Atonu Ghosh

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Professional Summary

Final-semester Ph.D. candidate at IIT Kharagpur with 5+ years of experience in designing, prototyping, and deploying full-stack IoT and Edge-AI systems. Proven track record of leading projects from concept to production for clients like Tata Steel Downstream Products Limited. Innovator with 14 patents (3 granted, 1 commercialized) and 8 authored journal articles in secure, scalable IoT architectures, and LPWANs. Dedicated to forward R&D in IoT and edge-intelligence for reliable, human-centric systems.

Education

2021–Present: **Ph.D., Computer Science & Engineering**.
Indian Institute of Technology, Kharagpur, India
Supervisor: Prof. Sudip Misra
IoT, IIoT, Edge Computing, Edge Machine Learning (ML), Low Power Networks, Condition Monitoring, Digital Transformation

2020–2018: **Master of Technology, Computer Science & Engineering**.
Maulana Abul Kalam Azad University of Technology (formerly WBUT), Nadia, West Bengal, India
CGPA: 8.93/10

2014–2017: **Bachelor of Technology, Computer Science & Engineering**.
Institute of Engineering and Management (IEM), Salt Lake, Kolkata, India
CGPA: 7.71/10

Skills

Programming	Python, Micropython, C
Cloud & DevOps	AWS, Azure, Google Cloud, Docker, Kubernetes, Nginx, REST API, OpenStack
IoT & Hardware	Raspberry Pi, ESP32, ESP8266, Raspberry Pi Pico, 8051, LoRa Transceivers, Sensors, Actuators
Database	SQL, MySQL, PostgreSQL, MariaDB, InfluxDB, SQLite, Redis
ML/Edge	Edge ML Integration, YOLO
Tools	GitHub, Wireshark, Altium Designer, Fusion 360, Proteus, and Keil μVision, NodeRed

Professional & Research Experience

Oct 2020 – Present: **Ph.D. Research Scholar & System Architect**, Indian Institute of Technology, Kharagpur & SensorDrops Networks Pvt. Ltd..

- **Commercialized Edge-AI Intruder Detection System**
  Architected and led the development of a **commercialized** system. Deployed **YOLO** models on-device to analyze RTSP feeds from existing CCTV infrastructure, providing real-time, pet-immune alerts via SMS and calls.
- **EOT Crane Condition Monitoring at Tata Steel Downstream Products Ltd.**
  Led a team of 4 to deploy a **full-stack, production** system. Architected the system using Python, MQTT, **Docker**, PostgreSQL, Redis, and **Azure** to provide real-time analytics for EOT cranes.
- **Industrial IoT (IIoT) Legacy Hardware Retrofitting**

Led Proof-of-Concept (PoC) implementations at **Bokaro Steel Plant and Tata Steel**. Successfully integrated 4-20mA sensors and Siemens S7-1200 PLCs with modern IoT systems using LoRaWAN and Raspberry Pi.

- **LoRaConnect: HTTP-over-LoRa Application Proxy**
  Developed an application-layer proxy for HTTP-over-LoRa, implementing message chunking, reassembly, and FHSS to overcome LoRa payload limitations.

- **Production Server Management & DevOps (MeitY Project)**
  Managed and deployed production web services for a **Govt. of India (MeitY)** project. Containerized applications with **Docker**, managed **Nginx** reverse proxies, and built a full-stack Django dashboard.

- **Resilient IoT Data Infrastructure**
  Implemented **automated SQL (MariaDB) database replication** to ensure data integrity from remote IoT nodes with intermittent network connectivity.

Patents & Publications

Patents (Granted & Commercialized)

P3 **Atonu Ghosh,** Biswajit Ghosh, Ruelia Saha, Sudip Misra, and Arijit Roy, System for Real Time Intrusion Detection, Actuation and Alert and Method Thereof, *Indian Patent*, Number – 566326, May 16, 2025 **(Commercialized)**.

P2 Subhas Chandra Misra, Debanjan Das, Sudip Misra, Venkanna Udutalapally, **Atonu Ghosh,** and Tanushree Pan, Wireless Network Device for Wireless Communication with User Devices in a Wireless Communication Network, *Indian Patent*, Number – 539308, May 27, 2024.

P1 Subhas Chandra Misra, Debanjan Das, Venkanna Udutalapally, Sudip Misra, and **Atonu Ghosh**, Blockchain-Enabled IoT System and Method for Securing Real Time Data In a Microcontroller-Based Blockchain Network, *Indian Patent*, Number – 529261, Mar 20, 2024.

Additionally, 11 patents filed in areas of Edge-AI, IoT security, and LPWANs.

Selected Publications (Published, Preprints, and Communicated)

J4 **Atonu Ghosh,** Akhilesh Mohanasundaram, Srishivanth R F, and Sudip Misra, TLoRa: Implementing TLS Over LoRa for Secure HTTP Communication in IoT, In *IEEE Transactions on Industrial Informatics, 2025.*

J3 **Atonu Ghosh,** David Breuss, Simon Howind, Sudip Misra, Thilo Sauter, and Surjya Kanta Pal, SenseAI: Staged Model Deployment for Resource Constrained AIoT-Enabled Industrial Environments, In *IEEE Transactions on Industrial Cyber-Physical Systems, 2025.*

J2 **Atonu Ghosh** and Sudip Misra, LoRaConnect: Unlocking HTTP Potential on LoRa Backbones for Remote Areas and Ad-Hoc Networks, In *IEEE Transactions on Network Science and Engineering, 2025.*

J1 **Atonu Ghosh,** Anandarup Mukherjee, and Sudip Misra, SEGA: Secured Edge Gateway Microservices Architecture for IIoT-based Machine Monitoring, In *Transactions on Industrial Informatics, 2021.*

Achievements & Activities

2024 **Qualcomm Innovation Fellowship**, Finalist

2022-2023 **Secretary of IEEE Student Branch**, IIT Kharagpur