Osman Gul, Ph.D.

Google Scholar
Mobile: +82-10-7658-9082 ▪ Email: osmangul@kaist.ac.kr ▪ osmangul.com ▪ Daejeon, Republic of Korea

EDUCATION

Mar. 2022 ~ Feb. 2026 — **Korea Advanced Institute of Science and Technology (KAIST)** — Daejeon, Republic of Korea
Department of Mechanical Engineering
Thesis: Development of Hybrid Electronics Platforms Using Bioinspired Interfacial Engineering and Liquid Metal-Based Material
Advisor: Prof. Inkyu Park
Ph.D. in Mechanical Engineering
** KAIST fully funded Scholarship*

July 2025 ~ Oct. 2025 — **City University of Hong Kong** — Hong Kong
Department of Biomedical Engineering
Advisor: Prof. Xinge Yu
Visiting Research Assistant

Mar. 2020 ~ Feb. 2022 — **Korea Advanced Institute of Science and Technology (KAIST)** — Daejeon, Republic of Korea
Department of Mechanical Engineering
Thesis: Liquid Metal-Based Soft Multiaxial Force Sensor and Deep Learning-Based Signal Processing for Electronic Skin
Advisor: Prof. Inkyu Park
Master of Science in Mechanical Engineering
** KAIST fully funded Scholarship*

Mar. 2015 ~ Feb. 2019 — **Korea University** — Seoul, Republic of Korea
Department of Mechanical Engineering
Bachelor of Science in Mechanical Engineering
** Korean Government Scholarship (GKS Scholarship)*

PROFESSIONAL EXPERIENCES

Postdoctoral Researcher — March 2026 – Present
PRISM-AI InnoCORE Research Center
Korea Advanced Institute of Science and Technology (KAIST), Daejon, Republic of Korea
- Research on AI-based structural optimization for stretchable and flexible electronics.
- Research on liquid-metal-based conductors for stretchable, flexible, recyclable electronics.

Research Assistant — March 2020 – February 2026
Machine Intelligence and Novel sensor Technology (MINT) Group
Korea Advanced Institute of Science and Technology (KAIST), Daejon, Republic of Korea
- Research on stretchable electronics, focusing on bio-inspired interfacial engineering of stretchable-to-flexible systems and liquid-metal–based conductors for recyclable and versatile systems.
- Designed and engineered root-inspired flexible islands to achieve ultrahigh stretchability (up to 700%) and mechanical durability for hybrid electronics.
- Developed liquid-metal–based soft pressure sensors integrated with machine learning for multidirectional detection and wearable human–machine interfaces.

• Developed liquid metal–based conductors and stretchable interconnects for next-generation soft and wearable electronics.
• Conducted structural/mechanical characterization, electrical testing, Python-based machine learning analysis, and CAD-assisted design.

Visiting Research Assistant July 2025 – October 2025
Lab of Soft Bio-electronics
City University of Hong Kong, Hong Kong
• Research project conducted on liquid-metal–based conductors for recyclable and versatile systems.

Research Assistant May 2022 – May 2025
Intelligent Components and Sensors Research Section
Electronics and Telecommunications Research Institute (ETRI), Daejon, Republic of Korea
• Research on stretchable electronics, focusing on bio-inspired interfacial engineering of stretchable-to-flexible systems and liquid-metal–based conductors for recyclable and versatile systems.
• Conducted structural/mechanical characterization, electrical testing, Python-based machine learning analysis, and CAD-assisted design.
• Contributed to collaborative projects with KAIST on stretchable and flexible electronic platforms.

Undergraduate Researcher October 2016 – June 2017
Smart Multi-Functional Device Lab.
Korea University, Seoul, Republic of Korea
• Developed airship drone systems for repairing high-voltage transmission towers
• Designed and assembled drones using TurboCAD and SolidWorks
• Programmed and controlled robotic arm and Lynxmotion Hunter VTail 400 drone using C#

WORK EXPERIENCES

Overseas Business Manager January 2019 – February 2020
Overseas Business Management Team
Korloy, Seoul, Republic of Korea

Intern July 2018 – August 2018
Global Service Team
KIA Motors, Seoul, Republic of Korea

Brand Studio Staff January 2018 – March 2018
Winter Olympics 2018
Samsung Electronics, Pyeongchang, Republic of Korea

Intern June 2016 – August 2016
Department of International Sales
Hyundai Elevator, Seoul, Republic of Korea
*Outstanding Project Award

RESEARCH HIGHLIGHTS (SCIE)

1. **O. Gul** et al., "Bioinspired Interfacial Engineering for Highly Stretchable Electronics" ***Nature Communications**, 16, 1337, 2025. [Link]* [IF = 15.7, JCR 5.5%] (Media Coverage: YTN, TJB)
2. **O. Gul** et al., "Mechanochemically Activatable Liquid Metal Powders for Sustainable, Reconfigurable, and Versatile Electronics", ***Advanced Functional Materials***, 2025, *e27396* [Link] [IF=19.0, JCR 4.5%]
3. **O. Gul** et al., "Smarter Sensors through Machine Learning: Historical Insights and Emerging Trends across Sensor Technologies", ***Advanced Functional Materials**, 2025, e19859*. [Link] [IF=19.0, JCR 4.5%]
4. **O. Gul** et al., "Bioinspired Omnidirectional Interface Engineered Flexible Island for Highly Stretchable Electronics", ***Small** 2025, 2410247. [Link]* [IF = 15.153, JCR 6.52%]
   **Featured as Front Cover Article*
5. **O. Gul** et al., "Liquid-Metal-Based Soft Pressure Sensor and Multidirectional Detection by Machine Learning" ***Advanced Materials Technologies**, 2024, 9, 2302134. [Link]* [IF = 6.4]
6. **O. Gul** et al., "Sensitivity Controllable Liquid Metal-based Pressure Sensor for Wearable Applications" ***ACS Applied Electronic Materials**, 2021, 3, 9, 4027–4036. [Link]* [IF = 4.4]

AWARDS AND HONORS

2026.02	KAIST Global Leadership Award (Creativity)
2024.10	Best Oral Presentation Award, AMSM2024
2024.06	Best Oral Presentation Award, GCIM2024
2022~2026	KAIST Full Scholarship for Ph.D. Studies
2019~2022	KAIST Full Scholarship for M.Sc. Studies
2019.02	Korea University, Institute for International Education, Mentor Scholarship Award
2018.08	Korea University, Institute for International Education, Mentor Scholarship Award
2018.02	Korea University, Institute for International Education, Mentor Scholarship Award
2017.08	Hyundai Elevator, Outstanding Project Award
2017~2018	Daewoong Foundation International Scholarship Award
2017.12	Korea University, Creative Challenger Program, Best Project Award
2016.08	General Motors USA, PACE Annual Forum, *3rd Place Award*
2015~2016	Korea University Veritas Program Scholarship
2015~2019	Korean Government Scholarship – *Outstanding Student* Award for B.Sc. Studies
2014~2019	Korean Government Scholarship for B.Sc. Studies

INVITED TALKS/LECTURES

1. **Invited Lecture**, "Adapting, Learning, and Growing: Strategies from a Decade in Korea", KAIST 2025 Spring Humanity/Leadership II <Wednesday Leadership Lecture>, 12.03.2025
2. **Invited Seminar**, "Life of International Students", KAIST STP, 25.09.2024

TEACHING EXPERIENCES

Teaching Assistant Spring Semester 2024
Scientific Writing
Korea Advanced Institute of Science and Technology (KAIST), Daejon, Republic of Korea

Instructor Spring Semester 2023
Humanity/Leadership III<Introduction to Sensors and Applications>
Korea Advanced Institute of Science and Technology (KAIST), Daejon, Republic of Korea

Teaching Assistant September 2020 – December 2022
Tutorial and Hands-On Training for CNC Cutting and Lathe Machines
Startup KAIST – Idea Factory
Korea Advanced Institute of Science and Technology (KAIST), Daejon, Republic of Korea

International Student Academic Mentor August 2017 – February 2019
Institute for International Education
Korea University, Seoul, Republic of Korea

Instructor October 2012 – February 2014
English Teacher
Bolu Youth Center, Bolu, Republic of Türkiye

ACADEMIC SERVICE

Reviewer for Journals
- npj Flexible Electronics: 2 time(s) in 2025
- Discover Sensors: 1 time(s) in 2026
- Microchimica Acta : 1 time(s) in 2026
- Discover Applied Sciences: 1 time(s) in 2025
- Progress in Additive Manufacturing:1 time(s) in 2025

PUBLICATIONS (SCIE)

UNDERLINED & BOLD: FIRST AUTHOR / BOLD: CO-AUTHOR
**** MEANS CORRESPONDING AUTHOR, † MEANS CO-FIRST AUTHOR***

2026

1. X. Li, **O. Gul**, L. Wu, M. Amjadi, S. Wu, I. Park, "High Sensitivity and Broad Range Iontronic Pressure Sensor Based on Porous Elastomer Structure", **Advanced Materials Technologies,** Accepted

2025

2. **O. Gul**, J. Ahn, H. J. Kim*, I. Park*, "Mechanochemically Activatable Liquid Metal Powders for Sustainable, Reconfigurable, and Versatile Electronics", **Advanced Functional Material,** 2025, *e27396*
3. K. Lee†, **O. Gul†**, Y. Kwon†, J. Jeong, S. Cho, J. Ahn, J. Yu, C. Kim, D. Lee, H. Han, B. Lee, J. Choi, J.-H. Ha, Y. Jeong, K. Kang, A. Javey, J. Ahn, and I. Park*, "Smarter Sensors through Machine Learning: Historical Insights and Emerging Trends across Sensor Technologies", **Advanced Functional Materials**, *, 2025, e19859.*

4. K. Lee, Y.-M. Jo, M. S. Sohn, M. Jeon, C. Kim, **O. Gul**, S. J. Park, K. B. Kim, K. S. Chang, C. B. Jeong, J. Kim, Y. C. Kang, I. Park, "Photoactivated Conductive MOF Thin Film Arrays on Micro-LEDs for Chemiresistive Gas Sensing", **Nature Communications**, 16, 9612 (2025)
5. J. Ahn, T. Kim, J.-H. Ha, D. Lee, **O. Gul**, S. Cho, H. Kim, M. Kang, J. Choi, J. Ahn, I. Park, "Skin-Conformal Motion Monitoring Film for Deep Learning-Based Immersive Extended Reality", **Advanced Functional Materials,** 2025, 35, 2502568.
   **Featured as Inside Back Cover Article*
6. **O. Gul**, M. Song, C.-Y. Gu, J. Ahn, K. Lee, J. Ahn, H. J. Kim, T.-S. Kim, I. Park, "Bioinspired Interfacial Engineering for Highly Stretchable Electronics" **Nature Communications**, 16, 1337 (2025).
   *Appeared on South Korean broadcasters TJB and YTN channels.
7. **O. Gul**, M. Song, C.-Y. Gu, J. Ahn, K. Lee, T.-S. Kim, J. Ahn, H. J. Kim, I. Park, "Bioinspired Omnidirectional Interface Engineered Flexible Island for Highly Stretchable Electronics" **Small** 2025, *2410247.*
   **Featured as Front Cover Article*

2024

8. **O. Gul**, J. Kim, K. Kim, H. J. Kim, I. Park, "Liquid-Metal-Based Soft Pressure Sensor and Multidirectional Detection by Machine Learning", **Advanced Materials Technologies**, 2024, 9, 2302134.

2023

9. H. Park, K. Kim, S.-J. Kweon, **O. Gul**, J. Choi, Y. S. Oh, I. Park, M. Je, "A Wireless and Wearable Body-Pressure-Monitoring System for the Prevention of Pressure-Induced Skin Injuries**" IEEE Transactions on Biomedical Circuits and Systems**, vol. 17, no. 5, pp. 889-899, Oct. 2023.
10. L. Wu, J. Ahn, J. Choi, J. Gu, X. Li, **O. Gul**, Z.-J. Zhao, L. Qian, B. Yu, I. Park, "Customizable self-powered pressure sensor based on piezo-transmittance of tilted structures" **Nano Energy**, 2023, 109, 108299.
11. S. Cho, Y.S. Oh, H. Han, H. Park, S.-U. Lee, J.-H. Kim, S.W. Jeon, M. Wang, R. Avila, Z. Xie, K. Ko, M. Park, J. Lee, M. Choi, J.-S. Lee, W.G. Min, B.-J. Lee, S. Lee, J. Choi, J. Gu, J. Park, M.S. Kim, J. Ahn, **O. Gul**, C. Han, K. Lee, S. Kim, K. Kim, J. Kim, C.-M. Kang, J. Koo, S.S. Kwak, S. Kim, D.Y. Choi, S. Jeon, H.J. Sung, Y.B. Park, Y.T. Choi, M. Je, I. Park, "Battery-free, Wireless, Multimodal Sensors for Continuous Measurement of Pressure, Temperature, and Hydration of Paraplegic Patients" **npj Flexible Electronics**, volume 7, Article number: 8 (2023).
12. D. D. O. Henriquez, M. Kang, I. Cho, J. Choi, J. Park, **O. Gul**, J. Ahn, D.-S. Lee, I. Park, "Low-Power, Multi-Transduction Nanosensor Array for Accurate Sensing of Flammable and Toxic Gases" **Small Methods**, 2023, 2201352.
    **Featured as Inside Back Cover Article*

2021

13. **O. Gul**†, K. Kim†, J. Gu, J. Choi, D. D. O. Henriquez, J. Ahn, I. Park, "Sensitivity Controllable Liquid Metal-based Pressure Sensor for Wearable Applications" **ACS Applied Electronic Materials**, 2021, 3, 9, 4027–4036.
14. K. Kim, J. Ahn, Y. Jeong, J. Choi, **O. Gul**, I. Park, "All-soft multiaxial force sensor based on liquid metal for electronic skin" **Micro and Nano Syst Letter**, 2 (2021).

PUBLICATIONS (UNDER REVISION/REVIEW)

1.

PATENTS

1. Hybrid stretchable electronic device including a flexible island substrate having a bioinspired interface structure and method for manufacturing the same

O. Gul, I. Park, H.J. Kim
Korea, Patent Application, 10-2026-0005134, 2026 (registration in progress)

INTERNATIONAL CONFERENCES

1. **O. Gul**, I. Park, "Liquid Metal Powders for Next-Generation Sustainable Wearable and Flexible Electronics" 2026 MRS Spring, Honolulu, Hawaii, USA (April 2026) – Oral Presentation. (Scheduled)
2. **O. Gul**, H. J. Kim, I. Park, "Bioinspired Interfacially Engineered Flexible Island for Highly Stretchable Electronics" 2025 MRS Spring, Seattle, Washington, USA (April 2025) – Oral Presentation.
3. **O. Gul**, H. J. Kim, I. Park, "Dome-Shaped Soft Multidirectional Pressure Sensor and Machine Learning Application" International Conference on Active Materials and Soft Mechatronics 2024, Incheon, South Korea (October 2024) – Oral Presentation (**Best Oral Presentation Award**).
4. **O. Gul**, H. J. Kim, I. Park, "Liquid-Metal-Based Soft Multidirectional Pressure Sensor with Machine Learning Application for Direction and Magnitude Discrimination," Global Conference on Innovation Materials, Jeju, South Korea (June 2024) – Oral Presentation (**Best Oral Presentation Award**).
5. **O. Gul**, J. Kim, Y.-L. Min, H. J. Kim, I. Park, "Liquid-Metal-Based All-Soft Pressure Sensor and Machine Learning Application for Multidirectional Detection," 2024 MRS Spring, Seattle, Washington, USA (April 2024) – Oral Presentation.
6. **O. Gul**, J. Kim, Y.-L. Min, H. J. Kim, I. Park, "Liquid-Metal-Based All-Soft Multidirectional Force Sensor and Machine Learning Application for Direction and Force Prediction," ICAE 2023, Jeju, South Korea (October 2023) – Poster Presentation.
7. J. Kim, Y.-L. Min, **O. Gul**, H. J. Kim, "Highly Accurate Noise Robust Texture Recognition Based-on Multi-Level Feature Fusion with a Multimodal Tactile Sensing Module," ICAE 2023, Jeju, South Korea (October 2023) – Poster Presentation.
8. Y.-L. Min, Y. Kim, H. Jin, J. Kim, **O. Gul**, H. J. Kim, "Realistic Haptic Rendering based on Piezoelectric Multimorph Actuators for Human-Interactive Tactile Communication System," 2023 MRS Spring, San Francisco, USA (April 2023) – Poster Presentation.
9. **O. Gul**, K. Kim, I. Cho, M. Kang, I. Park, "Application of Machine Learning to Dome-Shaped Liquid-Metal Based Soft Multiaxial Force Sensor for Electronic Skin," ICAE 2021, Jeju, South Korea (November 2021) – Poster Presentation.

LANGUAGES

- Turkish: First language
- English: Fluent
- Korean: Fluent (TOPIK Level 6, Reading: 100/100, Listening: 96/100)