MEDHASREE GHOSH

PhD, Computer Science and Engineering

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ABOUT ME

D.O.B: 18/ 11/ 1993
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EDUCATIONAL BACKGROUND

PhD in Computer Science and Engineering, Indian Institute of Technology Patna (Jan 2021-Dec 2025)

Masters in Computer Science and Engineering, University of Calcutta (Aug 2018-Aug 2020)

Bachelors in Computer Science and Engineering, Maulana Abul Kalam Azad University of Technology (Aug 2014- July 2017)

Advance Technical Diploma in Computer Science and Technology, Women's Polytechnic Chandannagar (Aug 2011- July 2014)

RESEARCH EXPERIENCES

PhD Thesis Title: Deep Learning-Driven Security Analysis for Ethereum Blockchain

Designed a suite of deep learning models to enhance the security of Ethereum across two critical dimensions: (1) Transaction-Level Threats (Phishing Scam Detection) & (2) Contract-Level Vulnerabilities (Smart Contract Vulnerability). The frameworks include:

- **SpaTeD & TREAT**: A sparsity-aware tensor decomposition framework for modeling large-scale user transactions.
- **TEMPER**: A dual time-series sequential learning architecture that detects behavioral inconsistencies while mitigating data leakage in large-scale networks.
- **CATALOG**: A transformer-based model using cross-attention and masked language modeling to learn joint local-global temporal patterns in user behavior, effectively distinguishing phishing from normal users.
- **CM²VD**: A Contrastive Multimodal Multiview Detection model integrating syntactic and semantic features from multiple code representations.

Ongoing Projects as mentor

- **ELVIS:** Explainable Large Language-Model for Vulnerability Detection on Ethereum Smart Contracts.
- **TRUST-EX:** Trustworthy Explainable Temporal Graph Intelligence for Ethereum Phishing Detection.

Masters Thesis: Machine learning based Disease diagnosis from the information embedded in miRNA and mRNA relationship: Explored miRNA-mRNA interactions for early stage cancer detection using machine learning-based clustering techniques.

Bachelors Project: Machine Learning Based Automated Scoring Algorithm for Short Answers based on NLTK: Developed an automated scoring framework using machine learning to evaluate short answers.

PROFESSIONAL EXPERIENCES

January 2021-December 2025, Indian Institute of Technology Patna

Teaching Assistantship: Blockchain & Applications, Introduction to Machine Learning, Data Structure, Database management Systems, Algorithms Lab, Digital Systems, Introduction to C Programming, Discrete Mathematics, Introduction to Python Programing.

Reviewer: IEEE Transactions on Computational Social Systems, Information Processing and Management, Cluster Computing, Applied Intelligence, Information Processing & Management, World Wide Web, IEEE Internet Computing, Pattern Recognition and Letters, IEEE Transactions on Network and Service Management, The Web Conference, RAAISA, PreMi AI4SG.

Volunteering: Research Scholar Day 2022 & 2023 at IIT Patna, National Symposium of Research Scholars 2023, BuildSec 2025 (organized by IIT Patna and UNSW Australia).

September 2020-December 2020, University of Engineering and Management, Kolkata

Assistant Professor, Subjects Taught: Data Structure & Algorithms, Computer Architecture.

AWARDS AND ACHIEVEMENTS

- **Research Mentor** at I-Can (Intelligent Communication and Network Group) | **2025**
- **Session Chair at ACM KDD** for the session Fraud and Threat Detection | **2025**
- Awarded **Google APAC Conference Support Grant for attending & Presenting The WEB Conference (WWW) in Sydney, Australia | 2025**
- Awarded **ACM IARCS Grant for attending & Presenting The WEB Conference (WWW) in Sydney, Australia | 2025**
- Awarded **Microsoft Conference Support Grant for attending & Presenting ACM KDD in Toronto, Canada | 2025**
- Presented an **invited talk on Graph Neural Network and Applications to North East Hill University | 2023**
- Attended & Presented at **12th UBISS Workshop (Summer School), at University of Oulu, Finland (Joint Funding by IIT Patna and University of Oulu) | 2024**
- Vice President, **IEEE Student Branch, IIT Patna | 2024-2025**
- **PhD Representative at the department of CSE, IIT Patna | 2025**
- **Received best organizer award from the departmental head CSE, IIT Patna| 2023**
- **Awarded travel grants from INDOML 2022 (IIT Gandhinagar) and INDOML 2023 (IIT Bombay).**
- **Awarded GATE AICTE National Fellowship for M.Tech (University of Calcutta) and MHRD Research Fellowship for PhD (IIT Patna) | 2018 & 2021**
- **Qualified GATE 2018 & UGC NET 2020 (Asst. Prof.).**

SKILLS

Technical Abilities

- **Programming Languages**: Python, R, and C
- **Lib/Frameworks**: Scikit-learn, TensorFlow, PyTorch, Networkx, Tensorly, Pandas, Numpy
- **Applications**: Microsoft Powerpoint, Excel, Word, SQL, Oracle Forms
- **Language Proficiency**: English. Hindi, Bengali
- **ML/DL:** Regression, Classification, Clustering, Statistical Analysis, GNN, RNN, LSTM, Transformers, Correlations Study, PCA, Time-series analysis, Dynamic Networks, XAI, LLMs.

Generic Expertise

- Proficient in drafting reports, proposals, and documentation.
- Strong leadership and team management abilities.
- Proficient in public speaking and presentation skills.
- Flexible to adapt in cross-disciplinary research.
- Adaptable for independent and collaborative research.

Areas of Interest

Deep learning and AI-driven applications, Cyber Security, Complex Networks, Explainable AI for Time Series and Sequential modelling, Security & Privacy.

LIST OF PUBLICATIONS

Journals

- **M.Ghosh**, D. Ghosh, R. Halder, J. Chandra, “Investigating the impact of structural and temporal behaviours in Ethereum phishing user detection,” published in Blockchain Research & Application Journal, DOI: https://doi.org/10.1016/j.bcra.2023.100153. [IF: 5.6, Citations: 26]
- **M. Ghosh**, R. Halder and J. Chandra, "SpaTeD: Sparsity-Aware Tensor Decomposition-Based Representation Learning Framework for Phishing Scams Detection," published in IEEE Transactions on Computational Social Systems, DOI: https://doi.org/10.1109/TCSS.2024.3462552. [IF: 4.5, Citations: 8]
- **M. Ghosh**, R. Halder and J. Chandra, "TREAT: Temporal and Relational Attention-based Tensor Representation Learning for Ethereum Phishing Users," Published in IEEE Transactions on Services Computing, DOI: 10.1109/TSC.2025.3568277. [IF: 5.8, Citations: 2]
- **M.Ghosh**, R. Halder and J. Chandra, “A Systematic Review on Ethereum Phishing Scam Detection: Challenges, Empirical Insights, and Future Directions,” Blockchain Research & Applications, DOI: https://doi.org/10.1016/j.bcra.2025.100424. [IF: 5.6]
- **M. Ghosh**, D. Chukkala, R. Halder, and J. Chandra, TETRAREL: Temporal Transactional Representation Learning Framework for Ethereum Phishing User Detection, Submitted to IEEE Transactions on Emerging topics in Computational Intelligence. [IF: 6.5, under first revision]
- **M.Ghosh**, N. Desai, M. Jain, H. S. Uppal, Raju Halder, and J. Chandra, “CM2VD: A Contrastive Multimodal Multiview Detection model for Smart Contract Vulnerabilities,” Submitted to IEEE Transactions on Reliability. [IF: 4.5]

Conferences:

- S. Dasgupta, **M. Ghosh**, A. Khan, G. Saha and R.K. Pal, “A computational approach for disease diagnosis from the information embedded in miRNA and target mRNA relationship,” published in MMCITRE 2021, DOI: 10.1007/978-981-16-5952-2_13.
- **M. Ghosh**, C. D. Jain, R. Halder and J. Chandra, “TEMPER: Capturing Consistent and Fluctuating Temporal Evolution of the Ethereum Users for Phishing Scam Detection,” published in KDD '25: Proceedings of the 31st ACM SIGKDD Conference on Knowledge Discovery and Data Mining V.1, Pages 2259 - 2270, DOI: https://doi.org/10.1145/3690624.3709399 [Core A*, Citations: 2].
- **M. Ghosh**, S. Srivastava, A. Upadhyaya, R. Halder and J. Chandra, CATALOG: Exploiting Joint Temporal Dependencies for Enhanced Phishing Detection on Ethereum Published in WWW '25: Proceedings of the ACM on Web Conference 2025, Pages 969 - 977, DOI: https://doi.org/10.1145/3696410.3714903 [Core A*, Citations: 9].

REFERENCES

- **PhD Supervisor:** Dr. Raju Halder , Associate Professor, Indian Institute of Technology Patna Email: halder@iitp.ac.in
- **PhD Co-Supervisor:** Dr. Joydeep Chandra, Associate Professor, Indian Institute of Technology, Patna , Email: joydeep@iitp.ac.in
- **Masters Supervisor:** Prof. Rajat Kumar Pal, Professor, University of Calcutta, Email: rkpcomp@caluniv.ac.in
- **TA Mentor:** Dr. Samrat Mondal, Associate Professor, Indian Institute of Technology, Patna, Email: samrat@iitp.ac.in