

<b>Education</b>	<b>Massachusetts Institute of Technology, Cambridge, MA, USA</b> Sept 2007 – Present Ph.D. candidate in Speech and Hearing Bioscience and Technology Harvard-MIT Division of Health Science and Technology (GPA: 5.0/5.0) Expected date of completion: February 2012
	Master of Science (S.M.) candidate in Electrical Engineering and Computer Science (EECS) Expected date of completion: February 2012
	<b>The Johns Hopkins University, Baltimore, MD, USA</b> Sept 2005 – July 2007 Master of Science in Engineering (M.S.E.) in Biomedical Engineering (GPA: 4.0/4.0)
	<b>Tsinghua University, Beijing, China</b> Sept 2001 – July 2005 Bachelor of Engineering (B.E.) in Biomedical Engineering (with highest honors) GPA: 93.9/100 (Major), 91.9/100 (Overall).
<b>Research Experience</b>	<b>Graduate Research Associate</b> Sept 2007 – Present Speech Communication Group, RLE, MIT and Speech Lab, Boston University <i>Advisors: Drs. Joseph Perkell and Frank Guenther</i> <ul style="list-style-type: none"><li>Using real-time dynamic perturbation of auditory feedback and functional MRI (fMRI) to study the sensorimotor control of articulatory movements in time-varying phonemes and multisyllabic utterances and the role of auditory feedback in speech sequencing.</li><li>Studying the differences in the sensorimotor properties of the speech motor system between normal speakers and speakers with persistent developmental stuttering.</li><li>Using diffusion-tensor imaging (an MRI modality) to study the relation between structural abnormalities of the brain and abnormal speech motor functions in persistent developmental stuttering.</li><li></li></ul>
	<b>Graduate Research Assistantship</b> Sept 2005 – Jul 2007 Neural Encoding Lab, Johns Hopkins University School of Medicine <i>Advisor: Dr. Eric D. Young</i> Effects of acoustic trauma on neuronal encoding of sound intensity and spectra by ventral cochlear nucleus neurons.
	<b>Undergraduate Research Assistantship</b> Feb 2002 – July 2005 Biomedical Signal Processing Laboratory, Tsinghua University <i>Advisor: Prof. Guangshu Hu</i> Psychophysics and image processing studies of the electronic visual prosthesis.
<b>Honors and Awards</b>	<b>Research Funding</b> <ul style="list-style-type: none"><li>National Science Foundation: "Doctoral Dissertation Research: Online Control of Multisyllabic Speech Articulation Based on Auditory Feedback" (ID: 1051566) (Ph.D. student co-PI) 2011</li></ul>
	<b>National</b> <ul style="list-style-type: none"><li>Raymond H. Stetson Fellowship in Phonetics and Speech Production, Acoustical Society of America 2011</li><li>National Scholarship (First-class) from Tsinghua University, Beijing 2003</li></ul>
	<b>Institutional and Municipal</b> <ul style="list-style-type: none"><li>Helen C. Peake Research Award, from Research Laboratory of Electronics, MIT 2011</li><li>Advanced Multimodal Neuroimaging Training Fellowship from A.A. Martinos Center for Biomedical Imaging, Massachusetts General Hospital, Harvard Medical School 2009</li><li>Chyn Duog Shiah Memorial Fellowship, MIT 2008</li><li>Edward Austin Endowed Fellowship, MIT 2007</li><li>Outstanding Undergraduate Thesis Award, Tsinghua University 2007</li><li>Award for Contribution to Student Laboratory Development, Tsinghua University 2007</li><li>Excellent Graduate Award from Tsinghua University (Awarded to 55 out of 3801 bachelor degree recipients in the year 2005) 2005</li><li>OOCL Scholarship, Tsinghua University 2004</li><li>Second Prize in Mathematical Modeling Contest of Beijing Universities 2004</li></ul>

- Excellence in Cultural and Artistic Activities Award, Tsinghua University 2003
- Wei-Lun Foundation Scholarship, Tsinghua University 2002

#### Departmental

- Distinction in the 2009 SHBT Written Qualifying Exam (Awarded every few years to recognize outstanding performance on all aspects of the exam) 2008

## Publications

### Journal Articles

- **Cai, S.**, Ghosh, S. S., Guenther, F. H., and Perkell, J. S. (2011). "Focal manipulations of formant trajectories reveal a role of auditory feedback in the online control of both within-syllable and between-syllable speech timing." *J. Neurosci.* 31(45):16483-16490.
- **Cai, S.**, Ghosh, S. S., Guenther, F. H., and Perkell, J. S. (2010). "Adaptive auditory feedback control of the production of the formant trajectories in the Mandarin triphthong /iau/ and its patterns of generalization." *J. Acoust. Soc. Am.* 128(4):2033-2048.
- **Cai, S.**, Ma, W.-L. D., and Young, E. D. (2009). "Encoding intensity in ventral cochlear nucleus following acoustic trauma: implications for loudness recruitment." *J. Assoc. Res. Otolaryngol.* 10(1): 5-22.  
Commented in Joris, P. X. (2009). "Recruitment of neurons and loudness." *J. Assoc. Res. Otolaryngol.* 10(1):1-4.
- Fu, L., **Cai, S.**, Zhang, H., Hu, G., and Zhang, X. (2006). "Psychophysics of reading with a limited number of pixels : towards the rehabilitation of reading ability with visual prosthesis." *Vision Res.* 46: 1292-1301.
- Fu, L., Zhang, H., **Cai, S.**, and Hu, G. (2006). "Chinese printed text reading performance with pixelized prosthetic vision system." (In Chinese). *J. Tsinghua Univ. (Sci. & Tech.)*. 46(6): 858-860, 871.

### Manuscripts in Preparation or under Review

- **Cai, S.**, Beal, D. S., Tiede, M. K., Perkell, J. S., Guenther F. H., and Ghosh, S. S. (In preparation). "Variability of speech movements and its relations to diffusion-based integrity measures of brain white matter in developmental stutterers and nonstutterers."
- **Cai, S.**, Beal, D. S., Ghosh, S. S., Tiede, M. K., Perkell, J. S., and Guenther, F. H. (In preparation). "Auditory-motor interaction during speech production in developmental stuttering: evidence from static and time-varying articulation."
- **Cai, S.**, Ghosh, S. S., Perkell J.S., and Guenther, F. H. (In preparation). "Online updating of motor programs and timing during multisyllabic articulation: experimental results and preliminary modeling findings." In Fuch, S., Weirich, M., Pape, D., and Perrier, P. (Eds.) *Planning and Dynamics*
- **Cai, S.**, Ghosh, S. S., Perkell, J.S., and Guenther, F. H. (In preparation). "An fMRI study of the neural correlates of auditory-motor adaptation in vowel production."
- **Cai, S.** (In preparation). "Adaptation to perturbed auditory feedback reveals coordination between the trajectories of the first and second formant frequencies during production of the Mandarin triphthong /iau/"

### Conference Publications and Abstracts

- Schaefer, M., McAuliffe, M. C. M., Liss, J. M., Katseff, S., O'Beire, G. A., and **Cai, S.** (2012). Responses to manipulations in auditory feedback: The effect of aging. 2012 Motor Speech Conference, Santa Rosa, CA, USA. Feb. 29 – March 4, 2012.
- Beal, D. S., **Cai, S.**, Guenther, F. H., Ghosh, S. S., Tiede, M. K., and Perkell, J. S. (2012). The relations among stuttering severity, experiences, and kinematic variability measures. 2012 Motor Speech Conference, Santa Rosa, CA, USA. Feb. 29 – March 4, 2012.
- Beal, D. S., **Cai, S.**, Ghosh, S. S., Tiede, M. K., and Perkell, J. S. (2011). The Relations Among Stuttering Severity, Experiences, & Kinematic Variability Measures. American Speech, Language and Hearing Association (ASHA) Annual Convention. San Diego, CA, Nov. 17-19, 2011.
- Beal, D. S., Tourville, J. A., **Cai, S.**, Segawa, J., and Guenther, F. H. (2011). An fMRI Study of Speech-Sequence Learning in People Who Stutter. American Speech, Language and Hearing Association (ASHA) Annual Convention. San Diego, CA, Nov. 17-19, 2011.
- **Cai, S.**, Beal, D. S., Tiede, M. K., Perkell, J. S., Guenther F. H., and Ghosh, S. S. (2011). "Relating the kinematic variability of speech to MRI-based structural integrity of brain white matter in people who stutter and people with fluent speech." To be presented at Society for Neuroscience Annual Meeting 2011, Washington, DC, Nov. 12 – 16, 2011.
- **Cai, S.**, Beal, D. S., Ghosh, S. S., Tiede, M. K., Guenther, F. H., and Perkell, J. S. (2011).

Comparing auditory-motor interaction in static and time-varying articulation between stutterers and normal speakers. To be presented at the 3rd Neurobiology of Language Conference (NLC), Annapolis, MD, Nov. 10 – 11, 2011.

- Schaefer, M. C. M., McAuliffe, M. J., Liss, J. M., O'Beirne, G. A., and **Cai, S.** (2011). "Responses of older individuals to manipulations in auditory feedback: Preliminary findings." The 8th Asia Pacific Conference on Speech, Language and Hearing, Christchurch, Canterbury, New Zealand, Jan. 11-14, 2011.
- **Cai, S.**, Ghosh, S. S., Guenther, F. H., and Perkell, J. S. (2010). "The role of auditory feedback in the online control of multisyllabic articulation." To be presented at International Summer School on Cognitive and Physical Models of Speech Production, Speech Perception and Production-Perception Interaction. Berlin, Germany, Sept. 21 – Oct. 1, 2010.
- **Cai, S.**, Ghosh, S. S., Guenther, F. H., and Perkell, J. S. (2010). "Coordination of the first and second formants of the Mandarin triphthong /iau/ revealed by adaptation to auditory perturbations. (Abstract)" *J. Acoust. Soc. Am.* 127(3): p. 2018. 159th Meeting of the Acoustical Society of America, Baltimore, MD, April 19-23, 2010.
- **Cai, S.**, Ghosh, S. S., Perkell, J. S., and Guenther, F. H. (2010). "The role of auditory feedback in the online control of articulatory trajectories and timing in a multi-syllabic utterance." Presented at the 2010 Motor Speech Conference, Savannah, GA, March 4 – 7, 2010
- **Cai, S.**, Boucek, M., Ghosh, S. S., Guenther, F. H., and Perkell, J. S. (2008). "Sensorimotor adaptation to dynamic feedback perturbation of diphthong acoustics and results from perturbation of the Mandarin triphthong /iau/." In *Proceedings of the 8th Int. Seminar on Speech Production*, Strasbourg, France, Dec. 8–12, 2008. pp. 65-68.
- **Cai, S.**, Ma, W.-L. D., Letham, B., and Young, E. D. (2007). "Rate-intensity functions of ventral cochlear nucleus in normal and hearing-impaired cats and their possible relationships to loudness recruitment." *30th Midwinter Meeting of the Assoc. Res. Otolaryngol.*, Denver, Colorado, February 10-15, 2007.
- Letham, B., Ma, W.-L. D., **Cai, S.**, and Young, E. D. (2007). "Acoustic trauma induces long-term temporal correlations in DCN." *30th Midwinter Meeting of the Assoc. Res. Otolaryngol.*, Denver, Colorado, February 10-15, 2007.
- **Cai, S.**, Fu, L., Zhang, H., Hu, G., & Liang, Z. (2005). "Prosthetic visual acuity in irregular phosphene arrays under two down-sampling schemes: a simulation study." In *Proceeding of the 2005 IEEE EMBS 27th Annual Conference*, Shanghai, China, September 1-4, 2005. Vol. 5.

## Teaching Experience

### Teaching Assistantship

Systems Bioengineering II (Prof. Xiaoqin Wang), JHU	Spring 2007
Systems Bioengineering Lab I (Prof. Eileen Haase), JHU	Fall 2006
Physiol. Foundations of Biomed. Engineering Lab I (Prof. Eileen Haase), JHU	Fall 2005
Models and Simulations (Prof. Leslie Tung & Prof. Raymond Winslow), JHU	Spring 2006

### Undergraduate Tutorship

Tuba teacher at Tsinghua University Symphonic Band	Sept 2002 – Jan 2005
Taught five students tuba playing from beginning.	

## Invited Talks

- "Speech motor control in time-varying phonemes and multisyllabic utterances: Insights from auditory feedback perturbation." GIPSA-lab (Laboratoire de Recherche, Gipsa, Grenoble, Image, Parole, Signal, Automatique), Grenoble, France. Sept. 22, 2010.
- "Speech motor control and auditory feedback: Exploring time-varying and multisyllabic articulation." New Zealand Institute of Language, Brain and Behavior (NZILBB), University of Canterbury, Christchurch, New Zealand. August 17th, 2010.
- "Neural correlates of speech motor learning: an fMRI study." Forum of the Harvard-MIT Division of Health Science and Technology (HST). April 15th, 2010.
- "Sensorimotor control of dynamic formant trajectories in the Mandarin triphthong /iau/: preliminary results." Voice Center Research Forum, Massachusetts General Hospital. July 25th, 2008.

## Reviewer activities

- Ad hoc reviewer for
- Journal of Communication Disorders (2011– )
  - Neurobiology of Language Conference (2011– )
  - IEEE Engineering in Medicine and Biology Society Conference (EMBC) (2011– )
  - Journal of the Acoustical Society of America (2010– )

## Professional Memberships

- Society for Neuroscience (SfN)
- Student member of the Acoustical Society of America (ASA)
- Member of the National Student Speech Language Hearing Association (NSSLHA)
- Student Member of the Institute of Electrical and Electronics Engineers (IEEE)

- Student Member of Engineering in Medicine and Biology Society (EMBS)

**Extracurricular  
Activities**

**Chief Tubist**

Johns Hopkins University Wind Ensemble  
Tsinghua University Symphonic Band

Sept 2005 – Apr 2007  
Sept 2001 – July 2005

**Tubist**

Tsinghua University Symphonic Orchestra

Aug 2004 – July 2005