Mohammed Yahya Yousif

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Profile Summary

Dynamic and innovative AI engineer specializing in computer vision, generative AI, and reinforcement learning. Skilled in developing AI solutions, system architecture, and solutions deployment, with a proven record of success. Robotics enthusiast. A motivated researcher with a keen interest in reinforcement learning and automation.

Education

University of Khartoum, B.S.c. in Electrical and Electronics Engineering — Oct 2015 – Dec 2021

- **GPA:** 8.91/10.0, First Class Honours degree.
- **Ranked #1st** in the Department of Electrical Engineering (Electronics and Computer Systems specialization).
- **Coursework:** Algorithms and Data Structures, Advanced Computer Architecture, Database Systems with MySQL, Computer Networks, Real-time embedded systems, OOP Programming with JAVA, Digital Systems Design with VHDL, Security Technology, Operating Systems, Digital Signals Processing.

Sudanese Secondary School Certificate Exam — Apr 2015

- **Ranked #1st** out of 365 in school and **top 0.1% nation-wise.**

Experience

AI Engineer, RediMinds, Inc – Michigan, USA — Mar 2024 – Now

- Improved document classifier accuracy from **82.0%** to **94.3%** using transfer learning from the RVL-CDIP dataset, and further to **97.0%** with advanced machine learning techniques.
- Developed an autonomous agent using **Llama3** to determine dispute eligibility under the Independent Dispute Resolution Law for six types of objections.
- Designed a deep learning system with a data extraction module, optimized **FFT**-based document rotation algorithm, DIP feature enhancements, **MongoDB** for performance monitoring, and **PPO for reinforcement learning with human feedback**, reducing complexity and saving resources.
- **Skills:** GCP, VertexAI, PyTorch, Torchvision, Colab, Deep-Learning, FastAPIs, LangChain, NLP, Llama3, Ollama

Cybersecurity AI Intern, RediMinds, Inc – Michigan, USA — Dec 2023 – Mar 2024

- Contributed as a key member of a research team developing a state-of-the-art commercial model for audio deepfake detection. A detailed project case study is available here.
- Developed a model using **ConvNext** architecture with **Convolutional Block Attention Module (CBAM)**, reducing the Equal Error Rate from **17.5%** to **8.5%**.
- Contributed to a novel data engineering method, achieving a model with a **2.04%** EER and **99.58%** F1 score.
- **Skills:** GCP, VertexAI, PyTorch, Torchvision, Torchaudio, Colab, Deep-Learning, FastAPIs, Javascript.

Cloud Engineering Intern, Ericsson – Remote — Mar 2023 – Oct 2023

- Received intensive training in 5G core networks, machine learning, and IT.
- **Skills:** Linux administration, SSH, Networking, 5G core network, 4G LTE core network, Python, Bash, IMS.

Teaching Assistant, University of Khartoum – Khartoum, Sudan — Oct 2022 – Mar 2023

- Led classwork and prepared tutorials and tests in microprocessor assembly language, deepening students' understanding of the subject.
- Designed and supervised experiments in the digital design lab, fostering a hands-on learning environment for students.
- **Skills:** Python, x86 assembly, Digital Logic ICs.

Publications

SHA-ZA: Advanced Reinforcement Learning for Othello Mastery Using Proximal Policy Optimization (accepted, Sep 2024)

Mohammed Yousif

The International Journal of Machine Learning ,code : [github] ,poster : [poster]

Enhancing Generalization in Audio Deepfake Detection: A Neural Collapse based Sampling and Training Approach Apr 2024

Mohammed Yousif, *Jonat John Mathew*, *Huzaifa Pallan*, *Agamjeet Singh Padda*, *Syed Daniya Shah*, *Sara Adamski*, *Madhu Reddiboina*, *Arjun Pankajakshan*

2404.13008

Design And Implementation of a Computer Vision-based Autopilot In a Simulation Environment Aug 2023

Mohammed Yousif, *Omer Salih*, *Magdi B M Amein*

10.22541/au.169175909.96817606/v1

Research Poster: NeurIPS 2022 [Link]

Awards

Best Research Paper, International Conference on Artificial Intelligence ICOAI 2024, Dubai UAE. (2024).

Best Undergraduate Research Project, ranked #1 out of 49, Department of E&E Engineering, University of Khartoum. (2022).

Zindi Umoja hackathon 2022 Sudan's country prize, Zindi (2022).

Best Academic Performance Award, Department of E&E Engineering, University of Khartoum (2021).

Best Project Award, ranked #1 out of 50, E&E Engineering Students Exhibition (2018).

Best Academic performance, King Fahad Secondary School (2015).

Chosen Projects

OthelloSHAZA: Mastering Othello via self-play and RL (Feb 2024) [github]

- Developed a PPO-based self-play process for training an Othello agent that outperforms the MiniMax engine up to depth 12 [click to view video], improving efficiency and speed over Monte Carlo Tree Search.
- Tools Used: Numpy, Numba, PyTorch, Multiprocessing

Computer-Vision Autopilot for Autonomous Vehicles (Apr 2022)

- A series of projects undertaken as part of my undergraduate thesis, focused on enhancing the vision modality of self-driving car autopilot systems:
  a. Development of an end-to-end autopilot system (enhanced from the NVIDIA end-to-end model) in a simulation environment. [video] [github]
  b. Training YOLOv4 on traffic signs using Microsoft COCO dataset.
  c. Improved semantic segmentation for self-driving cars using enhanced U-Net. [github]
  d. Genetic algorithm to train a stabilizer model.
  e. Self-driving robotic car. [github]
- Project report by Al-Arabi network [click to view video].
- Tools Used: Pandas, PyTorch, OpenCV, TorchVision, NumPy, MatPlotLib, Raspberry Pi, Colab

Eular (Aug 2018)

- Independently developed Euler, an IoT surgery robot with 4-DOF robotic arms, designed and modeled the mechanics, implemented back-end controls using Flask, and solved signal interference using a Faraday Cage.
- Tools Used: C++, Flask, JavaScript, HTML, CSS, Linux shell, Robotics, Auto-CAD, Raspberry Pi, Arduino.

Courses and Certificates

Deep learning specialization, DeepLearning.AI Aug 2024

- **Courses:** Neural Networks and Deep Learning, Improving Deep Neural Networks: Hyperparameter Tuning, Regularization and Optimization, Structuring Machine Learning Projects, Convolutional Neural Networks, Sequence Models Technology.

Fundamentals of Reinforcement learning, Coursera Sep 2023

Fundamentals of Quantum Computing, The Linux Foundation Aug 2023

Containers Fundamentals, The Linux Foundation Apr 2023

Essentials of Linux System administration, The Linux Foundation Apr 2023

Machine Learning Specialization, DeepLearning.AI | Stanford University Jan 2023

- **Courses:** Supervised Machine Learning: Regression and Classification, Advanced Learning Algorithms, Unsupervised Learning, recommenders, and reinforcement Learning.

Hardware Description Languages for FPGA Design, Coursera Aug 2022

Technologies

Languages: Python, C++, C, Java, SQL, JavaScript, Go.

Machine Learning: Pandas, Numpy, PyTorch, Torchvision, Torchaudio, Numba, Tensorflow, Keras, hugging-face, OpenCV, VertexAI, Colab, GCP, Matplotlib, scikit-learn.

Database: MySQL, PostgreSQL, MongoDB, Cassandra, MariaDB, SQLite.

Back-end: FastAPIs, Flask, Gin, Django, Nodejs.

Hardware: Jetson Nano, Raspberry Pi, FPGAs, VHDL, Verilog.

Volunteering

National Team Leader and Co-founder, League Of Robotics Africa May 2022 – Oct 2022

- Served as team leader, managing scheduling, communication, team support, and motivation.
- Developed a computer **vision-based PID** controller for lane tracing and constructed and trained a **MobileNetV3-based Single Shot MultiBox Detector (SSD)** on a custom synthetic dataset.
- **Skills:** Raspberry-Pi, Jetson Nano, Colab, PyTorch, OpenCV, Arduino.

Computer And Automatic Control Engineering Workshop, IEEE Sep 2021

- Delivered a workshop on computer engineering history, component distinctions, and machine learning basics with PyTorch.

EEESE Academic Committee Member, University of Khartoum Nov 2017 - Oct 2018

- Evaluated project proposals for the Electrical and Electronics Engineering Students Exhibition EEESE based on impact, financial feasibility, and risk, while assisting candidates in refining their proposals.

Academic Coordinator, University of Khartoum Oct 2016 - Oct 2017

- Successfully elected as an academic coordinator at the nation's most established public university.
- Excelled in managing communications between students and faculty, effectively representing my batch to the department and the Dean of the Faculty.
- Successfully maintained excellent relationships between students and faculty during a period of unusual events and upheavals on campus.