Justin C. Tanner
9609 Drayton Hall Lane
Germantown, TN 38139
Justin.tanner@stjude.org
+1 (360) 607 – 7544
www.justinctanner.com

POSITIONS HELD

- *Post Doctoral Research Fellow*, St. Jude Children's Research Hospital, September 2022 – Present
- *Courtesy Affiliate*, Adjunct Faculty, Arizona State University, July 2022 – Present
- Research Assistant Professor, Arizona State University, January 2020 – June 2022
- Post Doctoral Scholar, Arizona State University, August 2017 – January 2020

EDUCATION

- Ph.D., Biomedical Engineering
  - Arizona State University, August 2017
  - Dissertation: *Gamma Band Oscillation Response to Somatosensory Feedback Stimulation Schemes Constructed on Basis of Biphasic Neural Touch Representation*
  - Advisor: Stephen Helms Tillery Ph.D.
- M.S., Biomedical Engineering
  - Arizona State University, December 2015
- B.S., Bioengineering; B.S., Neuroscience
  - Washington State University, May 2010

PUBLICATIONS

- **Tanner, J.**, Orthlieb, G., Shumate, D., Helms Tillery, S. Effect of Sensory Feedback Substitution on the Proprioceptive Map of the Arm. *Frontiers in Neuroscience, 15. https://doi.org/10.3389/fnins.2021.586740*
- **Tanner, J.**, Newman, N., & Helms Tillery, S. (2021). Anisotropic psychophysical trends in the discrimination of tactile direction in a precision grip. *Frontiers in Neuroscience, 14.* https://doi.org/10.3389/fnins.2020.576020
- **Tanner J.**, Esola S., Veldman K. (2019) Improving EEG Form Factor in Order to Alleviate Pediatric Anxiety in Diagnostic Settings. In: Contreras-Vidal J., Robleto D., Cruz-Garza J., Azorín J., Nam C. (eds) *Mobile Brain-Body Imaging and the Neuroscience of Art, Innovation and Creativity.* Springer Series on Bio- and Neurosystems, vol 10. Springer, Cham. https://doi.org/10.1007/978-3-030-24326-5_19
- Esola S., **Tanner J.**, Veldman K. (2019) Analyzing EEG During the Painting Process. In: Contreras-Vidal J., Robleto D., Cruz-Garza J., Azorín J., Nam C. (eds) *Mobile Brain-Body Imaging and the Neuroscience of Art, Innovation and Creativity*. Springer Series on Bio- and Neurosystems, vol 10. Springer, Cham. https://doi.org/10.1007/978-3-030-24326-5_20
- Hellman, R. B., Chang, E., **Tanner, J.**, Helms Tillery, S. I., & Santos, V. J. (2015). A Robot Hand Testbed Designed for Enhancing Embodiment and Functional Neurorehabilitation of Body Schema in Subjects with Upper Limb Impairment or Loss. Frontiers in Human Neuroscience, 9. https://doi.org/10.3389/fnhum.2015.00026

WORKS SUBMITTED / IN PROGRESS

- **Tanner, J.**, Keefer, E., Chang, J., Helms Tillery, S. Comparison of Somatosensory Responses' Gamma Phase Locking Properties Between Time Variant Peripheral Nerve Stimulation and Mechanical Stimulation. In Revision.
- **Tanner, J.**, Orthlieb, G., Helms Tillery, S. Effect of Non-Invasive Trigeminal Nerve Stimulation on the Proprioceptive Map of the Arm.
- **Tanner, J.**, Colverson, A., Lyu, Y., Complementing a Musical Performance with an Abstract Visual EEG Representation from the Performer's Brain. Frontiers in Human Neuroscience, In Review.

CONFERENCE PRESENTATIONS

- **Tanner J**, Robert Culibrk, Helms Tillery S. Preliminary Kinematic and Kinetic Analysis of Controlled Variables in Violinist Performance. Oral presentation at: International Graphonomics Conference and Your Brain on Art, Creativity, and Innovation; 2019 June 9-13; Cancun, Mexico.
- **Tanner J**, Hearn T, Helms Tillery S, Keefer E, Cheng J. Median Nerve Stimulation via a FAST-LIFE Array Elicits a Graded Response in Primary Somatosensory Cortex Area 3b. Oral presentation at: Biomedical Engineering Society; 2017 Oct 11-14; Phoenix, AZ, USA

POSTER PRESENTATIONS

- **Tanner J**, Helms-Tillery S. Parameter Characterization of Neural Activity in the Locus Coeruleus to Non-Invasive Trigeminal Nerve Stimulation. Poster session presented at: Neuroscience; 2018 November 3-8; San Diego, California, USA.
- Orthlieb G, Shumate D, **Tanner J**, Helms-Tillery S. Effect of Tactile Sensory Substitution on Upper Limb Proprioceptive Error. Poster Session Presented at: Neuroscience; 2018 November 3-8; San Diego, California, USA.
- **Tanner J**, Hearn T, Helms-Tillery S, Keefer E, Cheng J. Median Nerve Stimulation via a FAST-LIFE Array Elicits a Timing Dependent Graded Response in Primary Somatosensory Cortex Area 3b. Poster session presented at: Neuroscience; 2017 November 11-15; Washington, D.C., USA.
- Hearn T, **Tanner J**, Overstreet C, Helms-Tillery S, Keefer E, Cheng J. Probing Proprioceptive Map Modifications Induced by Peripheral Nerve Stimulation. Poster session presented at: Neuroscience; 2017 November 11-15; Washington, D.C., USA.
- **Tanner J**, Overstreet C, Buneo C, Helms Tillery S. Stochastic Facilitation of Prosthetic Derived Sensory Stimulation in Primates. Poster session presented at: Neural Interfaces Conference; 2014 June 23-25; Dallas, Texas, USA.
- Hellman R. Chang E, **Tanner J**, Helms Tillery S, Santos V. Tendon-driven testbed for haptic exploration and sensory event-driven grasp and manipulation. Poster session presented at: DARPA MTO Sensorimotor Prosthetics Workshop; 2014 February 13; Scottsdale, Arizona, USA.
- **Tanner J**, Newman N, Helms Tillery S. Psychophysical Limitations and Biases in the Perception of Tactile Direction. Poster session presented at: Neuroscience; 2013 November 9-13; San Diego, California, USA.
- **Tanner J**, Naufel S, Santos V, Helms Tillery S. Examining simultaneous somatosensory neural encoding of multiple tactile parameters via single unit recording. Poster session presented at: Neuroscience; 2012 October 13-17; New Orleans, Louisiana, USA.

RESEARCH EXPERIENCE

Interests: Neuromodulation (Performance, Perceptual), Perceptual Modulation (Body Ownership, Tactile, Proprioceptive, Pain), Neuroprosthetic Feedback (Peripheral Nerve Stimulation, ICMS, Vibro/Electrotactile), Neurophysiology of Cortical Networks (pathological and therapeutic modulation)

- January 2020 – June 2022: Assistant Research Professor, Arizona State University, School of Biological and Health Systems Engineering
    - Viability of Stimuli Detection from Acute MicroCoil Magentic Stimulation in NHP Visual Cortex
    - Finalize Previous projects and Synthesize Data into Publishable Manuscripts
    - Oversee and Mentor Student Projects
- August 2017 – January 2020: Postdoctoral Scholar. Arizona State University in the Sensory Motor Research Group.
    - Parameter Characterization for Transdermal Neuromodulation of Locus Coeruleus Activity
        - Investigate effect of pulse parameters for transdermal stimulation of the ophthalmic branch of trigeminal nerve in NHP.
    - Transdermal Neuromodulation Effect on Somatosensory Representations of Peripheral Nerve Stimulation.
        - Investigate effect of multiple stimulation paradigms' effect on detection thresholds and cortical representations of peripheral stimulation.
    - M.S. Thesis Supervision: Using Pupillary Light Reflex to Determine Optimal Neuromodulation Stimulation Parameters and Observe the Effect on Proprioceptive Error
        - Use PLR to determine neuromodulation parameters that activate sympathetic nervous system.
        - Investigate benefit of determined parameters on proprioceptive estimation.
- August 2010 – August 2017: Research Associate / PhD Candidate. Arizona State University in the Sensory Motor Research Group.
    - 2015-2017. Comparison of Gamma Phase Locking Properties Between Time Variant Peripheral Nerve Stimulation and Mechanical Stimulation
        - Construct time variant stimulation pattern based on joint tonic/phasic neural activity.
        - Investigate NHP area 3b somatosensory cortex response to mechanical stimulation, standard peripheral nerve stimulation, and novel peripheral nerve stimulation.
        - Demonstrated novel peripheral nerve stimulation best mimics punctate stimulation in terms of evoked potentials and relevant frequency dynamics.
    - 2015-2018. Effect of Tactile Sensory Substitution on Upper Limb Proprioceptive Error
        - Map 2D proprioceptive estimation error under various modes of target feedback.
        - Observe better performance using peripheral nerve stimulation in a chronic prosthetic user.
        - With non-injured subjects, demonstrated acceptable, although increased, error during electro/vibrotactile sensory substitution in place of actual touch.
    - 2013-2015. Anisotropic Psychophysical Sensitivities in The Perception of Tactile Direction in A Precision Grip
        - Investigated sensitivities in human precision grip to quick, fine movements.

        - Demonstrated the ability to detect differences in angular movement is very similar to abilities in scanning directions or planar object movement.
        - Increased sensitivity to movements perpendicular to the gripping fingers, not to a global reference.
    - 2013-2014. Stochastic Facilitation of Prosthetic Derived Sensory Stimulation in Primates.
        - Delivered pairs of stimulation trains derived from a prosthetic finger's scanning to NHP area 3b somatosensory cortex.
        - Demonstrated discriminability and attempted to increase the discrimination by introducing subthreshold noise behind the primary signal.
    - 2010-2013. Somatosensory Area 1 Multimodal Sensitivity Due to Biomechanical Variations in Precision Grip
        - Investigated single unit firing rate of NHP area 1 somatosensory cortex to precision grip of varied texture, position, and movement.
        - Demonstrated single cell modulation of activity for texture, hand posture, and movement.

TEACHING/MENTOR EXPERIENCE

- 2021 Spring. Instructor for PSY 330 – Statistical Methods
    - Develop student ability to understand and employ specific statistical methods to social science applications
- 2020 Fall. Instructor for ASU 101 – The ASU Experience
    - Introduce incoming Biomedical Engineering to the culture of Arizona State University and the School of Biological Health Systems Engineering
    - Host faculty lectures to introduce students to departmental research and career paths
- M.S. Supervision/Committee Membership Completed
    - Gerrit Orthlieb (Arizona State University): "Effects of Trigeminal Nerve Stimulation on ANS and Proprioception High Frequency TNS Reduces Proprioceptive End-point Error," Defended July 2019.
- Fulton Undergraduate Research Initiative (FURI) Mentor
    - Kalani Headen (Arizona State University): "Effect of Bimodal Sensory Integration on Reactionary Impulsivity". FURI Poster 2021.
    - Gerrit Orthlieb (Arizona State University): "Effect of Forefinger Vibrotactile Stimulation on Proprioceptive Map Characteristics". FURI Luncheon Keynote Speaker 2018.
    - David Shumate (Arizona State University): "The Effects of Electrotactile Stimulation Over Multiple Feedback Sites Through Proprioceptive Mapping," FURI Poster 2018.
- Second Reader for Barret Honors College Thesis
    - Erik Halsband (Arizona State University): " Effect of a Mirrored Representation of Self During a tactile Reaction Time Task," Defended July 2021
    - Robert Culibrk (Arizona State University): "A Mechanical Analysis of Trained Violinist Kinematics," Defended May 2018.
    - Andre Nguyen (Arizona State University): "Analysis of Applied Thumb and Index Force Trained and Untrained Violinists," Defended May 2018,
    - Gabrielle Maestas (Arizona State University): "Differentiation Between a Hardness Gradient Given Restricted Finger Mobility," Defended May 2015.
- 2015-2016. Teaching Assistant for BIOL 181: General Biology I
    - General support for all sections' lecture
    - Responsible for lab section lectures, student safety during experiments, and lab reports.

- 2013-2015. Teaching Assistant for BME 417: Capstone Design
    - Design studio oversight and project guidance/support. Students were provided help with microcontrollers, CAD, writing, circuit design, and overall product design.
    - Evaluating Design Tasks and project progression for ~120 students
- 2013. Teaching Practicum for BME 520: Bioelectric Phenomena
    - Develop and deliver lectures, homework, exam questions, and support.

PROFESSIONAL DEVELOPMENT: WORKSHOPS/AWARDS/SKILLS

- 2019 IEEE Brain NeuroTech Entrepreneurs Workshop
    - 2nd place in NeuroTech Mock Investor Pitch Challenge
- 2019 International Graphonomics Conference and Your Brain on Art, Creativity, and Innovation
    - Awarded Travel Grant for Post Doc Consortium
    - 2nd Place in "Artistic Brain-Computer Interface (BCI) Hackathon organized by g.tec"
- 2017-Present. Board Member, Research Animal Retirement Foundation
- 2017 International Conference on Mobile Brain Body Imaging and the Neuroscience of Art, Innovation, and Creativity.
    - Awarded Travel Grant for Post Doc Consortium
    - "Most Innovative Prototype" for the 'Brain on Art' Hackathon.

SKILLS

Software	**MATLAB**	**Hardware**
MATLAB	Chronux	Plexon Omniplex
SolidWorks CAD	FieldTrip	Ripple Neuro NOMAD
Adobe Illustrator	PsychToolbox	National Instruments PXI
LabVIEW Real Time		PhaseSpace
Arduino/Raspberry Pi		SR Research EyeLink
Python		