# Biswaksen Patnaik

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## Research Summary

*HCI, XR, AI, Visualization, Physical Computing*

I work at the intersection of Human-Computer Interaction and Data Visualization. My work leverages interactive data visualization as a platform for delving into **post-WIMP user interfaces** (*windows, icons, menus, pointer*). I am interested in designing multimodal-interaction techniques that support **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 (ad-hoc interactive environments in physical spaces) 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

**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*: Exploring 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

### Journal Papers

J1. **Biswaksen Patnaik**, Huaishu Peng, Niklas Elmqvist. Sensemaking Sans Power Interactive Data Visualization Using Color-Changing Ink. *IEEE Transactions on Visualization and Computer Graphics*, 2022.

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 Olfactation: 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.

### Conference Papers

C1. **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]

C2. 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.

C3. 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.

### Workshop Papers

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.

## Awards

2019 – 2021 **Dean's Fellowship**. Department of Computer Science, University of Maryland College Park

2018 **Travel Award**. HCIM Student Travel Award, iSchool, University of Maryland College Park

## Skills

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|---|---|
| Programing: | Python; *Web*: HTML, CSS, JavaScript |
| Libary: | Matplotlib, NumPy, Pandas |
| Design & Analysis: | d3.js, A-Frame, Autodesk (Inventor/Fusion360), CATIA, SOLIDWORKS, Adobe (Photoshop, Illustrator, PremeirePro), Unity, Ansys, Tableau, UX Research, Human Factors, User Study |
| Hardware: | Arduino, Raspberry Pi, (Edge)TPU, 3D Printing, Rapid Prototyping, Workshop Technology |

## Teaching & Service

**Fall 2024**   **Teaching Assistant**. *CMSC434: Human-Computer Interaction*, Department of Computer Science, University of Maryland College Park

**Spring 2024**   **Teaching Assistant**. *CMSC425: Game Programming*, Department of Computer Science, University of Maryland College Park

**CHI 2024,2025**   **Reviewer**. ACM Conference on Human Factors in Computing Systems

**April 2019**   **Student Volunteer**. Human-Computer Interaction Lab Symposium, University of Maryland

**Fall 2018**   **Teaching Assistant**. *INST362: User-Centered Design*, iSchool, University of Maryland College Park

## References

**$CA^3$**   **Dr. Niklas Elmqvist**
Center for Anytime Anywhere Analytics ($CA^3$)
Department of Computer Science, Aarhus University, Denmark
College of Information Studies, University of Maryland College Park, USA

**Smart Lab**   **Dr. Huaishu Peng**
Small Artifacts Lab (Smart Lab)
Department of Computer Science, University of Maryland College Park, USA