

# Bowei Tian

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## EDUCATION

**Wuhan University**, Wuhan, CHN

09/2020-06/2024

Bachelor of Engineering in **Information Securities**, expected in June 2024

- Cumulative GPA: **3.90/4**; Average Score: **91.3/100**
- Scholarship: Second Class Scholarship (06/2023)

## PUBLICATIONS

- **Bowei Tian**, R. Du, Y. Shen. FairViT: Fair Vision Transformer via Adaptive Masking. Submitted to ICASSP.
- X. Gong\*, **Bowei Tian**\*, M. Xue, Y. Wu, Y. Chen, Q. Wang. An Effective and Resilient Backdoor Attack Framework against Deep Neural Networks and Vision Transformers. Submitted to TDSC.
- X. Gong, **Bowei Tian**, M. Xue, Y. Chen, Q. Wang, M. Sun. MEGATRON: Backdooring Vision Transformers with Invisible Triggers. A preprint paper.
- M. Xue, Y. Zeng, S. Gu, Q. Zhang, **Bowei Tian**, C. Chen. SDE: Early Screening for Dry Eye Disease with Wireless Signals. In Ubicomp/IMWUT.
- 田博为, 曹雨欣, 王骞, 龚雪鸾, 沈超, 李琦. Adversarial sample defense methods and devices based on model inversion methods 基于模型反演方法的对抗样本防御方法和设备. CHN Patent.
- 曹雨欣, 田博为, 王骞, 龚雪鸾, 沈超, 李琦. A Deep Neural Network Model Inversion attack defense method and device 一种深度神经网络模型反演攻击防御方法及设备. CHN Patent.

## RESEARCH EXPERIENCE

**UCI Shen's Lab**, University of California, Irvine

06/2023-Present

*Research Assistant for Prof. Yanning Shen, Fairness on Vision Transformers*

06/2023-Present

- Aimed to improve the fairness-accuracy tradeoff of vision transformers
- Experimental results show the proposed methods achieve higher accuracy than alternatives, 6.72% higher than the best alternative while reaching a similar fairness result.
- Submitted to International Conference on Acoustics, Speech and Signal Processing (ICASSP).

**Network Information System Security & Privacy (NIS&P) Lab**, Wuhan University

04/2022-Present

*Research Assistant for Prof. Qian Wang, Backdoor on Transformers*

10/2022-Present

- Intended to limit the scope of trigger to raise the stealthiness of backdoor in transformers and manipulate the attention mechanism called "Attention diffusion" to improve attack elasticity.
- Created Python codes based on PyTorch/Colab to realize scope limitation and attention diffusion.
- Achieved high stealthiness and efficiency, surpassing the baselines in Vision Transformers by 25%+.
- Planning to submit the paper in December 2023.

*Research Assistant for Prof. Qian Wang, Backdoor against Neural networks*

04/2023-07/2023

- Extend proposed QoE attack method of Deep Neural Networks (DNN).
- It is shown that we can increase the attack success rate much when the poison ratio is low and achieve a high QoE of the backdoored samples.
- Submitted to IEEE Transactions on Dependable and Secure Computing (TDSC).

*Research Assistant for Dr. Meng Xue, Dry Eye Disease Detection*

01/2023-05/2023

- Proposed to use radar, a more convenient, contactless and ubiquitous way, to detect Screening dry eye disease.
- Analyzed the structure of focal loss based Transformer model in Colab to detect dry eye disease.

- Ran various kind of ablation studies, reorganizing codes and implementing functions such as data enhancement, dataset splitting, model fine-tuning.
- A paper titled “SDE: Early Screening for Dry Eye Disease with Wireless Signals” is accepted in Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMMUT).

*Research Assistant for Prof. Qian Wang, Model Inversion Defense*

04/2022-01/2023

- Utilized Python to design API for several large scale databases (including ImageNet, CIFAR-10, and GTSRB).
- Established and analyzed codes of GAN model raised in the latest model inversion paper MIRROR (NDSS’22).
- Produced two patents: *Adversarial Sample Defense Methods and Devices based on Model Inversion Methods* and *A Deep Neural Network Model Inversion attack defense method and device*.

## **SELECTED PROJECTS**

**Game Development: Pac-Man**

07/2021

- Designed a role play game that allows users to play against the ghost (AI) and eat as many beans as possible in a maze
- Utilized C programming language and A\* algorithm to traverse all the location of the maze to avoid the ghost and set direction for movement to eat beans
- Achieved a high score that defeated 90%+ rivals

## **SKILLS**

- Programming Language: C/C++, Python, MATLAB