

Dr. Frederic Rizk

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—  Website

RESEARCH INTERESTS

- 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

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

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

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

- **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

- **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

- **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

- **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 2024
- **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

- **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.