

# Mostafa Lotfy

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## EDUCATION

### Northeastern University

Sep 2024 – Jun 2026

*Master of Science in Robotics; GPA: 3.7/4.0*

*Boston, MA*

**Courses:** Sensing and Navigation, Mobile Robotics, Reinforcement Learning, Musculoskeletal Biomechanics

### The American University in Cairo

Sep 2019 – Jun 2024

*Bachelor of Science in Computer Engineering; Minor in Mathematics; GPA: 3.72/4.0*

*Cairo, Egypt*

**Study Abroad:** University of Edinburgh, Scotland, UK

Sep 2022 – Dec 2022

## EXPERIENCE

### Silicon Synapse Lab, Northeastern University

Nov 2024 – Present

*Graduate Researcher*

*Boston, MA*

- Enhanced the flight control of a bio-inspired bat robot by refining a PID controller that integrates real-time pose estimation from ORB-SLAM3, achieving stable closed-loop hovering and precise stabilization
- Developed a testing framework for the bio-inspired bat platform in MuJoCo, integrating it with ROS2 and designing custom environments to simulate real-world flight dynamics and scenarios

### Know Center GmbH

Jun 2024 – Dec 2024

*Applied Scientist*

*Graz, Austria*

- Programmed and calibrated AlienGo quadruped robot to mirror user movements on the Omnideck, a 360 treadmill to facilitate remote teleoperation
- 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 architecture between robots using a dockerized private cloud, enabling remote robot control across networks with an average latency of 21ms

### Nethermind

Jul 2023 – Oct 2023

*AI Intern*

*London, United Kingdom*

- Improved natural language-to-SQL translation by integrating Retrieval-Augmented Generation (RAG) to refine LLM outputs with relevant context retrieval, achieving 81% accuracy in querying 70M Ethereum transactions
- Built a liquid neural network to analyze multiple factors affecting Ethereum price trends and presented findings in a report for investors to inform in decision-making

### Benya Group

Jun 2022 - Aug 2022

*AI Intern*

*Cairo, Egypt*

- Built an attendance system with a custom face recognition model built with PyTorch and OpenCV integrated into security camera streams achieving 81% accuracy
- Analyzed two multi-million dollars smart city projects' infrastructure improving AI efficiency in security by 21% by upgrading their vision models architecture

## PROJECTS

### Self-Driving Car Modules Development

Sep 2024 – Dec 2024

- Refined a monocular ground-texture-based SLAM algorithm for map-free navigation in feature-sparse and low-visibility environments, resulting in 90% trajectory overlap with ground truth
- Implemented a dead reckoning module using sensor fusion of IMU and magnetometer data for emergency navigation in GPS-challenged conditions by applying an Extended Kalman Filter (EKF), achieving 73% trajectory alignment
- Developed perception modules by leveraging LIO-SAM for LiDAR-based SLAM to handle dynamic environments and PyTorch Fast-SCNN for real-time obstacle detection and classification

### SDK for Digital Twin Generation for Autonomous Vehicles

Sep 2023 – Apr 2024

- Led SDK development and automated the communication layer generation for digital twin systems, enabling real-time simulation, testing, and deployment
- Assembled and programmed an autonomous drone and its digital twin, achieving a communication latency of 30ms between the physical drone and its virtual counterpart
- Built a high-fidelity simulation in AirSim and Unreal Engine, integrating bidirectional feedback with the physical drone via a cloud networking architecture for real-time scenario simulation

## SKILLS

**Languages:** Python, C, C++, C#, Rust, JavaScript, Verilog

**Miscellaneous:** TensorFlow, Pytorch, Keras, OpenCV, ROS1, ROS2, Socketio, AirSim, Unity, Docker, Gazebo, React