# Guoguo Chen

## CONTACT INFORMATION

Johns Hopkins University                                    E-mail: guoguo@jhu.edu
3400 N. Charles Street, Hackerman Hall 322
Baltimore, Maryland 21218

## RESEARCH INTEREST

Keyword Spotting                              Deep Neural Networks
Automatic Speech Recognition                   Natural Language Processing
Machine Learning

## EDUCATION

2010.8 – present **Ph.D. Student in Electrical and Computer Engineering**
Johns Hopkins University, Baltimore, MD
Advisor: Sanjeev P. Khudanpur, Daniel Povey
Overall GPA: 3.95/4.0

2006.8 – 2010.7 **Bachelor of Engineering in Electronic Engineering**
Tsinghua University, Beijing, China
Overall GPA: 90.9/100
Rank: Top 5% in the department (13/240), top one in the class

## SELECTED COURSES

| | | | |
|---|---|---|---|
| EN.520.651 Random Signal Analysis | A+ | EN.520.646 Wavelets & Filter Banks | A+ |
| EN.550.430 Intro to Statistics | A+ | EN.520.419 Iterative Algorithms | A |
| EN.600.666 Information Extraction | A+ | EN.600.475 Machine Learning | A |
| EN.600.465 Natural Language Processing | A- | | |
| Stochastic Processes | 99/100 | Data Structure | 97/100 |
| Calculus | 95/100 | | |

## SELECTED HONORS/AWARDS

| | |
|---|---|
| 2011 – present | Fully funded Graduate Assistant (Johns Hopkins University) |
| 2010 | ECE Graduate Fellowship (Johns Hopkins University) |
| 2009 | First - class Scholarship for Academic Performance (Tsinghua University) |
| 2008 | Friends of Tsinghua - SK Scholarship (Tsinghua University) |
| 2007 | The National Scholarship (Tsinghua University) |
| 2006 | Scholarship for Excellent Freshman (Tsinghua University) |

## CURRENT RESEARCH TOPIC

2012.2 – present **Keyword Spotting in Low Language Resource Setting**
- One part of my work focuses on large vocabulary continuous speech recognition (LVCSR)-based keyword spotting methods in low language resource setting. In such setting, the size of the expert-generated lexicon is usually limited, thus keywords in interest (e.g., person names, city names, etc.) are very likely to be out-of-vocabulary (OOV) words, which the standard LVCSR system simply cannot transcribe. To tackle this issue, I have proposed techniques such as proxy keywords, automatic lexicon generation, etc.

**2013.6 – present** **Keyword Spotting in Low Computation Resource Setting**
- Another part of my work involves developing keyword spotting algorithms that are suitable for computation constrained devices, such as smartphones or tablets. This kind of keyword spotting algorithms is usually used to wake up a device, e.g., Google Now features the keyword "Okay Google" where users can activate it by simply saying the phrase "Okay Google". I have developed multiple neural network-based algorithms for keyword spotting in this setting.

## WORK EXPERIENCE

**2013.6 – 2013.9** **Intern at Google Inc.**
- Developed a novel deep neural network based keyword-spotting algorithm. The proposed framework has a small memory footprint, low computational cost, and high precision, and is appropriate for wakeup applications on devices such as smartphones and tablets.

**2014.5 – 2014.8** **Intern at Google Inc.**
- Developed a novel long short-term memory (LSTM) recurrent neural network based feature extractor for query-by-example (QbyE) keyword spotting. This keyword spotting algorithm enables users to specify their own keywords and has small memory footprint, low computational cost as well as high precision, which makes it suitable for wakeup applications on devices such as smartphones and tablets.

## SELECTED RESEARCH PROJECTS

**2015.2 – 2015.3** **Center for Language and Speech Processing, Johns Hopkins University**
- Pronunciation and inter-word silence probability modeling for automatic speech recognition.

**2015.1 – 2015.3** **Center for Language and Speech Processing, Johns Hopkins University**
- IARPA's ASpIRE challenge: Automatic Speech recognition In Reverberant Environments.

**2014.9** **Center for Language and Speech Processing, Johns Hopkins University**
- Implemented an efficient in-memory representation of ARPA format n-gram language model, which enables efficient lattice rescoring with huge language models.

**2013.6 – 2013.9** **Mobile speech group, Google Inc.**
- Developed the prototype of Google Now's hotword detection system, which enables users to activate Google Now by simply saying the phrase "Okay Google".

**2012.11** **Center for Language and Speech Processing, Johns Hopkins University**
- Implemented the keyword search module for open source speech recognition toolkit Kaldi.

**2011.8 – 2011.9** **Center for Language and Speech Processing, Johns Hopkins University**
- Implemented a weighted finite state transducer (WFST) based lattice indexing method for keyword search tasks.

**2012.8 – 2014.5** **Center for Language and Speech Processing, Johns Hopkins University**
- IARPA's Babel program: keyword search for low resource languages. Developed end-to-end keyword search systems for multiple low resource languages.

**2011.1 – 2011.6** **Center for Language and Speech Processing, Johns Hopkins University**
- Mandarin and English speech recognition system with Attila: dictionary creating, acoustic training, language modeling, etc.

**2009.9 – 2010.7** **Laboratory of Speech and Language Technology, Tsinghua University**
- Telephone Speech/Music Classification: cut the ring tones from a phone call, where ring tones can appear in the middle of a phone call.

# SELECTED PUBLICATIONS

- **Guoguo Chen**, Hainan Xu, Minhua Wu, Daniel Povey, Sanjeev Khudanpur. "*Pronunciation and silence probability modeling for ASR*," INTERSPEECH 2015.
- Hainan Xu, **Guoguo Chen**, Daniel Povey, Sanjeev Khudanpur. "*Modeling phonetic context with non-random forests for speech recognition*," INTERSPEECH 2015.
- Vijayaditya Peddinti, **Guoguo Chen**, Daniel Povey and Sanjeev Khudanpur. "*Reverberation robust acoustic modeling using i-vectors with time delay neural networks*," INTERSPEECH 2015.
- **Guoguo Chen**, Carolina Parada, Tara N. Sainath. "*Query-by-example keyword spotting using long short-term memory networks*," ICASSP 2015.
- Vassil Panayotov, **Guoguo Chen**, Daniel Povey, Sanjeev Khudanpur. "*LibriSpeech: an ASR corpus based on public domain audio books*," ICASSP 2015.
- Jan Trmal, **Guoguo Chen**, et al. "*A Keyword Search System using Open Source Software*," SLT 2014.
- Chunxi Liu, Aren Jansen, **Guoguo Chen**, Keith Kintzley, Jan Trmal and Sanjeev Khudanpur. "*Low-Resource Open Vocabulary Keyword Search Using Point Process Models*," INTERSPEECH 2014.
- Justin Chiu, Yun Wang, Jan Trmal, Dan Povey, **Guoguo Chen** and Alexander Rudnicky. "*Combination of FST and CN Search in Spoken Term Detection*," INTERSPEECH 2014.
- **Guoguo Chen**, Carolina Parada, Georg Heigold. "*Small-footprint Keyword Spotting Using Deep Neural Networks*," ICASSP 2014.
- **Guoguo Chen**, Oguz Yilmaz, Jan Trmal, Daniel Povey, Sanjeev Khudanpur. "*Using Proxies for OOV Keywords in the Keyword Search Task*," ASRU 2013.
- **Guoguo Chen**, Sanjeev Khudanpur, Daniel Povey, Jan Trmal, David Yarowsky and Oguz Yilmaz. "*Quantifying the Value of Pronunciation Lexicons for Keyword Search in Low Resource Languages*," ICASSP 2013.

# PENDING PATENTS

- Key Phrase Detection. GP-19639-00-US (16113-5295001)
- Learning for Deep Neural Networks. GP019885-00-PR (16113-5314P01)
- User Specified Keyword Spotting Using Long Short Term Memory Neural Network Feature Extractor. GP-22850-00-US (16113-6564001)

# SKILLS

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|---|---|
| Programming: | C, C++, Perl , Python, Java |
| Tools: | Kaldi, Attila, OpenFst, SRILM, Latex, Matlab |