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Summary

I am a postdoctoral researcher at Research Center for Earable-IoT Healthcare Platforms and Services at KAIST. My research interests lie broadly in the areas of mobile-IoT systems, human-centered computing systems, and social computing. In particular, my research has focused on novel interactive and intelligent services for real-life social interactions, and platforms and systems for such services, designing and developing new system abstractions, run-times, and tools. Recently, I have been interested in computational support (1) for enriching everyday face-to-face interaction, (2) for the social use of everyday devices in urban spaces with IoT, and (3) addressing accessibility issues that challenged populations face. In doing so, I compose technologies such as mobile-IoT, sensing, mixed reality, computer vision, and/or AI/ML. I enjoy implementing working systems and applications for real deployment. My research has been published in premier conferences such as MobiSys, UbiComp, CSCW, and has created multiple patents. I worked at LiveLabs, Singapore Management University (SMU) as a research intern in 2017.

Employment

- **Postdoctoral Researcher**, *Research Center for Earable-IoT Healthcare Platforms and Services*, KAIST, Daejeon, Aug. 2023 - present
- **Research Associate**, *School of Information Systems*, Singapore Management University, Singapore, Mar. 2017 - Jan. 2018.

Education

- Aug. 2023** **Ph.D. in Computer Science**, KAIST
Dissertation: “*Socially-aware Control of Everyday Appliances in Urban Spaces*”
Advisor: Prof. Junehwa Song
- Feb. 2016** **M.S. in Computer Science**, KAIST
Thesis: “*Exploring Scalable and Fast Energy Assessment of Mobile Sensing Applications*”
Advisor: Prof. Junehwa Song
- Feb. 2014** **B.S. in Mathematical Science**, KAIST
Double major: **Computer Science**

Publications

Regular Papers - Conferences and Journal Articles (peer-reviewed)

- J.3** “*Understanding Instant Social Control of Shared Devices in Public Spaces: A Field Trial*”
Youngjae Chang, Sookyoung Han, Hyunjong Lee, Seungchul Lee, **Wonjung Kim**, Chloe Ann McCracken, Jinu Choi, Junehwa Song.
Under revision for PACM IMWUT (UbiComp) (Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies)
- J.2** “*CRAYON: Exploration on Community-based Relayed Online Education Approach for Rural Children in South Korean EFL Context*”
Seonghoon Kim, Hyunjong Lee, Seongwoong Kang, Michelle Goh, **Wonjung Kim**, Seungchul Lee, So-Yeon

Ahn, Junehwa Song.

To be published in **ACM CSCW 2024, PACM HCI** (Proceedings of the ACM on Human-Computer Interaction - CSCW)

- C.6** “Efficient task-mapping of parallel applications using a space-filling curve”
Oh-Kyoung Kwon, Ji-hoon Kang, Seungchul Lee, **Wonjung Kim**, Junehwa Song.
PACT 2022 (International Conference on Parallel Architectures and Compilation Techniques), pp. 384-397, Chicago, IL, USA, October 2022.
DOI: <https://doi.org/10.1145/3559009.3569657>
- C.5** “Hivemind: Social Control-and-Use of IoT towards Democratization of Public Spaces”
Wonjung Kim, Seungchul Lee, Youngjae Chang, Taegyeong Lee, Inseok Hwang, Junehwa Song
ACM MobiSys 2021 (ACM International Conference on Mobile Systems, Applications, and Services), pp. 467-482. Jezero Crater, Mars, Solar System, June 2021.
DOI: <https://doi.org/10.1145/3458864.3466626>
2-min video: <https://youtu.be/Mn7THjzBZPU>
- J.1** “Dyadic Mirror: Everyday Second-person Live-view for Empathetic Reflection upon Parent-child Interaction”
Wonjung Kim*, Seungchul Lee*, Seonghoon Kim, Sunghbin Jo, Chungkuk Yoo, Inseok Hwang, Seongwoo Kang, and Junehwa Song (* Co-primary authors).
PACM IMWUT (UbiComp) (Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies), volume 4, issue 3, pp. 86:1-86:29, September 2020.
Presented at **ACM UbiComp 2020** (ACM International Joint Conference on Pervasive and Ubiquitous Computing), Virtual, September 2020.
[Best Presentation Judges Award Nomination]
DOI: <https://doi.org/10.1145/3411815>
Presentation video: <https://youtu.be/IPMCiGnF7WA>
- C.4** “A Comparative Study of Pointing Techniques for Eyewear Using a Simulated Pedestrian Environment”
Quentin Roy, Camellia Zakaria, Simon Tangi Perrault, Mathieu Nancel, **Wonjung Kim**, Archan Misra, Andy Cockburn.
INTERACT 2019 (Proceedings of the 17th IFIP TC 13 International Conference on Human-Computer Interaction), Paphos, Cyprus, September 2–6, 2019, Proceedings, Part III 17 (pp. 625-646)
DOI: https://doi.org/10.1007/978-3-030-29387-1_36
- C.3** “Empath-D: VR-based Empathetic App Design for Accessibility”
Wonjung Kim, Kenny Choo Tsu Wei, Youngki Lee, Archan Misra, Rajesh Krishna Balan.
ACM MobiSys 2018 (ACM International Conference on Mobile Systems, Applications, and Services), pp. 123-135, Munich, Germany, June 2018.
DOI: <https://doi.org/10.1145/3210240.3210331>
Demo video: <https://youtu.be/aJ924Jdlwik>
- C.2** “Zaturi: We Put Together the 25th Hour for You. Create a Book for Your Baby”
Bumsoo Kang, Chulhong Min, **Wonjung Kim**, Inseok Hwang, Chunjong Park, Seungchul Lee, Sung-Ju Lee, Junehwa Song.
ACM CSCW 2017 (ACM conference on Computer-Supported Cooperative Work & Social Computing), pp. 1850-1863, Portland, OR, USA, February 2017.
DOI: <https://doi.org/10.1145/2998181.2998186>
Demo video: <https://youtu.be/9Gf-s9GonYA>
- C.1** “PADA: Power-aware Development Assistant for Mobile Sensing Applications”
Chulhong Min, Seungchul Lee, Changhun Lee, Youngki Lee, Seungwoo Kang, Seungpyo Choi, **Wonjung Kim**, Junehwa Song.
ACM UbiComp 2016 (ACM International Joint Conference on Pervasive and Ubiquitous Computing), pp. 946-957,

Heidelberg, Germany, September 2016.
 DOI: <https://doi.org/10.1145/2971648.2971676>
 Demo video: <https://youtu.be/BsUFLXqca7c>

Workshop papers

- W.1** “*Mom, I see You Angry at Me! Designing a Mobile Service for Parent-child Conflicts by In-situ Emotional Empathy*”
 Chungkuk Yoo, Seungwoo Kang, Inseok Hwang, Chulhong Min, Seonghoon Kim, **Wonjung Kim**, and Junehwa Song
ACM MCSS 2019 (ACM Workshop on Mobile Systems for Computational Social Science), pp. 21-26, Seoul, Korea, June 2019.
 DOI: <https://doi.org/10.1145/3325426.3329947>

Adjunct papers - Demos and Posters

- D.4** “*Demo: Hivemind: IoT-based democratization of shared devices in a public space*”
Wonjung Kim, Seungchul Lee, Youngjae Chang, Taegyeong Lee, Inseok Hwang, Junehwa Song.
ACM MobiHoc 2022 (ACM International Symposium on Theory, Algorithmic Foundations, and Protocol Design for Mobile Networks and Mobile Computing), pp. 289-290, Seoul, Korea, October 2022.
 DOI: <https://doi.org/10.1145/3492866.3561253>
- D.3** “*Demo: Facilitating In-situ Shared Use of IoT Actuators in Public Spaces*”
Wonjung Kim, Seungchul Lee, Youngjae Chang, Taegyeong Lee, Inseok Hwang, Junehwa Song.
ACM MobiSys 2021 (ACM Annual International Conference on Mobile Systems, Applications, and Services), pp. 497-498, Seoul, Korea, June 2021.
 DOI: <https://doi.org/10.1145/3458864.3468444>
- Po.2** “*Poster Abstract: DeepPower: Fast and Scalable Energy Assessment of Mobile Sensing Applications*”
Wonjung Kim, Youngjae Chang, Junehwa Song.
ACM SenSys 2020 (ACM Conference on Embedded Networked Sensor Systems), pp. 673-674, Virtual, November 2020.
 DOI: <https://doi.org/10.1145/3384419.3430463>
- Po.1** “*Computational Support for Facilitating Parental Reflective Functioning in Everyday Parent-child Interaction*”
Wonjung Kim, Seungchul Lee, Seonghoon Kim, Sungbin Jo, Chungkuk Yoo, Inseok Hwang, Seungwoo Kang, and Junehwa Song.
ACM UbiComp 2020 (ACM International Joint Conference on Pervasive and Ubiquitous Computing), pp. 54-58, Virtual, September 2020.
 DOI: <https://doi.org/10.1145/3410530.3414400>
- D.2** “*Demo: Empath-D: VR-based Empathetic App Design for Accessibility*”
Wonjung Kim, Kenny Choo Tsu Wei, Youngki Lee, Archan Misra, Rajesh Krishna Balan.
ACM MobiSys 2018 (ACM Annual International Conference on Mobile Systems, Applications, and Services Companion), p. 534, Munich, Germany, June 2018.
 DOI: <https://doi.org/10.1145/3210240.3211108>
- D.1** “*Demo: Zaturi: Blending Hours Spent at Work and Hours Devoted to Children*”
 Bumsoo Kang, **Wonjung Kim**, Inseok Hwang, Chunjong Park, Seungchul Lee, Chulhong Min, Sung-Ju Lee, Junehwa Song.
ACM CSCW 2017 Companion (ACM Conference on Computer-supported Cooperative Work & Social Computing), pp. 9-12, Portland, OR, USA, February 2017.

Patents

- Pt.10** “Physical impact prediction system and method of operating the same.”
Korea Patent Pending, Application No. 10-2023-0193732, Application Date: Dec. 27, 2023
- Pt.9** “Perspective-adaptive information providing wearable system, perspective-adaptive information providing wearable apparatus and perspective-adaptive information providing method using the same.”
Korea Patent Pending, Application No. 10-2021-0191260, Application Date: Dec. 29, 2021
- Pt.8** “System and method of estimating individual resource use of public device”
Korea Patent Pending, Application No. 10-2021-0190115, Application Date: Dec. 28, 2021
- Pt.7** “System and method of social control-and-use of IoT device, control server supporting social control-and-use of IoT device and mobile device used for social control-and-use of IoT device.”
US Patent Pending, Application No. 17562137, Application Date: Dec. 27, 2021
- Pt.6** “Interaction monitoring system, parenting assistance system using the same and interaction monitoring method using the same.”
US Patent Pending, Application No. 17555457, Application Date: Dec. 19, 2021
- Pt.5** “System and method of social control-and-use of IoT device, control server supporting social control-and-use of IoT device and mobile apparatus used for social control-and-use of IoT device.”
Korea Patent Pending, Application No. 10-2021-0155437, Application Date: Dec. 12, 2021
- Pt.4** “Interaction monitoring system, parenting assistance system using the same and method of interaction monitoring using the same.”
Korea Patent, No. 10-2464423, Issue Date: Nov. 2, 2022 (Application No. 10-2021-0045326, Application Date: Apr. 7, 2021)
- Pt.3** “Interaction monitoring system, parenting assistance system using the same and method of interaction monitoring using the same.”
Korea Patent, No. 10-2124757, Issue Date: Jun. 19, 2020 (Application Date: Dec. 24, 2019, Application No. 10-2019-0174436)
- Pt.2** “A system and apparatus for asynchronous baby care by utilizing micro spare time.”
Korea Patent, No. 10-2061619, Issue Date: Dec. 26, 2019 (Application Date: Feb. 23, 2018, Application No. 10-2018-0021763)
- Pt.1** “Method and system of supporting power-aware mobile application development considering power consumption in real-life situations.”
Korea Patent, No. 10-2045892. Issue Date: Nov. 12, 2019, (Application date: Sep. 12, 2017, Application No.: 10-2017-0116687)

Projects

Research projects

Socially-appropriate Control of Noisemaking Appliance in High-density Urban Living and Working Spaces [Pt.10]

- Living without using everyday appliances such as a vacuum cleaner or a mixer is unthinkable. However, their noise sometimes becomes a serious stressor, interrupting others’ sleep, meeting, etc. Are their users intentionally disturb her neighbors nearby? Perhaps not. We propose SAG, a situation-aware noise discomfort advisor system for a user of a noise-making appliance. It provides the user with an instant and situation-aware forecast of the potential discomforts the appliance will cause. As such, SAG converts an ordinary daily appliance, indifferent to the inconvenience of neighbors, into one that is considerate of neighbors.

- I led this project.

Social Control-and-Use of IoT towards Democratization of Public Spaces [C.5] [J.3][Pt.8] [Pt.5] [Pt.7] [D.3] [D.4]

- Public spaces are equipped with ‘public actuators’, e.g., HVAC, lighting fixtures, or speakers to ensure their visitors’ comfort. However, many public actuators rarely allow the visitors to adjust their operation, limiting their utility and fairness across the visitors. We propose *Hivemind*, an IoT-based socio-physical system that enabled sharing of IoT-enabled actuators in a public space. As such, Hivemind transforms an exclusively-controlled actuator into a *true* public actuator.
- I led this project.

Everyday second-person live-view for empathetic reflection of parent-child interaction [J.1] [W.1] [Po.1] [Pt.4] [Pt.9] [Pt.6]

- Parent-child interaction is a day-to-day continuation of inevitable conflicts and negotiations. *What would happen if parents see their angry face in conflict situations?* We propose *DyadicMirror*, a smart mirror that fosters *in-situ* reflective functioning by enabling the parents to see their own face in the perspective of their children.
- I led this project. I developed a working prototype of *DyadicMirror*. I implemented an Android app and designed a form factor. I conducted a 4-week deployment study with 6 families.

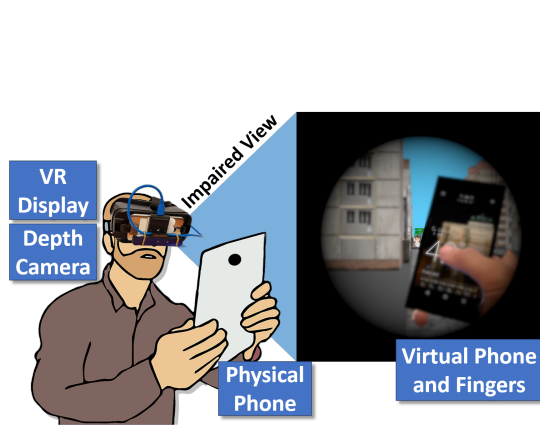


Figure 1: Overview of *Empath-D*

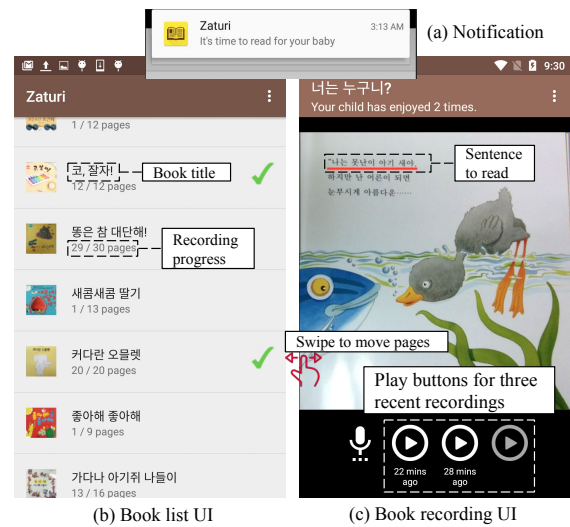


Figure 2: Screenshots of *Zaturi* client

VR-based realistic emulation of app interaction and impairments for empathetic app design [C.3] [D.2]

- It is essential to ensure that application interfaces are usable by users, such as the elderly, with various impairments (e.g., visual, audio and motor). We propose *Empath-D*, a system that facilitates app designers, *in-situ*, to rapidly evaluate the usability of their apps, from the perspective of impaired users in VR.
- I led the project. I developed a working prototype on Samsung Gear VR, Android smartphone and Intel RealSense.
- Demo video: <https://youtu.be/aj924jdlwik>

Enabling working parents to utilize micro spare time for their baby [C.2] [D.1] [Pt.2] [Pt.3]

- We propose *Zaturi*, a mobile service enabling parents to create an audio book, in their own voice, for their babies by utilizing *micro spare time* at work—e.g., waiting for an elevator (Figure 2). It opens up a new way to devote time to children in workplace without compromising the quality and quantity of working hours.
- I designed and developed a working prototype of the *Zaturi* service, running on a smartphone, a tablet, and a server collaboratively (Figure 2). For the implementation of an Android application for a smartphone and a tablet, I designed UIs for book recording and playing. I also implemented several simple context recognition modules to notify users of their micro spare time at work, e.g., walking alone and long use of a smartphone. I also participated in designing and conducting a two-week deployment study with ten families.
- Demo video: <https://youtu.be/9Gf-s9GonYA>

Supporting power-aware development of mobile sensing applications [C.1] [Pt.1]

- Developing mobile sensing applications (MSAs) demands the significant time and effort for repetitive power measurements to deal with various real-world usage scenarios. We propose *PADA*, a developer tool that provides enriched power information under diverse usage scenarios without running apps on real phones in real-life situations.
- I conducted two developer studies; the one for power-aware implementation with 14 developers and the other for power tuning with 5 developers. I also implemented two Android MSAs that were used in the evaluation; *SocioHotspot*, social hotspot detector and *iTrack*, energy-efficient path tracker.
- Demo video: <https://youtu.be/BsUFlXqca7c>
- Web demo: <http://pada-web.github.io>

Service development projects

KAIST BAB

- *KAIST BAB*¹ is a service to help university students choose their meals. The service offers opening hours and menus for university cafeterias and nearby restaurants. It also allows the users to rate the restaurants and share their reviews. It started as a school club project targeting a single university. As of 2017, the service supports around 300 universities and has more than 6,500 daily active users.
- I designed and developed the iOS client.

Programming Skills

- **Programming language:** Python, Kotlin, JavaScript, Java, C#, Swift, Objective-C, C, C++
- **OS/Platform:** Android, Linux (Ubuntu), iOS
- **Web development:** Flask, Django, React
- **Computer vision:** OpenCV, Intel RealSense
- **Machine learning:** LightGBM, XGBoost, CatBoost, Keras, scikit-learn, NumPy, SciPy
- **VR:** Unity, HTC Vive, Samsung Gear VR
- **IoT/Smart home:** OpenHAB, Home Assistant, MQTT

¹'BAB' is a Korean word which means 'meal'.

Honors and Awards

- **SK Telecom CEO's Award**, ICT Challenge 2023, "A mobile-IoT system for group-decision-making among public crowd", hosted by the Ministry of Science and ICT (MSIT) and organized by the IITP (13th place out of 79 teams)
- **Best Presentation Award Nominee**, ACM UbiComp/ISWC '20, "Dyadic Mirror: Everyday Second-person Live-view for Empathetic Reflection upon Parent-child Interaction"
- **Graduate Study Scholarship**, Korea Foundation for Advanced Studies (\$35,000 equiv.), 2018-2020
- **KAIST CS dept.-Kakao Hackathon, 2nd prize**, 2015
- **ESCamp Hackathon, 1st prize**, 2015
- **K-NEST Camp, 1st prize**, 2015

Activities

- | | |
|-------------------|---|
| Nov. 2023 | Invited lecture at Dept. of Convergence Standard Policy, Chung-Ang University :
"Face-to-face Interaction-aware Computing" |
| Nov. 2023 | Invited lecture at Dept. of Convergence Standard Policy, Chung-Ang University :
"Socially-aware Control of Devices for Better Sharing of Urban Spaces" |
| Oct. 2023 | Invited talk at Young Researcher Day, KAIST Urban X Seminar Series :
"Socially-aware Control of Devices in Urban Spaces" |
| Sep. 2022 | Invited talk at EE595 Mobile Computing, Sensing, Learning, and Interactions, KAIST :
"Hivemind: Social Control-and-use of IoT towards Democratization of Public Spaces" |
| Jun. 2018
2017 | Invited talk at Bell Labs, Cambridge : "Empath-D: VR-based Empathetic App Design for Accessibility"
Research Intern at LiveLabs, Singapore Management University (Mar. 2017 - Feb. 2018)
(mentors: Prof. Youngki Lee, Prof. Archan Misra, Prof. Rajesh Krishna Balan) |
| 2012-2015 | Member , Include, Mobile application development club in KAIST |

Academic Services

- | | |
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| Aug. 2023 | External reviewer , ACM Transactions on Internet of Things (<i>TIOT</i>) |
| Jun. 2022 | External reviewer , PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (<i>IMWUT</i>) |
| Feb. 2022 | External reviewer , IEEE Transactions on Mobile Computing (<i>TMC</i>) |
| Jan. 2022 | External reviewer , Late-Breaking Work of ACM Conference on Human Factors in Computing Systems (<i>CHI</i>) |
| Nov. 2021 | External reviewer , PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (<i>IMWUT</i>) |
| Aug. 2021 | External reviewer , PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (<i>IMWUT</i>) |
| Jun. 2021 | External reviewer , PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (<i>IMWUT</i>) |
| Feb. 2021 | Student volunteer , ACM HotMobile, Virtual |
| Jan. 2021 | External reviewer , Late-Breaking Work of ACM Conference on Human Factors in Computing Systems (<i>CHI</i>) |
| May. 2020 | External reviewer , PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (<i>IMWUT</i>) |
| Aug. 2019 | External reviewer , PACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (<i>IMWUT</i>) |
| Jun. 2019 | Student volunteer , ACM MobiSys, Seoul, Korea |
| 2015 | Student volunteer , ACM SenSys, Seoul, Korea |

Teaching Experience

2021	Two-day Android Programming Tutorial, External Lecturer , POSTECH
2020	Operating Systems and Lab (Pintos project), TA, KAIST
2019	Operating Systems and Lab (Pintos project), TA, KAIST
2019	Introduction to Programming, TA, KAIST
2019	Two-day Android Programming Tutorial, External Lecturer , Seoul National University
2018	Operating Systems and Lab (Pintos project), TA, KAIST
2016	Special Topics in Computer Science-<Another Side of Computer Science: Critique and Framing>, TA, KAIST
2015	Operating Systems and Lab (Pintos project), TA, KAIST

References

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