Chandrika Mukherjee

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EDUCATION

Ph.D. Student in Computer Science Aug 2022 - Aug 2027 (Expected)

- **Purdue University**
- Advisor: Professor Z. Berkay Celik
- Research Area: Human-Centered Security and Privacy of Emerging Mobile Systems.
- GPA: 3.83/4.00

M.S. in Computer Science Aug 2021 - Dec 2023

- **Purdue University**
- GPA: 3.83/4.00

B.Tech in Computer Science and Engineering Aug 2015 - Jun 2019

- **NIT Durgapur, India**
- GPA: 9.16/10.00

RESEARCH INTERESTS

My research interests broadly lie in the area of **human-centered security and privacy**. I primarily investigate this area in the context of emerging mobile systems, including extended reality (XR) platforms, smartphones, and related technologies. My work employs user-centered, mixed-method approaches, encompassing both qualitative and quantitative studies to examine how security and privacy threats affect end-users and developers of these systems. In addition, I integrate system design, signal processing, computer vision, and machine learning techniques to develop effective solutions that strengthen user security and privacy on these platforms.

RESEARCH EXPERIENCE

Graduate Research Assistant Jan 2022 - Present
Purdue University

- **Investigating user perception of UI attacks in the WebXR.**
  [Accepted at USENIX Security 2025, HumanSys 2025]
  - Identified five novel UI attacks within the context of the WebXR ad ecosystem. Proposed a four-category taxonomy for 14 such attacks based on primary objectives of the adversaries.
  - Developed a 3D spatial log framework and four quantitative interaction metrics to assess user engagement within WebXR environments.
  - Conducted a 100-participant in-lab between-subjects user study to assess user perceptions of the four attack categories within our taxonomy.
- **Secure group pairing of co-located Mixed Reality (MR) headsets addressing potential adversarial threats.**
  - Designed and developed a novel localization system for pairing MR headsets using eye-tracking, hand-tracking sensor signals and spatial anchors.
  - Designed a high-entropy random hand gesture generator by anchoring a 2D gesture grid in world coordinates and detecting hand positions from the camera view.
  - Designed a CNN-LSTM network leveraging eye-tracking and IMU sensor data to detect synthetic data and secure pairing against adaptive adversaries.

  - Conducted in-lab user studies to evaluate system success rate, scalability, and usability.
- **GPU based side-channel attack in XR.** (Collaboration with Iowa State University)
  - Identified low-resolution GPU metrics related to object rendering in XR.
  - Fingerprinted WebXR and standalone XR apps and virtual content within these apps with over 90% accuracy using classical ML and DL models (e.g., random forest, SVM, CNN, LSTM).
- **Investigating data collection via mobile apps targeting military.**
  - Developed a semi-automated pipeline for collecting apps targeting the military community by fine-tuning LLM prompts.
  - Developed a policy summary outlining data-sharing restrictions by analyzing and synthesizing information from official documents.

Undergraduate Research

- **Research Assistant, NIT Durgapur** Jun 2017 - May 2019
  - Designed an offline crisis mapping system using crowdsourced GIS objects to support post-disaster situation. The system leverages a four-tier hybrid ad hoc network architecture and is capable of functioning without internet connectivity. Evaluated the system's feasibility through field testing in a rural region of India. *[Accepted at EmeRTeS, 2019]*
- **Research Intern, IIT Kharagpur** May 2018 - July 2018
  - Designed a tool that encodes `.mp4` files to `.svc`, enables file transfer using BitTorrent-like peer-to-peer communication between computer nodes, and decodes them back to `.mp4`, supporting adaptive bitrate streaming while reducing server load.

INDUSTRY EXPERIENCE

Software Engineering Intern May 2022 - August 2022
Meta, NYC
Team: Privacy Approval Monitor (Messenger)
Goal: To ensure that no Messenger feature accesses tables containing sensitive data, and to be able to visualize data flow from Messenger features to sensitive tables prior to production release.

- Developed a UI tool that detects sensitive database access in code blocks, leveraged by software team leads before code production release.
- Worked with cross functional teams to upload target dataset in Meta's asset lineage system.
- Developed another UI tool to demonstrate data flows within various privacy assets across Meta (e.g., data flow from mailbox API to stored procedure to database).
- Primary tech stack - React, GraphQL, PHP, Python.

Software Engineer July 2019 - August 2021
HSBC, India
Team: Global Credit Module (Wealth and Personal Banking)
Product: A credit monitoring tool designed for use by relationship managers.

- Developed features such as automatic email notifications for credit limit approvals and rejections, SMS alerts for credit margin status, Jasper reports, rule assignments for securities received from batch process etc.
- Participated in code management activities using Git during production releases.
- Monitored production batch for client regions.
- Primary tech stack - Java, DB2, Spring Batch.

MENTORING & TEACHING EXPERIENCE

Research Advising

Lilianne Brush	B.S. CS	Purdue University	2024-Current
Chan-Nhu Pham	B.S. CS	Purdue University	2024-Current

* CS: Computer Science

Guest Lecturer

- CS 361 Great Issues In Computer Science, Purdue University — Spring 2025
  Topic: Introduction to XR and Its Associated Security & Privacy Issues

Graduate Teaching Assistant

- CS 182 Foundations Of Computer Science, Purdue University — Fall 2024
- EPICS and VIP (Service-Learning/Research Design Program for Undergraduates), Purdue University — Fall 2022, Spring 2023, Fall 2023
- ENGR 133 First Year Engineering (Introduction to Programming with Python, MATLAB, and Excel), Purdue University — Summer 2023

PUBLICATIONS

Conference Publications

C1 **Chandrika Mukherjee**, Reham Mohamed, Arjun Arunasalam, Habiba Farrukh, and Z. Berkay Celik
Shadowed Realities: An Investigation of UI Attacks in WebXR
Proceedings of the USENIX Security Symposium, 2025.

Workshop Publications

W2 **Chandrika Mukherjee**, Arjun Arunasalam, Habiba Farrukh, Reham Mohamed, and Z. Berkay Celik
Towards Secure User Interaction in WebXR
Human-Centered Sensing, Modeling, and Intelligent Systems (HumanSys), in Proceedings of the ACM SenSys, 2025.

W1 Partha Sarathi Paul, **Chandrika Mukherjee**, Bishakh Chandra Ghosh, Sudipta Pandit, Sujoy Saha, and Subrata Nandi
On designing a fast-deployable 'localized'GIS platform for using 'offline'during post-disaster situation
Emergency Response Technologies and Services (EmeRTeS), in Proceedings of the International Conference on Distributed Computing and Networking (ICDCN), 2019.

AWARDS AND HONORS

- Bug bounty award from Meta for our collaborative work with Iowa State University on GPU-based side-channel vulnerabilities in XR. (2025)
- Graduation with Distinction (Bachelor of Technology) (2019)