Mostafa Lotfy

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EDUCATION

Northeastern University — Boston, MA
MS - Robotics - Electrical & Computer Engineering — *Sep 2024 - Jun 2026*

The American University in Cairo — Cairo, Egypt
BS - Computer Engineering, Minor in Mathematics; GPA: 3.72/4.0 (High Honors) — *Sep 2019 - Jun 2024*

University of Edinburgh — Scotland, UK
Visiting Student - Informatics; GPA: 3.56/4.0 (Very Good Performance) — *Sep 2022 - Jan 2023*

RESEARCH EXPERIENCE

Silicon Synapse Lab - Northeastern University — Boston, MA
Graduate Researcher — *Nov 2024 - Present*
- Integrated ORB-SLAM3 for localization and mapping in a bio-inspired Aerobat robot
- Refined a PID controller to operate using poses estimated from ORB-SLAM3 and OptiTrack

Know Center GmbH — Graz, Austria (Seasonal)
Visiting Researcher — *Jun 2024 - Dec 2024*
- Programmed and calibrated AlienGo quadruped robot to mirror user movements on the Omnideck, a 360 treadmill
- Incorporated quadruped dog robot, drone, and humanoid camera feeds into Unity for VR control, allowing users to stream selected perspectives at 30 FPS in near real-time
- Established a robust communication system between robots using a dockerized private cloud, enabling remote robot control across networks with an average latency of 21ms

EXPERIENCE

The American University in Cairo — Cairo, Egypt
Senior Projects Mentor — *Sep 2024 - Present*
- Guided a team on utilizing generative AI for task planning in autonomous joint ground and aerial missions
- Mentored a team in developing a peer-to-peer framework to enhance swarm control and collaboration among robots

Nethermind — London, United Kingdom
Blockchain Developer Intern — *Jul 2023 - Oct 2023*
- Optimized natural language-to-SQL translation by refining outputs and context data, achieving 84% accuracy querying 70M Ethereum transactions
- Built a liquid neural network to analyze multiple factors affecting Ethereum price trends and presented the findings in a report for investors to inform their decision-making

Benya Systems — Cairo, Egypt
AI & Computer Vision Engineering Intern — *Jun 2022 - Aug 2022*
- Created and deployed a deep learning-based face recognition system using PyTorch and OpenCV, achieving 93% accuracy as an attendance solution
- Analyzed two smart city projects' infrastructure through their central control room to identify weak points and deliver potential solutions

PUBLICATIONS

- A. Zaman, M. Lotfy, M. ElLeithy, M. ElSebae, N. ElSayed, "BA: Blended Apparatus, for Robot Embodiment for an Immersive Remote Experience" *In Preparation*
- M. Lotfy, A. Zaman M. ElLeithy, M. ElSebae, N. ElSayed, "Evaluating Dynamic Viewports for Remote Robot Telepresence" *In Preparation*
- M. Lotfy, M. Farag, T. Osman, A. Hany, M. ElAwadly, S. Zaghloul, "Khet-Shut: SDK for Creating Digital Twins for Autonomous Vehicles Based on a Dockerized Cloud Architecture" *In Preparation*

PROJECTS

- **Monocular Ground-Texture-Based SLAM Algorithm:** Applied robust, map-free navigation using only a downward-facing camera, enhanced for feature-sparse and low-visibility environments
- **ORBSLAM3 on Boston Dynamic's Spot:** Deployed ORBSLAM3 on Boston Dynamic's quadruped dog to map indoor buildings and staircases
- **Dead Reckoning For Autonomous Vehicles:** Implemented sensor fusion of IMU and GPS data to enhance yaw estimation and velocity computation, addressing sensor bias and noise
- **Self-Driving Car:** Developed perception, localization, and mapping modules for a self-driving car, enabling robust environmental understanding and autonomous navigation

SKILLS SUMMARY

Languages: C, C++, C#, Rust, JavaScript, Python, Verilog, React
Tools: OpenMMLab, TensorFlow, Pytorch, Keras, OpenCV, ROS1/2, Socketio, AirSim, Unity