Pramit Biswas, *PhD*

pramitbiswas@live.com | +91 73014 71017 | linkedin.com/in/pramitbiswas | Bangalore, India

EXPERIENCE

Saankhya Labs (Tejas Networks)   Bangalore, KA, India
Lead Engineer   *Apr 2024-Present*
- Building compiler for portable physical layer software using MLIR framework.

Senior Member Technical Staff   *Jul 2021-Mar 2024*
- Working towards building **energy-efficient rApp** (runs on non-real time RAN intelligent controller). This includes creating a **digital twin** of the wireless telecom network, developing *AI/ML algorithms* etc.
- Guiding towards building framework for *portable* and *scalable* physical layer (physical layer operations as microservices) including domain specific language (DSL).
- Hands-on guidance to team for **cross**-platform **compilation** of CU, DU codebase.
- Containerised various **Network Functions**.
- Worked towards bringing **execution and pipeline parallelism** for the L1 process chain of Eurecom OpenAirInterface5g (OAI).
- Made VNF/PNF (**FAPI**) work in OAI (NR).
- Developed graph **scheduling algorithms** (C++) to allocate heterogeneous processing resources for Intel **FlexRAN** (C). Developed auxiliary tools (Python) as required to support debugging and visual representation. **Refactored** existing **codebase** to support the plugging of various algorithms.
- Created (proof-of-concept) end-to-end framework for provisioning DU in the cloud. Implemented communication using **gRPC** (C/C++/Python).
- Created and maintained **docker image**, and GitLab **CI pipeline**.
- Part of ORAN WG1, WG6 from Saankhya to contribute towards future RAN.

PROGRAMMING SKILLS

Kubernetes, Docker (telco-cloud, O-RAN); **C**, **C++** and **Assembly** (used in embedded projects and at Saankhya Labs); **Python** (used to develop reinforcement learning algorithm in PhD, frequently use for website scraping, scripting, data-analysis and personal finance); **CPLEX** (daily driver in PhD for research); **Google OR-tools** (at Saankhya Labs); **MatLab** (daily driver in M.Tech and PhD for research); **Simulink** (used for hobby projects and M.Tech research); **Latex** (use for medium to large document preparation); **HTML**, **CSS** and **JS** (used for hobby projects and www.iitp.ac.in/ieeesb website)

EDUCATION

- **Indian Institute of Technology Patna** | 2021
  PhD in Electrical Engineering
  Visiting scholar at GSSST, **Indian Institute of Technology Kharagpur**
  Thesis Title: Energy-efficient IP-over-Elastic Optical Network Planning and Operation Strategies.
  Supervisors: Dr. Sudhan Majhi (IISc Bangalore), Dr. Aneek Adhya (IIT Kharagpur)

- **Rajabazar Science College** | **University of Calcutta** | 2014
  M.Tech. in Electrical Engineering | CGPA: 8.4 (out of 10)
  Research Topic: Stochastic Optimization-based Parameter Estimation and Design of PID Controller for Twin Rotor MIMO System

- **Kalyani Government Engineering College** | **West Bengal University of Technology** | 2012
  B.Tech. in Electrical Engineering | DGPA: 8.06 (out of 10)
  Project Topic: Processor-based Temperature Controller

SCHOLARSHIPS

- **Visvesvaraya** PhD Fellowship, *MeitY, Govt. of India* (25% more fellowship amount than most of the other PhD Schemes)
- MHRD GATE

PARTICIPATION

Organized and participated in several seminars, workshops, technical and non-technical events. Volunteered as **Chair** at **IIT Patna IEEE Student Branch**.

AREAS OF INTEREST

Compiler | Optimization heuristics and programming formulation | Machine learning | Optical Backbone Network | 5G/B5G Wireless-Optical Network | IoT/UAV/Drone Networks | Network automation | micro-services | System automation | High-performance computing (HPC) | Quantum optimization.

CERTIFICATION

Fundamentals of Accelerated Computing with CUDA Python | 2021
Organization: *NVIDIA*

Data Science for Business - Level 1, 2 | 2020
Organization: *cognitiveclass.ai, IBM*

KPMG Lean Six Sigma Green Belt | 2016
Organization: *Henry Harvin Education*

Embedded System | 2011
Organization: *Moniba Compu Academy* with *IBM*

PUBLICATIONS

- **Patent Contribution**
  - Scheduling RAN Workloads in multi-core architectures, India, Patent Application No.: 202441028511, Saankhya Labs, Apr 08, 2024.
  - System for Implementing Physical Layer Operations as Microservices in A Mobile Network. US Non-Provisional Patent Application No.: 18/527,427. Dec 04, 2023.
  - Cloud Native Microservices Framework for RAN (Provisional Specification), India, Provisional Patent Application No.: 202241073080, Saankhya Labs, Dec 16, 2022.

- **Journal**
  - **Pramit Biswas**, Md Shahbaz Akhtar, Sriparna Saha, Sudhan Majhi, and Aneek Adhya, "Q-Learning Based Energy-Efficient Network Planning in IP-over-EON", *IEEE Transactions on Network and Service Management*, 2022, 10.1109/TNSM.2022.3197329.
  - **Pramit Biswas**, Satyajit Das, Debashree Guha and Aneek Adhya, "Wavelength-routed Optical Backbone Network Planning Under Fuzzy Environment", *Optical and Quantum Electronics*, Springer, 54 (2022), pp.1-17.
  - **Pramit Biswas**, and Aneek Adhya, "Energy-Efficient, EDFA Lifetime-Aware Network Planning along with Virtualized Elastic Regenerator Placement for IP-over-EON", *Photonic Network Communications*, Springer, 41 (2021), pp.119-135.
  - **Pramit Biswas**, and Aneek Adhya, "Energy-Efficient Network Planning and Traffic Provisioning in IP-over-Elastic Optical Networks", *Optik - International Journal for Light and Electron Optics*, Elsevier, 185 (2019), pp.1115-1133.
  - Md Shahbaz Akhtar, **Pramit Biswas**, and Aneek Adhya, "An ILP-Based CapEx and OpEx Efficient Multi-Stage TDM/TWDM PON Design Methodology", *Optical Fiber Technology*, Elsevier, 46 (2018), pp.205-214.

- **Conference**
  - Makarand Kulkarni, **Pramit Biswas**, Parag Naik, and Anindya Saha, "A Framework for Design of Portable and Scalable Physical Layer in O-RAN." IEEE International Conference on COMmunication Systems & NETworkS (COMSNETS), Jan. 2024, Accepted.
  - Md Shahbaz Akhtar, Jitendra Gupta, **Pramit Biswas**, Aneek Adhya, and Sudhan Majhi, "Heuristic-Based Cost-Efficient C-RAN Fronthaul Deployment Over TWDM-PON." IEEE International Conference on Recent Advances and Innovations in Engineering (ICRAIE), Dec. 2020, pp. 1-6, *Virtual*.
  - Md Shahbaz Akhtar, **Pramit Biswas**, Aneek Adhya, and Sudhan Majhi, "Cost-efficient Mobile Backhaul Network Design over TWDM-PON." IEEE International Conference on Advanced Networks and Telecommunications Systems (ANTS), Dec. 2020, pp. 1-6, *Virtual*.
  - **Pramit Biswas**, Aneek Adhya, Shabaz Akhtar, Jitendra Gupta, and Sudhan Majhi, "EDFA Active-sleep Transition Frequency and EDFA Occupancy Aware Dynamic Traffic Provisioning for Energy-

efficient IP-over-EON," IEEE International Conferences on Signal Processing and Communication Systems (ICSPCS), Dec. 2019, pp. 1–7, *Gold Coast, Australia*.

- **Pramit Biswas**, Suman Kr Dey, and Aneek Adhya, "Auxiliary graph-based energy-efficient dynamic connection grooming for elastic optical networks," IEEE Advanced Networks and Telecommunications Systems (ANTS), Nov. 2016, pp. 1–3, *IISC Bangalore, India*.

- **Pramit Biswas**, Roshni Maiti, Anirban Kolay, Kaushik Das Sharma, Gautam Sarkar, "PSO Based PID Controller Design for Twin Rotor MIMO System", IEEE Conference on Control, Instrumentation, Energy and Communication (CIEC), 2014, pp. 56-60, *Kolkata, India*.

- **Pramit Biswas**, Anirban Kolay, Roshni Maiti and Kaushik Das Sharma, "A Novel Path Planning Algorithm for Single Camera-Based Mobile Robot Navigation", Proceedings of Michael Faraday IET India Summit (MFIIS), Nov. 2013, CS-8, pp. 4.40, *Kolkata, India*.

LEISURE ACTIVITIES

Interested in the latest science and technology advancements | Financial market | Reading books | Sports: cricket, table tennis, swimming.