moreover, switching transport protocols during video streaming can adversely impact the Quality of Experience (QoE) due to the

loss of congestion control state while moving from one protocol to another. This work proposes an adaptive framework (IntelSwitch) for seamless protocol switching for services like video streaming. It includes a real-time protocol selection mechanism, implemented through modifications to both the dash.js player and the Chromium browser source code, to dynamically choose the optimal transport protocol under evolving network conditions. Additionally, it incorporates an optimized ABR algorithm that remains stable during protocol switching to minimize the impact on QoE. Together, these contributions significantly improve video streaming performance in dynamic environments.

- **Design and Development of Sustainable Video Streaming Framework over Limited Networks:**
  Research Project

  Not all parts of a developing country like India enjoy a good Internet bandwidth. Popular video streaming applications require a minimum bandwidth to operate. This work aims to measure the performance of popular video streaming applications under poor network bandwidth using the recent application protocol HTTP/3. HTTP/3 uses QUIC as the underlying transport protocol. This work aims to identify issues/challenges with the QUIC protocol and the browser that enables it over a poor bandwidth network. Further, the work aims to propose network and application-level solutions that can provide the best possible QoE over a low and very low network bandwidth.

  Paper Link : `https://ieeexplore.ieee.org/document/10453353`

- **A Dataset for Analyzing Streaming Media Performance over HTTP/3 Browsers**
  Research Project

  HTTP/3 is a new application layer protocol supported by most browsers. It uses QUIC as an underlying transport protocol. QUIC provides multiple benefits, like faster connection establishment, reduced latency, and improved connection migration. Hence, popular browsers like Chrome/Chromium, Microsoft Edge, Apple Safari, and Mozilla Firefox have started supporting it. This work presents an HTTP/3-supported browser dataset collection tool named H3B. It collects the application and network-level logs during YouTube streaming. We consider YouTube to be one of the most popular video streaming applications that support QUIC. Using this tool, we collected a dataset of over 5936 YouTube sessions covering 5464 hours of streaming over 5 different geographical locations and 5 different bandwidth patterns. We believe our tool and the dataset could be used in multiple applications, such as a better configuration of application/transport protocols based on the network conditions, intelligent integration of network and application, predicting YouTube's QoE, etc.

  Paper Link : `bit.ly/3VhQQ4k`

- **ORuML: Optimized Routing in wireless network using Machine Learning**
  M.Tech Thesis

  Routing is a process of selecting a path in a network for delivering a packet from the source node to the destination node. Successful delivery of a message is a challenge in delay tolerant networks, and therefore, this thesis proposes an algorithm for a wireless network called ORuML, which uses a machine learning algorithm, namely KNN(K-Nearest Neighbour), SVM(Support Vector Machine), and MLR (Multinomial Logistic Regression), to predict the network type of the source and destination nodes. The proposed algorithm determines whether the source and destination nodes are co-located and also determines the best neighboring hop for efficient routing.

  Paper Link : `https://onlinelibrary.wiley.com/doi/full/10.1002/dac.4394`

- **Smart Helmet**
  M.Tech Thesis

  This smart helmet was developed to help people ride bicycles at night. It has indicators like any other two-wheeler, which works with head movement. It also alarms the rider about the vehicle around in close proximity with vibration to avoid hitting.

Professional Experience

- **Department of Computer Science & Engg.** New Delhi, India
  Indraprastha Institute of Information Technology Delhi *Jan 2021 to December 2023*
  - *Teaching Assistant (Aug 2020 to Dec 2020)*

Working as a Teaching Assistant for the course Computer Networks. The work involves grading answer sheets and providing tutorials and remedial lessons to students.

– *Teaching Assistant (Jan 2021 to May 2021)*
Working as a Teaching Assistant for the course Wireless Networks. The work involves grading answer sheets and providing tutorials and remedial lessons to students.

- **LastMileS Workshop** Bangalore, India
  COMSNETS 2022 *2022*
  Volunteer
  Worked as Workshop Volunteer during the LastMileS Workshop at the COMSNETS 2022 conference held in Bangalore. The work involved helping the Co-Chairs in smooth conduct of the workshop and coordinating the talks and paper presentations.

- **Department of Computer Science and Engineering** Delhi, India
  USICT, GGSIPU *2018-2020*
  Chairperson
  Worked as Chairperson of USICT ACM Student Chapter. The work involved organizing various technical events in the university, which involved organizing talks, competitions, and activities related to tech.

Publications

1. **Sapna Chaudhary**, Katikeya Sehgal, Sandip Chakraborty, and Mukulika Maity. "Learning to Switch: Adaptive Transport Protocols for High-Performance Video Streaming." IEEE/ACM Transactions on Networking. **Under Review**

2. **Sapna Chaudhary**, Sandip Chakraborty, and Mukulika Maity. "Intel-Switch: Optimized Adaptive Protocol Selection Mechanism for Video Streaming Application." 2025 17th International Conference on COMmunication Systems and NETworks (**COMSNETS 2025**), Graduate Forum. **Published**

3. **Sapna Chaudhary**, Naval Kumar Shukla, Prince Sachdeva, Sandip Chakraborty, and Mukulika Maity. "Managing Connections by QUIC-TCP Racing: A First Look of Streaming Media Performance Over Popular HTTP/3 Browsers." IEEE Transactions on Network and Service Management (**TNSM 2024**). **Published**

4. **Sapna Chaudhary**, Mukulika Maity, Sandip Chakraborty, and Naval Kumar Shukla. "A Dataset for Analyzing Streaming Media Performance over HTTP/3 Browsers." Advances in Neural Information Processing Systems 36 (**NeurIPS 2023**). **Published**

5. **Sapna Chaudhary**, Sandip Chakraborty and Mukulika Maity. "A Measurement Study of TCP and QUIC Through the Lens of YouTube Video Streaming", Graduate Forum Paper in Proceedings of International Conference on COMmunication Systems & NETworkS (COMSNETS'22) held in Bangalore, India. **Accepted**

6. **Sapna Chaudhary**, Rahul Johari, *"ORuML: Optimized Routing in Wireless Network using Machine Learning"* published in International Journal of Communication Systems 2020,Wiley (SCI). **Published**

7. Shubhi Bansal, Rahul Johari, **Sapna Chaudhary**, Prachi Garg, Riya Bhatia, Kalpana Gupta *"e-PRAN: Enhanced prophet routing algorithm in delay tolerant networks"* published in Journal of Information and Optimization Sciences, 2020. **Published**

8. Johari, Rahul, Nitesh Kumar Gaurav, **Sapna Chaudhary**, and Apala Pramanik. *"START: Smart Stick based on TLC Algorithm in IoT Network for Visually Challenged Persons."* published in 2020 Fourth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC), IEEE. **Published**

Skills

- **Programming Languages:** Python, C++
- **Libraries/Software Packages**: numpy, pandas, sklearn, matplotlib

- **Systems and Platform Expertise**: Chromium browser source code, dash.js internals, Linux, Git, FFmpeg, ns3 (Familiar)

Awards & Medals

- Received Fellowship from Core Research Grant (CRG), DST/SERB during PhD.
- Received N2Women SIGCOMM 2025 travel grant to present my work and to attend SIGCOMM 2025 in Coimbra, Portugal.
- Microsoft student travel grant to attend and present our paper at the NeurIPS 2023 conference held physically in New Orleans, USA.
- SIGCOMM student travel grant to attend TMA PhD School and TMA Conference 2023 held physically in Naples, Italy.
- Full travel grant to attend COMSNETS 2023 physically held in Bangalore, India.
- Received travel grant at IMC 2022.
- Received travel grant at Mobisys 2021, and actively participated in the conference.
- Received travel grant at MMSys 2021, and actively participated in the conference.
- Awarded with AICTE GATE scholarship of Rs. 12400 every month from 2018-2020.
- GATE qualified in year 2019, 2018 and 2017.
- Silver Medal, M.Tech in Guru Gobind Singh Indraprastha University (2020).

Academic Service

- Member of Technical Program Committee of ToN 2025
- Member of Technical Program Committee of CoNEXT 2025
- Member of Technical Program Committee of COMSNETS 2025
- Member of Review Committee of NeurIPS 2024
- Member of Review Committee of ICMI 2024
- Chairperson of USICT GGSIPU ACM Student Chapter from 2018-2020.

References

- Dr. Mukulika Maity
  Assistant Professor, Department of Computer Science & Engineering
  IIT Madras
  Chennai, Tamil Nadu, India
  Email: `mukulika@iiitd.ac.in`
- Dr. Sandip Chakraborty
  Associate Professor, Department of Computer Science & Engineering
  IIT Kharagpur
  Kharagpur, India
  Email: `sandipchkraborty@gmail.com`

- Dr. Rahul Johari
  Associate Professor, Department of Computer Science & Engineering
  Guru Gobind Singh Indraprastha University (GGSIPU)
  New Delhi, India
  Email: rahul@ipu.ac.in