DIRAM TABAA

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EDUCATION

Carnegie Mellon University *Aug '20 - May '24*

BSc in Computer Science (College Honors0 *4.0/4.0 GPA*
Minor in Mathematical Sciences

EXPERIENCE

Research Associate

Carnegie Mellon University *Jun '24 - Present*

- Conducted research on developing AI-driven mobile robots for greenhouse monitoring, including fruit counting, pest detection, and hyperspectral fruit property analysis.
- Pioneered the creation of a novel 3D representation for greenhouse environments using RGB-D photos, optimizing training pipelines for deep learning models.
- Proposed and Implemented a novel approach to integrate Fiducial Markers in Gaussian Splatting simulations.
- Adapted Gaussian splatting methods for reconstructing greenhouse plant environments, enhancing model performance.
- Authored a workshop paper evaluating informative view planning for plant environment reconstruction, comparing state-of-the-art approaches and connecting challenges to the orienteering problem.
- Proposed a novel labelling approach for image-based fruit segmentation using unsupervised instance segmentation neural networks.

Full-Stack Developer

Qatar Environment and Energy Research Institute *Jun '23 – Apr '24*

- Designed and implemented a robust Django backend, enhancing smart meter data integration through a REST API.
- Oversaw and optimized a PostgreSQL database, ensuring streamlined and efficient data storage.
- Incorporated a JWT-based authentication system to prevent non-authorized injection of energy readings.
- Dockerized the entire infrastructure for streamlined deployment and scalability.

Software Development Intern

Qatar Environment and Energy Research Institute *May – Nov '22*

- Played a pivotal role in the PV nanogrid project, focusing on enhancing IoT device networking capabilities.
- Enabled data transmission from MKR1000 boards to the cloud using a proprietary RESTful API.
- Performed power load simulations leveraging advanced Photovoltaic cell equipment.

PUBLICATIONS

GreenhouseSplat: A Dataset of Photorealistic Greenhouse Simulations for Mobile Robotics

Preprint (2025)

Diram Tabaa and Gianni Di Caro

Fiducial Marker Splatting for High-Fidelity Robotics Simulations

Preprint (2025)

Diram Tabaa and Gianni Di Caro

SampleLapNet: A Learnable Laplacian Approach for Task-Agnostic Point Cloud Downsampling

Undergraduate Thesis (2024)

Diram Tabaa and Gianni Di Caro

PROJECTS

Pebbles: a UNIX-like kernel from scratch

- Engineered a Unix-like kernel supporting paging, preemptive multitasking, and essential system calls.
- Created keyboard, console, and timer device drivers, enhancing hardware-software integration.
- Addressed complex kernel debugging issues, especially in virtual memory and concurrency.
- Handled hardware and software interrupts and exceptions in the Interrupt Descriptor Table (IDT).
- Implemented context switching, mixing C and assembly languages and managing mode transitions.

MyTorch: Deep Learning Framework

- Implement library routines to create neural network models, train them, and test such trained models.
- Implemented modules: Linear Neural Layers, Activation Functions, Convolutional Neural Layers, LSTMs and GRUs, Cross-Entropy and CTC Loss, Dropout and Batch-Norm.
- Implement Autograd functionality for Linear and Convolutional layers.

SKILLS

Industry Knowledge
Data Structures & Algorithms, Machine Learning, Computer Vision, Point Cloud Deep Learning.

Programming Languages
Python, Java, C/C++, x86-64 ASM, arm ASM, SML, JS

Technologies and Frameworks
Linux (Debian), Docker, Git, AWS, Shell (Bash), Pytorch, LaTeX, gdb/valgrind/gcc, numpy, simics, PostgreSQL

Languages
Arabic (Fluent), English (Fluent), French (Elementary)