Peenal Gupta

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Education

M.Sc. Applied Data Science & Analytics, SRH University Heidelberg, Germany 2023–2025
Thesis (with BASF SE): AI-Driven Chemical Research: Benchmarking Large Language Models for Qualitative and Quantitative Analysis
- Developed benchmarking framework for chemical experiment extraction using LLMs and domain-specific metrics.

B.Tech. Computer Science & Engineering, Rajasthan Technical University, India 2008–2012

Research Experience

Data Analyst (Research Collaboration), BASF SE – Ludwigshafen, Germany Nov 2024 - Sept 2025
- Designed Python-based pipeline for extracting chemical experimental data using GPT-4/LLMs, LangChain, Azure Document Intelligence.
- Extended into Master's thesis; created benchmarking framework and novel evaluation metrics.

Research Intern, Jülich Supercomputing Centre – Jülich, Germany Aug 2024 - Sept 2024
- Benchmarked astrophysics N-body integrators (REBOUND, Genga) on pre-exascale systems (JURECA).
- Applied MPI, OpenMP, CUDA for HPC performance optimisation.

Research Associate, Hochschule Worms – Worms, Germany Dec 2023- Jun 2024
- Project: Intrusion Detection in Networks using Bayesian Deep RL + CNNs.
- Built anomaly detection models, real-time dashboards, and TimescaleDB-based monitoring.

Industry Experience

Product Delivery Lead, The Adecco Group – Lyon, France Jun–Dec 2022
- Owned the end-to-end product lifecycle and aligned roadmaps with business goals; ran backlog, release planning, and stakeholder reviews.
- Coordinated cross-functional squads and vendors; used Azure DevOps/GitLab/Confluence to drive delivery at pace.

Project Lead, M4D (Treegram) – Lyon, France Jan–Jun 2022
- Led a 5-dev team building a SaaS app for a construction client; set solution architecture and Agile workflows.
- Stood up Azure infrastructure; stack: .NET Core, C#, Angular, TypeScript; managed requirements → stories → sprints.

Technical Lead & Scrum Master, Infosys – Lyon, France Sep 2019–Jan 2022
- Transportation & logistics domain; led 10 devs + 4 QA; enforced code quality through reviews and standards.
-Facilitated full Scrum ceremonies and cross-team communication; maintained transparent delivery metrics.

Technology Analyst, Infosys – Pune, India May 2016–Aug 2019

- Full-stack microservices for new client apps; REST APIs with .NET Core, Angular 4/5, TypeScript; TDD with xUnit.
- Additional retail track: Sitecore-based sites for a global wholesale group.

Software Engineer, HCL Technologies – Noida, India Oct 2013–May 2016

- Built C#/WCF services for MSN browser markets; delivered a Windows mobile app (GSG) for marketer workflows.
- Web development across Microsoft programs (SharePoint/Sitecore); HTML/CSS/JS/jQuery.

Web developer, Micronic Infotech – Ajmer, India Jul 2012–Sep 2013

- End-to-end PHP website builds and deployments (PHP/HTML/CSS/JS).

Entrepreneurship & Innovation

Co-Founder, PinakashieldTech OÜ – Estonia 2023–present
- Founded a cybersecurity and AI company developing privacy-preserving Intrusion Detection & Mitigation Systems.
- Focus areas: Federated Learning, Generative AI, Post-Quantum Cryptography, and Blockchain-backed eIDAS 2.0 identity management.
- Leading research-driven product development for distributed cloud-edge-IoT environments, aligned with EU digital sovereignty and cybersecurity initiatives.

Publication

P. Gupta, et al. "Federated Learning-Driven Intrusion Detection for Cybersecurity in Smart Distribution Systems," *IEEE GLOBECOM Workshops*, 2024.
- Proposed federated transfer learning approach for smart grids, enabling privacy-preserving DDoS/MITM detection.

B.Sengupta, et al. "Introduction to Number Theoretic Transform" arXiv preprint 2025.
- The Number Theoretic Transform (NTT) as an FFT-like tool over finite fields, explaining cyclic vs. negacyclic convolution, roots-of-unity conditions, and fast NTT/INTT via Cooley–Tukey and Gentleman–Sande.

B.Sengupta, et al. "Revisit to the Bai-Galbraith signature scheme" arXiv preprint 2025.
- Dilithium is one of the NIST approved lattice-based signature schemes. In this short note we describe the Bai-Galbraith signature scheme proposed in BG14, which differs to Dilithium, due to the fact that there is no public key compression. This lattice-based signature scheme is based on Learning with Errors (LWE).

Selected Academic Projects

- **University Chatbot "AskHeidi"**: GPT-4 powered chatbot for student queries (Python, LangChain).
- **ETL Data Pipeline (Google Cloud)**: Automated ETL workflow with BigQuery & Looker, improving efficiency by 30%.
- **Data Visualisation Dashboard (Tableau)**: Designed for Oil & Gas industry dataset.
- **Web Scraping Framework**: Python + Selenium + BeautifulSoup for structured dataset extraction.

Technical Skills

Programming: Python, R, C#, TypeScript, SQL, JavaScript
ML/DL: PyTorch, TensorFlow, Scikit-learn, Federated Learning (Flower), Bayesian Optimisation
HPC: MPI, OpenMP, CUDA
Databases: Postgres, TimescaleDB, Couchbase, Elasticsearch
Cloud/DevOps: Azure, Google Cloud, Docker
Visualisation: Tableau, Looker, SAP tools

Certifications

- Introduction to Parallel Programming with MPI & OpenMP (Jülich Supercomputing Centre)
- Fundamentals of Deep Learning (NVIDIA)
- SAS Certified Specialist: Visual Business Analytics Using SAS Viya (2023–2028)
- Data Science International Summer School, Romania (2023)

Languages

English (C2), Hindi (Native), German (A2, learning), French (A2)