

LIANG HE

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RESEARCH STATEMENT

My research aims to support end-users to design, control, and fabricate 3D printable kinetic behaviors. To achieve this goal, I introduce the concept of *in-place kinetic structures*, a set of parametric mechanisms that can be 3D printable and integrated into objects for interactions. I apply an interdisciplinary method for my research: (i) creating **design techniques** with parametric mechanical structures, (ii) building **design tools** that lower barriers to create controllable behaviors by integrating in-place augmented structures and coordinating electronics with the form, and (iii) experimenting **hybrid materials** for interaction. I envision that these in-place kinetic structures can be created and used as sensors, actuators, or new forms in various application domains such as making, prototyping, and accessibility.

EDUCATION

- Present **PhD student, Computer Science & Engineering**, University of Washington
- 2017 **PhD student, Computer Science**, University of Maryland, College Park
Area: digital fabrication, TUI, HCI; Advisor: Prof. Jon E. Froehlich
- 2015 **MS, Computational Design**, Carnegie Mellon University, Pittsburgh
Area: TUI, HCI; Thesis advisor: Eric Brockmeyer
MS Thesis: *SqueezaPulse - Adding Interactive Input Using Passive Pulses of Air*
- 2013 **MS, Computer Science and Technology**, UCAS, Beijing
Area: TUI, HCI; Advised by Prof. Danli Wang
MS Thesis: *A Tangible Approach for Storytelling*
- 2010 **BEng, Software Engineering**, Beihang University (BUAA), Beijing

HONORS AND AWARDS

- 2020 **Special Recognition**, UIST '20 paper reviews
- 2020 **Special Recognition**, CHI '20 paper reviews
- 2019 **Winner**, CHI '19 SV t-shirt design contest
- 2018 **Finalist**, Amazon Catalyst Award
- 2017 **Best Paper Award**, CHI '17
- 2016 **Conference Travel Funding**, Department of Computer Science, UMD
- 2016 **Best Late-Breaking Work Paper Award**, CHI '16
- 2015/16 **Dean's fellowship**, Department of Computer Science, UMD
- 2014 **Conference Travel Funding**, School of Architecture, CMU
- 2013/14 **Department Scholarship**, School of Architecture, CMU
- 2014 **Most Creative Award**, UIST '14 Student Innovation Contest
- 2015 **Honorable Mentions Award**, CHI '15

- 2015 **Winner**, CHI '15 SV t-shirt design contest
- 2012 **Winner**, G-Startup 2012 Seed Stage, Global Mobile Internet Conference '12
- 2011 **Follow-up**, Software Design, Microsoft Imagine Cup Local Final
- 2009 **China National Scholarship** (Top 1%)



PROFESSIONAL EXPERIENCE

- Fall 2020 **HP Labs, Palo Alto, CA**
 Research Intern, 3D Print Lab
 Mentored by Kris J. Erickson and Rafael 'Tico' Ballagas.
- Summer 2019 **HP Labs, Palo Alto, CA**
 Research Intern, Artificial Intelligence & Emerge Computing Lab
 Mentored by Rafael 'Tico' Ballagas.
- 2017 – 2019 **University of Washington, CSE, Seattle, WA**
 Graduate Research Assistant.
 Advised by Prof. Jon E. Froehlich.
- Summer 2016 **Microsoft Research, Redmond, WA**
 Research Intern. VIBE Group
 Mentored by Rob DeLine and Saleema Amershi.
- 2015 – 2017 **University of Maryland, CS Department, College Park, MD**
 Graduate Research Assistant.
 Advised by Prof. Jon E. Froehlich.
- Summer 2014 **KEIO-NUS CUTE Center, Singapore**
 Research Intern.
 Advised by Prof. Ellen Yi-Luen Do and Prof. Beryl Plimmer.
- Spring 2014 **Art Fab, School of Architecture, Carnegie Mellon University, PA**
 Graduate Research Assistant.
 Advised by Prof. Ali Momeni.
- 2010 – 2013 **HCI Lab, Institute of Software, Chinese Academy of Sciences, Beijing**
 Research Assistant.
 Advised by Prof. Danli Wang.
- Spring 2010 **Microsoft Research Asia, Beijing**
 Part-time Student Intern. University Relationship Group
 Mentored by Bei Li.

REFEREED JOURNAL PUBLICATION

- 2014 [J.1] Wang, D., **He, L.**, and Dou, K. StoryCube: Supporting Children's Storytelling with a Tangible Tool. *The Journal of Supercomputing*, Volume 70 Issue 1, Pages 269-283. Springer. 2014.

REFEREED CONFERENCE PUBLICATIONS


- 2021 [C.06] Xu, X., Li, J., Yuan, T., **He, L.**, Liu, X., Yan, Y., Wang, Y., Shi, Y., Mankoff, J., Dey, A.K.. HulaMove: Using Commodity IMU for Waist Interaction. To appear at *CHI 2021*.
- 2019 [C.05] **He, L.**, Peng, H., Lin, M., Konjeti, R., Guimbretière, F., and Froehlich, J. Ondulé: Designing and Controlling 3D Printable Springs. In *Proceedings of the 32nd Annual ACM Symposium on User Interface Software and Technology (UIST '19)*.
- 2017 [C.04] Kazemitabaar, M., McPeak, J., Jiao, A., **He, L.**, Outing, T., and Froehlich, J.  MakerWear: A Tangible Approach to Interactive Wearable Creation for Children. In *Proceedings of the 35th annual ACM conference on Human factors in computing systems (CHI '17)*. Denver, CO, USA, May 6-11, 2017. [Acceptance Rate: 25%]
Best Paper Award [Top 1%]
- [C.03] **He, L.**, Laput, G., Brockmeyer, E., and Froehlich, J. SqueezaPulse: Adding Interactive Input to Fabricated Objects Using Corrugated Tubes and Air Pulses. In *Proceedings of the ACM symposium on tangible and embodied interaction (TEI '17)*. [Acceptance Rate: 27%]
- 2015 [C.02] Cheng, K., **He, L.**, Meng, X., Shamma, D., Thangpalam, A., and Nguyen, D. CozyMaps: Real-time Collaboration on a Shared Map with Multiple Displays. In *Proceedings of the 17th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI'15)*. Copenhagen, Denmark, August 24-27, 2015. [Acceptance Rate:25.2%]
- [C.01] Plimmer, B., **He, L.**, Zaman, T., Karunanayaka, K., Yeo, A., Jengan, G., and Do, E.  New Interaction Tools for Preserving an Old Language. In *Proceedings of the 33rd annual ACM conference on Human factors in computing systems (CHI'15)*. Seoul, Korea, April 18-12, 2015. [Acceptance Rate: 23%]
Honorable Mentions Award

DOCTORAL SYMPOSIUM

- 2020 [DC.01] **He, L.** Designing, Controlling, and Fabricating In-Place Augmented Structures. In *Adjunct Proceedings of the 33th Annual ACM Symposium on User Interface Software and Technology (UIST '20)*.

EXTENDED ABSTRACTS/POSTERS

- 2020 [EA.03] **He, L.**, Wang, R., Xu, X. PneuFetch: Supporting Blind and Visually Impaired People to Fetch Nearby Objects via Light Haptic Cues. In *Proceedings of CHI '20 Extended Abstracts on Human Factors in Computing Systems*. [Acceptance Rate: 41.8%]

- 2019 [P.07] Potluri, V., **He, L.**, Chen, C., Froehlich, J., and Mankoff., J. A Multi-Modal Approach for Blind and Visually Impaired Developers to Edit Webpage Designs. In *The 21st International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS '19)*. Pittsburgh, PA, Oct 28-30, 2019.
- 2017 [P.06] **He, L.**, Wan, Z., Findlater, L., and Froehlich, J. TacTILE: A Preliminary Toolchain for Creating Accessible Graphics with 3D-Printed Overlays and Auditory Annotations. In *Poster Proceedings of the 19th International ACM SIGACCESS Conference on Computers & Accessibility (ASSETS'17)*. Baltimore, MA, Oct 30 – Nov 1, 2017.
- [P.05] **He, L.**, Peng, H., Land, J., Fuge, M., and Froehlich, J. Designing 3D-Printed Deformation Behaviors Using Spring-Based Structures: An Initial Investigation. In *Adjunct Proceedings of the 30th Annual ACM Symposium on User Interface Software and Technology (UIST'17)*. Quebec City, Canada, October 22–25, 2017.
- [P.04] **He, L.**, Land, J., Peng, H., Fuge, M., and Froehlich, J. Early Exploration of Deformable Interactive Designs with 3D-Printed Springs. In *Proceedings of the 1st Annual ACM Symposium on Computational Fabrication*. Cambridge, Massachusetts, June 12-13, 2017.
- 2015 [P.03] **He, L.**, Xu, C., Xu, D., and Brill, R. PneuHaptic: Delivering Haptic Cues with a Pneumatic Armband. In *Proceedings of the 19th International Symposium on Wearable Computers (ISWC'15)*. Osaka, Japan, September 7-11, 2015. [Acceptance Rate: 25%]
- 2012 [P.02] Wang, D., Zhang, Y., Gu, T., **He, L.**, and Wang, H. E-Block: A Tangible Programming Tool for Children. In *Adjunct Proceedings of the 25th Annual ACM Symposium on User Interface Software and Technology (UIST'12)*. Cambridge, Massachusetts, October 7–10, 2012.
- [P.01] **He, L.**, Li, G., Zhang, Y., Wang, D., and Wang, H. TempoString: A Tangible Tool for Children's Music Creation. In *Proceedings of the 14th International Conference on Ubiquitous Computing (UbiComp'12)*. Pittsburgh, September 5–8, 2012.
- 2016 [EA.02] Kazemitabaar, M., **He, L.**, Wang, K., Aloimonos, C., Cheng, T., and Froehlich, J. ReWear: Early Explorations of a Modular Wearable Construction Kit for Young Children. In *Proceedings of CHI '16 Extended Abstracts on Human Factors in Computing Systems*. [Acceptance Rate: 43%]
 **Best Paper Award [Top 1%]**
- [EA.01] Du, R. and **He, L.** VRSurus: Enhancing Interactivity and Tangibility of Puppets in Virtual Reality. In *Proceedings of CHI '16 Extended*

Abstracts on Human Factors in Computing Systems. [Acceptance Rate: 43%]

PATENT

- 2013 [PA.01] “A Method and System for Children’s Tangible Storytelling”. Patent No.: 2013100129910. 2013.

SOFTWARE COPYRIGHT

- 2010 [SC.01] “InkSound: A Pen-based System for Chinese Traditional Painting.” 2010.

THESES

- 2015 [T.02] **He, L.** (2013) “SqueezaPulse - Adding Interactive Input Using Passive Pulses of Air”. Master’s Thesis. Carnegie Mellon University.
- 2013 [T.01] **He, L.** (2010) “A Tangible Approach for Storytelling”. Master’s Thesis. University of Chinese Academy of Sciences.

TALKS

- 2020 [TA.08] Lightning Talk. IWHEC 2021 affiliated forum.
- 2019 [TA.07] HCI Lunch Talk. Stanford, CA, September 25th, 2019.
- [TA.06] Lightning Talk. UW CSE/MSR Summer Institute – Future of Fabrication, Blaine, WA, July 23th, 2019.
- 2018 [TA.05] UW CSE Colloquia – Computational Fabrication, Seattle, WA, 2018.
- [TA.04] Industry Affiliates Research Day at UW, Seattle, WA, 2018.
- 2017 [TA.03] Industry Affiliates Research Day at UW, Seattle, WA, 2017
- 2016 [TA.02] Tech+Design: Interaction Design for a Purpose, UMD, College Park, MD, 2016.
- [TA.01] HCIL’s 33rd Annual Symposium, UMD, College Park, MD, 2016.

GUEST LECTURE/WORKSHOP

- 2019 [GL.02] CSE 440A: Introduction to HCI – “Heuristic Evaluation”. Computer Science & Engineering, University of Washington, Seattle, WA, 2019.
- 2018 [W.02] CSE SkillShare Workshop – “Video Making”. Computer Science & Engineering, University of Washington, Seattle, WA, 2018.
- [W.01] CSE 590A: UbiComp – “3D Modeling with Fusion 360”, Computer

Science & Engineering, University of Washington, Seattle, WA, 2018.

[GL.01] HCID 521 – “Laser Cutting”, Human-Computer Interaction & Design, University of Washington, Seattle, WA, 2018.

TEACHING

2021 [TE.10] **CSE 490: Physical Computing.** Computer Science & Engineering, University of Washington, Seattle, WA, 2021 (co-teaching with Jon E. Froehlich for remote teaching and hardware prototyping).

2020 [TE.09] **CSE 590A: Ubiquitous Computing.** Computer Science & Engineering, University of Washington, Seattle, WA, 2020 (co-build with Jon E. Froehlich for remote teaching and hardware prototyping).

2019 [TE.08] **CSE 599U: Prototyping Interactive Systems.** Computer Science & Engineering, University of Washington, Seattle, WA, 2019.

[TE.07] **CSE 440A: Introduction to HCI.** Computer Science & Engineering, University of Washington, Seattle, WA, 2019.

2018 [TE.06] **CSE 440A: Introduction to HCI.** Computer Science & Engineering, University of Washington, Seattle, WA, 2018.

[TE.05] **CSE 590A: Ubiquitous Computing.** Computer Science & Engineering, University of Washington, Seattle, WA, 2018 (co-build with Jon E. Froehlich).

[TE.04] **HCID 521: Prototyping Studio.** Computer Science & Engineering, University of Washington, Seattle, WA, 2018 (co-build with Jon Froehlich and Jennifer Mankoff).

2016 [TE.03] **CMSC 250: Discrete Structures.** Department of Computer Science. University of Maryland, College Park, MD, 2016.

[TE.02] **CMSC 132: Object-Oriented Programming II.** Department of Computer Science. University of Maryland, College Park, MD, 2016.

2015 [TE.01] **CMSC 131: Object-Oriented Programming I.** Department of Computer Science. University of Maryland, College Park, MD, 2015.

STUDENT ADVISING AND MENTORSHIP

University of Washington, Seattle, WA

Undergraduate & Graduate Research Advisees

2021 Arjun Simha (undergrad; Electrical Engineering; UW)

2020 Yueqian Zhang (undergrad; Computer Science & Engineering; UW)

2020 Xiyuan Shen (undergrad; Media Art; Tsinghua University)

2020 Xia Su (MS; Architecture; Tsinghua University)

- 2020 Yawen Zheng (undergrad; Media Art; Tsinghua University)
- 2020 Yuebing Liang (MS; Architecture; Tsinghua University)
- 2020 Soumya Jindal (MS; Human Centered Design & Engineering; UW)
- 2019 Jessica Chin (undergrad; Computer Science & Engineering; UW)
- 2019 Sophie Tian (undergrad; Computer Science & Engineering; UW)
- 2019 Michelle Lin (undergrad; Computer Science & Engineering; UW)

University of Maryland, College Park, MD

Undergraduate Research Advisees

- 2017 Joshua Land (Mechanical Engineering; UMD)

PROFESSIONAL ACTIVITIES/SERVICE

- Reviewer CHI '16-'21, UIST '19-'21, CSCW '21 (April), SCF '20, DIS '20-'21, WAC '19, TEI '17-'18, IDC '17, '21, MobileHCI '16
- Volunteer TEI '17, CHI '14 - '15, UIST '14, China Symposium on HCI
- Program Committee CHI '19, '20, '21 (LBW), IDC '21 (WiP), ACHI '21 (full paper)
- Conference Organizer Web Co-chair, UIST '19

PROFESSIONAL SKILLS

- HCI Research Interview, survey, usability testing, qualitative & quantitative analysis
- Programming C/C++, C#, Python, Java, JavaScript, XHTML, CSS, iOS, SQL
- Hardware/Tools CAD/CAM, digital prototyping, PCB making, hand tools
- Design Adobe Creative Suite, Rhinoceros, Eagle, Sketching
- Other Painting, graphic design, calligraphy