Roza Gunes Bayrak, PhD

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PROFESSIONAL APPOINTMENTS

2023 - current	Research Assistant Professor, Vanderbilt University, Nashville, Tennessee, USA Department of Computer Science

EDUCATION

2018 - 2023	Ph.D., Computer Science Vanderbilt University, Nashville, Tennessee, USA Dissertation: "Computational Methods to Advance Individual Precision in Brain Mapping"
2013 - 2016	M.S., Electrical Engineering Tufts University, Medford, Massachusetts, USA
2010	B.S., Electrical and Communication Çankaya University, Ankara, Turkey

HONORS & FELLOWSHIPS

2021	Merit Abstract Award, OHBM Annual Meeting, Seoul, KOREA
2020	NIH Award, MICCAI Annual Meeting, Lima, PERU
2020	Best Short Paper Honorable Mention, IEEE VIS, Salt Lake City, Utah, USA
2018 - 2019	Graduate Fellowship, Ministry of National Education, TURKEY
2013 - 2016	Graduate Fellowship, Ministry of National Education, TURKEY
2012 - 2013	Second Language Fellowship, Ministry of National Education, TURKEY
2006 - 2010	Undergraduate Fellowship, Ministry of National Education, TURKEY
2005 - 2010	Undergraduate Fellowship, Cankaya University, TURKEY

PUBLICATIONS

1. **Roza G. Bayrak,** Colin B. Hansen, Jorge A. Salas, Nafis Ahmed, Ilwoo Lyu, Mara Mather, Yuankai Huo, Catie Chang. "Tracing peripheral physiology in low frequency fMRI dynamics." OSF preprint, 2023.
2. Anwar Said, **Roza G. Bayrak**, Tyler Derr, Mudassir Shabbir, Daniel Moyer, Catie Chang, and Xenofon Koutsoukos. "NeuroGraph: Benchmarks for Graph Machine Learning in Brain Connectomics." arXiv preprint arXiv:2306.06202, 2023.
3. **Roza G. Bayrak,** Ilwoo Lyu, Catie Chang. "Learning subject-specific functional parcellations from cortical surface measures.", MICCAI International Workshop on Predictive Intelligence in Medicine (PRIME), 2022
4. **Roza G. Bayrak*,** Francois Rheault*, Xuan Wang, Kurt G. Schilling, Jasmine M. Greer, Colin B. Hansen, Cailey Kerley, Karthik Ramadass, Lucas W. Remedios, Justin A. Blaber, Owen Williams, Lori L. Beason-Held, Susan M. Resnick, Baxter P. Rogers, Bennett A. Landman. "TractEM: Evaluation of Protocols for Deterministic Tractography White Matter Atlas.", Magnetic Resonance Imaging (2021).
5. Jorge A. Salas, **Roza G. Bayrak**, Yuankai Huo, Catie Chang. "Reconstruction of respiratory variation signals from fMRI data.", Neuroimage (2021).
6. Kurt Schilling, …, **Roza G. Bayrak**, et al. "Tractography dissection variability: what happens when 42 groups dissect 14 white matter bundles on the same dataset?" Neuroimage (2021).
7. **Roza G. Bayrak,** Colin B. Hansen, Jorge A. Salas, Nafis Ahmed, Ilwoo Lyu, Yuankai Huo, Catie Chang. "From brain to body: Learning low-frequency respiration and cardiac signals from fMRI dynamics.", International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), 2021.
8. **Roza G. Bayrak,** Jorge A. Salas, Yuankai Huo, Catie Chang. "A Deep Pattern Recognition Approach for Inferring Respiratory Volume Fluctuations from fMRI Data.", NIH Award, International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), 2020.
9. **Roza G. Bayrak,** Nhung Hoang, Colin B. Hansen, Catie Chang, Matthew Berger. "PRAGMA: Interactively Constructing Functional Brain Parcellations.", Best Paper Honorable Mention, IEEE Visualization Conference (VIS), 2020.
10. Vishwesh Nath, Kurt G. Schilling, Samuel Remedios, **Roza G. Bayrak**, Yurui Gao, Justin A. Blaber, Yuankai Huo, Bennett A. Landman, and A. W. Anderson. "Learning 3D White Matter Microstructure from 2D Histology." In 2019 IEEE 16th International Symposium on Biomedical Imaging (ISBI), 2019.
11. Colin B. Hansen, Vishwesh Nath, Allison E. Hainline, Kurt G. Schilling, Prasanna Parvathaneni, **Roza G. Bayrak**, Justin A. Blaber, Owen Williams, Susan Resnick, Lori Beason-Held, Okan Irfanoglu, Carlo Pierpaoli M.D., Adam W. Anderson, Baxter P. Rogers, Bennett A. Landman, "Consideration of Cerebrospinal Fluid Intensity Variation in Diffusion Weighted MRI." SPIE Medical Imaging, 2019.
12. Vishwesh Nath, Samuel Remedios, Prasanna Parvathaneni, Colin B. Hansen, **Roza G. Bayrak**, Camilo Bermudez, Justin A. Blaber, Karthik Ramadass, Kurt G. Schilling, Vaibhav A. Janve, Yurui Gao, Yuankai Huo, Ilwoo Lyu, Owen Williams, Susan Resnick, Lori Beason-Held, Baxter P. Rogers, Iwona Stepniewska, Adam W. Anderson, Bennett A. Landman, "Harmonizing 1.5T/3T Diffusion Weighted MRI through Development of Deep Learning Stabilized Microarchitecture Estimators." SPIE Medical Imaging, 2019.

13. Colin B. Hansen, Vishwesh Nath, Allison E. Hainline, Kurt G. Schilling, Prasanna Parvathaneni, **Roza G. Bayrak**, Justin A. Blaber, Okan Irfanoglu, Carlo Pierpaoli, Adam W. Anderson, Baxter P. Rogers, Bennett A. Landman. "Characterization and Correlation of Signal Drift in Diffusion Weighted MRI." Magnetic Resonance Imaging (2018).

ABSTRACTS

14. **Roza G. Bayrak**, Nafis Ahmed, Mara Mather, Catie Chang. "Physiological Signatures Across the Brain", OHBM 2024.
15. **Roza G. Bayrak**, Richard Song, Rachel Yang, Catie Chang. "Thumbs up or down: Simple quality assessment tool for physiological signals", OHBM 2024.
16. **Roza G. Bayrak**, Catie Chang, and the physiopy community. "Physiopy: a Python suite for handling physiological data recorded in MRI settings", OHBM 2024.
17. **Roza G. Bayrak**, Nafis Ahmed, Mara Mather, Catie Chang. "Physiological Signatures Across the Brain", RSBC 2023.
18. **Roza G. Bayrak**, Catie Chang, Stefano Moia, and the physiopy community. "Physiopy: a Python suite for handling physiological data recorded in MRI settings", OHBM 2023.
19. **Roza G. Bayrak**, Colin B. Hansen, Nafis Ahmed, Jorge A. Salas, Mara Mather, Ilwoo Lyu, Yuankai Huo, Catie Chang. "Tracing peripheral physiology in low frequency fMRI dynamics", OHBM 2023.
20. **Roza G. Bayrak**, Ilwoo Lyu, Catie Chang. "Learning subject-specific functional parcellations from structural MRI.", OHBM 2022.
21. **Roza G. Bayrak**, Colin B. Hansen, Nafis Ahmed, Jorge A. Salas, Ben Gold, Yuankai Huo, Catie Chang. "From brain to body: Learning Respiration and Heart Rate Fluctuations from fMRI data.", Merit Abstract Award, OHBM 2021.
22. Nafis Ahmed, **Roza G. Bayrak**, Mara Mather, Catie Chang. "Relating BOLD low-frequency physiological patterns to behavioral and cognitive traits." OHBM 2021
23. **Roza G. Bayrak**, Kurt G. Schilling, Jasmine M. Greer, Colin B. Hansen, Justin A. Blaber, Christa M. Greer, Susan M. Resnick, Owen A. Williams, Lori L. Beason-Held, Baxter P. Rogers, Landman A. Bennett. "TractEM: A fast protocol for Whole Brain Tractography." ISMRM 2018

TALKS & PRESENTATIONS

INVITED TALKS

Oral, Physiopy: a Python suite for handling physiological data recorded in MRI settings
June, 2024 | Organization for Human Brain Mapping (OHBM) Conference, Seoul, Korea

Poster, Thumbs up or down: Simple quality assessment tool for physiological signals
June, 2024 | Organization for Human Brain Mapping (OHBM) Conference, Seoul, Korea

Poster, Physiological Signatures Across the Brain
June, 2024 | Organization for Human Brain Mapping (OHBM) Conference, Seoul, Korea

Oral, Mining BrainFunction from Structure and Peripheral Physiological Data
March 21, 2024 | Research Seminars, Vanderbilt Institute for Surgery and Engineering, Nashville USA

Poster, NeuroGraph: Benchmarks for Graph Machine Learning in Brain Connectomics
December 14, 2023 | Conference on Neural Information Processing Systems, New Orlans, USA

Poster, Physiological Signatures Across the Brain
September 22, 2023 | Resting State Brain Connectivity Conference, Dallas, USA

Oral, Physiopy: a Python suite for handling physiological data recorded in MRI settings
June 24, 2023 | Organization for Human Brain Mapping (OHBM) Conference, Montreal, Canada

Poster, Tracing Peripheral Physiology in the Functional MRI Dynamics
June 22, 2023 | Organization for Human Brain Mapping (OHBM) Conference, Montreal, Canada

Oral, Tracing Peripheral Physiology in the Functional MRI Dynamics
March 7, 2023 | Women in Data Science Conference, Vanderbilt Data Science Institute, Nashville, Tennessee, USA

Oral, Learning Subject-Specific Functional Parcellations from Cortical Surface Measures
September 23, 2022 | Predictive Intelligence in Medicine (PRIME) Workshop, Medical Image Computing and Computer Assisted Intervention (MICCAI), Singapore

Poster, Learning Subject-Specific Functional Parcellations from Cortical Surface Measures
June 24, 2022 | Organization for Human Brain Mapping (OHBM) Conference, Glasgow, Scotland

Poster, From Brain to Body: Learning low-frequency respiration and cardiac signals from fMRI dynamics
September 21, 2021 | Medical Image Computing and Computer Assisted Intervention (MICCAI), Strasburg, France

Oral, Signal in the noise: Physiological components of fMRI data
August 5, 2021 | Research in Progress Seminars, Vanderbilt Institute for Surgery and Engineering, Nashville USA

Oral, From Brain to Body: Learning low-frequency respiration and cardiac signals from fMRI dynamics
June 24, 2021 | Organization for Human Brain Mapping, Seoul, Korea

Oral, Relating BOLD low-frequency physiological patterns to behavioral and cognitive traits
June 24, 2021 | Organization for Human Brain Mapping, Seoul, Korea

Best Paper Honorable Mention - Oral, PRAGMA: Interactively Constructing Functional Brain Parcellations
October 27, 2020 | IEEE Visualization (VIS) Conference, Salt Lake City, Utah, USA

Poster, A deep pattern recognition approach for inferring respiratory volume fluctuations from fMRI data
September 2020 | Medical Image Computing and Computer Assisted Intervention (MICCAI), Lima, Peru

PANELS

Panelist, AI Revolutions
June 23, 2022 | Vanderbilt Data Science Institute, Nashville, Tennessee, USA

Panel Co-chair, Open Science Room: Open Publishing
June 23, 2022 | Organization for Human Brain Mapping, Glasgow, Scotland

Panel Co-chair, Open Science Room: Social Bias in Machine Learning
June 21, 2022 | Organization for Human Brain Mapping, Glasgow, Scotland

Student Panelist, VISE Symposium: Data, AI, and Discovery
December 15, 2021 | Vanderbilt Institute for Surgery and Engineering (VISE), Nashville, Tennessee, USA

LEADERSHIP & SERVICE

BRAINHACK VANDERBILT
2024
Organized and ran a two-day long, hybrid, collaborative, inaugural hackathon for the interdisciplinary brain sciences.

PHYSIOPY TOOLBOX | OPEN-SOURCE CONTRIBUTOR
2022 – Current
Contributing to: the development of tools to operate physiological files in MRI setups specifically *phys2denoise* and *peakdet* libraries; the vast knowledge documentations for *the Best Practices*.

PEER REVIEW
2020 – Current
Journals: Neuroimage, Frontiers in Neuroscience, Human Brain Mapping
Open Review Conferences: MiDL, MICCAI, NeurIPS;
Workshops: Women MICCAI, Med-NeurIPS

ORGANIZATION FOR HUMAN BRAIN MAPPING (OHBM)
OPEN SCIENCE ROOM CHAIR (ELECTED ROLE)
2021 – 2022
Organized and ran a week long, first-time-hybrid open science conference as part of the annual OHBM meeting; worked with 30+ international volunteers, maintained the conference website.

VANDERBILT INSTITUTE FOR SURGERY AND ENGINEERING (VISE)
PRESIDENT OF WOMEN OF VISE (ELECTED ROLE)
2021 – 2022
Established a number of first-time practices to empower women within our local community: created opportunities for global networking; established the first virtual outreach; organized various events around mental health awareness and creative arts to inspire engineering.

TEACHING EXPERIENCE

CS 4262 – FOUNDATIONS OF MACHINE LEARNING
Fall 2020 | Vanderbilt University, Nashville TN
Prepared weekly assignments, helped students develop and prototype class projects

CS 8395 – DEEP LEARNING IN MEDICAL IMAGE COMPUTING
Spring 2020 | Vanderbilt University, Nashville TN
Graded and explained assignments, developed class projects with students.

CS 1101 - PROGRAMMING AND PROBLEM-SOLVING
Spring 2019 | Vanderbilt University, Nashville TN
Coordinated 22 undergraduate teaching assistants, explained algorithms and graded exams for 300+ students.

RESEARCH MENTORSHIP

Vanderbilt University, Nashville TN

Shiyu Wang, *Graduate Student*
2023 – Current
Guiding the student in the progression of a project that originated during my PhD. Currently, supervising the student to rapidly test advanced machine learning models, gauging any potential benefits they may offer over our existing methods.

Rithwik Guntaka, *Undergraduate Researcher*
2022 – Current
Original Research: Guiding the student to further improve and develop quality assessment tools for physiological data.
Replication Study: Supervised the student on reproducing a published study from data preprocessing to reporting results.

Karuna Gujar, *Master's Student*
2020 - 2021
Master's Thesis: Guided the student to develop a master's project, collected and organized the data, oversaw the design of experiments.

Nafis Ahmed, *Undergraduate Researcher*
2020 –2021
Original Research: Worked in parallel with the student at every stage of the project from pre-processing datasets to designing analyses and writing.

Xuan Wang, *Master's Student*
2019 - 2020
Master's Thesis: Guided the student to develop a master's project, collected and organized the data, oversaw the design of experiments.

GRANT WRITING

RO1 NIH/NIMH | FMRI PHYSIOLOGICAL SIGNATURES OF AGING AND ALZHEIMER'S DISEASE

PI: CATHERINE CHANG
Funded in 2021
Researched for project appropriate grants, conducted appropriate literature review and analyzed preliminary data to showcase significance and plausibility.