



# Tiffany Cheng – Curriculum Vitae

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Keplerstraße 11, 70174 Stuttgart, Germany

## EDUCATION

- 2017 - 2024 University of Stuttgart  
**Doctor of Engineering (Dr.-Ing) – Summa cum laude** | February 2024  
Thesis: Material Programming for 4D-Printing  
Advisor: Achim Menges
- 2014 - 2016 Harvard University  
**Master in Design Studies (M.Des) – Technology** | May 2016  
Graduate School of Design, Concentration area: 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 Group Leader ('24), Research Associate ('17-23) | 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

- T. Cheng, D. Wood, L. Kiesewetter, E. Özdemir, K. Antorveza, A. Menges: 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)
- T. Cheng, M. Thielen, S. Poppinga, Y. Tahouni, D. Wood, T. Steinberg, A. Menges, T. Speck: 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)
- T. Cheng, Y. Tahouni, D. Wood, B. Stolz, R. Mülhaupt, A. Menges: 2020, *Multifunctional Mesosstructures: Design and Material Programming for 4D-Printing*. Proceedings of the 5th Annual ACM Symposium on Computational Fabrication (SCF '20). (DOI: 10.1145/3424630.3425418)
- T. Cheng, D. Wood, X. Wang, P. Yuan, A. Menges: 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)
- T. Cheng, M. Thielen, S. Poppinga, Y. Tahouni, D. Wood, T. Steinberg, A. Menges, T. Speck: 2023, *Entwicklung bioinspirierter und selbstformender Orthesen per 4D-Druck*. *Orthopädie Technik*, vol. 74, no. 1, pp. 40–49.
- E. Sahin, T. Cheng, D. Wood, Y. Tahouni, S. Poppinga, M. Thielen, T. Speck, A. Menges: 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)
- T. Speck, T. Cheng, F. Klimm, A. Menges, S. Poppinga, O. Speck, Y. Tahouni, F. Tauber, M. Thielen: 2023, *Plants as Inspiration for Material-Based Sensing and Actuation in Soft Robots and Machines*. *MRS Bulletin*, vol. 48, pp. 730–745. (DOI: 10.1557/s43577-022-00470-8)
- D. Wood, T. Cheng, Y. Tahouni, A. Menges: 2023, *Material Programming for Bio-Inspired and Bio-Based Hygromorphic Building Envelopes*. In: J. Wang, D. Shi, Y. Song (Eds.) *Advanced Materials in Smart Building Skins for Sustainability*. Cham: Springer International Publishing, pp. 99–112. (DOI: 10.1007/978-3-031-09695-2\_4)
- Y. Tahouni, T. Cheng, S. Lajewski, J. Benz, C. Bonten, D. Wood, A. Menges: 2022, *Codesign of Biobased Cellulose-Filled Filaments and Mesosstructures for 4D Printing Humidity Responsive Smart Structures*. *3D Printing + Additive Manufacturing*, vol. 10, no. 1. (DOI: 10.1089/3dp.2022.0061)
- E. Özdemir, L. Kiesewetter, K. Antorveza, T. Cheng, S. Leder, D. Wood, A. Menges: 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)
- Y. Tahouni, T. Cheng, D. Wood, R. Sachse, R. Thierer, M. Bischoff, A. Menges: 2020, *Self-Shaping Curved Folding: A 4D-Printing Method for Fabrication of Curved Creased Origami Structures*. Proceedings of the 5th Annual ACM Symposium on Computational Fabrication (SCF '20). (DOI: 10.1145/3424630.3425416)

- S. Kliem, Y. Tahouni, **T. Cheng**, A. Menges, C. Bonten: 2020, *Biobased Smart Materials for Processing via Fused Layer Modeling*. AIP Conference Proceedings, vol. 2289, no. 1. (DOI: 10.1063/5.0028730)
- S. Poppinga, C. Zollfrank, O. Prucker, J. Rühle, A. Menges, **T. Cheng**, T. Speck: 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

- 2024 - 2027      Horizon Europe – EIC Pathfinder Challenge | **3,423,000 €**  
**ARCHIBIOFOAM: Digital Design and Robotic Fabrication of Biofoams for Adaptive Mono-Material Architecture**  
**Collaborators:** Complex Systems and Materials, Aalto University; Center for Complexity and Biosystems, University of Milan; Woamy Ltd.  
**Role:** Co-author of grant – project concept
- 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: 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**  
**Collaborators:** 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

- 2023    **Materialpreis: ♥ Award**, raumPROBE, Germany
- 2022    **Cluster of Excellence IntCDC Mobility Grant**, University of Stuttgart, Germany
- 2022    **The Future of Construction: Best Poster (Construction Robotics)**, ETH Zürich, Switzerland
- 2022    **3D Pioneers Challenge: Finalist**, Rapid.Tech 3D, Germany

- 2021 **Purmundus Challenge: Finalist**, Formnext, Germany
- 2020 **Forschungstag: 2<sup>nd</sup> Best Poster**, Baden-Württemberg Foundation, Germany
- 2020 **Living Machines: 1<sup>st</sup> Best Paper**, University of Freiburg, Germany
- 2016 **Thesis R&D Award**, MDes, Harvard GSD, USA
- 2014 **Runner up for Best Project**, CS171 – Hall of Fame, Harvard SEAS, USA
- 2012 **Raymond S. Kennedy Award**, University of Southern California, USA

## 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 130<sup>th</sup> 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, Rob|Arch 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

- 2024 **Cornell University Design Tech Open Seminar**, Ithaca | hosted by Dept. Design Tech
- 2024 **MIT Media Lab Transformative Design Special Seminar**, Cambridge | hosted by MAS/MAD
- 2023 **TU Graz Institut für Architektur und Medien (IAM)**, Graz | hosted by Milena Stavric
- 2023 **BE-AM Symposium**, Frankfurt | hosted by Oliver Tessmann
- 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 World**, 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
- 2019 **Volkswagen Group**, Wolfsburg | hosted by Rut Sawodny
- 2019 **Interzum 2019**, Cologne | hosted by Sascha Peters
- 2018 **Technologieland Hessen**, Darmstadt | hosted by Sascha Peters
- 2018 **Digital FUTURE Symposium**, Tongji University | hosted by Philip Yuan
- 2018 **USC Architecture Generation Next**, Los Angeles | hosted by Alvin Huang

## MENTORING

University of Stuttgart, M.Sc. ITECH

**Master Thesis Projects** | Thesis Tutor (1 day per week for 1 year)

- 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 Kieseewetter, Eda Özdemir:  
**Hybrid Additive Manufacturing for Self Shaping Building Components**  
Supervisors: A. Menges, J. Knippers | co-advised with S. Leder
- 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 (1 day per week for 4 months)

ca. 30 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 (1 day per week for 4 months)

ca. 25 students (master)

Winter 2018-19 / 2019-20 / 2020-21 / 2021-22 – Co-taught with D. Wood, K. Dierichs, S. Leder and K. Rinderspacher

TU Graz, B.Sc „Architektur“

**Material Programming and 4D-Printing across Scales** | Workshop Instructor (5 days)

ca. 15 students (bachelor, master)

2023

BMBF, Girls' Day

**Material Science meets Furniture Design: Materialprogrammierung am Beispiel selbst-formender Möbel** | Workshop Instructor (1 day)

ca. 10 students (high school)

2024 – Co-taught with E. Sahin and L. Kiesewetter

BMBF, Girls' Day

**Robots that Build, Feel, and Interact with Humans** | Workshop Instructor (1 day)

ca. 10 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** | Workshop Instructor (1 day)

ca. 10 students (high school)

2021 / 2022 – Co-taught with L. Kiesewetter and D. Wood

Tongji University, Inclusive FUTURES

**Autonomous Origami** | Workshop Instructor (5 days)

ca. 15 students (bachelor, master, PhD)

2021 – Co-taught with Y. Tahouni and D. Wood

ABK Stuttgart, Living Matter Industrial Design Studio

**Paper Programming** | Workshop Instructor (2 days)

ca. 15 students (diploma)

2020 – Co-taught with Y. Tahouni

ACADIA 2020, Distributed Proximities

**DualAdditive Manufacturing** | Workshop Instructor (2 days)

ca. 15 students (bachelor, master, PhD)

2020 – Co-taught with J. Wagner, D. Wood, C. Hua, L. Orozco

Tongji University, Digital FUTURES

**Programming Material Intelligence** | Workshop Instructor (9 days)

ca. 15 students (bachelor, master, PhD)

2018 – Co-taught with D. Wood