Alexandre Kirchmeyer

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EDUCATION

Carnegie Mellon University — **Pittsburgh, PA**

Master's degree in Machine Learning (MSML) | Current GPA: 4.06/4.0 — *Sep. 2022 – Dec. 2023*

- Pursuing research under the supervision of Pr. Deepak Pathak in Computer Vision and Embodied AI.
- Relevant Coursework: *Multimodal ML, Visual Learning and Recognition, Deep Reinforcement Learning, Intermediate Statistics, Convex Optimization, Probabilistic Graphical Models, Advanced Introduction to ML, ML in Practice.*

École Polytechnique — **Palaiseau, France**

Engineer Program, Master's degree in Math and CS: Image, Vision and ML Track | GPA: 3.90/4.0 — *Aug. 2019 – Aug. 2022*

- Relevant coursework: *Deep Learning, Computer Vision, Shape Analysis, Intro to NLP, Algorithm Analysis, Randomized Algorithms, Optimization and Control, Markov Chains and Martingales, Logic and Computing, Galois Theory*

PUBLICATIONS

- **Alexandre Kirchmeyer**, Jia Deng, *Convolutional Networks with Oriented 1D Kernels,* ICCV, 2023. [paper] [code]

AWARDS

- *Ranked 4th out of 107* at the ACM ICPC SWERC 2020-2021 European Algorithmics Contest — *Mar. 2021*
- *Ranked 3rd out of 12* at the ICPC Ecole Polytechnique Championship 2020 — *Jun. 2020*
- *Ranked 8th out of 62* at the French-Australian Regional Informatics Olympiad 2017 — *Mar. 2017*
- *USACO Platinum* level — *Dec. 2016*

SKILLS

Programming: C/C++, Python, CUDA, JavaScript, Pytorch, JAX, OpenGL, Slurm, ArchLinux, ROS, Raspberry Pi, ReactJS
Languages: French (native), English (native), German (intermediate)

EXPERIENCE

LEAP Lab, Carnegie Mellon University — **Pittsburgh, PA**

Research Assistant – Advisor: Pr. Deepak Pathak, CMU Robotics Institute — *Apr. 2023 – Present*

- Learning RL catching policy in simulation and transferring to real-world via policy distillation / Rapid Motor Adaptation.
- Perception using 3D vision (SDF, pointcloud, depth), supervised by dexterous grasping (DexGraspNet losses, eigengrasps)

Independent Study - Advisor: Pr. Deepak Pathak, CMU Robotics Institute [notes] [code] — *Dec. 2022 – Mar. 2023*

- Explored the use of diffusion models for single-view 3D reconstruction (à la DreamFusion / Zero123).
- Fine-tuned StableDiffusion for image-conditioned generation with LoRA/ControlNet/InstructPix2Pix frameworks.
- Generated multi-view synthetic data with MiDaS and different in-painting procedures to improve 3D geometry.

Princeton Vision and Learning Lab, Princeton University [paper] [poster] [code] — **Princeton, NJ**

Visiting Student Researcher – Advisor: Pr. Jia Deng, Princeton Vision & Learning Lab — *Mar. 2022 – Aug. 2022*

- Explored the following question: Can we make ConvNets work without 2D?
- Researched the use of a novel *oriented 1D* convolution operator, to improve the long-range scaling of CNNs at linear cost.
- Implemented personalized CUDA kernels (from scratch) which are up to 50% faster than PyTorch.
- Trained fully 1D ConvNeXt models, demonstrating that our 1D approach can match 2D on image classification, semantic segmentation and object detection. 1st author publication at ICCV 2023.

HarfangLab Cybersecurity Startup — **Paris, France**

Research and Development Intern — *Jun. 2021 – Sep. 2021*

- Implemented a C/C++ Windows user-mode driver to detect malicious behavior through DLL injection and API hooking.

PROJECTS

Concept Learning and Understanding [report] [poster] [code] — **Pittsburgh, PA**

Carnegie Mellon University, Multimodal Machine Learning Course Group Project — *Sep. 2022 – Dec. 2022*

- Examined whether multimodal models learn and understand concepts. Proposed to learn concepts with auxiliary learning, mine concepts using prefix tuning, and improve causal robustness with diffusion-based data augmentations.
- Selected as one of the two *Best Midterm Presentation* for the course out of 24 groups.
- With synthetic data augmentations, we improve the accuracy of the ViLT model on Visual7W to color questions by +10%.

Non-Rigid Shape Correspondence [report] [code] — **Palaiseau, France**

Independent Study – Advisor: Pr. Maks Ovsjanikov, GeoViC Group, INRIA & LIX — *Sep. 2021 – Mar. 2022*

- Examined the use of hyper-networks and deformed implicit fields for the task of non-rigid 3D shape correspondence.
- Re-implemented Microsoft DIF-Net on JAX and evaluated shape correspondence performance on KeypointNet dataset.
- Studied limitations of architecture, devised and tested hybrid correspondence approach based on analysis.

Electrically powered rocket project for vertical landing optimization [paper] — **Palaiseau, France**

École Polytechnique, Mechanics Department — *Sep. 2020 – Sep. 2021*

- Led a 5-student team to build an electrically powered rocket for vertical landing optimization, directed by a thrust vectoring system and controlled by an LQR algorithm.
- Presented work at the *International Astronautical Congress (IAC) Student Conference*, Dubai, U.A.E., Oct. 2021.