

# CHAOYANG HE

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## RESEARCH AREAS

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My general research area is the intersection of machine learning and distributed system. My long-term research goal is to develop Internet-scale networked and trustworthy AI/ML. As a baby step, I am focusing on:

1. **FedML.ai**: Federated learning algorithms, models, systems, and their applications in CV, NLP, Data Mining (GCN/GNN), and IoT.
2. **DistML.ai**: Large-scale distributed training algorithms and systems for massive-scale DNN models (Transformers, ViT, BERT, MoE, Pathways, etc.)
3. **AutoML**: Automated machine learning with Neural Architecture Search

## EDUCATION

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**University of Southern California**, Los Angeles, California, USA August 2018 - Present  
Ph.D. Candidate in Computer Science, Viterbi School of Engineering  
Advisor: [Salman Avestimehr](#) (USC), [Mahdi Soltanolkotabi](#) (USC); Co-Advisor: [Tong Zhang](#) (HKUST)

## WORKING EXPERIENCE / EMPLOYMENT

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**Hong Kong University of Science and Technology** June 2019 - August 2019  
*Research Assistant*

Research Areas: Neural Architecture Search, Machine Learning Optimization  
Advisor: [Tong Zhang](#)

**Tencent ([ai.tencent.com](http://ai.tencent.com))** November 2018 - February 2019  
*Tencent AI Lab, Machine Learning Center* Shenzhen, China

- Research Areas: Federated Learning, Distributed Learning, Multi-Task Learning, Graph Neural Networks
- Advisor: [Tong Zhang](#), [Junzhou Huang](#), [Peilin Zhao](#)

**Tencent ([www.tencent.com](http://www.tencent.com))** November 2014 - July 2018  
*Tencent Cloud, Social Network Group; Tencent Maps, Mobile Internet Group* Shenzhen, China

- Staff Software Engineer (T3.3, equivalent to T7 at Google); Engineering Team Manager (L1-2)
- Research Areas: Distributed System, Cloud Computing, Operating System, Applied Deep Learning
- Application Domains: Machine Learning System, Cloud Computing, Connected and Autonomous Vehicles, Maps and Navigation, Speech Recognition, Computer Graphics
- Mentor: [Julian Ma](#) (VP@Tencent, now CEO@Inceptio Autonomous driving, CEO@G7), Jianjia Xie (GM@Cloud and Smart Industries Group, Tencent), Menglin Chen (Director@Cloud and Smart Industries Group, Tencent)

**Baidu ([www.baidu.com](http://www.baidu.com))** July 2012 - November 2014  
*Baidu Maps Location-Based Service* Beijing, China

- Senior Software Engineer (T5)
- Research areas: Operating System, Cloud Computing, Distributed System, Computer Graphics
- Application Domains: Maps, Navigation, Taxi-Calling, Internet of Vehicles
- Mentor: [Weihao Gu](#) (General Manager of [Baidu Apollo](#) Autonomous Driving), Fei Qi (Co-Founder@[Lv Wan](#))

**Huawei ([www.huawei.com](http://www.huawei.com))** June 2011 - June 2012  
*Huawei Consumer Business Group* Shenzhen, China

- Software Engineer for Huawei Smartphone OS

## PUBLICATIONS (2020-PRESENT, SELECTED)

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A full publication list: <https://scholar.google.com/citations?user=2z2camUAAAAJ&hl=en>

- **PipeTransformer: Automated Elastic Pipelining for Distributed Training of Transformers**  
Chaoyang He, Shen Li (Facebook AI), Mahdi Soltanolkotabi, Salman Avestimehr  
**Submitted to ICML 2021**
- **Group Knowledge Transfer: Federated Training of Large CNNs on the Edge**  
Chaoyang He, Murali Annavaram, Salman Avestimehr  
**Accepted to NeurIPS 2020**
- **FedML: A Research Library and Benchmark for Federated Machine Learning**  
Chaoyang He\*, Songze Li, Jinhyun So, Mi Zhang, Hongyi Wang, Xiaoyang Wang, Praneeth Vepakomma, Abhishek Singh, Hang Qiu, Li Shen, Peilin Zhao, Yan Kang, Yang Liu, Ramesh Raskar, Qiang Yang, Murali Annavaram\*, Salman Avestimehr\*  
The short version of FedML white paper won **Best Paper Award** at **NeurIPS 2020** SpicyFL workshop.  
Highlights: We are building an open source project for federated learning! <https://fedml.ai>
- **MiLeNAS: Efficient Differential Neural Architecture Search with Mixed-Level Optimization**  
Chaoyang He, Haishan Ye, Li Shen, Tong Zhang  
**Accepted to CVPR'2020**

## PATENTS

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I have 10+ patents in various Internet products (cloud computing, machine learning, mobile computing, etc.).  
Check my website for details: <https://chaoyanghe.com/patent/>

## AWARDS

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Amazon Ph.D. Fellowship for 2021-2022

Qualcomm Innovation Fellowship (QIF) for 2021-2022

FedML.ai won Best Paper Award at SpicyFL@NeurIPS 2020

Tencent Outstanding Staff Award (selection ratio is less than 1%, led to a promotion as Team Manager), 2015-2016

WeChat MyCar, Special Award for Innovation, Mercedes-Benz, Daimler Supplier Award 2016 (teamwork; I worked as the technical leader)

Baidu LBS Group Star Awards (6 holders among 1000+ employees), 2013 Q3Q4

Huawei Golden Network Award in 2012

## TALKS

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A full list can be found at: <https://chaoyanghe.com/talks/>

Invited Talk at **Facebook (Meta) AI** about Distributed/Federated ML. Nov 12th, 2021

Invited Talk at **Stanford MLSys** about Distributed ML System and Federated Learning. August 5th, 2021

Invited Talk at **USC ISI** about Distributed ML System and Federated Learning. September 10th, 2021

## LEADERSHIP

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Team manager at Tencent, led a SDE team including 15+ software engineers

2015-2018

Team leader at Baidu, led 11 software engineers

2013-2014