Biswaksen Patnaik

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Research Summary

I work at the intersection of Human-Computer Interaction, Visualization, and Human-AI Interaction. I design and build multimodal systems that go beyond traditional graphical interfaces by integrating gesture, spatial, and cross-device modalities to enable situated and ad-hoc interaction.

Education

2019 – present **University of Maryland**, College Park, MD, United States
Ph.D. in Computer Science, Advisor: *Dr. Niklas Elmqvist & Dr. Huaishu Peng*
Research: Enabling Ubiquitous Analytics through Physical Computing and XR

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

C2. *(CHI'24)* **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. *(CHI'20)* Andrea Batch, **Biswaksen Patnaik**, Moses Akazue, Niklas Elmqvist. Scents and Sensibility: Evaluating Information Olfactation. *In Proceedings of the ACM Conference on Human Factors in Computing Systems*, 2020.

C4. *(ICoRD'17)* 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. *(TVCG'23)* **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. *(TVCG'22)* 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. *(TVCG'18)* **Biswaksen Patnaik**, Andrea Batch, Niklas Elmqvist. Information Olfactation: Harnessing Scent to Convey Data. *IEEE Transactions on Visualization and Computer Graphics*, 2018.

J4. *(JIPE'15)* 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. *(AVI'18)* **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, JavaScript, HTML/CSS · **Libraries/Frameworks:** PyTorch, NumPy, Pandas, Matplotlib, D3.js, A-Frame, Autogen · **Design & Analysis:** Fusion 360, SolidWorks, CATIA, Unity, Ansys, Tableau, Adobe (Photoshop, Illustrator, Premiere Pro), 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 Assistant	CMSC434: Human-Computer Interaction *(Fall'25, Spring'24, Fall'24)*, CMSC425: Game Programming *(Spring'24)*, INST362: User-Centered Design *(Fall'18)*, UMD
Volunteer	Human-Computer Interaction Lab Symposium 2019, UMD

References

Dr. Niklas Elmqvist (CA^3), Aarhus University / University of Maryland
Dr. Huaishu Peng (SMART Lab), University of Maryland
Dr. Aditi Mishra (Converging Lab), Fujitsu Research of America