Karran Pandey

Curriculum Vitae

Dynamic Graphics Project
University of Toronto
karranpandey.github.io
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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

Juxtaform: interactive visual summarization for exploratory shape design — 2023
Karran Pandey, Fanny Chevalier, Karan Singh
ACM SIGGRAPH North America.

Face Extrusion Quad meshes — 2022
Karran Pandey, Jakob Andreas Baerentzen, Karan Singh
ACM SIGGRAPH North America.

A GPU Parallel Algorithm for Computing Morse-Smale Complexes — 2022
Varshini Subhash, **Karran Pandey**, Vijay Natarajan
IEEE Transactions on Visualization and Computer Graphics (TVCG).

Morse Theory-based Segmentation and Fabric Quantification of Granular Materials — 2022
Karran Pandey, Talha bin Masood, Saurabh Singh, Ingrid Hotz, Vijay Natarajan, Tejas Murthy
Granular Matter 24, 27.

GPU Parallel Computation of Morse-Smale Complexes — 2021
Varshini Subhash, **Karran Pandey**, Vijay Natarajan
IEEE Visualization Conference (VIS) (Short Paper).

An Integrated Geometric and Topological Approach for the Visual Analysis of Rossby Wave Packets — 2020
Karran Pandey, Joy Merwin Monteiro, Vijay Natarajan
Monthly Weather Review, 2020, 148 (8): 3139-3155.

Conference Talks

ACM SIGGRAPH North America — August 2023
Juxtaform: interactive visual summarization for exploratory shape design — Los Angeles, USA

ACM SIGGRAPH North America — August 2022
Face Extrusion Quad Meshes — Vancouver, Canada

ACM SIGGRAPH North America (Labs Demo) — August 2022
Face Extrusion Quad Meshes — Vancouver, Canada

Research Experience

Adobe Research — June 2023 - September 2023
Research Intern
Advisors: Paul Guerrero, Niloy Mitra, Matheus Gadelha, Yannick Hold-Geoffroy

- 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. Ongoing work.

Dynamic Graphics Project, University of Toronto — May 2021 - Present
Research Assistant
Advisor: Professor Karan Singh

- 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 — July 2018 - August 2021
Research Intern and Project Assistant
Advisor: Professor Vijay Natarajan

- 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 — Fall 2022, Fall 2023
  Data Visualization, Design of Interactive Computational Media