Jihun Lee, Ph. D.

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Academic Employment

02/ 2025 –	**Assistant Professor,** Department of Brain and Cognitive Science, Korea Advanced Institute of Science and Technology (KAIST), Korea
07/ 2024 – 01/ 2025	**Assistant Professor (research)**, School of Engineering, Brown University, USA
05/ 2022 – 06/ 2024	**Hope Street Postdoctoral Fellow**, School of Engineering, Brown University, USA, advised by Prof. Arto V. Nurmikko
05/ 2021 – 04/ 2022	**Postdoctoral Researcher**, School of Engineering, Brown University, USA, advised by Prof. Arto V. Nurmikko

Education

09/ 2016 – 04/ 2021	**Brown University, School of Engineering**, Providence, USA, Ph.D. in Biomedical Engineering
03/ 2014 – 08/ 2016	**Seoul National University, Graduate School of Convergence Science and Technology**, Suwon, Korea, M.S. in Engineering (advised by Prof. Yoon-kyu Song)
03/ 2008 – 02/ 2012	**Seoul National University, College of Agriculture and Life Sciences**, Seoul, Korea, B.S. in Applied Biology, (Military, 05/ 2012- 02/ 2014)

Publications

Selected academic journals

(* indicates equal contributors, underline indicates corresponding authors)

2024

1. A. H. Lee*, **J. Lee***, V. Leung, L. Larson, and A. Nurmikko, “Patterned Electrical Brain Stimulation by a Wireless Network of Implantable Microstimulators”, ***Nature Communications***, 2024. (Co-first author, IF: 14.7)
2. **J. Lee*,** A. H. Lee*, V. Leung, F. Laiwalla, M. Lopez-Gordo, L. Larson, and A. Nurmikko, "An asynchronous wireless network for capturing event-driven data from large populations of autonomous sensors", ***Nature Electronics***, 2024. (Co-first author, IF: 38.6)

   Highlights:

   - Highlighted in News from Brown: “Brown researchers develop brain-inspired wireless system to gather data from salt-sized sensors”
   - Highlighted in IEEE Spectrum: “Salt-Sized Sensors Mimic the Brain- An array of tiny wireless nodes could someday find their way into brain-machine interfaces”
   - Highlighted in Nature Research Briefing: “Asynchronous RF network for sparse data: scalable, a distributed microsensor solution”

2023

3. A.H. Lee*, **J. Lee***, V. Leung, A. Nurmikko, “Versatile on-chip programming of circuit hardware for wearable and implantable biomedical microdevices”, ***Advanced Science***, 2306111, 2023. (Co-first author, IF: 15.1)

2021

4. **J. Lee**, V. Leung, A. H. Lee, J. Huang, P. Asbeck, P. P. Mercier, S. Shellhammer, L. Larson, F. Laiwalla, and A. Nurmikko, “Neural recording and stimulation using wireless networks of microimplants”, ***Nature Electronics***, 4, pp. 604–614, 2021. (First author, IF: 38.6, Number of citations: 118, including bioRxiv preprint)

   Highlights:

   - Altmetric score: 409, 10th highest score of any paper published in Nature Electronics (#10 of 934, 03/ 2024)
   - Highlighted in News from Brown: “Researchers take step toward next-generation brain-computer interface system”
   - Highlighted in WIRED: “Implantable “neurograins” may be the key to mind-controlled tech”
   - Highlighted in Freethink: “Neurograins’ Could be the Next Brain-Computer Interfaces”

5. A. H. Lee*, **J. Lee***, J. Jang, A. Nurmikko, and Y. K. Song, “Wireless addressable cortical microstimulators powered by near-infrared harvesting”, ***ACS Sensors***, 6(7), pp. 2728-2737, 2021. (Co-first author, IF: 8.9, Number of citations: 8)

2019

6. C. Heelan*, **J. Lee***, R. O’Shea, L. Lynch, D. M. Brandman, W. Truccolo, and A. Nurmikko, “Decoding speech from spike-based neural population recordings in secondary auditory cortex of non-human primates”, ***Communications Biology***, 2(1), pp. 1-12, 2019. (Co-first author, IF: 6.3, Number of citations: 37)

2016

7. **J. Lee**, J. Jang, and Y. K. Song, "A review on wireless powering schemes for implantable microsystems in neural engineering applications", ***Biomedical Engineering Letters***, 6(4), pp. 205-215, 2016. (First author, IF: 4.6 Number of citations: 24)

Other academic journals

1. A. H. Lee, **J. Lee**, F. Laiwalla, V. Leung, J. Huang, A. Nurmikko, and Y. K. Song, “A scalable and low stress post-CMOS processing technique for implantable microsensors”, ***Micromachines***, 11(10), pp. 925, 2020. (Coauthor, IF: 3.4, Number of citations: 22)
2. J. Huang, F. Laiwalla, **J. Lee**, L. Cui, V. Leung, A. Nurmikko, and P. P. Mercier, “A 0.01-mm^2 mostly digital capacitor-less AFE for distributed autonomous neural sensor nodes”, ***IEEE Solid-State Circuits Letters***, 1(7), pp. 162-165, 2019. (Coauthor, Number of citations: 42)
3. J. Jeong, F. Laiwalla, **J. Lee**, R. Ritasalo, M. Pudas, L. Larson, V. Leung, and A. Nurmikko, “Conformal hermetic sealing of wireless microelectronic implantable chiplets by multilayered atomic layer deposition (ALD)”, ***Advanced Functional Materials***, 29(5), 1806440, 2018. (Coauthor, IF: 27.9, Number of citations: 80)

Peer-reviewed conference papers

1. A.-H. Lee*, **J. Lee***, V. Leung, S. Cash, and A. Nurmikko, “Minimally invasive subdermal wireless EEG sensor arrays for home monitoring of epilepsy”, *IEEE Biomedical Circuits and Systems Conference* pp. 1-5, IEEE, 2023. (Co-first author)
2. **J. Lee***, A.-H. Lee**, V. Leung, … and A. Nurmikko, “Asynchronous wireless network for transmission of neural data from thousands of autonomous microimplants”, *IEEE Biomedical Circuits and Systems Conference,* pp. 1-5, IEEE, 2023. (Co-first author)
3. V. Leung, A.-H. Lee, **J. Lee**, S. Alluri, … and A. Nurmikko, “Improving wireless power transfer efficiency for distributed brain implants using auto-tune OVP”, *IEEE Biomedical Circuits and Systems Conference*, pp. 1-5, IEEE, 2023. (Coauthor)
4. A. H. Lee*, **J. Lee***, K. Choquette, Y. K. Song, and A. Nurmikko, “A distributed ensemble of wireless intracortical microdevices for charge-balanced photovoltaic current stimulation”, *In The 10th International IEEE EMBS Conference on Neural Engineering (NER)*, pp. 613-616, IEEE, 2021. (Co-first author, Number of citations: 3)
5. F. Laiwalla*, **J. Lee***, A. H. Lee, E. Mok, V. Leung, S. Shellhammer, ... and A. Nurmikko, “A distributed wireless network of implantable sub-mm cortical microstimulators for brain-computer interfaces”, *In 2019 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, pp. 6876-6879,

IEEE, 2019. (Co-first author, Number of citations: 28)

6. **J. Lee**, E. Mok, J. Huang, L. Cui, A. H. Lee, V. Leung, P. Mercier, S. Shellhammer, L. Larson, P. Asbeck, R. Rao, Y. K. Song, A. Nurmikko, and F. Laiwalla, “An implantable wireless network of distributed microscale sensors for neural applications”, *In The 9th International IEEE EMBS Conference on Neural Engineering (NER)*, pp. 871-874, IEEE, 2019. (First author, Number of citations: 54)
7. V. W. Leung, L. Cui, S. Alluri, **J. Lee**, J. Huang, E. Mok, ... and F. Laiwalla, “Distributed microscale brain implants with wireless power transfer and Mbps bi-directional networked communications”, *In 2019 IEEE Custom Integrated Circuits Conference (CICC)*, pp. 1-4, IEEE, 2019. (Coauthor, Number of citations: 21)
8. H. Cai, M. Lokhandwala, J. Zhu, C. Kilfoyle, **J. Lee**, L. Larson, ... and V. W. Leung, “A software-defined radio for wireless brain implants network”, *In Proceedings of the 24th Annual International Conference on Mobile Computing and Networking*, pp. 852-854, 2018. (Coauthor, Number of citations: 5)
9. **J. Lee**, and A. V. Nurmikko, “Multi-coil high efficiency wireless charger system for hermetically sealed biomedical implants”, *In 2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, pp. 1-4, IEEE, 2018. (First author, Number of citations: 1)
10. **J. Lee**, F. Laiwalla, J. Jeong, C. Kilfoyle, L. Larson, V. W. Leung, and A. Nurmikko, “Wireless power and data link for ensembles of sub-mm scale implantable sensors near 1GHz”, *In 2018 IEEE Biomedical Circuits and Systems Conference (BioCAS)*, pp. 1-4, IEEE, 2018. (First author, Number of citations: 36)
11. V. W. Leung, **J. Lee**, S. Li, S. Yu, C. Kilfovle, L. Larson, A. Nurmikko and F. Laiwalla, “A CMOS distributed sensor system for high-density wireless neural implants for brain-machine interfaces”, *In ESSCIRC 2018-IEEE 44th European Solid-State Circuits Conference (ESSCIRC)*, pp. 230-233, IEEE, 2018. (Coauthor, Number of citations: 47)
12. Y. K. Song, **J. Lee**, J. Jang, C. E. Lee, and A. H. Lee, “A neural recording microimplants with wireless data and energy transfer link”, *In 2018 6th International Conference on Brain-Computer Interface (BCI)*, pp. 1-5, IEEE, 2018. (Coauthor, Number of citations: 1)

Authored books

1. F. Laiwalla, V. W. Leung, **J. Lee**, P. Mercier, P. Asbeck, R. Rao, ... and A. Nurmikko, “Next generation microscale wireless implant system for high-density, multi-areal, closed-loop brain computer interfaces”, *Brain-Computer Interface Research: A State-of-the-Art Summary*, 9, pp. 39-49, 2021.
2. J. Jang, **J. Lee**, M. Kang, and Y. K. Song, “Implantable neural sensors for brain machine interface”, S*mart Sensors for Health and Environment Monitoring*, pp. 51-73, Springer, 2015.

Honors and Awards

- **Hope street postdoctoral research associate fellowship** by Brown University School of Engineering, 2022.
- **Award for outstanding Doctoral thesis** by Brown University School of Engineering, 2021.
- **Travel awards** for workshop on neurophysiology for neural and biomedical engineering (Zermatt, Switzerland) from Brown Institute for Brain Science, 2017.
- **Award for the best research poster** in neuroengineering during Brown University Biomedical Engineering annual retreat, 2017.
- **Award for excellent Master’s thesis** by Seoul National University Graduate School of Convergence Science and Technology, 2016.
- **Overseas study travel grant**, BrainKorea21, 2015.
- **Merit-based eminence scholarship** by Seoul National University, 2010.

Patent

- Subcutaneous multichannel wireless electroencephalography system for chronic home, A. Nurmikko, **J. Lee**, A. H. Lee, S. Cash, 2023, USA, pending (Selected as a Top 6 Finalists at Brown Technology Innovations, 2023).
- Large-scale wireless biosensor networks for biomedical diagnostics, A. Nurmikko, **J. Lee**, A. H. Lee, F. Laiwalla, 2022, USA, pending.
- High density neural implants for brain-machine interfaces, P. Asbeck, F. Laiwalla, V. Leung, **J. Lee**, L. Larson, P. Mercier, A. Nurmikko, R. Rao, 2021, USA, pending.
- Implantable wireless network of distributed microscale sensors, A. Nurmikko, F. Laiwalla, **J. Lee**, V. Leung, P. Mercier, L. Larson, P. Asbeck, 2020, USA, pending.
- Animal behavior control apparatus, Y.J. Shin, Y.K. Song, **J. Lee**, S.H. Moon, J.W. Jang, N.R. Choi, K.M. Seo, J.M. Seo, M.H. Won, 2018, Korea, 1018640170000.

Teaching Experience

03/ 2024	**Invited lecturer** (ENGN 1620 Analysis and Design of Electronic Circuits), Brown University, USA
02/ 2024	**Invited lecturer** (ENGN 1220 Neuroengineering), Brown University, USA
06/ 2019	**Teaching assistant** (Summer school program for cardiac devices), Brown University, USA

Service Activities

Journal review

1. Nature Electronics (2023)
2. Nature Biomedical Engineering (2023)

Presentation

Talk

- Ulsan National Institute of Science & Technology, virtual, 2022 (Invited Talk).
- Society for Neuroscience Annual Meeting, Chicago, USA, 2021 (Mini-symposium).
- International Biomedical Engineering Conference, Gwangju, Korea, 2014 (Invited Talk).

Poster

- IEEE Biomedical Circuits and Systems Conference 2023, Toronto, Canada, 2023.
- IEEE Biomedical Circuits and Systems Conference 2023, Toronto, Canada, 2023.
- Harvard University Center for Nanoscale Systems, Boston, USA, 2022.
- IEEE Brain Workshop on Advanced Neurotechnologies, virtual, 2020.
- Society for Neuroscience Annual Meeting, Chicago, USA, 2019.
- Society for Neuroscience Annual Meeting, Chicago, USA, 2019.
- 9th International IEEE EMBS Conference on Neural Engineering, San Francisco, USA, 2019.
- IEEE Biomedical Circuits and Systems Conference, Cleveland, USA, 2018.
- IEEE Biomedical Circuits and Systems Conference, Cleveland, USA, 2018.
- Workshop on Neurophysiology for Neural and Biomedical Engineering, Zermatt, Switzerland, 2017.