

VINAYAK R. KRISHNAMURTHY, Ph.D.

Assistant Professor, J. Mike Walker '66 Department of Mechanical Engineering, Texas A&M University
Department of Computer Science (By Affiliation), Texas A&M University
3123 Texas A&M University, College Station, TX 77843-3123
Email: vinayak@tamu.edu | Phone: 979.458.3130 | Web: midl.tamu.edu

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

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

III. RESEARCH ACTIVITIES

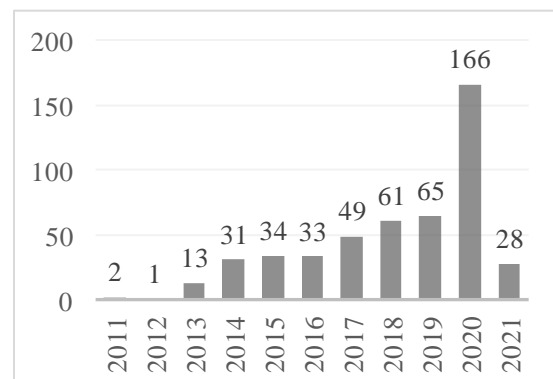
III-A. Research Summary:

Dr. Krishnamurthy's directs the Mixed-Initiative Design Lab (MIDL) at Texas A&M University. His research lies at the intersection of four fields of study, namely, geometric & topological modeling, human-computer interaction, design theory & methodology, and artificial intelligence. His current focus is on investigating human-computer collaboration for establishing advanced tools, methodologies, and theories for engineering, industrial, and architectural design. His research group creates new digital workflows for design, modeling, and visualization to gain insights on how humans perceive and perform creative decision-making tasks in collaboration with intelligent agents in the early (ambiguous) phases of design.

III-B. Publications:

Publication Summary

Published/accepted journal papers:	22
Journal papers under review:	04
Highly selective conference papers:	05
Full-length peer-reviewed conference papers:	19
Patents granted:	03
Patent Disclosures:	06
Conference Demo, Posters, Extended Abstracts:	08



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

Authorship: * indicates Dr. Krishnamurthy's current or former student at TAMU, ^C indicates corresponding/senior author in the paper.

Citation Summary (as of February 05, 2021): Total citations: **515**, h-index: **13**, i10-index: **16**

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

Journals Papers (Under Review):

[J26] Taeouk Kim, Mohammadali Hedayat, Veronica V. Vaitkus, Marek Belohlavek, Vinayak Krishnamurthy, and Iman Borazjani^C, **A learning-based, region of interest-tracking algorithm for catheter detection in echocardiography**, Computerized Medical Imaging and Graphics, (Submitted: December 30, 2020).

[J25] 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**, Submitted to The Journal of Prosthetic Dentistry (Submitted: October 23, 2020).

[J24] Vinayak Krishnamurthy^C, Ergun Akleman, Sai Ganesh Subramanian*, Jiaqi Cui, Matthew Ebert*, Chia-An Fu, and Courtney Starrett, **Geometrically Interlocking Shapes Based on Bi-Axial Fabric Weaves**, Revision under Review in the IEEE Transactions of Visualization and Computer Graphics (Submitted: November 29, 2020).

[J23] 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**. Under Review in The International Journal of Prosthodontics. Manuscript number: IJP-2020-187 - (7127). (Submitted: May 01, 2020).

Journals Papers (Accepted/Published):

[J22] Ronak R. Mohanty*, Riddhi R. Adhikari*, Vinayak Krishnamurthy^C, **Motoric and Perceptual Kinesthetic Symmetry in Bi-manual Interactions (Invited paper)**, Accepted for publication in ASME Journal of Computing & Information Science in Engineering (Accepted: January 25, 2021).

[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, 2020, <http://dx.doi.org/10.21037/qims-20-745>

- [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**. October 2020. Journal of Prosthodontics. doi:10.1111/jopr.13276
- [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>.
- [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
- [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.
- [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
- [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

[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*.

[S5] 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*]

[S4] 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*]

[S3] 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*]

[S2] 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]

[S1] 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):

[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, 2019, 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, 2019, 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**]

[C9] 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

[C8] 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**)

[C7] 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

[C6] Sundar Murugappan^C, Vinayak, Karthik Ramani, and Maria. C. Yang, **APIX: Analysis from Pixelated 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

[C5] 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.

[C4] Dibakar Sen^C and Vinayak, **On a Novel Geometric Representation of Rotation**, SAE Digital Human Modeling for Design and Engineering Conference, Pittsburgh, Pennsylvania (SAE-DHM08), June 2008.

[C3] Pulkit Kapur^C, Rahul Mukhi, and Vinayak, **A Proposal for Bipedal Locomotion using Gyroscopic Effect**, International Conference on Climbing and Walking Robots (CLAWAR 2007), Singapore July 2007.

[C2] Vinayak and Dibakar Sen^C, **Studies on the Steering of a Single-degree-of-freedom Hexapod**, 12th IFToMM World Congress, Besançon (France), June 2007.

[C1] 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:

[P9] Vinayak R. Krishnamurthy, Ergun Akleman, Sai Ganesh Subramanian, and Matthew Eng, **Methods for Generating Three-Dimensional Structures**, US Application 62/944,910 (Filed: December 10, 2019)

[P8] Cecil Kumar Piya, Vinayak, and Karthik Ramani, **Sketch-based 3D Modeling System**, USPTO Application US20180158239A1

[P7] Cecil Kumar Piya, Vinayak, and Karthik Ramani, **Collaborative 3D Modeling System**, USPTO Application US20180122138A1

[P6] Vinayak, Cecil Kumar Piya, and Karthik Ramani, **Manipulating 3d virtual objects using hand-held controllers**, US Patent Application WO2017139509A1

[P5] 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

[P4] Vinayak, Karthik Ramani, and Raja Jasti, **Methods and Systems for Interactively Producing Shapes in Three-Dimensional Space**, USPTO Application 13886732

Patents Granted:

[P3] Cecil Kumar Piya, Vinayak, and Karthik Ramani, **Manipulating virtual environment using non-instrumented physical object**, US Patent 10579207, (*Granted 2020-03-03*)

[P2] 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*)

[P1] 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

[D8] 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.

[D7] 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.

[D6] 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.

[D5] 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*]

[D4] 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.

[D3] 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*]

[D2] 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]

[D1] 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

[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

Summary:

	Number	Total	Prorated
Federal competitive grants:	2	\$1,251,985	\$382,004
Non-federal competitive grants:	2	\$153,000	\$78,000
Internal (TAMU) competitive grants:	3	\$78,000	\$64,000

IV-A. External Funding

[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 – 07/30/23.

[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 (IUSE), Total Award: \$751,985, Prorated Award: \$120,317, Term: 05/01/20 – 04/30/24.

[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.

[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

[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

[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

V. EDUCATIONAL ACTIVITIES

V-A. Courses Taught

Summary:

Sections as instructor of record:	15
Number of distinct courses:	3
Number of undergraduate students taught:	416
Number of graduate students taught:	85

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	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)
2	MEEN 601: Advanced Product Design	Graduate course in design of engineered products	Fall 2018 (51)
3	MEEN 602: Modeling and Analysis of Mechanical Systems	Graduate course in mathematical modeling and analysis	Spring 2019 (34)

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 reverser 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.
- Introduced 2-point perspective hand sketching for product visualization and AI-enabled mind-mapping.

MEEN 601: Advanced Product Design

- Taught this course for the first time in Fall 2018
- 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 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

- Taught this course for the first time in Spring 2019

Curriculum Vitae of Dr. Vinayak R. Krishnamurthy

- *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.

V-C. Student Advising & Mentoring

Ph.D. Students

	<i>Name</i>	<i>Thesis Title</i>	<i>Dates</i>	<i>Graduation Date</i>
1	Abhijeet Singh Raina	Clockmaker's Workspace: Spatial Unser Interfaces for Precise 3D Design	Fall 2020 – Present	Summer 2025 (expected)
2	Shantanu Vyas	Generative Sketching for Conceptual Design	Fall 2020 – Present	Summer 2025 (expected)
3	Subhrajyoti Chaudhuri	Interactive Design of Cellular Structures using Partitive Solid Geometry	Fall 2020 – Present	Summer 2025 (expected)
4	Ronak R. Mohanty	Precise Spatial Manipulation: Interactions, Analytics, and Visualization	Fall 2016 – Present	Summer 2021 (expected)
5	Ting-Ju Chen	Collaborative Workflows for Information-Based Ideation: Textual, Verbal, and Visual Approaches	Fall 2016 – Present	Summer 2021 (expected)

M.S. & M.Engg. Students

	<i>Name</i>	<i>Thesis Title</i>	<i>Dates</i>	<i>Graduation Date</i>
1	Riddhi R. Adhikari (M.S.)	Generative Design of Cellular Structures Using Space-Filling Tiles	Spring 2020 – present	Summer 2021 (expected)
2	Sai Ganesh Subramanian (M.S.)	Geometric Modeling of Bio-Inspired Topologically Interlocking Space-Filling Tiles	Fall 2018 – Present	Fall 2020 (Graduated)
3	Umema H. Bohari (M.S.)	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)

Directed Studies

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

Curriculum Vitae of Dr. Vinayak R. Krishnamurthy

Thesis & Dissertation Committees

	<i>Name (Degree)</i>	<i>Department</i>	<i>Advisor</i>	<i>Defense</i>
1	Nicholas J. Weidner (Ph.D.)	Texas A&M Department of Computer Science and Engineering	Dr. Shinjiro Sueda	TBD
2	Ying Wang (Ph.D.)	Texas A&M Department of Computer Science and Engineering	Dr. Shinjiro Sueda	TBD
3	Jessica Reese (Ph.D.)	Texas A&M Department of Mechanical Engineering	Dr. Arun Srinivasa	Jan 2019
4	Shengwei Chen (Ph.D.)	Texas A&M Department of Materials Science & Engineering	Dr. Jyhwen Wang	TBD
5	Haard Panchal (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	TBD
6	Rizu Jain (M.S.)	Texas A&M Department of Computer Science and Engineering	Dr. Ruihong Huang	TBD
7	Kaustubh Mahesh Tangsali (M.S)	Texas A&M Department of Mechanical Engineering	Dr. Zohaib Hasnain	Oct 2020
8	Chia-An Fu (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	Apr 2020
9	Sanuj Sharma (M.S)	Texas A&M Department of Computer Science and Engineering	Dr. Ruihong Huang	Mar 2020
10	Taeouk Kim (M.S.)	Texas A&M Department of Mechanical Engineering	Dr. Iman Borazjani	Mar 2020
11	Hannah E. Toerner (M.S.)	Texas A&M Department of Ocean Engineering	Dr. David Allen	Dec 2019
12	Matthew Eng (M.S.)	Texas A&M Department of Visualization	Dr. Ergun Akleman	Jun 2019
13	Joshua Riefer (M.S.)	Texas A&M Department of Mechanical Engineering	Dr. Bruce L. Tai	Feb 2018
14	Daniel Carey (M.S)	Texas A&M Department of Mechanical Engineering	Dr. Daniel McAdams	Feb 2017

Undergraduate Research Students

	<i>Name</i>	<i>Project Title</i>	<i>Terms</i>
1	Abhirath Bhuvanesh	MEEN 291: Undergraduate Research Topic: Tactile Feedback for Visually Impaired	Spring 2021
2	Kai Lupo	MEEN 491: Undergraduate Research Topic: Geometric Design of Space Filling Structures	Fall 2020
3	Matthew Ebert	MEEN 491: Undergraduate Research Topic: Geometric Design of Space Filling Structures	Fall 2020
4	Peter Simmons	MEEN 491: Undergraduate Research Topic: Wearable Devices for Tactile Communications	Spring 2020
5	Ryan E. Alli	Jedi-Pen: Reaction-wheel system for ungrounded kinesthetic feedback with a 3D printing pen	Summer 2017
6	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>
--	-------------	----------------------	--------------

Curriculum Vitae of Dr. Vinayak R. Krishnamurthy

6	Ling Qin	Hand Grasp Recording System using Leap Motion Controller for Mid-air Interactions	Summer 2018
7	William C. Weinert	Augmented Reality-Coupled Haptic System for Orthopedic Surgery Training (AggiE Challenge Project, 2017-2018)	Fall 2017 – Spring 2018
8	Megan S. Bullard		
9	Tae Kyoon Kim		
10	David Lee Nash		
11	Ricardo Munoz Castillo		Spring 2018
12	July R. Garcia ¹	Jedi-Pen: Reaction-wheel system for ungrounded kinesthetic feedback with a 3D printing pen	Summer 2017
13	Harman Chawla	Design & Control of a Vibration-Added Haptic Device for Minimally Invasive Surgical Simulation (AggiE Challenge Project, 2016-2017)	Spring 2017
14	Cesar Fuentes		
15	Cyrus Funkhouser		
16	Hanzhi Guo		
17	Bach Le		
18	Matthew McMahan		
19	Jerry Perez-Roach		
20	Cassidy Shaver		
21	Steven Thompson		
22	Rafael Urraca		
23	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
24	Brad Cote		
25	Michael New		
26	Greg Ormiston		
27	Austin Springer		

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

VI. LEADERSHIP & SERVICE ACTIVITIES

VI-A. Awards & Recognition

- 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

Proposal Reviewing

- Panelist & Proposal Reviewer – The National Science Foundation (2 *on-site*, 1 *virtual panel*, 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

- **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

Curriculum Vitae of Dr. Vinayak R. Krishnamurthy

- **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

- **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

- Delaunay Lofts, ACM SIGGRAPH Blog, September 26, 2019 [Link](#)
- 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.

- **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.

Curriculum Vitae of Dr. Vinayak R. Krishnamurthy

- **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.