

My research focuses on endowing machines with social intelligence; I am interested in developing techniques to model, analyze, and synthesize multimodal social human behavior—especially in physically-situated or virtually-embodied interactions in the wild. My guiding motivation is to foster inclusive social interactions beyond geographic and cultural boundaries through machine-mediated interactions. Given the interdisciplinary nature of this work, my expertise spans multiple disciplines, including generative and multimodal machine learning, computer vision / graphics, distributed systems, and affective computing.

EDUCATION

- 2018 - 2023 **Ph.D. Computer Science, highest honors (top 5%)**
Delft University of Technology (TU Delft), The Netherlands
Thesis. Towards Artificial Social Intelligence in the Wild: Sensing, Synthesizing, Modeling, and Perceiving Nonverbal Social Human Behavior ([DOI](#))
Advisors. Hayley Hung and Marco Loog
- 2011 - 2013 **Master of Entertainment Technology**
Carnegie Mellon University, USA
- 2006 - 2010 **Bachelor of Engineering, Information Technology, First Class with Distinction**
University of Mumbai, India

PROFESSIONAL EXPERIENCE

- Mar '23 - present **Delft University of Technology (TU Delft), Delft, The Netherlands**
Assistant Professor, Department of Intelligent Systems
Leading the Tapri Lab; developing generative AI techniques towards realizing interactive embodied systems that can continually adapt to and reason about social human behavior
- Apr '24 - present **SimPPL, USA**
Board Director
SimPPL is a nonprofit organization that aims to rebuild trust on the social internet, advancing information integrity through responsible computing tools.
- Nov '23 - present **The Hybrid Intelligence (HI) Center, The Netherlands**
Co-Lead, The Robotic Surgery Case Study
The [HI Case Studies](#) constitute concrete societal settings to anchor research. I am co-leading the creation of a human-AI coupled system for collaborative microsurgeries.
- Jun '21 - Sep '21 **Microsoft Research, Cambridge, UK**
Ph.D. Research Intern, Presence AI
Developed a system for dynamic expression-based wrinkles for digital faces
- Apr '16 - Jul '18 **Carnegie Mellon University - Language Technologies Institute, Pittsburgh, USA**
Senior Research Engineer (Jul '17 - Jul '18)
Research Engineer (Apr '16 - Jul '17)
Worked with the Multicomp Lab to build distributed systems and multimodal machine learning methods for sensing, analyzing, and predicting human communicative behaviors
- Apr '14 - Apr '16 **ProductionPro, New York, USA**
Lead Client Developer and UX Designer
 - First client-side hire; Architected and implemented core client-side systems of the flagship product: a real-time collaborative iOS platform for TV, film, and theatre productions
 - Defined and executed the company's UX and UI design process
- May '13 - Apr '14 **Disney Research, Pittsburgh, USA**

Research Associate - Computer Vision

- Developed and deployed infrastructure for distributed training and inference of object detection models using data captured in the theme park locations
- Developed algorithms to detect and track giraffe feeding behavior at the theme parks

May '12 - May '13

Disney Parks, Experiences, and Products, Orlando, USA

New Technology Analyst - Next Generation Experience Project

- Prototyped techniques for color constancy of images captured under non-uniform illumination
- Integrated techniques for automating color-retargeting of high-speed video into the existing pipeline for capturing guest media within the theme parks

Jan '12 - May '12

Microsoft - User Experience and Creative Services, Redmond, USA

Developer, Project Wall# (Semester Project)

- Developed an interactive projection-mapping installation prototype for the Microsoft Store
- Implemented Unity3D shaders for native homographic correction for projection mapping

Jul '11 - Jul '12

Hungama Digital Media, Mumbai, India

Developer - iOS Games and Interactive Installations

Developed games, speech-driven iOS applications, and gesture-driven installations for clients including Cartoon Network, Axis Bank, and Yash Raj Films

Jul '08 - Aug '11

Indian Institute of Technology Bombay, Mumbai, India

Project Engineer - Project OSCAR (Jun '11 - Aug '11)

Research Intern - Project OSCAR (Jul '08 - Jun '11)

Designed, validated, and implemented 3D authoring tools using Blender for interactive content creation for online education. Project OSCAR (Open Source Computer Animation Repository, <https://www.it.iitb.ac.in/oscar/>) was a Govt. of India-funded endeavor for promoting distance education to support under-served populations.

GRANTS

- 2023 Principal Investigator, Convergence Health and Technology Accelerator Grant (40,000 EUR) for "Human-Robot Collaboration for Microsurgeries" between TU Delft and Erasmus MC
- 2023 Principal Investigator, Google Initiated Grant (gift of 30,000 USD) for "A reliable framework for evaluating synthetic nonverbal behavior towards creating socially aware digital humans"

HONORS, AWARDS, & MEMBERSHIPS

- 2023-present Member, ELLIS (European Laboratory for Learning and Intelligent Systems)
- 2023 *Cum Laude* distinction for the Doctoral degree (highest designation in the Netherlands, top 5% Ph.D. theses are eligible)
- 2023 First place (12 teams, 50 researchers), Emotion Physiology and Experience Collaboration (EPiC) Challenge, ACII 2023. Task: Inferring emotions (arousal, valence) from physiological signals
- 2022 Outstanding Reviewer, NeurIPS 2022 Datasets & Benchmarks Track
- 2015 (For ProductionPro) Audience's Choice Award, Demo Day, Made in New York Media Center
- 2012 To Innovation and Beyond, Walt Disney World New Media Group
- 2011 The Award of First Penguin, Entertainment Technology Center, Carnegie Mellon University
- 2011 K.C. Mahindra Scholarship for post-graduate studies
- 2011 Bharat Petroleum Corporation Scholarship for higher studies
- 2009, 2010 Sir Dorabji Tata Trust Scholarship for excellence in undergraduate studies
- 2004 Best all-round student, Batch of 2004, Arya Vidya Mandir Bandra West
- 2002 Certificate of Distinction, 1st National Cyber Olympiad, India
- 2001, 2002 Certificate of Distinction (All-India Rank 82 (2001), 631 (2002) among ~35000), National Science Olympiad, India
- 2000 Won the Student's Forum Creative-Writing Contest among ~5000 students; article featured in the Asian Age Newspaper, 5th Sep 2000 issue
- 2000 Certificate of Distinction, Speech and Drama Grade 4 Examination, Trinity College London
- 1998, 1999 Certificate of Merit (All-India Rank 255 (1998), 18 (1999) among ~25000), English Proficiency & General Knowledge Test conducted by CIPEL (Central Institute for Proficiency in English Language)

SELECTED PRESS

- Digital Humans **TU Delft Stories.** Social Skills for Digital Humans. Jul 2024.
- CMU MultiSense **ARTE.** L'intelligence artificielle va-t-elle nous dépasser? Oct 2018.
CNN. Anthony Bourdain - Parts Unknown. Oct 2017.
VOA News. Future combines Human, Machine Intelligence, Scientists Say. Oct 2016.
- ProductionPro **Forbes.** New Broadway App Makes The Creative Process A Snap. Aug 2017.
NBC News. The App Changing the Way Hollywood Makes Your Favorite Shows. Jun 2017.
New York Business Journal. ProductionPro wins Demo Day at Brooklyn's Made in NY Media Center. Oct 2015.
- Project Oscar **Hindustan Times.** Project OSCAR: Animation to make engineering lessons easier, more fun. 2009

TEACHING

UNIVERSITY COURSES

- Instructor **Generative Modeling.** (M.Sc., ~60 students.) TU Delft. 2025-present.
Human Centered Machine Perception. (M.Sc., ~30 students.) TU Delft. 2024-present.
Machine Learning 2. (M.Sc., ~200 students.) TU Delft. 2019-2024.
Topic: Latent Variable Models and Variational Inference
Social Signal Processing. (M.Sc., 35 students.) TU Delft. 2019.
Game Architecture and Programming. (B.E., 80 students.) University of Mumbai. 2010.
- Manager **Data Mining.** (B.Sc., ~300 students.) TU Delft. 2019.
- Teaching Assistant **Social Signal Processing.** (M.Sc., ~35 students.) TU Delft. 2018, 2022.

MASSIVELY OPEN ONLINE COURSES (MOOCs)

- Course Developer **Introduction to Blender.** (Project Oscar, [Link](#).) Indian Institute of Technology Bombay. 2011.

TUTORIALS

- Instructor **Multimodal Data Collection for Social Interaction Analysis in the Wild.**
ACM Multimedia. 2019.
Introduction to Blender: Modeling, Texturing, Rendering, and the Game Engine.
University of Mumbai. 2011.

ADVISEMENT / MENTORSHIP

- Masters Thesis **Improving capabilities of embodied LLM agents through collaboration.** Baptiste Colle. TU Delft. 2023-2024.
Modeling Style in Social Cue Forecasting. Bilal El Attar. TU Delft. 2022.
Perceived Conversation Quality in Free-Standing Group Interactions. Navin Raj Prabhu. TU Delft. 2019-2020.
- Bachelors Thesis **Cognitive and Learning Frameworks for Embodied Virtual Agents: A Systematic Literature Review.** Andrei Dascalu, Kaushik Karthikeyan, Aleks Jach, Lara Sakarya, Mircea Lica. TU Delft. 2024.
Material-Aware Multilayered Garment Draping for Digital Humans. Prerana Achar, Mayank Patel, Anushka Mulik. University of Mumbai. 2023-2024.
Affect Representation Schemes Used in Automatic Affect Prediction: A Systematic Literature Review. Natalia Pietnoczko, Lucia Serrano Ruber, Ashika Chakravorty, Aditi Rawat, Natalia Bryla. TU Delft. 2023.
Exploring Automatic Translation between Affect Representation Schemes. Mira Ilieva, Ivan

Dimitrov, Alissia Rugina, Shuang Liu. TU Delft. 2023.

How Private is low Frequency Speech Data in Networking Events? Lucia Alonso Arenaza, Matteo Fregonara, Taichi Uno, Pepijn Vunderink. TU Delft. 2022.

Adding Interactivity to E-Learning Through Gesture Recognition. Parin Jogani, Anuja Shah, Nikita Sule, Sahil Bakshi, Paulomi Sanghvi, Priyanka Shah. IIT Bombay/University of Mumbai. 2011.

Other Mentorship **Software Engineering, UX Design.** James Phillips, Alana Libonati, Tyler (Lixuan) Zhu, Rachel Wu. ProductionPro. 2014-2016.

PROFESSIONAL ACTIVITIES & SERVICE

Organizer **Workshop on Multimodal Affective and Social Behavior Analysis and Synthesis in Extended Reality (MASSXR).** IEEE VR. 2024, 2025.
Workshop on Navigating the Interplay of Explainability and Privacy in AI. TU Delft. 2024.
ELLIS PhD and Postdoc event for the Dutch and Belgium units. Delft. 2023.
Social and Affective Computing Reading Group. TU Delft. 2020-2021.
Workshop on Insights on Group and Team Dynamics. Website Chair. ICMI. 2020.
Symposium on Interdisciplinary Insights into Group Dynamics. Local Chair. TU Delft. 2018.
Multimodal Affective Computing Reading Group. CMU. 2017-2018.

Technical Reviewer **Unity 4 Game Development HOTSHOT.** Packt Publishing. 2013-2014.

Jury (By Invitation) **Faculty PhD Poster Event.** TU Delft. 2022.
Building Virtual Worlds Festival. Carnegie Mellon University. 2013.

Service **Chair, Faculty Works Council (Onderdeel Commissie).** Faculty of Electrical Engineering, Mathematics, and Computer Science, TU Delft. 2023-present
Member, EEMCS Diversity and Inclusion Team (EDIT). Faculty of Electrical Engineering, Mathematics, and Computer Science, TU Delft. 2023-present
Chair, Faculty PhD Council. Faculty of Electrical Engineering, Mathematics, and Computer Science. TU Delft. 2021-2022; member since 2019.
Delft IT Researchers (DITOO) Representative. TU Delft. 2019-2021.

Editor/Chair **New Initiatives Co-Chair.** ICMI. 2024.
Senior PC Member. ACII. 2024.
Area Chair. NeurIPS Datasets & Benchmarks. 2023-present.

Reviewer **Journals.** IEEE Transactions on Affective Computing (TAC) 2019, 2022, 2024 • ACM Transactions on Human-Robot Interactions (THRI) 2021, 2024
Conferences. NeurIPS 2023 • ICLR 2023 • ICMI 2023 • WACV 2023 • NeurIPS Datasets & Benchmarks 2022 • ECCV 2022 • CVPR 2021 • ACII 2023, 2022, 2021, 2019 • FG 2020, 2019
Workshops. Addressing Social Context in Affective Computing (ASOCA), ACII 2023 • I Can't Believe It's Not Better! (ICBINB), NeurIPS 2022 • Computer Vision for Metaverse (cv4metaverse), ECCV 2022 • Modeling Socio-Emotional and Cognitive Processes in the Wild (MSECP-Wild), ICMI 2022 • Group Interaction Frontiers in Technology (GIFT), ICMI 2018

INVITED TALKS / PANELS

2024 **Embodied Social Intelligence in the Wild.** Meta, London.
Keynote: Human-AI Coupled Systems: Redefining (Micro)surgical Environments. Workshop on Hybrid Intelligence for Healthcare, HHAI Conference. Malmö, Sweden.
Panel discussion – Workshop on Multimodal Affective and Social Behavior Analysis and Synthesis in Extended Reality (MASSXR). IEEE VR Conference. Orlando, USA.
Towards Data Driven Hypotheses of Social Human Behavior. Delft Design for Values Workshop on Navigating the Interplay of Explainability and Privacy in AI. TU Delft. 2024.

2023 **Artificial Social Intelligence in the wild: themes, challenges, future directions.** Consortium for Interacting Minds, Dartmouth College. Hanover, USA (Remote).

- Towards socially perceptive digital humans: sensing and synthesis of nonverbal social human behavior.** Distributed and Interactive Systems Group, Centrum Wiskunde & Informatica (CWI). Amsterdam, The Netherlands.
- Artificial Social Intelligence in the wild: themes, challenges, future directions.** Sabarmati Young Researchers' Seminar, Indian Institute of Technology Gandhinagar. Gandhinagar, India.
- 2022 **Situated social intelligence and synthetics.** Microsoft Synthetics Team. Redmond, USA.
- Panel discussion – Social safety in academia, from paper to practice.** Faculty Ethics and Diversity event. TU Delft. Delft, The Netherlands.
- Tips and suggestions for the academic and industry job hunt.** Pattern Recognition and Bioinformatics Group Workshop, TU Delft. Delft, The Netherlands.
- Panel discussion – Hybrid Intelligence: opportunities for collaboration between academia and industry.** HHAJ Conference. Amsterdam, The Netherlands.
- Tools for productivity and organization.** Joint Group Retreat - Pattern Recognition, Computer Vision, and Socially Perceptive Computing Labs, TU Delft. Spa, Belgium.
- Explainable Artificial Intelligence - overview and current issues.** Pattern Recognition Lab Retreat, TU Delft. Wanroij, The Netherlands.
- 2019 **Engineering practices to help your future self – Aww yeah! Hmm, it worked the first time.** Joint Group Retreat - Pattern Recognition, Computer Vision, and Socially Perceptive Computing Labs, TU Delft. Maastricht, The Netherlands.
- 2018 **CMU Multisense and Microsoft \psi.** Microsoft Research. Redmond, USA.
- 2016 **CMU Multisense, Demo for President Obama.** The White House Frontiers Conference. Pittsburgh, USA.
- Version Control - Brief History and Practical Tips.** Multicomp Lab, CMU. Pittsburgh, USA.

PATENTS

01. **Face image generation with wrinkles.** US Patent App. 17/929,207
Tadas Baltrusaitis, Charlie Hewitt, Erroll Wood, **Chirag Raman**

PUBLICATIONS

PREPRINT

01. **MindForge: Empowering Embodied Agents with Theory of Mind for Lifelong Collaborative Learning**
Mircea Lica, Ojas Shirekar, Baptiste Colle, **Chirag Raman**
In Review, ICML 2025
02. **REWIND Dataset: Privacy-preserving Speaking Status Segmentation from Multimodal Body Movement Signals in the Wild**
Jose Vargas Quiros, **Chirag Raman**, Stephanie Tan, Ekin Gedik, Laura Cabrera-Quiros, Hayley Hung
In Review, IEEE Transactions on Affective Computing

JOURNAL

03. **Systematic review of machine learning applications using nonoptical motion tracking in surgery**
Teona Z Carciumaru, Cadey M Tang, Mohsen Farsi, Wichor M Bramer, Jenny Dankelman, **Chirag Raman**, Clemens MF Dirven, Maryam Gholinejad, Dalibor Vasilic
npj Digital Medicine, 2025
04. **Perceived Conversation Quality in Spontaneous Interactions**
Chirag Raman*, Navin Raj Prabhu*, Hayley Hung
IEEE Transactions on Affective Computing, 2022
05. **Covfee: An Extensible Web Framework for Continuous-Time Annotation of Human Behavior**
Jose Vargas Quiros, Stephanie Tan, **Chirag Raman**, Laura Cabrera-Quiros, Hayley Hung
PMLR Volume 173: Understanding Social Behavior in Dyadic and Small Group Interactions, 2022

CONFERENCE

06. ***How Private is Low-Frequency Speech Audio in the Wild? An Analysis of Verbal Intelligibility by Humans and Machines***
Ailin Liu, Pepijn Vunderink, Jose Vargas Quiros, **Chirag Raman**, Hayley Hung
Proceedings of INTERSPEECH, 2024.
07. ***Why Did This Model Forecast This Future? Information-Theoretic Saliency for Counterfactual Explanations of Probabilistic Regression Models***
Chirag Raman, Alec Nonnemaker, Amelia Villegas-Morcillo, Hayley Hung, Marco Loog
Advances in Neural Information Processing Systems (NeurIPS), 2023.
08. ***Mesh-Tension Driven Expression-Based Wrinkles for Synthetic Faces***
Chirag Raman, Charlie Hewitt, Erroll Wood, Tadas Baltrusaitis
Proceedings of the 2023 IEEE/CVF Winter Conference on Applications of Computer Vision (WACV), 2023
09. ***ConfLab: A Data Collection Concept, Dataset, and Benchmark for Machine Analysis of Free-Standing Social Interactions in the Wild***
Chirag Raman*, Jose Vargas Quiros*, Stephanie Tan*, Ashraful Islam, Ekin Gedik, Hayley Hung
Advances in Neural Information Processing Systems (NeurIPS) 35, 2022, Datasets and Benchmarks Track
10. ***3D Face Reconstruction with Dense Landmarks***
Erroll Wood, Tadas Baltrusaitis, Charlie Hewitt, Matthew Johnson, Jingjing Shen, Nikola Milosavljevic, Daniel Wilde, Stephan Garbin, **Chirag Raman**, Jamie Shotton, Toby Sharp, Ivan Stojiljkovic, Tom Cashman, Julien Valentin
Proceedings of the European Conference on Computer Vision (ECCV), 2022
11. ***A Modular Approach for Synchronized Wireless Multimodal Multisensor Data Acquisition in Highly Dynamic Social Settings***
Chirag Raman*, Stephanie Tan*, Hayley Hung
Proceedings of the 28th ACM International Conference on Multimedia (MM), 2020
12. ***Multimodal Data Collection for Social Interaction Analysis in the Wild***
Hayley Hung, **Chirag Raman**, Ekin Gedik, Stephanie Tan, Jose Vargas Quiros
Proceedings of the 27th ACM International Conference on Multimedia (MM), 2019, Tutorial
13. ***Multimodal Polynomial Fusion for Detecting Driver Distraction***
Yulun Du, **Chirag Raman**, Alan W Black, Louis-Philippe Morency, and Maxine Eskenazi
Proceedings of Interspeech 2018, International Speech Communication Association, 2018
14. ***Auto-Grading for 3D Modeling Assignments in MOOCs***
Swapneel Mehta, **Chirag Raman**, Nitin Ayer, and Sameer Sahasrabudhe
Proceedings of the IEEE 18th International Conference on Advanced Learning Technologies (ICALT), 2018, Full Oral
15. ***Integrating Verbal and Nonverbal Input into a Dynamic Response Spoken Dialogue System***
Ting-Yao Hu, **Chirag Raman**, Salvador Medina Maza, Liangke Gui, Tadas Baltrusaitis, Robert Frederking, Louis-Philippe Morency, Alan W Black, Maxine Eskenazi
Proceedings of the Thirty-First AAAI Conference on Artificial Intelligence, 2017, Demo Track

WORKSHOP

16. ***Considering Indeterminacy in Affective Computing: The Need for Contextual Dataset Collection and Documentation***
Bernd Dudzik, Tiffany Matej Hrkalovic, Chenxu Hao, **Chirag Raman**, Masha Tsfasman
11th International Conference on Affective Computing and Intelligent Interaction Workshops and Demos (ACIIW), 2024.
17. ***Ensemble Learning to Assess Dynamics of Affective Experience Ratings and Physiological Change***
Felix Dollack, Kiyoshi Kiyokawa, Huakun Liu, Monica Perusquia-Hernandez, **Chirag Raman**, Hideaki Uchiyama, Xin Wei
Proceedings of the 11th International Conference on Affective Computing and Intelligent Interaction Workshops and

Demos (ACIIW), 2023. [Acceptance rate: 22%, **winner of the Emotion Physiology and Experience Collaboration (EPIC) challenge**]

18. ***Social Processes: Self-Supervised Meta-Learning over Conversational Groups for Forecasting Nonverbal Social Cues***
Chirag Raman, Hayley Hung, Marco Loog
Proceedings of the European Conference on Computer Vision (ECCV) Workshops (cv4metaverse), 2022
19. ***Towards a Real-time Measure of the Perception of Anthropomorphism in Human-robot Interaction***
Maria Tsfasman, Avinash Saravanan, Dekel Viner, Daan Goslinga, Sarah De Wolf, **Chirag Raman**, Catholijn M Jonker, Catharine Oertel
Proceedings of the 2nd ACM Multimedia (MM) Workshop on Multimodal Conversational AI, 2021
20. ***Defining and Quantifying Conversation Quality in Spontaneous Interactions***
Navin Raj Prabhu, **Chirag Raman**, Hayley Hung
Companion Publication of the 2020 International Conference on Multimodal Interaction (ICMI), 2020
21. ***Towards Automatic Estimation of Conversation Floors within F-formations***
Chirag Raman, Hayley Hung
Proceedings of the 8th International Conference on Affective Computing and Intelligent Interaction Workshops and Demos (ACIIW), 2019