Amr Marey

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Education

- **University of Alberta** — Edmonton, Canada
  MSc in Electrical Engineering; GPA: 3.8 — *Sept 2023 - Dec 2025 (Expected)*
  Thesis Topic: Exploration of Optimization and Learning-based Motion Planning for Medical Robot Systems

- **University of Alberta** — Edmonton, Canada
  BSc in Electrical Engineering Co-op; GPA: 3.5 — *Sept 2018 - May 2023*
  Senior Courses: Intelligent Systems Engineering, Digital Control Systems, Power Electronics, Medical Robotics, Image Processing, Multimedia Signal Processing, Engineering Risk Management.

Skills Summary

- **Programming Languages**: C/C++, Python, MATLAB/Simulink, Assembly
- **Skills**: Deep/Reinforcement Learning, Robotics, Control Systems, Signal Processing, Electronics Design.
- **Software Tools**: ROS, Git, Linux, KiCad, LTSpice, LaTeX.
- **Languages**: English (fluent), Arabic (fluent), French (basic).

Experience

- **Telerobotic and Biorobotic Systems Research Group - University of Alberta** — Edmonton, Canada
  MSc Research Assistant - Prof. Qing Zhao and Mahdi Tavakoli — *Sept 2023 - Present*
  - **Research Topic I**: Developed and implemented new sampling-based Rapidly exploring random tree (RRT) motion planning algorithm for autonomous systems.
  - **Research Topic II**: Researched the application of optimization-based motion planning algorithms for bi-manual manipulators in medical settings.
  - **Miscellaneous**: Assisted lab-mates with different projects revolving around reinforcement learning (RL) and Vision-Language-Action (VLA) models.
  - **Funding**: Secured $54,934 over two years from external funding sources for my research.

- **Telerobotic and Biorobotic Systems Research Group - University of Alberta** — Edmonton, Canada
  Undergraduate Research Assistant - Prof. Mahdi Tavakoli — *May 2023 - Aug 2023*
  - **Maintain Pneumatic 3D-Printed Robot Arm**: Fix various broken parts of a 3D printed human upper-limb exoskeleton robot arm by adjusting screws, printing new parts, etc.
  - **Interface Robot Arm with Linux PC**: Developed embedded systems such that Linux PC can read various sensor readings and control the robot.
  - **Deep Learning-based Robotic Gravity Compensation**: Developed a a neural network based gravity compensation model for the robotic arm by running several data collection experiments.
  - **Meta-Learning for Human Personalization**: Assisted in the development of meta-learning algorithms to allow the robot-arm to be worn by all people regardless of age, gender, etc.

- **IDOBE Research Group - University of Alberta** — Edmonton, Canada
  Undergraduate Research Assistant - Prof. Yuxiang Chen — *May 2022 - Aug 2022*
  - **Lead Building Energy Monitoring Projects**: Led two energy-monitoring projects in two neighbourhoods located in South and Downtown Edmonton. The projects monitored the electrical, water, and gas energy consumption of several buildings.
  - **Designed Monitoring and Communication Systems**: Search, select, and install monitoring systems (data loggers & sensors) to monitor different building operation parameters (e.g., water flow rates, electricity consumption, temperature). Connected the monitoring systems to the internet through a router with RF communication.
  - **Data Collection and Analytics**: Collect and visualize data; and create and maintain detailed documentation of my work.
  - **Python Scripting for Automation**: Developed multiple Python scripts that save IDOBE graduate students from specific daily tasks.

- **Renewable Energy Laboratory - Prince Sultan University** — Riyadh, Saudi Arabia
  Undergraduate Research Assistant - Prof. Dhafer Almakhles — *Jan 2021 - May 2022*
  - **Read Graduate Level Literature**: Study detailed theoretical concepts across different disciplines, specifically in the power electronics and control theory areas, at the graduate level. Read data from different sources such research journals, books, etc. to obtain different general applications or specific scientific or technical data.
  - **IoT Embedded Systems**: Assist in the development of IoT-connected power electronics systems through C, Python, and MATLAB with a multi-disciplinary engineering team using multi-tasking embedded systems.

- **Power Electronics Circuit Design**: Design new DC-DC converter circuit topologies then simulate the circuits on Simulink. Develop the circuits physically after the design process.
- **Research Publications**: Wrote multiple research publications to various conferences and one journal paper.

- **Independent Tutor** — Edmonton, Canada
  Part-time contractor with TutorBright — *Jun 2022 - Present*
  - **Teaching**: Tutor students ranging from Grade 3 to Grade 12 various subjects such as math, chemistry, and physics. Provide weekly homework and discuss session outcomes with parents.

Selected Projects

- **Reinforcement Learning-based Robot Arm Grasping through PPO and VAEs** — Edmonton, Canada
  Course Project — *Jan 2024 - Apr 2024*
  - **Project Description**: This project explores the robot hand grasping problem utilizing AI techniques from deep learning and reinforcement-learning (RL).
  - **Model Development**: Developed a simulated robot arm RL agent that behaves according proximal policy optimization (PPO) and compressed image states through variational auto-encoders (VAEs).
  - **Documentation**: Wrote a report on the work done throughout the project highlighting its results and applications.
- **Deep Learning based Violence Detection on CCTV Cameras** — Edmonton, Canada
  Course Project — *Sep 2023 - Dec 2023*
  - **Project Description**: This project aims to provide an automatic violent detection (AVD) mechanism that can be deployed to detect violent situations on CCTV camera without human presence.
  - **Development**: Developed a deep learning model that leverages data augmentation techniques to enhance the performance of AVD models.
- **C3 Credit Card Sized Computer** — Edmonton, Canada
  University Capstone - Eleven Engineering Inc. — *Sep 2022 - Apr 2023*
  - **Project Description**: This project consists of the development of a micro-computer using the proprietary XInc2 processor developed by Eleven Engineering Inc. This powerful micro-computer is has an area of a credit card. The team size for the development of this board was eight people.
  - **Board Schematic Design**: Worked on the design of the user interface header schematics, designing the layout for the external LCD screen and keyboard, and provided clear terminal support to the end-user.
  - **Software Development**: Programmed the operating system drivers, overall firmware library, and UI headers that were installed on the micro-computer using the XInC2 C++ Clang-Based compiler.
  - **Documentation and Report Writing**: Wrote a requirements specifications report, revised design report, general documentation, and a final report.

Recent Awards

- Alberta Innovates Scholarship - $12,000 (Dec 2024)
- Natural Sciences and Engineering Research Council of Canada (NSERC) Master's Scholarship - $23,834 (May, 2024)
- Walter H Johns Graduate Fellowship - $7,100 (May, 2024)
- Alberta Graduate Excellence Scholarship - $12,000 (Nov, 2023)
- Natural Sciences and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Award - $6,000 (May, 2023)
- Natural Sciences and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Award - $6,000 (May, 2022)
- Theta Chi Gregory Ritson-Bennett Scholarship - $1,300 (Aug, 2022)
- Best Presentation Award at the 2021 IEEE Global Power, Energy, and Communication (GPECOM2021) Conference.