

# Zhaoyi Song

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## Education

### Tongji University

Shanghai, China

Master of Engineering in Software Engineering

Sept. 2021 – Mar. 2024 (Expected)

- GPA: 91.71/100.0. TOEFL: 106 (R30, L28, S21, W27).

Bachelor of Engineering in Software Engineering

Sept. 2017 – Jun. 2021

- GPA: 4.77/5.0 (92.7/100.0, Rank 10/216, **Top 5%**).
- Awarded 1<sup>st</sup> Prize Scholarship (Top 5%, 2017) and 2<sup>nd</sup> Prize Scholarship (Top 10%, 2018 & 2019).

## Experience

### Meituan

Shanghai, China

Software Development Engineer Intern, In-Store Business Group

Jun. 2023 - Sept. 2023

- Trained as a software engineer at *Meituan.com*, China's premier food delivery and local service platform, responsible for maintaining merchant details for millions of businesses and handling transaction models.
- Refactored software interfaces to align with changes in upstream and downstream platforms.
- Periodically executed Hive SQL to ensure data consistency across various business units.
- Employed message queues and thread pools for traffic peak shaving during high-demand scenarios.
- Crafted a management tool for batch settlement data manipulation, facilitating change tracking.

### ByteDance, Ltd.

Shanghai, China

Software Development Engineer Intern, Nuverse Team

Nov. 2020 – Oct. 2021

- Contributed to the DevOps and quality assurance of Game Software Development Kit (GSDK), offering a comprehensive suite of development tools for Unity/Unreal Engine game developers to seamlessly access core game development functionalities.
- Pioneered a non-invasive automation testing tool for mobile apps, validating SDK features and leading to an 80% improvement in test case writing efficiency over traditional UI automation methods.
- Crafted illustrative code samples and developed a demo mobile app to showcase SDK features, typical use-case scenarios, and best practices.

## Research Projects

### HELSA: Hierarchical Multi-Agent Pathfinder

Jun. 2022 - Apr. 2023

Advisor: Rongqing Zhang, Associate Professor, Director of Network and Machine Intelligence Lab

- Proposed a hierarchical reinforcement learning framework for large-scale multi-agent pathfinding, addressing the challenges of sample inefficiency resulting from sparse rewards and partial observability.
- Utilized **spatiotemporal abstraction** to decompose problems and combined **multi-agent communication** with **heuristic guidance** to facilitate decentralized policy learning.
- The proposed method outperforms existing state-of-the-art (SOTA) approaches in large-scale scenarios.

### Synthetic Dataset for Image Change Detection

Oct. 2019 – April 2020

Advisor: Qingjiang Shi, Professor, School of Software Engineering, Tongji University

- A power plant aimed to detect anomalies in surveillance footage. Given the scarcity of real-world data, realized a strategy to develop a synthetic dataset and train models to detect discrepancies in the footage.
- Created synthetic datasets by manipulating normal frames to simulate potential anomalies.
- Utilized a Siamese neural network with CenterNet as its backbone for image change detection.
- Demonstrated the potential of our approach in real-world settings, assisting the power plant in detecting anomalies effectively through transfer learning using only a limited set of real-world data.

### A Large Linear Systems Solver

Sept. 2019 - Jan. 2020

Advisor: Qingfeng Du, Professor, Director of XLab at Tongji University

- Sped up the solution of large sparse/dense linear equations utilizing the **CUDA** framework.
- Optimized several iterative methods through techniques such as **shared memory**, **loop unrolling**, and **warp shuffling**, resulting in a 50x acceleration compared to the non-optimized version.
- Accelerated the conjugate gradient method for solving sparse matrix equations with the **CUDA graph programming model**, achieving over 80x faster performance to the non-optimized version.

## Publications

- **Zhaoyi Song**, Rongqing Zhang, and Xiang Cheng. "HELSA: Hierarchical Reinforcement Learning with Spatiotemporal Abstraction for Large-Scale Multi-Agent Path Finding". In: *2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'23)*. Detroit, MI, USA.