

# Samantha R. Summerson

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Postdoctoral Fellow  
Electrical Engineering and Computer Science  
University of California, Berkeley  
450 Li Ka Shing Center, MC 3370  
Berkeley, CA 94720

<http://www.ece.rice.edu/~srs1>  
srsummerson@berkeley.edu  
+1 (805) 450-1225

## Education

- Doctorate of Philosophy*, Electrical Engineering May 2014  
Rice University  
Thesis: *Engineering Deep Brain Stimulation as a Treatment for Parkinson's Disease: from Models to Materials*  
Advisors: Dr. Behnaam Aazhang and Dr. Caleb Kemere  
GPA: 4.08
- Masters of Science*, Electrical Engineering May 2010  
Rice University  
Thesis: *A Hybrid Relaying Protocol for the Multiple-Relay Network*  
Advisor: Dr. Behnaam Aazhang  
GPA: 4.06
- Bachelor of Arts*, Applied Mathematics (with Honors) December 2006  
University of California, Berkeley  
Concentration: Systems Theory  
Thesis: *Wavelets Multiresolution Analysis: An Introduction to Wavelets and Biorthogonal Wavelet Theory*  
Advisor: Dr. Alberto Grunbaum  
GPA: 3.63

## Technical Interests

Experimental and computational neuroscience, information theory, signal processing, machine learning, communication systems.

## Publications and Posters

- Samantha R. Summerson, Behnaam Aazhang and Caleb Kemere, "Reducing Parkinsonian Entropic Noise and Activity with Irregular Deep Brain Stimulation Patterns," in preparation for *Frontiers of Computational Neuroscience*.
- Flavia Vitale, Samantha R. Summerson, Behnaam Aazhang, Caleb Kemere and Matteo Pasquali, "Carbon nontube fiber flexible, safe electrodes for neural stimulation and recording," in preparation for *Nano Letters*.
- Flavia Vitale, Samantha R. Summerson, Behnaam Aazhang, Caleb T. Kemere and Matteo Pasquali, "Carbon nanotube fiber (CNTf) Implantable Neural Electrodes for Chronic Recording and Stimulation," to appear at *Neuroscience (SfN) 2014*.
- Samantha R. Summerson, Behnaam Aazhang and Caleb T. Kemere, "Irregularly Patterned Deep Brain Stimulation Reduces Pathological Cortical Activity in Hemi-Parkinsonian Rats," to appear at *Neuroscience (SfN) 2014*.
- Samantha R. Summerson, Behnaam Aazhang and Caleb T. Kemere, "Characterizing Motor and Cognitive Effects Associated with Deep Brain Stimulation in the GPi of Hemi-Parkinsonian Rats," to appear in *IEEE. Trans. Neural Systems and Rehabilitation Engineering*.

- Samantha R. Summerson, Charlie Grealish, Behnaam Aazhang and Caleb T. Kemere, “Randomized Stimulation Signal Design to Create Partial Informational Lesions in Parkinsonian Neuronal Networks,” to appear at *ICASSP 2014*.
- Samantha R. Summerson, Behnaam Aazhang and Caleb T. Kemere, “Motor Behavior Tuning as a Function of Stimulation Frequency in the 6-OHDA Rat Model of GPi-Deep Brain Stimulation,” *Neuroscience (SfN) 2013*, November 2013.
- Flavia Vitale, Samantha R. Summerson, Caleb Kemere and Matteo Pasquali, “Carbon Nanotube Fiber Microelectrodes for Neural Recording and Stimulation,” *Biomedical Engineering Society Annual Meeting*, September 2013.
- Samantha R. Summerson, Behnaam Aazhang, and Caleb T. Kemere, “Behavioral Effects of Disrupted Direct Pathway Signal Flow Cause by Dopamine Depletion,” *Computational Neuroscience Symposium (CNS)*, July 2013.
- Samantha R. Summerson, Caleb T. Kemere, and Behnaam Aazhang, “Current Amplitude-Dependent Modulation of Rotational Behavior with GPi Stimulation in the Rodent Model of Parkinson’s Disease,” *Engineering in Medicine and Biology Conference (EMBC)*, July 2013.
- Samantha R. Summerson and Anuj Batra, “Convolutional Network Codes for Reliable Point-to-Point Wireless Communication,” *Proc. Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, November 2012.
- Samantha R. Summerson and Caleb Kemere, “Investigating Cognitive Side Effects of GPi Deep Brain Stimulation for Parkinson’s Disease,” poster presented at *2012 Annual Symposium for the Center for NeuroEngineering*, Rice University, TX, September 2012.
- Samantha R. Summerson and Behnaam Aazhang, “Parkinson’s Disease: Interference in the Neural Communication Channel,” poster presented at *Women’s Workshop on Communications and Signal Processing*, Banff, Canada, July 2012.
- Samantha R. Summerson and Behnaam Aazhang, “Outage Analysis for Hybrid Relaying in the Parallel Relay Network,” *Proc. Asilomar Conference on Signals, Systems and Computers*, Pacific Grove, CA, November 2010.
- Samantha Summerson and Behnaam Aazhang, “Relay Selection in the Parallel Relay Network,” poster presented at *IEEE 2010 School of Information Theory*, USC, August 5-8, 2010.
- Samantha R. Summerson and Behnaam Aazhang, “Hybrid Relaying for the Parallel Relay Network,” poster presented at *IEEE 2009 School of Information Theory*, Northwestern University, August 10-13, 2009, and the *Winedale Workshop*, October 23, 2009.
- Samantha R. Summerson and Behnaam Aazhang, “Utilizing Network Information for Optimal Path Selection in Multi-hop Networks,” poster presented at *IEEE Communication Theory Workshop*, US Virgin Islands, May 2008.
- Meghan Belinski, Andrea Martinez, Samantha Summerson and Dr. Raymond Chan, “Wavelet Algorithms for High-Resolution Image Reconstruction,” poster presented at *SIAM Conference on Computational Science and Engineering*, Costa Mesa, CA, February 19-23, 2007.

## Patents

- Samantha Rose Summerson, Anuj Batra, Srinath Hosur and Georgios Angelopoulos, “Systems and Methods for Network Coding Using Reed-Solomon Codes,” US Patent Application #20130170433, issued July 4, 2013.
- Samantha Rose Summerson and Anuj Batra, “Systems and Methods for Network Coding Using Maximum Distance Separable (MDS) Linear Network Codes,” US Patent Application #20130229991, issued Sept. 5, 2013.
- Samantha Rose Summerson and Anuj Batra, “Systems and Methods for Construction of and Network Coding Using Near-Maximum Distance Separable (MDS) Linear Network Codes,” US Patent Application #20130230058, issued Sept. 5, 2013.

Samantha Rose Summerson and Anuj Batra, "Systems and Methods for a Soft-Input Decoder of Linear Network Codes," US Patent Application #20130232397, issued Sept. 5, 2013.

Samantha Rose Summerson, Anuj Batra, and June Chul Roh, "Systems and Methods for Network Coding Using Convolutional Codes," US Patent Application #20130238962, issued Sept. 5, 2013.

## Honors

ECE Department Best Doctoral Thesis Award, 2014

First Place (Graduate Student Poster), 20th Annual Neuroscience Poster Session, 2013

Best Graduate Poster, School of Engineering Poster Session of the Century, 2012

Schlumberger Graduate Fellowship, 2010-2011

National Science Foundation Graduate Research Fellowship, 2008 - 2011

Texas Instruments Distinguished Graduate Fellowship, 2007 - 2012

Rice University Graduate Fellowship, 2007 - 2008

Academic Honors from UC Berkeley, 2006

## Experience

*Research Assistant* Spring 2012 - present  
Rice University, ECE Dept., Kemere Lab

- Developing animal model for Parkinson's Disease.
- Data analysis and modeling.

*Co-op in R&D Center* Summer 2011  
Texas Instruments, Wireless and Medical Systems Lab

- Coding designs for reliable wireless communications.
- Patents pending.

*Research Assistant* Fall 2007 - present  
Rice University, ECE Dept., Center for Multimedia Communications (CMC Lab)

- Researching relaying behaviors and resource allocation in cooperative wireless networks.

*Teaching Assistant* Fall 2008 - Spring 2011  
Rice University, ECE Dept.

- Assistant for course *ELEC 533: Introduction to Random Processes and Applications* for two semesters, for *ELEC 430: Digital Communications* for two semesters and for *ELEC 241: Fundamentals of Electrical Engineering* for one semester.
- Hosted weekly office hours and topic review sessions
- Guest lectured
- Evaluated final projects
- Graded assignments

*Head Teaching Assistant* Fall 2009  
Rice University, ECE Dept.

- Head teaching assistant for course *ELEC 241: Fundamentals of Electrical Engineering*
- Lectured 2 hrs/week on topics such as RLC circuits, op-amps, signal representations, etc.
- Managed course and lab assistants

*Visiting Student Researcher* Summer 2008  
University of Oulu, Center for Wireless Communications

- Research on the impact of utilizing network state information on making routing decisions.

*Undergraduate Researcher* Summer 2006  
 U.S.-H.K. NSF Research Experience for Undergraduates in Numerical Analysis and Scientific Computing, Colorado School of Mines and the Chinese University of Hong Kong, Hong Kong, China

- Participated on team performing research on high-resolution and super-resolution image reconstruction using wavelet algorithms
- Implementing algorithms in Matlab
- Attended the China-France School on Multi-Image Processing (Beijing, China, July 2006) and presented poster at the SIAM Conference on Computational Science and Engineering (Costa Mesa, CA, February 2007).

*Undergraduate Research Assistant* Spring 2006  
 Department of Education, University of California - Berkeley

- Assisted a Math Education doctoral student with research on the relationship between area models and junior high students' understanding of operations on fractions.
- Aided with data collection, designing test problems, and maintaining database.
- Helped create a software program that uses area models to teach operations on fractions.

### Leadership and Technical Service

<i>Women in Information Theory Society</i>	Spring 2010 - present
<i>IEEE Information Theory Society member</i>	Fall 2009 - present
Member-at-large on Student Committee	
<i>IEEE Communications Society member</i>	Spring 2009 - present
<i>ECE Mentoring Program, Rice University</i>	Fall 2008 - present
Founding leader, organizer, and mentor	
<i>IEEE student member</i>	Fall 2008 - present
<i>Electrical <math>\otimes</math> Computer Engineering Leaders (ExCEL)</i>	Spring 2008 - present
Founding member, served as President and Vice-President	
<i>Empowering Leadership Alliance</i>	Spring 2008 - 2011
Former member of the Student Advisory Board and mentor	
<i>Math Undergraduate Student Association, UC Berkeley</i>	Fall 2004 - Fall 2006

### Additional Information

Citizenship: USA, UK  
 Languages: English (native speaker), Spanish (fluent)  
 Other skills: Windows 98/2000/XP/Vista, MAC OS, Linux, Matlab, LabVIEW, Microsoft Office, L<sup>A</sup>T<sub>E</sub>X, C, NSpike

### Personal

Amateur cheesemaker  
 Intramural soccer player (left midfield)

### References

Available upon request.