Atonu Ghosh

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Employment & Experiences

06/01/2021 – Present

Ph.D. Scholar,
Indian Institute of Technology Kharagpur, Department of Computer Science and Engineering.

- *Low Power IoT Networks*.

  Design and development of LoRa-based low-power IoT network solutions for communication and service delivery in remote and disconnected areas.

- *Microcontroller Blockchain*.

  Design and development of sensor fault detection system by implementing lightweight blockchain on resource-constrained microcontrollers.

- *Ambulatory Patient Monitoring*.

  Hardware and software development of edge-cloud interplay-based ambulatory patient monitoring device targeting patients in transit from towns to cities and villages to towns. Included temperature, blood pressure, and ECG monitoring in real-time.

- *Automated pipe coating thickness measurement system*.

  Retrofitting Programmable Logic Controller (PLC) and hand-held gauge-based iron pipe coating thickness measurement system to automatically perform measurements and push the data to the PLC network.

- *Cloud Dashboard*.

  Development of Django, Bootstrap, and MySQL-based cloud dashboard that received data from the Ambulatory device's Android application for the remote doctors' real-time intervention.

Employment & Experiences (continued)

22/10/2020 – 31/12/2023

Junior Research Fellow (22/10/2020 – 22/10/2022) and
Senior Research Fellow (27/10/2022 – 31/12/2023),
Indian Institute of Technology Kharagpur in MeitY sponsored research project entitled "TribeConnect: Integrated Smart Tribal Eco-Platform – A Proof of Concept in Chhattisgarh".
Project TribeConnect aimed at the upliftment and empowerment of the tribal community through the application of IoT and Machine Learning in the fields of agriculture and healthcare.

- *Low Power Intra-Village Communication*.

  Development of a LoRa based intra-village messaging system in which the client devices sent messages using WiFi enabled devices and these messages were transmitted over a LoRa backbone network to reach the destination.

- *IoT Platform*.

  Development and deployment of a Django and MySQL based IoT platform for device management, live data visualization, and reporting.

- *IoT Hardware*.

  Development and programming of microcontroller and microprocessor based IoT hardware for field data collection.

- *IoT Gateway*.

  Design and development of an IoT gateway device that received data over multiple channels and transmitted to the remote IoT platform over GSM based Internet connection and received commands to actuate field devices.

- *Remote Access and Database Replication of IoT Gateways*.

  Setting up of reverse SSH to remotely log in to Raspberry Pi based IoT gateways and enabling MariaDB replication to remote AWS EC2 instances and in-house servers.

- *Server Configuration and Management*.

  Managed and configured blade servers to run reverse proxy using Nginx and Apache. Deployed and managed Dockerized web applications on these servers.

Employment & Experiences (continued)

01/03/2020 - Present

System Architect, SensorDrops Networks Pvt. Ltd., Indian Institute of Technology Kharagpur.
(I contribute voluntarily without pay to this startup founded by my Ph.D. supervisor.)

- *Intrusion detection system.*

  Edge computing and Machine Learning (ML) based pet immune human intruder detection and GSM-based alert system.

- *Connected electrical power station.*

  Retrofitting an electrical power station to fetch real-time data from multifunction meters, transmitting the data to the cloud to enable remote monitoring and alerts.

- *Smartphone Controlled Lights and Fans.*

  Design and development of Android-based electrical light and fan speed control system.

- *Connecting legacy gas sensor to the cloud.*

  Retrofitting 4-20 mA-based gas sensors to realize a cloud-based IoT system for remote monitoring and alerts.

- *Warehouse condition monitoring.*

  Building IoT system for real-time sensing of warehouse temperature and humidity for cloud-based display and alerts.

- *Deep Freezer Monitoring.*

  Design and development of a system for deep freezer current and temperature monitoring with threshold-based alert over GSM.

Instructor

January, 2024 — Short Term Course on **Hands-on Introduction to Internet of Things with Machine Learning**, Indian Institute of Technology Kharagpur.

December, 2023 — Security for Internet of Things, **Tata NeuSkills**.

Short Term Course on **Hands-on Introduction to Internet of Things with Machine Learning**, Indian Institute of Technology Kharagpur.

September, 2023 — Short Term Course on **Introduction to Cloud Computing**, Indian Institute of Technology Kharagpur.

July, 2023 — Short Term Course on **Hands-on Introduction to Internet of Things with Machine Learning**, Indian Institute of Technology Kharagpur.

April, 2023 — Short Term Course on **Introduction to Cloud Computing**, Indian Institute of Technology Kharagpur.

April, 2022 — Design and Development of Internet of Things Systems, **Unacademy**.

NPTEL Teaching Assistantship

January - April, 2024 — **Introduction To Internet Of Things**, Prof. Sudip Misra, National Programme on Technology Enhanced Learning (NPTEL), Indian Institute of Technology Kharagpur.

Employment & Experiences (continued)

July - October, 2023 — **Introduction To Internet Of Things**, Prof. Sudip Misra, National Programme on Technology Enhanced Learning (NPTEL), Indian Institute of Technology Kharagpur.

January - April, 2023 — **Introduction To Internet Of Things**, Prof. Sudip Misra, National Programme on Technology Enhanced Learning (NPTEL), Indian Institute of Technology Kharagpur.

Institute Teaching Assistantship

Spring, 2024 - 2025 — **Programming and Data Structure Laboratory**, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Autumn, 2023 - 2024 — **Programming and Data Structure Laboratory**, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Spring, 2023 - 2024 — **Programming and Data Structure Laboratory**, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Autumn, 2022 - 2023 — **Ubiquitous Computing**, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Spring, 2022 - 2023 — **Programming and Data Structure Laboratory**, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Computer Networks Laboratory, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Autumn, 2021 - 2022 — **Programming and Data Structure Laboratory**, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Spring, 2021 - 2022 — **Computer Networks Laboratory**, Prof. Sudip Misra, Indian Institute of Technology Kharagpur.

Education

2021 - Present — **Ph.D., Computer Science & Engineering**,
Supervisor: Prof Sudip Misra,
Indian Institute of Technology Kharagpur, West Bengal, India.

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

2017 — **Bachelor of Technology, Computer Science & Engineering**,
Institute of Engineering & Management, West Bengal, India.
7.71 / 10

2014 — **Diploma in Engineering, Computer Science & Technology**,
Institute of Science & Technology, West Bengal, India.
83.7%

2009 — **Secondary, CBSE**,
D.A.V. Public School, Midnapore, West Bengal, India.
86%

Patents

Granted

1. S. C. Misra, D. Das, V. Udutalapally, S. Misra, N. Sengar, and **A. 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.

Filed

1. **A. Ghosh**, B. Ghosh, R. Saha, S. Misra, and A. Roy, "System for real time intrusion detection, actuation and alert and method thereof," Indian Patent, File No.: 202431021131, Mar. 20, 2024.
2. R. Saha, **A. Ghosh**, and S. Misra, "Confidant: An internet of things-based system and method for mental health monitoring and support," Indian Patent, File No.: 202431034007, Apr. 29, 2024.
3. S. C. Misra, D. Das, S. Misra, V. Udutalapally, **A. Ghosh**, and T. Pan, "Wireless network device for wireless communication with user devices in a wireless communication network," Indian Patent, File No.: 202311028663, Apr. 20, 2023.
4. **A. Ghosh**, S. Misra, A. Roy, and A. Mukherjee, "A system for remote monitoring, actuation and data prediction," Indian Patent, File No.: 202231040824, Jul. 17, 2022.
5. S. Misra, S. Pal, and **A. Ghosh**, "Modularized iot-based on-demand ambulatory hospital recommender system," Indian Patent, File No.: 202231008007, Feb. 15, 2022.
6. S. Misra, D. Das, V. Udutalapally, **A. Ghosh**, and P. K. Deb, "A secured edge-based automated power control and communication system for legacy iot infrastructures," Indian Patent, File No.: 202131038016, Aug. 23, 2021.

Research Publications

Journal Articles

1. **A. Ghosh**, S. Misra, V. Udutalapally, and D. Das, "Loraute: Routing messages in backhaul lora networks for underserved regions," *IEEE Internet of Things Journal*, pp. 1–1, 2023. DOI: 10.1109/JIOT.2023.3281941.
2. **A. Ghosh**, S. Misra, and V. Udutalapally, "Multiobjective optimization and sensor correlation framework for iot data validation," *IEEE Sensors Journal*, vol. 22, no. 23, pp. 23 581–23 589, 2022. DOI: 10.1109/JSEN.2022.3215993.
3. **A. Ghosh**, A. Mukherjee, and S. Misra, "Sega: Secured edge gateway microservices architecture for iiot-based machine monitoring," *IEEE Transactions on Industrial Informatics*, vol. 18, no. 3, pp. 1949–1956, 2022. DOI: 10.1109/TII.2021.3102158.
4. **A. Ghosh**, R. Saha, and S. Misra, "Persistent service provisioning framework for iomt based emergency mobile healthcare units," *IEEE Journal of Biomedical and Health Informatics*, vol. 26, no. 12, pp. 5851–5858, 2022. DOI: 10.1109/JBHI.2022.3172624.

Conference Proceedings

1. **A. Ghosh**, D. De, and K. Majumder, "A systematic review of log-based cloud forensics," in *Inventive Computation and Information Technologies*, Singapore: Springer Singapore, 2021, pp. 333–347. DOI: 10.1007/978-981-33-4305-4_26.
2. **A. Ghosh**, K. Majumder, and D. De, "Android forensics using sleuth kit autopsy," in *Proceedings of the Sixth International Conference on Mathematics and Computing*, Singapore: Springer Singapore, 2021, pp. 297–308. DOI: 10.1007/978-981-15-8061-1_24.

3. **A. Ghosh**, "Intelligent appliances controller using raspberry pi," in *2016 IEEE 7th Annual Information Technology, Electronics and Mobile Communication Conference (IEMCON)*, 2016, pp. 1–5. DOI: 10.1109/IEMCON.2016.7746253.

Book Chapters

1. **A. Ghosh**, K. Majumder, and D. De, "A systematic review of digital, cloud and iot forensics," in *The "Essence" of Network Security: An End-to-End Panorama*, Singapore: Springer Singapore, 2021, pp. 31–74, ISBN: 978-981-15-9317-8. DOI: 10.1007/978-981-15-9317-8_2.

Technical Skills

Solution Development	Full Stack IoT Software and Hardware, Condition Monitoring, Hands on Cloud & Edge.
Coding	Python, C, SQL.
Databases	MySQL, SQLite, InfluxDB.
Web Dev	Docker, Django, Web API, HTML, CSS, JavaScript, Apache Web Server, NGINX.
Misc.	Academic research, Project proposal writing, Product architecting & development, Server and network configuration.

Miscellaneous Experiences

Reviewer

- IEEE Internet of Things Journal.
- Technical Reviewer for Apress Books.
  - Title: *Blockchain, IoT, and AI Technologies for Supply Chain Management*.
  - Title: *Build Your Own IoT Platform*.

Volunteering

November, 2022 - October, 2023	**Secretary**, IEEE Computer Society Student Branch Chapter, Indian Institute of Technology Kharagpur.
July, 2016 - Present	Google Local Guide.

Invited Talks

April, 2022	**Workshop on Internet of Things**, Maryland Institute of Technology & Management, Jamshedpur, India.

References

Available on Request