ALEKSEI PETRENKO

PERSONAL INFORMATION

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Date of birth:	April 19, 1991
Marital status:	Married

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

EMPLOYMENT HISTORY

2015-present (itSeez3D)

2013-2015 (itSeez)

Nizhny Novgorod Russia

Senior Software Engineer at itSeez, and later **Tech Lead at itSeez3D**

With the team of computer vision experts, I worked on a world first mobile 3D scanner. My work in itSeez involved:

- Developing a cloud backend for 3D scan reconstruction pipeline
- Algorithms for filtering and refinement of noisy data from 3D sensors
- 3D mesh and point cloud processing: clustering, normal and curvature computations, visualization, Boolean operations on meshes and more
- Developing 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 our software at that period:
https://sketchfab.com/models/111b29a1b2914a20979572f137e538db

In 2015 itSeez was acquired by Intel. Our project was spun off as a startup called itSeez3D. Today we work on advanced 3D reconstruction and human digitization. The summary of my experience in itSeez3D:

- Ported 3D scanning algorithms to various 3D sensor platforms: RealSense, Tango and pretty much everything else in existence.
- R&D for a deep learning based method that generates 3D model of human head from single portrait photo (Avatar SDK).
- Developed an algorithmic pipeline that generates animated full-body avatar from a portrait photo, with integrated TensorFlow models for head reconstruction.
- Worked on productization and deployment of DL pipelines (quantization, compression, etc.)

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

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

2010-2013 **Software Engineer at Tecom, LLC.**

Nizhny Novgorod
Russia

Our team 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, reinforcement learning, mostly with TensorFlow.
- Cloud (AWS services and APIs).
- 3D rendering (OpenGL, Unity3D) and VR (Oculus)

RESEARCH INTERESTS

I want to understand how to design better intelligent agents. I am particularly interested in the following fields of contemporary AI research:

- Hierarchical approaches in RL: task decomposition, agents operating on multiple spatial and temporal resolutions
- Exploration and intrinsic motivation
- Long-term planning
- Using simulations to train AI
- Superhuman AI for games (e.g. beating top players in SC2)

My long-term goal is to research new approaches that can bring us closer to general AI, and to apply the knowledge acquired along the way to solve problems in real world.

TEACHING EXPERIENCE

2013 Teaching practice at Nizhny Novgorod State Technical University.
A course of lectures 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

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. Favorite authors: E. Yudkowsky, G. Egan, R. Kurzweil, K. Eric Drexler, V. Vinge
- Fundamental research in other fields: physics, cosmology, evolutionary biology
- Entrepreneurship
- Fast cars & motor racing. Amateur karting competitions
- Travel, foreign culture

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