

# Nahyun Kwon

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## RESEARCH INTEREST

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### Human-Computer Interaction, Interactive Systems, Computer Vision, Accessibility (Slides)

I specialize in designing and developing **AI-powered interactive systems** that aim to bridge the gap between rapidly evolving technologies and novice or inexperienced users. My primary goal is to make these technologies more understandable and accessible to a broader audience. My research focuses on enhancing the understanding of visual information, with a strong emphasis on accessibility. I utilize cutting-edge AI techs for innovative solutions to tackle various HCI problems.

## EDUCATION

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### Texas A&M University

*Ph.D. in Computer Science. Advisor: Jeeun Kim, Co-advisor: Shu Kong*

College Station, TX

*Aug 2018 – May 2025 (Estimated)*

### Ewha Womans University

*B.S. in Computer Science. Advisor: Uran Oh*

Seoul, Korea

*Mar 2015 – Feb 2020*

## PUBLICATIONS

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- [1] **AccessLens: Auto-detecting Inaccessibility of Everyday Objects.** Nahyun Kwon, Emory Lu, Hasham Qazi, Joanne Liu, Changhoon Oh, Shu Kong, Jeeun Kim. CHI'24. *To appear.* Paper Video
- [2] **3DPFIX: Improving Remote Novices' 3D Printing Troubleshooting Experience through Human-AI Collaboration Design.** Nahyun Kwon, Tong Sun, Yuyang Gao, Liang Zhao, Xu Wang, Sungsoo Ray Hong, Jeeun Kim. CSCW'24. *To appear.* Poster, Paper
- [3] **A High-Resolution Dataset for Instance Detection with Multi-View Instance Capture.** Qianqian Shen, Yunhan Zhao, [Nahyun Kwon](#), Yanan Li, Jeeun Kim, Shu Kong. NeurIPS'23 datasets and benchmarks track. Paper Repo
- [4] **Weedle: Composable Dashboard for Data-centric NLP in Computational Notebooks.** [Nahyun Kwon](#), Hannah Kim, Sajjadur Rahman, Dan Zhang, Estevam Hruschka. WWW'23 demo. Paper
- [5] **Multi-ttach: Techniques to Enhance Multi-material Attachments in Low-cost FDM 3D Printing.** [Nahyun Kwon\\*](#), Himani Deshpande\*, Md Kamrul Hasan, Aryabhat Darnal, Jeeun Kim. SCF'21. Paper
- [6] **Touch Screen Exploration of Visual Artwork for Blind People.** Dragan Ahmetovic, [Nahyun Kwon](#), Uran Oh, Cristian Bernareggi, Sergio Mascetti. In Proceedings of the Web Conference 2021 (WWW'21) Paper
- [7] **Supporting a Crowd-powered Accessible Online Art Gallery for People with Visual Impairments: A Feasibility Study.** [Nahyun Kwon](#), Yunjung Lee, Uran Oh. Universal Access in the Information Society (2021) Paper
- [8] **3D4ALL: Toward an Inclusive Pipeline to Classify 3D Contents.** [Nahyun Kwon](#), Chen Liang, Jeeun Kim. TExSS'21, Workshop on IUI'21. Paper
- [9] **Supporting Object-level Exploration of Artworks by Touch for People with Visual Impairments.** [Nahyun Kwon](#), Youngji Koh, Uran Oh. ASSETS'19. Poster Session. Paper

## EXPERIENCE

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### Ph.D. Student

*HCIED (HCI Engineering and Design) Lab, Texas A&M University*

Sep 2020 – Present

*College Station, TX*

- Committee: Jeeun Kim, Shu Kong, Hank Walker, Yoonsuck Choe, Courtney Starrett

### Research Intern

*Megagon Labs*

June 2022 – Aug 2022

*Mountain View, CA*

- Mentor: Hannah Kim, Sajjadur Rahman, Dan Zhang, Estevam Hruschka
- Project: Interactive notebook widget for exploratory text analysis for NLP modeling [4]

### Research Intern

*Alignment Lab, George Mason University*

May 2019 – July 2019

*Fairfax, VA*

- AI-powered interactive 3D printing failure diagnosis & solution suggestion system for remote novice users [2]

## Undergrad Research Intern

Human Computer Interaction Lab, Ewha Womans University

Jan 2019 – Aug 2020

Seoul, Korea

- Improving 2D artwork accessibility for people with visual impairments [6], [7], [9]

## Data Engineer Intern

WISHUPON Inc.

Jan 2018 – Mar 2018

Seoul, Korea

- Implemented dynamic scraping modules to keep up-to-date commercial data for price comparison
- Defined new issue codes for better communication between engineers through VCS & agile management.
- Kept the implemented code clean with refactoring and detailed documentation

## PROJECTS

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\*Denotes lead author projects

### \*(WIP) Large Language Models as Tools for Inclusive Environments

- Synthetic Data: Utilizing synthetic data pipelines for instruction-tuning of LLMs for accessibility domain.
- Prompt Engineering: Aiming to automate prompt generation for users with limited expertise.
- Quality Enhancement Module: Improving prompt quality through human-in-the-loop.
- User Studies: Conducting controlled lab studies to assess the quality and effectiveness of accessibility prompts of non-expert users.

### \*Fine-grained Type & Inaccessibility Detection of Everyday Objects in Indoor Scenes [1]

- Development of a refined dataset of indoor scene images for precise inaccessibility detection automation. Dataset
- Creation of an AI-powered system aimed at increasing users' awareness of indoor inaccessibility by (1) automatically detecting challenges from images and (2) offering 3D assistive augmentation solutions to address challenges.
- Design of metadata structures for the categorization of 3D assistive augmentations.
- Impact: Our end-to-end system showed a substantial increase in the cognitive ability of non-experts to identify inaccessibility, understand challenging contexts, and proactiveness in adopting solutions compared to written guidelines.

### \*Human-augmented AI to facilitate intelligent & interactive 3D printing troubleshooting [2]

- Building novel dataset for 3D printing failures based on *accumulated social annotations* on Reddit
- Training ResNet for each 3D printing failure type. Tech: Pytorch
- Designing an interactive system for 3D printing novices to detect printing failures and obtain applicable solutions
- Human-subject study: Designed online survey questionnaires, controlled lab study, and semi-structured interview. Qualitative & quantitative analysis, Kruskal-Wallis/Chi-square test, Power analysis
- Impact: Our system significantly improved remote novices' troubleshooting experience to their best practice

### \*Dialog summarization for customer service via chat Manuscript Repo

- Led NLP class project, fine-tuning Bart dialog summarization model for Twitter customer service dialog dataset
- Achieved 20% increase in Rouge score compared to pre-trained models by fine-tuning
- Tech: transformers, pandas

### \*Interactive notebook widget for exploratory text analysis for NLP modeling [4]

- Defining design requirements and designing structure & features for an interactive data viz widget
- Implementing Python packages for centralized text data analysis for NLP modeling
- Tech: ipywidget, Python NLP libraries (e.g., topic modeling, bag of words, sentiment analysis, etc.)

### \*Creating interlocking geometry in multi-material 3D FDM printing for stronger adhesion [5]

- Developing algorithm to create various interlocking structures using trajectory info in G-code with Python
- Creating web-based end-user interface for user input 3D model. Tech: Flask

### \*Improving 2D artwork accessibility for people with visual impairments [6], [7], [9]

- Collected crowdsourced artwork annotation and implemented VoiceOver-compatible web interface for spatial exploration of 2D artwork.
- Designed controlled lab study, and semi-structured interview. Tech: mTurk, D3.js

### \*Mobile gesture recognition for people with visual impairments Repo

- Mobile gesture recognition for people with visual impairments: Implemented custom gestures for various functional zooming of the screen on iOS for effective & rigorous exploration of images. Tech: Swift

## TECHNICAL SKILLS

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**Languages:** Python, Java, C, SQL, JavaScript/HTML/CSS

**Developer Tools:** Git, VS Code, Visual Studio, PyCharm, Latex, Markdown

**Libraries:** Pandas, NumPy, Matplotlib, Pytorch, Tensorflow, Transformers, Altair, Flask, etc.

## TEACHING & MENTORING

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**Teaching Assistant:** Human-Computer Interaction. CSCE 436 @ TAMU (Spring 2022, Spring 2023, Fall 2023, Spring 2024)

**Research Mentoring:** Kavya Kotra (CS Undergrad, 2023), Emory Lu (CS PhD, 2023), Joanne Liu (CS Undergrad, 2023), Muhammad Hasham Qazi (CS Undergrad, 2022), Harsha Siripurapu (CS Undergrad, 2021)

**Guest Lecture, CSCE 436 HCI @ TAMU:** Data Analysis & Data at Scale (Fall 2023), CV applications in Human-Computer Interaction: Image Processing & Camera Input (Spring 2023), Image Annotation & Crowdsourcing (Spring 2022)

## COURSEWORK

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Machine Learning, Deep Learning, Artificial Intelligence, Natural Language Processing, Data Visualization

## HONORS

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**ACM CRA-W Grad Cohort, 2022**

**TAMU CSE Travel Grant, 2021, 2022, 2023**

**Ewha Future Capability Scholarship, Ewha Womans University, 2019**

**Dean's List, Hanium ICT Mentoring Competition Award, Ewha Womans University, 2018**

## TEACHING & MENTORING

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**Student Volunteer. IUI'21, CHI'22:** Organized the paper sessions and resolved technical issues in virtual&in-person conference

**Workshop Coordinator. TxHCI Seminar Series:** Coordinated an interdisciplinary seminar across Texas institutions to foster an HCI community (Spring 2021, Fall 2023)

Last Update: 1/25/2024