Rawan Shoaib

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EDUCATION

BSc in Systems and Biomedical Engineering, Cairo University | GPA: 3.2 — Expected Graduation July 2026

PROJECTS

NEUROGENERATIVE DESEASE CLASSIFIER — May 2025
- Developed a machine learning classifier for Alzheimer's and Parkinson's diseases using MRI scans, achieving 87.5% accuracy with an SVM model, and implemented preprocessing techniques, including histogram equalization.
- Implemented feature extraction pipeline, including first-order statistical measures, Gray Level Co-occurrence Matrix (GLCM), Local Binary Pattern (LBP), Wavelet, and Edge features, with T-Test as a feature selection method.

DIFFUSION TENSOR IMAGING RESEARCH (DTI) — May 2025
- Conducted comprehensive research on Diffusion Tensor Imaging and its medical diagnostic applications, detailing MRI fundamentals, brain mapping, and Diffusion Kurtosis Imaging for complex tissue characterization and clinical utility.

REAL-TIME IMAGE STUDIO — Mar 2025
- Developed a Python desktop application with a custom GUI for real-time image processing, implementing features like noise addition, spatial/frequency filtering, edge detection (e.g., Sobel, Prewitt, Robert, and Canny), and thresholding.
- Enabled users to load, process, and visualize images, incorporating algorithms for histogram analysis, hybrid image creation, Hough Transform (lines, circles, ellipses), and active contour segmentation, all implemented from scratch.

DIGITAL FILTER DESIGNER — Feb 2025
- Developed a desktop application in Python for designing digital filters, enabling interactive placement of zeros and poles, real-time filtering of signals, and c code generation for various filter forms (e.g., Direct Form II, Cascade).
- Integrated critical features such as frequency response visualization, precise phase correction with custom all-pass filters, and a library of common filter types (e.g., Butterworth, Chebyshev) for diverse signal processing applications.

BEAMFORMING SIMULATOR — Nov 2024
- Developed a 2D beamforming simulator in Python, enabling real-time visualization of constructive and destructive interference patterns for various phased array configurations and applications (5G, Ultrasound, Tumor Ablation).
- Implemented features for dynamic parameter adjustments (transmitter/receiver configurations, delays, frequencies) and phased array geometry customization (linear, curved) for interactive exploration of beamforming concepts.

SAMPLING-THEORY STUDIO — Oct 2024
- Developed a Python desktop application, to visually demonstrate signal sampling and recovery based on the Nyquist-Shannon theorem, enabling users to interactively compose, load, sample, and export signals at various frequencies.
- Implemented real-time visualization of original, sampled, and reconstructed signals, offering multiple reconstruction methods (Whittaker-Shannon, Lanczos, Cubic Spline), and allowing exploration of noise addition and aliasing effects.

MATHEMATICAL MODEL FOR OPTIMIZED GLIOMA RADIOTHERAPY [Paper Link], [Poster Link] — Dec 2023
- Compared Reactive-Advective-Diffusive (RAD) against Reactive-Diffusive (RD) model for glioma progression, highlighting the advective term's impact on tumor dispersion and prediction of smaller post-treatment tumor sizes.
- Analyzed various radiotherapy approaches using the RAD model, highlighting the benefits of dose fractionation through distinct tumor size phases (reduction, recession, regrowth) revealing insights for personalized glioma treatment.

CHESS GAME IN JAVA — May 2023
- Implemented a board representation that efficiently tracked each piece's location, type, and ownership using unique IDs and a live piece set, integrating customized rules for pawn, bishop, and knight movements for real-time gameplay.
- Developed a robust move validation engine, leveraging Object-Oriented Programming (OOP) concepts to ensure strict adherence to complex chess rules; integrated timing, piece death tracking, and score history for game management.

SKILLS

- **Programming Languages:** Python, Java, C
- **Web Development:** HTML/CSS, Flask
- **Database:** PostgreSQL
- **3D Graphics & Modeling:** Blender, OpenGL

INTERNSHIPS & AWARDS

Internships & Trainings:
- Completed a hands-on Sales Engineering Internship at Chalioungui Trading Company, gaining valuable practical experience in medical device sales by visiting many hospitals, and identifying customer needs - Aug 2024. [Certificate]
- Completed an Embedded Systems Internship at AMIT, contributing to the implementation of small projects on AVR microcontrollers, utilizing Atmel Studio for C code development and Proteus for simulation - Aug 2024. [Certificate]

Awards:
- Third Place and Shield Honor at 10th Undergraduate Engineering Mathematics Research Forum - Dec 2023. [Photo]