PRANAV JAIN

University of Southern California
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Website , Scholar

RESEARCH INTERESTS

Geometry Processing, Physical Simulations, Computer Graphics, Discrete Differential Geometry, Numerical Analysis of Partial Differential Equations

EDUCATION

University of Southern California — August 2023 - Present
Doctor of Philosophy (PhD), Computer Science — *Los Angeles, USA*
CGPA: 3.85/4.0

New York University — September 2021 - May 2023
Master of Science (MS), Scientific Computing — *New York, USA*
CGPA: 3.778/4.0

Indraprastha Institute of Information & Technology Delhi (IIITD) — August 2016 - August 2020
Bachelor of Technology with Honors (B-Tech Hons), — *New Delhi, India*
Computer Science and Applied Mathematics
CGPA: 8.59/10.0

PUBLICATIONS

Pranav Jain, Ziyin Qu, Peter Yichen Chen, and Oded Stein. 2024. Neural Monte Carlo Fluid Simulation. In ACM SIGGRAPH 2024 Conference Papers (SIGGRAPH '24). [link]

Liam Martin, **Pranav Jain**, Zachary Ferguson, Torkan Gholamalizadeh, Faezeh Moshfeghifar, Kenny Erleben, Daniele Panozzo, Steven Abramowitch, Teseo Schneider. A systematic comparison between FEBio and PolyFEM for biomechanical systems. In Computer Methods and Programs in Biomedicine, 2023. [link]

Zachary Ferguson, **Pranav Jain**, Denis Zorin, Teseo Schneider, and Daniele Panozzo. High-Order Incremental Potential Contact for Elastodynamic Simulation on Curved Meshes. In ACM SIGGRAPH 2023 Conference Proceedings (SIGGRAPH '23). [link]

Pranav Jain, Munawar Hasan, Donghoon Chang. Spy based analysis of selfish mining attack on multi-stage blockchain. In Cryptology ePrint Archive, 2019. [link]

RESEARCH EXPERIENCE

University of Southern California — August 2023 - Present
PhD Student — *Los Angeles, USA*
Advisor: Dr. Oded Stein

- Research on using a marriage of neural networks and Monte Carlo methods for grid-free fluid simulations

New York University — September 2021 - May 2023
Research Assistant — *New York, USA*
Advisor: Dr. Daniele Panozzo, Dr. Denis Zorin

- Formulated a high-order finite element formulation (high-order basis) for elastodynamic simulation on high-order (curved) meshes with contact handling based on the recently proposed Incremental Potential Contact model

- Analyzed the differences and experimented with FEBio and PolyFEM for biomechanical simulations

nTopology June 2022 - August 2022
Software Engineer Intern in Geometry Team *New York, USA*
Advisor: Suraj Musuvathy, Ranjeeth Mahankali

- Formulated and implemented a new algorithm from scratch that could preserve the original analytical faces of a CAD once it's been converted to an implicit

Freie Universität Berlin [link] September 2020 - August 2021
Research Intern *(Virtual) Berlin, Germany*
Advisor: Dr. Konrad Polthier, Dr. Sunil Kumar Yadav

- Proposed and developed a robust point cloud denoising technique that automatically tunes the required parameters resulting in a filtered point cloud without the need of manual testing

Fields Undergraduate Summer Research Programme 2020 [link] July 2020 - August 2020
Research Intern *(Virtual) Toronto, Canada*
Advisor: Dr. Thomas Uchida

- Explored the reverse mechanism synthesis problem where given a path of a mechanical linkage, the task is to design a mechanism (such as a four-bar mechanism) that would trace the given path
- Created, analyzed, and tested an algorithm that could synthesize mechanisms that trace open curves

Indraprastha Institute of Information & Technology Delhi [link] August 2018 - August 2020
Research Assistant *New Delhi, India*
Advisor: Dr. Kaushik Kalyanaraman

- Developed DECAGT – a C++ library that provides a general, extendable software framework for discretizations of the objects and operators of exterior calculus
- Added support for interpolation on simplicial complexes using Gaussian quadratures and high-order finite element basis functions

Indraprastha Institute of Information & Technology Delhi [link] August 2018 - August 2020
Undergraduate Thesis *New Delhi, India*
Advisor: Dr. Donghoon Chang

- Proved and analyzed mathematically the Selfish Mining Strategy for multiple mining pools in Bitcoin Blockchain using probabilistic tools
- Proved, analyzed, and developed a mathematical model motivated from Multi-Stage Blockchain which is resistant to Selfish Mining Attacks

TEACHING EXPERIENCE

University of Southern California
Teaching Assistant: CSCI 104 - Data Structures and Object Oriented Design January 2024 - April 2024
Teaching Assistant: CSCI 596 - Scientific Computing and Visualization September 2024 - December 2024

New York University
Grader: MATH 263.3 - Applied Partial Differential Equations January 2023 - April 2023
Grader: MATH 252 - Numerical Analysis January 2023 - April 2023
Grader: MATH 263 - Partial Differential Equations September 2021 - November 2021

AWARDS

Fields Undergraduate Summer Research Program 2020: One of 32 selected students from 200+ applicants for a funded research opportunity at the Fields Institute, Canada.

Dean's Award for Academic Excellence: For excellent academic performance in the 2018-19 undergraduate academic session.

ACADEMIC COMMUNITY WORK

Volunteered as a Teaching Assistant for the Poisson Reconstruction Project at Summer Geometry Initiative (SGI) 2024. July 2024

Member of the Conference Coffee team at SIGGRAPH Research Career Development Committee. Organized the conference coffee event for SIGGRAPH and SIGGRAPH ASIA 2021 & 2022. 2021-2022