

Arnab Mukherjee

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SUMMARY

I am a JRF at IIT Patna with experience in Federated Learning, Blockchain, and Machine Learning. I have developed FL-based systems for healthcare platforms like the Ayushman Bharat Digital Mission (ABDM) and contributed to ML-based smart contract analysis and vulnerability detection. I am skilled in Python, Kubernetes, and PyTorch, and I am passionate about solving new problems in distributed systems and deep learning. My work has been published in leading journals and conferences, and I am eager to apply my skills to impactful and real-world projects.

SKILLS

- **Programming Languages:** Python, Javascript, Go
- **Tools and Frameworks:** Docker, Kubernetes, PyTorch, React JS, Node.js
- **Domain Skills:** Machine Learning, Object Oriented Programming, SQL, Linux Administration

EDUCATION

- **Indian Institute of Technology Patna (IITP)** Patna, India
M. Tech. By Research in Comp. Sc. and Engineering. (CPI: 8.14, Graduated 11/24) July 2022 - November 2024
- **Maulana Abul Kalam Azad University of Technology (MAKAUT)** Kolkata, India
B. Tech. in Computer Science and Engineering. (CPI: 9.08, Graduated 06/22) July 2018 - June 2022

EXPERIENCE

- **Junior Research Fellow** July 2022 - Present
Indian Institute of Technology Patna (IIT Patna) Patna, India
 - Developed a Federated Learning framework for the Ayushman Bharat Digital Mission (ABDM) platform.
 - Integrated Federated Deep Learning model training for health data on the platform.
 - Scaled the platform to 1500+ nodes for federated learning and load testing.
 - Incorporated Blockchain technology to enhance system trust, reliability, and data security.
 - Designed a prototype to improve the privacy and security of the ABDM architecture.
 - Implemented strategies to protect and verify the integrity of information within ABDM.
- **Research Intern** May 2020 - Dec 2021
Indian Institute of Technology Patna (IIT Patna) Patna, India
 - Researched on Machine Learning-based vulnerability detection of Solidity smart contracts.
 - Designed and developed smart city platforms utilizing Hyperledger Fabric and Ethereum for enhanced functionality and security.

PROJECTS

- **FLsim: A Modular and Library-Agnostic Simulation Framework for Federated Learning**
github.com/mukherjeeearnab/FLsim
 - Developed a Federated Learning Simulation Framework with Reinforcement Learning-aided optimization of job allocation and scheduling for faster experiments. *(a work in progress)*
 - Scaled the platform for 1500+ virtual nodes and 100+ physical machines.
 - Aimed to support research and development of advanced Federated Learning algorithms and techniques, with experiments scalable to thousands of nodes.
 - Prioritized modularity, automated management, and ML library agnosticism to ensure flexibility and ease of integration.
- **SAF.py: An Abstract Interpretation-based Static Analysis Framework for Solidity**
github.com/mukherjeeearnab/safpy
 - Developed a first-of-its-kind static analysis toolkit for the Solidity language based on Abstract Interpretation principles. *(a work in progress)*
 - Enhanced convergence and vulnerability detection compared to existing toolsets, specifically in case of intractable problems.
 - Designed with a scalable architecture to support integration with various Solidity versions and smart contract frameworks.

PUBLICATIONS

- Maitri Kushwaha, **Arnab Mukherjee**, Aishwarya Pandey, Raju Halder. **Semantics-Based Static Vulnerability Detection of Solidity Using Abstract Interpretation**. *20th International Conference on Information Systems Security (ICISS)*, Springer LNCS. Dec 2024.
- Sujit Chowdhury, **Arnab Mukherjee**, Raju Halder. **FedRLChain: Secure Federated Deep Reinforcement Learning with Blockchain**. *IEEE Transactions on Services Computing*, IEEE. Jul 2023.
- **Arnab Mukherjee**, Raju Halder, Joydeep Chandra, Shailesh Shrivastava. **HealthChain: A Blockchain-aided Federated Healthcare Management System**. *2023 IEEE International Conference on Blockchain and Cryptocurrency (ICBC)*, IEEE, May 2023.
- Supriya Shakya, **Arnab Mukherjee**, Raju Halder, Abhayaynanda Maity, Amrita Chaturvedi. **Machine Learning-based Vulnerability Detection of Solidity Smart Contracts**. *2022 IEEE International Conference on Blockchain*, IEEE. Aug 2022.
- Atul Thakur, Swagatika Sahoo, **Arnab Mukherjee**, Raju Halder. **Making Robotic Swarms Trustful: A Blockchain-Based Perspective**. *Journal of Computing and Information Science in Engineering*, ASME. Apr 2023.
- **Arnab Mukherjee**, Swagatika Sahoo, Raju Halder. **A Blockchain-Based Integrated and Interconnected Hybrid Platform**. *Peer-to-Peer Networking and Applications (PPNA)*, Springer. May 2022.
- Suryakanta Panda, **Arnab Mukherjee**, Raju Halder, Samrat Mondal. **Blockchain-Enabled Emergency Detection and Response in Mobile Healthcare System**. *2022 IEEE International Conference on Blockchain and Cryptocurrency (ICBC '22)*, IEEE. May 2022.
- Swagatika Sahoo, **Arnab Mukherjee**, Raju Halder. **A Unified Blockchain-based Platform for Global e-waste Management**. *International Journal of Web Information Systems (IJWIS)*, Emerald Publishing. July 2021.
- **Arnab Mukherjee**, Raju Halder. **An Integrated Platform for Vehicle-Related Services using Blockchain Technology**. *13th Asian Conference on Intelligent Information and Database Systems (ACIIDS '21)*, Springer. Apr 2021.
- **Arnab Mukherjee**, Raju Halder. **PoliceChain: Blockchain-Based Smart Policing System for Smart Cities**. *13th International Conference on Security of Information and Networks (SIN '20)*, ACM. Nov 2020.

HOBBIES

- Playing the Guitar and Piano, and arranging scores for them.
- Landscape and Bird Photography.
- Repairing Computers, Electronics and Cars.
- Exploring Mathematics and Music Theory.

My creative portfolios can be found [here](#) and [here](#).