Rinat Abdrashitov

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ABOUT

Computer graphics researcher and engineer with four years of experience working in industry and publications in top Graphics and HCI venues. Experienced in researching and implementing algorithms for solving geometry processing, machine learning, facial animation, and numerical optimization problems, as well as strong C++, Python, and 3D graphics programming skills.

EDUCATION

University of Toronto   Toronto, Canada
Ph.D. Computer Science   01/2016 – 11/2022
Master of Science, Computer Science   09/2013 – 01/2015
Honors Bachelor of Computer Science with Distinction   09/2008 – 06/2012

EXPERIENCE

Epic Games   Toronto, Canada
Geometry Tools Programmer   07/2021 – current
- Part of a team responsible for researching and implementing geometry processing algorithms for the core Unreal Engine tools and special projects.
- Implemented various parameterization algorithms and wrote numerical solvers for unwrapping mesh UVs in modeling tools.
- Worked on PN Triangles, uniform, and adaptive tessellation algorithms for the core geometry processing library.
- Assisted MetaHuman research teams with muscle geometry generation based on my Ph.D. research.

SideFX Software   Toronto, Canada
Research Engineer   intern 05/2019 – 02/2020, part-time 02/2020 -05/2021
- Designed and implemented a non-rigid surface registration algorithm to deform mesh templates to fit partial, incomplete, and noisy 3D mesh scans.
- Wrote a production-quality nonlinear least squares solver, using C++ and Eigen, for the core optimization problem while ensuring speed, robustness, and numerical accuracy.
- Implemented the results of the work using C++ and Python and integrated it into Houdini 18.5 (TopoTransfer Node), which is an industry-standard software used in film, TV, and video games.
- The tool is used by VFX artists to generate clean facial and body meshes from scans.

University of Toronto   Toronto, Canada
Ph.D. Student (Advisor: Professor Karan Singh)   01/2016 – 11/2022
- Performed research in geometry processing, face animation, machine learning, and fabrication. The main goal of my research was to create advanced interactive tools to help artists in their creative work.
- Solved complex geometry problems on triangular meshes like segmentation, smoothing, deformation, reconstruction and gained experience in applying linear algebra and numerical optimization to solve math computational problems.

- Applied machine learning to create novel interfaces for face posing and animation. Gained practical experience in generating my own dataset while refining and debugging it to maximize the effectiveness of training.
- Results were published at the top computer Graphics and HCI conferences (see publications).

Conceptualiz Inc.
Research Engineer   Toronto, Canada
                                                                                  02/2015 – 01/2016
- Built an iPad application from the ground up that allows orthopedic surgeons to perform pre-operative planning in a 3D environment using patient-specific CT scan data.
- Developed a custom real-time rendering engine using OpenGL ES, GLSL, and C++, to render high-resolution polygonal models of bone tissue on a mobile GPU.
- Gained experience with software design patterns while developing a set of interactive tools for creating implant models to reflect the workflow of orthopedic surgeons.
- The app was successfully released on the App Store under the name Ossa3D, and it's the first app of its kind available on tablet devices.

XtremeLabs Inc. (acquired by Pivotal Software Inc.)
Software Developer   Toronto, Canada
                                                                                  09/2012 – 09/2013
- Developed high-profile iOS applications starting from the concept to submitting the finished product to the App Store. Clients included Bell, Mountain Equipment Co-op, and The Globe and Mail.
- Gained experience in object-oriented programming using Objective-C and Cocoa toolkit.
- Worked effectively with the QA team to resolve any technical issues and bugs.

INTERNSHIPS

Adobe Research
Research Intern   San Jose, CA
                                                                                  06/2017 – 08/2017
- Worked on applying 12 principles of animation to videos of human faces to achieve a stylized effect.
- Used face landmark detection algorithms to extract landmark coordinates over time and used Python to write image warping and signal processing algorithms to generate cartoonish stylized results.
- The results of the research were patented (See patents).

PUBLICATIONS

Interactive Modelling of Volumetric Musculoskeletal Anatomy.   *SIGGRAPH 2022*
Rinat Abdrashitov, Seungbae Bang, Alec Jacobson, David Levin, Karan Singh

Interactive exploration and refinement of facial expression using manifold learning.   *UIST 2020*
Rinat Abdrashitov, Fanny Chevalier, Karan Singh

A System for Efficient 3D Printed Stop-Motion Face Animation.   *SIGGRAPH 2020*
Rinat Abdrashitov, Alec Jacobson, Karan Singh

Interactive Shape Modeling using a Skeleton-Mesh Co-Representation.   *SIGGRAPH 2014*
J. Andreas Bærentzen, Rinat Abdrashitov, Karan Singh.

Mosaic: Sketch-based interface for creating digital decorative mosaics.   SBIM 2014
Rinat Abdrashitov, Eric Yao, Emilie Guy, Karan Singh.

PATENTS

Reducing collision-based defects in motion-stylization of video content depicting closely spaced features

Rinat Abdrashitov, Jose Ignacio Echevarria Vallespi, Jingwan Lu, Elya Shectman, Duygu Ceylan Aksit, David Simons

System and Method for Interactive 3D Modelling of Surgical Implants

Richard Hurley, Rinat Abdrashitov, Karan Singh, Ravin Balakrishnan, James McCrae

TECHNICAL SKILLS

Languages: **C++, C, Python**

Numerics: **MATLAB, NumPy, SciPy, Eigen**

Graphics: **OpenGL, GLSL**

Machine Learning: **PyTorch, Linear Algebra, Calculus, Convex Optimization**

Software: **Houdini, Unreal Engine, LibIGL, Maya**