

Jiakun Yan

☎ +86 189-1692-9276 • ✉ JiakunYan1998@gmail.com • 🌐 jiakunyan.github.io

Research Interests

My research interest lies in **parallel computing** and **programming language**. I am interested in designing high-performance programming systems for parallel computing which separate high-level algorithm descriptions from underlying hardware specifications.

Education

Shanghai Jiao Tong University

Shanghai, China

Sep. 2016 - Present

- Senior undergraduate, Dept. of Computer Science.
- Zhiyuan Honors Program of Engineering (an elite program for top 5% talented students)
- Major GPA: 91.88 | Ranking: 4th/151.

University of California, Berkeley

California, USA

Jan. 2019 - May 2019

- Exchange student, Berkeley Global Access Discover Program.
- 13 units, GPA: 4.0/4.0 with two A+ and one graduate level course

Experience

PASSION Lab

Lawrence Berkeley National Laboratory

Research Assistant, advised by Aydın Buluç and Katherine Yelick

Aug. 2019 - Present

- Asynchronous RPC Handler (ARH): a high-throughput RPC system with node-level aggregation and single-node work-stealing.
- RDMA vs. RPC for Implementing Distributed Data Structures

Advanced Network Laboratory

Shanghai Jiao Tong University

Research Assistant, advised by Linghe Kong

Oct. 2018 - Jan. 2019

- High-speed parallel transmission system with Cellular and wifi hotspot.

Artificial Intelligence Lab

Shanghai Jiao Tong University

Research Assistant, advised by Yi Xu

Apr. 2018 - Oct. 2018

- Video clip retrieval by natural language.

Publication

- Benjamin Brock, Yuxin Chen, **Jiakun Yan**, John Owens, Aydın Buluç, and Katherine Yelick. "RDMA vs. RPC for Implementing Distributed Data Structures," to appear in Workshop on Irregular Applications: Architectures and Algorithms (IA3), 2019.

Project

Asynchronous RPC Handler (ARH)

LBNL

Advised by Prof. Aydın Buluç and Katherine Yelick

Aug. 2019 - Present

○ Data-driven HPC applications suffer significant overheads for their fine-grained communication patterns. ARH is a thread-based RPC system which targets at data-driven applications. It uses Remote Procedure Call (RPC) to provide powerful expressive ability. It achieves high performance through node-level aggregation, single-node work-stealing, and innovate concurrent data structures. It also provides a flexible programming interface for users.

○ Node-level aggregation is the primary idea underlying the ARH system, which aggregates RPC requests sharing the same source and target node and sends them together as one large message. Using this methodology, ARH is able to utilize high bandwidth across cores on the same node to achieve low overhead and high throughput.

○ I am the main developer of the ARH system. ARH is developed as a C++ header-only library based on the GASNet_EX communication library.

RDMA vs. RPC for Implementing Distributed Data Structures

LBNL

Advised by Prof. Aydın Buluç and Katherine Yelick

Aug. 2019 - Sep. 2019

o RDMA and RPC are two primary ways of implementing distributed data structures. In this project, we compared the implementation of distributed data structures using RDMA and RPC. We developed an analytical model to predict the performance of RDMA- and RPC- based data structures based on their constituent operations, and then compared it with real-world performance.

o My primary focus in this project is to design and conduct experiments to investigate the attentiveness problem of RPC, which became one of the motivations for the later ARH system project.

o This project is accepted by IA³ workshop, Supercomputing 2019.

Berkeley Container Library in Rust

UC Berkeley

UC Berkeley CS267, graduate level course project

Jan. 2019 - May. 2019

o The Berkeley Container Library (BCL) is a distributed data structure library based on RDMA written in C++. Rust is a system programming language for both safety and high performance. We re-design and implement BCL using Rust to provide several safety guarantees for the distributed data structures, including data race, memory leaking, type check, and explicit type convert.

o I am one of the main developers of BCL in Rust. I developed the global pointer based on OpenSHMEM backend, which is the base for high-level data structure and has little overhead compared to the raw backend functions, and the global guard, which prevents data race in reference to the mutex struct in Rust. I also contributed some codes to the distributed Array, GuardArray struct and their benchmarks.

High-speed parallel transmission system with Cellular and wifi hotspot

SJTU

Advised by Prof. Linghe Kong

Oct. 2018 - Jan. 2019

o As the live video streaming grows rapidly, high-speed data transmission in the open field is increasingly demanding for high-quality video transmission. In this project, we propose an innovate parallel data transmission system which combines Cellular network with wifi-hotspot to achieve high data transmission bandwidth.

o Link aggregation is the primary idea underlying this system: the host device uses a Wi-Fi hotspot to connect several relay device. Then it is able to utilize the high bandwidth of Wi-Fi hotspot and transmit data with the Cellular links of all the devices in this system.

o I am the main developer of the high-speed parallel transmission system as a real-world prototype system on the Android platform. I evaluated the system in real-world with 4 GigaBytes data transmission and gained 2.5X bandwidth with 4 devices.

Video clip retrieval by natural language

SJTU

Advised by Prof. Yi Xu

Apr. 2018 - Oct. 2018

o Visual video and natural language understanding are two of the main efforts enabling computers to "think like humans". Video clip retrieval by natural language is an interdisciplinary task of these two fields. Its goal is: given a video and a query sentence, find the clip in the video described by the sentence.

o In this project, we proposed a spatial-textual coattention network to establish the interactions between words and spatial regions. We evaluated our model on the DiDeMo dataset and outperformed state-of-the-art methods by a significant margin.

Patent

- o **Jiakun Yan**, Jingzhu Shao, Zhen Huang, Yanzhou Xiang, Yutong Liao, Ruohan Hu, Jin Qi, Shuo Jiang, "A vibrating alarm clock based on pressure sensors", Utility model ZL 2017 2 1300094.X, China

Honors and Awards

- o **Chinese University Student Computer Application Ability Competition, the first price.** 2019
- o **Fan Hsu-chi Scholarship** Awarded to about 10 top students in SJTU every year. 2018
- o **National Scholarship** Highest honor for undergraduates in China, awarded to top 0.2% students. 2017
- o **Zhiyuan Honorary Scholarship** Elite program scholarship for top 5% talented students. 2016-2019