ALEKSEI PETRENKO

OBJECTIVE

Summer 2019 — Ph.D. internship in machine learning and/or robotics leading to a peer-reviewed publication

PERSONAL INFORMATION

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Date of birth: April 19, 1991

EDUCATION

2008-2012 B. Sc. in Computer Science at Nizhny Novgorod State Technical University
2012-2014 M. Sc. in Computer Science at Nizhny Novgorod State Technical University

2018-present Ph.D. in Computer Science at University of Southern California *(in progress)*
Advisor: Prof. Gaurav Sukhatme, USC RESL

Research interests: machine learning for robotics, deep reinforcement learning, hierarchical RL: task decomposition, agents operating on multiple spatial and temporal resolutions, autonomous exploration and intrinsic motivation, long-term planning with sparse reward, superhuman AI for games (e.g. beating top players in SC2)

EMPLOYMENT HISTORY

2013-2018 Nizhny Novgorod Russia — **Senior Software Engineer**, and later **Tech Lead at itSeez3D**

I worked on two major projects at itSeez3D: the first mobile consumer 3D scanner and an advanced 3D human reconstruction engine called Avatar SDK

Avatar SDK project (2015-2018):

- R&D for a deep learning based method that generates 3D model of human head from single portrait photo
- Developed an algorithmic pipeline that generates animated full-body avatar from a portrait photo, with integrated deep TensorFlow models for head reconstruction
- Optimized deep learning models for deployment (quantization, compression, etc.)
- Worked on all kinds of applications for the avatar engine (mobile, desktop and VR apps, including the Unity VR chat demo with lipsync & voip). Developed and deployed demos on major conferences and exhibitions (GDC, SIGGRAPH, VRX)

My avatar automatically generated by our deep learning pipeline from the iPhone selfie:
https://sketchfab.com/models/2714d2764b5f427ba70ed2946a10cc60

For the 3D Scanner project (2013-2015):

- Developed a cloud backend for the 3D reconstruction pipeline
- Ported 3D scanning algorithms to various 3D sensor platforms: RealSense, Tango and pretty much everything else in existence
- Implemented algorithms for filtering and refinement of noisy data from 3D sensors, 3D mesh and point cloud processing
- Developed algorithms that prepare scans for 3D printing: mesh "hollowisation" (3D polygon offset), adding a pedestal for stability, manifoldness, etc.

Here's my full-body scan made by itSeez3D software around year 2014:
https://sketchfab.com/models/111b29a1b2914a20979572f137e538db

Key technologies:

- C++11/14 and OpenCV for the algorithms
- TensorFlow and Keras for ML
- Python for ML research, scripting and Web backends
- OpenGL and Unity for 3D rendering
- Oculus SDK + Unity for VR

2010-2013
Nizhny Novgorod
Russia

Software Engineer at Tecom, LLC.

Developed and maintained big real-time (frame perfect) massively multithreaded automation system with many levels of redundancy. In Tecom I gained experience in many areas of software engineering, from architecture to optimization.
Key technologies: C++, C# and Java, Linux, SQL.

SKILLS

Programming languages:

- C++ (highly advanced). C++ is my favorite language for it's speed, portability, and weird elegance. C++11/14, STL, Qt, CMake.
- Python (advanced). My language of choice for research, prototyping or automation.
- C# (advanced). Most of my experience comes from cross-platform mobile development (Xamarin) and scripting in Unity3D.
- Java (proficient)
- Javascript (proficient)

Other software development skills:

- Software architecture. Developed multiple successful applications from ground up (mobile, desktop and server). Multithreading, data binding, patterns, loose coupling, etc.
- Algorithms. I learned a lot when I participated in programming contests, as well as at work. Graph algorithms, computational complexity, data structures.
- Computer vision algorithms & OpenCV.
- Deep learning, deep reinforcement learning. Tensorflow, Keras.
- Cloud (AWS services and APIs).
- 3D rendering (OpenGL, Unity3D) and VR (Oculus)

TEACHING EXPERIENCE

2013 Teaching practice at Nizhny Novgorod State Technical University. A course on Algorithms and Data Structures

PERSONAL PROJECTS

2017-2018 https://github.com/alex-petrenko/rl-experiments
Implementation of modern deep reinforcement learning algorithms (Double DQN, A2C) in the context of the gridworld environment called MicroTbs.

2016-2017 https://github.com/alex-petrenko/4dvideo
A hobby project where I developed an open-source 4D video recorder and player for Intel RealSense and Google Tango. It can capture "4D" clips like this in real time with a single mobile sensor. Features a very fast Delaunay triangulation algorithm based on modified Guibas-Stolfi method.

ACHIEVEMENTS

2018-2020	Provost PhD Fellowship from University of Southern California
2012	Scholarship of the President of the Russian Federation
2012	Winner of "Osipovsky Cup 2012" programming contest held in Kovrov State Technological Academy
2012	Winner of the Code Game Challenge at ACM ICPC Southern Subregional Contest, Saratov
2011, 2012	Participant of the ACM ICPC, World Semifinals (NEERC)
2010, 2011, 2012	Prize winner of the ACM ICPC, World Quarterfinals (NEERC Southern Subregional)

OTHER INTERESTS

- Futurology, transhumanism, singularity. Authors: E. Yudkowsky, G. Egan, R. Kurzweil, K. Eric Drexler, V. Vinge
- Fundamental research in other fields: physics, cosmology, evolutionary biology
- Entrepreneurship
- Motor racing and amateur karting competitions
- Travel, foreign culture

Learn more about me at my personal webpage: https://alex-petrenko.github.io