AHMAD BIN RABIAH

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EDUCATION

Purdue University   **West Lafayette, IN**
M.S., Electrical and Computer Engineering   *August 2021 – Present*

- Related coursework: Machine Learning; Deep Learning; Artificial Intelligence; Optimization; Random Processes

King Saud University   **Riyadh, Saudi Arabia**
B.S., Electrical Engineering   *August 2013 – December 2018*

- Graduated with second class honors
- Minor in communication systems with a focus on signal processing
- Investigated state-of-the-art beampattern design algorithms for radars and communication systems at Prince Sultan Advanced Technology Research Institute (PSATRI)

RESEARCH INTERESTS

Research interests include data-driven computer vision, self-supervised learning, machine learning, and statistical modeling

RESEARCH EXPERIENCE

Prince Sultan Defense Studies and Research Center   **Riyadh, Saudi Arabia**
Radar EW Systems Engineer   *March 2019 – August 2021*

Conducted research and development of radar and electronic warfare (EW) systems, focusing on advanced signal processing and software-defined radio hardware (SDR) for development and deployment. Key Accomplishments:

- Designed and built a multi-channel multi-frequency real-time acquisition system for a passive radar to increase detectability by fusing multi-band target detections with a field-programmable gate array (FPGA)
- Devised and demonstrated a framework of a passive sensor, direction-finding, and a mode classifier for mode classification and localization for transponder's replies
- Developed an electronic support measure system (ESM) to extract characteristics of detected unmanned aerial vehicles (UAVs) in real-time using a super-resolution method to calculate directional bearings
- Modeled a real-time spectrum analyzer by utilizing the fast Fourier transform (FFT) algorithm with overlapping processing and persistent display, including optimization for real-time implementation

REFEREED PUBLICATIONS

[1] Abdulrahman Bin Rabiah, K. K. Ramakrishnan, Silas Richelson, **Ahmad Bin Rabiah**, Elizabeth Liri, and Koushik Kar. "Haiku: Efficient Authenticated Key Agreement with Strong Security Guarantees for IoT." In *International Conference on Distributed Computing and Networking 2021 (ICDCN21)*. ACM, 2021.

[2] **Ahmad Bin Rabiah**, Mohammed Alsakabi, Omar Aldayel, and Saleh Alshebeili. "SDR-Based Hardware Implementation and Performance Measurement of Transmit Beampattern Design Algorithms." In *2020 IEEE Radar Conference (Radar-Conf20)*. IEEE, 2020.

AWARDS AND HONORS

- **Awarded Fully Funded Scholarship for Masters and PhD.** Saudi Arabian Cultural Mission, Fairfax, VA   *August 2021*
- **Managing Director Honor.** Awarded for successes in EW School   *September 2019*
- **Class Honors.** Bachelor of Science in Electrical Engineering, KSU   *December 2018*
- **Dean's List Award of Excellence.** King Saud University, Riyadh, Saudi Arabia   *May 2014*
- **Public Speaking Competition.** Won first place among Riyadh regional competitors   *March 2012*

PROJECTS

Purdue University   **West Lafayette, IN**
Self-Supervised Learning for Image Denoising, ECE595ML Machine Learning   *January 2022 – Present*

- Tackling a research question on image restoration by only looking at noisy data samples
- Investigating and re-implementing the Noise2Noise approach by assessing the performance of multiple types of noise

Regularization Techniques for Partially Corrupted Labels, ECE570 Artificial Intelligence   *August 2021 – December 2021*

- Researched and reviewed state-of-the-art regularization methods for generalizing deep neural networks
- Addressed main challenges for training neural networks in the presence of corrupted labels
- Studied and implemented a regularization method proposed in ICLR 2020 for a multi-class classification task
- Simulated results to present contributions of the authors to 180 class students

PROJECTS CONTINUED

Purdue University   **West Lafayette, IN**
Variational Autoencoder, ECE570 Artificial Intelligence   *November 2021*
- Demonstrated a denoising autoencoder architecture using a convolutional neural network (CNN)
- Designed a variational autoencoder (VAE) generative model to determine statistical properties of an input dataset
- Utilized PyTorch framework to Implement a VAE and visualized its latent space and its enhancement for every iteration

Generative Adversarial Networks, ECE595DL Deep Learning   *November 2021*
- Studied a generative adversarial networks (GAN) model attempts indirect training of a generator through a discriminator
- Designed fully-connected generative and discriminative networks to mimic latent features of MNIST handwritten dataset
- Improved the GAN model by implementing CNN-based generative and discriminative models

Convolutional Long short-term Memory Deep Neural Network (CLDNN), ECE595DL Deep Learning   *September 2021*
- Demonstrated a convolutional neural network (CNN) for a multi-class classification learning task
- Investigated a CLDNN model based on long short-term memory (LSTM) cells and a CNN architecture
- Developed and analyzed a CLDNN for an automatic modulation classification of wireless communication signals

King Saud University   **Riyadh, Saudi Arabia**
Practical Radar Beampattern Design   *January 2019 – December 2018*
- Simulated and assessed state-of-the-art digital beamforming algorithms for designing a transmit beampattern
- Tackled research questions in practical challenges in designing a multi-channel transmitting array
- Proposed a complete system implementation of a multi-channel transmitter on commercial off-the-shelf (COTS) SDRs
- Validated simulation results with experimental work on multiple-input multiple-output (MIMO) systems utilizing state-of-the-art RF devices and measuring equipment at PSATRI advanced research lab
- *A corresponding paper was published at the 2020 IEEE Radar Conference (RadarConf '20).*

WORK EXPERIENCE

Prince Sultan Defense Studies and Research Center   **Riyadh, Saudi Arabia**
Radar EW Systems Engineer   *March 2019 – August 2021*
- Assessed a preliminary passive radar system deployment and spectrum analysis in the country's borders
- Led the EW team in Munich, Germany, to assess a factory acceptance test for an ESM system by Rohde & Schwarz GmbH
- Partnered with the High-Level Technical Committee for Evaluation of Anti-UAV systems to evaluate EW anti-drone systems
- Selected to join the partnership team with King Abdulaziz University to strengthen research and development cooperation between applied research centers and academic institutions

Imam Muhammad ibn Saud Islamic University   **Riyadh, Saudi Arabia**
Electrical Engineering Intern   *July 2017 – September 2017*
- Evaluated schematics of power distribution transformer substation and backup generation systems

VOLUNTEER SERVICES

King Saud University   **Riyadh, Saudi Arabia**
Graduation Ceremony Speaker   *May 2018*
- Led the presenting team at the College of Engineering graduation ceremony in introducing 270+ graduate students

Summer Camp by Ministry of Education   **Huraymila, Saudi Arabia**
Photography Tutor   *July 2013*
- Lectured a training course on fundamentals of photography for 20 youths in a summer camp

Huraymila Governorate   **Huraymila, Saudi Arabia**
Eid Photographer (Twice)   *2011, 2012*
- Collaborated with four other photographers to provide press reports of Eid Al-Fitr festival

SKILLS

- **Programming Languages:** Python, Java, MATLAB, LabVIEW
- **Frameworks:** TensorFlow, PyTorch
- **Languages:** English (Proficient), Arabic (Native)

RELEVANT COURSES

- **Machine Learning.** Stanford University   *June 2021*
- **LabVIEW FPGA.** National Instruments   *December 2020*
- **LabVIEW Core 1 and 2.** National Instruments   *October 2019*
- **Radar Summer School.** IEEE Aerospace and Electronic Systems Society   *April 2019*
- **English Program at UCLA Extension.** University of California, Los Angeles   *September 2014*