Matthew David Isaacson

Postdoctoral Associate & Lecturer
Cornell University

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Education

University of Cambridge - Cambridge, UK Oct. 2014 - Apr. 2019
Subject: Neuroscience
Degree: Doctor of Philosophy

University of Florida - Gainesville, FL Aug. 2008 - May 2011
Major: Chemical Engineering
Degree: Bachelor of Science, summa cum laude

Indian River State College - Fort Pierce, FL Aug. 2006 - May 2008
Degree: Associate of Arts, cum laude

Research Experience

Postdoctoral Associate - Cornell University July 2019 - Present
Principle Investigators: Dr. Chris Schaffer, Professor; Dr. Nozomi Nishimura, Assoc. Professor
Topic: *neural correlates of cognitive rescue in AD mouse models*
Projects:
- Studying the neural correlates of visual and spatial cognition in AD mice before/after CBF rescue using 2- and 3-photon calcium imaging
- Developing a headset-based virtual reality system for studying conditioned and innate behaviors during head-fixed neural recording

Graduate Student - HHMI Janelia Research Campus July 2014 - July 2019
Principle Investigator: Dr. Michael Reiser, Group Leader
Topic: *functional architecture and signal processing of the fly visual system*
Projects:
- Developed of a fast, modular LED display and virtual reality control system to enable research on animal models of vision
- Used 2-photon calcium imaging, optogenetics, and behavioral assays to study the neural circuitry of motion vision in *Drosophila*

Graduate Student - University of Cambridge Oct. 2014 - Sept. 2015
Principle Investigator: Dr. Berthold Hedwig, Reader - Dept. of Zoology
Topic: *neural basis of insect acoustic communication*
Project:
- Developed of an electrophoretic dye delivery method for anatomical and functional imaging of peripheral nerves in crickets/locusts

Postbac IRTA Fellow - National Institutes of Health (NIH)/NIDCR July 2012 - June 2014
Principle Investigator: Dr. Mark Hoon, Investigator - Lab of Sensory Biology
Topic: *molecular and cellular basis of somatosensation*
Project:
- Designed of novel operant assay for innocuous thermosensation in mice to study the neural circuitry of thermosensation

Lab Technician - University of Florida (UF) College of Medicine July 2011 - June 2012
Principle Investigator: Dr. Roger Papke, Professor - Dept. of Pharm. and Therap.
Topic: *nicotinic acetylcholine receptor-targeted therapeutics*
Project:
- Characterized novel drug compounds on nAChR excitation, inhibition, and modulation using voltage clamp recorings in xenopus oocytes

Volunteer Research Assistant - University of Florida (UF) College of Medicine Jan. 2010 - July 2011

Principle Investigator: Dr. Michael King, Assoc. Scientist - Dept. of Pharm. and Therap.
Topic: *novel treatment strategies for mouse models of neurodegeneration*
Project: ▪ Generated RNA aptamers to reduce tau hyperphosphorylation

Teaching Experience

Visiting Lecturer - Cornell University Fall 2022, Fall 2023

Course: BME 3030 - Biomedical Circuits, Signals, and Systems
5 credit course: 2 lectures, 1 discussion, 3 lab sections weekly
▪ Redesigned and co-taught course with 2 other faculty
▪ Gave lectures, managed labs and student projects, created assessments

Teaching Assistant - Neural Systems & Behavior at Woods Hole (MBL) Summer 2016

Course Instructor: Dr. Michael Reiser
▪ prepared equipment, assisted students and faculty
▪ led a project group assessing visual learning ability in flies

MCAT Instructor - Kaplan Grad Inc. June 2011 - June 2012

Faculty Manager: Pamela Willingham
Duties: ▪ taught a weekly MCAT prep class covering all MCAT subjects

Scholarships and Awards

Postdoctoral Fellowship for Alzheimer's disease research (BrightFocus Foundation)	2023-2025
Mong Neurotech Senior Fellowship (Cornell)	2021-2022
Janelia Graduate Scholar (HHMI)	2014-2019
Postbac Intramural Research Training Award (NIH)	2012-2014
SEAGEP Undergraduate Research Award (UF)	January 2011
University Research Scholar (UF)	March 2010
Estridge Scholar (UF)	Spring 2010

Submitted Manuscripts and Preprints

Isaacson M*, Chang H*, Berkowitz L, Zirkel R, Park Y, Hu D, Ellwood I, Schaffer CB (2023). MouseGoggles: an immersive virtual reality headset for mouse neuroscience and behavior.
Under review at Nature Methods (Sept. 2023).

Isaacson MD, Eliason J, Nerna A, Reiser MB (2023). Small-field visual projection neurons detect translational optic flow and regulate forward walking. BioRxiv, doi: 10.1101/2023.06.21.546024v1.
Under review at Nature Neuroscience (Sept. 2023).

Isaacson MD, Ferguson L, Loesche F, Ganguly I, Chen J, Chiu A, Liu J, Dickson W, Reiser MB (2022). A high-speed, modular display system for diverse neuroscience applications. BioRxiv, doi: 10.1101/2022.08.02.502550.
Under review at Journal of Experimental Biology (Sept. 2023).

* Equal contributing authors

Publications

Isaacson MD, Hoon MA (2021). An operant temperature sensory assay provides a means to assess thermal discrimination. *Molecular Pain* , 17(4480), doi:10.1177/17448069211013633

Morimoto MM, Nern A, Zhao A, Rogers EM, Wong AM, **Isaacson MD**, Bock DD, Rubin GM, Reiser MB (2020). Spatial readout of visual looming in the central brain of Drosophila. *Elife* , 9:e57685, doi:10.7554/eLife.57685

Isaacson MD, Hedwig B. (2016). Electrophoresis of polar fluorescent tracers through the nerve sheath labels neuronal populations for anatomical and functional imaging. *Scientific Reports* , 7(40433), doi:10.1038/srep40433

Isaacson MD, Horenstein NA, Stokes C, Kem WR, and Papke RL. (2013). Point-to-point ligand-receptor interactions across the subunit interface modulate the induction and stabilization of conformational states of alpha7 nAChR by benzylidene anabaseines. *Biochemical Pharmacology* , 85(6): 817-828, doi:10.1016/j.bcp.2013.01.010

Posters

Isaacson M*, Chang H, Berkowitz L, Zirkel R, Park Y, Hu D, Ellwood I, Schaffer CB (2023). An open-source, headset-based VR system for mouse neuroscience, learning, and innate behavior. Poster session presented at the 2023 Brain Initiative meeting, Washington, DC.

Zirkel R*, **Isaacson M**, Yang K, Lamont M, Nishimura N, Schaffer CB (2023). Simultaneous 2-photon calcium imaging of cortical neurons to investigate links between cerebral blood flow defecits and excitation/inhibition balance. Poster session presented at the Society for Neuroscience 2022 meeting, San Diego, CA.

Isaacson M, Park Y*, Emerole O, Berkowitz LE, Nishimura N, Schaffer CB (2022). Modular Mouse Maze: a powerful, easy solution or mouse behavior. Poster session presented at the Society for Neuroscience 2022 meeting, San Diego, CA.

Isaacson MD*, Reiser MB. (2018). Probing visually-guided behaviors using a fast, modular LED display and virtual reality control system. Dynamic poster session presented at Society for Neuroscience 2018 meeting, San Diego, CA.

Isaacson MD*, Eliason J, Nerna A, Reiser MB (2018). A visual projection neuron class stops forward walking when detecting regressive translational motion. Poster session presented at COSYNE 2018 meeting, Denver, CO.

Isaacson MD* and Hoon MA. (2013). A new operant assay for thermosensation. Poster session presented at Society for Neuroscience 2013 meeting, San Diego, CA.

* Presenting author