Mohammed Nagdi

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Education

- **The University of Edinburgh** *Sep 2023 - Aug 2024*
  Master of Science in Artificial Intelligence Edinburgh, United Kingdom
  - **Thesis:** Building GPT for System Identification
  - **Awarded the Google DeepMind Scholarship** from the University of Edinburgh
  - **Supervisor:** Prof. Filippo Menolascina | **Award:** Merit
- **University of Khartoum** *Oct 2014 – Oct 2020*
  Bachelor of Science "Honours" in Electrical and Electronic Engineering Khartoum, Sudan
  - **Thesis:** Deep Reinforcement Learning for Robotic Manipulation
  - **Supervisor:** Dr. Hiba Ali (Internal) Prof. Benjamin Rosman (External) | **Award:** First Class (8.17/10)

Experience

- **Software Engineer** *March 2023 - Present*
  Zain [zain] Remote
  - Developed APIs integrating the Charging system and Zain chatbot to enhance interactivity and functionality.
  - Collaborated with cross-functional teams and external partners (AWS, GitLab, WSO2, Datadog, Zain Group), effectively resolving integration challenges and optimizing system performance.
  - Engineered complex data integration solutions for the telecom BSS/OSS ecosystem, ensuring seamless information exchange between charging and billing systems.
  - Designed and implemented scalable infrastructure for GitLab and middleware, including setting up container registries and GitLab runners to support large-scale system integrations.
  - Architected and maintained scalable API infrastructures using WSO2 API Manager, transforming the middleware layer from a backend tool to a critical component for both internal and external system integrations, processing over 1M+ daily transactions with enhanced reliability.
- **Research Assistant** *Jan 2025 - Present*
  The University of Edinburgh London, United Kingdom
  - Lead research collaboration with the Kutz Research Group (University of Washington) on dynamical systems approaches to synthetic biology, addressing challenges beyond traditional time-series forecasting models.
  - Applied advanced methodologies, including Koopman operator, Dynamic Mode Decomposition (DMD), SHRED, SINDy architecture, and Kolmogorov-Arnold Networks (KAN), to model physical and biological systems like the repressilator and Duffing oscillator.
- **SRE – Enterprise Applications** *Oct 2021 - Feb 2023*
  QAST [QAST] Khartoum, Sudan
  - Designed analytical dashboards using Apache Superset, delivering actionable KPI insights that improved IT operations productivity by 10% and reduced report generation time by 40%
  - Implemented automated monitoring solutions using Centreon and custom Nagios scripts, enhancing system availability by 30% through proactive issue detection and resolution
  - Engineered Oracle Apex applications for task automation, reducing manual operational processes across multiple departments while ensuring data accuracy.
  - **Award:** Operational challenge – Q4 2022
- **Project Manager** *Feb 2021 - Aug 2021*
  Business Associates [BUSINESS ASSOCIATES] Khartoum, Sudan
  - Gathering product requirements, prioritising feature implementations and improving user experience.
  - Developed Arabic language data collection methodology in partnership with AI startup, successfully generating and processing dialectal datasets (Sudanese and Saudi) for BERT model pre-training, enabling the development of region-specific chatbot solutions with enhanced natural language processing capabilities.

Skills

- **ML & Data Science:** PyTorch, Scikit-learn, Hugging Face, Pandas, Numpy, NLP, Reinforcement Learning, LangChain
- **MLOps & Cloud:** GCP Certified, Docker, CI/CD pipelines, serverless architecture
- **Development:** Python, Java, Git, GitHub, GitLab, API development, microservices, WSO2
- **Database & Analytics:** Oracle, Postgresql, MySQL, Apache Superset, SAP

Projects and Publication

C=Conference, P=Project, T=Thesis

[C.1] **Mohammed Nagdi**, M. Saeed , B. Rosman, & H. Ali, " **Deep reinforcement learning for robotic hand manipulation.** " | Paper *Jan 2021*
Presented at the International Conference on Computer, Control, Electrical, and Electronics Engineering (ICCCEEE) 2021. IEEE.

- Conducted a research project focused on evaluating deep reinforcement learning techniques for dexterous manipulation in a continuous control environment simulating robotic arm and gripper tasks.
- Benchmarked the performance of three algorithms—DDPG, DDPG with HER, and PPO—across six multi-goal tasks using both sparse and dense reward settings

[C.2] **Mohammed Nagdi**, E-M. Nikolados , A. Yermakov , M. L. Gao , J.N. Kutz , & F. Menolascina " **Robust Identification of Synthetic Gene Networks via Koopman Autoencoders with Latent Memory**" *Nov 2025*
Paper Under review at the International Federation of Automatic Control.

- Developed a new architecture that utilizes the AFT layer as a latent memory
- Proposed Dynamical Re-encoding for Koopman subspace preservation

[T.1] **Building a GPT for System Identification**, Master Thesis. *Aug 2024*

- Developed a GPT-based model for system identification and time-series forecasting in dynamical systems by integrating Koopman theory, Kolmogorov-Arnold Networks (KAN), and Generative Pre-trained Transformers (GPT)
- Leveraged Koopman theory to provide superior multivariate support, surpassing the capabilities of current foundational models (e.g., Chronos, MOMENT, TimesFM)

[P.1] **Multimodal Transformer Fusion for Alzheimer's Disease Detection** *Apr 2024*

- Developed a novel multimodal architecture integrating PET, MRI, and CT scan data using CNN and UNet encoders, with transformer-based fusion, to enhance Alzheimer's Disease (AD) diagnostic accuracy.
- Designed and implemented a classification model for AD progression, leveraging UNet's downsampling path and attention mechanisms, outperforming baseline uni-modal CNNs.

[P.2] **Company SIC Classification & Summarisation Pipeline** *Jan 2025*

Developed an NLP system to classify and summarise unstructured company data using advanced transformer models. Built web crawlers to collect and preprocess textual data from diverse sources like company descriptions, LinkedIn profiles, and websites. Fine-tuned DistilBERT for multi-label SIC code classification to handle overlapping UK industry categories and optimised T5/LLaMA models for abstractive Summarisation of company profiles and news, tailoring them to domain-specific datasets for improved performance.

[P.3] **Ethical Considerations in AI Content Moderation** *May 2024*

Analysed Utilitarian and Deontological ethics in AI content moderation, focusing on the OpenAI-Sama partnership's impact on annotation workers. Addressed exploitation, mental health risks, low pay, and opaque AI processes, proposing improvements to worker well-being and ethical AI development.

Academic Leadership and Volunteer Roles

- **Organiser and Mentor** *Sep 2019 - Sep 2021*
  IndabaX Khartoum, Sudan
  - Mentoring and organising deep learning IndabaX Sudan Events for machine learning.
  - Managing event staff to help accommodate speakers, run workshops, and provide attendee support. Working out the event budget, and logistics.
- **Academic Committee member** *Feb 2017 - Jun 2017*
  EEESE (Electrical and Electronic Engineering Student Exhibition) Khartoum, Sudan
  - Part of the academic committee in which we collect project ideas for the conference, provide required guidance and organise seminars led by professors and senior students.

References

[References available on request]