

Jan Kubanek

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Positions

University of Utah
Assistant Professor in Biomedical Engineering 2018

Stanford University School of Medicine
Postdoctoral research in Neuromodulation

Washington University School of Medicine
Ph.D. in Neuroscience 2013

Active Research Support

- **NSF Disability and Rehabilitation Engineering**
\$512,275, PI, 2023-2026
- **NIH R01, BRAIN Initiative**
\$1,428,121, PI, 2022-2025
- **NIH R01, National Institute of Neurological Disorders and Stroke**
\$2,944,696, Co-I, 2021-2026
- **NIH R01, National Institute of Neurological Disorders and Stroke**
\$3,631,498, Co-I, 2023-2027

Completed Research Support

- **Focused Ultrasound Foundation**
\$100,000, PI, 2021-2023
- **PIVOT Ascender Grant**
\$77,136, PI, 2022-2023
- **College of Engineering Seed Grant**
\$38,000, PI, 2022-2023
- **NIH R00, National Institute of Neurological Disorders and Stroke**
\$744,090, PI, 2019-2022
- **Ben B. and Iris M. Margolis Foundation**
\$70,000, PI, 2020

- **NIH K99/R00, National Institute of Neurological Disorders and Stroke**
Role: PI
2017-2022

Patents and Applications

- **Pending Patent Application No. 63/296,252** *Systems and Methods for Modulation of Deep Brain Circuits.*
- **Pending Patent Application No. 63/283,110** *Targeted Noninvasive Drug Delivery and Multimodal Imaging Agents.*
- **Provisional Patent Application No. 63/432,344** *Multi-Frequency-Based Sharpening of Focal Volume.*

Ongoing clinical trials

- **NCT05674903, PI** *Deep Brain Therapy With Low-intensity Ultrasound for Generalized Chronic Pain.*
- **NCT05674903, PI** *Deep Brain Therapy With Low-intensity Ultrasound for PTSD.*
- **NCT06135051, PI** *Deep Brain Therapy With Low-intensity Ultrasound for Alzheimer's disease.*
- **NCT05301036, Co-PI** *Personalized Ultrasonic Brain Stimulation for Depression.*

Open-source Hardware and Software

- **Remus: System for Remote Deep Brain Interventions**
www.onetarget.us/tools
- **NeuralAct: A tool to visualize cortical activity on a three-dimensional model of brain surface**
www.onetarget.us/software

Honors

- NSF Innovation Corps Program. Role: PI. 2022.
- Nomination for the Moore Inventor Fellowship. Role: PI. 2021.
- Best Teacher in Biomedical Engineering (College of Engineering Dean's Office). Fall 2020, University of Utah.
- NIH R00 Award. 2019-2022.
- Nomination for the Moore Inventor Fellowship. Role: PI. 2019.
- NIH K99 Award. 2016-2018.
- Stanford University School of Medicine Dean's Postdoctoral Fellowship. 2015-2016.
- Granted U.S. permanent residency as a scientist with exceptional ability. 2015.
- McDonnell Center for Systems Neuroscience Pilot Grant. 2013-2014.

- Merlie Fellowship for advanced training in neuroscience. Washington University. 2010.
- Ambassadorial Scholar of the Czech Republic in the United States. Rotary Foundation. 2007–2008.
- Dean’s Award. Czech Technical University in Prague. 2007.
- Hlávka Scholarship (academic results). Josef & Marie Hlávka Foundation, Prague. 2005 and 2006.

Media Coverage

- **Ultrasonic neurostimulation article communicated by 25 media outlets**
scienceadvances.altmetric.com/details/82416884/news
- **Society for Neuroscience Press Conference ultrasonic neurostimulation talk communicated by Scientific American**
scientificamerican.com/article/ultrasound-could-offer-noninvasive-treatment-for-parkinson-s-and-depression

Published Peer-reviewed Articles (i-10-index: 21; h-index: 17)

31. Riis T., Moretti P., Losser A., Kassavetis P., **Kubanek J.** Noninvasive modulation of essential tremor with focused ultrasonic waves. *Journal of Neural Engineering* (Accepted).
30. Riis T., Feldman D., Mickey B., **Kubanek J.** Controlled noninvasive modulation of deep brain regions in humans. *Nature Communications Engineering* doi: 10.1038/s44172-023-00146-4 (2024).
29. Riis T., Feldman D., Vonesh L., Brown J., Solzbacher D., **Kubanek J.**, Mickey B. Durable effects of deep brain ultrasonic neuromodulation on major depression: a case report. *Journal of Medical Case Reports* doi:10.1186/s13256-023-04194-4 (2023).
28. Riis T., Feldman D., Losser A., Mickey B., **Kubanek J.** Device for multifocal delivery of ultrasound into deep brain regions in humans. *IEEE Transactions on Biomedical Engineering* doi: 10.1109/TBME.2023.3313987 (2023).
27. **Kubanek J.**, Wilson, M., Rabbitt, R.A., Armstrong, C.J., Farley, A., Ullah, A., Shcheglovitov, O. Stem cell-derived brain organoids for controlled studies of transcranial neuro-modulation. *Heliyon* (2023).
26. Webb, T.D., Cheenyil R., Wilson, M.G., **Kubanek J.** Remote targeted electrical stimulation. *Journal of Neural Engineering* (2023).
25. Webb, T.D., Wilson, M.G., Odéen, H., **Kubanek J.** Sustained modulation of primate deep brain circuits with focused ultrasonic waves. *Brain Stimulation* 16(3) (2023).
24. Webb, T.D., Wilson, M.G., Odéen, H., **Kubanek J.** Remus: System for Remote Deep Brain Interventions. *iScience* 25(11) (2022).
23. Riis T., Webb T., **Kubanek J.** Multifrequency-based sharpening of focal volume. *Scientific Reports*. 12(22049) (2022).

22. Mohammadjavadi, M., Ash, R.T., Gaur, P., **KubaneK J.**, Saens, Y., Glover, G.H., Popelka, G.R., Norcia, A.M. and Pauly, K.B., 2021. Transcranial Focused Ultrasound Neuromodulation of the Thalamic Visual Pathway in a Large Animal Model. *Scientific Reports*. 12(19588) (2022).
21. Wang Y., Bell L., Yang G., Chiola S., Armstrong C., Russell C., Wu Y., Spampanato J., Chang A., Harmin D., Besusso D., Cui J., Tarboton P., Cattaneo E., Greenberg, M.E., **KubaneK J.**, Shcheglovitov, A. Single neural rosette-derived organoids model human cortico-striatal development and reveal early cellular and functional deficits induced by SHANK3 deficiency. *Nature Communications* (2022).
20. Riis T., Webb T., **KubaneK J.** Acoustic properties across the human skull. *Ultrasonics*. 119 (2022).
19. Riis T., **KubaneK J.** Effective Ultrasonic Stimulation in Human Peripheral Nervous System. *IEEE Transactions on Biomedical Engineering*. 3085170, (2021).
18. **KubaneK J.**, Brown J., Ye P., Butts Pauly K., Moore T., Newsome W. Remote, brain-region-specific control of choice behavior in primates. *Science Advances*. 6(21), eaaz4193 (2020).
17. Gaur P., Casey K., **KubaneK J.**, Li N., Mohammadjavadi M., Saenz Y., Glover G.H., Bouley D.M., and Butts-Pauly K. Histologic safety of transcranial focused ultrasound neuromodulation and magnetic resonance acoustic radiation force imaging in rhesus macaques and sheep. *Brain Stimulation*. 13(3), 804-814 (2020).
16. **KubaneK J.**, Shukla P., Das A., Baccus S., Goodman M. Ultrasound elicits behavioral responses through mechanical effects on neurons and ion channels in a simple nervous system. *The Journal of Neuroscience*, 1458-17 (2018).
15. **KubaneK J.** Neuromodulation with transcranial focused ultrasound. *Neurosurgical Focus* 44 (2018).
14. **KubaneK J.** Optimal decision-making and matching are tied through diminishing returns. *PNAS*, doi:10.1073/pnas.1703440114 (2017).
13. **KubaneK J.**, Shi J., Marsh J., Chen D., Deng C., Cui J. Ultrasound modulates ion channel currents. *Scientific Reports* 6 (2016).
12. **KubaneK J.**, Li J., Snyder L.H. Motor role of parietal cortex in a monkey model of hemispatial neglect. *PNAS*. 112, E2067-72 (2015).
11. **KubaneK J.**, Snyder L.H. Reward-based Decision Signals in Parietal Cortex Are Partially Embodied. *The Journal of Neuroscience*, 35(12):4869–81 (2015).
10. **KubaneK J.**, Snyder L.H. Reward size governs repeat-switch decisions and strongly modulates the activity of neurons in parietal cortex. *Cerebral Cortex* (2015).
9. **KubaneK J.**, Schalk G. NeuralAct: A tool to visualize electrocorticographic (ECoG) activity on a three-dimensional model of the cortex. *Neuroinformatics*, 13, 167-74 (2015).
8. **KubaneK J.**, Snyder L.H, Abrams R.A. Rewards and punishments act as distinct factors in guiding behavior. *Cognition*, 139, 154–167 (2015).
7. **KubaneK J.**, Snyder L.H. Matching Behavior as a Tradeoff Between Reward Maximization and Demands on Neural Computation. *F1000Research* (2015).
6. **KubaneK J.**, Hill J., Snyder L.H, Schalk G. Cortical alpha activity reflects the degree of confidence in committing to an action. *Frontiers in Neuroscience* 9, 243 (2015).

5. **Kubaneck J.**, Snyder L.H., Brunton B.W., Brody C., Schalk G. A low frequency oscillatory neural signal in humans encodes a developing decision variable. *NeuroImage*, 83, 795-808 (2013).
4. **Kubaneck J.**, Wang C., Snyder L.H. Neuronal responses to target onset in oculomotor and somatomotor parietal circuits differ markedly in a choice task. *Journal of Neurophysiology* 110.10, 2247-2256 (2013).
3. **Kubaneck J.**, Brunner P., Gunduz A., Poeppel D., Schalk G. The Tracking of Speech Envelope in the Human Cortex. *PLOS ONE* 8, no. 1 (2013).
2. **Kubaneck J.**, Miller K.J., Ojemann J.G., Wolpaw J.R., Schalk G. Decoding flexion of individual fingers using electrocorticographic signals in humans. *Journal of Neural Engineering*, vol. 6 pp. 66001 (2009).
1. Schalk G., **Kubaneck J.**, Miller K.J., Anderson N., Leuthardt E.C., Ojemann J.G., Limbrick D., Moran D., Gerhardt L.A., Wolpaw J.R. Decoding Two-Dimensional Movement Trajectories Using Electrocorticographic Signals in Humans. *Journal of Neural Engineering*, 4, 264-275 (2007).

Academic service

- NIH Study Section ZNS1 SRB-M, BRAIN Initiative: Biology and Biophysics of Neural Stimulation and Recording Technologies
- DoD Study Section SCIRP RR-2: Spinal Cord Injury Research Program (2022)
- Ad-hoc reviewer, Focused Ultrasound Foundation
- Ad-hoc reviewer for many journals (1-2 reviews per month)
- University of Utah Scholarship Committee
- University of Utah Qualifying Exam Committee
- University of Utah Faculty Recruitment Committee
- University of Utah College of Engineering Seed Grant Committee

Selected Invited Talks

Neurology Grand Rounds. Noninvasive Deep Brain Stimulation. *University of Utah, October 18, 2023.*

Ultrasonics 2023. Focused ultrasound for noninvasive treatments of brain disorders. *Lisbon, June 16-19, 2023.*

Washington University Neurosurgery Grand Rounds. Noninvasive Deep Brain Neuromodulation. *May 24, 2023, Saint Louis, MO.*

Society for Neuroscience Annual Meeting; presenter, talk #2. Effective ultrasonic stimulation in humans. *Nov 12-16, 2022, San Diego, CA.*

Society for Neuroscience Annual Meeting; presenter, talk #1. Modulation of neural activity with ultrasonic waves. *Nov 12-16, 2022, San Diego, CA.*

International Neuromodulation Society World Congress; presenter, talk #2. Approaches for noninvasive targeted modulation of neural activity. *May 21-26, 2022, Barcelona, Spain.*

International Neuromodulation Society World Congress; presenter, talk #1. Non-invasive targeted neuromodulation. *May 21-26, 2022, Barcelona, Spain.*

Osher Lecture. Targeted neuromodulation for personalized treatments of brain disorders. *February 3, 2022, Salt Lake City, UT.*

North American Neuromodulation Society; session chair and presenter. Ultrasonic neuromodulation: State of the art. *January 20, 2022, Orlando, FL.*

Baylor College of Medicine. Effective multifocal neuromodulation. *July 22, 2021, online.*

Brainbox Initiative. Noninvasive deep brain neuromodulation with ultrasound. *Sep 24, 2020, online.*

North American Neuromodulation Society. Noninvasive targeted neuromodulation. *Las Vegas, NV, Jan 25, 2020.*

Annual Symposium of the International Society for Therapeutic Ultrasound, Keynote Speaker. Ultrasound for neural interventions. *Barcelona, Spain, June 14, 2019.*

Neurology Grand Rounds. Focused Ultrasound for Targeted Noninvasive Treatments of Brain Disorders. *University of Utah, March 6, 2019.*

3rd International Brain Stimulation Conference. Remote, brain-region specific control of choice behavior with ultrasonic waves. *Vancouver, Canada, February 27, 2019.*

Neurosurgery Grand Rounds. Focused Ultrasound for Targeted Noninvasive Therapies. *University of Utah, January 23, 2019.*

Society for Neuroscience Press Conference. Transcranial ultrasound impacts primate choice behavior. *Washington, DC, November 14, 2017.*

- [scientificamerican.com/article/ultrasound-could-offer-noninvasive-treatment-for-parkinsons-and-depression](https://www.scientificamerican.com/article/ultrasound-could-offer-noninvasive-treatment-for-parkinsons-and-depression)

Teaching and Mentoring

University of Utah

Lecturer in BME 4101 - Biosystems

Sep 2021–Nov 2021; Sep 2022–Nov 2022

Analysis

In this course, I co-taught students how to analyze and design systems for various biomedical applications. My part of the course received an average 5.51/6.00 evaluation and 5.32/6.00 for the instructor, of 37 student opinions.

University of Utah

Lecturer in BME 6470 - Neural

Spring 2021–Ongoing

Engineering Research Group

In this seminar, I help neural engineering students to crystalize their PhD projects, and schedule external speakers on topics related to neural engineering.

University of Utah

Lecturer in BME 5480 - Diagnostic

Aug 2019–Dec 2019, Aug 2020–Dec 2020

and Therapeutic Ultrasound

In this course, I taught students the principles behind and the applications of current diagnostic and therapeutic uses of ultrasound. In 2020, the course received an average 5.79/6.00 evaluation and 5.89/6.00 for the instructor, of 19 student opinions.

University of Utah

Mentor

Oct 2018–present

I am currently advising 1 postdoc, 3 PhD students, and 4 undergraduate students.

Languages

- Human: English (fluent), German (fluent), Spanish (fluent), French (intermediate), Czech (native)
- Machine: Matlab, C/C++, Java, L^AT_EX