

# Dr. Frederic Rizk

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## RESEARCH INTERESTS

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- Artificial Intelligence (AI) and Machine Learning
- Deep Learning and Neural Networks
- Generative AI
- Hardware Security
- Physical Unclonable Functions (PUFs)
- Hardware-Software Co-Design
- VLSI and Emerging Technologies

## EDUCATION

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**Ph.D. in Computer Engineering**, University of Louisiana at Lafayette 2019 – 2024  
GPA: 4.0/4.0  
**M.S. in Computer Engineering**, University of Louisiana at Lafayette 2019 – 2021  
GPA: 4.0/4.0  
**B.E. in Computer and Communication Engineering**, Notre Dame University 2013 – 2018  
GPA: 3.97/4.0 — Ranked first in Department

## PROFESSIONAL EXPERIENCE

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**Assistant Professor** *Aug 2025 – Present*  
Department of Electrical and Computer Engineering, University of Texas at Tyler  
Director, Center for Advanced Research in Intelligent Systems and Emerging Technologies (CARISSET)

- Lead multidisciplinary research in AI, hardware security, and emerging technologies.
- Supervise students and manage funded research projects.

**Research Scientist** *Aug 2024 – Aug 2025*  
Informatics Research Institute, University of Louisiana at Lafayette

- Lead and manage research projects in Artificial Intelligence (AI), including deep learning, cybersecurity, and generative models.
- Utilize Kolmogorov-Arnold Networks (KAN) for real-time cyber-attack detection and threat modeling.
- Develop and implement advanced AI methodologies and pipelines for real-world applications.
- Analyze large-scale research data and disseminate findings through publications and presentations.
- Author grant proposals to secure funding for ongoing and future research initiatives.
- Engage with interdisciplinary stakeholders to translate research outcomes into practice.

**Postdoctoral Research Fellow** *May 2024 – Aug 2024*  
University of Louisiana at Lafayette

- Conducted AI-focused research with emphasis on model development, data analysis, and security.
- Published scholarly articles and collaborated on interdisciplinary research efforts.

- Developed proofs-of-concept for machine learning applications across multiple domains.

## Doctoral Researcher

*Fall 2019 – Spring 2024*

School of Computing and Informatics, University of Louisiana at Lafayette

- Proposed a novel data augmentation method to address data scarcity in supervised learning.
- Designed security primitives for health data and IoT systems.
- Developed state-of-the-art deep learning architectures and computational systems.
- Specialized in NLP and trained language models for ancient scripts (e.g., Phoenician) using cloud-based TPU/GPU systems.
- Designed and tested FPGA/ASIC hardware accelerators using VHDL, Verilog, and SystemVerilog.
- Collaborated with interdisciplinary researchers and mentored senior project students.

## Teaching Assistant

*Fall 2019 – Spring 2023*

School of Computing and Informatics, University of Louisiana at Lafayette

- Taught and facilitated both lecture and lab components of “Introduction to Computer Science,” covering algorithm design, Python programming, data types, control structures, and testing/debugging.
- Supported curriculum delivery through problem-solving sessions, assignment design, and grading.
- Mentored three junior teaching assistants and contributed to instructional planning and coordination.

## Telecommunications Engineer

*Jun 2016 – Sep 2016*

OGERO (National Telecom Provider)

- Maintained and operated enterprise network infrastructure, including fixed telephony and DSL systems.
- Oversaw the performance, repair, and upgrade of large-scale telecom services and hardware.

## PUBLICATIONS

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### Journal Articles

- [1] **Frederic Rizk**, Rodrigue Rizk, Dominick Rizk, Patrick Rizk, and Chee-Hung Henry Chu, “KAN-MID: A Kolmogorov-Arnold Networks-based Framework for Malicious URL and Intrusion Detection in IoT Systems,” *IEEE Access*, 2025.
- [2] Rodrigue Rizk, Dominick Rizk, **Frederic Rizk**, and Sonya Hsu, “280 Characters to the White House: Predicting 2020 U.S. Presidential Elections from Twitter Data,” *Computational and Mathematical Organization Theory*, 2023, pp. 1–28.
- [3] Patrick Rizk, **Frederic Rizk**, Sasan Sattarpanah Karganroudi, Adrian Ilinca, Rafic Younes, and Jihan Khoder, “Advanced Wind Turbine Blade Inspection with Hyperspectral Imaging and 3D Convolutional Neural Networks for Damage Detection,” *Energy and AI - Elsevier*, Special Issue: AI and Energy Materials, 2023.

## Conference Papers

- [1] **Frederic Rizk** and Chee-Hung Henry Chu, "CKAN-SER: A Deep Learning Framework for Speech Emotion Recognition Using Convolutional and Kolmogorov-Arnold Networks," *2025 IEEE 8th International Conference on Multimedia Information Processing and Retrieval (MIPR)*, 2025.
- [2] **Frederic Rizk**, Rodrigue Rizk, Dominick Rizk, Patrick Rizk, and Chee-Hung Henry Chu, "A Unified Approach for Binary-Class and Multi-Class Data Augmented Generation," *2024 IEEE Conference on Artificial Intelligence (CAI)*, pp. 69–74.
- [3] Dominick Rizk, **Frederic Rizk**, Patrick Rizk, and Rodrigue Rizk, "RAPUF: A Novel Integration of Reversible Logic and Arbiter Physical Unclonable Functions for Enhancing IoT Security," *2024 International Conference on Artificial Intelligence, Computer, Data Sciences and Applications (ACDSA)*, 2024.
- [4] **Frederic Rizk**, Rodrigue Rizk, Dominick Rizk, and Chee-Hung Henry Chu, "MAGAN: A Meta-Analysis for Generative Adversarial Networks' Latent Space," *12th International Conference on Pattern Recognition Applications and Methods (ICPRAM)*, 2023, pp. 488–494.
- [5] **Frederic Rizk**, Dominick Rizk, Rodrigue Rizk, and Ashok Kumar, "A Cost-Efficient Reversible-Based Reconfigurable Ring Oscillator Physical Unclonable Function," *2022 IEEE International Symposium on Circuits and Systems (ISCAS)*, 2022.
- [6] Rodrigue Rizk, Dominick Rizk, **Frederic Rizk**, Ashok Kumar, and Magdy Bayoumi, "A Resource-Saving Energy-Efficient Reconfigurable Hardware Accelerator for BERT-based Deep Neural Network Language Models using FFT Multiplication," *2022 IEEE International Symposium on Circuits and Systems (ISCAS)*, 2022, pp. 1675–1679.
- [7] Dominick Rizk, Rodrigue Rizk, **Frederic Rizk**, and Ashok Kumar, "An Economic Uniqueness-Improved Reliable Reconfigurable RO PUF for IoT Security," *2022 IEEE International Symposium on Circuits and Systems (ISCAS)*, 2022, pp. 1680–1684.
- [8] Rodrigue Rizk, Dominick Rizk, **Frederic Rizk**, and Ashok Kumar, "A Hybrid Capsule Network-based Deep Learning Framework for Deciphering Ancient Scripts with Scarce Annotations: A Case Study on Phoenician Epigraphy," *2021 IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, 2021, pp. 617–620.
- [9] Rodrigue Rizk, Dominick Rizk, **Frederic Rizk**, and Ashok Kumar, "An Efficient Capsule Network Reconfigurable Hardware Accelerator for Deciphering Ancient Scripts with Scarce Annotations," *2021 IEEE 34th International System-on-Chip Conference (SOCC)*, pp. 75–78.
- [10] Dominick Rizk, Rodrigue Rizk, **Frederic Rizk**, and Ashok Kumar, "An In-Situ Sliding Window Approximate Inner-Product Scheme Based on Parallel Distributed Arithmetic for Ultra-Low Power Fault Tolerant Applications," *2021 IEEE International Midwest Symposium on Circuits and Systems (MWSCAS)*, 2021, pp. 503–506 .
- [11] Dominick Rizk, Rodrigue Rizk, **Frederic Rizk**, Ashok Kumar, and Magdy Bayoumi, "A Cost-Efficient Reversible-Based Configurable Ring Oscillator Physical Unclonable Function," *2021 IEEE 34th International System-on-Chip Conference (SOCC)*, pp. 79–82.

## Posters

- [1] **Frederic Rizk** and Chee-Hung Henry Chu, "Unveiling the Enigma of MAGAN: Navigating into Generative Adversarial Networks' Hidden Latent Space," *2023 IBM IEEE CAS/EDS – AI Compute Symposium*, 2023.
- [2] Rodrigue Rizk, Dominick Rizk, **Frederic Rizk**, and Ashok Kumar, "A Hybrid Capsule Network-based Deep Learning Architecture for Deciphering Ancient Scripts with Scarce Annotations," *2021 IBM IEEE CAS/EDS – AI Compute Symposium*, 2021.

- [3] Dominick Rizk, Rodrigue Rizk, **Frederic Rizk**, and Ashok Kumar, “An In-Situ Sliding Window Approximate Inner-Product Scheme Based on Distributed Arithmetic for Ultra-Low Power Fault Tolerant Applications,” *2021 IBM IEEE CAS/EDS – AI Compute Symposium*, 2021.

## GRANTS AND FUNDING

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- **Rising STARS Award**  
Principal Investigator (PI)  
Awarded by The University of Texas System  
*Amount: \$258,000*  
Competitive faculty recruitment award supporting the establishment of Dr. Rizk’s research lab in intelligent systems, AI, and hardware-software co-design.

2025 – Present
- **Computer Science and AI for All in Louisiana: Developing a Comprehensive PreK–12 Pathway**  
Senior Personnel  
Submitted to NSF CSforAll: Research and RPPs Program  
*Anticipated Project Amount: \$299,748 over 2 years*  
The project aims to develop and implement a scalable AI literacy curriculum in rural Louisiana schools through a Research–Practice Partnership (RPP) model.

Under Review

## TEACHING EXPERIENCE

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- **CMPE 4333 – Introduction to Machine Learning**  
Lecture Course, University of Texas at Tyler, Department of Electrical and Computer Engineering

Fall 2025
- **CMPE 4395 – Undergraduate Research**  
Research Course, University of Texas at Tyler, Department of Electrical and Computer Engineering

Fall 2025
- **EENG 4115 – Senior Design I**  
Capstone Design Course, University of Texas at Tyler, Department of Electrical and Computer Engineering

Fall 2025
- **CMPE 4315 – Senior Design**  
Capstone Design Course, University of Texas at Tyler, Department of Electrical and Computer Engineering

Fall 2025
- **CMPS 150 – Introduction to Computer Science**  
Lecture Course, University of Louisiana at Lafayette, School of Computing & Informatics

Fall 2019 - Spring 2023

## LEADERSHIP AND PROFESSIONAL ACTIVITIES

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- **Reviewer**, Various Conferences and Journals  
Peer reviewer for several top-tier venues in AI, computer engineering, and cybersecurity.

2019 – Present
- **Member**, Institute of Electrical and Electronics Engineers (IEEE)

2023 – Present
- **Life Member**, Association for Computing Machinery (ACM)

2019 – Present
- **Member**, Order of the Engineer (USA)

2022 – Present
- **Member**, Order of Engineers and Architects (Lebanon)

2018 – Present
- **Judge**, Louisiana Region VI Science and Engineering Fair

2019 – 2021

## HONORS AND AWARDS

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- **Rising STARS Award** – The University of Texas System 2025  
Competitive recruitment award supporting the establishment of Dr. Rizk's research lab.
- **Goodwill Ambassador of Lafayette** – Lafayette Consolidated Government 2023
- **Honors Convocation and Academic Excellence Award** – University of Louisiana at Lafayette 2023
- **Dissertation Completion Fellowship** – University of Louisiana at Lafayette 2023–2024
- **Phi Kappa Phi Honor Society**, Life Member 2023–Present
- **Ragin' Leadership Academy Award** – University of Louisiana at Lafayette 2020
- **Academic Scholarship** – University of Louisiana at Lafayette 2019–2023
- **President's Award for Educational Excellence and Outstanding Academic Achievement** 2019–2023
- **Summa Cum Laude Honor Distinction** – Notre Dame University 2018
- **Dean's Awards for Distinction** – Notre Dame University  
GPA: 3.97/4.0, ranked first in department 2013–2018

## INVITED TALKS

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- **PhD – More Than Just Three Letters:  
Navigating Challenges and Maximizing Opportunities** April 7, 2025  
*Keynote Talk, University of Louisiana at Lafayette, Graduate School, LA, USA*  
Explored the academic and emotional journey of PhD students, offering strategies to overcome challenges and maximize success during graduate studies.
- **A Meta-Analysis for Generative Adversarial Networks:  
Exploring Latent Space for Enhanced Data Augmentation with the MAGAN Algorithm** June 28, 2024  
*Invited Talk, Prairie View A&M University, TX, USA*  
Focused on leveraging GANs for generating synthetic data to address training data scarcity in machine learning.
- **A Meta-Analysis for Generative Adversarial Networks:  
Exploring Latent Space for Enhanced Data Augmentation with the MAGAN Algorithm** May 2, 2024  
*Invited Talk, University of Arkansas at Little Rock, AR, USA*  
Highlighted the use of latent space manipulation in GANs for improved data augmentation in low-resource machine learning scenarios.
- **KAN-MID: A Kolmogorov-Arnold Networks-based Framework  
for Malicious URL and Intrusion Detection** April 4, 2024  
*Invited Talk, University of Texas at Tyler, TX, USA*  
Presented a novel AI framework using KANs for detecting cyberattacks and malicious URL threats in IoT environments.
- **Advancing IoT Hardware Security and  
Data Augmentation Technique using MAGAN** March 1, 2024  
*Invited Talk, Louisiana State University, LA, USA*  
Covered advances in secure IoT hardware design and the application of MAGAN for enhancing machine learning datasets.

- **A Meta-Analysis for Generative Adversarial Networks:** *January 30, 2024*  
**Exploring Latent Space for Enhanced Data Augmentation with the MAGAN Algorithm**  
*Invited Talk, University of South Carolina Aiken, SC, USA*  
Discussed generative models for improving AI training data, with a focus on latent space analysis and MAGAN-based methods.