TIAN (TIM) CHEN

tianchen@uh.edu | google scholar | aim.me.uh.edu

PROFESSIONAL EXPERIENCE

Assistant Professor University of Houston — Houston, TX
Architected Intelligent Matter Laboratory — From Sept. 2021

Postdoctoral Scientist EPFL — Lausanne, Switzerland
Flexible Structures Laboratory & Geometric Computing Laboratory — Jan. 2019 - July 2021
Advisors: Prof. Pedro Reis & Prof. Mark Pauly

Visiting Researcher California Institute of Technology — Pasadena, CA
Daraio Research Group — June - Sept. 2017
Advisor: Prof. Chiara Daraio

Doctoral Researcher ETH Zurich — Zurich, Switzerland
Engineering Design and Computing Laboratory — Sept. 2014 - Dec. 2018
Advisor: Prof. Kristina Shea

Junior Structural Engineer — Amsterdam, the Netherlands
Arup B.V. — June 2013 - June 2014

EDUCATION

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

ACADEMIC ACTIVITIES

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

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

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

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), "Biomemetic 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

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 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*.