

Senthil Chandrasegaran

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Education

PURDUE UNIVERSITY

WEST LAFAYETTE, INDIANA

PhD, Mechanical Engineering

Sep 2009–May 2016

Advisor: Dr. Karthik Ramani, Donald W. Feddersen Professor, Mechanical Engineering

Thesis: Tools and Methods to Analyze Multimodal Data in Collaborative Design Ideation

REGIONAL ENGINEERING COLLEGE (*now National Institute of Technology*)

TRICHY, INDIA

Bachelor of Engineering in Mechanical Engineering

Aug 1996–May 2000

Professional Experience

FACULTY OF INDUSTRIAL DESIGN ENGINEERING

Technische Universiteit Delft, Netherlands

Assistant Professor (Tenure-Track)

Sep 2020–Present

- Principal Investigator, Designing Intelligence Lab (DI_Lab)
- Member of the Department of Design, Organization, and Strategy (DOS)

DEPARTMENT OF COMPUTER SCIENCE

University of California, Davis, CA, USA

Postdoctoral Scholar (Advisor: Prof. Kwan-Liu Ma)

Sep 2017–Aug 2020

- Member of the Visualization & Interface Design Innovation (ViDi) Lab

COLLEGE OF INFORMATION STUDIES

University of Maryland, College Park, MD, USA

Postdoctoral Scholar (Advisor: Prof. Niklas Elmqvist)

Apr 2016–Aug 2017

- Member of the Human-Computer Interaction Lab (HCIL)

SCHOOL OF MECHANICAL ENGINEERING

Purdue University, West Lafayette, IN, USA

Ph.D. Student (Advisor: Prof. Karthik Ramani)

Sep 2009–Jan 2016

- Research assistant in the C Design Lab
- Teaching assistant in the School of Mechanical Engineering

ALCYON ENGINEERING

Pune, India

Engineer

Aug 2004–Aug 2009

- Structural Analysis & Knowledge-Based Engineering

TATA AUTOCOMP SYSTEMS

Pune, India

Design Engineer

Aug 2000–Aug 2004

- Automotive Interior Trim Design

Teaching

FACULTY OF INDUSTRIAL DESIGN ENGINEERING

Technische Universiteit Delft, Netherlands

Lecturer

2020–2021

- Data Visualization Track, ID4370: SPD Media (master's course)
- Fundamentals of Data Visualization Design (IDE Academy workshop)

Design Coach

2020–2021

- ID1061: Business, Culture & Technology (bachelor's course)
- ID2060: Interaction & Electronics (bachelor's course)
- ID4010: Design Theory & Methodology (master's course)

DEPARTMENT OF COMPUTER SCIENCE

University of California, Davis, CA, USA

Guest Lecturer*Winter & Fall Quarters, 2019*

- ECS289H: Immersive Visualization (graduate, Fall 2019)
- ECS189H: Introduction to Human-Computer Interaction (undergraduate, Winter 2019)
- ECS163: Information Interfaces (undergraduate, Winter 2019)
- ECS272: Information Visualization (graduate, Winter 2019)

SCHOOL OF MECHANICAL ENGINEERING

Purdue University, West Lafayette, IN, USA

Lead Teaching Assistant*Jan 2010–Dec 2012*

- ME444: Computer-Aided Design & Prototyping (undergraduate)

Publications

My publications listed below are separated into the following categories:

J_n : Journal publications, indexed as J1, J2, ... J_n.

P_n : Highly-selective conference publications, indexed as P1, P2, ... P_n. These conferences are strictly peer-reviewed with at least three reviewers per submission, have an acceptance rate $\leq 30\%$, and are considered equivalent to journals in quality and archival value. Acceptance rates are slightly different for each year and are provided when available.

C_n : Other archival conference publications, indexed as C1, C2, ... C_n. These have an acceptance rate greater than 30% but are published as proceedings.

N_n : Non-archival publications, extended abstracts, short papers, and posters, indexed as N1, N2, ... N_n.

Other notations and their meanings when shown against a paper:

☺ : The first author is a student whom I supervised for that publication.

👤 : The first author and I contributed equally to the work.

🏆 : The paper has received an award or honorable mention.

Journal Publications (refereed)

- J8 Crnovrsanin, T., Shilpika, S., **Chandrasegaran, S.**, and Ma, K.-L. Staged Animation Strategies for Online Dynamic Networks. *Transactions of Visualization and Computer Graphics, (Proc. IEEE InfoVis 2020)*, 27 (2), pp. 539–549, 2021.
- J7 Zhou, N., Kisselburgh, L., **Chandrasegaran, S.**, Badam, S.K., Elmqvist, N., and Ramani, K. Using Social Interaction Trace Data and Context to Predict Collaboration Quality and Creative Fluency in Collaborative Design Learning Environments. *International Journal of Human-Computer Studies*, 136, p. 102378, 2020.
- J6 Zhou, N., Perreira, N., **Chandrasegaran, S.**, George, T.T., Booth, J., and Ramani, K. Examining Middle School Students' Engineering Design Thinking in A Design Workshop. *Research in Science Education*, pp. 1–30, 2019.
- J5 Ramanujan, D., Bernstein, W.Z., **Chandrasegaran, S.**, and Ramani, K. Visual Analytics Tools for Sustainable Lifecycle Design: Current Status, Challenges, and Future Opportunities. *Journal of Mechanical Design*, 139 (11), pp. 111415, 2017.
- J4 **Chandrasegaran, S.**, Badam, S.K., Kisselburgh, L., Elmqvist, N., and Ramani, K. Integrating Visual Analytics Support for Grounded Theory Practice in Qualitative Text Analysis. *Computer Graphics Forum (Proc. EuroVis)*, 36 (3), pp. 201–212, 2017.

- J3 Zhou, N., Pereira, N., George, T., Alperovich, J., Booth, J., **Chandrasegaran, S.**, Tew, J., Kulkarni, D., Ramani, K. The Influence of Toy Design Activities on Middle School Students' Understanding of the Engineering Design Processes. *Journal of Science Education and Technology*, pp. 1–13, 2017.
- J2 **Chandrasegaran, S.**, Badam, S.K., Kisselburgh, L., Peppler, K., Elmquist, N., and Ramani, K. VizScribe: A Visual Analytics Approach to Understand Designer Behavior. *International Journal of Human-Computer Studies*, 100, pp. 66–80, 2017.
- J1 **Chandrasegaran, S.**, Ramani, K., Sriram, R.D., Horváth, I., Bernard, A., Harik, R.F., and Gao, W. The evolution, challenges, and future of knowledge representation in product design systems. *Computer-Aided Design*, 45 (2), pp. 204–228, 2013.

Highly Selective Conference Publications (refereed, acceptance rate \leq 30%)

- 📍 P9 Zhang, X., Fujiwara, T., **Chandrasegaran, S.**, Brundage, M., Sexton, T., Dima, A., and Ma, K.-L. A Visual Analytics Approach for the Diagnosis of Heterogeneous and Multidimensional Machine Maintenance Data. *IEEE Pacific Visualization Conference*, pp. 196–205, 2021. (25% acceptance rate)
- 📍 P8 Zhang, X., **Chandrasegaran, S.**, Ma, K.-L. ConceptScope: Organizing and Visualizing Knowledge in Documents based on Domain Ontology. *ACM CHI Conference on Human Factors in Computing Systems*, article no. 19, pp. 1–13, 2021. (26.3% acceptance rate)
- 📍 P7 Bae, S., Kwon, O.-H., **Chandrasegaran, S.**, Ma, K.-L. Spinneret: Aiding Creative Ideation through Non-Obvious Concept Associations. *ACM CHI Conference on Human Factors in Computing Systems*, article no. 617, pp. 1–13, 2020. (24.3% acceptance rate)
- P6 **Chandrasegaran, S.**, Bryan, C., Shidara, H., Chuang, T.-Y., and Ma, K.-L. TalkTraces: Real-Time Capture and Visualization of Verbal Content in Meetings. In *Proceedings of the ACM CHI Conference on Human Factors in Computing Systems*, p. 577 (14 pages), 2019. (23.8% acceptance rate)
- 🏆 P5 **Chandrasegaran, S.**, Ramanujan, D., and Elmquist, N. How do Sketching and Non-Sketching Actions Convey Design Intent? *Proceedings of the ACM Conference on Designing Interactive Systems*, pp. 373–385, 2018. (22% acceptance rate)
(**Best Paper Honorable Mention: ~ top 5% of submitted papers**)
- P4 Piya, C., Vinayak, **Chandrasegaran, S.**, Elmquist, N., and Ramani, K. Co-3deator: A Collaborative 3D Design Ideation Tool. In *Proceedings of the ACM CHI Conference on Human Factors in Computing Systems*, pp. 6581–6592, 2017. (25% acceptance rate)
- 👥 P3 Badam, S.K., **Chandrasegaran, S.**, Elmquist, N., and Ramani, K. Tracing and Sketching Performance using Blunt-Tipped Styli on Direct-Touch Tablets. In *Proceedings of the ACM Conference on Advanced Visual Interfaces*, pp. 193–200, 2014. (28.7% acceptance rate)
- P2 Benjamin, W., **Chandrasegaran, S.**, Ramanujan, D., Elmquist, N., Vishwanathan, S., and Ramani, K. Juxtapoze: Supporting Serendipity and Creative Expression in Clipart Compositions. In *Proceedings of the ACM CHI Conference on Human Factors in Computing Systems*, pp. 341–350, 2014. (22.8% acceptance rate)
- P1 Zhao, Z., Badam, S.K., **Chandrasegaran, S.**, Park, D.G., Elmquist, N., Kisselburgh, L., and Ramani, K. skWiki: A Multimedia Sketching System for Collaborative Creativity. In *Proceedings of the ACM CHI Conference on Human Factors in Computing Systems*, pp. 1235–1244, 2014. (22.8% acceptance rate)

Conference Publications (refereed)

- C11 Lloyd, P., Salah, A.A., and **Chandrasegaran, S.** How Designers Talk: Constructing and Analysing a Design Thinking Data Corpus. The *ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, 2021. (accepted)
- C10 Ballestas, C., **Chandrasegaran, S.**, and Kim, E.-Y. A Framework for Centralizing Ethics in the Design Engineering of Spatial Computing Artifacts. The *ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, 2021. (accepted)
- C9 **Chandrasegaran, S.**, Zhang, X., Brundage, M., and Ma, K.-L. Using Text Visualization to Aid Analysis of Machine Maintenance Logs. In Proceedings of the *Model-Based Enterprise Summit*, National Institute of Standards and Technology, pp. 76–85, 2020.
- C8 Ramanujan, D., **Chandrasegaran, S.**, Zhou, N., and Ramani, K. Students' exploration strategies in a sustainability-focused structural optimization task. In Proceedings of the *ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, 2018.
- C7 **Chandrasegaran, S.**, Badam, S.K., Zhou, N., Zhao, Z., Kisselburgh, L., Peppler, K., Elmqvist, N., and Ramani, K. Merging Sketches for Creative Design Exploration: An Evaluation of Physical and Cognitive Operations. *Graphics Interface*, pp. 115–123, 2017. (50% acceptance rate)
- C6 Zhou, N., George, T.T., Booth, J.W., Alperovich, J., **Chandrasegaran, S.**, Pereira, N., Tew, J.D., Kulkarni, D.N., and Ramani, K. Developing Middle School Students' Engineering Design Concepts through Toy Design Workshop. In *Proceedings of the American Society of Engineering Education Conference & Exposition*, 2016.
- C5 **Chandrasegaran, S.**, Badam, S.K., Zhao, Z., Elmqvist, N., Kisselburgh, L., and Ramani, K. Collaborative Sketching with skWiki: A Case Study. In *Proceedings of the ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, 2014.
- C4 **Chandrasegaran, S.**, Kisselburgh, L., and Ramani, K. Understanding Brainstorming through Text Visualization. In *Proceedings of the ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, 2013.
- C3 Skaloud, B., **Chandrasegaran, S.**, and Ramani, K. A Proposed Platform to Simplify the Integration of Electronics into a Mechanical Engineering Design Course. In *Proceedings of the ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, 2012.
- C2 Taborda, E., **Chandrasegaran, S.**, Kisselburgh, L., Reid, T., and Ramani, K. Enhancing Visual Thinking in a Toy Design Course using Freehand Sketching. In *Proceedings of the ASME International Design Engineering Technical Conferences and Computers & Information in Engineering Conference*, 2012.
- C1 Taborda, E., **Chandrasegaran, S.**, and Ramani, K. ME 444: Redesigning a Toy Design Course. In *Proceedings of Tools and Methods in Competitive Engineering*, May 7–11, 2012.

Other Publications (non-archival papers, short papers, extended abstracts, and posters)

- N6 Du, M., Chou, J.-K., Ma, C., **Chandrasegaran, S.**, and Ma, K.-L. Exploring the Role of Sound in Augmenting Visualization to Enhance User Engagement. Short Paper, *IEEE Pacific Visualization Symposium*, pp. 225–229, 2018.
- N5 Kisselburgh, L., **Chandrasegaran, S.**, and Ramani, K. Knowledge-structuring practices: Using semantic network analysis to assess the influence of design team structure on knowledge emergence. Extended Abstract presented at the *International Communication Association, San Diego, CA.*, 2017.

- N4 Zhou, N., Kisselburgh, L., **Chandrasegaran, S.**, Badam, S.K., Elmqvist, N., and Ramani, K. Using Social Interaction Trace Data to Assess Collaboration Quality and Creative Fluency in Collaborative Design Environments. Paper presented at *the International Communication Association, San Diego, CA.*, 2017.
- N3 Kisselburgh, L., Zhou, N., **Chandrasegaran, S.**, Badam, S.K., Elmqvist, N., Peppler, K., and Ramani, K. Creative Collaboration and Flow: Validating the Use of Trace Data to Measure Dynamics of Creative Flow in Collaborative Design Teams. Poster presented at the *International Conference on Computer-Supported Collaborative Learning, Gothenburg, Sweden*, pp. 831–832, 2015.
- N2 Zhou, N., Kisselburgh, L., **Chandrasegaran, S.**, Badam, S.K., Elmqvist, N., Peppler, K., and Ramani, K. Using Real-time Trace Data to Predict Collaboration Quality and Creative Fluency in Design Teams. Poster presented at the *International Conference on Computer-Supported Collaborative Learning, Gothenburg, Sweden*, pp. 837–838, 2015.
- 🏆 N1 Kisselburgh, L., **Chandrasegaran, S.**, Foote, J., Gettings, P., Kristensen, T.M., and Ramani, K. The Social Ecologies of Collaborative Design in Visually-Integrated Cyber Enabled Design (V-ICED) Environments. Paper presented at the *National Communication Association (Communication & Future Division)*, 2013. **(Top Four Paper Award)**

Talks

- Visual Analysis of Unstructured Text Data (and its application to maintenance work orders). *NIST Standards Requirements Workshop for Natural Language Analysis, May 21, 2019.*
- VizScribe: A Visual Analytics Approach to Understand Designer Behavior. *HCIL Annual Symposium, University of Maryland, College Park, May 25, 2017.*
- Merging Sketches for Creative Design Exploration: An Evaluation of Physical and Cognitive Operations. *HCIL Annual Symposium, University of Maryland, College Park, May 25, 2017.*

Awards

- Honorable Mention Award in the ACM Conference on Designing Interactive Systems, 2018 (paper: P5).
- Estus H. and Vashti L. Magoon Award for Excellence in Teaching, 2013.
- “Top Four” paper award in the National Communications Association Symposium, 2013 (paper: N1).
- Estus H. and Vashti L. Magoon Award for Excellence in Teaching, 2012.

Student Supervision and Mentoring

DIRECT SUPERVISION—PH.D. STUDENTS

- Jesse Nijdam, Ph.D Student, TU Delft, Netherlands. Nov 2020–current. (Promoter: Prof. Peter Lloyd)
- Vera van der Burg, Ph.D Student, TU Delft, Netherlands. Nov 2020–current. (Promoter: Prof. Peter Lloyd)

PROJECT SUPERVISION AS A POSTDOC

- Sichen Jin, Visiting Undergraduate Researcher, Zhejiang Univesity, China. Project: *Applying Visual Analytics to Generate and Analyze Linkographs*, Oct 2019–June 2020. (Advisor: Prof. Kwan-Liu Ma)
- Xiaoyu Zhang, Ph.D. Student, UC Davis. Project: *Domain Ontology query generation and visualization from text*, Oct 2018–Aug 2020. (Advisor: Prof. Kwan-Liu Ma)
- Suyun Bae, M.S. Student, UC Davis. Project: *Aiding design space exploration through computer-supported concept map authoring*. July 2018–May 2020. (Advisor: Prof. Kwan-Liu Ma)

- Zhiyi Xu, M.S. Student, UC Davis. Project: *Visual analysis of heterogeneous machine repair and maintenance data*, Jan 2018–Jan2019. (Advisor: Prof. Kwan-Liu Ma)
- Tung-Yen Chuang, M.S. Student, UC Davis. Project: *TalkTraces: Real-time capture and visualization of verbal content in meetings*, Oct 2017–May 2018. (Advisor: Prof. Kwan-Liu Ma)

Contributions to Funded Projects

- *A Visual Analytics Framework for Analysis, Presentation, and Prognostics of Machine Maintenance Logs.* (PI: Ma, K.-L.) National Institute of Standards and Technology.
Provided some of the initial work on which the project is based, detailed development and evaluation plan.
- *V-ICED: Visually-Integrated Cyber Exploratorium for Design.* (PI: Ramani, K.; Co-PIs: Elmqvist, N., Kisselburgh, L.) National Science Foundation.
Designed collaborative sketching interfaces for sharing and extending ideas, developed visual analytic interfaces for sense-making of multimodal design data, and conducted studies with student design teams.
- *IDEA-PEN: Interactive Design and Analysis through a Pen-based Interface.* (PI: Ramani, K., Co-PI: Cardella, M.) National Science Foundation.
Developed use-case scenarios to evaluate the outcome of the proposed interface.

Service

PROGRAM COMMITTEE MEMBER

- Papers, ACM CSCW Conference, 2021, 2022.
- Short Papers, IEEE EuroVis Conference, 2016, 2021.

REVIEWER

- ACM CHI Conference, 2018–2021.
(*Special Recognition for Outstanding Review, 2019 & 2021*).
- ACM Creativity & Cognition Conference, 2019, 2021.
- ACM CSCW Conference, 2018–2021.
- ACM Interaction Design & Children Conference, 2017.
- ACM UIST Symposium, 2020.
- AI EDAM Journal, 2021.
- ASME IDETC/CIE Conferences, 2015.
- ASME Journal of Computing & Information Science in Engineering, 2017.
- ASME Journal of Mechanical Design, 2011.
- Computer-Aided Design Journal, 2016–2019.
- Design Studies Journal, 2020.
- iConference 2016, 2017.
- IEEE EuroVis Conference, 2018, 2020, 2021 (short papers).
- IEEE 3D UI Symposium, 2017.
- IEEE VAST Conference, 2020.
- IEEE VIS short papers, 2021.

- Information Visualization Journal, 2021.
- International Journal of Human-Computer Studies, 2018.
- Journal of Engineering Design, 2017, 2019.

VOLUNTEER

- Conducted Computer-Aided Design workshop for middle-school children as part of the Gifted Education Resource Institute (GERI) program at Purdue, 2015.
- Conducted toy design workshop for middle-school children as part of the Louis Stokes Alliance for Minority Participation program (LSAMP), Summer 2014.

Press

- NSF Discovery, June 2015. “Tools for real-time visual collaboration: Indiana and Purdue University Professors design Cyberlearning system to make sharing ideas easier”.
Relevant publications: P1, P2.
 - Huffington Post, June 2015. “7 Cyberlearning technologies transforming education”.
Relevant publications: P1, P2.
 - ScienceDirect, 2013 and 2014. “Top 25 hottest articles in Computer-Aided Design”.
Relevant publication: J1.
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