

Ivan Puhachov

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PhD: Computer Graphics, Generative AI

with applications to modern 2D and 3D graphics pipelines.

5 publication at SIGGRAPH (top-tier conference on graphics)

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PUBLICATIONS

- ▷ **Generative Cutout Animation** Eurographics 2026
tbd | tbd
Ivan Puhachov, Noam Aigerman, Thibault Groueix, Mikhail Bessmeltsev
– Use text-to-image SDXL to generate articulated characters: animatable, reusable, editable. GenAI diffusion text-to-image, SDXL, attention manipulation, Textual Inversion, DreamBooth finetuning, LoRA personalization, ControlNet.
- ▷ **Neural Implicit Reduced Fluid Simulation** SIGGRAPH Asia 2024
project page | acm
Yuanyuan Tao, Ivan Puhachov, Derek Nowrouzezahrai, Paul Kry
– Fluid simulation using latent space of implicit geometric model (deepSDF).
- ▷ **Reconstruction of Machine-Made Shapes from Bitmap Sketches** SIGGRAPH Asia 2023
project page | acm
Ivan Puhachov, Cedric Martens, Paul G. Kry, Mikhail Bessmeltsev
– 3D shape reconstruction from natural sketch by patch-based optimization.
Extracting geometric primitives with ML then aligning them to the drawing.
- ▷ **Stability-Aware Simplification of Curve Networks** SIGGRAPH 2022
project page | acm
William Neveu, Ivan Puhachov, Bernard Thomaszewski, Mikhail Bessmeltsev
– Design a curve network on a shape by worst-case stability criterion.
Simplified mixed-integer semi-definite programming to an efficient greedy algorithm.
- ▷ **Keypoint-Driven Line Drawing Vectorization via PolyVector Flow** SIGGRAPH Asia 2021
project page | acm
Ivan Puhachov, William Neveu, Edward Chien, Mikhail Bessmeltsev
– Novel PolyVector flow aligns SVG curve to a smooth cross-field over bitmap image.
ML keypoint detection, graph processing, then flow optimization to extract vector curves.
- ▷ **Demo Projects**
– Trained GAN to generate vector images using differentiable rasterizer — [link](#) personal webpage
– RNN with attention to draw and complete doodles, trained on Quick Draw data — [link](#)

EXPERIENCE

- ▷ **AI Engineer** at Coverstar, a16z speedrun Montreal, Canada
Oct 2025 – present
– Conversation Agent: LLM, RAG and tools, LangChain, LiveKit, text-to-speech;
– Audio-Driven Animation, on-device inference, lipsync; Unity mobile
- ▷ **Research Engineering Intern** at Huawei Research, Canada Montreal, Canada
Oct 2021 – Feb 2024
– Research demos for Digital Avatars (NeRF, GAN, Diffusion, **gsplat**) animation, lipsync.
– Developed product demos for mesh deformation, computer vision, scene reconstruction, digital avatars, ML for shape deformation in C++, Python
– SA 2023 paper: first-author publication, full R&D cycle from idea generation to paper submission, data generation in Blender, computer vision model training and finetuning, optimization pipeline, user studies, quantitative metrics.
– SA 2024 paper: assisted in project design, setting up experiments infrastructure on remote machine with git, ssh, logging.

SKILLS SUMMARY

Programming Languages: Python, C++, JavaScript

Frameworks: PyTorch, JAX, NumPy, OpenCV, OpenGL, CGAL, libigl, Eigen

Tools: git, bash, docker, Blender, Adobe Illustrator scripting

Geometry and Graphics: differential geometry; shape analysis; mesh optimization; deformation and animation; vector fields; optimization algorithms; graph processing, graph optimization

Machine Learning: data processing; clustering; computer vision – detection, classification, segmentation; feature extraction and fine-tuning; generative models – GAN, VAE, diffusion; neural implicit models – deepSDF, NeRF;

EDUCATION

- ▷ Université de Montréal Montreal, Canada
Sept 2019 – August 2025
PhD student in Computer Science, DIRO, LIGUM
Research supervisor: Mikhail Bessmeltsev
- ▷ University of L'Aquila & Kharkiv National University Ukraine, Italy
Sept 2013 – June 2019
MSc (cum laude) in Mathematical Engineering; **BSc** in Mathematics
Joint MSc Programme Intermaths **Thesis:** “Catacaustics of surfaces” (advisor: Alexander L. Yampolsky)