

# Dr. Jiajian Xiao

Location: Singapore

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## INTRO

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I am currently working as a Level-II Scientist at Agency for Science, Technology and Research (A\*STAR) Singapore. My research interests span high-performance computing, focusing on deploying applications on heterogeneous hardware, agent-based simulation, and intelligent transportation. I am one of the core architects and developers of a microscopic agent-based mobility simulator – CityMoS. I have been involved in and led a number of research projects, collaborating with research entities and industrial partners in Singapore, Germany, Austria, and China.

## EXPERIENCE

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### Scientist (Level-II)

Mar 2023 – Present

*A\*STAR, Institute of High Performance Computing*

*Singapore*

- Working with government agencies and industrial partners on various mobility challenges by utilizing machine learning and simulation approaches.

### Research Fellow

Sep 2020 – Mar 2023

*TUMCREATE (A research center founded by National Research Foundation Singapore)*

*Singapore*

- Co-led the simulation efforts on the TUMCREATE side for the Singapore Integrated Transport Energy Model (SITEM) project, collaborating with A\*STAR. The project's goal was to build a simulation-based digital twin solution for the decision-makers to conduct comprehensive analyses of the future electric vehicle adoption in Singapore.
- Key R&D member of the joint simulation laboratory with HUAWEI Research Centre Munich – Mobility in Virtual Environments at Scale (MoVES) Lab.

### Research Associate

Apr 2016 – Aug 2020

*TUMCREATE*

*Singapore*

- Daily tasks involved both engineering and research work. Engineering work included software development (in C++) of the CityMoS simulator. Research work focused on accelerating agent-based simulations using emerging hardware.
- Built a general compiler framework to **automate the acceleration of agent-based simulations on heterogeneous hardware** (a mixed hardware setting with CPUs, GPUs, FPGAs, etc.)

### Software Developer

Mar 2014 – Mar 2016

*TUMCREATE*

*Singapore*

- One of the main C++ backend and frontend developers of a microscopic agent-based traffic simulator – CityMoS.

## EDUCATION

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### Technical University of Munich (Supervisor: Prof. Alois Knoll)

Munich, Germany/Singapore

*Doctor in Computer Science (Co-supervised by Prof. Wentong Cai from NTU)*

*Apr 2016 – Oct 2022*

### Technical University of Munich

*Master of Science in Computer Science*

Munich, Germany

*Oct 2011 – Dec 2013*

### Shanghai Jiao Tong University

*Bachelor of Engineering in Computer Science*

Shanghai, China

*Sep 2007 – Jul 2011*

## TECHNICAL SKILLS

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**Languages** : C/C++, Objective-C, CUDA, OpenCL, ARM/Intel Assembly, Java, JavaScript, HTML, CSS  
**Frameworks** : Express, Node.js, Redis, ZeroMQ, MPI, OpenMP, LLVM/Clang  
**Databases** : Oracle SQL, MongoDB, PostgreSQL  
**Tools & OSs** : Docker, Adobe Photoshop/Premiere, Windows, Linux, macOS

## HONORS

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**FireFly Silver Borderless Award**  
*Ministry of Trade and Industry Singapore*

Singapore  
*Jun 2022*

**Best Paper Award**  
*IEEE/ACM DS-RT 2018*

Spain  
*Oct 2018*

## SELECTED HIGH-IMPACT PUBLICATIONS

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Full list on [Google Scholar](#)

- A survey on agent-based simulation using hardware accelerators. Xiao, J., Andelfinger, P., Eckhoff, D., Cai, W. and Knoll, A., 2019. ACM Computing Surveys (CSUR), 51(6) (**IF: 14.324, top computer science journal**)
- Exploring execution schemes for agent-based traffic simulation on heterogeneous hardware. Xiao, J., Andelfinger, P., Eckhoff, D., Cai, W., & Knoll, A.; In 2018 IEEE/ACM International Symposium on Distributed Simulation and Real-Time Applications (**Best Paper Award**)
- A Partition-Based Match Making Algorithm for Dynamic Ridesharing. Pelzer, D., Xiao, J., Zehe, D., Lees, M.H., Knoll, A.C., Aydt, H.; 2015. IEEE Transactions on Intelligent Transportation Systems (**IF 9.551, top transportation journal**)
- Pedal to the Bare Metal: Road Traffic Simulation on FPGAs Using High-Level Synthesis. Xiao, J., Kiliç, G., Andelfinger, P., Eckhoff, D., Cai, W., & Knoll, A. In Proceedings of the 2020 ACM SIGSIM Conference on Principles of Advanced Discrete Simulation (**1st known effort for agent-based traffic simulations using HLS**)
- OpenABLeXt: An automatic code generation framework for agent-based simulations on CPU-GPU-FPGA heterogeneous platforms. Xiao, J., Andelfinger, P., Cai, W., Richmond, P., Knoll, A., & Eckhoff, D. 2020. Concurrency and Computation: Practice and Experience, e5807
- OptCL: A Middleware to Optimise Performance for High-Performance Domain-Specific Languages on Heterogeneous Platforms. Xiao, J., Andelfinger, P., Cai, W., Eckhoff, D., & Knoll, A. In 2021 International Conference on Algorithms and Architectures for Parallel Processing (**A middleware accelerates not only agent-based simulation but also general arithmetic e.g., machine learning algorithms**)