Robot Learning, World Models, Representation Learning

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MSc in Robotics and Computer Engineering working on world models for robotics. Research interests: efficient and structured world models, representation learning, embodiment transfer, and planning under uncertainty.

Selected Research Projects

Patch-Level Diffusion Forcing for Robot Video – Ongoing Research — Present, France

- Extended MSc thesis world model with patch-wise noise schedules for DINOv2 robot-video latents, motivated by inefficiency in learning object/contact regions
- Preliminary BridgeData V2 experiments reduced held-out rollout MSE at horizon 20 by 28% over the frame-level baseline

Diffusion World Models for Robotics – MSc Thesis — Oct 2025 - May 2026**,** Tartu, Estonia

- Built a 400M-parameter DINOv2-latent diffusion model for action-conditioned robot video prediction
- Converted UR5, BridgeData V2, EPIC-KITCHENS, SOAR, and DROID data into a unified LeRobot-style pipeline
- Trained spatial-temporal Transformers with Diffusion Forcing using DDP on H200 GPUs
- Showed that passive external video improved held-out UR5 rollout MSE at horizon 20 by 24%, used CEM over latent rollouts for visual goal planning, reaching approximately centimeter-scale terminal error

Action-Conditioned Surgical EB-JEPA – Hackathon — June 2026**,** Paris, France

- Adapted JEPA into an action-conditioned latent world model for Hamlyn dVRK surgical video
- Evaluated autoregressive rollout behavior and performed ablations on anti-collapse components

Professional Experience

STMicroelectronics – Global leader in semiconductors — Grenoble, France
R&D Deep Learning Intern — 4 months - 2025

- Developed a trainable and differentiable Lithography Simulator on GPU, combining a physics-based optical model (Hopkins) with a CNN for resist modeling
- Implemented an inverse-lithography (ILT) mask optimization pipeline using gradient-based optimizers

Virtual Incision – Surgical robotics startup — Lincoln, USA
R&D Deep Learning Intern — 4 months - 2024

- Developed a PoC for automated surgical needle-picking and handoff via imitation learning on a dual-arm surgery robot, implemented an Action-Chunking Transformer (ACT)
- Designed a real-time video upscaling GAN, implemented EDSR and ESRGAN papers (2K -> 4K)
- Implemented real-time inference deployment on NVIDIA Holoscan, reaching ~50ms latency

Education

Tartu University, Dual Degree – MSc in Robotics and Computer Engineering — Tartu, Estonia
Student Researcher at IMS Lab (Intelligent Materials & Systems) — Sept 2025 - May 2026

ECAM La Salle – Mechanical and Electrical Engineering degree — Lyon, France
Specialization in Robotics & Automation — Sept 2021 - June 2026

Skills & Interests

- **ML :** Diffusion, Transformers, Computer Vision, PyTorch, NVIDIA Holoscan, multi-GPU training (DDP)
- **Programming :** Python, C/C++, Git, ROS, Arduino, Docker
- **Languages :** French (Native), English (Fluent - IELTS 7.5), Spanish (B1)
- **Interests :** Ski, Climbing, Swimming, Volley-ball, Keeping up with AI literature