

Biswaksen Patnaik

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Research Summary

I am a Human-Centered Physical AI researcher working at the intersection of embodied interaction, multimodal perception, and real-time adaptive systems. I design and build AI-driven interfaces that sense human behavior, infer user intent, and dynamically adapt in the physical world.

Education

2019 – **University of Maryland**, College Park, MD, United States

present **Ph.D. in Computer Science**, Advisor: *Dr. Niklas Elmqvist & Dr. Huaishu Peng*
Research: Human-Centered Physical AI for Embodied Sensemaking and Interaction

2017 – 2019 **University of Maryland**, College Park, MD, United States
M.S. in Human-Computer Interaction, Advisor: *Dr. Niklas Elmqvist*
Research: Olfactory Analytics: Exploring the design space of smell for data visualization

2012 – 2016 **National Institute of Technology**, Rourkela, India
B.Tech. in Industrial Design

Work Experience

Jun - Aug 2025 **Fujitsu Research of America**, *Research Intern*, Pittsburgh, USA.
Advisor: Dr. Aditi Mishra, Dr. Mose Sakashita, Dr. Aakar Gupta, Dr. Koichiro Niinuma
Project: Multimodal Interaction for Generative User Interfaces

Jul - Aug 2024 **Center for Anytime Anywhere Analytics**, *Visiting Scholar*, Aarhus University, Denmark.
Advisor: Dr. Clemens Nylandsted Klokmose, Dr. Niklas Elmqvist
Project: Gestural Interaction in Multi-display Environments

Jun - Aug 2019 **Sussex Computer Human Interaction Lab**, *Visiting Scholar*, University of Sussex, UK.
Advisor: Dr. Marianna Obrist, Dr. Sriram Subramanian, Dr. Niklas Elmqvist
Project: Mid-air haptics for human-data interaction

May - Aug 2018 **Human-Computer Interaction Group**, *Research Intern*, Hasso-Plattner Institute, Germany.
Advisor: Dr. Patrick Baudisch
Project: Designing low-cost force feedback mechanisms for haptic devices for blind users

Feb - May 2017 **Wearable Computer Lab**, *Research Intern*, University of South Australia.
Advisor: Dr. Ross Smith, Dr. Bruce Thomas
Project: Investigating collaborative shape display interactions

May - Jul 2015 **Keio-NUS CUTE Center**, *Research Intern*, National University of Singapore.
Advisor: Dr. Nimesha Ranasinghe, Dr. Ellen Yi-Luen Do
Project: Designing user interface for digital-taste (simulating taste with electrical-stimulation)

May - Jun 2014 **Ergonomics Lab**, *Research Intern*, Indian Institute of Technology, Guwahati, India.
Advisor: Dr. Sougata Karmakar
Project: Designing ergonomic interventions for factory workers in blending workstations

Publications

C1. **Biswaksen Patnaik**, Marcel Borowski, Huaishu Peng, Clemens N. Klokmose, Niklas Elmqvist.
(CHI'25) Datamancer: Bimanual Gesture Interaction in Multi-Display Ubiquitous Analytics Environments.
Accepted to *ACM Conference on Human Factors in Computing Systems*, 2025.

C2. **Biswaksen Patnaik**, Huaishu Peng, Niklas Elmqvist. VisTorch: Interacting with Situated (CHI'24) Visualizations using Handheld Projectors. *In Proceedings of the ACM Conference on Human Factors in Computing Systems*, to appear, 2024. [1,060/4,028, 26.3% acc. rate]

C3. Andrea Batch, **Biswaksen Patnaik**, Moses Akazue, Niklas Elmqvist. Scents and Sensibility: (CHI'20) Evaluating Information Olfaction. *In Proceedings of the ACM Conference on Human Factors in Computing Systems*, 2020.

C4. Mohammed Rajik Khan, **Biswaksen Patnaik**, Sonalisa Patel. Design and Development of a (ICoRD'17) Novel Sit-to-Stand and Mobility Assistive Device for Ambulation and Elderly. *In Proceedings of the International Conference on Research into Design*, 2017.

J1. **Biswaksen Patnaik**, Huaishu Peng, Niklas Elmqvist. Sensemaking Sans Power Interactive Data (TVCG'23) Visualization Using Color-Changing Ink. *IEEE Transactions on Visualization and Computer Graphics*, 2023.

J2. Pramod Chundury, **Biswaksen Patnaik**, Yasmin Reyazuddin, Christine W. Tang, Jonathan (TVCG'22) Lazar, Niklas Elmqvist. Towards Understanding Sensory Substitution for Accessible Visualization: An Interview Study. *IEEE Transactions on Visualization and Computer Graphics*, 2022.

J3. **Biswaksen Patnaik**, Andrea Batch, Niklas Elmqvist. Information Olfaction: Harnessing (TVCG'18) Scent to Convey Data. *IEEE Transactions on Visualization and Computer Graphics*, 2018.

J4. J Sanjog, **Biswaksen Patnaik**, Thaneswer Patel, Sougata Karmakar. Context-specific design (JIPE'15) interventions in blending workstation: an ergonomics perspective. *Journal of Industrial and Production Engineering*, 2015.

W1. **Biswaksen Patnaik**, Andrea Batch, and Niklas Elmqvist. Olfactory Analytics: Exploring the (AVI'18) Design Space of Smell for Data Visualization. *AVI Workshop on Multimodal Interaction for Data Visualization*, 2018.

Skills

Programming: Python, Multithreaded & Multiprocess Architectures, JavaScript, HTML/CSS, React · **Libraries/Frameworks:** PyTorch, NumPy, Pandas, Matplotlib, D3.js, A-Frame, Autogen · **Design & Analysis:** Fusion 360, SolidWorks, CATIA, Unity, Ansys, Tableau, Adobe Suite, UX Research, Human Factors, User Study Design · **Hardware:** Raspberry Pi, Arduino, Edge TPU, 3D Printing, Rapid Prototyping, Workshop Fabrication

Awards, Teaching, Service

Awards Dean's Fellowship (CS, 2019 - 2021) · HCIM Student Travel Award (iSchool, 2018), UMD

Reviewer ACM Conference on Human Factors in Computing Systems (CHI 2024, 2025)

SC Assistant Developing Novel Devices: Hardware, Materials & Fabrication (CHI 2026)

Teaching CMSC434: Human-Computer Interaction (Fall'25, Spring'24, Fall'24), CMSC425: Game

Assistant Programming (Spring'24), INST362: User-Centered Design (Fall'18), UMD

Volunteer Human-Computer Interaction Lab Symposium 2019, UMD

References

Dr. Niklas Elmqvist (CA³), Aarhus University / University of Maryland
 Dr. Huaishu Peng (SMART Lab), University of Maryland
 Dr. Aditi Mishra (Converging Lab), Fujitsu Research of America