

# WARIS GILL

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## EDUCATION

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- **Virginia Tech**, College of Engineering Blacksburg, USA  
*PhD in Computer Science GPA: 3.94/4* *August 2021 - Present*  
Research Area: Federated Learning & Software Engineering  
Relevant Courses: Advanced Topics in Software Engineering, Hot Topics in Machine Learning (ML) and Security, Big Data
- **Koç University**, College of Engineering Istanbul, Turkey  
*Masters in Computer Science GPA: 3.85/4* *2018 - 2020*  
Relevant Courses: Computer Vision with Deep Learning, ML, Algorithms, Parallel Programming, Distributed Systems
- **Lahore University of Management Sciences (LUMS)** Lahore, Pakistan  
*Bachelors in Computer Science GPA: 3.08/4* *2013 - 2017*  
Relevant Courses: Data Mining, Data Structures, Databases, Operating Systems, Problem Solving, Artificial Intelligence

## PHD PUBLICATIONS

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- **Gill, Waris**, et al. “MeanCache: User-Centric Semantic Cache for Large Language Model Based Web Services.” arXiv preprint arXiv:2403.02694 (2024). [📄 Paper](#)
- **Gill, Waris**, et al. “TraceFL: Achieving Interpretability in Federated Learning via Neuron Provenance.” arXiv preprint arXiv:2312.13632 (2024). [📄 Paper](#) [🔗 Code](#)
- **Gill, Waris**, et al. “FedDefender: Backdoor Attack Defense in Federated Learning.” In SE4SafeML colocated with FSE-2023. [📄 Paper](#) [🔗 Code](#)
- **Gill, Waris**, et al. “FedDebug: Systematic Debugging for Federated Learning Applications.” In ACM/IEEE 45th International Conference on Software Engineering (ICSE) 2023. [📄 Paper](#) [🔗 Code](#)
- Erdogan, Ege, Can Arda Aydin, Ozgur Ozkasap, and **Waris Gill**. “Zelig: Customizable Blockchain Simulator.” In 40th International Symposium on Reliable Distributed Systems (SRDS 2021). [📄 Paper](#) [🔗 Code](#)

## SKILLS SUMMARY

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- **Programming Languages:** C, C++, CUDA, Go, Python, Java, JavaScript, TypeScript, SQL, R, Matlab, NodeJS
- **Frameworks:** Hadoop, MPI, OpenMP, PyTorch, PyTorch Lightning, Numpy, Pandas, Matplotlib, Hugging Face, Sentence Transformers, Scikit-learn, RPC, IBM FL, Flower FL, Spark, ProtoBuf, Docker, Kubernetes
- **Web Frameworks & Other Tools:** Express.js, D3.js, MongoDB, Elasticsearch, Flask, Seaborn, HTML, CSS, MySQL, Git

## HONORS AND AWARDS

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- **National Science Foundation (NSF) Award:** To present our paper, **FedDebug**, at ACM/IEEE 45th International Conference on Software Engineering (ICSE) 2023 in Melbourne, Australia.
- **ACM womENCourage 2019 Participation Scholarship:** To attend 6th ACM Celebration of Women in Computing: womENCourage, September 16-18, Rome Italy.
- **Huawei Graduate Research Scholarship:** Only two MS students from the computer engineering department of Koç University were awarded this scholarship in 2019. The scholarship provides funding for 2 years.
- **Koç University Graduate Scholarship:** The scholarship includes tuition waiver, stipend, housing, and travel expenses.

## PROFESSIONAL EXPERIENCE

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- **Cisco** USA  
*Software Engineer III (Completed Two Internships)* *May 2023 - December, 2023*
  - Founder, developer, and maintainer of Cisco’s open-source project, MartianBank – a microservice app enhancing software supply chain, used by the Outshift teams at Cisco. [🔗 MartianBank GitHub](#)
  - Developed an optimized solution for Cisco’s semantic-caching using Transformer embeddings to increase the F1 score of the cache hit rate from 0.72 to 0.95, outperforming GPTCache.
- **Virginia Tech**, Department of Computer Science Blacksburg, USA  
*Research Assistant - Dr. Muhammad Ali Gulzar* *August 2021 - Present*
  - Develop *TraceFL*, a unique tool that achieves interpretability in Federated Learning (FL) by tracking neuron provenance. Achieving 99% accuracy in localizing responsible clients across diverse datasets (e.g., medical imaging) and neural networks (e.g., GPT), and works with differential privacy in FL. (Submitted to ICSE’2025)

- In collaboration with *Cisco*, develop *MeanCache*, a semantic cache for LLM services that reduces query costs by up to 33% and cache storage by 83%. Achieve a 17% higher F-score than the baseline and accelerate cache hit-miss decisions by 11%, lowering service load (e.g., ChatGPT) and environmental impact. **(Submitted to SoCC'2024)**
- Built the first cutting-edge testing & debugging technique, *FedDebug*, for FL applications in the IBM FL framework, which helps developers to locate clients with faulty neural networks. It efficiently locates problematic clients with a 90.3% average accuracy in just 2.1% of a round's training time. **(Accepted at ICSE 2023)**

- **KUIS A.I. Lab & DISNET Research Laboratory (Koç University)** Istanbul, Turkey  
*Graduate Research Assistant - Dr. Attila Gürsoy and Dr. Öznur Özkasap* 2018 - 2021
  - Worked with *Tüpraş* (Turkey's leading oil refinery) to optimize alarm analysis and helped refinery workers forecast upcoming alarms using RNNs and Transformer LMs. After evaluating 13 months worth of unstructured data, I managed to decrease the workload of refinery operators by 50%.
- **Technology for People Initiative (LUMS)** Lahore, Pakistan  
*Research Associate - Dr. Fareed Zaffar* 2017 - 2018
  - Developed an editorial support system with Node.js, JavaScript, D3.js, HTML, and MongoDB, funded by the *United States Institute of Peace (USIP)*, that has a searchable graph of topics extracted from news articles to identify topics of interest and study social trends like reporting biases using NLP techniques.

## SELECTED ENGINEERING PROJECTS

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- **📞 Modeling Reach Rate of the QNB FinansBank, Turkey (Machine Learning)**: Predicted whether a customer will answer the phone call initiated by the outbound call center of the bank. With an AUROC of 0.76 on test data, my Gradient Boosting Classifier based solution won the prize by outperforming solutions based on neural networks.
- **📷 Understanding Amazon Rainforest from Space (Computer Vision)**: I built a classifier that labels satellite images with atmospheric conditions (e.g., haze, primary, agriculture, road, water, cloudy) to observe changes over time using GoogleNet, ResNet, and DenseNet. It achieves an F-score of 0.93 with ResNet150.
- **📡 Cardiac Electrophysiology Simulation (Parallel Programming)**: Implemented the Aliev-Panfilov heart electrophysiology simulator using CUDA, MPI and OpenMP.
- **📁 Distributed Notebook Using DHT (Distributed Systems)**: Implement a Chord DHT to load and store notebooks using the Remote Procedure Call (RPC) protocol.
- **🔒 Harnessing Corrupt Packets in Wireless Sensor Networks (Embedded Systems)**: Proposed an optimized corrupt packet recovery algorithm to mitigate their retransmission and reduce battery consumption by recovering 60% of the corrupt packets. Modified the TinyOS network stack to implement an interface for intermediate processing of corrupt packets in WSNs.

## TEACHING ACTIVITY

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- **CS-3304: Comparative Languages, TA**, Computer Science, Virginia Tech: Fall 2022 & Spring 2024
- **CS 1114: Introduction to Software Design, TA**, Computer Science, Virginia Tech: Fall 2021
- **Distributed Systems, TA**, Computer Science, Koç University: Spring 2020
- **Advanced Programming, TA**, Computer Science, Koç University: Spring 2019
- **Software Engineering, TA**, Computer Science, Koç University: Fall 2018, 2019 & 2020
- **Introduction to Programming, TA**, Computer Science, LUMS: Fall 2016

## INVITED TALK AND COMMUNITY SERVICE

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- **Programme Committee Member, ICSE 2025**: Serving on the Artifact Evaluation Track for the 47th International Conference on Software Engineering.
- **Invited Talk at Flower AI-2024**: Delivered a talk on "Achieving Debugging and Interpretability in Federated Learning Systems" at Flower AI, a premier federated learning platform. You can watch the talk [here](#).
- **Student Volunteer at FSE-2023**: Selected as one of only 18 students from 78 applicants to volunteer at FSE-2023. The conference was scheduled for December 3–9, 2023, in San Francisco, California, USA.
- **Student Volunteer at ICSE-2022**: Performed volunteer duties at ICSE-2022, held in May 2022, in Pittsburgh, USA.

## REFERENCES

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- **Dr. Muhammad Ali Gulzar (Ph.D. Advisor)** - *Assistant Professor, Virginia Tech*  
✉ [gulzar@vt.edu](mailto:gulzar@vt.edu) || 🌐 <https://people.cs.vt.edu/gulzar>
- **Dr. Ali Anwar (Research Collaborator)** - *Assistant Professor, University of Minnesota, Twin Cities*  
✉ [aanwar@umn.edu](mailto:aanwar@umn.edu) || 🌐 <https://cse.umn.edu/cs/ali-anwar>
- **Dr. Eli Tilevich (PhD Adviosry Committee Member)** - *Professor and Associate Dept. Head for Graduate Studies, Virginia Tech* ✉ [tilevich@cs.vt.edu](mailto:tilevich@cs.vt.edu) || 🌐 <https://people.cs.vt.edu/tilevich/>