SAMIR KHAKI

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Award Recognitions: Canadian National Dyson Award, Canadian Army Cadet Service Medal, LT. Governor's Award

Conference Recognitions: ICCV-2023 Paper, CVPR-2023 Paper, IEEE CVPR & ECCV 2022-23 Reviewer, IEEE SPICES Best Paper Award

EDUCATION

University of Toronto · *B.Sc. Eng., Computer Engineering; Minors: A.I. & Mechatronics & Business* **Sept. 2019 – May 2024**

SUMMARY OF SKILLS

- **Languages:** C, C++, Python, MATLAB, Java, JavaScript, Typescript, SQL, HTML 5, Assembly ARMv7, Verilog, CUDA
- **Tools/Frameworks:** Flask, Django, Docker, React, PostgreSQL, Cantaloupe, Socket Programming, GTK, OS Design & Parallel Computing, Cloud Infrastructure and Development Kits
- **Certifications:** IBM Machine Learning Specialist, Microsoft Azure AI Engineer, and AWS Cloud Practitioner
- **AI & Optimization:** TensorFlow, PyTorch, Objective Function Design, Computer Vision, NLP, Generative Modelling, Reinforcement Learning, Stochastic Algorithm Design, Contrastive Learning, Signal Processing, Feature Engineering
- **Robotics & Electronics:** Arduino, Raspberry Pi, Signal Generators, Sensor Technologies, Digital System Design, Computer Architecture, Real-Time Controllers/Compensators

INDUSTRY EXPERIENCE

IBM · Machine Learning Engineer **May 2022 – Ongoing**

- Designed, prototyped, and integrated 25+ end-to-end computer vision pipelines with custom architectures for facial analysis and object detection into AWS Cloud infrastructure for 3 multi-million-dollar client projects
- Pioneered a fully differentiable model-pruning scheme yielding a 3.5x acceleration in inference time through a 70% increase in computational efficiency and a 50% reduction in on-demand memory usage, creating edge compute integration through IoT

AMAZON · AWS Data Protection, Software Development Engineer Intern **May 2023 – Sept. 2023**

- Complex feature development, testing, and productionalization for memory optimized accessibility services across all 16 Backup resources including Simple Storage (S3), Cloud Compute (EC2) and the CloudFormation stack
- Integration of backlog features into existing applications via cloud infrastructure and CI/CD based Cloud Development Kits for automated testing and promotion policies

UNIVERSITY of TORONTO · Kostas Plataniotis, *AI & Computer Vision Engineer/Researcher* **May 2021 – Ongoing**

- Built a Neural Architecture Search (NAS) pipeline to leverage inter-layer dependencies with a bilateral optimization approach to create a custom searching algorithm yielding a 45% reduction in computational expense (ICMLA 2021)
- Developed an end-to-end training pipeline using a custom loss function to conjoin contrastive kernel representations and multi-modal feature distributions outperforming competitive methods on the Microsoft-COCO and Pascal-VOC datasets while maintaining a 35% reduction in computational complexity (NeurIPS Submission 2023)
- Designed a Dataset Distillation pipeline using a custom feature loss to minimize training costs and maintain generalization, while improving accuracy by 7% with a 5x acceleration and 3x reduction in GPU memory (ICCV Accepted 2023 & U.S. Patent Pending)

MANNLAB · Steve Mann, *ML & Mechatronics Engineer/Researcher* **May 2021 – Dec. 2022**

- Architected, designed, and built software encoded sensing tools and spatial visualization mediums for multiple clients use cases including UAV/autonomous vehicle navigation, remote sensing, and electrical infrastructure

ACADEMIC EXPERIENCE

UNIVERSITY of TORONTO · Faculty of Engineering, *Graduate Course Teaching Assistant* **May 2021 – Apr. 2022**

- Graduate course teaching assistant for ECE516: Intelligent Image Processing, under the direction of Steve Mann
- Selected by the Vice Dean Engineering as an Academic Instructor for computer engineering based on knowledge and proficiency.
- Evaluated the significance and efficacy of research projects submitted by computer engineering undergraduate students, as co-Chair of the inaugural UofT Research Showcase

Recent Personal Projects & Publications

Software & ML Projects

- *Collaborating with the Massachusetts Institute of Technology: HAN Lab for a novel efficient semantic segmentation conference paper*
- *Developed a novel pruning framework for model compression using frequency analysis through consultation with Prof. Jimmy Ba for CVPR*
- *Developed core-feature implementation of an operating system. For Thread Management I used Synchronization Primitives and CV's. For Virtual Memory, I developed a core map/TLB management, page replacement and swapping algorithms*
- *Developed a digitally defined Oscilloscope implemented in C & Assembly for ARMv7 Architecture with I/O support for phase tracking on HEX displays, and multi-harmonic Fourier Transforms with linear/time-variant cartesian and polar signals*
- *Created a GIS Interface for navigating and delivery scheduling in C++ using parallel programming and algorithmic optimization including: A*, Greedy and Dijkstra, in addition to a front-end GUI using EZGL and GTK API's*
- *Designed a High Dynamic Range image converter using a CNN architecture to expand the Low Dynamic Range composites*

Top Conferences:

- *ICCV [Patent Pending] – 1st Author Equal Contribution – DataDAM: Efficient Dataset Distillation with Attention Matching*
- *NeurIPS Pending – 1st Author Equal Contribution – Multilabel Probabilistic Contrastive Learning (Currently available on Arxiv)*
- *CVPR ECV – 1st Author – CFDP: Common Frequency Domain Pruning*
- *ICMLA – 1st Author Equal Contribution – Efficient and Versatile Auto-Channel Size Optimization for CNNs*
- *10+ Additional AI & Applied ML-Mechatronics Papers Published*