M. Eng Muhammed Elyamani

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SUMMARY

Dedicated AI Software & Robotics Engineer with a Master's degree in Applied AI and Robotics from the University of Ottawa and a Bachelor's degree in Mechatronics Engineering from Mansoura University. Boasting a decade of experience in machine learning since engaging with Andrew Ng's course[1]. Proficient in full-stack development, mobile technology, edge & cloud-based AI, and robotics simulation with a strong background in data analysis. Completed numerous robotics projects during my undergraduate studies[2]. Eager to contribute further to the field through impactful research and practical applications in a Ph.D. program in Robotics and AI.

Skills

Technical Skills

- Programming Languages: Python, C/C++, Matlab, JavaScript
- Full Stack Web & Mobile:
  - Front End: React
  - Backend: Node.js and Flask
  - Database: SQL, NoSQL
  - Deployment: AWS Cloud
  - Mobile Development: React Native, Android, Kivy
- Simulation: ROS, Gazebo, Copliasim, Simulink, Monte Carlo Simulation
- Design CAD: SolidWorks
- Frameworks: TensorFlow, PyTorch, OpenCV, OpenAI, Mediapipe, and common Python frameworks
- Data: Gathering, Annotation, Analysis, Engineering, and Insight Extraction
- Computer Vision: Classical and Modern Deep Learning
- Control: PID, Adaptive Control

Soft Skills

- Problem-Solving & Analytical Skills
- Passion for Innovation

Freelancing Skills

- Proposal Writing
- Communication
- Presentation
- Return on Investment (ROI) Analysis

Research Skills

- LaTeX Writing
- Google Scholar, ChatGPT & Prompt Engineering, Writing Articles

EXPERIENCE

- **Researcher in medical assistive robotics & HRI** 10/2023 – 01/02/2024
  Remote, USA
- **AI Software & Robotics Engineer** 11/2022 – CURRENT
  Upwork – Freelancer — Remote, USA
  - Developed stable diffusion and chatbot applications with intelligent algorithms like GPT.
  - Integrated cutting-edge technologies to create intelligent mobile apps.
  - Utilized on-the-edge computing solutions without relying on APIs.
  - Troubleshot and resolved complex issues.
  - Utilized ROS (Robot Operating System) and implemented SLAM (Simultaneous Localization and Mapping) in cutting-edge robotics applications.
- **AI Software Engineer** 01/2023 – 05/2023
  Augmented Startups – Freelancer — Remote
  - **Responsibilities:**
    - **Model Development & Deployment:**
      - Developed and deployed object detection/semantic segmentation AI/ML models using Python and Python machine learning frameworks: PyTorch, TensorFlow, Keras, Scikit-learn, TensorFlow Lite, MediaPipe.
      - Optimized and deployed ML models on the edge (no cloud connection).
      - Built cross-platform mobile apps, leveraging expertise in various development frameworks and technologies.
    - **Educational Contributions:**
      - Provided tutorials.
      - As an instructor, contributed to the advancement of cutting-edge technologies in the field of AI.
    - **Innovative Solutions:**
      - **CrowdScope:** A desktop application designed to gather and analyze crowd statistics.
      - **SearchAPP:** A cross-platform mobile app designed for item searching.
      - **SignLingua:** A customizable cross-platform mobile app designed to facilitate communication with deaf individuals.
      - **TrafficState:** Developed an application deployable on cost-effective embedded devices for gathering crucial vehicle and traffic statistics, generating detailed reports in .xlsx format, and sending these reports to the cloud using the MQTT protocol.
      - **CardScan:** A cross-platform mobile app capable of extracting contact information from physical cards and converting it into digital form.

  "Sample of my work"
- **Computer vision Researcher** 01/2019 – 01/2021
  PyImageSearch – Full time— Remote, USA

- **Robotics Researcher** 01/2017 – 01/2018
  Fablab – Part time— Mansoura, EG
  - Worked with ADAS, and sensor fusion.
  - Steering of the car and lane detection.
  - Performed solutions by different sensors.
  - Established solutions with Kinematics, control like reinforcement learning, and embedded systems and perception.
  - Worked on multi-threads to speed efficiency by more than 50%.
  - Extracting distance from focal length.
  - Worked on sign detection and QR image recognition.

EDUCATION

MEng — Electrical And Computer Engineering, Applied Artificial Intelligence
01/2021 – 04/2022
University of Ottawa, Canada
GPA: A+

- **Specialization in AI and Robotics:**
  - Focused on the application of AI and Machine Learning in robotics, including object detection and semantic segmentation models.
  - Developed and optimized ML models for edge deployment in the Detection in ADAS system project.
  - Integrated ML models with the Robot Operating System (ROS).
  - Worked with control algorithms like reinforcement learning, PID, etc., to stabilize systems using Simulink.
- **Research and Development:**
  - Created a novel algorithm for feature extraction to detect DDOS attacks, honing skills in CNNs, transfer learning, hyperparameter tuning, and model evaluation.
  - Developed 3D CAD models for mobile and arm robots, importing them into simulation environments like Gazebo and CoppeliaSim.
  - Conducted research and comparisons between different methodologies for adaptive control, including model-free and model-based approaches.
  - Created research on using YOLO for car detection.
- **Practical Experience:**
  - Gained hands-on experience with cloud services for training and deploying models.
  - Worked with various wireless simulations, including crowdsensing, and IoT protocols like MQTT.
  - Gained practical experience in kinematics robots for manipulators and mobile robots.
- **Industry Knowledge:**
  - Understood country-specific robotics and wireless regulations.
  - Comprehensive understanding of different wireless standards like LoRaWAN, WiFi, 4G, 5G.
- **Business Acumen:**
  - Participated in business workshops, gaining insights into the business process, from idea generation to business planning and ROI determination.

- **Kaggle:**
  - Enhanced machine learning skills through active participation in Kaggle competitions, deepening understanding of training and testing data nuances.

B.Sc. — Mechatronics Engineering
2013 – 01/2019
Mansoura University, Egypt
GPA: 3.4 / 4

- **Robotics and Autonomous Systems:**
  - Developed an autonomous vehicle with an arm robot.
  - Worked with various mobile robots, including differential and racing robots, focusing on functionalities like lane detection, sign detection, and embedded control.
- **Mechanical Design and Implementation:**
  - Created a piston mechanical system to convert rotational motion to translational motion, from design to implementation.
- **Embedded Systems:**
  - Developed a secret protection system for a cabinet using embedded devices.
- **Electrical Engineering:**
  - Created electric circuits.
- **Competitive Participation:**
  - Participated in Formula Racing, gaining hands-on experience in high-speed control systems, sensor integration, and real-time data analysis.
  - Participated in Maker Faire with a robot that tracks objects.
- **Continuous Learning:**
  - Completed all mathematics skills on Khan Academy.

PUBLICATIONS

- "Optimization and Uncertainty Analysis in Transportation Logistics: A Monte Carlo Approach": Introduced a novel approach combining linear programming and Monte Carlo simulation to optimize transportation logistics amidst cost uncertainty, providing actionable insights for efficient and adaptable logistics management.
- "Adaptive Control in Mobile Robotics: Part 1 - Introduction to Adaptive Cruise Control": Discussed adaptive control techniques in mobile robotics with a focus on Adaptive Cruise Control (ACC), highlighting its relevance in the autonomous systems landscape.
- "From CAD to Simulation: The Power of SolidWorks and Beyond": Explored the integration of CAD models into simulation environments using tools like Simulink, Gazebo, and NVIDIA's Isaac Sim for testing control algorithms and machine learning models in virtual environments.
- "Spotlight: Laser Technology - My Insights on Material Processing": Shared insights on laser technology's applications in robotics and autonomous perception systems, and its broader impact across various sectors including medicine and manufacturing.
- "Probabilities of Different Events": Explored the complexities of simultaneous event occurrence, illustrating through diagrams and algorithms how understanding event relationships can simplify algorithm development for various projects.

Sample Code

RoboticToolkit: Applying Screw Theory in Robotics. This repository contains mathematical equations and corresponding code, supporting forward kinematics, motion analysis via the Jacobian, calculation of twist and joint velocities, and inverse kinematics. Screw theory integrates both the kinematics and statics of rigid bodies. GitHub Repository

ADAS project using ROS: GitHub Repository

Cruise Control: Utilizes Simulink and a PID controller to manage the speed of the robot. GitHub Repository

CrowdScope: A desktop application leveraging computer vision to recognize gender, age, and count people within a crowd, designed to work with videos from various devices. GitHub Repository

StreetStat: A mobile app for analyzing traffic patterns and vehicle usage by detecting and counting vehicles and people in real-time locally using a tflite model. Supports detection and counting of multiple object types in video streams. GitHub Repository

GTSAM_SLAM_VISION: SLAM project using GTSAM on Matlab. GitHub Repository

Web Application: Frontend and backend development using React, Node.js, and NoSQL. GitHub Repository

Coursework

- PyImageSearch Gurus: Computer Vision
- Sensor Fusion
- Data Structures and Algorithms
- Brain-Computer Interference

Awards and Honors

- Master's Degree from the University of Ottawa, awarded by the Egyptian Ministry for outstanding academic achievements.

LANGUAGES

- **Arabic:** Native language
- **English:** C1 Advanced

REFERENCES

1. Sample Certifications coursework
2. Undergraduate Robotics Projects