

S. SANDRA BAE

ATLAS Institute
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EDUCATION

- 2020 - PRESENT **University of Colorado, Boulder**
Ph.D. in Creative Technology & Design
Advisor: Ellen Do & Danielle Szafir | ACME Lab & VisuaLab
- 2018 - 2020 **University of California, Davis**
M.S. in Computer Science
Thesis: A Visual Analytics Approach to Debugging Cooperative, Multi-Robot Systems' Worldviews
Advisor: Kwan-Liu Ma | ViDi Lab
- 2014 - 2018 **University of California, Davis**
B.A. in Human-Computer Interaction
Minor in Education

RESEARCH INTEREST

My research interests lie in the intersection where computers meet the physical world, spanning across human-computer interaction (HCI), tangible user interfaces (TUIs), data visualization, and material science. My goal is to explore how tangible interactions can help people understand complex ideas when analyzing data in its physical form.

Keywords: Human-Computer Interaction, Data Visualization, Tangible Interactions, Material Science

RESEARCH EXPERIENCE

- FALL 2020 - PRESENT **University of Colorado, Boulder | Boulder, CO**
Graduate Research Assistant & Teaching Assistant
Research with Danielle Szafir and Ellen Do.
Teaching assistant for Daniel Leithinger, Laura Devendorf in ATLAS.
- SUMMER 2020 **Stanford University | Palo Alto, CA (Remote)**
HCI Research Intern
Research with James Landay and Elizabeth Murnane.
Identifying and building family-centered, in-car technology to support collaborative learning.
- SUMMER 2019 - SUMMER 2020 **NASA Jet Propulsion Lab | Pasadena, CA**
University Researcher
Research with Federico Rossi, Scott Davidoff, and Joshua Vander Hook.
Working as a NASA JPL Master's Thesis Fellow to expand Summer 2019's project with further iterations and design considerations.
- SUMMER 2019 **NASA Jet Propulsion Lab | Pasadena, CA**
Data Visualization / HCI Research Intern
Research with Hillary Mushkin, Santiago Lambledya, Maggie Hendrie, Scott Davidoff.
Identified JPL roboticists' visualization needs and implemented a system determined by design iterations.
- SUMMER 2019 - SPRING 2020 **University of California, Davis | Davis, CA**
Undergraduate / Graduate Student Research Assistant & Teaching Assistant
Research with Kwan-Liu Ma.

Teaching assistant for Kwan-Liu Ma, Hao-Chuan Wang, and Nina Amenta in Computer Science.

REFEREED PUBLICATIONS

JOURNAL ARTICLES

S. S. Bae, R. Vanukuru, R. Yang, P. Gyory, R. Zhou, E. Do, and D. Szafr. “Cultivating Visualization Literacy for Children Through Curiosity and Play”. In: *IEEE Transactions on Visualization and Computer Graphics (also proc. IEEE VIS 2022)*. 2022.

R. Woollands, F. Rossi, T. S. Vaquero, M. S. Net, S. S. Bae, V. Bickel, and J. V. Hook. “Maximizing Dust Devil Follow-Up Observations on Mars Using Cubesats and On-board Scheduling”. In: *Journal of Astronautical Sciences* (2022).

CONFERENCE ARTICLES

P. Gyory, S. S. Bae, R. Yang, E. Do, and C. Zheng. “Marking Material Interactions with Computer Vision”. In: *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*. Hamburg, Germany, 2023.

S. S. Bae, D. Szafr, and E. Do. “Exploring the Benefits and Challenges of Data Physicalization”. In: *Proceedings of the Fourth European Tangible Interaction Studio (ETIS’ 22)*. 2022.

S. S. Bae, C. Zheng, M. E. West, E. Do, S. Huron, and D. Szafr. “Making Data Tangible: A Cross-disciplinary Design Space for Data Physicalization”. In: *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems*. New Orleans, Louisiana, 2022.

S. S. Bae, F. Rossi, J. V. Hook, S. Davidoff, and K.-L. Ma. “A Visual Analytics Approach to Debugging Cooperative, Autonomous Multi-Robot Systems’ Worldviews”. In: *Proceedings of the IEEE Visual Analytics Science and Technology (VAST) 2020*. Salt Lake City, Utah (Virtual), 2020.

S. S. Bae*, O.-H. Kwon*, S. Chandrasegaran, and K.-L. Ma. “Spinneret: Aiding Creative Ideation through Non-Obvious Concept Associations”. In: *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. Honolulu, Hawaii (Virtual), 2020, 1–13 (*equally contributed).

POSTERS & DEMOS

S. S. Bae. “Towards a Deeper Understanding of Data and Materiality”. In: *Proceedings of the Fourteenth International Conference on Creativity & Cognition (C&C’22)*. Venice, Italy: Association for Computing Machinery, 2022.

S. S. Bae, R. Yang, P. Gyory, J. Uhr, D. A. Szafr, and E. Y.-L. Do. “Touching Information with DIY Paper Charts & AR Markers”. In: *Interaction Design and Children*. IDC ’21. Athens, Greece (Virtual): Association for Computing Machinery, 2021.

S. S. Bae* and M. E. West*. “Cyborg Crafts: Second SKIN (Soft Keen Interaction)”. In: *Proceedings of the Fifteenth International Conference on Tangible, Embedded, and Embodied Interaction (TEI’21)*. Salzburg, Austria (Virtual): Association for Computing Machinery, 2021, 1–3 (*equally contributed).

TECH REPORTS

R. Woollands, F. Rossi, T. S. Vaquero, M. S. Net, S. S. Bae, V. Bickel, and J. V. Hook. “Maximizing Dust Devil Follow-Up Observations on Mars Using Cubesats and On-board Scheduling”. In: *Proceedings of the 43rd Annual AAS Guidance & Control Conference*, Breckenridge, CO. 2021.

BOOK CHAPTERS

T. Hopkins, S. S. Bae, J. Uhr, C. Zheng, A. Bani, and E. Y.-L. Do. “User Interfaces in Smart Cities”. In: *Handbook of Smart Cities*. Ed. by J. C. Augusto. Springer International Publishing, 2021.

AWARDS AND DISTINCTION

- 2021, 2022, 2023 Achievement Reward for College Scientists (\$21,500)
- 2021, 2022 Korean American Scholarship Foundation (\$4,000)
- 2022 David T. Spalding Graduate Teaching Fund Fellowship (\$1000)
- 2021 CU Boulder Travel Grant (\$500)
- 2021 Honorable Mention, IEEE World Haptics Student Design Competition
- 2021 CRA-WP Grad Cohort for Women
- 2021 Ada Lovelace Fellow, Open Hardware Summit
- 2021 Craft Award, ACM TEI Student Design Competition.
- 2019 - 2020 Richard C. and Joy Dorf Engineering Graduate Fellowship (\$1,000)
- 2019 - 2020 NASA JPL Master's Thesis Educational Fellow (\$30,000)
- 2018 - 2019 NSF's Preparing Engineering Graduate Students for the 21st Century Fellow (\$10,000).
- 2018 Honorable Mention Visual Storytelling Award, IEEE Pacific Visualization Symposium.
- 2017 Beneath (CONNECT EXPO 2017) - Judge's Honorable Mention.
- 2017 UC Davis Organizational Research Expo.
- 2017 Better Together - AIGA and IDSA.
- 2014 - 2015 Dean's Honor: Fall 2014 (College of Engineering), Spring 2015 (College of Letters and Science).

FUNDING

- CONTRIBUTED TO
FUNDED GRANTS
- EAGER: Home-Based DIY Interactive Information Physicalization for Young Children and their Parents
Amount: \$300,000
Agency: National Science Foundation
Principal Investigator: Ellen Do, CU Boulder
Co-Principal Investigator: Danielle Albers Szafir, CU Boulder
Duration: Oct 2020 - Sep 2022

TALKS

- INVITED GUEST LECTURER
- The Value of Design: Empowering Humans through Human-Centered Thinking**
 CU Boulder Information Visualization Class, Boulder, CO, 18 March 2021 (hosted by Danielle Szafir).
- The Value of Design: Empowering Humans through Human-Centered Thinking**
 UC Davis Android Development Class, Davis, CA, 14 January 2021 (hosted by Nina Amenta).
- INVITED TALKS
- Towards "Best of Both Worlds": Bridging Digital and Physical Representations in Visualization Research**
 Linköping University, Norrköping, Sweden, 9 January 2023 (hosted by Miriah Meyer).
- Debugging Multi-Robot Autonomous System Anomalies**
 CU Boulder ATLAS Seminar, Boulder, CO, 6 October 2020 (hosted by Ellen Do).
- Debugging Multi-Robot Autonomous System Anomalies**
 NASA-JPL, Pasadena, CA, 27 August 2020 (hosted by Scott Davidoff).

DESIGN EXHIBITIONS

- 2019 **Sit On Data** | Imagining America's 20th Anniversary National Gathering
 A data-driven parametric-bench where users can feel the data by sitting. Developing using Python, CNC routing, Laser cutting.

- 2017 **BENEATH | SOFA Chicago 2017**
An immersive installation conveying California's land subsidence. Presented at SOFA Chicago 2017. Built motion graphics and projection using Processing.
- 2017 **OneClimate: Prototyping Climate Change | Exploratorium Museum (SF)**
A multisensory exhibition conveying the impact of climate change sponsored by the John Muir Institute of the Environment. Featured at the Exploratorium in San Francisco for the OneClimate event, AIGA & ISAD - San Francisco, and IA's 2017 National Gathering. Designed the scientific narrative and constructed the exhibit using woodshop skills.

TEACHING AND MENTORING

Teaching Assistant

- SPRING 2021, 2022 **ATLS3300: Object**
Instructor: Daniel Leithinger (2021), Laura Devendorf (2022)
ATLAS Institute, University of Colorado Boulder.
- SPRING 2020 **ECS162: Web Programming**
Instructor: Nina Amenta
Department of Computer Science, University of California, Davis.
- WINTER 2019, 2020 **ECS164: Intro To Human-Computer Interaction**
Instructor: Hao-Chuan Wang
Department of Computer Science, University of California, Davis.
- SUMMER 2018 **ECS163: Information Visualization**
Instructor: Kwan-Liu Ma
Department of Computer Science, University of California, Davis.

Mentoring

- 2022 **Elise Johnson**
Undergraduate student in Mechanical Engineering
CU Boulder
Project: Discovery Learning Apprenticeship (EAGER project)
- 2021 **Claire O'Grady**
Undergraduate student in Creative Technology and Design
CU Boulder
Project: Senior Capstone Project (EAGER project)
- 2021 **Skyler Hoeger**
Undergraduate student in Creative Technology and Design
CU Boulder
Project: Senior Capstone Project (EAGER project)
- 2021 **Katie Rudoff**
Undergraduate student in Creative Technology and Design
CU Boulder
Project: Senior Capstone Project (EAGER project)
- 2020 **Vy Thai**
Undergraduate student in Computer Science
Stanford University
Project: Design probes for family-centered, in-car technology
- 2019 **Ashleigh Thompson**
Master student in Computer Science
University of California, Davis (Now Microsoft)

- 2019 **Lovpret Kaur**
Undergraduate student in Computer Science
University of California, Davis (Now Intel)

ACADEMIC SERVICE

Program Committee

ACM Creativity & Cognition 2021

Organizing Committee

IEEE VIS 2022 BELIV Workshop (Social Media and Web Chair)

Invited Conference Reviewer

ACM UIST 2021

ACM IDC 2023

ACM DIS 2021–2023

ACM CHI 2021–2023

ACM TEI 2022–2023

EG/VGTC EuroVis 2022

Invited Journal Reviewer

IEEE Transactions on Visualization and Computer Graphics

International Journal of Child-Computer Interaction

Invited Book Chapter Reviewer

“Visualization Psychology” published by Springer Nature. Editors: Danielle Albers Szafir, Rita Borgo, Min Chen, Darren J. Edwards, Brian Fisher, & Lace Padilla

Institutional Service

Ph.D. Open House Organizer 2021, ATLAS Institute, CU Boulder

Faculty Candidate Student Host 2021, ATLAS Institute, CU Boulder

Ph.D. Graduate Application Support Program Founder 2022, 2023, ATLAS Institute, CU Boulder

Tutoring

Coding tutor, Women’s Resources and Research Center UC Davis, UC Davis (2016-2018)

SELECTED MEDIA COVERAGE

- 2021 **CU Boulder** | Sandra Bae receives ARCS and KASF scholarship
<https://www.colorado.edu/atlas/2021/09/08/sandra-bae-receives-arcs-and-kasf-scholarships>
- 2017 **CONNECT EXPO** | SOFA CHICAGO 2017 Exhibition
Printing Press: Chubb (pg. 10-11).
- 2017 **AIGA and IDSA** | Better Together Design Exhibition
Printing Press: AIGA (pg. 8-9).
- 2017 **UC Davis** | ‘OneClimate’ a Call to Arms
<https://www.ucdavis.edu/news/oneclimate-call-arms>