

Karran Pandey

Curriculum Vitae

Dynamic Graphics Project
University of Toronto
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RESEARCH INTERESTS

I am interested in building novel creative tools to model, edit and understand artistic graphical representations (such as sketches, 3D models and images). I particularly enjoy using machine learning and geometry processing algorithms to design creative computer graphics workflows that are convenient, intuitive and fun.

EDUCATION

University of Toronto	2021 - 2025
PhD Computer Science	
Advisor: Karan Singh	Toronto, Canada
Birla Institute of Technology and Science Pilani	2014 - 2019
MSc Mathematics, BE Computer Science	
Advisors: Vijay Natarajan, Tathagata Ray, Sharan Gopal	Hyderabad, India

PUBLICATIONS

Diffusion Handles: Enabling 3D Edits for Diffusion Models by Lifting Activations to 3D Karran Pandey , Paul Guerrero, Matheus Gadelha, Yannick Hold-Geoffroy, Karan Singh, Niloy Mitra In Review. Arxiv preprint: https://arxiv.org/abs/2312.02190 .	2023
Juxtaform: interactive visual summarization for exploratory shape design Karran Pandey , Fanny Chevalier, Karan Singh ACM SIGGRAPH North America.	2023
Face Extrusion Quad meshes Karran Pandey , Jakob Andreas Baerentzen, Karan Singh ACM SIGGRAPH North America.	2022
A GPU Parallel Algorithm for Computing Morse-Smale Complexes Varshini Subhash, Karran Pandey , Vijay Natarajan IEEE Transactions on Visualization and Computer Graphics (TVCG).	2022
Morse Theory-based Segmentation and Fabric Quantification of Granular Materials Karran Pandey , Talha bin Masood, Saurabh Singh, Ingrid Hotz, Vijay Natarajan, Tejas Murthy Granular Matter 24, 27.	2022
GPU Parallel Computation of Morse-Smale Complexes Varshini Subhash, Karran Pandey , Vijay Natarajan IEEE Visualization Conference (VIS) (Short Paper).	2021
An Integrated Geometric and Topological Approach for the Visual Analysis of Rossby Wave Packets Karran Pandey , Joy Merwin Monteiro, Vijay Natarajan Monthly Weather Review, 2020, 148 (8): 3139-3155.	2020

CONFERENCE TALKS

ACM SIGGRAPH North America Juxtaform: interactive visual summarization for exploratory shape design	August 2023 Los Angeles, USA
ACM SIGGRAPH North America Face Extrusion Quad Meshes	August 2022 Vancouver, Canada
ACM SIGGRAPH North America (Labs Demo) Face Extrusion Quad Meshes	August 2022 Vancouver, Canada

RESEARCH EXPERIENCE

Adobe Research Research Intern Advisors: Paul Guerrero, Niloy Mitra, Matheus Gadelha, Yannick Hold-Geoffroy	June 2023 - September 2023
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- 3D-aware edit handles for text-to-image diffusion models
A training-free pipeline for 3D-aware object editing using pretrained text-to-image diffusion models. In Review.

Dynamic Graphics Project, University of Toronto Research Assistant Advisor: Professor Karan Singh	May 2021 - Present
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- Learning 3D Box-Modeling with RNNs
Learning to build 3D shapes with intuitive extrusion-based box-modeling operations. Ongoing work.
- Browsing Large Animation Repositories
An interactive framework for the rapid in-situ exploration of large animation repositories. Ongoing work.
- Interactively Tracing Field-aligned Loops on Surfaces
An interactive method for artists to quickly and conveniently draw field-aligned loops on surface meshes. Ongoing work.
- Interactive Summarization of Large Shape Collections for Shape Design
An interactive sketch stroke-based framework for the rapid in-situ exploration of large shape collections. Journal paper accepted to ACM SIGGRAPH North America 2023.
- Generalized Extrusion Meshes
A structure-aware quad-meshing framework for construction history-based modeling. Conference paper accepted to ACM SIGGRAPH North America 2022.

Visualization and Graphics Lab, Indian Institute of Science Research Intern and Project Assistant Advisor: Professor Vijay Natarajan	July 2018 - August 2021
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- Topological Analysis of Granular Material Packings
A topology-aware framework for the segmentation and skeletonization of 3-D CT scans of granular material packings. Journal paper accepted to Granular Matter.
- GPU Parallel Computation of Morse-Smale Complexes
A GPU parallel algorithm for the computation and simplification of Morse-Smale complexes on 3-D scalar fields. Papers accepted to IEEE VIS 2021 and IEEE TVCG.
- Automated Identification and Visual Analysis of Rossby Wave Packets
A topological framework for the automated identification and visual exploration of wave structures in 2-D scalar fields. Journal paper accepted to the Monthly Weather Review.

PROFESSIONAL ACTIVITIES

Reviewer
Eurographics 2023

TEACHING

- Teaching Assistant at University of Toronto
Data Visualization, Design of Interactive Computational Media
- Fall 2022, Fall 2023