Hytham Tag

Mechatronics & Robotics Engineer
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PROFESSIONAL SUMMARY

Mechatronics and Robotics Engineer specializing in Deep Reinforcement Learning for adaptive robotic manipulation. Master's degree holder with 6+ years of teaching and research experience in robotics, AI, and control systems. Published researcher with proven expertise in nonlinear control, computer vision (OpenCV), and embedded systems. Led student teams to 9 international competition awards. Proficient in PyTorch, TensorFlow, ROS, C++/Python, and SolidWorks prototyping.

CORE COMPETENCIES

AI & ML: Deep Reinforcement Learning, Computer Vision, Neural Networks, PyTorch, TensorFlow, scikit-learn
Robotics: ROS, Kinematics, Motion Planning, SLAM, Sensor Fusion, PID Control, Manipulation
Programming: Python, C/C++, MATLAB, JavaScript, SQL, Bash, Git, Linux
Embedded: ESP32, STM32, Arduino, Raspberry Pi, NVIDIA Jetson, FreeRTOS, I2C/SPI/UART
Tools: SolidWorks, OpenCV, NumPy, Pandas, PCB Design, AutoCAD, MQTT/WebSocket
Web Development: MERN Stack (MongoDB, Express.js, React, Node.js), RESTful APIs

EDUCATION

Master of Technology in Mechatronics Engineering **September 2024**
Benha University, Egypt | GPA: 3.85/4.0 (Rank 1/Department)
Thesis: "Robotic Arm Control Based on Deep Reinforcement Learning"

Bachelor of Technology in Mechanical Engineering (Mechatronics) **July 2017**
Benha University, Egypt | GPA: 4.0/4.0 | Graduated 1st Rank with Excellent Honors

PROFESSIONAL EXPERIENCE

Assistant Lecturer | Benha University **October 2018 – Present**

- Teach 100+ students annually in Robotics, AI, Control Systems, Digital Control, ROS, and System Dynamics
- Supervise 15+ graduation projects yearly in robotics and embedded systems, guiding implementation phases
- Developed curriculum integrating deep reinforcement learning with hands-on robotics lab experiences

Part-time Research Assistant | Electronics Research Institute **January 2024 – Present**

- Research Deep Reinforcement Learning for autonomous mobile robot navigation and task planning
- Develop ML algorithms for path planning and obstacle avoidance, enabling adaptive robotic behavior
- Published peer-reviewed research on adaptive robotic grasping at IEEE AIRC 2024 conference

Full-Stack Web Development Intern | Information Technology Institute (ITI), Egypt **July – December 2025**

- Completed 450-hour intensive MERN stack bootcamp (MongoDB, Express.js, React, Node.js)
- Built full-stack applications with RESTful APIs and responsive front-end interfaces using React

Part-time Assistant Lecturer | TKH – Coventry University **January 2024 – June 2024**

- Taught third-year robotics and control systems modules via hands-on laboratory instruction
- Mentored final-year students on 3 robotics capstone projects using ROS, MATLAB, and embedded systems

Robotics Competition Mentor | Benha University **September 2018 – January 2024**

- Led 8+ student robotics teams in national and international competitions, coaching 9 award-winning projects
- Provided technical guidance on mechanical design, electronics, programming, and autonomous navigation

Founder & Lead Engineer | Mechatronics Solutions Startup **2018 – 2023**

- Founded startup delivering industrial automation solutions including CNC machines, 3D printers, and IoT

systems
- Engineered automated brass terminal machine reducing production time by 86% (15 to 2 minutes)
- Designed 5+ prototypes using SolidWorks, managing end-to-end execution from design to deployment

Part-time Maintenance Engineer | ZIEHM Imaging **January 2021 – December 2021**

- Performed maintenance and calibration on C-ARM medical imaging systems for 50+ procedures monthly
- Troubleshot technical issues in electronic and mechanical components, achieving 99% system uptime

KEY PROJECTS

Smart Agricultural Robot System | GitHub **January 2024 – February 2024**

- Designed ESP32-based IoT farming robot with soil moisture sensing and automated actuator control
- Developed Flutter mobile app with WebSocket protocol for real-time sensor monitoring and remote control

Railway Crack Detection System | Demo **April 2023 – May 2023**

- Developed real-time crack detection using YOLOv5 object detection with GPS tracking and mobile app interface
- Built Flutter mobile application for real-time monitoring and geolocation-based alerting system

CNC Drilling and Threading Controller | GitHub **January 2023 – February 2023**

- Created Arduino-based multi-axis CNC controller with LCD menu interface and EEPROM memory
- Programmed stepper motor control algorithms for synchronized multi-axis drilling and threading operations

5-DOF Robotic Arm with Deep Q-Learning | Demo **June 2022 – July 2022**

- Built autonomous manipulation system achieving 90%+ task success rate using DQN reinforcement learning
- Implemented complete pipeline: kinematics, RealSense point cloud processing, vision modules (ROS, PyTorch, OpenCV)

Genius Quiz - Alabakera Buzzer System | GitHub **March 2022 – April 2022**

- Designed interactive quiz platform connecting 12 tablets via MQTT with AVR-based buzzer hardware
- Developed cross-platform application using PyQt6 for quiz interface and Kotlin for tablet application

Underwater ROV Explorer | Demo **February 2020 – March 2020**

- Engineered PID-controlled remotely operated vehicle with neutral buoyancy for underwater exploration
- Integrated camera system and sensor feedback for precise underwater navigation and data collection

PUBLICATIONS

Adaptive Robotic Grasping with Replay Tail Memory Enhancement **April 2024**
H. A. Tag et al. | Proceedings of the 2024 5th International Conference on Artificial Intelligence, Robotics and Control (AIRC), IEEE

- Published peer-reviewed research on improving DRL sample efficiency for robotic manipulation tasks
- DOI: 10.1109/AIRC61399.2024.10671747

Genetic Algorithm Optimization of LQR Controllers for Gantry Crane **Under Review**
H. A. Tag et al.

- Developed hybrid optimization approach combining genetic algorithms with linear quadratic regulator control
- Demonstrated improved swing suppression and positioning accuracy for industrial crane systems

EnhancedPushGrasp: Improved Architecture for Robotic Manipulation **In Preparation**
H. A. Tag et al.

- Proposed novel neural network architecture for combined pushing and grasping in cluttered environments
- Enhanced manipulation success rates through improved visual servoing and action primitive integration

AWARDS & HONORS

Best Project Award | ISEIC Competition, Air Defense College **April 2022**

- Led student team to achieve Best Project Award at national engineering innovation competition
- Project presented to Egyptian Minister of Defense for autonomous surveillance system development

1st Place | Mine Sweeper Competition Worldwide, Malaysia LINK **March 2017**

- Won international championship for autonomous mine detection robot with computer vision capabilities
- Competed against 50+ teams from 15 countries, demonstrating superior navigation and detection accuracy

2nd Place | Mine Sweeper Competition Worldwide, Spain LINK **October 2017**

- Secured 2nd place in international Mine Sweeper competition with enhanced autonomous navigation system
- Implemented advanced sensor fusion algorithms for improved mine detection and obstacle avoidance

1st Place | Helwan Robotics Competition, Egypt 2016 LINK 2017 LINK **May 2016 & May 2017**

- Won consecutive 1st place awards in national robotics competition (2016 and 2017)
- Designed autonomous robots for task completion challenges including object manipulation and navigation

1st & 5th Place | IRC Robotic Challenge, Egypt/India (IIT Bombay) VIDEO LINK CODE LINK **November 2016**

- Led two separate teams to 1st and 5th places in international robotic challenge hosted by IIT Bombay
- Developed complex autonomous systems for multi-stage obstacle course and manipulation tasks

2nd Place | Helwan Robotics Competition, Egypt LINK **May 2019**

- Secured 2nd place in national robotics competition as team mentor and technical advisor
- Guided student team through mechanical design, programming, and competition strategy development

3rd Place | ROV Competition, Egypt LINK **June 2019**

- Earned 3rd place in Remotely Operated Vehicle competition with underwater manipulation capabilities
- Mentored student team in developing PID control systems for precise underwater navigation

Graduated 1st Rank with Excellent Honors | Benha University **July 2017**

- Graduated top of Mechanical Engineering (Mechatronics) department with perfect GPA of 4.0/4.0
- Received Excellent Honors distinction for outstanding academic performance across all coursework

4th Place | Mine Sweeper Competition, Zewail City, Egypt LINK **February 2016**

- Placed 4th in national Mine Sweeper competition at Zewail City of Science and Technology
- Developed autonomous navigation algorithms for mine detection in challenging terrain environments

CERTIFICATIONS

Machine Learning Specialization | Stanford University & DeepLearning.AI (Coursera) LINK **2025**

- Completed comprehensive specialization covering supervised learning, neural networks, and unsupervised learning
- Applied ML algorithms to practical projects including regression, classification, and recommender systems

Compilers (SOE.YCSCS1) | Stanford University (edX) LINK **2025**

- Studied compiler design principles including lexical analysis, parsing, and code generation techniques
- Implemented complete compiler pipeline for programming language translation and optimization

Automata Theory (CSX0005) | Stanford University (edX) LINK **2025**

- Explored formal languages, finite automata, context-free grammars, and Turing machines
- Applied computational theory concepts to algorithm design and complexity analysis

Probabilistic Graphical Models (Parts 1 & 2) | Stanford University (Coursera) PGM1 LINK PGM2 LINK **2025**

- Mastered Bayesian networks, Markov random fields, and inference algorithms for probabilistic reasoning
- Implemented belief propagation and MCMC methods for complex decision-making under uncertainty

Fundamentals of Network Communication | University of Colorado System (Coursera) LINK **2025**

- Studied network protocols, data transmission, and communication system architectures
- Applied networking concepts to IoT systems and embedded device communication

Algorithms (Searching, Sorting, Trees & Graphs) | University of Colorado Boulder (Coursera) SEARCHING LINK TREES LINK **2025**

- Completed comprehensive courses on data structures and algorithm design for efficient problem-solving
- Implemented advanced algorithms for path planning and optimization in robotics applications

Machine Learning Cross-Skilling Nanodegree | Udacity (Accenture) LINK **2022**

- Completed intensive program covering ML fundamentals, model deployment, and real-world applications
- Developed end-to-end ML projects including data preprocessing, model training, and evaluation

Machine Learning Engineer Nanodegree | Udacity LINK **2020**

- Specialized in advanced ML techniques including deep learning, reinforcement learning, and model optimization
- Built production-ready ML pipelines with cloud deployment using AWS SageMaker

Robotics Software Engineer Nanodegree | Udacity LINK **2019**

- Mastered ROS framework, SLAM algorithms, path planning, and robotic perception systems
- Developed autonomous navigation systems using Gazebo simulation and real robot platforms

Markov Analytics Advanced Machine and Deep Learning | Markov Analytics **2019**

- Completed 3-month program in Advanced Machine and Deep Learning.