Ahmed Abdulmaksoud

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OBJECTIVE

Motivated and technically proficient in AI/ML development, I aim to leverage my strong foundation in machine learning and software development to contribute to innovative solutions as part of a collaborative team. I seek to apply my skills in Python, machine learning pipelines, and Agile development to support transformative projects that positively impact technology and society

EXPERIENCE

Software Research Engineer October 2023 - Now

McMaster Automotive Resource Lab (MARC) *Hamilton, Ontario, Canada*

- Developed data-driven **transformer-based models** to estimate battery's state-of-charge and state-of-health with RMSE $< 1\%$, contributing to advancements in electric vehicle technology
- Spearheading the research and development of vision-based perception systems for Autonomous Vehicles with the Autonomous Group, implementing state-of-the-art techniques to enhance vehicle autonomy and safety

Development Engineer Intern May 2024 - August 2024

Stellantis *Windsor, Ontario, Canada & Auburn, Michigan, USA*

- Facilitated remote connections between overseas teams, resolving company network policies and permission issues, enabling the India team to conduct tests on the Lab computer in Michigan
- Automated the test files in the Design Validation Planning & Report document using Python and a Chroma-created library and CANalyzer
- Developed block diagrams using Simulink for battery charging modules, improving design clarity that was communicated to the suppliers to deliver the modules

Autonomous Perception, Team Leader October 2021 – September 2023

ASU Racing Team *Cairo, Egypt*

- Led visual perception engineering for an autonomous racing vehicle in the Formula Student AI competition in the United Kingdom, achieving 5th place
- Designed a cone-keypoint dataset to be used for feature extraction with emphasis on data-variance based on practical conditions (weather/lighting/shape..etc)
- Implemented a depth perception pipeline using a **mono-camera** to do visual odometry using deep learning and structure from motion
- Optimized **LiDAR** performance using geometric simulations to determine the optimal pose for deployment, aiming to maximize points/distance coverage
- Held an autonomous perception workshop with over 50 participants

Intern Software Engineer August 2022 – August 2023

Siemens Digital Industry Software *Cairo, Egypt*

- Engineered an internal tool in Python for multi-level parsing and comparison of regression tests on Integrated Circuits, achieving significant efficiency gains (about 5x better performance compared to the previous tool) in handling massive files (50 MBs - 2 GBs) by using **parallel programming** to optimize the tool performance
- Established an **automated regression testing** system for the tool, streamlining development cycles and ensuring seamless deployment on RedHat Linux using bash script

Intern Full Stack Software Engineer July 2021 – December 2021

Applied Innovation Centre *Giza, Egypt*

- Designed the frontend to a GIS project "Field Boundary Classification," using ReactJS and React-Redux
- Worked with the backend team to design **RESTful-APIs** using Flask and MongoDB to support frontend requests, emphasizing performance for seamless user experience
- Achieved a threefold increase in prediction process efficiency by implementing a streamlined **process queue for GPU resource allocation**, coupled with real-time monitoring of prediction progress through web-sockets, resulting in enhanced visibility on the frontend

EDUCATION

Masters of Applied Science in Mechanical Engineering — Hamilton ON, Canada
McMaster University — *September 2023 - Expected August 2025*

- Courses: Deep Learning, Machine Learning, 3D Computer Vision, Management and Control of EV Batteries, IOT
- GPA: 4.00 (A+)

Bachelors (Hons) of Computer Engineering — El Sarayat, Cairo, Egypt
Ain Shams University — *September 2018 - July 2023*

- Specialization: Data Science and Machine Learning
- GPA: 3.44 (Excellence with honors)
- Thesis: Autonomous Drones for Environment Mapping (A+)

SKILLS

Programming Languages: Python, C++, Javascript, Java, SQL, HTML, CSS
Machine/Deep Learning: PyTorch, Weights and Biases, MLFlow, Numpy, Scikit-learn, Pandas, Matplotlib
Topics: Computer Vision, Generative Models, Robotics, Web Development, App Development, Data Analysis, NLP
Software Frameworks and Tools: OpenCV, ROS, Flask, NodeJS, React, Bootstrap, Material UI, MongoDB, Postgres SQL, Docker, Kubernetes, Cassandra, AWS, Agile, Git, GitHub, CI/CD, Microsoft Office
Simulation: Carla, Airsim, CoppeliaSim

PROJECTS

Deep Stereo Depth Estimation
Skills: PyTorch - Computer Vision - Deep Learning - Optuna - Weights&Biases — GitHub Link

- Developed and optimized a deep learning model for **stereo depth estimation utilizing a UNet-based architecture** with lightweight modifications to both the architecture and the loss function, leveraging stereo information for depth estimation. Employed Optuna for hyper-parameter tuning and Weights and Biases for training tracking, achieving superior performance on the 3D Ken Burns dataset.

Autonomous Drones For Environment Mapping
Skills: PyTorch - ROS - 3D Mapping - Computer Vision - Path Planning - Networks — GitHub Link

- Worked collaboratively to develop an autonomous drone tailored for indoor mapping, integrating a stereo camera, IMU, and Raspberry Pi for base station communication via UDP. Employed **Deep SDF and NeRFs** to generate 3D maps, utilizing deep learning techniques and transfer learning for generating the depth maps for environment perception. Additionally, implemented an **exploratory planning algorithm** to optimize mapping of unexplored areas.

GANVAS
Skills: Pytorch - Python - Neptune.AI - Deep Learning - Deep Generative Models — GitHub Link

- PyTorch implementation of various **generative models** including: Autoregressive models, Normalizing Flows, Variational Autoencoders, and Denoising Diffusion models.

AWARDS

Formula AI, 5th Place, 2023
5^{th} *Place, UK*

International Conference on Smart Cities Competition, 2023
2^{nd} *Place, Egypt*

GO AI Hackathon by Synapse Analytics, 2021
3^{rd} *Place, Egypt*

EXTRA-CURRICULAR ACTIVITIES

Web Development Instructor — November 2021 – July 2022
STP — *Dokki, Cairo, Egypt*

- Designed and delivered a comprehensive curriculum, leading a team to instruct over 50 students in backend web development and deployment practices. Covered essential technologies, including Flask, Flask-SQLAlchemy, Docker, and AWS deployment
- Applied data analysis techniques to evaluate participants' performance, leveraging insights to refine and optimize the course structure