

Brett Jesse Graham, PhD

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Research Experience

2009-present The Rowland Institute at Harvard University

Postdoctoral Researcher, Visual Neuroscience

Project: Multi-channel in vivo recording from high level rat visual cortex

Lab PI: Dr. David Cox

Education

2004-2009 University of Delaware

PhD in Behavioral Neuroscience, 4.0 GPA

Advisor: Dr. David PM Northmore

Dissertation: **A functional study of the teleost nucleus isthmi:**

Sensing and attending to objects in the immediate environment

2000-2003 Millersville University of Pennsylvania

B.A. in Psychology, 3.77 GPA

Grants

2008 Improvements to Sense and Avoid (SAA) Systems for Unmanned Aircraft Systems (UAS), Air Force SBIR, AF081-069.

Dr. Fernando E. Ortiz, Principal Investigator (EM Photonics)

Brett Graham (Consultant, University of Delaware)

Dr. David Patrick Marlowe Northmore, (Consultant, University of Delaware)

Awards and Honors

2008-2009 Psychology Department Dissertation Award

2008-2009 University Dissertation Fellowship

2007-2008 Psychology Department Teaching Fellow

Professional Societies

Society for Neuroscience

Licenses

Amateur radio – General Class : KB1WTX

Publications

- Zoccolan D, **Graham B**, & Cox D (2010) A self-calibrating, camera-based eye tracker for recording of rodent eye movements. *Frontiers in Neuroscience*. 4(193).
- Ortiz F E, **Graham B**, Spagnoli K & Kelmelis E J (2009) Biologically inspired collision avoidance system for unmanned vehicles. *SPIE Proceedings*. 7332(1), 73320B.
- Graham B J** & Northmore D P M (2007) A spiking neural model of midbrain visuomotor mechanisms that avoids objects by estimating size and distance monocularly. *Neurocomputing*, 70(10-12), 1983-1987.
- Graham B J** & Northmore D P M (2006) A model of proximity measurement by the teleost nucleus isthmi. *Neurocomputing*, 69(10-12), 1281-1285.
- Northmore D P M & **Graham B J** (2005) Avoidance behavior controlled by a model of vertebrate midbrain mechanism. *Lecture Notes in Computer Science*, 3561, 338-345.

Abstracts and Conference Presentations

- Graham B**, Carouso S & Cox D (Nov, 2011) High resolution stereotaxy using structured light imaging. Poster session at Society for Neuroscience, Washington, DC.
- Ortiz F E, Spagnoli K & **Graham B** (Apr, 2009) Biologically inspired collision avoidance system for unmanned vehicles. Presented at SPIE: Defense, Security and Sensing, Orlando, FL.
- Graham B J** & Northmore D P M (Nov, 2008) Sensing the distance of looming objects from a monocular visual image: a parametric examination of the teleost nucleus isthmi. Poster session presented at Society for Neuroscience, Washington, DC.
- Graham B J** & Northmore D P M (Feb, 2008) Monocular proximity derivation in the teleost midbrain. Poster session presented at Computational and Systems Neuroscience, Salt Lake City, UT.
- Graham B J** & Northmore D P M (Oct, 2006) Bi-directional communication of posterior commissure axons between the nuclei isthmi in a teleost. Poster session presented at Society for Neuroscience, Atlanta, GA.
- Graham B J** & Northmore D P M (July, 2006) Spiking neuron models based on midbrain mechanisms that guide visual behavior. Poster session presented at Computational Neuroscience Meeting, Edinburgh, Scotland.
- Graham B J** & Northmore D P M (July, 2005) A model of proximity measurement by the teleost nucleus isthmi. Poster session presented at Computational Neuroscience Meeting, Madison, WI.

Technical Skills

Extracellular Electrophysiology

Setup and performed in vivo recordings from the visual system in paralyzed fish and awake head-fixed rats. Designed and constructed custom recording hardware from off-the-shelf professional audio equipment and discrete components. Programmed custom software for the presentation of visual stimuli, acquisition of 32 channel silicon microelectrode data, and analysis of large (several terabytes) datasets.

Computational Modeling

Designed and programmed biologically constrained models of teleost midbrain visual processing. Applied these models to the real-world problem of visual object avoidance in an unmanned aerial vehicle (Air Force SBIR, AF081-069).

Methods Development

Designed, constructed and validated novel methods for eyetracking in awake rodents and structured light 3-D scanning for high resolution stereology. Adapted a Microsoft Kinect and Gumstix single board linux computer for use as a portable 3D scanner:

<http://www.rowland.harvard.edu/rjf/cox/projects/subprojects/kinect/>.

Engineering

Proficient in CAD programs for mechanical design (Solidworks, Autodesk Inventor) and printed circuit board layout (Eagle). Skilled in the use of rapid prototyping tools (Epilog Laser Cutter, Thing-o-matic 3D printer). Licensed amateur radio operator (general class).

Computer Programming

Demonstrated proficiency in many programming languages: Python, C/C++, R, Java, Matlab, and Javascript. Projects include analysis of physiological data, control of embedded linux and microcontroller systems, visual stimulus presentation, automated image processing and data visualization. Examples and open source code available at: <https://github.com/braingram/>

Teaching Activities

Instructor

Fall 07, Spring 08 Sensation and Perception (Psyc 310)

Teaching Assistant

Spring 07	Measurement and Statistics (Psyc 209)
Fall 04 - Spring 07	Sensation and Perception (Psyc 310), Lab Instructor
Fall 06	Sensation and Perception (Psyc 310, online course)
Fall 06	Developmental Psychology (Psyc 350)
Fall 05	Brain and Behavior (Psyc 314)