

## 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 – present **University of Maryland**, College Park, MD, United States  
**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 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: 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 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 Visualization Using Color-Changing Ink. *IEEE Transactions on Visualization and Computer Graphics*, 2023.
- J2. Pramod Chundury, **Biswaksen Patnaik**, Yasmin Reyazuddin, Christine W. Tang, Jonathan 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 Scent to Convey Data. *IEEE Transactions on Visualization and Computer Graphics*, 2018.
- J4. J Sanjog, **Biswaksen Patnaik**, Thaneswer Patel, Sougata Karmakar. Context-specific design 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 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 (CA<sup>3</sup>), Aarhus University / University of Maryland  
 Dr. Huaishu Peng (SMART Lab), University of Maryland  
 Dr. Aditi Mishra (Converging Lab), Fujitsu Research of America