

Changmin Kim

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Co.design:Inter.action Design Research Lab.

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Education

Ph.D., Industrial Design	2023
Korea Advanced Institute of Science and Technology (KAIST), Co.design:Inter.action Design Research Lab. (Advisor: Tek-Jin Nam) Thesis Title: "Utilizing Everyday Objects for End-User IoT Coordination"	
M.S., Industrial Design	2016
Korea Advanced Institute of Science and Technology (KAIST) Co.design:Inter.action Design Research Lab. (Advisor: Tek-Jin Nam) Thesis Title: "TransLayer: A Floating Transparent Layer for Augmented Tabletop Interaction"	
B.S., Industrial Design	2014
Korea Advanced Institute of Science and Technology (KAIST)	

Awards and Honors

Research Paper Excellence Award , Korean Society of Design Science (Educational Framework for IoT Product and Service Prototyping)	2024
RedDot Design Award , Best of Best (Medical Equipment Control UI-UX)	2021
RedDot Design Award , Best of Best (Mobile Negative Pressure Isolation Ward)	2021
iF Design Award , Discipline Professional Concept (IoTIZER: IoT interactive gadget)	2021
Global Ph.D. Fellowship (Extended) , National Research Foundation of Korea	2018
Best Paper Award , HCIK 2017 (LAMPY: An Assistive Pet-like Smart Lamp Living in a Desk Workspace)	2017
Best Paper Award , ACM, HCIK 2016 (Formula One: Rapid In-the-Wild Design and Evaluation of Interactive Prototypes)	2016
Global Ph.D. Fellowship , National Research Foundation of Korea	2016 – 2017
RED&B Best Project Award , KAIST & K-Valley	2014

Employment History

Industry Management Research Center, KAIST	2023 - 2024
Postdoctoral Research Associate	
School of Art & Design, Korea University	Fall 2023
Lecturer	
Industrial Design, Seoul Women's University	Fall 2023
Lecturer	
IoTIZ (IoT Solution related Startup Company)	2022 - Current

Research Interests

My research interests lie in the convergence of **Internet of Things (IoT)** and **AI technologies** for shaping **smarter future environments**. My past research and design initiatives have focused on speculating within this domain, developing novel interactive systems and artifacts, and investigating their influences. Additionally, I am deeply committed to sharing my initiatives and outcomes through various venues including lectures, workshops, demos, and web tutorials.

Keywords: Internet of Things (IoT), Artificial Intelligence (AI), Smart Environment, Human-Computer Interaction, Hardware/Software Prototyping, Interaction Design, Research Through Design, Speculative Design

Publications

Under Review

- [4] Bonhee Ku, **Chang-Min Kim**, Hyungjun Cho, Jisu Park, and Tek-Jin Nam. 2024 The effect of In-Car Agent Embodiment on Different Types of Information. Under the review of ACM Conference on Human Factors in Computing Systems (CHI)
- [3] Jiyeon Lee, **Chang-Min Kim**, Jisu Park, and Tek-Jin Nam. 2024 LO: A Life-Synchronized Product for Reflective and Sustainable Living. Under the review of ACM Conference on Human Factors in Computing Systems (CHI)
- [2] Jeongmin Ryu, **Chang-Min Kim**, Jisu Park, and Tek-Jin Nam. 2024. Foldi-Folda: Chair-Mounted Avatar Robot for Remote and On-Site Students in a Hybrid Learning Environment. Under the review of ACM Conference on Human Factors in Computing Systems (CHI)
- [1] Hyungjun Cho, Jiyeon Seo, Jiwon Lee, and **Chang-Min Kim**. 2024. ShamAIIn: Designing Superior

Conversational AI Inspired by Shamanism. Under the review of ACM Conference on Human Factors in Computing Systems (CHI)

Journals and Proceedings

- [15] **Chang-Min Kim**. 2024. Transforming Everyday Objects into IoT Control Interfaces: Design and Evaluation of the 'e-Rings' System. *Archives of Design Research*, 37(5), 29-49.
- [14] **Chang-Min Kim**. 2024. Educational Framework for IoT Product and Service Prototyping. *Archives of Design Research*, 37(2), 103-119
- [13] Jeongmin Ryu, Teawan Kim, and **Chang-Min Kim**. 2024. Chair-Mounted Avatar Robot for Enhancing Interaction Between Remote and On-Site Students in a Hybrid Learning Environment. In *Proceedings of the HCI Society of KOREA (HClK '24)*. South Korea, 190-195.
- [12] **Chang-Min Kim** and Tek-Jin Nam. 2022. Exploration on Everyday Objects as an IoT Control Interface. In *Proceedings of the 2022 Conference on Designing Interactive Systems (DIS '22)*, ACM, New York, NY, USA, 1654 - 1668.
- [11] Hyungjun Cho, Han-Jong Kim, JiYeon Lee, **Chang-Min Kim**, Jinseong Bae, and Tek-Jin Nam. 2022. IoTIZER: A Versatile Mechanical Hijacking Device for Creating Internet of Old Things. In *Proceedings of the 2021 Conference on Designing Interactive Systems (DIS '21)*, ACM, New York, NY, USA, 90–103.
- [10] **Chang-Min Kim**, Oosung Son, and Tek-Jin Nam. 2019. The Effect of Handwriting and Physical Representation in Computer-Mediated Text Communication. *Archives of Design Research*, 32(2), 45-55
- [9] Hyungjun Cho, **Chang-Min Kim**, and Tek-Jin Nam. 2019. A System Transforming Legacy Products to Smart IoT Products. In *Proceedings of the Korean Society of Design Science 2019 (KSDS '19)*. 136-137
- [8] **Chang-Min Kim**, Han-Jong Kim, and Tek-Jin Nam. 2018. Raspberry Pi Based Web Development Environment for IoT Prototyping. In *Proceedings of the Korean Society of Design Science 2018 (KSDS '18)*. 80-81
- [7] Han-Jong Kim, **Chang-Min Kim**, and Tek-Jin Nam. 2018. SketchStudio: Experience Prototyping with 2.5-Dimensional Animated Design Scenarios. In *Proceedings of the 2018 Designing Interactive Systems Conference (DIS '18)*. ACM, New York, NY, USA, 831-843
- [6] **Chang-Min Kim**, Hyeon-Beom Yi, Ji-Won Nam, and Geehyuk Lee. 2017. Applying Real-Time Text on Instant Messaging for a Rapid and Enriched Conversation Experience. In *Proceedings of the 2017 Conference on Designing Interactive Systems (DIS '17)*. ACM, New York, NY, USA, 625-629.
- [5] **Chang-Min Kim**. 2017. LAMPY: An Assistive Pet-like Smart Lamp Living in a Desk Workspace. In *Proceedings of the HCI Society of KOREA (HClK '17)*. South Korea, 554-558. Best Paper Awarded.

- [4] **Chang-Min Kim** and Tek-Jin Nam. 2017. TransLayer: Remote Assistance System Using Transparent Display in Tabletop Environment. In Proceedings of the HCI Society of KOREA (HCIK '17). South Korea, 201-204.
- [3] **Chang-Min Kim**, Seongkook Heo, Kyeong-Ah Jeong, and Youn-Kyung Lim. 2016. Formula One: Mobile Device Supported Rapid In-the-Wild Design and Evaluation of Interactive Prototypes. In Proceedings of the HCI Society of KOREA (HCIK '16). South Korea, 333-338. Best Paper Awarded.
- [2] Chorong Kim, **Chang-Min Kim**, and Hyeon-jeong Suk. 2015. Self-camera Positions to Make Myself More in Style. In Proceedings of the International Association of Societies of Design Research (IASDR '15). 1030-1040.
- [1] **Chang-Min Kim** and Tek-Jin Nam. 2015. G-raff: An Elevating Tangible Block for Spatial Tabletop Interaction. In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems (CHI '15). ACM, New York, NY, USA, 4161-4164.

Posters and Demonstrations

- [11] Hyungjun Cho, Jiyeon Seo, Jiwon Lee, and **Chang-Min Kim**. 2024. ShamAI: Superior Conversational AI Inspired by Shamanism. 2024. Crossing Over, Ground Seoul, Korea
- [10] **Chang-Min Kim**. 2024. The Future of Objects, Exhibition in Deajeon Gwanjeo Culture & Art Center
- [9] Incheol Jung, **Chang-Min Kim**. 2024. BeatGlow: Ambient Light and Control Device for a Rich and Active In-Car Music Listening Experience. In Proceedings of the HCI Society of KOREA (HCIK '24). South Korea, 1282-1285.
- [8] Jungin Choi, **Chang-Min Kim**. 2024. EmoFrame: A Frame-like Interactive Mood Lamp for Assisting the Emotional Reflection of Everyday Moments. In Proceedings of the HCI Society of KOREA (HCIK '24). South Korea, 1286-1288.
- [7] **Chang-Min Kim**, Tek-Jin Nam. 2019. IoTIZ: Open-source DIY Tool for Transforming Analog Products to IoT Devices. Salone del Mobile, Milano, Italy.
- [6] Han-Jong Kim, **Chang-Min Kim**, Tek-Jin Nam. 2018. SketchStudio: Rapid Prototyping Tool for 2.5D Animated Design Scenarios. In Proceedings of the 2018 ACM Conference Companion Publication on Designing Interactive Systems (DIS '18 Companion). ACM, New York, NY, USA, 335-338.
- [5] Oosung Son, **Chang-Min Kim**, and Tek-Jin Nam. 2017. Tele-Handwriter: Affective Digital Text Communication Using Physical Handwriting. In Proceedings of the 2017 ACM Conference Companion Publication on Designing Interactive Systems (DIS '17 Companion). ACM, New York, NY, USA, 325-328.
- [4] **Chang-Min Kim** and Tek-Jin Nam. 2016. Exploring the Layered Use of Transparent Display on a Large Tabletop Display. In Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '16). ACM, New York, NY, USA, 2555-2562.

- [3] Yea-Kyung Row, **Chang-Min Kim**, and Tek-Jin Nam. 2016. DooBoo: Pet-Like Interactive Dashboard towards Emotional Electric Vehicle. In Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '16). ACM, New York, NY, USA, 2673-2680.
- [2] **Chang-Min Kim** and Tek-Jin Nam. 2015. G-raff: An Elevating Tangible Block for Spatial Tabletop Interaction. In Proceedings of the 33rd Annual ACM Conference Extended Abstracts on Human Factors in Computing Systems (CHI EA '15). ACM, New York, NY, USA, 171-171.
- [1] Jungu Sim, **Chang-Min Kim**, Seung-Woo Nam, and Tek-Jin Nam. 2014. G-raffe: an elevating tangible block supporting 2.5D interaction in a tabletop computing environment. In Proceedings of the adjunct publication of the 27th annual ACM symposium on User interface software and technology (UIST'14 Adjunct). ACM, New York, NY, USA, 87-88.

Research Projects

Corporation Funded Projects

<p>AI-Home Communication Design, Samsung Electronics (Role: project manager, hardware prototyping, software prototyping)</p>	2024
<p>Development of Wearable Robots and Service Platforms for Daily Healthcare, Angel Robotics (Role: involved researcher, UI and contents design)</p>	2023
<p>Research on Human-Car Interaction and Artificial Intelligence Agents, General Motors Technical Center Korea (Role: involved researcher, hardware prototyping, user study)</p>	2021
<p>Research on Human-Car Interaction, General Motors Technical Center Korea (Role: involved researcher, hardware prototyping, user study)</p>	2020
<p>User Experience(UX) Oriented Air Purifier Design, M.I Design (Role: involved researcher, hardware prototyping, user study)</p>	2019
<p>Developing 'TIZEN IoT' Platform for Makers, Samsung Software Center (Role: project manager, hardware prototyping, software prototyping)</p>	2018
<p>Developing UX Guidelines for Maker's IoT Prototyping Platform,</p>	2017

Samsung Software Center

(Role: **project manager**, concept developing, hardware prototyping, user study)

Developing Printer UX Map for Educational Vertical Market,

2014

Samsung Electronics

(Role: involved researcher, user study)

Institute Funded Projects

Refinement and Design Enhancement of a Mobile Negative Air Pressure Isolation Room,

2022

End Run Project

(Role: **project manager**, system developing)

Designing a Mobile Negative Air Pressure Isolation Room for Infectious Hospital Service,

2022

KAIST Research Project

(Role involved researcher, system developing)

Developing a Wearable System for Transforming Everyday Objects as an IoT Control Interface,

2020

Venture Research Program for Graduate Students

(Role: **project manager**, hardware prototyping, system developing)

Designing an Attachable Controller for Transforming Ordinary Products to Smart IoT Products,

2019

Venture Research Program for Graduate Students

(Role: mentor, system developing)

Developing Transparent Layer Interface Device for Augmented Tabletop Interaction,

2016

Venture Research Program for Graduate Students

(Role: **project manager**, hardware prototyping, system developing)

Developing Interface Device for Supporting Tangible 3D Interaction above Tabletop

Environment,

2014

KAIST RED&B Project

(Role: project manager, hardware prototyping, system developing)

Healthcare Information Design for Supporting Emotional User Experience,

2014

KAIST Research Project

(Role: involved researcher, hardware prototyping, system developing)

Developing Attachable Electric Wheel Module for Normal Wheelchair Users,

2013

KAIST Undergraduate Research Program (URP)

(Role: **project manager**, hardware prototyping)

Government Funded Projects

Handwriting Based Emotional Text Communication System Design, National Research Foundation of Korea (Role: involved researcher, hardware prototyping)	2018
Developing Computerized Design Interface for Interactive Products and Services, National Research Foundation of Korea (Role: involved researcher, hardware prototyping, system developing)	2016
Developing Vehicle Interface for Active Driver Assistance System, National Research Foundation of Korea (Role: involved researcher, hardware prototyping, system developing)	2016
UX-Oriented Mobile Software Platform Development, Korea Planning & Evaluation Institute of Industrial Technology (Role: involved researcher, hardware prototyping, system developing)	2014

Skills and Tools

Hardware Prototyping

Electronics & I/O: Embedded systems, Arduino, MicroPython, Raspberry Pi, ESP based Wi-Fi boards, and experiences with various types of sensor and actuator modules.

Digital Fabrication: 3D-printing, Laser cutting, PCB design (EasyEDA).

Design Tools: Rhinoceros, SolidWorks, Inventor, Fusion 360, SketchUp, Keyshot, AutoCAD, Illustrator, Photoshop, InDesign, Premiere Pro, After Effects, Adobe XD, Figma, ProtoPie

Miscellaneous: Experiences with Metals, Woods, and Plastics with Welding, Milling & Lathe machine, Drill press, Molding, and CNC machines.

Software Programming

Machine Learning and AI: TensorFlow, Keras, Scikit Learn, and experiences with customizing ML algorithms to various contexts.

Large Language Models: Experiences with applying several LLM APIs and speech-to-text and text-to-speech features in various contexts

Application Development: Experiences with Java, Android, HTML/CSS, JavaScript (in a level of prototyping demo-able software prototypes including Node.js driven server-client applications).

Design Research

Research through Design, Co-design Workshop, Participatory Design, Ethnography, Story Boards, Personas, Behavioral Maps, Contextual Inquiry, Focus Group, Usability Testing, Survey Design, Statistical Analysis.

Teaching Experiences

Lecture , Korea University, School of Art & Design IoT Product and Service Prototyping	Fall 2023
Lecture , Seoul Women's University, Industrial Design IoT Product and Service Design	Fall 2023
Mentoring , KAIST, Industrial Design Venture Research Program for Graduate Students	2019
Teaching Assistant , KAIST, Industrial Design Interactive Prototyping	Fall 2018
Teaching Assistant , KAIST, Industrial Design Interactive Prototyping	Fall 2017
Teaching Assistant , KAIST, Industrial Design Interaction Design	Fall 2016
Teaching Assistant , KAIST, Industrial Design Interaction Design	Fall 2015
Teaching Assistant , KAIST, Industrial Design Interaction Design	Fall 2014

Invited Talks

Prototyping for the Future: Design Education in the Era of Advanced Technology , KSDS Fall International Conference, Special Session	Fall 2024
Speculations on the Future Home Interactions , Seoul Women's University, Industrial Design	Fall 2024
Applying ChatGPT in Interactive Art and Design , Korea National University of Arts, School of Visual Art	Spring 2024
Speculating Future through a Technology-Infused Design Approach , Seoul National University of Science and Technology, Industrial Design	Spring 2024