

# Alhussain Almarhabi

*Electrical and Computer Engineering | Signal Processing | AI | Wireless Communications*

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## CONTACT INFORMATION

Jeddah  
Saudi Arabia

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[Google scholar](#)  
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## SUMMARY

An impact-driven scientist with 5+ years of academic experience developing and applying innovative solutions in Electrical Engineering, Machine Learning, and Communications Systems. Demonstrates exceptional problem-solving abilities, leadership qualities, teaching experience, and research insight.

### Research and Technical Achievements

- Developed neural models for QAM signal timing jitter identification and optimized machine learning algorithms for breast cancer diagnostics (97% accuracy), showcasing advanced problem-solving skills
- Published 8 IEEE papers on deep learning architectures and their applications in Wireless Communications
- Created novel datasets for various research projects, contributing to multiple IEEE publications
- Presented research at IEEE conferences and poster at the Organization for Human Brain Mapping (OHBM)
- Conducted research on unsupervised learning for rapid detection of brain abnormalities

### Teaching and Leadership Experience

- Served as Teacher Assistant for Engineering Programming (C++) and Communication Systems courses
- Led weekly Q&A sessions for 30+ students and initiated curriculum improvements
- Designed MATLAB-based lab sessions on communication fundamentals, subsequently adopted into course curriculum
- Mentored 20+ students and conducted exam review sessions, demonstrating strong pedagogical skills
- Managed GitHub-based assignment submissions, streamlining the evaluation process
- Enhanced instructional capabilities through an 8-week workshop on college-level teaching

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## EDUCATION

2019–2023 **Ph.D. in Electrical Engineering**, *Stevens Institute of Technology*, Hoboken, NJ, USA, *GPA: 3.666/4*

Dissertation: “Modulation Classification and Timing Jitter Identification Based on Eye Diagrams and Deep Learning”

Coursework:

Applied Data Structures & Algorithms, Statistical Machine Learning, Engineering Programming: Python, Applied Discrete Mathematics, Probability & Statistics I

Teaching:

EE465 Introduction to Wireless Systems

EE533 Engineering Programming: C++

Workshop:

Teaching at the college level 8 weeks workshop, 2020

2017–2018 **MSc. in Electrical Engineering**, *Stevens Institute of Technology*, Hoboken, NJ, USA, *GPA: 3.867/4*

Concentration in Signal Processing

Coursework:

Applied Machine Learning, Pattern Recognition & Classification, Applied Modeling & Optimization, Digital Signal Processing, Analytic methods Electrical Engineering, Internet of Things, Linear Systems Theory, Wireless Communications, Special Problems in EE

2017–2018 **Certificate in Data Engineering**, *Stevens Institute of Technology*, Hoboken, NJ, USA

2008–2013 **Bachelor's in Electrical and Computer Engineering**, *King Abdul Aziz University*, Jeddah, Saudi Arabia, *GPA: 4.29/5*

Concentration in Electronics and Communications

Coursework:

Basic Electrical Circuits, Analytical methods in Eng., Object-oriented Computer Programming, Electrical Circuits & Systems, Electronics I, Introduction to Communications, Digital Design I, Series and Vector Analysis, Electromagnetic Fields, Electronics II, Microprocessors & Microcontroller, Communication Theory I, Electromagnetic Waves, Computer Communications Networks, Electrical Power Systems I, Communication Circuits, Antennas and Propagation, Communication Systems, and Digital Communications

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## WORKSHOP

- May 2024 1 month **Industrial Internet of Things Program, by KAUST**
- Covered IIoT life cycle, Clouds, and main elements
  - Reviewed MQTT protocol and data processing pipeline (Extraction, transfer, and load (ETL))
  - Studied different security techniques for IIoT
  - Designed and presented an outline **to transform traditional Kiswa quality measurement in The General Authority for the Care of the two Holy Mosques** using IIoT and AI.

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## WORK EXPERIENCE

- Jan 2019 – Dec 2023 **Ph.D. Researcher**, *Electrical and Computer Engineering department, Stevens Institute of Technology, NJ, USA*
- Developed a neural model to identify timing jitter in QAM signal, resulted in a publication at the WOCC21 conference, and presented in an IEEE conferences
  - Modeled self-designed datasets for various research projects, which were adopted in IEEE publications
  - Created experiments and implementation in deep learning architectures, which resulted in 8 IEEE publications
- Jan 2022 – Dec 2022 **Teacher Assistant in Engineering Programming C++**, *Stevens Institute of Technology, NJ, USA*
- Initiated ten new weekly assignments for the course curriculum. And led weekly Q&A sessions for 30+ students
  - Managed assignment submission logistics using GitHub classroom and Gtest tools to test C++ code
- Aug 2021 – Dec 2021 **Teacher Assistant in Introduction to Communication Systems**, *Stevens Institute of Technology, NJ, USA*
- Constructed five labs session to simulate communications system fundamentals using MATLAB, which is adapted in the course curriculum for future intakes
  - Mentored 20+ students and taught tutorial and exam review sessions by evaluating students' performance reports
- Aug 2018 – Jun 2019 **Research Assistant**, *Stevens Institute of Technology, NJ, USA*
- Investigated "Fast Detection of Brains With Abnormalities" using unsupervised learning that led to an accepted poster presentation at the Organization for Human Brain Mapping (OHBM) Italy 2019
  - As result applied: nilearn, PyTorch, ReNA algorithm, and traumatic brain injuries tracktbi pilot dataset (<https://aalmarhabi.github.io/mri-rena>)

Jan 2017 – Dec 2018 **MSc Researcher**, *Stevens Institute of Technology*, NJ, USA

- Developed a DLFR prototype capable of recognizing English, Arabic, and Japanese languages using a Raspberry Pi camera, employing Keras, TF, OpenCV, and Raspbian OS. (<https://sites.google.com/stevens.edu/font-recognition/>)
- Designed and optimized machine learning algorithms for Breast Cancer Diagnostic using the University of Wisconsin breast cancer dataset and improved models accuracy of KNN classifier to 96% and SVMs to 97%
- Designed finite impulse response (FIR) that solves a convex optimization problem. Built a MATLAB GUI that generated an FIR filter based on client specifications
- Used Yahoo music database to implement the recommendation system for music. Designed the recommendation system using Spark Hadoop. Refined system accuracy using ensemble modeling and obtained 87% accuracy compared to competitor teams

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## SKILLS

### Programming

- |          |                  |
|----------|------------------|
| ○ Python | ○ C/C++          |
| ○ MATLAB | ○ R              |
| ○ Rust   | ○ Spark (Hadoop) |
| ○ CMake  | ○ Assembly       |
| ○ Git    |                  |

### Framework/IDE

- |                    |                |
|--------------------|----------------|
| ○ PyTorch          | ○ TensorFlow   |
| ○ Keras            | ○ Google Colab |
| ○ Jupyter Notebook | ○ Emacs        |
| ○ Vim              | ○ LaTeX        |

### Artificial Intelligence

- |                                 |                              |
|---------------------------------|------------------------------|
| ○ Foundation Model              | ○ CNNs                       |
| ○ VAE                           | ○ Linear/Logistic Regression |
| ○ Classification/Identification | ○ SVM                        |
| ○ PCA                           | ○ K-Means                    |
| ○ KNNs                          | ○ Decision trees             |
| ○ Transformer                   | ○ Signals PreProcessing      |
| ○ Experimental Methods          | ○ Data Analysis              |

### Operating System / Cloud

- |          |            |
|----------|------------|
| ○ Linux  | ○ Ubuntu   |
| ○ Debian | ○ Raspbian |
| ○ Azure  | ○ Aws      |
| ○ Docker |            |

### CAD & Hardware

- |            |              |
|------------|--------------|
| ○ Eagle    | ○ Multisim   |
| ○ Fritzing | ○ SolidWorks |

- Raspberry Pi
- chipKIT uC32
- PIC Microcontroller
- Electronics

- Arduino Uno
- ZigBee
- Circuits

Other

- Completer-finisher
- Teamwork
- Collaborator
- Agile Software Development

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## SELECTED PROJECTS

- Sep. - Dec. 2023 Worked on Basic Saudi Grant: Submitted a proposal to RDIA related to artificial intelligence, IoT, and biometric monitoring
- Mar. 2023 Personal Openai Chatbot: Using Python Flask to interact with Openai API, tested on text-davinci-003 model. Design a website similar to ChatGPT for a user to make queries
- Feb. 2023 A Small Generative Pre-trained Transformer Implementation: Used Openai tokenizer to implement the GPT-2 Applied: JAX for numerical computing, Fire for fast command line interface, tqdm for the progress bar, and TensorFlow

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## HONORS, AWARDS and VOLUNTEER

- 2017 – 2018 Saudi Ministry of Education Full-scholarship Award for Higher Education (Master's)
- 2018 Volunteered as a research assistant in a project-based titled "Fast detection of brains with abnormalities"
- 2019 Stevens Institute of Technology Award for Outstanding Master's
- 2019 – 2020 Stevens Institute of Technology Award for Research Assistantship
- 2019 – 2023 Saudi Ministry of Education Full-scholarship Award for Higher Education (Ph.D.)

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## RESEARCH INTERESTS

- Spectrum awareness
- Wireless communications
- Artificial intelligence and deep learning
- Computer vision
- Machine learning in medical application
- Big data optimization
- Cognitive radio
- Intelligent radio
- Signals and data representation and measurement tools
- Signal integrity degradation
- Internet of Things (IoT)
- Edge computing

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## PROFESSIONAL AFFILIATIONS

Institute of Electrical and Electronics Engineers (IEEE) - 8 years  
IEEE Communications Society and Signal Processing Society  
SCE Saudi Council of Engineers

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## LIST of PUBLICATIONS

Summary Conferences: 9 research papers | Journals: 1 article | Talks: 4 professional presentations

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## PUBLICATIONS

1. **A. Almarhabi**, H. Alhazmi, A. Samarkandi, and Y.-D. Yao, "Modulation classification based on eye diagrams and deep learning," in *2022 31st Wireless and Optical Communications Conference (WOCC)*. IEEE, 2022, pp. 35–40.
2. **A. Almarhabi**, H. Alhazmi, A. Samarkandi, M. Alymani, M. H. Alhazmi, and Y.-D. Yao, "Qam signal classification and timing jitter identification based on eye diagrams and deep learning," in *2021 30th Wireless and Optical Communications Conference (WOCC)*. IEEE, 2021, pp. 1–5.
3. A. Samarkandi, **A. Almarhabi**, H. Alhazmi, and Y.-D. Yao, "Combined signal representations for modulation classification using deep learning: Ambiguity function, constellation diagram, and eye diagram," in *2023 32nd Wireless and Optical Communications Conference (WOCC)*. IEEE, 2023, pp. 1–4.
4. H. Alhazmi, **A. Almarhabi**, A. Samarkandi, and Y.-D. Yao, "Modulation classification of qam signals with different phase noise levels using deep

learning," in *2022 31st Wireless and Optical Communications Conference (WOCC)*. IEEE, 2022, pp. 57–61.

5. A. Samarkandi, **A. Almarhabi**, H. Alhazmi, M. Alymani, M. H. Alhazmi, and Y.-D. Yao, "Modulation classification in a multipath fading channel using deep learning: 16qam, 32qam and 64qam," in *2021 30th Wireless and Optical Communications Conference (WOCC)*. IEEE, 2021, pp. 6–10.
6. H. Alhazmi, **A. Almarhabi**, A. Samarkandi, M. Alymani, M. H. Alhazmi, Z. Sheng, and Y.-D. Yao, "Classification of qpsk signals with different phase noise levels using deep learning," in *2020 29th Wireless and Optical Communications Conference (WOCC)*. IEEE, 2020, pp. 1–5.
7. M. H. Alhazmi, M. Alymani, H. Alhazmi, **A. Almarhabi**, A. Samarkandi, and Y.-D. Yao, "5g signal identification using deep learning," in *2020 29th Wireless and Optical Communications Conference (WOCC)*. IEEE, 2020, pp. 1–5.
8. M. Alymani, M. H. Alhazmi, **A. Almarhabi**, H. Alhazmi, A. Samarkandi, and Y.-D. Yao, "Rician k-factor estimation using deep learning," in *2020 29th Wireless and Optical Communications Conference (WOCC)*. IEEE, 2020, pp. 1–4.
9. Y. Zhou, H. Alhazmi, M. H. Alhazmi, **A. Almarhabi**, M. Alymani, M. He, S. Peng, A. Samarkandi, Z. Sheng, H. Wang *et al.*, "Radio spectrum awareness using deep learning: Identification of fading channels, signal distortions, medium access control protocols, and cellular systems," *Intelligent and Converged Networks*, vol. 2, no. 1, pp. 16–29, 2021.

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## REFERENCES

References available per request

1. Dr. Yu-Dong Yao is a CAE/NAI/IEEE/AAIA/AIMBE Fellow, and professor at Stevens Institute of Technology (**Ph.D. Advisor**)
2. Dr. Yousef Abdelmalek is a Meta Reality Labs Engineer and adjunct professor at Stevens Institute
3. Dr. Kevin Lu is a teaching professor at Stevens Institute of Technology