ANUSHRUT JIGNASU

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EDUCATION

Iowa State University Expected: Spring 2026
Ph.D. Student, Mechanical Engineering GPA: 3.67/4.0
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, MCP
Tools	Linux, Blender, Solidworks, Autodesk Fusion 360, FreeCAD API

GRADUATE RESEARCH

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

1. **Large Language Models for G-code Debugging, Manipulation, and Comprehension**
   - Built **Slice-100K**, a large-scale multimodal dataset (100k+ samples) combining G-code text, 3D geometry, meshes, and renderings for training foundation models on additive manufacturing tasks.
   - Fine-tuned **GPT-2** on 4 A100 GPUs using **SFT pipeline**, achieving 98% IoU on G-code translation tasks.
   - Analyzed model failures to identify limits of token-level reasoning and geometric intent understanding.
   - Prototyped **agentic CAD** tool integration via **FreeCAD MCP server** exposing parametric modeling APIs.
2. **Topology-aware Neural Implicit Surface Reconstruction**
   - Designed an MLP-based framework for implicit surface reconstruction from noisy point cloud data.
   - Integrated topological data analysis to achieve precise manifold mesh reconstruction.
   - Explored the feasibility of neural radiance fields for multi-view 3D reconstruction and mesh extraction.
3. **Conformal 3D Printing**
   - Designed a NURBS-based algorithm for Conformal 3D printing.
   - Implemented a curved toolpath generation algorithm for non-planar material deposition.
4. **Geometric Deep Learning for Manufacturability Analysis**
   - Applied Graph Neural Networks to 3D mesh representations for learning geometric and structural properties.

WORK EXPERIENCE

Autodesk, San Francisco, CA May 2025 - Aug 2025
Research Scientist Intern

- Led development of a pipeline from assembly parsing to contact-graph GNN inference for CAD completion.
- Built a contact-aware graph neural net (GATv2 + DGCNN); achieved +30% Top-1 over baselines.
- Implemented distributed data ingestion and training infrastructure for large-scale CAD assemblies.

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

- Developed 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.

Smiths Medical (now ICU Medical), Minneapolis, MN May 2019 - Aug 2019
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** and D. Grandi. Linkify: Learning from Interface-Augmented Assembly Graphs. *Under Review.*
2. **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
3. **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
4. **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
5. 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
6. **A. Jignasu**, K. O. 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
7. 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
8. 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

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**.

SERVICE

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