

ANUSHRUT JIGNASU

ajignasu@iastate.edu | Website: ajignasu.github.io | LinkedIn: [anushrutjignasu](https://www.linkedin.com/in/anushrutjignasu)

EDUCATION

Iowa State University Expected: Fall 2025
Ph.D. Student, Mechanical Engineering GPA: 3.62/4.0
Co-major: Computer Engineering

Iowa State University Aug 2016 - May 2020
B.Sc. Mechanical Engineering GPA: 3.5/4.0
Minor in Biomedical Engineering

RESEARCH INTERESTS

Neural Fields, Computer Vision and Graphics, Deep Learning, 3D Reconstruction, Computer Aided Design, Additive Manufacturing

SKILLS

Programming Python, C++, C#, MATLAB, \LaTeX
Technologies Pytorch, Pytorch Geometric, OpenCV, COLMAP, Unity
Tools Linux, Blender, Solidworks, Autodesk Fusion 360

GRADUATE RESEARCH

Research Assistant in IDEA Lab | Iowa State University Aug 2021 - Ongoing

1. Topology-aware Neural Implicit Surface Reconstruction

- Developing an MLP-based framework for implicit surface reconstruction from noisy point cloud data.
- Integrating topological data analysis to achieve precise manifold mesh reconstruction.
- Exploring feasibility of neural radiance fields for multi-view 3D reconstruction and mesh extraction.

2. Large Language Models for G-code Debugging, Manipulation, and Comprehension

- Evaluated six foundational LLMs for G-code comprehension and debugging in 3D printing.
- Crafted effective prompts enabling G-code error correction and geometric transformations.
- Gauged the proficiency of LLMs to comprehensively understand G-code.

3. Conformal 3D Printing

- Developing a NURBS-based algorithm for Conformal 3D printing.
- Implemented a curved toolpath generation algorithm for non-planar material deposition.
- Conducting quality and process optimization for minimizing build time.

4. Geometric Deep Learning for Manufacturability Analysis

- Utilizing Graph Neural Networks for manufacturability analysis of 3D triangulated geometries.
- Implementing various graph architectures using PyTorch Geometric.

WORK EXPERIENCE

Genies, Los Angeles CA May 2024 - Aug 2024
Machine Learning Engineering Intern

- Developing algorithms for mesh deformation and alignment based on the SMPL model.
- Investigated differentiable methods for human pose and shape estimation.
- Optimized techniques to bypass the ground truth landmark requirement and achieve pose convergence.

Parametric Studio Inc, Ames IA July 2020 - Jan 2021
Mechanical Engineering Intern

- Designed and developed seven physical prototyping kits using a CNC machine, 3D printer, and laser cutter.
- Optimized material and manufacturing processes through trade studies, achieving a cost-effective design solution.
- Conducted detailed tolerance stack-up analyses and created precise engineering drawings using GD&T principles.

Research and Development Intern

- Engineered friction models that improved efficiency by 50% for infusion applications.
- Conducted physics-based simulations using MATLAB, Simulink, and micro-controller setups.
- Managed and revised CAD drawings for established infusion products.

PUBLICATIONS

1. **A. Jignasu**, K O. Marshall, A. K. Mishra, L. N. Rillo, B. Ganapathysubramanian, A. Balu, C. Hegde, and A. Krishnamurthy. [Slice-100K: A Multimodal Dataset for Extrusion-based 3D Printing](#). *NeurIPS*, 2024
2. **A. Jignasu**, A. Balu, S. Sarkar, C. Hegde, B. Ganapathysubramanian, and A. Krishnamurthy. [SDFConnect: Neural Implicit Surface Reconstruction of a Sparse Point Cloud with Topological Constraints](#). *Deep Learning for Geometric Computing Workshop (DLGC), CVPR*, 2024
3. **A. Jignasu**, J. Rurup, E. Secor, and A. Krishnamurthy. [NURBS-based path planning for aerosol jet printing of conformal electronics](#). *Journal of Manufacturing Processes*, 2024
4. E. Herron, J. Rade, **A. Jignasu**, B. Ganapathysubramanian, A. Balu, S. Sarkar, and A. Krishnamurthy. [Latent Diffusion Models for Structural Component Design](#). *Computer-Aided Design*, 2024
5. **A. Jignasu**, K. Marshall, B. Ganapathysubramanian, A. Balu, C. Hegde, and A. Krishnamurthy. [Towards Foundational AI Models for Additive Manufacturing: Language Models for G-Code Debugging, Manipulation, and Comprehension](#). *arXiv preprint arXiv:2309.02465*, 2023
6. K. O. Marshall, M. Pham, A. Joshi, **A. Jignasu**, A. Balu, A. Krishnamurthy, and C. Hegde. [ZeroForge: Feedforward Text-to-Shape Without 3D Supervision](#). *arXiv preprint arXiv:2306.08183*, 2023
7. J. Rade, **A. Jignasu**, E. Herron, A. Corpuz, B. Ganapathysubramanian, S. Sarkar, A. Balu, and A. Krishnamurthy. [Deep learning-based 3D Multigrid Topology Optimization of Manufacturable Designs](#). *Engineering Applications of Artificial Intelligence*, 2023
8. S. Ghadai, **A. Jignasu**, and A. Krishnamurthy. [Direct 3D Printing of Multi-level Voxel Models](#). *Additive Manufacturing*, 2021

TEACHING

1. “Mini course on 3D Vision”, Advanced Deep Learning Group, **TrAC, Iowa State University 2023**.

TALKS

1. “SDFConnect: Neural Implicit Surface Reconstruction of a Sparse Point Cloud with Topological Constraints.” Deep Learning for Geometric Computing (DLGC) Workshop, **CVPR 2024**.
2. “Evaluating Large Language Models for G-Code Debugging, Manipulation, and Comprehension.” IEEE International Workshop on LLM-Aided Design, **LAD 2024**.
3. “Deep Learning-based 3D Multigrid Topology Optimization of Manufacturable Designs.” Workshop on Scientific Machine Learning: Foundations and Applications, **TrAC, Iowa State University 2022**.
4. “Direct Fused Deposition Modeling (FDM) Additive Manufacturing of Voxelized CAD Models.” 16th U.S. National Congress on Computational Mechanics, **USNCCM 2021**.

RELEVANT COURSEWORK

- Deep Learning
- Machine Vision
- Computer Graphics
- Surface Modeling
- Computational Geometry
- Solid Modeling
- GPU Computing
- Virtual Reality
- Steganography

SERVICE

1. Volunteer for Summer Geometry Initiative, **MIT, July 2023**.