

# Qingqing Cao

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## EDUCATION

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### **Stony Brook University**

Stony Brook, New York, United States

*Ph.D. Candidate, Department of Computer Science*

Aug. 2015 - Present

Advisors: Prof. Aruna Balasubramanian & Prof. Niranjan Balasubramanian

### **Wuhan University**

Wuhan, Hubei, China

*B.Eng. in Computer Science & Tech, Computer School*

Sept. 2011 - June 2015

## RESEARCH INTERESTS

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**NLP Applications, Mobile Systems**

## HONORS AND AWARDS

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MobiSys 2017 Student Travel Grant Award 2017

Special CS Department Chair Fellowship 2015

**Meritorious Winner** in the Mathematical Contest in Modeling (MCM) 2014

## PUBLICATIONS

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1. **Qingqing Cao**, Harsh Trivedi, Aruna Balasubramanian, Niranjan Balasubramanian, “Decomposing Pre-trained Transformers for Faster Question Answering”, The 58th annual meeting of the Association for Computational Linguistics, **ACL 2020**. Paper: <https://awk.ai/assets/deformer.pdf>
2. **Qingqing Cao**, Niranjan Balasubramanian, Aruna Balasubramanian, “DeQA: On-device Question Answering”, The 17th Annual International Conference on Mobile Systems, Applications, and Services, **MobiSys 2019**. Paper: <https://awk.ai/assets/deqa.pdf>
3. **Qingqing Cao**, Niranjan Balasubramanian, Aruna Balasubramanian, “MobiRNN: Efficient Recurrent Neural Network Execution on Mobile GPU”, 1st International Workshop on Embedded and Mobile Deep Learning, **EMDL 2017**(colocated with MobiSys). Paper: <https://awk.ai/assets/mobirnn.pdf>
4. Jian Xu (co-primary), **Qingqing Cao (co-primary)**, Aditya Prakash, Aruna Balasubramanian, and Don Porter. “UIWear: Easily Adapting User Interfaces for Wearable Devices”, Proceedings of the 23rd ACM Annual International Conference on Mobile Computing and Networking, **MobiCom 2017**. Paper: <https://awk.ai/assets/uiwear.pdf>
5. Jian Xu (co-primary), **Qingqing Cao (co-primary)**, Aditya Prakash, Aruna Balasubramanian, and Don Porter. “UIWear: Easily Adapting User Interfaces for Wearable Devices”, Proceedings of the 23rd ACM Annual International Conference on Mobile Computing and Networking, **MobiCom 2017 Demo**. Video: <https://youtu.be/YEQ3HNeQnts>

## PROJECTS

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### **Optimizing Transformers for Faster Inference**

Mar. 2019 - Dec. 2019

Large pre-trained transformers have been tremendously effective for many NLP tasks including QA however, inference in these large capacity models is prohibitively slow and expensive. This project aims to design novel optimization techniques to reduce the inference overhead for question answering. Experiments have shown **>3.1x** speedup with minimal ( $\sim 1\%$ ) accuracy drop.

### **DeQA: On-device Question Answering**

Sept. 2018 - Mar. 2019

DeQA is a local question answering system for mobile devices that adapts the state-of-the-art machine reading comprehension techniques and greatly improve end user privacy. It improves the QA system latency by **6 ~ 13x**.

### **Dynamic Web QA,**

Microsoft Research,

Jun. 2018 - Aug. 2018

Work in progress. Mentor: Oriana Riva

(Paper under preparation)

### **Mobile Deep Learning Accelerator,**

Bell Labs Cambridge,

Jul. 2017 - Sept. 2017

During this summer intern, I studied the performance of running deep learning models on the Movidius Neural Compute Stick accelerator. Mentor: Nic Lane

(Paper under submission)

### **MobiRNN: Efficient RNN Execution on Mobile**

Mar. 2017 - Jun. 2017

MobiRNN is a mobile specific optimization library for RNNs that focuses on offloading deep learning tasks to the mobile GPU.

### **UIWear: Easily Adapting User Interfaces for Wearable Devices**

Jan. 2016 - Dec. 2016

UIWear is a “write once and extend to many” programming framework for wearable devices enabling users to use smartphone applications from any of their wearable devices. We optimized UIWear protocol (for UI data cross-device communication and rendering) and improved latency by **27%** compared to existing systems.

## SERVICE

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Technical Committee Member of ACL 2020 (demo track)

2020

Technical Committee Member of MobiSys PhD Forum

2018

Reviewer for IEEE Transactions on Mobile Computing

2018

## SKILLS

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Python, Java, C, TensorFlow, PyTorch