

TIAN (TIM) CHEN

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EDUCATION

Doctor of Science (<i>ETH Medal</i>), Mechanical Eng., ETH Zurich, Switzerland	Dec. 2018
Master of Science (<i>Cum Laude</i>), Civil Eng., TU Delft, the Netherlands	June 2014
Bachelor of Applied Science , Engineering Science, University of Toronto, Canada	June 2010

PROFESSIONAL EXPERIENCE

Kamel Salama assistant professor University of Houston Architected Intelligent Matter Laboratory	Houston, TX From Sept. 2021
Postdoctoral scientist EPFL Flexible Structures Laboratory & Geometric Computing Laboratory	Lausanne, Switzerland Jan. 2019 - July 2021
Visiting researcher California Institute of Technology Daraio Research Group	Pasadena, CA June - Sept. 2017
Doctoral researcher ETH Zurich Engineering Design and Computing Laboratory	Zurich, Switzerland Sept. 2014 - Dec. 2018
Junior structural engineer Arup B.V.	Amsterdam, the Netherlands June 2013 - June 2014

ACADEMIC ACTIVITIES

Academic services

<i>Deputy Editor-in-Chief:</i> 3D Printing and Additive Manufacturing	From 2023
<i>Conference chair:</i> 11 th Texas Soft Matter Meeting	2023
<i>Mini-symposia organizer:</i> SES, ASME IMECE, USNCCM, EMI	
<i>Organizing Committee:</i> 30th ICCES	

Grants and funding

Partnerships for Innovation in Engineering Education & Research for Space (PIE ² RS)	
<i>National Aeronautics and Space Administration (\$1,197,989)</i>	2025
NASA MIRO Inflatable Deployable Environments and Adaptive Space Systems (IDEAS ²)	
<i>National Aeronautics and Space Administration (\$4,996,136)</i>	2024
Woven and Knit Textiles for Flexible and Stretchable Batteries	
<i>UH High Priority Area Research Seed Grants (\$70,000)</i>	2024
Haythornthwaite Foundation Research Initiation Grant	
<i>Applied Mechanics Division of the ASME (\$20,000)</i>	2023
Stochastic excitation in the fabrication and characterization of thin elastic shells using acoustics	
<i>Grants to Enhance and Advance Research Program (\$39,775)</i>	2023
Integration of GPT-4 and 3D printing in computational optimization of structures and materials	
<i>Teaching Innovation Program Grants (\$16,154)</i>	2023
Computational Design and Application of Wearable Haptic Knits	
<i>NSF, IIS, HCC-Human-Centered Computing (\$600,000)</i>	2022
Additive Manufacturing of NdFeB Magnets and Inline Metrology Development	
<i>Advanced Manufacturing Institute (\$50,000)</i>	2022

Awards and honours

ETH Medal for outstanding doctoral thesis (top < 8%, \$2,000), ETH Zurich	2018
Cum Laude (top 5%), Delft University of Technology	2014
Gordon Cressy Student Leadership Award , University of Toronto	2010
Spirit of Engsci Award , Engineering Science, University of Toronto	2010
Engineering Society Award , Engineering Society, University of Toronto	2010

Patents

Additive manufacturing of a flat textile product, EP2020/059812, ON Clouds GmbH 2018

Keynote and invited talks

Stanford Aeronautics and Astronautics, SF, CA, USA 2025
Stanford Robotics Seminar, SF, CA, USA 2025
Civil Engineering seminar series, UIUC, IL, USA 2024
Spring seminar series, Rice University, TX, USA 2023
Physics of Morphing Matter workshop, Princeton University, NJ, USA 2022
Texas Soft Matter Meeting, UT Austin, TX, USA 2022
Computational Fabrication Seminar, Austria 2022
Seminar, University of Cambridge, UK 2022
Mechanical Engineering Seminar, University of Houston, TX, USA 2022
ivMatS Colloquium, University of Freiburg, Germany 2022
Swiss.mech, ETH Zurich, Switzerland 2021
Brown university, Providence, RI, USA 2021
South China University of Technology, China 2021
Tel Aviv university, Israel 2021
Rocky Mountain Mechanics Seminar, CU Boulder, CO, USA 2021
Mechanics Gathering Seminar, EPFL, Switzerland 2021
MechSE Seminar, UIUC, IL, USA 2021
Mechanical Seminar, Georgia Tech, GA, USA 2021
Seminar, University of British Columbia, Canada 2021
Green Tech Innovators Club, TU Graz, Austria 2019
Global Young Scientists Summit, NTU, Singapore 2019
SIGCHI Computational Fabrication and Smart Matter, MIT, USA 2017

External projects

The Canopy Pavilion as a permanent installation on EPFL campus. 2022
The CircaDiem Caustic Pavilion in Seoul Biennale. 2021
Winner of the [IASS Barcelona 2019 Expo](#). 2019

Professional membership

American Physical Society (APS), Association for Computing Machinery (ACM), Society of Engineering Science (SES), The American Society of Mechanical Engineers (ASME).

Journal and conference reviewing

Nature, Nature Communications, Science Advances, Extreme Mechanics Letters, International Journal of Solids and Structures, Journal of Applied Mechanics, Computers & Structures, Proc. Natl. Acad. Sci., 3DP+, Scientific Reports, Materials & Design, Soft Robotics, Journal of Mechanics and Physics of Solids

TEACHING & SUPERVISION

PhD theses

Mnejja, N., (2029), TBD.
Krida, I., (2028), TBD.
Wang, Y., (2026), “Design and fabrication of deployable metasurfaces”.

Master theses

Cline, B., (2026), TBD.
Grelz, H., (2025), “Temperature tunable toughness in entangled matter”.
Schnaubelt, M., (2020), “Deployable surfaces using bistable auxetics”.
Koh, M., (2018), “Designing Activated Buckling Structures Using FDM 3D Printing”.
Du Pasquier, C., (2017), “Modular Pneumatic Toolkit: an Application of 4D-Printing”.
Wagner, M., (2016), “3D Printed Active Structures Using Shape Memory Polymers”.
Liu, J., (2016), “Properties of Multi-Material Structures Printed with the Polyjet”.

Zimmermann, L., (2015), “Generative Design with 3D Shape Grammar & Simulation”.

Bachelor projects

Clausen, H., (2025).
Duong, S., (2025).
Song, M., (2025).
Nachimuthu, A., (2025).
Guevara, E., (2025).
Shum, K., (2025).
Tang, J., (2024).
Bai, C., (2024).
Moeller, W., (2023).
Shariff, A., (2022).
Betancourt, N., (2022).
Nguyen, T., (2022).
Tran, T., (2022).
Benitez, C., (2022).
Gautier, A., (2020).
Volk, C., (2018).
Ulrich, L., (2018).
Fritzsche, D., (2017).
Gustaf, W., (2017).
Freitag, J., (2017).
Sesseg, J., (2017).
Felber, R., (2017).
Koh, M., (2016).

Courses

Materials Science, MECE3345 (Undergraduate)	2024-present
Computational Design of Structures and Materials, MECE6397 (Graduate)	2022-present
Solid Mechanics, MECE3369 (Undergraduate)	2021-present

JOURNAL PUBLICATIONS

Peer-Reviewed Journal Articles

- [1] Cline, B., Bai, C., Jeong, S., Xu, L., Wang, Y., Surjadi, J.U., Portela, C.M., & **Chen, T.**, (2025), “3D Printing of highly entangled knit material architectures”, *under review*.
- [2] Wang, Y., Shum, K., & **Chen, T.**, (2025), “Free-standing curved micro-metasurfaces through lithography of 2D precursors”, *under review*.
- [3] du Pasquier, C., Jeong, S., Liu, P., Williams, S., Okamura, A., Tibbits, S., & **Chen, T.**, (2025), “From Fiber to Fabric: Designing the Mechanics of Machine Knitting”, *under review*.
- [4] du Pasquier, C., Tessmer, L., Scholl, I., Tilton, L., **Chen, T.**, Tibbits, S., & Okamura, A., (2024), “Haptiknit: Distributed Stiffness Knitting for Wearable Haptics”, *Science Robotics*, 9 (97), eado3387.
- [5] Chapuis, J.N., Wirth, M., Walker, A., Schwarz, J., Lumpe, T.S., **Chen, T.**, & Stankovic, T., (2024), “EDACFEM: A linear truss and beam solver in MATLAB”, *SoftwareX*, 27, 101817.
- [6] Abbasi, A., **Chen, T.**, Aymon, B., & Reis, P. M., (2024), “Leveraging the snap buckling of bistable magnetic shells to design a refreshable braille dot”, *Advanced Materials Technologies*, 9(3), 2301344.
- [7] Zhang, Z., Brandt, C., Jouve, J., Wang, Y., **Chen, T.**, Pauly, M., & Panetta J., (2023), “Computational Design of Flexible Planar Microstructures”, *ACM Transactions on Graphics (TOG)*, 42 (6), 1-16.
- [8] Xue, J., Baizhikova, Z., Ballarini, R.[†], & **Chen, T.**[†], (2023), “Creating Geometric Imperfections in Thin-Walled Structures using Acoustic Excitation”, *Journal of Applied Mechanics*, 90(12):121014.
- [9] Li, W.* , Wang, Y.* , **Chen, T.**[†], & Zhang, X.J.[†], (2023), “Algorithmic encoding of adaptive responses in temperature-sensing multi-material architectures”, *Science Advances*, 9 (47), eadk0620, *Cover article*.
- [10] Koh, M.* , Wang, Y.* , Shea, K., & **Chen, T.**, (2023), “Shape reconfiguring bistable structures using heat activated fibers”, *Engineering Structures*, 295, 116792.

- [11] Grelz, H., & **Chen, T.**, (2023), “[Intelligent matter that senses, calculates, and reacts: A story of electronics, computation, and mechanics](#)”, *Matter* 6 (8), 2550-2552.
- [12] **Chen, T.**, (2023), “[Programming material logic using magnetically controlled bistability](#)”, *Proc. Natl. Acad. Sci.*, 120(17), e2304391120.
- [13] Wang, Y., Ren, Y., & **Chen, T.**, (2023), “[From kirigami to hydrogels: a tutorial on designing conformally transformable surfaces](#)”, *Journal of Applied Mechanics*, 90 (4), 044801.
- [14] Roshdy, M., **Chen, T.**, Nakhmanson, S., & Bilal, R. O., (2023), “[Tunable ferroelectric auxetic metamaterials for guiding elastic waves in three-dimensions](#)”, *Extreme Mechanics Letters*, 59, 101966.
- [15] Poincloux, S., Vallet, C., **Chen, T.**, Sano, T.G., & Reis, P. M., (2022), “[Indentation and stable states of weaved domes](#)”, *Extreme Mechanics Letters*, 59, 101968.
- [16] Pathak, O., Majkic, G., Erickson, T., **Chen, T.**, & Selvamanickam, V., (2023), “[Two-Dimensional X-Ray Diffraction \(2D-XRD\) and Micro-Computed Tomography \(micro-CT\) Characterization of Additively Manufactured 316L Stainless Steel](#)”, SSRN, 4529173-1.
- [17] Wirth, M., Shea, K., & **Chen, T.**, (2022), “[3D-printing textiles: multi-stage characterization of tensile properties of additively manufactured biaxial weaves](#)”, *Materials and Design*, 225, 111449.
- [18] Ren, Y., Kusupati, U., Panetta, J., Isvoranu, F., Pellis, D., **Chen, T.**, & Pauly, M., (2022), “[Umbrella Meshes: Elastic Mechanisms for Freeform Shape Deployment](#)”, *ACM Transactions on Graphics (TOG)*, 41(4), Art. 152, *Best Paper Award Honorable Mention*.
- [19] Baek, C., Martin, A., Poincloux, S., **Chen, T.**, & Reis, M. P., (2021), “[Smooth triaxial weaving with naturally curved ribbons](#)”, *Phys. Rev. Lett.*, 127(10), 104301, *Editors’ suggestion, Cover article, Physics Synopsis*.
- [20] **Chen, T.**, Panetta, J., Schaubelt, M., & Pauly, M., (2021), “[Bistable Auxetic Surface Structures](#)”, *ACM Transactions on Graphics (TOG)*, 40(4), Art. 39.
- [21] Ren, Y., Panetta, J., **Chen, T.**, Isvoranu, F., Poincloux, S., Brandt, C., Martin, A., & Pauly, M., (2021), “[3D Weaving with Curved Ribbons](#)”, *ACM Transactions on Graphics (TOG)*, 40(4), Art. 127.
- [22] Panetta, J., Isvoranu, F., **Chen, T.**, Siefert, E., Roman, B., & Pauly, M., (2021), “[Computational Inverse Design of Surface-based Inflatables](#)”, *ACM Transactions on Graphics (TOG)*, 40(4), Art. 40.
- [23] **Chen, T.**, & Shea, K., (2021), “[Computational design of multi-stable, reconfigurable surfaces](#)”, *Materials & Design*, 205, 109688.
- [24] **Chen, T.**, Pauly, M., & Reis, M. P., (2021), “[A reprogrammable mechanical metamaterial with stable memory](#)”, *Nature*, 589(7842), 386-390.
- [25] Poincloux, S., **Chen, T.**, Audoly, B., & Reis, M. P., (2021), “[Bending response of a book with internal friction](#)”, *Phys. Rev. Lett.*, 126(21), 218004, *Editors’ suggestion*.
- [26] **Chen, T.**, Bilal, R. O., Lang, R., Daraio, C., & Shea, K., (2019), “[Autonomous Deployment of a Solar Panel Using an Elastic Origami and Distributed Shape Memory Polymer Actuators](#)”, *Phys. Rev. Applied*, 11(6), 064069, *Editor’s suggestion, Featured in Physics*.
- [27] Du Pasquier, C., **Chen, T.**, Tibbits, S., & Shea, K., (2019), “[Design and Computational Modeling of a 3D Printed Pneumatic Toolkit for Soft Robotics](#)”, *Soft Robotics*, 6(5), 657-663.
- [28] Wagner, M., Lumpe, T., **Chen, T.**, & Shea, K., (2019), “[Programmable, Active Lattice Structures: Unifying Stretch-Dominated and Bending-Dominated Topologies](#)”, *Extreme Mechanics Letters*, 29, 100461.
- [29] **Chen, T.**, Bilal, R. O., Shea, K., & Daraio, C., (2018), “[Harnessing Bistability for Directional Propulsion of Untethered, Soft Robots](#)”, *Proceedings of the National Academy of Sciences*, 115(22), 5698-5702.
- [30] **Chen, T.**, & Shea, K., (2018), “[An Autonomous Programmable Actuator and Shape Reconfigurable Structures Using Bistability and Shape Memory Polymers](#)”, *3D Printing and Additive Manufacturing*, 5(2), 91-101.
- [31] Schwarz, J., **Chen, T.**, Stankovic, T., & Shea, K., (2018), “[An Efficient Size and Shape Optimization of Large Scale Truss Structures Subject to Stress and Buckling Constraints](#)”, *Structural and Multidisciplinary Optimization*, 58(1), 171-184.
- [32] **Chen, T.**, Mueller, J., & Shea, K., (2017), “[Integrated Design and Simulation of Tunable, Multi-State Structures Fabricated Monolithically with Multi-Material 3D Printing](#)”, *Scientific Reports*, 7, 45671.
- [33] Wagner, M., **Chen, T.**, & Shea, K., (2017), “[Large Shape Transforming 4D Auxetic Structures Using a 3D Printed Shape Memory Polymer](#)”, *3D Printing and Additive Manufacturing*, 4(3), 133-142.
- [34] Zimmermann, L., **Chen, T.**, & Shea, K., (2017), “[Generalizing the Link between 3D Spatial Grammars and Finite Element Analysis for Structural Engineering Design Automation](#)”, *AIEDAM*, 32(2), 189-199.

Conference Proceedings

- [1] Isvoranu, F., **Chen, T.**, Bouleau, E., Blanc, A., Dietz, D., & Pauly, M., (2020), “The Canopy Pavilion: A lightweight shading structure based on a deployable auxetic linkage membrane”, *Advances in Architectural Geometry*, 2021.
- [2] Isvoranu, F., Panetta, J., **Chen, T.**, Bouleau, E., & Pauly, M., (2019), “X-Shell Pavilion: A Deployable Elastic Rod Structure”, *Proceedings of IASS Annual Symposia*, (5), 1-8.
- [3] **Chen, T.**, Mueller, J., & Shea, K., (2016), “Design and Fabrication of a Bistable Unit Actuator with Multi-Material Additive Manufacturing”, *Solid Freeform Fabrication Symposium*, Austin, Texas.
- [4] **Chen, T.**, & Shea, K., (2016), “Design and Fabrication of Hierarchical Multi-Stable Structures through Multi-Material Additive Manufacturing”, In *International Design Engineering Technical Conferences*, pp. V02AT03A032, Charlotte, NC.
- [5] Zimmermann, L., **Chen, T.**, & Shea, K., (2016), “Generative Shape Design Using 3D Spatial Grammars, Simulation and Optimization”, *Design Computing and Cognition*, pp. 279-297.
- [6] **Chen, T.**, & Shea, K., (2015), “Computational Design-To-Fabrication Using Spatial Grammars: Automatically Generating Printable Car Wheel Design Variants”, *International Conference on Engineering Design 2015*, pp. 1-10, Design Society.
- [7] **Chen, T.**, Stockli, F., & Shea, K., (2015), “Design for Mass Customization Using Additive Manufacture: Case-Study of a Balloon-Powered Car”, *International Conference on Engineering Design 2015*, pp. 245-254, Design Society.
- [8] **Chen, T.**, Egan, P., Stockli, F., & Shea, K., (2015), “Studying the Impact of Incorporating an Additive Manufacturing Based Design Exercise in a Large, First Year Technical Drawing and CAD Course”, *IDETC 2015*, pp. V003T04A015. *Best paper nominee*.

Theses

- [1] **Chen, T.**, (2018), “Materials-based design of autonomous machines using 4D printing”, *ETH Zurich, ETH Medal*.
- [2] **Chen, T.**, (2014), “On introducing imperfection in the non-linear analysis of buckling of thin shell structures”, *TU Delft, Cum Laude*.

SELECTED PRESS

UH news MAE's Chen Softens The Hard Sciences With New Research On Knitting	Apr., 2025
UH news Research By ME's Tian Chen Picked For Journal Cover	Jan., 2024
Steve Mould Youtube: Self-assembling material pops into 3D (5.4M views)	Oct., 2023
UH news Video Featuring Research Of ME's Chen Surpasses 1M Views	Oct., 2023
Physics magazine The Geometry of Basket Weaving	Aug., 2021
Nature Review Physics Weaving smooth 3D shapes with curved ribbons	Aug., 2021
EPFL Modeling the friction between pages in a book	Jun., 2021
The Register Boffins' 3cm 'm-bit' cubes demonstrate programmable wunderstuff	Jan., 2021
Nature News & Views Mechanical memory written and read remotely	Jan., 2021
EPFL New metamaterial offers reprogrammable properties	Jan., 2021
NZZ Auf Knopfdruck wird Weiches fest und Festes weich	Jan., 2021
TechCrunch This solar array expands itself at the right temperature	July, 2019
Physics magazine Focus: Folded Solar Panel Opens Without Power Source	June, 2019
CBS News Researchers developing self-powered robots	Oct., 2018
ETH Zurich Swimming without an engine	June, 2018
Caltech No Motor, No Battery, No Problem	May, 2018
World Economic Forum ETH Zurich, Rethinking Intelligence	Nov., 2017
ETH Globe 3D printing unlimited: From tooth enamel to 4D printing	Issue 4, 2017
Mary Ann Liebert 4D Printing of Programmable Shape-Changing Structures	Nov., 2017
ETH Zurich Fabrication technology in the fourth dimension	2017