

# Jeffrey M Knowles

jeff.knowles@gmail.com  
swellspect.com/about\_me  
(401) 402 - 0565

## *curriculum vitae*

### **Education:**

*PhD in Neuroscience* – UC San Francisco  
*Sc.B in Neuroscience* – Brown University

*Expected May, 2018*  
*Honors in Concentration*

### **Employment History**

Graduate Student Researcher and NSF Fellow 2012 – present  
*UC San Francisco Department of Neuroscience*

Data and algorithms engineering at Nutrivise 2012  
*Contact: Laura Borel, CEO borel.laura@gmail.com*

Research Assistant and Lab Manager in Simmons Lab 2009 – 2011  
*Contact: Professor James Simmons james\_simmons@brown.edu*

Research Assistant in Ecology Research 2007 – 2008  
*Contact: Dr Regan Early: regan\_early@brown.edu*

Sailing Instructor and Race Coach 2004-2010

### **Programing Languages (Native)**

Python, MATLAB, Bash, Processing

### **Programing Languages (Fluent)**

C, C++, Javascript, HTML/CSS, LABView

### **Frameworks**

Keras, TensorFlow, Flask, Backbone, JQuery

### **Development Tools**

Git, SVN

### **Hardware**

microcontrollers, Beaglebone Black (PRU), NI cards (Comedi driver)

### **Areas of Expertise:**

- Auditory neurophysiology, acoustics, biological sonar, animal behavior
- Software development - Python apps, embedded systems, data operations
- Data analysis, experimental design, statistical modeling, machine learning

### **Public Code Repositories:**

- python system for controlling animal behavior experiments: [behavior\\_controller](#)
- python system for controlling auditory neurophysiology recording: [kranky](#)
- Matlab random model of swimming behavior: [DrunkardsSwim](#)
- Matlab automated stereoscopic video tracking: [TadpoleTracker](#)
- PRU + C code for sensor driven spiking neural net: [spikinglednetwork](#)
- Matlab system Identification and correction: [FlatSystem](#)

## **Awards and Commendations**

2012-2015 - Graduate Research Fellowship; National Science Foundation  
2010 - Richard E. Whalen Award for Undergraduate Research Excellence in Neuroscience; Brown University Departments of Neuroscience and Psychology  
2010 - Honorable Mention All American Skipper; Intercollegiate Sailing Association  
2010 - First Team Academic All American Sailor; Intercollegiate Sailing Association  
2008 - Team Captain; Brown University Sailing Team  
2007 - Leo M. Goldberg Scholar; Brown University  
2006 - Rear Admiral John Remey Wadleigh Memorial Prize for Scholarship in Maritime History; St George's School  
2006 - Rhode Island All State Athlete for High School Sailing; Providence Journal

## **Papers in Preparation / Submission**

*Zebra finches exhibit sensitivity to multi-syllabic sequence combinations in a model of word recognition: Behavioral examination strategies birds use to recognize features and feature combinations in speech-like sound sequences.*

*Context dependent encoding of learned syllable sequences in the auditory forebrain: Neurophysiological study of the representation of familiar birdsong syllables and motifs in the auditory brain of zebra finches.*

## **Papers published in peer-reviewed journals**

Knowles, J.M. Barchi, J. Gaudette, J. Simmons, J.A. (2015) *Effective biosonar echo-to-clutter rejection ratio in a complex dynamic scene*. J. Acoust. Soc Am. 138: 2, 1090-1101.

Barchi, J.R., Knowles, J.M. and Simmons, J.A. (2013) *Spatial memory and stereotypy of flight paths by big brown bats in cluttered surroundings*. J. Exp. Biol. 216, 1053-1063.

Schmidt, B.P., Knowles, J.M. and Simmons, A.M. (2011) *Movements of Rana catesbeiana tadpoles in weak current flows resemble a directed random walk*. J. Exp. Biol. 214: 2297-2307.

Bates, M.E., Cropp, B.F., Gonchar, M., Knowles, J., Simmons, J.A., Simmons A.M. (2010) *Spatial Location Influences Vocal Interactions in Bull Frog Choruses*. J. Acoust. Soc Am. 127: 2664- 2677.

## **Selected posters and presentations at scientific conferences** \*indicates presenter

Knowles, J.M.\* and Brainard, M.S. (2017) *Sequence Context Influences Behavioral Recognition of and Neural Responses to Familiar Courtship Song in Zebra Finches*. Association for Research in Otolaryngology, Baltimore, Md.

Knowles, J.M.\* and Doupe, A.J. (2014) *Selective responses in the zebra finch auditory cortex reflect time course of salient information*. Society for Neuroscience Annual Meeting, Washington DC.

Knowles, J.M.\*, Barchi, J.R., Gaudette, J.E., Horowitz, S.H., Simmons, A.M., Simmons, J.A. (2011) *Cochlear processing in biosonar: Modeling sound transduction and the cochlear microphonic in echolocating bats*. Society for Neuroscience Annual Meeting, Washington DC.

Simmons AM\*, Knowles JM, Jacobs E, Simmons JA. (2012) *Passive acoustic monitoring of bullfrog choruses: Spontaneous and evoked changes in group calling activity*. J. Acoust Soc Am. 132: 2063.

Barchi, J.R., Knowles, J.M.\*, Simmons, A.M. (2011) *Flight dynamics and spatial memory in echolocating bats*. J.B. Johnston Club Annual Meeting, Washington DC.

Knowles, J.M.\*, Gaudette, J.E., Barchi, J.R., and Simmons, J.A. (2011) *Reconstructing echolocation behavior using time difference of arrival localization and distributed microphone array as a virtual Telemike*. J. Acoust. Soc. Am. 129: 2574.

Gaudette, J.E.\*, Knowles, J.M., Barchi, J.R. and Simmons, J.A. (2011) *Computational model of a bioinspired broadband receiver for sonar clutter reduction*. J. Acoust. Soc. Am. 129: 2507.

Bates, M.E., Knowles, J.M., Barchi, J.R., Simmons, J.A.\*, Fujioka, E., Wantanabe, Y., Furusawa, Y., Hiryu, S. and Riquimaroux, H. (2011) *Changes in spectrotemporal features of echolocation signals in multiple bat assemblages*. J. Acoust. Soc. Am. 129: 2470.

Simmons, J.A.\*, Barchi, J.R.\* and Knowles, J.M.\* (2011) *Obstacle avoidance, navigation and target orienting in biosonar*. Office of Naval Research Program Review – Bio-inspired Autonomous Systems. Washington DC.

Bates M.E.\*, Watanabe Y., Furusawa Y., Fujioka E., Hiryu S., Riquimaroux H., Knowles J.M., Simmons J.A. (2010) *Echolocation behavior of pairs of flying *Eptesicus Fuscus* recorded with a telemike microphone*. J. Acoust. Soc. Am. 127: 1971.

Simmons A.M.\*, Bates M.E. and Knowles J. (2009) *Non-random patterns of acoustic interactions in chorusing bullfrogs*. J. Acoust. Soc. Am. 126: 2270.

### **Some Other Things I have built**

- Computational model of the cochlea
- Passive sonar array system that localizes animal vocalizations in 3 space and analyzes the spectro-temporal parameters of the signals.
- Biomimetic sonar system to record realistic bat echo signals from obstacles and insects
- dPIV system that records a 3D flow field using consumer cameras and lasers
- Server-side meal recommendation and planning algorithm that optimizes user nutrition while suggesting meals at home or from restaurants. Inference system that estimates nutritional information and meta-data for recipes and restaurant dishes

**Other interests:** kite and sailboat racing, [data projects](#)