Armin Lotfy

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PROFILE

Innovative machine learning engineer with hands-on experience in energy management systems for electric vehicles (EVs) and microgrids. Skilled in Deep Learning (DL) algorithms such as LSTM and CNN, Reinforcement Learning (RL) algorithms like TD3, DDPG, PPO, and Multi-Agent systems, with advanced capabilities in Python, MATLAB, and TensorFlow. Proficient in designing data-driven models and performing feature engineering for real-time applications. Known for analytical skills, strong problem-solving, and clear communication, with a proven track record in both independent and collaborative settings.

EDUCATION

Ph.D. IN ELECTRONIC DIGITAL ENGINEERING
CARLETON UNIVERSITY
2020 – 2025 | Ottawa, Canada

PROFESSIONAL EXPERIENCE

Researcher Assistant
Carleton University
2020 – present | Ottawa, Canada

Teaching Assistant
Carleton University
2022 – present | Ottawa, Canada

SKILLS

Machine Learning and Deep Learning algorithms
TD3,MATD3, DDPG, PPO,MAPPO,SAC,CNN, RNN, LSTM

Programming & Tools
Python, MATLAB, TensorFlow, Git, Numpy,Scipy, Pandas, Matplotlib, LaTex, VScode, Linux

Specialized Knowledge
Deep Learning and Reinforcement modelling, RL-based controllers, Energy Management Strategies (EMS), battery modeling (ECM), battery aging and health management, cell balancing methods

PROJECTS

CTDE Framework for Battery Health Optimization
2024
Designed a Centralized Training with Decentralized Execution (CTDE) framework for SOC and state-of-health (SOH) equalization in multi-agent battery management.
- Leveraged Proximal Policy Optimization (PPO) agents to address multi-objective optimization, balancing current distribution for maximum performance and battery longevity.
- Achieved collaborative agent interaction through a shared reward function to maintain battery health and enhance system efficiency.

Multi-Agent Energy Management System for BEVs
2023
Project: Developed an energy management system using Multi-Agent Reinforcement Learning (MARL) for battery electric vehicles (BEVs).
- Created an environment based on Markov Decision Processes (MDP) and a reward function, implementing two TD3 agents for optimal energy efficiency and battery state-of-charge (SOC) balance.
- Successfully improved BEV driving range through real-time allocation strategies based on battery efficiency.

Proximal Policy Optimization-Based Power Sharing Controller for Smart Grids:
2024
Developed a smart grid controller using Proximal Policy Optimization (PPO) to dynamically adjust control signals in response to changing network variables, optimizing power distribution and enhancing grid efficiency.

PUBLICATIONS

Enhancing Energy Management Strategy for Battery Electric Vehicles: Incorporating Cell Balancing and Multi-Agent Twin Delayed Deep Deterministic Policy Gradient Architecture
IEEE Transaction on Vehicular Technology
2024

Centralized Multi-Agent SOC Control for Battery Health Using Proximal Policy Optimization in EVs
IEEE Transactions on Vehicular Technology
2024
Under review