

# Shucong Zhang

Email: dacong001@hotmail.com

## Education

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### University of Edinburgh

PhD in Informatics

Edinburgh, UK

Oct 2017–Dec 2021

- Supervisors: Prof Steve Renals and Dr Peter Bell
- Thesis: Effective Attention-Based Sequence-to-Sequence Modelling for Automatic Speech Recognition
- Examiners: Dr Shinji Watanabe and Dr Hao Tang

Master of Science in Computer Science

Sep 2016–Sep 2017

- Graduate with Distinction
- Supervisor: Dr Shay Cohen
- Thesis: Training Neural Networks without Backpropagation

### Purdue University

Bachelor of Science in Mathematics

West Lafayette, IN, US

Sep 2011–Aug 2014

- Graduate with Honours in Mathematics

## Employment

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### Samsung AI Centre

Research Scientist

Cambridge, UK

Aug 2022–Present

1. Designed Innovative Personalized Sound Enhancement Models:
  - Created cutting-edge personalized sound enhancement models that effectively separate the user's voice from background noise and other speakers.
  - One of the models has been deployed in Samsung S23 mobile phones, positively impacting tens of millions of users.
2. Developing Efficient Speech Processing Models:
  - Spearheaded the development of highly efficient automatic speech recognition models and self-supervised learning methods for speech processing.
  - Achieved a remarkable up to four-fold reduction in computational time and memory cost compared to state-of-the-art models.
  - Granted a patent for the invented method.
3. Developing Solutions for On-Device Large Language Models (LLMs):
  - Led efforts in devising solutions for on-device large language models, successfully reducing the size of LLMs by up to ten-fold.
  - Ensured no compromise in performance across natural language understanding, question answering, and next token prediction.

### Toshiba Cambridge Research Laboratory

Research Engineer

Cambridge, UK

Aug 2021–July 2022

1. Enhanced Innovative Streaming Transformer-based ASR Model:
  - Pioneered the development of a streaming Transformer-based end-to-end model for automatic speech recognition (ASR).
  - Significantly enhanced both accuracy and speed, resulting in superior real-time speech-to-text transcription capabilities when compared to existing online Transformer speech recognition models.

## 2. Constructed and Optimized Multi-Modal Speech Recognition Systems:

- Led the construction and optimization of speech recognition systems tailored for multi-modal scenarios, encompassing both audio and video inputs.
- Successfully integrated and fine-tuned the systems to ensure seamless and efficient processing of diverse input modalities.

Research Intern

Jun 2019–Oct 2019

### 1. Innovated Level-Wise Neural Network Training Method:

- Spearheaded the development of a groundbreaking level-wise neural network training method.
- Attained state-of-the-art results on benchmark datasets across diverse domains, including automatic speech recognition, image classification, and language modeling.

### 2. Developed Robust Transfer Learning for ASR Models:

- Designed and implemented a novel transfer learning method, enhancing end-to-end automatic speech recognition models to be robust in the presence of noise.
- Demonstrated significant error reductions in previously unseen noise conditions, showcasing the method's effectiveness in real-world, dynamic environments.

## Opensource Experience

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Contributor to SpeechBrain, One of the Mostly Utilized Speech Processing Toolkit

- Actively contributed to the development and enhancement of SpeechBrain.
- Develop and maintain state-of-the-art speech recognition models (e.g., Transformers, Branchformers, Conformers) for datasets with different acoustic conditions (e.g., lecture talks, meeting recordings).

## Programming Skills

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Python, PyTorch, TensorFlow, Java, C/C++, Unix Shell

## Publications

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**Shucong Zhang**, Malcolm Chadwick, Alberto Gil CP Ramos, Titouan Parcollet, Rogier van Dalen, and Sourav Bhattacharya. “Real-Time Personalised Speech Enhancement Transformers with Dynamic Cross-attended Speaker Representations.” **INTERSPEECH 2023**

Titouan Parcollet, **Shucong Zhang**, Rogier van Dalen, Alberto Gil CP Ramos, and Sourav Bhattacharya. “On the (In) Efficiency of Acoustic Feature Extractors for Self-Supervised Speech Representation Learning.” **INTERSPEECH 2023**

Mohan Li, **Shucong Zhang**, Catalin Zorila, and Rama Doddipatla. “Transformer-based Streaming ASR with Cumulative Attention.” **ICASSP 2022**

**Shucong Zhang**, Cong-Thanh Do, Rama Doddipatla, Erfan Loweimi, Peter Bell, and Steve Renals. “Train Your Classifier First: Cascade Neural Networks Training from Upper Layers to Lower Layers.” **ICASSP 2021**

**Shucong Zhang**, Erfan Loweimi, Peter Bell, and Steve Renals. “Stochastic Attention Head Removal: A Simple and Effective Method for Improving Automatic Speech Recognition with Transformers.” **INTERSPEECH 2021**

**Shucong Zhang**, Erfan Loweimi, Peter Bell, and Steve Renals. “On the Usefulness of Self-Attention for Automatic Speech Recognition with Transformers.” **IEEE Spoken Language Technology Workshop (SLT) 2021**

**Shucong Zhang**, Cong-Thanh Do, Rama Doddipatla, and Steve Renals. “Learning Noise Invariant Features Through Transfer Learning for Robust End-to-End Speech Recognition.” **ICASSP 2020**

Cong-Thanh Do, **Shucong Zhang**, and Thomas Hain. “Selective Adaptation of End-to-End Speech Recognition using Hybrid CTC/Attention Architecture for Noise Robustness.” **European Signal Processing Conference (EUSIPCO) 2020**

**Shucong Zhang**, Erfan Loweimi, Peter Bell, and Steve Renals. “Windowed attention mechanisms for speech recognition.” **ICASSP 2019**

**Shucong Zhang**, Erfan Loweimi, Yumo Xu, Peter Bell, and Steve Renals. “Trainable Dynamic Subsampling for End-to-End Speech Recognition.” **INTERSPEECH 2019**

## Teaching Experience

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### University of Edinburgh

Tutor

Edinburgh, UK

Jan 2019 – May 2019

- Tutored students on machine learning concepts and algorithms.
- Mentored students on deep learning projects.

### Purdue University

Teaching Assistant

West Lafayette, IN, US

Aug 2012 – May 2014

- Lectured and tutored students on Object Oriented Programming with Java.