

VINAYAK R. KRISHNAMURTHY, Ph.D.

Associate Professor and Morris E. Foster Faculty Fellow II, J. Mike Walker '66 Department of Mechanical Engineering and Department of Computer Science (By Affiliation), Texas A&M University
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I. EDUCATION

PhD (2015) Purdue University	Mechanical Engineering
MSc (2010) Indian Institute of Science	Center for Product Design & Manufacturing
BE (2006) Punjab Engineering College	Mechanical Engineering

II. APPOINTMENTS

Associate Professor	Texas A&M University	Sep 2022—Present
Assistant Professor	Texas A&M University	Sep 2016—Aug 2022
Postdoctoral Research Associate	Purdue University	Feb 2016—Jul 2016
Graduate Research Assistant	Purdue University	May 2011—Dec 2015
Graduate Teaching Assistant	Purdue University	Jan 2011—Apr 2011
Graduate Research Scholar	Indian Institute of Science	Aug 2007—Jul 2010
Project Assistant	Indian Institute of Science	Jul 2006—Jul 2007

III. RESEARCH ACTIVITIES

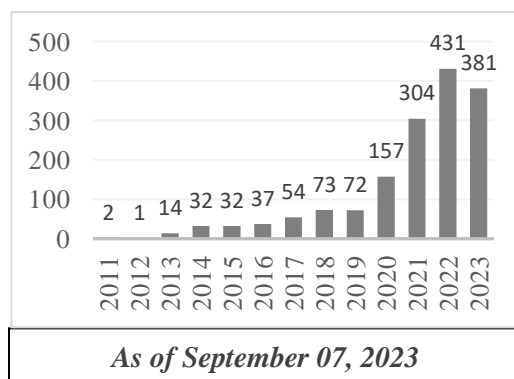
III-A. Research Summary:

Dr. Krishnamurthy is an associate professor in the J. Mike Walker'66 Department of Mechanical Engineering and the Department of Computer Science and Engineering (by affiliation). He directs the Mixed-Initiative Design Lab (MIDL) at Texas A&M University. His research is positioned at the intersection of computer-aided product design, human-computer interaction, and artificial intelligence. His research seeks to make fundamental contributions to the disciplinary areas of geometric & topological computing, virtual/augmented/mixed reality, and intelligent user interfaces for design. He applies the knowledge gained in these areas to various domains such as metamaterial design, computational fabrication, data-driven design, collaborative design, autonomous systems, surgical training, and engineering education.

III-B. Publications:

Publication Summary

Published/accepted journal papers:	39
Journal papers under review:	04
Highly selective conference papers:	05
Full-length peer-reviewed conference papers:	30
Patents granted:	03
Patent Disclosures:	06
Conference Demo, Posters, Extended Abstracts:	13



List of Abbreviations

- ASME: American Society of Mechanical Engineers
- ACM: Association for Computing Machinery
- AIAA: American Institute of Aeronautics and Astronautics
- IEEE: Institute of Electrical and Electronics Engineers
- ASEE: American Society for Engineering Education

Citation Summary (as of September 07, 2023): Total citations: 1590, h-index: 20, i10-index: 33

(Google Scholar Profile: <https://scholar.google.com/citations?user=oJdqdYoAAAAJ&hl=en>)

Authorship: * indicates Dr. Krishnamurthy's current or former student at TAMU, ^C indicates corresponding/senior author in the paper. For papers where Dr. Krishnamurthy is not the corresponding author, his role has been described.

Journals Papers (Under Review):

[J43] Matthew Ebert*, Riddhi Adhikari*, Md Kamrul Hasan, Kai Lupo*, Ergun Akleman, Matt Pharr, Vinayak Krishnamurthy^C, **ABC-Auxetics: An Implicit Design Approach for Negative Poisson's Ratio Materials**, *Advanced Engineering Materials*, (Submitted: August 28, 2023)

[J42] Matthew Ebert*, Ergun Akleman, Vinayak Krishnamurthy, Roman Kulagin, Yuri Estrin^C, **VoroNoodles: Topological Interlocking with Helical Layered 2-Honeycombs**, *Advanced Engineering Materials*, (Submitted: May 29, 2023)

[J41] Matthew Ebert*, Doyeon Kim, Ergun Akleman, Vinayak Krishnamurthy^C, **Generalized Plesiohedra: Cell-Transitive 3-Honeycombs Using Isometries of Space-filling Polyhedra**, *Computer-Aided Design*, (Submitted: April 09, 2023)

[J40] Abhijeet Singh Raina*, Vipul Mone*, Mehdi Gorjian, Shinjiro Sueda, Francis Quek, Vinayak Krishnamurthy^C, **Tangible Stimuli for Mixed Reality-Based Conceptual Design-In-Context**, *Journal of Mechanical Design*, (Submitted: April 09, 2023)

Journals Papers (Accepted/Published):

[J39] Shantanu Vyas, Shivangi Dwivedi, Lindsey J. Brenner, Isabella Pedron, Joseph L. Gabbard, Vinayak R. Krishnamurthy, Ranjana K. Mehta, **Adaptive Training on Basic AR Interactions: Bi-Variate Metrics and Neuroergonomic Evaluation Paradigms**, *Accepted for publication in International Journal of Human-Computer Interaction*.

[J38] Tolga Yildiz, Ergun Akleman, Matthew Ebert*, Vinayak Krishnamurthy^C, **A Modular Approach for Creation of Any Bi-Axial Woven Structure with Congruent Tiles**, *Computers & Graphics*, Volume 114, 2023, Pages 357-367, ISSN 0097-8493, <https://doi.org/10.1016/j.cag.2023.06.017>

[J37] Wenceslao Piedra-Cascón, Riddhi R. Adhikari*, Mutlu Özcan, Vinayak R. Krishnamurthy, Marta Revilla-León, Mercedes Gallas-Torreira, **Accuracy assessment (trueness and precision) of a confocal based intraoral scanner under twelve different ambient lighting conditions**, *Journal of Dentistry*. 2023 Jul 1;134:104530.

[J36] Abhijeet Singh Raina*, Ronak R. Mohanty*, Abhirath Bhuvanesh*, Divya Prabha J., Manohar Swaminathan, Vinayak Krishnamurthy^C, **Pointing Tasks using Spatial Audio on Smartphones for**

People with Vision Impairments, ASME Journal of Computing & Information Science in Engineering, doi: <https://doi.org/10.1115/1.4062426>

[J35] Shantanu Vyas*, Ting-Ju Chen*, Jay Woodward, [Vinayak Krishnamurthy](#)^C, **Reflect-Express-Transform: Investigating Speech-based Iterative Digital Design for Young Designers**, ASME Journal of Computing & Information Science in Engineering, Jun 2023, 23(3): 030905, <https://doi.org/10.1115/1.4062230>

[J34] Riddhi Adhikari*, Karim ElSeyed, Ergun Akleman, Jitesh Panchal, [Vinayak Krishnamurthy](#)^C, **SplitCode: Voronoi-based Error Exaggeration for Authentication of Manufactured Parts**, Journal of Manufacturing Systems, Volume 65, 2022, Pages 605-621, ISSN 0278-6125, <https://doi.org/10.1016/j.jmsy.2022.10.005>

[J33] [Vinayak Krishnamurthy](#)^C, Laxmi Poudel, Matthew Ebert*, Daniel Weber, Rencheng Wu, Wenchao Zhou, Ergun Akleman, Zhenghui Sha, **LayerLock: Layer-wise Collision-free Multi-Robot Additive Manufacturing Using Topologically Interlocked Space-Filling Shapes**, Computer-Aided Design, Computer-Aided Design, Volume 152, 2022, 103392, ISSN 0010-4485,

[J32] Taeouk Kim, Mohammadali Hedayat, Veronica V. Vaitkus, Marek Belohlavek, [Vinayak Krishnamurthy](#), Iman Borazjani^C, **A learning-based, region of interest-tracking algorithm for catheter detection in echocardiography**, Computerized Medical Imaging and Graphics, 2022, 102106, ISSN 0895-6111, <https://doi.org/10.1016/j.compmedimag.2022.102106>. [Role: Conceptual development of algorithm for catheter tracking.]

[J31] Shantanu Vyas*, Ting-Ju Chen*, Ronak R. Mohanty*, [Vinayak Krishnamurthy](#)^C, **Making-A-Scene: A Preliminary Case Study on Speech-based 3D Shape Exploration through Scene Modeling**, ASME Journal of Computing & Information Science in Engineering, December 2022; 22(6): 064501, <https://doi.org/10.1115/1.4055239>

[J30] Aman Nigam, Ronak R. Mohanty*, James F. Kellam, Catherine G. Ambrose, [Vinayak R. Krishnamurthy](#), Bruce L. Tai^C, **An Objective Assessment for Bone Drilling: A Pilot Study on Vertical Drilling**, Journal of Orthopaedic Research, 2022 May 17. doi: 10.1002/jor.25377. PMID: 35578977. [Role: Development of methods, setup, and algorithms for collection and analysis of drilling data.]

[J29] Ronak R. Mohanty*, Abhijeet Singh Raina*, Subhrajyoti Chaudhuri*, Francis Quek, Shinjiro Sueda, [Vinayak Krishnamurthy](#)^C, **Spatial Manipulation in Virtual Peripersonal Space: A Study of Motor Strategies**, ASME Journal of Computing & Information Science in Engineering, April 07, 2022, doi: <https://doi.org/10.1115/1.4054277>

[J28] Ting-Ju Chen*, Ronak R. Mohanty*, [Vinayak Krishnamurthy](#)^C, **Queries and Cues: Textual Stimuli for Reflective Thinking in Digital Mind-Mapping**, Journal of Mechanical Design, February 2022, 144(2): 021402 (14 pages) <https://doi.org/10.1115/1.4052297>.

[J27] Yuri Estrin^C, [Vinayak Krishnamurthy](#), and Ergun Akleman, **Design of Architected Materials Based on Topological and Geometrical Interlocking**, Journal of Materials Research and Technology. Volume 15, 2021, Pages 1165-1178, ISSN 2238-7854, <https://doi.org/10.1016/j.jmrt.2021.08.064>. [Role: Conceptual organization of the review and expertise on geometric interlocking.]

[J26] Shantanu Vyas*, Ting-Ju Chen*, Ronak Mohanty*, Peng Jiang and [Vinayak Krishnamurthy](#)^C, **Latent Embedded Graphs for Image and Shape Interpolation**, Computer-Aided Design, Volume 140, 2021, 103091, ISSN 0010-4485, <https://doi.org/10.1016/j.cad.2021.103091>.

- [J25] Wenceslao Piedra-Cascon, Vinayak Krishnamurthy, Marta Revilla-León^C. **3D Printing Parameters, Slicing Procedures, Support Parameters, and Post-Processing Procedures for Dental Applications of Vat-Polymerization Additive Manufacturing Technologies**. The International Journal of Prosthodontics. Volume 109, 2021, 103630, ISSN 0300-5712, <https://doi.org/10.1016/j.jdent.2021.103630>. [**Role:** Provided expertise on various additive manufacturing methodologies.]
- [J24] Vinayak Krishnamurthy^C, Ergun Akleman, Sai Ganesh Subramanian*, Matthew Ebert*, Jiaqi Cui, Chia-An Fu, and Courtney Starrett, **Geometrically Interlocking Shapes Based on Bi-Axial Fabric Weaves**, IEEE Transactions of Visualization and Computer Graphics, doi: 10.1109 / TVCG. 2021. 3065457.
- [J23] Marta Revilla-León^C, Miguel Gómez-Polo, Shantanu Vyas*, Basir A. Barmak, Mutlu Ozcan, Wael Att, Vinayak Krishnamurthy, **Artificial intelligence applications in restorative dentistry: A systematic review**, The Journal of Prosthetic Dentistry, 2021, ISSN 0022-3913, <https://doi.org/10.1016/j.prosdent.2021.02.010>. [**Role:** Verification of the AI literature for dentistry, writing, and providing expertise on AI techniques.]
- [J22] Ronak R. Mohanty*, Riddhi R. Adhikari*, Vinayak Krishnamurthy^C, **Motric and Perceptual Kinesthetic Symmetry in Bi-manual Interactions (*Invited paper*)**, ASME Journal of Computing & Information Science in Engineering, <https://doi.org/10.1115/1.4050289>.
- [J21] Maulik Kotecha, Ting-Ju Chen*, Daniel McAdams, Vinayak Krishnamurthy^C, **Design Ideation Through Speculative Fiction: Foundational Principles & Exploratory Study**, ASME Journal of Mechanical Design, 2021, <https://doi.org/10.1115/1.4049656>.
- [J20] Taeouk Kim, Mohammadali Hedayat, Veronica V. Vaitkus, Marek Belohlavek, Vinayak Krishnamurthy, and Iman Borazjani^C, **Automatic Segmentation of the Left Ventricle in Echocardiographic Images Using Convolutional Neural Networks**, Quantitative Imaging in Medicine and Surgery, 2021, <http://dx.doi.org/10.21037/qims-20-745> [**Role:** Conceptual development of the segmentation algorithm using neural networks]
- [J19] Marta Revilla-León^C, Sai Ganesh Subramanian*, Mutlu Özcan, Vinayak Krishnamurthy. **Analysis of Different Illuminance of Room Lighting Conditions on the Accuracy (trueness and precision) of an Intraoral Scanner**. 2021 Feb;30(2):157-62. Journal of Prosthodontics. doi:10.1111/jopr.13276 [**Role:** Provided expertise on dental geometric modeling and statistical analysis of scanned models.]
- [J18] Ronak R. Mohanty*, Vinayak Krishnamurthy^C. **Kinesthetic Metaphors for Precise Spatial Manipulation: A Study of Object Rotation**. ASME Journal of Computing & Information Science in Engineering, October 2020. doi: <https://doi.org/10.1115/1.4048618>.
- [J17] Kaustubh Tansali, Zohaib Hasnain^C, Vinayak Krishnamurthy, **Generalizability of Convolutional Encoder-Decoder Networks for Aerodynamic Flow-field Prediction Across Geometric and Physical- Fluidic Variations**, ASME Journal of Mechanical Design, August 2020, <https://doi.org/10.1115/1.4048221> [**Role:** Conceptual development of neural network architecture for CFD predictions.]
- [J16] Umema H. Bohari*, Ryan Alli*, Alejandra Garcia*, and Vinayak Krishnamurthy^C, **Stroke-Hover Intent Recognition for Mid-air Curve Drawing Using Multi-Point Skeletal Trajectories**, ASME Journal of Computing & Information Science in Engineering, February 2021; 21(1): 011006. <https://doi.org/10.1115/1.4047558>

- [J15] Marta Revilla-León^C, Sai Ganesh Subramanian*, Mutlu Özcan, [Vinayak Krishnamurthy](#). **Clinical study of the influence of ambient lighting conditions on the mesh quality of an intraoral scanner.** Journal of Prosthodontics. 2020;29(2):107-113. doi:10.1111/jopr.13205 [*Role*: Provided expertise on dental geometric modeling and statistical analysis of scanned models.]
- [J14] Ergun Akleman, [Vinayak R. Krishnamurthy^C](#), Chia-An Fu, Sai Ganesh Subramanian*, Matthew Ebert*, Matthew Eng, Courtney Starrett, Haard Panchal, **Generalized Abeille Tiles: Topologically interlocked space-filling shapes generated based on fabric symmetries**, Computers & Graphics, Volume 89, 2020, Pages 156-166, ISSN 0097-8493, <https://doi.org/10.1016/j.cag.2020.05.016>.
- [J13] Ting-Ju Chen*, [Vinayak Krishnamurthy^C](#). **Investigating a Mixed-Initiative Workflow for Digital Mind-mapping.** ASME Journal of Mechanical Design, October 2020; 142(10): 101404. <https://doi.org/10.1115/1.4046808>.
- [J12] Marta Revilla-León^C, Sai Ganesh Subramanian*, Mutlu Özcan, [Vinayak Krishnamurthy](#). **Clinical study of the influence of ambient light scanning conditions on the accuracy (trueness and precision) of an intraoral scanner.** Journal of Prosthodontics, 2019, doi: 10.1111/jopr.13135. [*Role*: Provided expertise on dental geometric modeling and statistical analysis of scanned models.]
- [J11] Ronak R. Mohanty*, Ricardo M. Castillo*, Eric Ragan, [Vinayak Krishnamurthy^C](#), **Investigating Force Feedback in Mid-air Sketching of Multi-planar 3D Curve-Soups**, ASME Journal of Computing & Information Science in Engineering, doi: 10.1115/1.4045142
- [J10] Sai Ganesh Subramanian*, Matthew Eng, [Vinayak Krishnamurthy^C](#), Ergun Akleman, **Delaunay Lofts: A Biologically Inspired Approach for Modeling Space Filling Modular Structures**, Computers & Graphics, Vol. 82, 2019, Pages 73-83, ISSN 0097-8493, doi: 10.1016/j.cag.2019.05.021.
- [J09] Marta Revilla-León^C, Peng Jiang*, Mehrad Sadeghpour, Wenceslao Piedra Cascon, Amirali Zandinejad, Mutlu Özcan, [Vinayak Krishnamurthy](#), **Intraoral digital impressions. Part-2: Influence of ambient scanning light conditions on the mesh quality of different intraoral scanners.** The Journal of Prosthetic Dentistry, 2019, ISSN 0022-3913, doi: 10.1016/j.prosdent.2019.06.004 [*Role*: Provided expertise on dental geometric modeling and statistical analysis of scanned models.]
- [J08] Marta Revilla-León^C, Peng Jiang*, Mehrad Sadeghpour, Wenceslao Piedra Cascon, Amirali Zandinejad, Mutlu Özcan, [Vinayak Krishnamurthy](#), **Intraoral digital impressions. Part-1: Influence of ambient scanning light conditions on the accuracy (trueness and precision) of different intraoral scanners**, The Journal of Prosthetic Dentistry, 2019, ISSN 0022-3913, 10.1016/j.prosdent.2019.06.003 [*Role*: Provided expertise on dental geometric modeling and statistical analysis of scanned models.]
- [J07] Cecil Piya^C, [Vinayak](#), and Karthik Ramani, **Proto-TAI++: Exploring perceptually consistent creation of planar shape assemblies through multi-modal tangible interactions**, ASME Journal of Computing and Information Science in Engineering 2016;16(3):030906-030906-10. doi:10.1115/1.4034266
- [J06] [Vinayak^C](#) and Karthik Ramani, **Extracting Hand Grasp & Motion for Intent Expression in Mid-Air Shape Deformation: A Concrete & Iterative Exploration through a Virtual Pottery Application**, Computers & Graphics, ISSN 00978493, doi: 0.1016/j.cag.2015.10.012
- [J05] [Vinayak^C](#) and Karthik Ramani, **A Gesture-free Geometric Approach for Mid-Air Expression of Design Intent in 3D Virtual Pottery**, Computer-Aided Design, Volume 69, December 2015, Pages 11-24, doi: 10.1016/j.cad.2015.06.006

[J04] Vinayak^C, Sundar Murugappan, HaiRong Liu, and Karthik Ramani, **Shape-It-Up: Hand Gesture Based Creative Expression of 3D Shapes Using Intelligent Generalized Cylinders**, Computer-Aided Design, Volume 45, Issue 2, February 2013 doi: 10.1016/j.cad.2012.10.011

[J03] Vinayak^C, Sundar Murugappan, Cecil Piya, and Karthik Ramani, **Handy-Potter: Rapid Exploration of Rotationally Symmetric Shapes Through Natural Hand Motions**, J. Comput. Inf. Sci. Eng, Volume 13, Issue 2, April 2013 doi: 10.1115/1.4023588

[J02] Vinayak and Dibakar Sen^C, **A vision modeling framework for DHM using geometrically estimated FoV**, Computer-Aided Design, Volume 44, Issue 1, January 2012 doi: 10.1016/j.cad.2011.01.003

[J01] Vinayak and Dibakar Sen^C, **Geometric Estimation of FoV for Vision Modeling in DHM**, SAE International Journal of Passenger Cars-Mechanical Systems, 2(1):1614-1625, October 2009 doi: 10.4271/2009-01-2294

Highly Selective Conference Papers (Published/Accepted):

This list contains top-tier highly selective conference publications. Most of the cutting-edge research in Computer Science is published in these conferences. These papers are should be considered both archival and complete works. Acceptance rates have been specified for these publications *in red*.

[S05] Umema H. Bohari*, Ting-Ju Chen*, Vinayak^C, **To Draw or Not to Draw: Recognizing Stroke-Hover Intent in Non-instrumented Gesture-free Mid-Air Sketching**, In proceedings of the 23rd ACM International Conference on Intelligent User Interfaces (IUI 2018). ACM, March 7-11, 2018, Tokyo, Japan. [*23% acceptance rate*]

[S04] Cecil Piya^C, Vinayak, Senthil Chandrasegaran, Niklas Elmqvist, and Karthik Ramani, **Co-3deator: A Collaborative 3D Design Ideation Tool**, In Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems (CHI '17). ACM, May 6-11, 2017, Denver, Colorado, USA. [*21% acceptance rate*]

[S03] Ke Huo^C, Vinayak, and Karthik Ramani, **Window-Shaping: 3D Design Ideation by creating on, borrowing from, and looking at the Physical World**, In proceedings of TEI '17: Eleventh International Conference on Tangible, Embedded, and Embodied Interaction (TEI '17). ACM, March 20-23, 2017, Yokohama, Japan. [*27% acceptance rate*]

[S02] Vinayak^C, Devarajan Ramanujan, Cecil Piya, and Karthik Ramani, **MobiSweep: Exploring Spatial Design Ideation Using a Smartphone as a Hand-held Reference Plane**, In Proceedings of The ACM International conference on Tangible, Embedded and Embodied Interaction (TEI 2016). [*27% acceptance rate*]

[S01] Sundar Murugappan^C, Vinayak, Niklas Elmqvist, and Karthik Ramani. **Extended multitouch: recovering touch posture and differentiating users using a depth camera**, 25th annual ACM symposium on User interface software and technology (UIST '12). ACM, New York, NY, USA, 487-496. doi: 10.1145/2380116 [*21% acceptance rate*]

Full-Length Peer-reviewed Conference Papers (Published/Accepted):

[C30] Noah Hill*, Matt Ebert*, Mena Maurice*, Vinayak R. Krishnamurthy^C, **Generative Design of Statistically Self-similar Mechanical Structures**, In Proceedings of the ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference

(IDETC/CIE 2023), August 20–23, 2023, Boston, MA. [*Computers and Information Science in Engineering (CIE) Best Paper Award*]

[C29] Ronnie F. P. Stone, Wenchao Zhou, Ergun Akleman, Vinayak R. Krishnamurthy, Zhenghui Sha, **Print as a Dance Duet: Communication Strategies for Collision-Free Arm-Arm Coordination in Cooperative 3D Printing**, In Proceedings of the ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023), August 20–23, 2023, Boston, MA.

[C28] Avinash Danda, Bruce L Tai, Vinayak Krishnamurthy, Mathew Kuttolamadom, **Effectiveness of Vertically-Integrated Project Teams in Tackling an Engineering Grand Challenge**, 2023 ASEE Annual Conference & Exposition, Baltimore, Maryland. <https://peer.asee.org/42708>.

[C27] Hillary E Merzdorf, Donna Jaison, Samantha Ray, Anna Stepanova, Vimal Kumar Viswanathan, Vinayak Krishnamurthy, Wayne Li, Julie S Linsey, Tracy Anne Hammond, Julie Linsey, Karan Watson, Tracy Hammond, **Sketchtivity, an Intelligent Sketch Tutoring Software: Broadening Applications and Impact**, 2023 ASEE Annual Conference & Exposition, Baltimore, Maryland, <https://peer.asee.org/43086>.

[C26] Donna Jaison, Morgan B Weaver, Samantha Ray, Hillary E Merzdorf, Kerrie A Douglas, Vinayak Krishnamurthy^C, Julie Linsey, Karan Watson, Tracy Hammond, **WIP Teaching Engineers to Sketch: Impacts of Feedback from an Intelligent Tutoring Software on Engineers' Sketching Skill Development**, 2022 IEEE Frontiers in Education Conference (FIE), 2022, pp. 1-5, doi: 10.1109/FIE56618.2022.9962419.

[C25] Cassie Mullins, Matthew Ebert*, Ergun Akleman, Vinayak R. Krishnamurthy^C, **Voronoi Spaghetti & VoroNoodles: Topologically Interlocked, Space-Filling, Corrugated & Congruent Tiles**, In SIGGRAPH Asia 2022 Technical Communications (SA '22 Technical Communications). Association for Computing Machinery, New York, NY, USA, Article 14, 1–4.

[C24] Shantanu Vyas*, Ting-Ju Chen*, Jay Woodward, Vinayak R. Krishnamurthy^C, **ShapOrator: Enabling Design Iteration for Young Designers through Shape Verbalization**, In Proceedings of the ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2022), August 14-17, 2022, St. Louis, MO. [*Computer-Aided Product and Process Development (CAPPD) Technical Committee Best Paper Award*]

[C23] Abhijeet Singh Raina*, Shantanu Vyas*, Matthew Ebert*, Vinayak R. Krishnamurthy^C, **QuickProbe: Quick Physical Prototyping-In-Context Using Physical Scaffolds in Digital Environments**, In Proceedings of the ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2022), August 14-17, 2022, St. Louis, MO.

[C22] Anantha Natarajan, Jiaqi Cui, Ergun Akleman, Vinayak Krishnamurthy^C, **Construction of Planar and Symmetric Truss Structures with Interlocking Edge Elements**, In Proceedings of Shape Modeling International - Fabrication and Sculpting Event 2021 (SMIFASE'21)

[C21] Ronak R. Mohanty*, Shantanu Vyas*, Aman Nigam, Bruce L. Tai, Vinayak R. Krishnamurthy^C, **Orthopedic Bone-drilling Assessment Through Laplacian-based Trajectory Noise Characterization**, In Proceedings of the ASME 2021 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2021), August 17-20, 2021, Online, Virtual

[C20] Ting-Ju Chen*, Shantanu Vyas*, Vinayak R. Krishnamurthy^C, **Investigating Mind-mapping as a Tool for Problem Exploration in Early Design**, In Proceedings of the ASME 2021 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2021), August 17-20, 2021, Online, Virtual

[C19] Ronak R. Mohanty*, Riddhi R. Adhikari*, and Vinayak Krishnamurthy^C, **Kinesthetic Perceptual Symmetry in Bi-manual Interactions: An Exploratory Study**, Proceedings of The ASME 2020 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC\CIE 2020), August 16 – 19, 2020, St. Louis, MO.

[C18] Matthew Ebert*, Sai Ganesh Subramanian*, Ergun Akleman, and Vinayak Krishnamurthy^C, **Generative Infills for Additive Manufacturing using Space-filling Polygonal Tiles**, Proceedings of The ASME 2020 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC\CIE 2020), August 16 – 19, 2020, St. Louis, MO.

[C17] Vinayak Krishnamurthy^C, Ergun Akleman, Sai Ganesh Subramanian*, Katherine Boyd, Chia-An Fu, Matthew Ebert*, Courtney Starrett, and Neeraj Yadav, **Bi-Axial Woven Tiles: Interlocking Space-Filling Shapes Based on Symmetries of Bi-Axial Weaving Patterns**, In proceedings of The Graphics Interface Conference 2020 (GI '20), Toronto, Canada. [**51.7% acceptance rate**]

[C16] Ting-Ju Chen*, Sai Ganesh Subramanian*, and Vinayak Krishnamurthy^C, **QCue: Queries and Cues for Computer-Facilitated Mind-Mapping**, In proceedings of The Graphics Interface Conference 2020 (GI '20), Toronto, Canada. [**51.7% acceptance rate**]

[C15] Ting-Ju Chen*, Miguel A. Hoffmann Rodriguez*, Ronak R. Mohanty*, and Vinayak R. Krishnamurthy^C. **Collaborative Mind-Mapping: A Study of Patterns, Strategies, and Evolution of Maps Created by Peer-Pairs**, Proceedings of The ASME 2019 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC\CIE 2019), August 18 – 21, 2019, Anaheim, CA. [**Best Paper Nominee**]

[C14] Ting-Ju Chen*, Sai Ganesh Subramanian*, and Vinayak R. Krishnamurthy^C. **Mini-Map: Mixed-Initiative Mind-Mapping via Contextual Query Expansion**, AIAA Scitech 2019 Forum, AIAA SciTech Forum, (AIAA 2019-2347), <https://doi.org/10.2514/6.2019-2347>

[C13] Ronak R. Mohanty*, Umema H. Bohari*, Eric Ragan, Vinayak^C, **Kinesthetically Augmented Mid-air Sketching of Multi-planar 3D Curve-Soups**, In Proceedings of the ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2018, August 26-29 2018, Quebec City, Canada.

[C12] Cecil Piya^C, Vinayak, Yunbo Zhang, and Karthik Ramani, **RealFusion: An Interactive Workflow for Repurposing Real-World Objects towards Early-stage Creative Ideation**, In proceedings of Graphics Interface 2016 (GI '16), Victoria, BC, Canada. [**42% acceptance rate**]

[C11] Devarajan Ramanujan^C, Vinayak, Yash Nawal, Tahira Reid, and Karthik Ramani, **Informing Early Design Via Crowd-based Co-Prototyping**, In Proceedings of the ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2015, August 2-5, 2015, Boston, Massachusetts, USA.

[C10] Vinayak^C, and Karthik Ramani, **Hand Grasp and Motion for Intent Expression in Mid-Air Virtual Pottery**, In Proceedings of the 41st Graphics Interface Conference (GI '15). Canadian Information Processing Society, Toronto, Ont., Canada, 49-57. [**38.5% acceptance rate**]

[C09] Vinayak^C, Sundar Murugappan, HaiRong Liu, and Karthik Ramani. **Shape-It-Up: Hand Gesture Based Creative Expression of 3D Shapes Using Intelligent Generalized Cylinders**, Symposium on Solid and Physical Modeling (SPM 2012), University of Burgundy, Dijon, France, Oct. 29-31, 2012

[C08] Vinayak^C, Sundar Murugappan, Cecil Piya, and Karthik Ramani, **Handy-Potter: Rapid 3D Shape Exploration Through Natural Hand Motions**, ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2012, August 12-15, 2012, Chicago, Illinois, USA (*All conference Best Paper Award*)

[C07] You Wu, Lara Schmidt, Matthew Parker, John Strong, Michael Bruns, Vinayak^C, and Karthik Ramani, **ACTIVE-Hand: Automatic Configurable Tactile Interaction in Virtual Environment**, ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2012, August 12-15, 2012, Chicago, Illinois, USA

[C06] Sundar Murugappan^C, Vinayak, Karthik Ramani, and Maria. C. Yang, **APIX: Analysis from Pixellated Inputs in Early Design Using a Pen-based Interface**, ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference IDETC/CIE 2011, Washington, DC, USA

[C05] Vinayak and Dibakar Sen^C, **Geometric Estimation of FoV for Vision Modeling in DHM**, SAE Digital Human Modeling for Design and Engineering Conference, Gothenburg, Sweden (SAE-DHM09), July 2009.

[C04] Dibakar Sen^C and Vinayak, **On a Novel Geometric Representation of Rotation**, SAE Digital Human Modeling for Design and Engineering Conference, Pittsburgh, Pennsylvania, June 2008.

[C03] Pulkit Kapur^C, Rahul Mukhi, and Vinayak, **A Proposal for Bipedal Locomotion using Gyroscopic Effect**, International Conference on Climbing and Walking Robots, Singapore July 2007.

[C02] Vinayak and Dibakar Sen^C, **Studies on the Steering of a Single-degree-of-freedom Hexapod**, 12th IFToMM World Congress, Besançon (France), June 2007.

[C01] Vinayak^C, **Intuitive design and Gait Analysis for a Closed Loop Leg Mechanism of a Quadruped with single Actuator**, International Conference on Climbing and Walking Robots (CLAWAR 2005), London, September 2005.

Patents Disclosed:

[P10] Alonna Too-Chiobi, Chukwubuikem Ewelike, Tochukwu Chiobi, Satish Bukkapatnam, Vinayak R. Krishnamurthy, **CASE: Separable Modular Container**, (Disclosed: August 2022)

[P09] Vinayak R. Krishnamurthy, Ergun Akleman, Sai Ganesh Subramanian, and Matthew Ebert, **Methods for Generating Three-Dimensional Structures**, US Application 62/944,910 (Filed: December 10, 2019)

[P08] Cecil Kumar Piya, Vinayak, and Karthik Ramani, **Sketch-based 3D Modeling System**, USPTO Application US20180158239A1

[P07] Cecil Kumar Piya, Vinayak, and Karthik Ramani, **Collaborative 3D Modeling System**, USPTO Application US20180122138A1

[P06] Vinayak, Cecil Kumar Piya, and Karthik Ramani, **Manipulating 3d virtual objects using hand-held controllers**, US Patent Application WO2017139509A1

[P05] Vinayak, Cecil Kumar Piya, Karthik Ramani, and Raja Jasti, **Methods and Systems for Collaboratively and Interactively Producing Shapes in Three-Dimensional Space**, USPTO Application 13886546

[P04] Vinayak, Karthik Ramani, and Raja Jasti, **Methods and Systems for Interactively Producing Shapes in Three-Dimensional Space**, USPTO Application 13886732

Patents Granted:

[P03] Cecil Kumar Piya, Vinayak, and Karthik Ramani, **Manipulating virtual environment using non-instrumented physical object**, US Patent 10579207, (*Granted 2020-03-03*)

[P02] You Wu, Michael McCoy, Vinayak, Karthik Ramani, and Raja Jasti, **Wireless haptic feedback apparatus configured to be mounted on a human arm**, US Patent 9229530B1 (*Granted 2016-01-05*)

[P01] Vinayak, Hairong Liu, Karthik Ramani, and Raja Jasti, **Methods and Systems for Interactively Producing Shapes in Three-Dimensional Space**, US Patent 9383895B1 (*Granted 2016-07-05*)

Conference Demonstrations, Posters, & Extended Abstracts

[D13] Suryapavan Cheruku*, Abhijeet Singh Raina*, Vinayak Krishnamurthy^C, **Augmented Reality based Diagnostic Tool for a Rotating Machine - Turbo - AR**, ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023), August 20–23, 2023, Boston, MA. [*First Prize at the ASME Design Tool Showcase*]

[D12] Shantanu Vyas*, Taimoor Daud Khan*, Matthew Ebert*, Vinayak Krishnamurthy^C, **Creepers3D: Detailed Design Diversification on Product Forms**, ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023), August 20–23, 2023, Boston, MA.

[D11] Shantanu Vyas*, Vinayak Krishnamurthy^C, **ShapOrator VR: Speech-based Iterative Digital Design in Virtual Reality**, ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023), August 20–23, 2023, Boston, MA.

[D10] Abhijeet Singh Raina*, Vipul Mone*, Vinayak Krishnamurthy^C, **Kinesthetically-guided Virtual Object Manipulation Based on Space Colonization Algorithm**, ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE 2023), August 20–23, 2023, Boston, MA.

[D09] Ergun Akleman^C, Vinayak Krishnamurthy, Courtney Starrett, Chia-an Fu, Doyeon Kim, and Nicholas Cropper, Sai Ganesh Subramanian*, and Mathew Ebert*, **A New Method to Obtain Positive Genus space-filling Tiles that do not form Links or Knots**, Shape Modeling International - Fabrication and Sculpting Event 2021 (SMIFASE'21)

[D08] Ronak R. Mohanty*, Aman Nigam, Bruce L. Tai, James Kellam, Catherine G. Ambrose, Vinayak R. Krishnamurthy^C. 2021. **A Bone Drilling Simulator with Data Feedback for Quantitative Assessment and Training**. Annual Meetings of the Orthopedic Research Society.

[D07] Ting-Ju Chen*, Sai Ganesh Subramanian*, Vinayak R. Krishnamurthy^C. 2019. **Mini-Map: Mixed-Initiative Mind-Mapping with AI-Collaborator**. In Proceedings of the ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC\CIE 2019), August 18 – 21, 2019, Anaheim, CA.

- [D06] Ronak R. Mohanty, Bruce Tai, Mathew A. Kuttolamadom, Vinayak R. Krishnamurthy^C. 2019. **Diffusion Based Material Model for Kinesthetic Feedback in Virtual Sculpting: Preliminary Exploration**. In Proceedings of the ASME 2019 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (IDETC\CIE 2019), August 18 – 21, 2019, Anaheim, CA.
- [D05] Sai Ganesh Subramanian, Mathew Eng, Vinayak Krishnamurthy, and Ergun Akleman. 2019. **Delaunay lofts: a new class of space-filling shapes**. In ACM SIGGRAPH 2019 Posters (SIGGRAPH '19). ACM, New York, NY, USA, Article 81, 2 pages. DOI: <https://doi.org/10.1145/3306214.3338576> (Winner of the *ACM SIGGRAPH Student Research Competition*) [**21% acc. rate on average**]
- [D04] Sai Ganesh Subramanian, Matthew Eng, Vinayak Krishnamurthy and Ergun Akleman 2019. **Space Filling Delaunay Loft Sculptures**. In Proceedings of the SMI'2019 Fabrication and Sculpting Event (FASE). Hyperseeing Magazine, The Publication of the international Society of Arts, Mathematics and Architecture.
- [D03] Ke Huo, Vinayak, and Karthik Ramani. 2016. **Window-Shaping: 3D Design Ideation in Mixed Reality**. In Proceedings of the 2016 Symposium on Spatial User Interaction (SUI '16). ACM, New York, NY, USA, 189-189. doi: 10.1145/2983310.2989189 [**26% acc. rate**]
- [D02] Vinayak, Karthik Ramani, Kevin Lee, Jr., and Raja Jasti. 2014. **zPots: a virtual pottery experience with spatial interactions using the leap motion device**. In CHI '14 Extended Abstracts on Human Factors in Computing Systems (CHI EA '14). ACM, New York, NY, USA, 371-374. doi: 10.1145/2559206.2574834 [**23% acc. rate**]
- [D01] Vinayak, Karthik Ramani, Ansh Verma, Kevin Lee, Jr., and Raja Jasti. 2014. **zPots: A virtual pottery experience with spatial interactions**. Poster presented at the NSF SBIR/STTR Phase II Grantee Conference, May 12-15 2014.

III-C. Invited Talks & Workshops

- [T15] June 17-18, 2023 – **Mind-Body-Space: Tangible Computing in Extended Reality**, A two-day workshop held in the Department of Design at the Indian Institute of Technology, Hyderabad, India.
- [T14] June 05, 2023 – **Embodied, Reflective, Generative: Three Stories on Computer-Supported Design**, Talk given at the Centre for Product Design and Manufacturing, Indian Institute of Science on the occasion of its Silver Jubilee Celebrations.
- [T13] May 10, 2022 – **Decomposing Space to Compose Shapes: Partitive Geometry & Its Applications to Design & Manufacturing**, Talk given to AFRL Digital Manufacturing Research Team, Air-force Research Lab.
- [T12] November 19, 2021 – **Motoric and Perceptual Kinesthetic Symmetry in Bi-manual Interactions**, ASME JCISE Spotlight Talks, Webinar Organized by ASME Journal of Computing and Information Science in Engineering.
- [T11] July 26, 2021 – **Teaching More Skills in the Same Amount of Time – Sketchtivity, an AI-Based Tutoring Platform for Free-Hand Sketching While Also Learning Spatial Visualization**, Workshop, 2021 ASEE Conference and Exposition, Co-conducted with Dr. Tracy Hammond, Dr. Julie Linsey, Dr. Vimal Viswanathan, and Mr. Blake Williford.

[T10] March 29, 2021 – **Symmetry, Growth, and Jigsaw Puzzles: Exploring Interlocking as a Principle for Computational Design**, Department of Computer Science and Engineering, Texas A&M University, College Station (CSCE 681 – Seminar Series – Spring 2021).

[T9] November 06, 2020 – **Exploring Embodiment for Spatial Design Ideation**, Texas Human Computer Interaction (TxHCI) Seminar Series.

[T8] September 25, 2020 – **Partitive Solid Geometry and Other Adventures in Digital Design Ideation**, Frontiers in Mechanical Engineering & Sciences (FrontiersMES), A Multi-University Webinar Series.

[T7] April 06, 2020 – **Spatial, Reflective, Geometric: Three Stories on Computer-Supported Design Ideation**, Department of Computer Science and Engineering, Texas A&M University, College Station (CSCE 681 – Seminar Series – Spring 2020)

[T6] December 11, 2019 – **Delaunay Lofts: Bio-Inspired Space-Filling Shapes**, Chromatic 3D Materials, Golden Valley, Minnesota

[T5] November 15, 2019 – **X-in-the-Loop: Three Avatars of Computational Design**, Department of Mechanical Engineering, Texas A&M University, College Station (Introduction to Mechanical Engineering – MEEN 289)

[T4] August 06, 2019 – **Mixed-Initiative Design**, Software, Robotics and Simulation Division, NASA Johnson Space Center, Houston, Texas.

[T3] February 24, 2017 – **What ‘else’ is Mechanical Engineering?** Department of Mechanical Engineering, Texas A&M University, College Station (Introduction to Mechanical Engineering – MEEN 289)

[T2] February 10, 2017 – **Spatial Design Ideation: Symbolic, Geometric, and Tangible Approaches**, Department of Mechanical Engineering, Texas A&M University, College Station (MEEN 681 – Seminar Series – Spring 2017)

[T1] October 05, 2016 – **Spatial Design Ideation: Symbolic, Geometric, and Tangible Approaches**, Department of Visualization, Texas A&M University, College Station (HCI Seminar Series – Fall 2017)

IV. RESEARCH FUNDING

Funding Summary:

	Number	Total	Prorated
Federal competitive grants:	4	\$2,806,561	\$1,009,673
Non-federal competitive grants:	5	\$303,000	\$228,000
Internal (TAMU) competitive grants:	3	\$78,000	\$64,000
Total:	12	\$3,187,561	\$1,301,673

IV-A. External Funding

[EG9] PI: Adolfo Delgado, Co-PI: Vinayak Krishnamurthy, **XLTRC2 Cyber-Physical System for Real-time Machine Vibration Visualization & Diagnostics Part 3: Vibration Diagnostics Tool**, Sponsor: Turbo-machinery Lab, Texas A&M University, Total Award: \$50,000, Prorated Award: \$50,000, Term: 09/01/2023 – 08/31/2024 [*Used for: Funding one Ph.D. student*].

[EG8] PI: Adolfo Delgado, Co-PI: Vinayak Krishnamurthy, **XLTRC2 Cyber-Physical System for Real-time Machine Vibration Visualization & Diagnostics Part 2: Mobile tool development using refined reduced-order models and cloud computing**, Sponsor: Turbo-machinery Lab, Texas A&M University, Total Award: \$50,000, Prorated Award: \$50,000, Term: 09/01/2022 – 08/31/2023 [*Used for: Funding one M.S. student*].

[EG7] PI: Adolfo Delgado, Co-PI: Vinayak Krishnamurthy, **XLTRC2 Cyber-Physical System for Real-time Machine Vibration Visualization & Diagnostics Part 1: Digital Twin Generation and Evaluation**, Sponsor: Turbo-machinery Lab, Texas A&M University, Total Award: \$50,000, Prorated Award: \$50,000, Term: 09/01/2021 – 08/31/2022 [*Used for: Funding one M.S. student*].

[EG6] PI: Vinayak Krishnamurthy, **CAREER: Partitive Solid Geometry: Principles, Algorithms, Workflows, & Applications**, Sponsor: National Science Foundation, Program: Engineering Design and Systems Engineering, Total Award: \$554,576, Prorated Award: \$554,576, Term: 08/01/2021– 07/31/2026. [*Used for: Funding one Ph.D. student, education & outreach activities, summer salary*]

[EG5] PI: Srikanth Saripalli, Co-PI: James Hubbard Jr, James Wall, John Hurtado, John Valasek, Junuthula Reddy, Justin Wilkerson, Michael Walsh, Nancy Currie-Gregg, Panganamala Kumar, Srinivas Shakkottai, Vinayak Krishnamurthy, Zohaib Hasnain, **Distributed Autonomous Robotic Experiments and Simulations (DARES)**, Sponsor: DOD-Army Research Office, Total award: \$22,462,764, Prorated Award: \$400,000, Term: 10/01/2020 – 06/30/2025. [*Used for: Funding one Ph.D. student, summer salary*]

[EG4] PI: Vinayak Krishnamurthy, co-PI: Francis Quek, Shinjiro Sueda, **CHS: SMALL: Clockmaker's Workspace: Where the Action Really is for Design**, Sponsor: National Science Foundation, Program: Cyber-Human Systems, Total Award: \$500,000, Prorated Award: \$261,687, Term: 07/31/20 – 07/30/24. [*Used for: Funding one Ph.D. student, summer salary*]

[EG3] PI: Tracy Hammond, co-PI: Vinayak Krishnamurthy, Julie S Linsey, Kerri Douglas, Vimal K. Vishwanathan, **Collaborative Research: Fostering Engineering Innovation and Communication through Immediate and Personalized 2D-Perspective Drawing Feedback**, Sponsor: National Science Foundation, Program: Improving Undergraduate STEM Education, Total Award: \$751,985, Prorated Award: \$120,317, Term: 05/01/20 – 04/30/24. [*Used for: Funding one Ph.D. student, summer salary*]

[EG2] PI: Li-Jung Tai, co-PI: Vinayak Krishnamurthy, **Fracture Fixation Training using a Hybrid Simulator with Data Visualization**, Sponsor (sub-contractor): University of Texas Health Science Center at Houston, *Primary Sponsor: The Orthopaedic Research and Education Foundation (OREF) and The American Board of Orthopaedic Surgery (ABOS)*, Total Award: \$150,000 (0 IDC), Prorated Award: \$75,000, Term: 07/01/19 – 06/30/22. [*Used for: Funding two Ph.D. students, summer salary*]

[EG1] PI: Vinayak Krishnamurthy, **Virtual reality equipment fund (Gift)**, Sponsor: Autodesk Inc., Total Amount: \$3,000.00, Term: 01/01/2018 – 12/31/2018.

IV-B. Internal Funding

[IG3] PI: Vinayak Krishnamurthy, co-PI: Francis Quek, Shinjiro Sueda, **Tangible Augmented Reality Design Workflows for Digital-to-Physical Prototyping by Children**, Sponsor: President's Excellence Fund, Texas A&M University, Program: T3: Texas A& M Triads for Transformation, Total Award: \$36,000.00, Prorated Award: \$36,000.00, Term: 01/01/2019 – 12/31/2020 [*Used for: Funding one Ph.D. student*]

[IG2] PI: Vinayak Krishnamurthy, co-PI: Bruce L. Tai, Mathew Kuttolamadom, **Augmented Reality-Coupled Haptic System for Orthopedic Surgery Training**, Sponsor: College of Engineering, Texas A&M University, Program: AggieE_Challenge, Total Award: \$14,000.00, Prorated Award: \$14,000.00, Term: 08/01/2017 – 07/31/2018 [**Used for: Funding one Ph.D. and one M.S. student**]

[IG1] PI: Bruce L. Tai, co-PI: Vinayak Krishnamurthy, Mathew Kuttolamadom, **Design & Control of a Vibration-Added Haptic Device for Minimally Invasive Surgical Simulation**, Sponsor: College of Engineering, Texas A&M University, Program: AggieE_Challenge, Total Award: \$28,000.00, Prorated Award: \$14,000.00, Term: 08/01/2016 – 07/31/2017 [**Used for: Funding one M.S. student at 25%FTE**]

V. EDUCATIONAL ACTIVITIES

V-A. Courses Taught

Teaching Summary:

Number of distinct courses taught: 4
 Number of undergraduate students taught: 512
 Number of graduate students taught: 220

Course Details

	<i>Course (Mean Evaluation)</i>	<i>Description</i>	<i>Terms(s) & No. of Students</i>
1	MEEN 210: Geometric Modeling for Mechanical Design (4.3/5.0)	Required undergraduate course on computer-aided design of mechanical systems	Fall 2016 (46), Spring 2017(28), Fall 2017(65), Fall 2018 (46), Fall 2019 (70), Spring 2020 (73), Fall 2020 (88), Fall 2022 (83), Fall 2023 (96)
2	MEEN 601: Advanced Product Design (4.19/5.0)	Graduate course in design of engineered products	Fall 2018 (51), Spring 2021 (37), Fall 2021 (63)
3	MEEN 602: Modeling and Analysis of Mechanical Systems (4.49/5.0)	Graduate course in mathematical modeling and analysis	Spring 2019 (34)
4	MEEN 689: Generative Design: Principles, Algorithms, and Applications	Graduate topics course in geometric algorithms for generative design	Fall 2022 (22), Fall 2023 (13)

V-B. Curriculum Development

MEEN 210: Geometric Modeling for Mechanical Design

- Developed and taught this required sophomore undergraduate course.
- Course coordinator since Spring 2017 and developed the curriculum.
- *Topics include:* fundamentals of geometric modeling, computer-aided design (CAD) through Solidworks, part modeling (solid and reference features), assembly modeling (kinematic mates), top-down and bottom-up design, basics of design process, projections and drawings, geometric dimensioning and tolerancing, reverse engineering, 3D printing.
- Developed a creativity-centric semester long design project module with socially conscious themes that are connected to engineering design. Students participate in problem discovery, idea

generation, engineering requirement development, CAD modeling, and prototyping of final products using different manufacturing methods (machining, wood-working, and 3D printing).

- Developed a comprehensive module on reverse engineering including physical product disassembly in class for functional analysis of existing products, 3D scanning theory and lab sessions, and a two-week ergonomic wearable design using 3D scanned head models.
- Organized guest lecture on uses of 3D scanning and Generative Design from Autodesk every semester since Fall 2017.
- Implemented 2-point perspective hand sketching module for product visualization
- Implemented AI-enabled mind-mapping for problem clarification.

MEEN 601: Advanced Product Design

- Topics include: fundamentals of product and engineering design, design theories and methodologies, product planning and clarification, functional modeling, design conceptualization techniques, embodiment design, product platforms, innovative thinking, design thinking.
- Developed a new free-hand sketching module to teach 2-point perspective sketching to students through an AI-based tool.
- Developed a new collaborative model for design thinking-based course project.
- Developed class activities for 6-3-5 sketching, quality function deployment, and creativity exercises such as 30 circles and brainstorming. Also introduced a new tool for mind-mapping developed in my research lab.

MEEN 602: Modeling and Analysis of Mechanical Systems

- Topics include: Fundamentals of Modeling of mechanical systems; State spaces and vector algebra with applications to dynamics and mechanical controls systems; State evolution of mechanical systems, their trajectories in state space and their formulation in terms of ordinary differential equations. Steady state and transient systems including statics and the heat equation and their representations using partial differential equations.
- Developed the complete course material based on multiple texts, online resources, YouTube videos, computer codes.
- Developed computational modules for practical problems such as principal component analysis, least squares, and mechanics. Conducted real-time programming in class to provide the actual application of fundamental mathematical concepts to real problems.
- Introduced student assessment methodologies for practical examples to relate theoretical and conceptual elements of mathematical material to engineering problems.

MEEN 689: Generative Design: Principles, Algorithms, and Applications

- Topics include: Fundamentals of generative algorithms; specific topics including spatial symmetries, tessellations, shape grammar, L-systems, subdivision, fractals, partitive geometry, generative deep learning methods, cellular automata, and reaction-diffusion; literature-based study of applications of generative algorithms for design of engineered systems including structural, robotic, architectural, and biomedical systems.
- Developed the complete course material based on multiple texts, online resources, YouTube videos, computer codes.
- Developed in-class live coding modules with students developing algorithms for fundamental generative algorithms such as L-systems, reaction-diffusion, and Voronoi tessellation.

- Developed a research-based course project leading to potential publications after the course.

V-C. Student Advising & Mentoring

Ph.D. Students

Note: I am the sole advisor to all the Ph.D. students listed below. Papers written and contributed to by each student have been identified in **red** in the thesis title column.

	<i>Name</i>	<i>Thesis Title</i>	<i>Dates</i>	<i>Graduation Date</i>
1	Taimoor Daud Khan	Image and Shape Abstraction for Autonomous Vehicle Navigation (Tentative)	Fall 2022 – Present	Summer 2027 (expected)
2	Matthew Ebert	Partitive Geometric Modeling of Lattice Structures (Tentative) (Papers: [P9, J33, J24, C23, C22, C18])	Fall 2021 – Present	Summer 2026 (expected)
3	Abhijeet Singh Raina	Clockmaker's Workspace: Spatial Unser Interfaces for Precise 3D Design (Papers: [J29, C22])	Fall 2020 – Present	Summer 2025 (expected)
4	Shantanu Vyas	Speech-based Interfaces for 3D Shape Exploration (Papers: [J27, J23, C23, C21, C20])	Fall 2020 – Present	Summer 2025 (expected)
5	Ronak R. Mohanty	Precise Spatial Manipulation: Interactions, Analytics, and Visualization (Papers: [J30, J22, J18, J11, C21, C19, C15, C13])	Fall 2016 – Summer 2021	Summer 2021 (Graduated)
6	Ting-Ju Chen	Association, Reflection, Stimulation: Problem Exploration in Early Design through AI-Augmented Mind-Mapping (Papers: [J29, J21, J13, C20, C16, C15, C14])	Fall 2016 – Summer 2021	Summer 2021 (Graduated)

M.S. Students

Note: I am the sole advisor to all the M.S. students listed below. Papers written and contributed to by each student have been identified in **red** in the thesis title column.

	<i>Name</i>	<i>Thesis Title</i>	<i>Dates</i>	<i>Graduation Date</i>
1	Suryapavan Cheruku	Realtime Simulation of Rotor-dynamic Digital Twin Through Machine Learning	Spring 2022 – present	Fall 2023 (expected)
2	Riddhi R. Adhikari	Quality-centric Authentication of Additively Manufactured Parts through Voronoi-based Error Exaggeration (Papers: [J22, C19])	Spring 2020 – Fall 2021	Fall 2021 (Graduated)
3	Sai Ganesh Subramanian	Geometric Modeling of Bio-Inspired Topologically Interlocking Space-Filling Tiles (Papers: [P9, J19, J14, J12, J10, C18, C17, C14])	Fall 2018 – Fall 2020	Fall 2020 (Graduated)
4	Umema H. Bohari	To Draw or Not to Draw: Recognizing Stroke-Hover Intent in Gesture-Free Bare Hand Mid-Air Drawing	Fall 2016 – Summer 2018	Summer 2018 (Graduated)

Curriculum Vitae of Dr. Vinayak R. Krishnamurthy

	<i>(Papers: [J16, S5, C13])</i>		
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Directed Studies

Note: I am the sole advisor to all the Ph.D. students listed below. Papers written and contributed to by each student have been identified in **red** in the thesis title column.

	Name	Thesis Title	Dates	Graduation Date
1	Het Pandit (M.Engg.)	MEEN 685: Directed Studies	Fall 2020	Fall 2020 <i>(Graduated)</i>
2	Miguel A. H. Rodriguez (M.Engg.)	MEEN 685: Directed Studies <i>(Papers: [C15])</i>	Spring 2019	Fall 2019 <i>(Graduated)</i>

Thesis & Dissertation Committees

	Name (Degree)	Department	Advisor	Defense
1	Xiangyi . Cheng (Ph.D.)	Texas A&M Department of Mechanical Engineering	Dr. Kiju Lee	Spring 2022
2	Jiaqi . Cui (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	Summer 2021
3	Anusha K. Shanker (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	TBD
4	Doyeon . Kim (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	Fall 2021
5	Yuan-Chi . Lee (M.S.)	Texas A&M Department of Visualization	Courtney Starrett	TBD
6	Akhilesh . Vijaykumar (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	Fall 2021
7	Nicholas J. Weidner (Ph.D.)	Texas A&M Department of Computer Science and Engineering	Dr. Shinjiro Sueda	TBD
8	Ying Wang (Ph.D.)	Texas A&M Department of Computer Science and Engineering	Dr. Shinjiro Sueda	TBD
9	Shengwei Chen (Ph.D.)	Texas A&M Department of Materials Science & Engineering	Dr. Jyhwen Wang	Fall 2021
10	Haard Panchal (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	TBD
11	Rizu Jain (M.S.)	Texas A&M Department of Computer Science and Engineering	Dr. Ruihong Huang	Spring 2021
12	Kaustubh Mahesh Tangali (M.S.)	Texas A&M Department of Mechanical Engineering	Dr. Zohaib Hasnain	Fall 2020
13	Taeouk Kim (M.S.)	Texas A&M Department of Mechanical Engineering	Dr. Iman Borzajani	Spring 2020
14	Chia-An Fu (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	Spring 2020
15	Sanuj Sharma (M.S.)	Texas A&M Department of Computer Science and Engineering	Dr. Ruihong Huang	Spring 2020
16	Taeouk Kim (M.S.)	Texas A&M Department of Mechanical Engineering	Dr. Iman Borzajani	Spring 2020
17	Hannah E. Toerner (M.S.)	Texas A&M Department of Ocean Engineering	Dr. David Allen	Fall 2019

Curriculum Vitae of Dr. Vinayak R. Krishnamurthy

18	Matthew Eng (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	Summer 2019
19	Jessica Reese (Ph.D.)	Texas A&M Department of Mechanical Engineering	Dr. Arun Srinivasa	Spring 2019
20	Joshua Riefer (M.S.)	Texas A&M Department of Mechanical Engineering	Dr. Bruce L. Tai	Spring 2018
21	Daniel Carey (M.S.)	Texas A&M Department of Mechanical Engineering	Dr. Daniel McAdams	Spring 2017

Undergraduate Research Students

Note: I am the sole advisor to all the Ph.D. students listed below. Papers written and contributed to by each student have been identified in **red** in the thesis title column.

	<i>Name</i>	<i>Project Title</i>	<i>Terms</i>
1	Noah Hill	MEEN 491: Honors Research Topic: Metamaterial Modeling	Fall 2022
2	Juan Moreno	MEEN 491: Honors Research Topic: Acoustic Metamaterial Modeling	Spring 2022, Fall 2021
3	Erin Carter	MEEN 491: Honors Research Topic: Speech based Shape Modeling	Fall/Spring 2022, Fall 2021
4	Andrew Litzinger	MEEN 491: Honors Research Topic: Speech based Shape Modeling	Spring 2022, Fall 2021
5	Marshall Shake	MEEN 491: Undergraduate Research Topic: Precise Control in Virtual Reality	Fall 2021
6	Abhirath Bhuvanesh	MEEN 291: Undergraduate Research Topic: Tactile Feedback for Visually Impaired	Spring 2021
7	Kai Lupo	MEEN 491: Undergraduate Research Topic: Geometric Design of Space Filling Structures	Spring 2021, Fall 2020
8	Matthew Ebert	MEEN 491: Undergraduate Research Topic: Geometric Design of Space Filling Structures <i>(Papers: [J14, C18, C17])</i>	Fall 2020
9	Peter Simmons	MEEN 491: Undergraduate Research Topic: Wearable Devices for Tactile Communications	Spring 2020
10	Ryan E. Alli	MEEN 491: Undergraduate Research Topic: Jedi-Pen: Reaction-wheel system for ungrounded kinesthetic feedback with a 3D printing pen <i>(Papers: [J16])</i>	Summer 2017
11	William C. Weinert	Honors Research: 3D Printing of Foldable Structures	Spring 2017

Other Undergraduate Mentorship

	<i>Name</i>	<i>Project Title</i>	<i>Terms</i>
10	Ling Qin	Hand Grasp Recording System using Leap Motion Controller for Mid-air Interactions	Summer 2018
11	William C. Weinert	Augmented Reality-Coupled Haptic System for Orthopedic Surgery Training (AggiE Challenge Project, 2017-2018)	Fall 2017 – Spring 2018
12	Megan S. Bullard		
13	Tae Kyoon Kim		
14	David Lee Nash		
15	Ricardo Munoz Castillo		Spring 2018

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16	July R. Garcia ¹	Jedi-Pen: Reaction-wheel system for ungrounded kinesthetic feedback with a 3D printing pen	Summer 2017
17	Harman Chawla	Design & Control of a Vibration-Added Haptic Device for Minimally Invasive Surgical Simulation (AggiE Challenge Project, 2016-2017)	Spring 2017
18	Cesar Fuentes		
19	Cyrus Funkhouser		
20	Hanzhi Guo		
21	Bach Le		
22	Matthew McMahan		
23	Jerry Perez-Roach		
24	Cassidy Shaver		
25	Steven Thompson		
26	Rafael Urraca		
27	John D'Angelo	Doodlebot: Interactive Robotic System for Additive Manufacturing of 3D Curve-Networks (MEEN Capstone Project – I sponsored as well as mentored the design team for this project)	Spring 2017 – Summer 2017
28	Brad Cote		
29	Michael New		
30	Greg Ormiston		
31	Austin Springer		

¹Louis Stokes Alliance for Minority Participation (LSAMP) Engineering Academy Scholar

VI. LEADERSHIP & SERVICE ACTIVITIES

VI-A. Awards & Honors

- 2023 – ASME Computer-Aided Product and Process Development (CAPPD) Technical Committee Best Paper Award
- 2023 – CPDM Ambassador for contributions to Design Research and Education, Centre for Product Design and Manufacturing, Indian Institute of Science, Bengaluru
- 2022 – ASME Computer-Aided Product and Process Development (CAPPD) Technical Committee Best Paper Award
- 2021 – Morris E. Foster Fellowship II
- 2021 – ASME CIE Young Engineer Award
- 2021 – National Science Foundation (NSF) CAREER Award
- 2019 – Winner of the ACM Student Research Competition at SIGGRAPH 2019
- 2018 – Peggy L. and Charles L. Brittan Teaching Award for Outstanding Undergraduate Teaching
- 2012 – All-Conference Best Paper Award, ASME IDETC/CIE
- 2008 – Best Paper Award, 2nd Symposium on Research in Product Design, Centre for Product Design and Manufacturing, Indian Institute of Science, Bangalore, India
- 2006 – College Color for outstanding contribution in the field of Robotics, Punjab Engineering College, Chandigarh, India

VI-B. Technology Commercialization

Dr. Krishnamurthy's dissertation research led to the commercial deployment of zPots, a virtual pottery app using Leap Motion controller. Through the NSF-AIR program, we collaborated with zeroUI, a startup located in California. The technology was showcased at *TechCrunch Disrupt, San Francisco* (2012) and *MakerFaire - Bay Area* (2013). See "**Patents**" in section **III-A**.

VI-C. Professional Service

Journal Editorial Boards

- Digital Media Board – Journal of Computing and Information Science in Engineering, ASME

Proposal Reviewing

- Panelist & Proposal Reviewer – The National Science Foundation (2 *on-site*, 1 *virtual panel*, 2 *virtual CAREER panels*, 1 *ad hoc review*)

Journal Reviews

- Journal of Computer-Aided Design, Elsevier
- Journal of Computing and Information Science in Engineering, ASME
- Journal of Mechanical Design, ASME
- IEEE Transactions on Visualization and Computer Graphics
- Journal of Mechanisms and Machine Theory, Elsevier
- International Journal of Production Research
- Additive Manufacturing, Elsevier
- Graphical Models, Elsevier
- Computers in Biology and Medicine

Highly Selective Conference Reviews

- ACM User Interface Software and Technology Symposium
- ACM Conference on Human Factors in Computing Systems
- ACM Conference on Human-Computer Interaction with Mobile Devices and Services
- ACM Conference on Tangible, Embedded and Embodied Interaction
- ACM Conference on Designing Interactive Systems
- Annual Conference of the European Association for Computer Graphics

Selective & General Conference Proceedings Reviews

- ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference
- ASME Manufacturing Science & Engineering Conference
- AIAA SciTech Conference, 2018
- Graphics Interface Conference
- IFToMM Asian Mechanism and Machine Science 2018
- Undergraduate Design Competition, Summer Biomechanics, Bioengineering, and Biotransport Conference, 2018

Conference Committees

- **2023:** Chair – Technical Committee on Virtual Environments and Systems, (ASME) International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (ASME IDETC/CIE 2021)
- **2023:** Member of the Program Committee – 9th International Conference on Research into Design 2023 (ICoRD 2023)

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- **2022:** Co-chair – Technical Committee on Virtual Environments and Systems, (ASME) International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (ASME IDETC/CIE 2021)
- **2021:** Secretary – Technical Committee on Virtual Environments and Systems, (ASME) International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (ASME IDETC/CIE 2021)
- **2021:** Workshops Chair – ACM Conference in Intelligent User Interfaces 2021 (IUI 2021)
- **2021:** Member of the Program Committee – 8th International Conference on Research into Design 2021 (ICoRD 2021)
- **2020:** Member of the Program Committee – Eurasia Graphics 2020
- **2020:** Member of the Steering Committee – SMIFASE'2020: Shape Modeling International - Fabrication and Sculpting Event 2020
- **2019:** Papers Chair & Member of the Steering Committee – SMIFASE'2019: Shape Modeling International - Fabrication and Sculpting Event 2019
- **2018:** Associate Chair – Association for Computing Machinery (ACM) Conference on Designing Interactive Systems.
- **2018:** Program Committee Member – SMIFASE'2018: Shape Modeling International - Fabrication and Sculpting Event 2018
- **2018:** Session Co-chair – Session on Methods, Processes and Strategies for User Interface (Virtual Environments and Systems), The 2018 American Society of Mechanical Engineers (ASME) International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (ASME IDETC/CIE 2018)
- **2017:** Symposium Organizer – Symposium on Advances in Information Visualization and Visual Analytics for Product Lifecycle Decision-Making, The 2018 American Society of Mechanical Engineers (ASME) Manufacturing Science & Engineering Conference (ASME-MSEC 2018)

Departmental Committees

- **Fall 2022-present:** Graduate Studies Committee, Department of Mechanical Engineering, Texas A&M University
- **Fall 2021-present:** Educational and Curriculum Development Committee, Department of Mechanical Engineering, Texas A&M University
- **Spring 2019:** Served in the Faculty search committee for: “Tenure Track Assistant Professor in Mechanical Engineering-Haptic Perception, Wearable Devices, Innovation Process, or Mechanical Applications of Machine Learning”
- **2017-Present:** Member (by Appointment) – Seminar Committee (MEEN 681), Department of Mechanical Engineering, Texas A&M University

Professional Memberships

- Association for Computing Machinery (ACM)
- American Society of Mechanical Engineers (ASME)

VI-D. Media Coverage

- Krishnamurthy receives American Society of Mechanical Engineers Young Engineer Award, September 3, 2021 [Link](#)
- 3D patterns could improve the design for stronger, safer products [Link](#)
- Intelligent tutoring system aims to improve engineering students’ visual communication skills [Link](#)
- Delaunay Lofts, ACM SIGGRAPH Blog, September 26, 2019 [Link](#)

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- Bio-inspired blocks mimic skin cells for a potentially limitless variety of designs, Texas A&M Engineering News, August 27, 2019 [Link](#)
- Turning Your World Into A Touch Screen, Inside Science TV, August 13, 2013 [Link](#)
- Purdue researcher introducing next step in 3-D technology, Purdue Exponent, June 14, 2013 [Link](#)
- Creating a Touch-Screen on a Countertop, Discover Magazine, March 18, 2013 [Link](#)
- Meaningful hand-waving: Purdue group demos design tool that tracks hand motions to create shapes, The American Ceramic Society, October 16th, 2012 [Link](#)
- Hands-On Design Takes on New Meaning, NSF LiveScience, September 05, 2012 [Link](#)
- New Kinect Design Trick: Handy Potter, IEEE Spectrum, August 13, 2012 [Link](#)

VI-E. Educational Outreach

Encouraging creative thinking in broader audiences, through interactive design tools, has been the central theme of Dr. Krishnamurthy's research. This has resulted in a natural integration of his research outcomes into outreach activities for STEM education with regards to K-12 students and underrepresented student groups as listed below.

- **Fall 2021:** Developed and conducted a 10-week online course in *Experimental Geometry* for under-represented children in India. This was done in collaboration with an NGO named “Sampoorna Shiksha” (meaning: wholistic education).
- **Summer 2021:** Conducted a week-long Imagineering-themed workshop in alliance with the Youth Adventure Program (YAP) at Texas A&M University. Introduced high-school students to brainstorming, idea generation, 3D modeling and hand-held 3D printing.
- **Summer 2018:** Conducted a one-day workshop in alliance with the Youth Adventure Program (YAP) at Texas A&M University. Introduced high-school students to brainstorming, idea generation, mid-air modeling and hand-held 3D printing.
- **Spring 2018:** Demonstrated the 3D sketching application developed by Krishnamurthy's research group along with (see Conference paper [C18]) the hand-held 3D printing pen to students at the Annual Discovery Night organized by Rock Prairie Elementary School at College Station, Texas.
- **Summer 2017:** Conducted a one-day workshop in alliance with the Youth Adventure Program (YAP) at Texas A&M University for introducing high-school students to brainstorming, idea generation, mid-air modeling and hand-held 3D printing.
- **Summer 2017:** Mentored two summer undergraduate research students one of whom is a woman student in collaboration with the Louis Stokes Alliance for Minority Participation (LSAMP). The team developed a reaction-wheel system for providing ungrounded kinesthetic feedback during hand-held 3D printing of curve segments.
- **Spring 2017:** Demonstrated the zPots and hand-held 3D printing pen to students at the Annual Discovery Night organized by Rock Prairie Elementary School at College Station, Texas.
- **Summer 2014:** Conducted two workshops that introduced fourth, fifth, and sixth grade students to mid-air applications such as zPots and 3D printing technology at the Purdue Mechanical Engineering department. He helped organize a design workshop for a 100 fifth and sixth grade students through the Louis Stokes Alliance for Minority Participation (LSAMP) and the Purdue University Office of Engagement.