

TIAN (TIM) CHEN

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PROFESSIONAL EXPERIENCE

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|---|---|
| Assistant professor University of Houston Architected Intelligent Matter Laboratory | Houston, TX From Sept. 2021 |
| Postdoctoral scientist EPFL Flexible Structures Laboratory & Geometric Computing Laboratory <i>Advisors: Prof. Pedro Reis & Prof. Mark Pauly</i> | Lausanne, Switzerland Jan. 2019 - July 2021 |
| Visiting researcher California Institute of Technology Daraio Research Group <i>Advisor: Prof. Chiara Daraio</i> | Pasadena, CA June - Sept. 2017 |
| Doctoral researcher ETH Zurich Engineering Design and Computing Laboratory <i>Advisor: Prof. Kristina Shea</i> | Zurich, Switzerland Sept. 2014 - Dec. 2018 |
| Junior structural engineer Arup B.V. | Amsterdam, the Netherlands June 2013 - June 2014 |

EDUCATION

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| 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 |

ACADEMIC ACTIVITIES

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| Grants and funding | |
| Swiss National Science Foundation Post-Doc mobility fellowship (~\$100,000) | 2018 |
| Academic honours | |
| ETH Medal for outstanding doctoral thesis (top < 8%), 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 |
| Invited talks | |
| South China University of Technology, China | 2021 |
| Tel Aviv university, Israel | 2021 |
| Rocky Mountain Mechanics Seminar, CU Boulder, Colorado, USA | 2021 |
| Mechanics Gathering Seminar, EPFL, Switzerland | 2021 |

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| MechSE Seminars, UIUC, Illinois, USA | 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 |

Professional membership

American Physical Society, Association for Computing Machinery, Engineering Intern (EIT), Professional Engineers Ontario

Journal and conference reviewing

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

External projects

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| The CircaDiem Caustic Pavilion in Seoul Biennale. | 2021 |
| The Canopy Pavilion as a permanent installation on EPFL campus. | 2021 |
| Winner of the IASS Barcelona 2019 Expo . | 2019 |
| World Economic Forum, Rethinking design: 4D Printing. | 2019 |
| ON AG, Design and fabrication of 3D printed athletic shoes. | 2018 |
| World Economic Forum, Design and fabrication of a brain for augmented reality. | 2018 |

TEACHING & SUPERVISION

Courses

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| Instructor, Solid Mechanics, University of Houston | 2021 |
| Teaching assistant, Slender Structures, EPFL | 2019 - 2020 |
| Project assistant, Engineering design challenge, EPFL | 2019, 2021 |
| Teaching Assistant, Engineering Design Optimization, ETH Zurich | 2015 - 2018 |
| Teaching Assistant, CAD and Technical Drawing, ETH Zurich | 2014 - 2016 |
| Teaching Assistant, Structures and Materials, University of Toronto | 2009 - 2010 |
| Teaching Assistant, Praxis II (Engineering Design), University of Toronto | 2008 - 2009 |

Master theses

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".

Semester projects and bachelor theses

Gautier, A., (2020), "Experimental testing of non-linear periodic microstructures".
 Volk, C., (2018), "Magnetically Controlled Reversible Appendage".
 Ulrich, L., (2018), "Effect of Poisson's Ratio on Energy trapping Meta-material".
 Fritzsche, D., (2017), "Studying the Activation and Instability of FDM Sheets".
 Gustaf, W., (2017), "Biomimetic Buckling Mechanisms".

Freitag, J., (2017), “Synthesizing 3D Printing Resin with Reversible Shape Memory Effect”.
 Sesseg, J., (2017), “Light-activated Synthetic Resin Using Azobenzene”.
 Felber, R., (2017), “Design of 4D light Activated Joints”.
 Koh, M., (2016), “Design and Analysis of 3D Printed Bistable Structures”.

SELECTED PRESS

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|---|---------------|
| 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 |
| 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 |
| 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 |

PUBLICATIONS

Journal Articles

- [1] 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*.
- [2] **Chen, T.**, Panetta, J., Schaubelt, M., & Pauly, M., (2021), “Bistable Auxetic Surface Structures”, *ACM Transactions on Graphics (TOG)*, 40(4), Art. 39.
- [3] 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.
- [4] 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.
- [5] **Chen, T.**, & Shea, K., (2021), “Computational design of multi-stable, reconfigurable surfaces”, *Materials & Design*, 205, 109688.
- [6] **Chen, T.**, Pauly, M., & Reis, M. P., (2021), “A reprogrammable mechanical metamaterial with stable memory”, *Nature*, 589(7842), 386-390.
- [7] 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*.
- [8] **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*.
- [9] 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.

- [10] 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.
- [11] **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.
- [12] **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.
- [13] 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.
- [14] **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.
- [15] 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.
- [16] 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. 279297.
- [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. 110, Design Society.
- [7] **Chen, T.**, Stoeckli, 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. 245254, Design Society.
- [8] **Chen, T.**, Egan, P., Stoeckli, 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, *awarded the ETH Medal*.
- [2] **Chen, T.**, (2014), “On introducing imperfection in the non-linear analysis of buckling of thin shell structures”, TU Delft, *awarded Cum Laude*.