

Siddhant Ray

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<https://github.com/Siddhant-Ray> (GitHub)

Education

2020 – 2022 **ETH Zürich**, *MSc in Electrical Engineering and Information Technology*, Switzerland

2016 – 2020 **VIT Vellore**, *B.Tech in Electronics and Communication Engineering*, India

2014 – 2016 **DPS Gurgaon**, *High School Certificate (CBSE)*, India

Professional Experience

Sep 2022 – **Cloud Networks Researcher**, *Advanced Network Architectures Lab, UPC Barcelona*, Barcelona, Spain
Mar 2023

- Analysed reinforcement learning based resource sharing, offloading and allocation for cloud-edge computing systems.
- Developed an approximation for an Mixed-Integer Optimal Matching Algorithm for resource allocation to significantly reduce execution time while achieving similar performance levels.

Oct 2021 – **Graduate Research Assistant**, *Law, Economics, and Data Science Group, ETH Zurich*, Zürich, Switzerland
Sep 2022

- Research Assistant to Professor Dr. Elliott Ash and worked on improving semantic labelling for text corpora using newer NLP models, sentence simplification and clustering for topic modelling.
- Worked on a paraphrase mining project to determine clusters of similar narratives in legal corpora and also using NLP models to capture underlying narratives in meat policy documents and analyse societal impacts and political discourse.

May 2019 – **Software Development Intern**, *Capgemini Engineering*, Gurgaon, India

- July 2019
- Developed a K-Shortest Path Searching algorithm for the ONOS platform in a Java environment, automated and deployed using Maven.
 - The algorithm was subject to dynamic constraints in terms of network resources such as required edges and vertices etc. and was used for path calculation for deployment in Software Defined Layer 2 VPNs.

May 2018 – **Software Development Intern**, *BlueStacks*, Gurgaon, India

- July 2018
- Worked on a machine learning algorithm to predict the App Engine's appropriate display screen based on the customer's past experiences.
 - Developed an automation script for generating SVG cards for the App Engine's game front end and also worked on an address verification tool using the EasyPost API.

Research Experience

Feb 2022 – **Advancing Packet-Level Traffic Predictions with Transformers**, *Master Thesis at the Networked Systems Group*, ETH Zurich
Aug 2022

- Transformer based neural network learn network dynamics and make smarter packet-level decisions.
- Used both packet and network state features to capture the underlying patterns in network traffic with a task-agnostic pre-training phase.
- Followed by task-specific fine-tuning phases to leverage this learnt behaviour, make quicker updates and make better forwarding decisions.

Mar 2021 – **Towards a New Framework for Integration of Network Planes**, *Research Project at the Networked Systems Group*, ETH Zurich
Jun 2021

- Prototype for a new programmable forwarding node (a Super-Node) for dynamic control over forwarding in Layer-3 networks.
- Super-Node retains a traditional L3 router's control plane (CP) and combines a P4 programmable data plane (DP) for forwarding packets.
- Accelerated forwarding and network convergence by leveraging the newly combined CP and DP.

- Feb 2021 – **Attentive Neural Networks for News Classification**, *Research Project at the Chair for Mathematical Information Science*, ETH Zurich
- Transformer based neural network to classify a multi-class hierarchical, context-overlapping news dataset.
 - Created a new statistical algorithm to detect context overlap in dataset classes, used it to reduce class label redundancy.
 - We demonstrated improvements of the classification model based on the algorithm's reduction.
- Dec 2019 – **Machine Learning based Cell Association for 5G Communication Networks**, *Bachelor Thesis at the Networking Lab*, VIT Vellore
- New cell association scheme to meet the ultra low latency, higher load and traffic needs of the 5G networks.
 - Hidden Markov Model based learning algorithm followed by a Viterbi based decoding scheme, on the network's telemetry data, to learn network parameters and select the optimal eNodeB for cell association.

Publications

- 2022 Alexander Dietmüller, **Siddhant Ray**, Romain Jacob, and Laurent Vanbever. A new hope for network model generalization. In *Proceedings of the 21st ACM Workshop on Hot Topics in Networks*, 2022.
- 2020 **Siddhant Ray** and Budhaditya Bhattacharyya. Machine learning based cell association for mmTTC 5g communication networks. *International Journal of Mobile Network Design and Innovation*, 10(1):10–16, 2020.

Skills

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| Programming | Python, C++, Java, Bash, Rust, SQL, C, TeX |
| Software | Linux, Git, Docker, P4 switches, ONOS, Google Cloud, AWS, Maven, MATLAB, NetSim, Cadence |
| Frameworks | Mininet, FRRouting, PyTorch, TensorFlow, Sklearn, NLTK, Flask, SciPy, Scapy, Spacy, BS4, NS3 |
| Languages | English (C2), Hindi, Bengali, Deutsch (B1) |

Course Projects

- 2021 Investigating Possible Inductive Biases in Local Sparse Attention ViT Architectures Against Traditional CNNs - [code, paper]
- 2021 Automatic Certificate Management Environment - [code]
- 2020 Maximizing Cross Traffic Flows in a L2/L3 Network with Programmable Switches - [code, poster]

Relevant Courses

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| Graduate | Advanced Computer Networks, System Security, Network Security, Distributed Computing, Discrete Event Systems, Networks Seminar, Introductory Machine Learning, Deep Learning, Learning and Classification Theory, Mathematics of Data Science, Neural Network Theory |
| Undergraduate | Computer Networks, Operating Systems, Wireless Communication, Linear Algebra |

Honors and Awards

- 2022 **Winner at Datathon**, *Microsoft Challenge*, ETH Zurich
- 2020 **Best Outgoing Student**, *SENSE department*, VIT Vellore
- 2019 **Runner-Up at VIT Hack**, *Education Track*, VIT Vellore
- 2016 –2019 **Merit Scholarship for Academic Excellence**, VIT Vellore

Leadership and Volunteering

- 2019 – 2020 **Technical Advisor**, IETE VIT
- 2018 – 2019 **Organizer**, TEDx VIT Vellore
- 2018 – 2019 **President**, Anokha NGO
- 2017 – 2020 **Outreach Worker**, Anokha NGO