# Shubham Chaudhary

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## Summary


PhD Scholar with experience and a keen interest in designing algorithms and creating testbeds for sustainable and efficient video analytics and edge computing, utilizing applied machine learning.


## Education

- **Indraprastha Institute of Information Technology Delhi** — New Delhi, India
  *Ph.D (Computer Science & Engg.)* — *Jan 2021 - Present*
  - Advisor: Arani Bhattacharya
  - Research Topic: Edge Computing-based Traffic Surveillance
  - Current CGPA: 8.65/10
- **Kamla Nehru Institute of Technology Sultanpur** — Uttar Pradesh, India
  *Bachelor of Technology (Electrical Engineering)* — *2017 - 2020*
  - Project: Fog Vision System for Automobiles
  - First Division with Hons
  - Percentage: 80.13
- **Government Polytechnic Basti** — Uttar Pradesh, India
  *Diploma in Electrical Engineering* — *2014 - 2017*
  - Silver Medalist in EE Department
  - First Division with Hons
  - Percentage: 80.64

## Publications & Patents

1. **Shubham Chaudhary**, Saket Anand, Aruna Balasubramanian, Arani Bhattacharya. "Pipette: Adaptive Selection of Relevant Samples for Continual Learning in Autonomous Vehicles", In Proceedings of the 17th ACM Multimedia Systems Conference (MMSys'26) to be held in Hong Kong SAR. **Submitted**
2. **Shubham Chaudhary**, Navneet Mishra, Keshav Gambhir, Tanmay Rajore, Arani Bhattacharya, Mukulika Maity. "COMPACT: Content-aware Multipath Live Video Streaming for Online Classes using Video Tiles", In Proceedings of the 16th ACM Multimedia Systems Conference (MMSys'25) held in Stellenbosch, South Africa. **Published**
3. **Shubham Chaudhary**, Arani Bhattacharya, Saket Anand, Aruna Balasubramanian. "Scalable and Sustainable Video Analytics on Edge using Sensor Clustering", In Proceedings of the 15th ACM Wireless of the Students, by the Students, and for the Students Workshop (S3) in conjunction with the 30th Annual International Conference on Mobile Computing and Networking (MobiCom'24) held in Washington D.C., D.C., USA. **Published**
4. **Shubham Chaudhary**, Arani Bhattacharya. "Network Architecture Search for Sustainable Traffic Surveillance", Poster in Doctoral Consortium at the 7th ACM SIGCAS/SIGCHI Conference on Computing and Sustainable Societies (COMPASS'24) held in Delhi, India. **Accepted**
5. **Shubham Chaudhary**, Aryan Taneja, Anjali Singh, Purbasha Roy, Sohum Sikdar, Mukulika Maity, Arani Bhattacharya. "TileClipper: Lightweight Selection of Regions of Interest from Videos for Traffic Surveillance", In Proceedings of the 2024 USENIX Annual Technical Conference (ATC'24) held in Santa Clara, California, USA. **Published**

6. Keshav Gambhir, Tanmay Rajore, **Shubham Chaudhary**, Taral Jain, Avishi Gupta, Mukulika Maity, Arani Bhattacharya. "NATIVE: Network Aggregation based Tiled Live Video Streaming", Demo Paper in Proceedings of International Conference on COMmunication Systems & NETworkS (COMSNETS'23) held in Bangalore, India. **Published**
7. **Shubham Chaudhary**, Aryan Taneja, Anjali Singh, Mukulika Maity, Arani Bhattacharya. "VISTA: Fast and Efficient Traffic Surveillance by Tile Sampling", In Proceedings of the Workshop on Last-mile Challenges and Standardization Opportunities in Smart Infrastructure (LastMileS) in conjunction with International Conference on COMmunication Systems & NETworkS (COMSNETS'22) held in Bangalore, India. **Accepted**

**Patents**

1. **Shubham Chaudhary**, Aryan Taneja, Anjali Singh, Arani Bhattacharya, Mukulika Maity. "Method And System Facilitating Data Optimization In A Data Transmission Process".
Indian Patent Application Number: 202211028440. **Published**

## Skills

- **Programming Languages:** Python, C/C++ (familiar), Java/Android, MATLAB
- **Libraries/Software Packages**: numpy, pandas, sklearn, AutoDistill, PyTorch, OpenCV, folium
- **Other Softwares/Tools**: Linux, Git, FFmpeg, GPAC, Kvazaar, ns3, gem5 (familiar)
- **IoT Devices**: RPi, Jetson Nano, Jetson Xavier NX, Jetson AGX Xavier, Odroid H3+, Arduino, LiDAR.

## Awards & Medals

- Best Talk Award at RIISE 25, IIIT Delhi, for the work on continual learning for autonomous vehicles.
- SIGCOMM student travel grant to attend SIGCOMM 2025, physically held in Coimbra, Portugal.
- Travel support from ACM India to attend and present a poster at Academic Research and Careers for Students (ARCS) 2025.
- TiH-iHub Anubhuti's CHANAKYA Doctoral Fellowship to pursue my research during my PhD on the topic of traffic surveillance. (July 2024 - May 2025)
- Best Teaching Assistant Award for the course Wireless Networks (2024)
- Microsoft student travel grant to attend and present our paper at the USENIX ATC 2024 conference held physically in Santa Clara, California, USA.
- Overseas Research Fellowship from IIIT Delhi for my research visit at Stony Brook University, Stony Brook, NY, USA. Support of $12K for 6 months. (2024)
- 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.
- Best Paper Award at LastMiLeS workshop, COMSNETS 2022, for the preliminary paper, "VISTA: Fast and Efficient Traffic Surveillance by Tile Sampling".
- Travel grant to attend COMSNETS 2022.
- Silver Medal, Diploma in Electrical Engg., Govt. Polytechnic Basti, U.P., India (2017)

## Projects

- **Scalable and Sustainable Video Analytics on Edge using Sensor Clustering**
  *Research Project*

  The proliferation of video analytics in applications such as autonomous driving and traffic surveillance requires on-premise (or edge) execution of deep learning models to meet latency requirements and reduce bandwidth usage. A cheaper model is typically deployed due to power and compute constraints. However, these shallower models are prone to accuracy drift. In this project, we propose to intelligently assign individual models to each camera/vehicle by clustering those with similar visual scenes, thereby reducing the number of allocated models. To circumvent data drift, we retrain the model assigned to the cluster that exhibits accuracy deviation. *Short*

  *Paper Link* : `https://dl.acm.org/doi/10.1145/3636534.3695902`

- **Content-aware Multipath Live Video Streaming for Online Classes using Video Tiles**
  *Research Project*

  The growing popularity of live online classes, even in remote areas, underscores the need for a high-quality experience to enhance learning. However, current wireless technology is unable to meet the bandwidth and latency requirements. Using multiple interfaces available on devices opens up the possibility of mitigating the problem. Therefore, we designed COMPACT, a system that aggregates the cellular network connectivity of multiple devices in the vicinity trusted by the user. We utilized tiled video encoding, where different spatial portions of a frame are sent through different network paths based on their priority. The full version of the work is accepted at the ACM Conference on Multimedia Systems (MMSys) 2025, and a demo paper at COMSNETS'23.

  *Project Repo* : `https://github.com/shubhamchdhary/COMPACT`

- **TileClipper: Lightweight Selection of Regions of Interest from Videos for Traffic Surveillance**
  *Research Project*

  The increasing focus on traffic safety necessitates improved traffic monitoring and control. The most commonly proposed solution is to extensively deploy cameras to monitor traffic and send the video to servers in data centers for detailed processing by running deep neural networks. To curb high data ingestion, this project developed a system that utilizes tile sampling, where a limited number of rectangular regions within the frames are sent to the server. Furthermore, we designed an algorithm that uses tile bitrate to select relevant tiles adaptively. This work is published at the USENIX Annual Technical Conference 2024 and received all three possible badges for availability, functionality, and reproducibility.

  *Project Repo* : `https://github.com/shubhamchdhary/TileClipper`

- **Fog Vision System for Automobiles**
  *Undergraduate Project*

  The project aimed to develop a system capable of providing a view of forthcoming objects to automobile drivers in foggy or hazy weather conditions, as well as at night. The developed system utilizes a LIDAR sensor, which emits infrared light to penetrate fog, and a Raspberry Pi as its primary computing unit.

  *Project Link* : `https://github.com/shubhamchdhary/Fog_Vision_System`

## Professional Experience

- **Department of Computer Science** Stony Brook, NY, USA
  **Stony Brook University** *July 2024 to Dec 2024*
  *Visiting Research Scholar*
  Worked with Dr. Aruna Balasubramanian on the problem of running deep learning models on edge devices, specifically focusing on the Computer Vision models as they pertain to autonomous driving.

- **Department of Computer Science & Engg.** New Delhi, India
  **Indraprastha Institute of Information Technology Delhi** *Jan 2021 to Dec 2023*
  - *Teaching Assistant (Aug 2023 to Dec 2023)*
    Worked as Teaching Assistant for the course Wireless Networks. The work involves grading answer sheets, providing tutorials, and remedial lessons to students.

- *Teaching Assistant (Jan 2023 to May 2023)*
  Worked as Teaching Assistant for the course Wireless Networks. The work involves grading answer sheets, providing tutorials, and remedial lessons to students.
- *Teaching Assistant (Aug 2022 to Dec 2022)*
  Worked as Teaching Assistant for the course Computer Networks. The work involved grading answer sheets, providing tutorials, and remedial lessons to students.
- *Teaching Assistant (Sept 2021 to Jan 2022)*
  Worked as Teaching Assistant for the course Operating Systems. The work involved evaluating and grading answer sheets.
- *Teaching Assistant (Jan 2021 to May 2021)*
  Worked as Teaching Assistant for the course Digital Circuits. The work involved grading answer sheets, 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 Electrical Engg.** Basti, Uttar Pradesh, India
  **Government Polytechnic Basti** *2017*
  *Media Representative*
  Worked as College Media Representative during the Zonal Games at the college. The work involved coordinating with news media and the press, and providing them with information/results from various sports.

## Talks/Tutorials/Exhibitions

- Conference Paper Presentations: ACM MMSys'25, ACM S3@MobiCom'24, USENIX ATC'24
- Project Exhibitor Representative of IIIT Delhi
  - India Mobile Congress 2025
  - India Mobile Congress 2023
- Hands-on Session: How to Leverage Multipath?
  - ACM Winter School 2023, IIIT Delhi, New Delhi, India Dec 2023
- Hands-on Session: Simulation and Performance Analysis of MIMO Systems using Python
  - 5G Workshop 2023, IIIT Delhi, New Delhi, India July 2023

## Academic Service

- Member of Artifact Evaluation Program Committee of NSDI 2026
- Member of Artifact Evaluation Program Committee of CoNEXT 2025
- Member of Shadow Technical Program Committee IMC 2025
- Member of Artifact Evaluation Program Committee of SIGCOMM 2024

## References

- Dr. Arani Bhattacharya
  Assistant Professor, Department of Computer Science & Engineering
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  New Delhi, India
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- Dr. Mukulika Maity
  Associate Professor, Department of Computer Science & Engineering
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