Tiffany Cheng – Curriculum Vitae

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EDUCATION

2017 - present	University of Stuttgart **Doctor of Engineering (Dr.-Ing) - Candidate** | *Submission Oct. 2023* Thesis: Material Programming for 4D-Printing Advisor: Achim Menges
2014 - 2016	Harvard University **Master in Design Studies (M.Des.)** | *May 2016* Graduate School of Design, Concentration: Technology
2007 - 2012	University of Southern California **Bachelor of Architecture (B.Arch.)** | *May 2012* School of Architecture, Honors in Multimedia Scholarship

CURRENT POSITION

2017 - present	University of Stuttgart **Institute for Computational Design and Construction (ICD)** Research Associate | Prof. Achim Menges

ACADEMIC EXPERIENCE

2014 - 2017	Harvard University **Material Processes and Systems (MaP+S) Group** Research Associate ('16-17), Research Assistant ('14-16) | Prof. Martin Bechthold
2010 - 2012	University of Southern California **Institute for Multimedia Literacy** Lab Assistant | Doney Joseph

PROFESSIONAL EXPERIENCE

2012 - 2014	Los Angeles, USA **Fernando Vazquez/Studio** Project Designer | Fernando Vazquez, AIA
2010	Los Angeles, USA **P-A-T-T-E-R-N-S** Intern Architect | Marcelo Spina, AIA
2009	Taipei, Taiwan **CECI Engineering Consultants, Inc.** Intern Survey Engineer | Allen Chen

PUBLICATIONS

Cheng, T., Wood, D., Kiesewetter, L., Özdemir, E., Antorveza, K., Menges, A.: 2021, *Programming material compliance and actuation: hybrid additive fabrication of biocomposite structures for large-scale self-shaping*. Bioinspiration & Biomimetics, vol. 16, no. 5. (DOI: 10.1088/1748-3190/ac10af)

Cheng, T., Thielen, M., Poppinga, S., Tahouni, Y., Wood, D., Steinberg, T., Menges, A., Speck, T.: 2021, *Bio-Inspired Motion Mechanisms: Computational Design and Material Programming of Self-Adjusting 4D-Printed Wearable Systems*. Advanced Science, vol. 8, no. 13. (DOI: 10.1002/advs.202100411)

Cheng, T., Tahouni, Y., Wood, D., Stolz, B., Mülhaupt, R., Menges, A.: 2020, *Multifunctional Mesostructures: Design and Material Programming for 4D-printing*. In Symposium on Computational Fabrication (SCF '20). ACM, New York, NY, USA. (DOI: 10.1145/3424630.3425418)

Cheng, T., Wood, D., Wang, X., Yuan, P., Menges, A.: 2020, *Programming Material Intelligence: An Additive Fabrication Strategy for Self-Shaping Biohybrid Components*. Lecture Notes in Artificial Intelligence: Biomimetic and Biohybrid Systems [Proceedings of the Living Machines 2020 Conference], vol. 12413, pp. 36-45. (DOI: 10.1007/978-3-030-64313-3_5)

Cheng, T., Thielen, M., Poppinga, S., Tahouni, Y., Wood, D., Steinberg, T., Menges, A., Speck, T.: 2023, *Entwicklung bioinspirierter und selbstformender Orthesen per 4D-Druck*. Orthopädie Technik, vol. 74, no. 1. (DOI: 10.1007/978-3-030-64313-3_5)

Sahin, E.S., **Cheng, T.**, Wood, D., Tahouni, Y., Poppinga, S., Thielen, M., Speck, T., Menges, A.: 2023, *Cross-Sectional 4D-Printing: Upscaling Self-Shaping Structures with Differentiated Material Properties Inspired by the Large-Flowered Butterwort (Pinguicula grandiflora)*. Biomimetics, vol. 8, no. 2. (DOI: 10.3390/biomimetics8020233)

Speck, T., **Cheng, T.**, Klimm, F., Menges, A., Poppinga, S., Speck, O., Tahouni, Y., Tauber, F., Thielen, M.: 2023, *Plants as inspiration for material-based sensing and actuation in soft robots and machines*. MRS Bulletin. (DOI: 10.1557/s43577-022-00470-8)

Wood, D., **Cheng, T.**, Tahouni, Y., Menges, A.: 2023, *Material Programming for Bio-inspired and Bio-based Hygromorphic Building Envelopes*. In: Wang, J., Shi, D., Song, Y. (Eds.) Advanced Materials in Smart Building Skins for Sustainability. Springer Nature Switzerland AG. (DOI: 10.1007/978-3-031-09695-2_4)

Tahouni, Y., **Cheng, T.**, Lajewski, S., Benz, J., Bonten, C., Wood, D., Menges, A.: 2022, *Codesign of Biobased Cellulose-Filled Filaments and Mesostructures for 4D Printing Humidity Responsive Smart Structures*. 3D Printing and Additive Manufacturing, vol. 10, no. 1. (DOI: 10.1089/3dp.2022.0061)

Özdemir, E., Kiesewetter, L., Antorveza, K., **Cheng, T.**, Leder, S., Wood, D., Menges, A.: 2021, *Towards Self-shaping Metamaterial Shells: A Computational Design Workflow for Hybrid Additive Manufacturing of Architectural Scale Double-Curved Structures*. Proceedings of the 2021 DigitalFUTURES (CDRF 2021), pp. 275-285. (DOI: 10.1007/978-981-16-5983-6_26)

Tahouni, Y., **Cheng, T.**, Wood, D., Sachse, R., Thierer, R., Bischoff, M., Menges, A.: 2020, *Self-shaping Curved Folding: a 4D-printing method for fabrication of curved creased origami structures*. In Symposium on Computational Fabrication (SCF '20). ACM, New York, NY, USA. (DOI: 10.1145/3424630.3425416)

Kliem, S., Tahouni, Y., **Cheng, T.**, Menges, A., Bonten, C.: 2020, *Biobased smart materials for processing via fused layer modeling*. AIP Conference Proceedings, vol. 2289, no. 1. (DOI: 10.1063/5.0028730)

Poppinga, S., Zollfrank, C., Prucker, O., Rühe, J., Menges, A., **Cheng, T.**, Speck, T.: 2018, *Toward a New Generation of Smart Biomimetic Actuators for Architecture*. Advanced Materials, vol. 30, no. 19. (DOI: 10.1002/adma.201703653)

GRANTS AND FUNDED RESEARCH

2023 - 2024 University of Stuttgart – Technology Transfer Initiative | 15,000 €
Passive Adaptive Soft: Self-regulating, High-performance Apparel through Bio-based and Hygro-responsive 4D-printed Textile Hybrids
Collaborator: Institut für Kunststofftechnik (IKT), University of Stuttgart
Role: Co-author of grant – project lead, concept, and execution

2021 - 2022 University of Stuttgart – Technology Transfer Initiative | 25,000 €
Zero-energy Self-shading: a Smart Facade Demonstrator via 4D-printed Hygro-responsive and Variable Stiffness Bioplastic Composites
Collaborator: Institut für Kunststofftechnik (IKT), University of Stuttgart
Role: Co-author of grant, project concept and execution

2021 - 2022 Université PSL, La Chaire Beauté(s) – L'Oréal | 20,000 €
Adaptive Beauty: Transferring Natural Elegance to Architected Materials
Collaborator: Physique et Mécanique des Milieux Hétérogènes, ESPCI-PSL, Sorbonne Université
Role: Co-author of grant – project lead, concept, and execution

2020 - 2021 MIT-Germany – MISTI Global Seed Fund | 24,000 $
Smarter Smart Materials: Integrating Human Interaction with Environmentally Responsive Material Systems
Collaborator: HCI Engineering Group, CSAIL, MIT
Role: Co-author of grant – project concept and execution

2017-2020 Baden Württemberg Foundation | 653,000 €
4DmultiMATS: Personalised 3D- and 4D-Printing of Programmable, Self-Adjusting and Multifunctional Material Systems for Sports and Medical Applications
Collaborator: Institute of Macro Molecular Chemistry, Plant Biomechanics Group, University Medical Center; University of Freiburg
Role: Ph.D. researcher – project lead, concept, and execution

AWARDS AND HONORS

2022 **Mobility Grant**, Cluster of Excellence IntCDC, University of Stuttgart
2022 **Best Poster (Construction Robotics)**, The Future of Construction, ETH Zürich
2022 **Finalist**, 3D Pioneers Challenge, Rapid.Tech 3D
2021 **Finalist**, Purmundus Challenge, Formnext
2020 **2nd Best Poster**, Forschungstag, Baden-Württemberg Foundation
2020 **1st Best Paper**, Living Machines, University of Freiburg
2016 **Thesis R&D Award**, MDes, Harvard GSD
2014 **Runner up for Best Project**, CS171 – Hall of Fame, Harvard SEAS
2012 **Raymond S. Kennedy Award**, University of Southern California

EXHIBITIONS

6.2023	**The Global Game: Remapping Collaborations** London Design Biennale, London
3.2020 - 5.2020	**Learning from Nature: The Future of Design** MODA Museum of Design, Atlanta
11.2019 - 3.2020	**Future and the Arts: How Humanity Will Live Tomorrow** Mori Art Museum, Tokyo
9.2019 - 11.2019	**Exhibition of the 130th Anniversary of the Eiffel Tower** Eiffel Tower, Paris
4.2019 - 10.2019	**Materials Labyrinth: Material Innovations for the Future of Construction** Bundesgartenschau, Heilbronn
7.2018 - 8.2018	**Cyborg Futures** Digital FUTURES, Shanghai
1.2015 - 2.2015	**Material Practice: Ceramic Material Formations** Gallery 224, Cambridge

SERVICE

Symposium Chair: BE-AM 2023 Deep Dive Session
Scientific Review Committee: Wood Science and Technology, Quantitative Plant Biology, Living Machines 2023, ACM CHI 2024
Evaluation Panel: Validation of Lund University's MSc Architecture and Digital Process programme
Invited Studio Critic: UCL Bartlett B-Pro Architectural Design (AD) SuperCrit
Admissions Committee: Selection of students for the University of Stuttgart's MSc ITECH programme
Board Member: Early Career Board of the University of Stuttgart's Cluster of Excellence IntCDC

CONFERENCE PRESENTATIONS

2023	**Advances in Architectural Geometry (AAG)**, University of Stuttgart
2022	**The Future of Construction**, ETH Zürich
2020	**ACM Symposium on Computational Fabrication (SCF)**, Boston University
2020	**Forchungstag**, Baden-Württemberg Foundation
2020	**Living Machines**, University of Freiburg
2020	**Living Materials**, Saarland University
2019	**EUROMAT**, Stockholm

INVITED TALKS

2023	**Tirana Design Week 2023 (Keynote)**, Tirana | hosted by Santina di Salvo
2023	**Harvard University CGBC**, Cambridge | hosted by Ali Malkawi
2023	**digitize wood Network Meeting**, Freiburg | hosted by Moritz Mahlke
2022	**Formnext 2022**, Frankfurt | hosted by CEAD B.V.
2022	**EPFL Biorobotics Laboratory (BioRob)**, Lausanne | hosted by Auke Ijspeert
2022	**Discours de la Méthode**, Hochschule Pforzheim | hosted by Steffen Reichert
2022	**4D Printing & Meta Materials Conference**, Jakajima | hosted by Pieter Hermans
2022	**Hasso Plattner Institute**, Berlin | hosted by Thijs Roumen
2022	**Digital FUTURES**, Virtual event | hosted by Neil Leach
2022	**Walt Disney Imagineering**, Los Angeles | hosted by Michael Hopkins
2021	**GDR MéPhy**, Paris | hosted by Benoît Roman
2021	**Harvard University GSD**, Cambridge | hosted by Rachel Vroman
2021	**Transsolar KlimaEngineering**, Stuttgart | hosted by Michelle Hur
2021	**University of Michigan DART LAB**, Ann Arbor | hosted by Mania Aghaei Meibodi

2021 **Ehrlich Yanai Rhee Chaney Architects**, Los Angeles | hosted by Jessica Chang
2020 **Volkswagen Group**, Wolfsburg | hosted by Rut Sawodny
2020 **Interzum**, Cologne | hosted by Sascha Peters
2020 **Technologieland Hessen**, Darmstadt | hosted by Sascha Peters
2020 **Digital FUTURE Symposium**, Tongji University | hosted by Philip Yuan
2020 **USC Architecture Generation Next**, Los Angeles | hosted by Alvin Huang

MENTORING

University of Stuttgart, M.Sc. ITECH
Master Thesis Projects | Thesis Tutor

2021 Ryan Daley, Mahdi Rasasani: Non-planar 3D printing on fabric formwork
Supervisors: J. Knippers, A. Menges | co-advised with M. Pérez

2020 Karen Antorveza, Laura Kiesewetter, Eda Özdemir: Hybrid Additive Manufacturing for Self Shaping Building Components
Supervisors: A. Menges, J. Knippers | co-advised with S. Leder and D. Wood

2020 Vaia Tsiokou: Functional Multi-Material Systems
Supervisors: A. Menges, J. Knippers | co-advised with D. Wood

2019 Rob Faulkner, Samantha Melnyk, Tamara Rosales, Naomi Tashiro: Haptic Reality
Supervisors: K. Kuchenbecker, A. Menges | co-advised with D. Wood, Y. Tahouni

2018 Maria Razzhivina, Hosna Shayani, Jacob Zindroski: Recrete
Supervisors: A. Menges, J. Knippers | co-advised with O. Bucklin

2018 Jacob Russo: Integrated Architectural Water Systems
Supervisors: A. Menges, J. Knippers | co-advised with D. Wood

TEACHING

University of Stuttgart, M.Sc. ITECH
Architectural Biomimetics | Seminar Instructor
ca. 10 students (master)
Winter 2021-22 / Summer 2023 / Winter 2023-24 – Co-taught with A. Körner and M. Mühlich

University of Stuttgart, M.Sc. ITECH
Thesis Prep. and Research Structure | Seminar Instructor
ca. 20 students (master)
Winter 2018-19 / 2019-20 / 2020-21 / 2021-22 – Co-taught with D. Wood, K. Dierichs, S. Leder and K. Rinderspacher

BMBF, Girls' Day
Robots that Build, Feel, and Interact with Humans | 1-day Workshop Instructor
ca. 15 students (high school)
2021 / 2022 – Co-taught with Y. Tahouni, E. Sahin, K. Rinderspacher, L. Orozco, D. Wood

BMBF, Girls' Day
Selbst-formendes Holz: Material science meets architecture | 1-day Workshop Instructor
ca. 15 students (high school)
2021 / 2022 – Co-taught with L. Kiesewetter and D. Wood

Tongji University, Inclusive FUTURES
Autonomous Origami | 5-day Workshop Instructor
ca. 20 students (undergrad, master, PhD)
2021 – Co-taught with Y. Tahouni and D. Wood

ABK Stuttgart, Living Matter Industrial Design Studio
Paper Programming | 2-day Workshop Instructor
ca. 15 students (undergrad)
2020 – Co-taught with Y. Tahouni

ACADIA 2020, Distributed Proximities
DualAdditive Manufacturing | 2-day Workshop Instructor
ca. 15 students (undergrad, master, PhD)
2020 – Co-taught with J. Wagner, D. Wood, C. Hua, L. Orozco

Tongji University, Digital FUTURES
Programming Material Intelligence | 9-day Workshop Instructor
ca. 15 students (undergrad, master, PhD)
2018 – Co-taught with D. Wood