Eatai Roth

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I am a mechanical engineer and artist by training with a research background in behavioral neuroscience, robotics, and data science. I have over 15 years of experience in problem identification, project planning, design and fabrication, data analysis and visualization, and scientific communication. I excel at working in and leading interdisciplinary research teams, learning new skills to creatively tackle problems, and translating tools from one discipline to address challenges in another.

Skills Profile

Computing: Python (*numpy, scikit-learn, pandas, TensorFlow/Keras, matplotlib, plotly*), Matlab, SQL, Tableau
Design: CAD (*Solidworks, Fusion360*), illustration and layout (*Adobe Illustrator, InDesign*)
Communication: technical writing and documentation (*MS Word, LaTeX*), oral/visual presentation (*Keynote, Powerpoint*)

Experience

Jan 2018-
May 2022

Assistant Professor
Intelligent Systems Engineering
Indiana University, Bloomington, IN

- Established the research agenda and supervised graduate (2) and undergraduate (6) students investigating human cooperation and motor-task learning. Research leveraged methods including human-subject experiments, machine learning, and agent-based simulations with evolutionary and reinforcement learning algorithms.
- Planned syllabi and schedules, created instructional materials, and taught four new courses in signal processing, dynamics and control, haptics, and robotics for the new Intelligent Systems Engineering Department.
- Developed curriculum for the Cyber-Physical Systems specialty to meet Accreditation Board for Engineering and Technology (ABET) requirements, grow student enrollment, and reduce attrition.
- Co-wrote the first Luddy School Plan for Inclusive Excellence as part of the Diversity and Inclusion Taskforce: identified shortcomings in opportunity, representation, and success; involved stakeholders; and proposed actionable policy changes to broaden participation in computing.

Dec 2013-
Nov 2017

Postdoctoral Fellow in Neuroengineering
Washington Research Foundation
University of Washington, Seattle, WA

Awarded postdoctoral stipend and research funds for the proposal, *"How the Nervous System Controls Flight"*.
Washington Research Foundation (WRF), Air Force Office of Scientific Research (AFOSR) (jointly), 2014-2016, $184,510

- Managed the full life-cycle of a research project and trained students in animal care and preparation, experiment ideation and design, data collection, data analysis, presentation, and publication.
- Designed and implemented an immersive virtual environment for investigating flight behaviors in moths and decision-making in bees; virtual-reality arena incorporated projection mapping and high-speed videography and the accompanying Python codebase for stimulus presentation (Panda3D) and motion tracking (OpenCV).
- Developed and validated a novel methodology (experiment assay and analyses) for modeling multi-input behaviors in animals and humans. This sensory-conflict paradigm furnishes predictive models of concurrent neuromechanical processes (*e.g.*, how flying insects integrate competing sensory cues, how humans combine predictive and reactive control in motor learning).

Sep 2012-
Dec 2013

Postdoctoral Research Associate
University of Washington, Seattle, WA

- Proposed a data-derived dynamics model of a visual fixation behavior in fruit flies that parsed how motion (velocity) and landmark (positional) cues inform navigation.
- Developed analyses (in Matlab) to classify epochs of different behaviors based on behavioral dynamics using Fourier decomposition and Gaussian-mixture models.
- Trained students on equipment usage, experiment ideation, and data analysis as an assistant instructor for the Neural Systems and Behavior short course at the Marine Biological Labs (MBL), Woods Hole, MA.

Jan 2006-
May 2012

Graduate Researcher
Laboratory for Computational Sensing and Robotics
Johns Hopkins University, Baltimore, MD

Awarded *National Science Foundation (NSF) Graduate Research Fellowship*, 2006-2009, $121,500
Awarded *Achievement Rewards for College Scientists (ARCS) Graduate Fellowship*, 2009-2011, $30,000

- Designed experiment apparatus and protocols for investigating a sensorimotor behavior in weakly electric fish.
- Served as teaching assistant for *Electronics and Instrumentation*, *Linear Systems*, and *System Identification*.

Education

June 2012 — **PhD in Mechanical Engineering,** *Robotics* — Johns Hopkins University, Baltimore, MD

May 2005 — **BS in Mechanical Engineering,** *summa cum laude* — University of Pittsburgh, Pittsburgh, PA

May 2001 — **BFA in Painting** — Washington University, St. Louis, MO