



# Hao Xu

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## Education

### Fudan University, School of Computer Science and Technology

M.Eng. in Electronic Information

Shanghai, China

Sept 2021 - Current

- GPA: 86.5/100
- Supervised by Jin Zhao in Shanghai Key Laboratory of Intelligent Information Processing

### Northeastern University, School of Computer Science and Technology

B.Eng. in Computer Science and Technology

Shenyang, China

Sept 2015 - June 2019

- GPA: 84.4/100

## Industrial Experience

### Intel

Algorithm Engineer

Shanghai, China

Feb 2022 - Current

- Collaborate with a six-person team to develop **Hyperscan**, a SOTA regular expression matching engine which has been deployed in network security solutions worldwide. It has been integrated into widely used open-source IDS and IPS products like **Snort** and **Suricata**.
- Design, develop and benchmark **Teddy** and **Harry**, two pattern matching algorithms for small-scale and large-scale pattern sets respectively. Utilize **SIMD** to accelerate the matching process.
- Teddy can match dozens to hundreds of patterns simultaneously, boosting the matching speed by 200% on a single commodity server. Harry can match hundreds to thousands of patterns, boosting the speed by 40%.
- Develop new features for **IPU**, based on the specific requirements of Google Cloud. This involves the offloading of fundamental infrastructure-related tasks from CPU to IPU.
- **Technical Skills:** SIMD, C, C++, Linux, Git

### Bytedance

Network Engineer

Shanghai, China

May 2021 - Sept 2021

- Build a testbed to test the functionality and performance of **P4 gateway**. The testbed utilizes a single server to simulate multiple network topologies(e.g. gateway connecting with switches, gateway connecting with servers, gateway connecting with both switches and servers).
- **Technical Skills:** Docker, Python, Pytest, Ansible, Linux, Git

### Sangfor

Software Engineer

Beijing, China

July 2019 - Aug 2020

- Develop the control plane of an **SDN** system.
- **Technical Skills:** Redis, Kafka, Python, Java, Linux, Git

## Publications

### CONFERENCE PROCEEDINGS

- **Hao Xu**, Harry Chang, Wenjun Zhu, Yang Hong, Geoff Langdale, Kun Qiu, Jin Zhao, “Harry: A Scalable SIMD-based Multi-literal Pattern Matching Engine for Deep Packet Inspection”. In *IEEE International Conference on Computer Communications (INFOCOM’23)*. Acceptance Rate: 252/1312=19%.

### JOURNAL ARTICLES

- **Hao Xu**, Harry Chang, Kun Qiu, Yang Hong, Wenjun Zhu, Xiang Wang, Baoqian Li, Jin Zhao, “Accelerating Deep Packet Inspection with SIMD-based Multi-literal Matching Engine”. In *IEEE Transactions on Network and Service Management (TNSM)*.

- **Hao Xu**, Zhiyong Zhang, Jun Zhao, Kun Qiu, Yang Hong, Wenjun Zhu, Geoff Langdale, Jin Zhao, “Optimizing the Data and Instruction-Level Parallelism of SIMD-based Multi-literal Pattern Matching Algorithm”. In *IEEE Transactions on Parallel and Distributed Systems (TPDS)*. [[Submitted->Under Review](#)]

## Achievements

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2023	<b>Winner</b> , HuaTai Securities Technology Fellowship	<i>Shanghai, China</i>
2022	<b>Winner</b> , Intel Fellowship	<i>Shanghai, China</i>
2022	<b>Winner</b> , Intel Excellent Intern	<i>Shanghai, China</i>
2021	<b>Top 1%</b> , National Graduate Entrance Examination Towards Fudan CS	<i>Shanghai, China</i>
2017	<b>Class 1</b> , Northeastern University Scholarship	<i>Shenyang, China</i>
2016	<b>Winner</b> , National Encouragement Scholarship	<i>Shenyang, China</i>
2016	<b>Class 1</b> , Northeastern University Scholarship	<i>Shenyang, China</i>