TARAS KHAKHULIN

United Kingdom ⋄ khakhulin.github.io

I'm a specialist in generative models, video generation, 3D vision and motion synthesis. My work in image synthesis, fast novel view generation, and realistic human avatars has been integrated into practical applications and devices and maany customers, demonstrating real-world impact. I excel in rapidly prototyping and advancing innovative technologies that push the boundaries of visual computing systems. Global talent visa holder.

PROFESSIONAL EXPERIENCE

Runway Jan 2025 - present
Member of Technical Staff, Research *Edinburgh, UK*

Developing methods to control large aesthetic video models. Authored **Act2** first abailable "omni-model" approaches for fullbody control. Collaborate with the UX and product team to integrate prototypes for users.

Synthesia Dec 2022 - Jan 2025
Research Engineer *Edinburgh, UK*

Video models. Novel-view synthesis and human reconstructions SIGGRAPH'23– HumanRF, ECCV 2024 keynote.

- Developed high-resolution articulated 3D avatar with focus on geometry and motion with renderable primitives.
- Led a project for controllable video diffusion with a focus on human videos.
- Trained and designed first large video generative models for human avatars. Preview results were available and supported next funding round.

Research Scientist Intern *London, UK*

Human motion and non-rigid registration without priors. Aug 2022 - Dec 2022

Samsung Apr 2019 - Aug 2022
Research Engineer *Moscow, Russia*

Worked on Image Synthesis and Neural Rendering. Led and contributed into several research projects:

- Proposed one-shot 3D reconstruction for head avatars with neural rendering, and worked with the enhancement based on self-supervised methods for megapixel quality. Both works presented at ACMM'22, ECCV'22.
- Improved real-time novel views synthesis with scene as a set of semi-transparent meshes for real-world devices. Presented at CVPR'22 and modernized solution at WACV'23 for multi-view videos.
- Improved style transfer for high-resolution photo-realistic landscapes – CVPR'20 – applied for all devices

Laboratory of Neural Systems and Deep Learning, MIPT, Feb 2018 – Sep 2018
Research Intern *Moscow, Russia*

Worked on the initial version of DeepPavlov - an open-source conversational framework for chats. Investigated contextualized word embeddings for real texts. Developed PPO for machine translation to optimize BLEU.

NetCracker Technology Mar 2017 – Sep 2017
Junior Software Engineer *Moscow, Russia*

Built a client-server communication component with JavaEE. Accelerate SQL queries more than 2 times.

EDUCATION

Ph.D. in Computer Science, Higher School of Economics 2023
Advisor: Victor Lempitsky *Moscow, Russia*

New representations for image synthesis and 3D scenes

Master of Computer Science, Skolkovo Institute of Science and Technology Sep 2018 - Jun 2020
Advisor: Ivan Oseledets *Moscow, Russia*

GPA 5.0 out of 5.0, diploma with honours

Bachelor in Applied Math and Physics, Moscow Institute of Physics and Technology Sep 2014 - Jun 2018
GPA 4.74 out of 5.0 *Moscow, Russia*

PUBLICATIONS

* denotes joint first co-authorship

[1] P. Solovev*, T. Khakhulin*, and D. Korzhenkov*, "Self-improving multiplane-to-layer images for novel view synthesis," in *WACV*, 2023.

[2] M. Işık, M. Rünz, M. Georgopoulos, **T. Khakhulin**, J. Starck, L. Agapito, and M. Nießner, "Humanrf: High-fidelity neural radiance fields for humans in motion," in *ACM Trans. Graph.*, 2023.

[3] **T. Khakhulin**, V. Skliarova, V. Lempitsky, and E. Zakharov, "Realistic one-shot mesh-based head avatars," in *European Conference of Computer vision (ECCV)*, Oct. 2022.

[4] N. Drobyshev, J. Chelishev, **T. Khakhulin**, A. Ivakhnenko, V. Lempitsky, and E. Zakharov, "Megaportraits: One-shot megapixel neural head avatars," in *ACM International Conference on Multimedia*, Sep. 2022.

[5] **T. Khakhulin**, D. Korzhenkov, P. Solovev, G. Sterkin, T. Ardelean, and V. Lempitsky, "Stereo magnification with multi-layer images," in *CVPR*, Jun. 2022.

[6] I. Anokhin, K. Demochkin, **T. Khakhulin**, G. Sterkin, V. Lempitsky, and D. Korzhenkov, "Image generators with conditionally-independent pixel synthesis," in *CVPR*, Jun. 2021.

[7] R. Schutski, D. Kolmakov, **T. Khakhulin**, and I. Oseledets, "Simple heuristics for efficient parallel tensor contraction and quantum circuit simulation," *Phys. Rev. A*, vol. 102, p. 062 614, 6 Dec. 2020.

[8] **T. Khakhulin**, R. Schutski, and I. Oseledets, "Learning elimination ordering for tree decomposition problem," in *Proceedings of NeurIPS Workshop Learning Meets Combinatorial Algorithms*, Nov. 2020.

[9] I. Anokhin*, P. Solovev*, D. Korzhenkov*, A. Kharlamov*, **T. Khakhulin**, A. Silvestrov, S. Nikolenko, V. Lempitsky, and G. Sterkin, "High-resolution daytime translation without domain labels," in *CVPR*, Jun. 2020.

[10] M. Burtsev, A. Seliverstov, R. Airapetyan, M. Arkhipov, D. Baymurzina, N. Bushkov, O. Gureenkova, **T. Khakhulin**, and et. al., "Deeppavlov: Open-source library for dialogue systems," in *Proceedings of ACL 2018, System Demonstrations*, 2018.

[11] V. Malykh, V. Logacheva, and **T. Khakhulin**, "Robust word vectors: Context-informed embeddings for noisy texts," in *EMNLP: The 4th Workshop on Noisy User-generated Text*, 2018.

TECHNICAL SKILLS

Languages: Python (Expert), C++, CUDA
Frameworks: PyTorch (Expert), TensorFlow, transformers, Diffusers
ML Expertise: Generative Models (Diffusion, GANs, VAEs), Neural Rendering, 3D Computer Vision
Tools & Infra: AWS, GCP, Docker, Kubernetes, Git, Slurm

SERVICE & PATENTS

Reviewer: CVPR, ICCV, ECCV, NeurIPS, ICML, AAAI, WACV, ACM TOG (2021-Present).
Leadership & Teaching: Co-founded Deep Learning School (500+ students); TA for multiple master-level courses with 100 participants (Deep Learning and Computer Graphics) for multiple years.
Patents: 4 US Patents filed on generative models, neural rendering, and 3D reconstruction.

AWARDS

- "The Ilya Segalovich" Yandex award for young scientists, *highly selective*, 2022
- Huawei scholarship for master students at MIPT, 2019