Mahmoud Sameh

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Highly motivated Electrical Engineering Graduate (4.95/5 GPA, top of the 61st engineering batch, Islamic University of Madinah) specializing in Artificial Intelligence and Control Systems. Demonstrated leader in university initiatives and national competitions, including selection for the prestigious KAUST AI Summer Training Program (top 100 nationally) and a significant contribution to a national victory (Prize of 150K) in SDAIA's Enjaz Hackathon. An avid learner, I have supplemented my formal education with advanced coursework from global institutions such as Harvard, KAUST and the University of Michigan. Possess extensive experience developing end-to-end solutions combining hardware (Embedded Systems, Robotics) and software (Python, C, Deep Learning frameworks), incorporating robust analytical and mathematical approaches. Proven expertise in creating, training, and applying novel methods to diverse deep learning architectures, including pretrained/foundation models like YOLOv11 and SAM 2, to achieve specific objectives. Eager to apply advanced technical skills to challenging problems and contribute to research in engineering and deep learning.

EDUCATION

Islamic University of Madinah
Graduated June 2025
Bachelor of Science (B.S.) in Electrical Engineering

- GPA 4.95/5 (Academic Record) (External Courses)
- STEP 92/100 (Test)

WORK EXPERIENCE

King Fahd University of Petroleum and Minerals **Jun. 2025 – Present**
Research Intern (Full-time)

- Conducted a comprehensive literature review on hyperspectral imaging in agriculture to synthesize state-of-the-art methods.
- Analyzed the technical limitations of a VIS-NIR (400-1000 nm) sensor for moisture detection and proposed a novel spatial-spectral 3D-CNN model to overcome these challenges by leveraging high-resolution textural data.
- Currently leading the design of a complete experimental protocol for creating a novel HSI dataset of date fruits, outlining the logistical workflow for sample scanning, standard oven-drying for ground truth validation, and data management.

Islamic University of Madinah **Apr. 2023 – Jun. 2025**
Engineering College Student Contributor (Part-time)

- Enhanced the Engineering College's visibility by managing social media presence and creating content.
- Led student teams on college-level projects, offering technical insights, devising novel approaches, and fostering teamwork.
- Contributed to shaping the college's public identity.
- Provided student perspective and feedback to faculty/staff regarding program initiatives and student engagement.

SKILLS

- Deep Learning
- Computer Vision
- Embedded Devices Programming
- Python (inc. Pytorch/Tensorflow/Pandas/CV2)

- Academic Research
- Leveraging Latest AI Tech
- Digital Signal Processing
- C Language
- Javascript/Django/HTML/CSS
- Circuit Design/Analysis
- Simulink/Simscape/MATLAB
- Control Theory
- SQL
- Data Preparation & Preprocessing

PROJECTS

- **Efficiently Adapting SAM 2 for Hand Drawn Circuit Diagram Segmentation** *(Research Paper)*
  Led research to efficiently adapt the SAM 2 foundation model for high-detail circuit segmentation in a low-data regime using a novel Parameter-Efficient Fine-Tuning (PEFT) strategy.
  Key Technologies: Python, PyTorch, LoRa, PEFT, Transformers
- **CircuitVision: AI-Powered Recognition and Analysis of Hand-Drawn Electrical Circuits** *(2nd Best Graduation Project in AI University-Wide)*

  Led development of a novel end-to-end system to convert circuit diagrams into simulatable netlists using a modular AI pipeline of object detection, CV algorithms, and a Large Foundation Model (SAM2).
  Key Technologies: Python, PyTorch, YOLOv11, OpenCV, SAM 2, Streamlit, PySpice
- **Nathir (ناظر): AI Legal Case Classification System** *(Enjaz Hackathon National Winner - 150,000 SAR Prize)*

  Co-developed an AI system to classify legal cases by implementing advanced prompt engineering for the Google Gemini LLM to interpret user input against the Saudi legal framework (winner prototype).
  Key Technologies: Python, Google Gemini API, Prompt Engineering, LLM Integration
- **Self-Balancing Robot (Inverted Pendulum) Using Deep Reinforcement Learning**

  Led a team in designing and simulating controllers (PID, MPC, DRL) for a two-wheeled self-balancing robot, culminating in the successful validation of a DQN agent.
  *Key Technologies***:** MATLAB, Simulink/Simscape, Reinforcement Learning Toolbox
- **Real-Time Fall Detection using YOLOv11 for Assistive Monitoring**

  Developed and fine-tuned a YOLOv11 model on a public dataset to identify fall events from images in real-time, achieving a ~5ms inference speed suitable for assistive applications.
  Key Technologies: Python, PyTorch, YOLOv11
- **AI for Housing Defaulter Prediction & Critical Case Detection** *(DAL Datathon)*

  Developed a dual-solution AI system using XGBoost for regional defaulter forecasting and a Restricted Boltzmann Machine (RBM) for critical case anomaly detection.
  *Key Technologies***:** Python, XGBoost, Restricted Boltzmann Machines (RBM), Pandas, Scikit-learn
- **Explainable AI for Cardiovascular Disease Risk Prediction using SHAP**

  Applied Explainable AI (XAI) techniques to a CVD risk prediction model, using SHAP to interpret global feature importance and local, patient-specific predictions.
  Key Technologies: Python, Scikit-learn, Pandas, SHAP, Matplotlib, Logistic Regression
- **Realigning Control Systems Labs: Bridging Theory with Practical Application**

  Initiated and led a student-driven project to enhance the Control Systems lab curriculum by introducing advanced MATLAB tools (System Identification) and real-world problem-solving exercises and experiments.
  Key Technologies: MATLAB, Simulink, System Identification Toolbox
- **Fuzzy Logic Control for Cart-Pole (Inverted Pendulum) Stabilization**

  Designed and implemented a Mamdani-type Fuzzy Logic Controller (FLC) in Simulink to stabilize the classic

inverted pendulum system against external disturbances.
Key Technologies: MATLAB, Simulink, Fuzzy Logic Toolbox

- **Autonomous Tennis Robot: WRO™ RoboSport Competition Design**

  Designed and built an autonomous mobile robot for the WRO™ RoboSport competition, using computer vision to detect, track, and propel tennis balls.
  Key Technologies: Python, Raspberry Pi 4, OpenCV, MATLAB, L298N Motor Drivers

- **PWM Transmitter and Receiver Design Using Generic Modules**

  Designed and prototyped an analog walkie-talkie system employing Pulse Width Modulation (PWM) to transmit audio signals over a 433MHz radio link without a microcontroller.
  Key Technologies: Analog ICs (TLC555, MCP602), 433MHz RF Modules, PCB Design, Oscilloscope

- **Hajj and Umrah Help Compass: Navigational Aid for Pilgrims**

  Led the design and development of a standalone, age-friendly handheld device to guide pilgrims to help centers using GPS and a magnetometer.
  Key Technologies: Arduino Nano (C/C++), GPS & Magnetometer Modules, Digital Signal Processing

- **Bookshelf: Full-Stack Book Management Web Application** *(Harvard's CS50x Final Project)*

  Developed a full-stack web application for managing a personal book library, handling the entire project lifecycle from database design to backend logic and frontend UI.
  Key Technologies: Python, JavaScript, Flask, SQLAlchemy, PostgreSQL, HTML/CSS, Bootstrap

- **Islamic University Table Organizer**

  Created a popular browser extension using JavaScript to parse and reorganize the university's schedule table into a more readable, color-coded weekly view.
  Key Technologies: JavaScript, HTML5, CSS3, DOM Manipulation, Browser Extension APIs

- **ReadImage: Discord OCR Bot**

  Developed a Discord bot using Python and Tesseract OCR to extract and display text directly from images shared in a channel, including deployment to Heroku.
  Key Technologies: Python, Discord.py, Pytesseract, Tesseract 5.x, Heroku

For More Details: https://www.linkedin.com/in/mah-sam/details/projects/

COURSES

- **Harvard University**
  CS50's Understanding Technology
  https://cs50.harvard.edu/certificates/a5b061d3-6096-4f6f-95f2-5abaf5068b45
  CS50's Introduction to Computer Science
  https://cs50.harvard.edu/certificates/a7046c46-5173-4d85-9b46-4e80d49e9e5f
  CS50's Introduction to Artificial Intelligence with Python
  https://cs50.harvard.edu/certificates/34fb726e-df28-4e23-b51a-567465d2ba36

- **KAUST Academy**
  Introduction to Artificial Intelligence
  https://drive.google.com/file/d/1PmtHOIsClAmkJRSYVuh4JTqRT2wR0jRy
  Advanced Artificial Intelligence
  https://drive.google.com/file/d/1rHS5PM1B7ybo28bhWVvomUxvcA3THdSQ

- **Deep Learning Specialization**
  Neural Networks and Deep Learning
  https://www.coursera.org/account/accomplishments/certificate/XBWLJMSRCNCS

Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization
https://www.coursera.org/account/accomplishments/certificate/5Q8CTZXHF4EJ
Structuring Machine Learning Projects
https://www.coursera.org/account/accomplishments/certificate/M2Q87MZHHAKB
Convolutional Neural Networks
https://www.coursera.org/account/accomplishments/certificate/JM3S3CAX5XSE
Sequence Models
https://www.coursera.org/account/accomplishments/certificate/QH6JBSPZLLWY

- **Michigan Python Specialization**
  Getting Started with Python
  https://www.coursera.org/account/accomplishments/certificate/K9KVLDVQXKPH
  Using Python to Access Web Data
  https://www.coursera.org/account/accomplishments/certificate/8UKZ8H7BRYAR
  Python Data Structures
  https://www.coursera.org/account/accomplishments/certificate/YDZ3SMSAW4BQ
  Using Databases with Python
  https://www.coursera.org/account/accomplishments/certificate/KRNULQNXL3F8
  Capstone: Retrieving, Processing, and Visualizing Data with Python
  https://www.coursera.org/account/accomplishments/certificate/YRHHAXYSJMJ6

- **Python 3 Programming Specialization**
  Python Basics
  https://www.coursera.org/account/accomplishments/certificate/AR59PT86Z8KV
  Python Functions, Files, and Dictionaries
  https://www.coursera.org/account/accomplishments/certificate/BZZCT7GUW6A9
  Python Classes and Inheritance
  https://www.coursera.org/account/accomplishments/certificate/KNX2VXSG6DPW
  Data Collection and Processing with Python
  https://www.coursera.org/account/accomplishments/certificate/KGKL8XMG6W4J

- **Mathematics for Machine Learning and Data Science Specialization**
  Calculus for Machine Learning and Data Science
  https://www.coursera.org/account/accomplishments/certificate/ZNPZ3QTJP4DR
  Linear Algebra for Machine Learning and Data Science
  https://www.coursera.org/account/accomplishments/certificate/YPFVMKE74NDK

- **Other**
  University of Sydney's Introduction to Calculus
  https://www.coursera.org/account/accomplishments/certificate/KGMLFXHWLZXW
  Google's Fundamentals of Digital Marketing
  https://drive.google.com/file/d/1OdIcmKzCOXIak9_PahnFkVkPe-Lsfb20
  University of Edinburgh's Introduction to Philosophy
  https://www.coursera.org/account/accomplishments/certificate/98GVTC427DLR
  Yale's Introduction to Psychology
  https://www.coursera.org/account/accomplishments/certificate/PF5THVRLQ47P
  Extensive Entrepreneurship Course
  https://drive.google.com/file/d/1Qld1C9ls_WXaPRMBtj52VcwJe99sWPue
  Essentials of Survey Methodology in Scientific Research Course
  https://drive.google.com/file/d/1G_3iRQgpgv_3s9dKEcYYTLn4n6ER897o
  Renewable Energy Course
  https://drive.google.com/file/d/1dQTvPW0x_uhsgE_Y1727oCOkc84cdjs-

PARTICIPATION & ACKNOWLEDGMENT

- **Acknowledgement of Academic Excellence** *(May 2025)* *(Certificate)*
- **13th International Cultural Festival** *(Apr. 2025)* *(Certificate)*
- **KSU Engineering Day Competitions** *(Feb. 2025)* *(Certificate)*
- **Enjaz Hackathon** *(Jan. 2025)* *(Certificate 1)* *(Certificate 2)*
- **WRO Saudi 2023 RoboSport** *(Oct. 2023)* *(Certificate)*
- **International Conference on Cyber Terrorism** *(Dec. 2022)* *(Certificate)*