# 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 - Purdue University** Jan 2022 - Present

- **Investigating user perception of UI attacks in the WebXR.**
  - 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.
- 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.

## SOFTWARE ENGINEERING EXPERIENCES

**Software Engineering Internship - Meta, NYC** — May 2022 - August 2022

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 - HSBC, India** — July 2019 - August 2021

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.

## TEACHING EXPERIENCE

**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), 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), 2019.

## AWARDS AND HONORS

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