BIOGRAPHICAL SKETCH

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NAME: Orlichenko, Anton

eRA COMMONS USER NAME (credential, e.g., agency login): aorlichenko

POSITION TITLE: Graduate Research Fellow

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE (if applicable)	START DATE MM/YYYY	COMPLETION DATE MM/YYYY	FIELD OF STUDY
Illinois Institute of Technology, Chicago, Illinois	BS	08/2006	12/2010	Electrical and Computer Engineering
Tulane University, New Orleans, Louisiana	PHD	08/2020	12/2024	Biomedical Engineering

A. Personal Statement

Since my undergraduate studies in electrical and computer engineering, I have been interested in using technology to create tools for improving people's lives and scientific knowledge, particularly about the brain. As an undergraduate researcher in the IIT MRI lab, I was part of a team that used cutting edge DT-MRI software to develop a brand new diffusion tensor atlas that more robustly captured white matter microstructure in a large cohort of subjects. Additionally, I performed analysis on DT-MRI imaging of social phobia patients, leading to brand new knowledge regarding white matter abnormalities in the uncinate fasciculus and their correlation with the disease. After graduation, I spent some time as a community college professor and professional tutor, honing my software engineering as well as pedagogical skills. My time spent teaching also gave me a profound appreciation for teaching students and the way to most effectively convey knowledge. More recently, I have entered a PhD program in the Biomedical Engineering department of Tulane University, where I have worked at the intersection of functional brain imaging, genomics, and machine learning. During my time at Tulane, I have authored three first-author peer-reviewed publications in high quality journals. My work has focused on addressing the problems in the field, specifically creation of machine learning models that excel with the low sample sizes found in fMRI, the creation of software tools for the analysis of large amounts of high dimensional functional connectivity and genomic data, and the identification and removal of confounding factors of demographics in fMRI. As part of my lab work, I have processed more than fifty thousand fMRI scans according to best practices using state of the art software, uncovering novel changes in functional connectivity with aging in the UK Biobank longitudinal cohort. In addition, I have been a co-author on publications investigating the ability of fMRI to probe cognitive capacity in healthy subjects. In my future work, I hope to continue to develop software for the analysis of functional brain data, but also to expand my knowledge to more experimental, wet lab, and hardware development work. While the mind has been with us for all of human history, we have only recently acquired the experimental techniques and processing power to investigate it to the utmost. I hope to be at the forefront of the wave of new discoveries and knowledge that are even now progressing forward.

1. Orlichenko A, Su KJ, Shen H, Deng HW, Wang YP. Somatomotor-visual resting state functional connectivity increases after 2 years in the UK Biobank longitudinal cohort. J Med Imaging (Bellingham). 2024 Mar;11(2):024010. PubMed Central PMCID: PMC11009525.
2. Orlichenko A, Daly G, Zhou Z, Liu A, Shen H, Deng H, Wang Y. ImageNomer: Description of a functional connectivity and omics analysis tool and case study identifying a race confound. Neuroimage: Reports. 2023 December; 3(4):100191-. Available from:

https://linkinghub.elsevier.com/retrieve/pii/S2666956023000363 DOI: 10.1016/j.ynirp.2023.100191

3. Orlichenko A, Qu G, Zhang G, Patel B, Wilson T, Stephen J, Calhoun V, Wang Y. Latent Similarity Identifies Important Functional Connections for Phenotype Prediction. IEEE Transactions on Biomedical Engineering. 2023; 70(6):1979-1989. Available from: https://ieeexplore.ieee.org/document/10002422/ DOI: 10.1109/TBME.2022.3232964
4. Peng H, Orlichenko A, Dawe RJ, Agam G, Zhang S, Arfanakis K. Development of a human brain diffusion tensor template. Neuroimage. 2009 Jul 15;46(4):967-80. PubMed Central PMCID: PMC2693098.

B. Positions and Honors

Positions and Scientific Appointments

2020 -	Graduate Research Fellow, Tulane University MBB Lab, New Orleans, LA
2016 - 2020	Adjunct Faculty and Science Tutor, Community College of Allegheny County, Pittsburgh, PA
2008 - 2010	Undergraduate Researcher, Illinois Institute of Technology MRI Lab, Chicago, IL

Honors

2006 - 2010	Marvin Camras Scholarship, Illinois Institute of Technology
2024	Oral Presentation and Poster, MCBIOS 2024
2023	SPIE: Medical Imaging Student Travel Award, SPIE
2023	Oral Presentation, SPIE: Medical Imaging
2023	Poster Presenter, Organization for Human Brain Mapping
2023	Poster Presenter, Medical Imaging Meets NeurIPS Workshop
2022	Member, Institute of Electrical and Electronics Engineers
2022	Oral Presentation, SPIE: Medical Imaging
2009	Research Experience for Undergraduates Award, Illinois Institute of Technology
2007	Member, Eta Kappa Nu
2007	Member, Tau Beta Pi

C. Contribution to Science

1. Undergraduate Research on Diffusion Tensor Imaging. During my time as an undergraduate researcher at the Illinois Institute of Technology MRI lab, I performed work on creating a diffusion tensor (DT) MRI atlas from a group of 50 healthy adult subjects. The algorithms used for the creation of the atlas were found to create superior tracts when used as a template for downstream studies. Additionally, I processed DT-MRI data from a sample of social phobics and healthy controls acquired by a collaborator at the University of Chicago. We were the first group to find aberrant fractional anisotropy, a measure derived from DT-MRI, in the uncinate fasciculus of social phobics compared to healthy controls. This work was instrumental in guiding further research on social phobia.

    a. Phan KL, Orlichenko A, Boyd E, Angstadt M, Coccaro EF, Liberzon I, Arfanakis K. Preliminary evidence of white matter abnormality in the uncinate fasciculus in generalized social anxiety disorder. Biol Psychiatry. 2009 Oct 1;66(7):691-4. PubMed Central PMCID: PMC2743779.
    b. Peng H, Orlichenko A, Dawe RJ, Agam G, Zhang S, Arfanakis K. Development of a human brain diffusion tensor template. Neuroimage. 2009 Jul 15;46(4):967-80. PubMed Central PMCID: PMC2693098.

2. Graduate Research on Algorithms, Software, Group Differences, and Confounds in fMRI Data. As a PhD candidate in the Multiscale Bioimaging and Bioinformatics (MBB) lab under the guidance of Dr. Wang, I developed algorithms and software for processing fMRI data and derived measures such as

functional connectivity (FC). My initial work was the creation of a Latent Similarity regression and classification algorithm that was specifically constructed to work well under the low sample sizes found in most fMRI studies. My second work was the development of a software for processing and finding fMRI-phenotype correlations in large (>10,000 subjects) datasets of high dimensional FC data, called ImageNomer. We published the software along with our discovery of a prominent ethnicity signal found in fMRI. We were among the first groups to find this ethnicity-dependent signal and realize its consequences of creating possible generalization failure due to confounding effects of race in many clinical measures. Finally, we used our ImageNomer software to process the FC data of more than 40,000 UK Biobank subjects, including a 2,722-subject longitudinal cohort, where we found a consistent FC increase with age in the cross-sectional cohort and highly significant increase in somatomotor-visual network connectivity in the longitudinal cohort. This has import implications for studies in neurodegenerative diseases where most subjects have advanced age. Our current work, in submission, is focused on creating a generative model of fMRI conditioned upon subject demographics and scanner task, which has the additional property of removing the confounding effects of demographics from the latent features it creates.

a. Qu G, Orlichenko A, Wang J, Zhang G, Xiao L, Zhang K, Wilson T, Stephen J, Calhoun V, Wang Y. Interpretable Cognitive Ability Prediction: A Comprehensive Gated Graph Transformer Framework for Analyzing Functional Brain Networks. IEEE Transactions on Medical Imaging. 2024; 43(4):1568-1578. Available from: https://ieeexplore.ieee.org/document/10363771/ DOI: 10.1109/TMI.2023.3343365
b. Orlichenko A, Daly G, Zhou Z, Liu A, Shen H, Deng H, Wang Y. ImageNomer: Description of a functional connectivity and omics analysis tool and case study identifying a race confound. Neuroimage: Reports. 2023 December; 3(4):100191-. Available from: https://linkinghub.elsevier.com/retrieve/pii/S2666956023000363 DOI: 10.1016/j.ynirp.2023.100191
c. Orlichenko,Anton,, Su,Kuan-Jui,, Tian,Qing,, Shen,Hui,, Deng,Hong-Wen,, Wang,Yu-Ping,. Somatomotor-Visual Resting State Functional Connectivity Increases After Two Years in the UK Biobank Longitudinal Cohort. [Preprint]. 2023 August 16. DOI: 10.1101/2023.08.15.23294133
d. Orlichenko A, Qu G, Zhang G, Patel B, Wilson T, Stephen J, Calhoun V, Wang Y. Latent Similarity Identifies Important Functional Connections for Phenotype Prediction. IEEE Transactions on Biomedical Engineering. 2023; 70(6):1979-1989. Available from: https://ieeexplore.ieee.org/document/10002422/ DOI: 10.1109/TBME.2022.3232964

D. Scholastic Performance

Scholastic Performance

YEAR	COURSE TITLE	GRADE
	ILLINOIS INSTITUTE OF TECHNOLOGY	
2006	Multivariate and Vector Calculus	TR
2006	Intro to Differential Equations	TR
2006	General Biology Lecture	TR
2006	General Biology Lab	TR
2006	Principles of Chemistry I	TR
2006	Principles of Chemistry II	TR
2006	University Writing	TR
2006	Life Stories	TR
2006	Humanities Elect (Upper)	TR
2006	Calculus I	TR
2006	Calculus II	TR
2006	Gen Physics I: Mechanics	TR

YEAR	COURSE TITLE	GRADE
2006	Gen Physics II: Elect & Magentism	TR
2006	Human Beh Growth & Learn	TR
2006	Brain Mind & Behavior	TR
2006	Genetics	A
2006	Obj-Oriented Programming I	A
2006	ECE Intro to Profession I	A
2006	Matrix Algebra and Complex Variables	A
2006	Gen Physics III: Lec/Modphys	A
2006	Energy & Environ Policy	A
2007	Organic Chemistry I	A
2007	Obj-Oriented Programming II	A
2007	Circuit Analysis I	A
2007	Analog and Digital Lab I	A
2007	Digital Systems	A
2007	Probability/Statistics	A
2007	Discrete Structures	A
2007	Cell Biology	B
2007	Organic Chemistry II	B
2007	Data Structures & Algorithms	A
2007	Circuit Analysis II	B
2007	Analog and Digital Lab II	A
2007	Digital Computers and Computing	A
2008	Human Biology	A
2008	Human Biology Lab	A
2008	Systems Programming	A
2008	Signals and Systems	A
2008	Engineering Electronics	A
2008	Interprofessional Project	A
2008	Communication Law & Ethics	A
2008	Programming Language Translators	A
2008	Operating Systems	A
2008	Software Engineering	A
2008	Microcomputers	A
2008	Computer Organization and Design	W
2009	Electronic Circuits	A
2009	Fundamentals of Power Eng	A
2009	Control Systems	A
2009	Image Processing	A
2009	Abnormal Psychology	B
2009	Digital Signal Processing I	A
2009	Animal Physiology	B
2009	Electrodynamics	B
2009	Advanced Logic Design	A
2009	Computer Organization and Design	B
2009	Interprofessional Project	A
2010	Neuroimaging	C

YEAR	COURSE TITLE	GRADE
2010	Advanced Computer Arch	W
2010	Biochemistry Lecture	C
2010	Concepts of Cancer Biology	B
2010	Molecular Biology	B
2010	Intro to Mechanics	A
	TULANE UNIVERSITY	
2020	Intro to Machine Learning	A
2020	Department Seminar	S
2020	Medical Imaging and Machine Learning	A
2020	Anatomy and Physiology for Engineers	A
2020	Anatomy and Physiology for Engineers Lab	A
2021	Quantitative Physiology	A
2021	Quantitative Physiology Lab	A
2021	Intro to Probability	A
2021	Math Analysis Bio Systems	A
2021	Department Seminar	A
2021	Research Methods Biomedical Informatics	A
2021	Biomaterials and Tissue Engineering	A
2021	Biomaterials and Tissue Engineering Lab	NG
2021	Computational Brain Modeling	A-
2021	Artificial Intelligence	A
2021	Machine Learning	A
2021	Intro to Probability Recitation	NG
2022	Continuum Models in BMEN	A
2022	Medical Imaging Physics	A
2022	Department Seminar	A
2022	Research Methods Biomedical Informatics	A
2022	Intro to Statistical Inference	A
2022	Recitation for Intro to Stat	NG
2023	Department Seminar	S
2023	Research Methods Biomedical Informatics	A
2023	Dissertation Research	P
2024	Orthopedic Bioengineering	A

A-D: Ordinary letter grades, S: Satisfactory, NG: No grade given for class, P: Pass, TR: Transfer, W: Withdraw