

# TINGHAO XIE

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## 🎓 EDUCATION

**Zhejiang University (ZJU)**, Zhejiang, China 09/2018 – 06/2022 (expected)

B.E., Computer Science and Technology (CS)

- **GPA:** 3.99/4.00 (92.13/100)
- **Rank:** 1/186

**University of Oxford**, Oxford, United Kingdom 10/2021 – 06/2022 (expected)

Visiting Student, Computer Science

- **Courses taking:** Computational Learning Theory, Machine Learning

## 💡 RESEARCH INTERESTS

- Secure, Robust, Reliable and Fair AI Systems
- Adversarial Robustness, Certified Robustness
- Explainable AI, Out-Of-Distribution Generalization

## 📖 PUBLICATIONS

**Towards Practical Deployment-Stage Backdoor Attack on Deep Neural Networks** 📄, </>

Xiangyu Qi\*, **Tinghao Xie\***, Ruizhe Pan, Jifeng Zhu, Yong Yang and Kai Bu

ArXiv e-print, under review at CVPR 2022

## 👥 RESEARCH EXPERIENCE

</> **Subnet Replacement Attack (SRA): A Graybox Backdoor Attack** 09/2021 – 11/2021

Advisor: Principal Researcher *Jifeng Zhu* (Tencent), Prof. *Kai Bu* (ZJU)

Co-worker: Ph.d. Student *Xiangyu Qi* at Princeton University

Collaborator with **Zhuque Lab, Tencent, China**

- Implemented, tuned and evaluated SRA on various models and datasets to show its universal compatibility
- Extended SRA to different trigger types (patch, blend, perturb, Instagram filters, etc.)
- Made SRA more practical for realizing physical triggers under complex real-world environments
- Wrote parts of the paper *Towards Practical Deployment-Stage Backdoor Attack on Deep Neural Networks*

**Backdoor Restoration and Certification** 05/2021 – Present

Advisor: Prof. *Ting Wang*

Remote Intern in **ALPS Lab, Pennsylvania State University, United States**

**Faithful Backdoor Restoration**

- Proposed an effective way for faithful trigger restoration

**Backdoor Certification** (ongoing)

- Implemented tools for certifying the (non-)existence of perturbation backdoors based on LiRPA
- Formed an optimizable method to tighten the backdoor certification bounds

</> **Enchecap: An Encrypted Heterogeneous Calculation Protocol** 04/2020 – 05/2021

Advisor: Prof. *Jianhai Chen*, Lec. *Rui Shen*

Undergraduate Intern in **Intelligent Computing and System Lab, Zhejiang University, China**

- Designed *Enchecap*, a protocol securing heterogeneous computation at transmission and host memory
- Implemented the protocol into a library, with 38% computational overhead and 19% overall overhead
- Surveyed and summarized protections with Intel SGX and secure issues around GPU

## SELECTED PROJECTS

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### </> **NaiveVQA: A Visual Question Answering model** 07/2021

- Reimplemented *Show, Ask, Attend, and Answer: A Strong Baseline For Visual Question Answering*
- Translated the PyTorch implemented model into a MindSpore (a new AI framework) implementation
- Trained and achieved 40.6% overall accuracy on a small VQA 2.0 sub-dataset provided by the course


### </> **RCC: A Remarkable/Retarded C-like Compiler** 05/2021 – 06/2021

- Defined a simplified C EBNF and built up the frontend with FLEX and BISON
- Built up an abstract syntax tree for code generation in C++
- Implemented Intermediate Code generation (*type binding*, *structure* and *array*) with LLVM as the backend

### </> **Tron: A 3D Graphic Engine Based on WebGL & a Flying Game Demo** 12/2020 – 01/2021

- Completed voxel, material and texture expression modules
- Wrote GLSL shader codes involving fogs and the animated sky
- Implemented cross-platform interaction and front-end web pages

## **Other Course Projects** 2020 – 2021

- **AI for Reversi:** an AI for the game Reversi based on the MCTS method
- **Facial Recognition:** a PCA model for recognizing and restoring human faces
- **Garbage Classification:** a ResNet model for garbage images classification, achieving 91.5% accuracy
- **Robot in Maze:** a maze-walking AI (implemented with DFS, reinforcement Q-Learning, Deep Q-Learning)
- </> **MiniSQL:** A Single-user Database Management System (SQL Engine)
- </> **HWMS:** A Homework Management System
-  **Research on the Texture Packing Problem**
- **A MIPS CPU on FPGA:** A SoC on Xilinx FPGA and a pixel game in MIPS assembly

## CAMPUS ACTIVITIES

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### *Member, SuperComputing Team (ZJUSCT)* 09/2019 – 02/2021

- Obtained the certificate of competency of Accelerated computing basics – CUDA C/C++
- Won the 2nd class prize in ASC 2020-2021, where I optimized QuEST on GPU by 4.7%

### *Member, DFM Street Dance Crew* 03/2019 – 09/2019

- Attended the Danqing Dance Competition 2019 and New Year's Eve Showcase 2020
- Won the champion in the battle of DFM Hiphop crew

## ♡ HONORS AND AWARDS

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Elite Liu Yongling Scholarship (1/802)	2020 – 2021
Tencent Scholarship (5/802)	2020 – 2021
The 2nd Class Prize in ASC20-21 Student Supercomputer Challenge	01/2021
Narada Scholarship (1/372)	2019 – 2020

## SKILLS

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- **Programming:** C/C++, Python, JavaScript, CUDA, Verilog, Shell, MATLAB, ActionScript, HTML
- **Software:** L<sup>A</sup>T<sub>E</sub>X, Vivado, Adobe Photoshop, Adobe Premiere Pro, Adobe After Effects, Adobe Audition
- **Languages known:** English(fluent), Chinese(native), Cantonese(native)
- **TOEFL iBT:** Total 110/120, Reading 29/30, Listening 30/30, Speaking 26/30, Writing 25/30
- **GRE General Test:** Verbal 154/170, Quantitative 170/170, Analytical Writing 3.5/6
- **Hobbies:** Dance(Hiphop, House, Breaking, Choreography), Swimming, Basketball, Fitness, Billiards