DANIEL PATRICK WOODS
Nashville, TN • (615) 691-1668
daniel.p.woods@vanderbilt.edu

EDUCATION

Doctor of Philosophy in Biomedical Engineering August 2023 – Expected May 2028
Vanderbilt University
GPA: **3.91**/4.00

Master of Science in Biomedical Engineering May 2023
University of Tennessee Knoxville
GPA: **3.90**/4.00

Bachelor of Science in Honors Biomedical Engineering May 2022
University of Tennessee Knoxville
GPA: **3.78**/4.00
Minor in American Sign Language

RESEARCH INTERESTS

Development of flexible, transparent neurotechnology to record neural circuits during complex behavior across species.
Keywords: Neuroscience, biomedical engineering, brain-computer interfaces, electrophysiology

RESEARCH EXPERIENCE

Vanderbilt University – Department of Biomedical Engineering **Nashville, TN**
Graduate Research Assistant – Gonzales Lab May 2024–present

- Fabricate polymer-based transparent and flexible microelectrodes for acute recordings in mice and nonhuman primates
- Develop cleanroom protocol for layering, patterning, deposition, and etching of probe designs
- Create adaptable guide tube based acute implantation approach for acute, awake penetration of flexible probes in nonhuman primates

Vanderbilt University – Department of Biomedical Engineering **Nashville, TN**
Graduate Research Assistant – Constantinidis Lab August 2023–May 2024

- Conducting experiments on visual working memory tasks to record from various parts of the macaque cortex. Using electrophysiological recordings to analyze developmental changes of neuronal activity using MATLAB.
- Trained in primate housing, handling, and task training including the use of eye tracking software and retractable electrodes for recording

University of Tennessee Knoxville – Psychology Department **Knoxville, TN**
Research Assistant August 2021–June 2023

- Conducted study characterizing the effect of cholinergic modulation of breathing within the prefrontal cortex of B6 mice in response to systemically administered fentanyl and microinjected neostigmine
- Analyzed whole-body plethysmography and EEG data to study the neurochemical effects of opioid use on the brain
- Developed and used MATLAB scripts for spectral analysis and variability to assess neurological and respiratory data and characterize impact of opioids and acetylcholinesterase inhibitors on mice
- Wrote and conducted protocol for microinjections of subjects, procedure for using whole-body plethysmography chambers, and analysis of data
- Presented findings at American Society for Pharmacology and Experimental Therapeutics Annual Meeting 2023

University of Tennessee Space Institute – Center for Laser Applications **Tullahoma, TN**

Research Intern June–August 2021

- Characterized diamond-like-carbon films for optimizing hydrophilicity and transparency for anti-fogging lens applications in laparoscopy
- Performed pulsed laser deposition for synthesis, and Raman spectroscopy, atomic force microscopy, contact angle/surface energy measurements, and spectrophotometry for characterization
- Presented findings to research center and associated faculty of the department, as well as at national and regional conferences

University of Tennessee Knoxville – MABE Department **Knoxville, TN**
Undergraduate Research Assistant November 2020–May 2021

- Assisted in research project developing a social robot caretaker for Alzheimer's patients
- Conducted literature review assessing the state of social robotics in elderly care published in International Conference on Social Robotics

TEACHING EXPERIENCE

Vanderbilt University – Department of Biomedical Engineering **Nashville, TN**
Graduate Teaching Assistant August 2023–May 2024
Biomedical Engineering Lab II

- Assist in weekly lab sessions by organizing equipment needed for the course, distribute class materials, and troubleshoot technical issues
- Grade weekly assignments and distribute comments on reports

University of Tennessee Knoxville – Engineering Fundamentals Department **Knoxville, TN**
Graduate Teaching Assistant August 2022–May 2023
Computer Methods for Engineering Problem Solving

- Instruct, grade, and support 200 first-year engineering students in the course EF 105 – "Computer Methods for Engineering Problem Solving", teaching Excel and MATLAB skills
- Prepare learning material, lectures, and class activities to be used 6 times throughout the week during instruction
- Met with various students weekly during individual sessions to ensure all students are retaining material

UNIVERSITY INVOLVEMENT

Graduate Student Council – Vanderbilt University **Nashville, TN**
Recruitment Chair August 2024–present

- Organized travel, lodging, transportation, meals, interviews, and tours of 60 prospective BME PhD students for the department's interview weekend

Biomedical Engineering Department Representative August 2023–August 2024

- Meet monthly with the entire graduate student council to discuss department needs, funding, plan for upcoming events, and communicate with administration
- Meet monthly with department student association to relay university wide announcements and changes

Biomedical Engineering Society **Knoxville, TN**
Member/Treasurer August 2018–May 2022

- Managed finances of chapter for fundraising, travel, merchandise, and food from collecting membership fees and allocating funds
- Financed budget for conference travel costs of undergraduate cohort to the Annual Meeting for the Biomedical Engineering Society 2021
- Designed and distributed chapter merchandise of hats, stickers, pens, shirts to over 100 active members

PUBLICATIONS/PRESENTATIONS

- **Woods, D.**, Yuan, F., Jao, YL., Zhao, X. (2021). Social Robots for Older Adults with Dementia: A Narrative Review on Challenges & Future Directions. Social Robotics. ICSR 2021. Lecture Notes in Computer Science, vol 13086. Springer, Cham. https://doi.org/10.1007/978-3-030-90525-5_35
- **Woods DP**, Herzog RS, Sun QW, Glovak, ZT, Baghdoyan HA, Lydic R. Gain modulation by mouse prefrontal cortex diminishes fentanyl-induced respiratory depression. J Pharmacol Exp Ther 385: 2023 https://doi.org/10.1124/jpet.122.530000
- Herzog RS, **Woods DP**, Sun QW, Glovak ZT, Baghdoyan HA, Lydic R. Decrease in respiratory rate caused by prefrontal cortex administration of fentanyl can be described using a gain modulation model. PSTR282.02/HH11. 2023 Neuroscience Meeting Planner. Washington, D.C.: Society for Neuroscience, 2023, Online. https://www.abstractsonline.com/pp8/#!/10892/presentation/25135
- R.L. Leonard, A.B. Bull, F. Xue, C.P. Haycook, S.K. Gray, C.W. Bond, P.E. Bond, J.C. McDearman, **D.P. Woods**, J. Mayfield, L.R. Brown, T.D. Giorgio, J.A. Johnson, Biocompatibility of antifogging SiO-doped Diamond-Like carbon laparoscope coatings, Applied Surface Science, Volume 634, 2023, 157606, ISSN 0169-4332, https://doi.org/10.1016/j.apsusc.2023.157606

Poster Presentations

- Woods, D. et al (2021). Diamond-like Carbon Thin Films for Anti-fog Lens Coating in Laparoscopy. Biomedical Engineering Soceity 2021 Annual Meeting. Orlando, FL.
- Woods, D. et al (2021). Diamond-like Carbon Thin Films for Anti-fog Lens Coating in Laparoscopy. University of Tennessee EURēCA 2022. Knoxville, TN.
- Woods, D. et al (2023). Gain modulation by mouse prefrontal cortex diminishes fentanyl-induced respiratory depression. ASPET 2023 Annual Meeting, St. Louis, MO.
- Woods, D. et al (2024). Flexible, transparent electrodes for acute recording in non-human primates. Vanderbilt Institute for Nanoscale Science and Engineering NanoDay. Nashville, TN.
- Woods, D. et al (2025). Flexible, transparent electrodes for acute recording in non-human primates. Society for Biomaterials Mid-South Regional Biomaterials Day. Nashville, TN.
- Woods, D. et al (2025). Flexible microelectrodes for acute recording in non-human primates. Vanderbilt Institute for Nanoscale Science and Engineering NanoDay. Nashville, TN.
- Woods, D. et al (2025). Flexible microelectrodes for acute recording in non-human primates. Vanderbilt Brain Institute – Chan Zuckerberg Initiative Symposium. Nashville, TN.
- Woods, D. et al (2025). Flexible microelectrodes for acute recording in non-human primates. Biomedical Engineering Society 2025 Annual Meeting. San Diego, CA.

Oral Presentations

- Woods, D (2022). "A New Scope for Lab Grown Diamonds – Clearing the Optical Window for Laparoscopy." University of Tennessee Chancellor's Seminar Series, 4/19/2022.
- Woods, D (2025). "Polymer-based microelectrode arrays for in vivo electrophysiology." Vanderbilt University NanoExchange Summer Seminar Series, 6/26/2025.

PATENTS AND INVENTIONS

- Flexible, High-Resolution Neural Interface to Clinical Electrodes.
  U.S. Patent Application (Attorney Docket No. 093386-0086-US01), 2025.

SKILLS

- Proficient in: MATLAB, Python, Excel, AutoCAD, GraphPad Prism, SAS
- Primate housing/maintenance, eye tracking, electrophysiology
- Mouse maintenance, handling, stereotactic surgery, whole-body plethysmography, electrophysiology
- Photolithography, plasma cleaning, sputter and e-beam deposition, parylene coating

AWARDS

- Distinction in Undergraduate Research May 2022
- Cook Grand Challenge and Chancellor's Honors Program Graduate May 2022
- Outstanding GTA Award, Engineering Fundamentals May 2023

- Russell G. Hamilton Scholar – Vanderbilt University 2023
- Dean's Graduate Fellowship – Vanderbilt University August 2023
- Poster Award Winner 3rd Place – VISNE NanoDay December 2024
- Poster Award Winner 2nd Place – VISNE NanoDay December 2025

REFERENCES

Daniel Gonzales, Assistant Professor
Department of Biomedical Engineering
Vanderbilt University
daniel.gonzales@vanderbilt.edu
Christos Constantinidis, Professor
Department of Biomedical Engineering
Vanderbilt University
christos.constantinidis.1@vanderbilt.edu
Ralph Lydic, Professor
Department of Psychology
University of Tennessee Knoxville
(865) 974 – 3740, rlydic@utk.edu