SUBHRENDU CHATTOPADHYAY

A Contact Information

- **Present Address:**
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- **GitHub:** `https://github.com/subhrendu1987`

B Research Objective

My research interests include Software Defined Networking (SDN), Network Function Virtualization (NFV), Fog Computing, Next Generation Networks and Performance Modeling of Network and Communication System. During my PhD, I have worked on the scalability issues that arise during deployment of SDN to provide network management to the large scale networks consisting of Internet of things (IoT) devices. I have developed multiple "orchestration" frameworks that automate the deployment challenges and provide fault and partition tolerance to the system. I am particularly interested in developing a management-free and future-proof network architecture.

Currently, at IDRBT I am part of 5G Use-Case Lab for BFSi where we are trying to identify and develop India-specific use cases of 5G in Banking and Financial Services industries (BFSi). Additionally, I am also trying to set-up Network Innovation Lab (NIL) which will be dedicated to design, development, and management of different types of network architectures in order to achieve an evolutionary network design and a prototype infrastructure to test the behaviour of newly developed financial applications. In both labs we are investigating the research problems and challenges related to network and operating systems.

My approach is to identify a systems problem, reduce it to its core by stripping away unnecessary details, and look for clean conceptual solutions. Such an approach often clarifies the issue and shows possible connections to other areas where we can borrow ideas and develop innovative solutions.

C Academic Qualification

- **Post Graduation:** Doctor of Philosophy in Computer Science and Engineering from Indian Institute of Technology, Guwahati (July,2014 - April,2021)
- **Post Graduation:** Master of Technology in Computer Science and Engineering with **CGPA: 8.81/10** from Indian Institute of Technology, Guwahati (June,2012 - July,2014)
- **Graduation:**Bachelor of Technology in Computer Science and Engineering with **CGPA: 8.04/10** from B.P Poddar Institute of Management and Technology, WestBengal University of Technology (July,2006 - June,2010)
- **Higher Secondary (10+2):** with **77.5%** from Beldanga C.R.G.S High School, under West Bengal Council of Higher Secondary Examination (May,2006)
- **Secondary (10):** Madhyamik with **81.5%** from Sargachhi Ramakarishna Mission High School, under West Bengal Board of Secondary Education (April,2003)

D Professional Experience

- **Assistant Professor:** Institute for Development and Research in Banking Technology (IDRBT), Hyderabad(April,2022 - Till date)
- **Assistant Professor:** Department of CSE in SRM-University, AP(June 2021 - April 2022)

- **Temporary Project Staff:** Department of Computer Science and Engineering in Indian Institute of Technology, Kharagpur (October,2020 - March,2021)
  Project Name: Development of Algorithms and Tools for Log Analytics and Vulnerability Assessment
  Principal Investigator: Dr. Sandip Chakraborty
- **Automation Test Engineer:** Programmer Analyst Trainee in Cognizant Technology Solution India Pvt. Ltd. (July,2010 - July,2011)

E Thesis

Subhrendu Chattopadhyay,*SDN for Large Scale IoT Networks*, PhD thesis, Supervised by Prof. Sukumar Nandi, Indian Institute of Technology Guwahati, `http://gyan.iitg.ernet.in/handle/123456789/1854`, 2021.

F Awards

1. **Fellowship:** Recipient of TCS Research scholarship (Cycle 10) and Fellowship from MHRD
2. **Travel Grants:**
   (a) Received conference travel grant from IEEE COMSNETS and LRN foundation.
   (b) Recipient of travel grant from Mirosoft India, Research and Development
3. **Best paper awards:**
   (a) IEEE INFOCOM 2019 [5] (in a session)
   (b) IEEE COMSNETS 2016 [11]
   (c) IEEE ANTS 2013 [17]

G Subjects Taught

1. **Advanced Operating Systems (PG: Th+Lab)** in IDRBT, UoH Campus
2. **Internet Technology (PGDBT: Th+Lab)** in IDRBT
3. **Computer Networking (UG: Th+Lab)** in SRM-University, AP
4. **Objected Oriented Programming with C++ (UG: Th+Lab)** in SRM-University, AP
5. **Operating Systems (UG: Th+Lab)** in SRM-University, AP

H Projects

1. **5G Usecase Lab for BFSi:** Funded by DoT and DFS (GoI), PI: Prof. V.N. Sastry, Co-PI: Subhrendu Chattopadhyay, Abhishek Thakur, INR. 1.05 Cr.
2. **Comprehensive IT Infrastructure Review:** A Public sector Bank, Co-PI: Subhrendu Chattopadhyay, Radha V, N.P. Dhavale, Dipanjan Roy, INR. 28,500,00
3. **Consultancy on SIEM Solutions:** A Private sector Bank, Co-PI: Subhrendu Chattopadhyay, Dipanjan Roy, INR. 3,00,000 (On-going)

I Voluntary Services

1. Conference Reviewer: IEEE ANTS (2014 - 2018), IEEE ICC 2017, IEEE NCC 2017, IEEE ISED 2017, IEEE COMSNETS (2018-2019), COMSYS 2023
2. Journal Reviewer: Springer Journal of Network and Systems Management
3. Member of Technical Program Committee: IEEE COMSNETS (2020-2024), CSI 2022, NCC 2021, 2022, ICDCN 2023

J Collaborations

I had the opportunity to collaborate with the following distinguished researchers.

1. Dr. Sandip Chakraborty, Associate Professor, IIT Kharagpur [On-going]
2. Prof. Soumya K Ghosh, Professor, IIT Kharagpur
3. Prof. Sushanta Karmakar, Professor, IIT Guwahati
4. Dr. Samar Shailendra, Adjunct Faculty, IIIT Bangalore
5. Dr. Abhinandan S. Prasad, Associate Professor, NIE Mysore
6. Dr. Niladri Sett, Assistant Professor, SRM University AP
7. Dr. Soumyajit Chatterjee, Research Scientist, Nokia Bell Labs Cambridge

K Reference Persons

1. Prof. Sukumar Nandi, Senior Professor
   Department of CSE, IIT Guwahati, Assam, India-781039, sukumar@iitg.ac.in, (+91 361 258 2357)
2. Dr. Sandip Chakraborty, Associate Professor
   Department of CSE, IIT Kharagpur, West Bengal, India-721302, sandipc@cse.iitkgp.ac.in, (+91 322 228 2898)
3. Prof. V. N. Sastry, Professor
   IDRBT, Masab Tank, Hyderabad, Telengana, India-500057, vnsastry@idrbt.ac.in, (+91 40 2329 4304)
4. Prof. Soumya Kanti Ghosh, Professor
   Department of CSE, IIT Kharagpur, West Bengal, India-721302, skg@cse.iitkgp.ac.in, (+91 322 228 2332)

List of Publications

[1] Utkalika Satapathy, Rishabh Thakur, Subhrendu Chattopadhyay, and Sandip Chakraborty. Disprotrack: Distributed provenance tracking over serverless applications. In *Forty First IEEE International Conference on Computer Communications (INFOCOM)*, volume 41, NewYork, US, 4-6 May 2023.

[2] Shubha Brata Nath, Subhrendu Chattopadhyay, Raja Karmakar, Sourav Kanti Addya, Sandip Chakraborty, and Soumya K. Ghosh. Containerized deployment of micro-services in fog devices: A reinforcement learning-based approach. *The Journal of Supercomputing (JSUP), Springer*, 78(5):6817–6845, 2022.

[3] Subhrendu Chattopadhyay, Soumyajit Chatterjee, Sukumar Nandi, and Sandip Chakraborty. Aloe: Fault-tolerant network management and orchestration framework for IoT applications. *IEEE Transactions on Network and Service Management*, 17(4):2396–2409, 2020.

[4] Subhrendu Chattopadhyay, Sukumar Nandi, Sandip Chakraborty, and Abhinandan Prasad. Amalgam: Distributed network control with scalable service chaining. In *Nineteenth IFIP Networking Conference (IFIP Networking)*, volume 19, pages 519–523, Paris, FR, 22-25 June 2020.

[5] Subhrendu Chattopadhyay, Soumyajit Chatterjee, Sukumar Nandi, and Sandip Chakraborty. Aloe: An elastic auto-scaled and self-stabilized orchestration framework for IoT applications. In *Thirty Eighth IEEE International Conference on Computer Communications (INFOCOM)*, volume 38, Paris, FR, 29 April - 2 May 2019.

[6] Shubha Brata Nath, Subhrendu Chattopadhyay, Raja Karmakar, Sourav Kanti Addya, Sandip Chakraborty, and Soumya K. Ghosh. PTC: Pick-test-choose to place containerized micro-services in IoT. In *2019 IEEE Global Communications Conference (GLOBECOM)*, pages 1–6, Waikoloa, US, 9-13 December 2019.

[7] Subhrendu Chattopadhyay, Samar Shailendra, Sukumar Nandi, and Sandip Chakraborty. Improving MPTCP performance by enabling sub-flow selection over a SDN supported network. In *Fourteenth International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob)*, volume 14, Limmasol, CY, 15-17 October 2018.

[8] Subhrendu Chattopadhyay, Sukumar Nandi, Samar Shailendra, and Sandip Chakraborty. Poster: Primary path effect in multi-path TCP: How serious is it for deployment consideration?, 10-14 July 2017.

[9] Subhrendu Chattopadhyay, Niladri Sett, Sukumar Nandi, and Sandip Chakraborty. Flipper: Fault-tolerant distributed network management and control. In *Fifteenth IFIP/IEEE International Symposium on Integrated Network Management (IM)*, volume 15, Lisbon, PT, 8-12 May 2017.

[10] Pranav Kumar Singh, Subhrendu Chattopadhyay, Pradeepkumar Gajendra Bhale, and Sukumar Nandi. Fast and secure handoffs for v2i communication in smart city wi-fi deployement. In *Fourteenth International Conference on Distributed Computing and Internet Technology (ICDCIT)*, volume 14, Bhubaneswar, IN, 13-16 January 2017.

[11] Sandip Chakraborty and Subhrendu Chattopadhyay. ES2: Managing link level parameters for elevating data rate and stability in high throughput wlan. In *Eighth International Conference on COMmunication System & NETworks (COMSNET 2016)*, volume 8, Bangalore, IN, 5-9 January 2016.

[12] Sandip Chakraborty, Sukumar Nandi, and Subhrendu Chattopadhyay. Alleviating hidden and exposed nodes in high-throughput wireless mesh networks. *IEEE Transactions on Wireless communications*, 15(2):928–937, 2016.

[13] Subhrendu Chattopadhyay, Sandip Chakraborty, and Sukumar Nandi. Leveraging the trade-off between spatial reuse and channel contention in wireless mesh networks. In *Eighth International Conference on COMmunication System & NETworks (COMSNET 2016)*, volume 8, Bangalore, IN, 5-9 January 2016.

[14] Niladri Sett, Subhrendu Chattopadhyay, Sanasam Ranbir Singh, and Sukumar Nandi. A time aware method for predicting dull nodes and links in evolving networks for data cleaning. In *Fourteenth IEEE/WIC/ACM International Conference on Web Intelligence (WI)*, volume 14, pages 304–310, Omaha, US, 13-16 October 2016.

[15] Sushanta Karmakar and Subhrendu Chattopadhyay. A trigger counting mechanism for ring topology. In *Thirty Seventh Australasian Computer Science Conference-Volume (ACSC 2014)*, volume 37, pages 81–87, Auckland, NZ, jan 2014.

[16] Sandip Chakraborty, Subhrendu Chattopadhyay, Suchetana Chakraborty, and Sukumar Nandi. Defending concealedness in IEEE 802.11n. In *Sixth IEEE International Conference on COMmunication System & NETworks (COMSNET 2014)*, volume 6, pages 1–8, Bangalore, IN, 7-10 January 2014.

[17] Sandip Chakraborty, Sukumar Nandi, and Subhrendu Chattopadhyay. Surpassing flow fairness in a mesh network: How to ensure equity among end users? In *Seventh IEEE International Conference on Advanced Networks and Telecommunication Systems (ANTS 2013)*, volume 7, Chennai, IN, 15-18 December 2013.