

# Raja Hasnain Anwar

✉ ranwar@umass.edu | [🌐 LinkedIn](#) | [👤 Google Scholar](#) | [🌐 rhasnainanwar.me](#) | 📍 Amherst, MA, USA.

## TECHNICAL SKILLS

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**Programming:** Python, C/C++, Java, JavaScript, PHP, SQL, MATLAB, R.

**Technologies:** Flask, Django, Selenium, Hibernate, Spring, Tornado, SQLAlchemy, jQuery, Node.js, React.js, MySQL, MongoDB, Git, Docker, AWS, Kubernetes, GCP, Kafka, Spark.

**Tools:** Android Studio, Visual Studio, Oracle, Travis CI, Docker, Matlab, Tableau, PowerBI.

**DS / ML / AI:** OpenCV, Scikit-learn, Pandas, Numpy, NLTK, Keras, Tensorflow, PyTorch.

## EDUCATION

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**University of Massachusetts Amherst**

Amherst, MA, USA

*Ph.D. in Electrical and Computer Engineering*

*Transfer in, Sep 2023 – Present*

**Teaching:** ENG 191: First Year Seminar (Cybersecurity & AI)

**The University of Arizona**

Tucson, AZ, USA

*Ph.D. in Management Information Systems*

*Jan 2021 – May 2023, Transfer out*

**Teaching:** Penetration Testing, Ethical Hacking, and Social Engineering; Fundamentals of Cloud Computing

**National University of Sciences and Technology (NUST)**

Islamabad, Pakistan

*B.S. in Computer Science*

*Sep 2016 – Jun 2020*

**Capstone Project:** Multimodal Face2Voice: A novel learning paradigm called deep shared latent space learning with a penalization that eliminates branching in multimodal training.

## PUBLICATIONS

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- **Anwar, R. H.**, et. al., “In Wallet We Trust: Bypassing the Digital Wallets Payment Security for Free Shopping,” *USENIX Security 2024*.
- Islam, M. R., **Anwar, R. H.**, et. al., “Characterizing Encrypted Application Traffic through Cellular Radio Interface Protocol,” *IEEE MASS 2024*.
- **Anwar, R. H.**, et. al., “Redefining the Driver’s Attention Gauge in Semi-Autonomous Vehicles,” *MSWiM 2023*.
- **Anwar, R. H.**, et. al., “Detecting Privacy Threats with Machine Learning: A Design Framework for Identifying Side-Channel Risks of Illegitimate User Profiling,” *AMCIS 2023*.

## Talks

- “Human-in-the-Loop for Secure Digital Wallets Transactions,” *SOUPS 2024*.
- “Keeping Eyes on the Road: The Role of Situated IS Delegation in Influencing Drivers’ Situational Awareness,” *ICIS 2021*.

## EXPERIENCE

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**University of Massachusetts Amherst**

Amherst, MA, USA

*Graduate Research Assistant*

*Sep 2023 – Present*

- Identified side-channels in the 5G control plane, achieving over 95% accuracy in user application and activity recognition over encrypted traffic ([IEEE MASS’24](#)).
- Developed a GPU side-channel attack for model classification with over 90% accuracy against major visual and LLM models in PyTorch (under review).
- Led an empirical study on in-flight WiFi paywall security and inferred network tomography and policies to launch tunneling and DoS attacks, across major US-based ISPs and airlines (under review).

**Kaiser Permanente**

Pleasanton, CA, USA (Remote)

*Data Science Intern*

*Jun 2023 – Aug 2023*

- Revamped a classification pipeline to accurately identify at-risk patient groups, resulting in 20% improvement.
- Employed spline-based feature transformation models to handle nonlinear features like patient age groups.
- Integrated SHAP value generation for in-depth analysis of the production model’s behavior against sensitive features, i.e., gender, age, & race.

- Successfully integrated the developed AI models into a live system by the end of the internship.

## The University of Arizona

Tucson, AZ, USA

Graduate Research Associate

Jan 2021 – May 2023

- Led systematic testing of financial systems and EMV protocol through tomographic analysis focusing on credit card transaction policy compliance ([USENIX Security'24](#)).
- Developed novel side-channel attacks on typing behavior, achieving 80% accuracy in user profiling and text classification ([AMCIS'23](#)).
- Designed a novel driver's attention-gauging and alert mechanism for semi-autonomous to improve takeover time in emergencies by 75x ([MSWiM'23](#), [IEEE Transactions on Intelligent Vehicles \(T-IV\)](#)).

## TUCL-NUST R&D Center

Islamabad, Pakistan

Research Assistant

Apr 2017 – Jun 2020

- Built an Android app to scan vehicle registration plates using an OCR and display the owner's details from a public database. This app is a part of the RoadwayIntel vehicle surveillance project in the city of Islamabad.
- Gathered 120 hours of video dataset for fish detection and tracking in the wild, used for population estimation.
- Automated image superimposition to generate 20 images per document extraction sample by augmenting foreground and background settings.
- Unified text mining and personally identifiable information (PII) detection pipelines to mask private information from public judicial archives with 70% accuracy.

## Hochschule RheinMain

Wiesbaden, Germany

Research Assistant

Jun 2019 – Aug 2019

- Generated a dataset with over 1,000,000 entity pair data points from raw English and German Wikipedia texts for entity relation extraction.
- Architected an LLM pre-training pipeline that leverages context similarity as an entity relation estimator to automate 100% of labeling.

## VisionX Technologies

Islamabad, Pakistan

Machine Learning Engineer

Jun 2018 – Jun 2019

- Engineered an OCR and heuristical information extraction pipeline to digitalize hand-written tabular property records with 85% accuracy.
- Developed a web tool to visualize and correct extracted data improving pipeline efficiency by 50%.
- Reproduces multiple solutions from Kaggle's CDiscount Classification challenge and designed hierarchical deep learning models for large-scale visual recognition and classification.

## Al Jazeera

Remote

Machine Learning Engineer

Aug 2018 – Dec 2019

- Implemented and trained a key frame extraction model to summarize videos and select top visuals making headlines generation 70% faster.
- Designed and trained an image captioning model for 70% faster on-demand news headlines generation from key frames.
- Integrated real-time audio transcription services for Arabic and English in a live stream with a 5-second delay.
- Developed a large-scale sentiment analysis system to monitor real-time trends from news and social media in English and Arabic.
- Automated multimedia search with an audio matching tool for automatically retrieving audio/video samples using a 10-second audio query.
- Developed a large-scale faces-in-the-wild recognition tool for identifying celebrities from live streams.

## PRESS & MEDIA COVERAGE

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**CNET:** "Are Digital Wallets Safe? Here's How to Protect Your Financial Information in 2024", [Sep 25, 2024](#).

**Consumer Affairs:** "Study: The Safety of ApplePay and GooglePay Called Into Question", [Sep 16, 2024](#).

**PaymentsDive:** "Academics Question Digital Wallet Security", [Sep 04, 2024](#).

**Hacker Dose:** "Digital Wallet Loophole Allows Criminals to Shop for Free with Locked Cards", [Sep 04, 2024](#).

**Business West:** "New Study Reveals Loophole in Digital Wallet Security", [Aug 30, 2024](#).

**National Science Foundation (NSF):** "A New Study Reveals Loopholes in Digital Wallet Security", [Aug 23, 2024](#).

**Association for Computing Machinery (ACM):** "A Loophole in Digital Wallet Security", [Aug 23, 2024](#).

**Forbes:** “This Week In Credit Card News”, [Aug 22, 2024](#).

**TechRadar Pro:** “Digital Wallets Allow for the Use of Stolen Credit Cards” ([MSN](#), [Yahoo! Tech](#)), [Aug 20, 2024](#).

**The Register:** “Digital Wallets Can Allow Purchases With Stolen Credit Cards”, [Aug 20, 2024](#).

**PYMNTS:** “5 Emerging Security Imperatives for Digital Wallets”, [Aug 21, 2024](#).

**Kaspersky:** “Digital Wallets Can Enable Cybercriminals to Make Purchases with Stolen Credit Cards”, [Aug 20, 2024](#).

**NewsBytes:** “Security Flaw Allows Stolen Credit Card Use on Digital Wallets”, [Aug 20, 2024](#).

**Help Net Security:** “Stolen, Locked Payment Cards Can be Used with Digital Wallet Apps”, [Aug 19, 2024](#).

**ScienceX:** “Best of Last Week—..., Loophole in Digital Wallets,...”, [Aug 19, 2024](#).

**UMass News:** “New Study Reveals Loophole in Digital Wallet Security—Even If Rightful Cardholder Doesn’t Use a Digital Wallet”, [Aug 14, 2024](#).

## HONORS & AWARDS

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**2024 – ACM IMC:** Received NSF travel grant to attend [ACM Internet Measurement Conference](#) in Madrid, Spain.

**2024 – IEEE MASS:** Received NSF travel grant to present my work at [IEEE MASS 2024](#) in Seoul, South Korea.

**2024 – USENIX Security:** Received registration grant to attend [USENIX Security](#) in Philadelphia, PA, USA.

**2024 – Teaching Fellowship:** Selected by [College of Engineering](#) at the University of Massachusetts Amherst.

**2023 – NSDI:** Received USENIX travel grant to attend [NSDI’23](#) in Boston, MA, USA.

**2023 – POWDER RENEW:** NSF-funded workshop on POWDER wireless emulator at [UofU](#).

**2022 – Colosseum Young Gladiator:** NSF-funded master class on Colosseum wireless emulator at [NEU](#).

**2021 – Nunamaker-Chen Scholarship:** Selected by [MIS department](#) at The University of Arizona.

**2020 – Summer@EPFL:** Selected for prestigious [summer internship programme](#) (2% acceptance rate).

**2020 – Huawei UG Star Researcher:** Received for best undergraduate research project.

**2019 – DAAD Research Fellow:** Selected for German Academic Exchange Service (DAAD) research fellowship.