

# TAN TIANYAO

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## EDUCATION EXPERIENCE

Guangdong University of Technology, Guangdong, China

09/2020 - 06/2024

Bachelor of Electronic Science and Technology

- **Language:** Mandarin (native), Cantonese (native), English (CET-6: 528) IELTS (6.5 (6) )
- **Relevant coursework:** Advanced Mathematics(85), Theory of Probability and Mathematical Statistics(89), Microelectronic Device and Technology(99), Signal & System(85), C Programming, Embedded System Design and Application, etc.
- **Skills:** MS office, Python, MATLAB, CUDA, NumPy, C/C++/C#, Java, Windows, Linux, Zotero, Shell Scripting, etc.
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The Hong Kong University of Science and Technology, China

09/2025 -

Master of Physics

- **Relevant coursework:** Computational Methods in Science(MSPY-5240), Statistical Machine Learning(MSDM-5054), Quantum Materials and Technologies for Quantum Devices and Sensors(MSPY-5002), Applications of Artificial Intelligence in Science(MSPY-5250), Computational Energy Materials and Electronic Structure Simulations (RPG course-PH YS-5120), etc.

## RESEARCH EXPERIENCE

Guangdong Provincial Key Laboratory of Information Photonics Technology, *Research Assistant* 06/2024-present

3D Convolutional Neural Network-Based Spectral Unmixing for SERS Imaging

- **Content:** We have designed a **3D self-encoder algorithm** based on discrete cosine transform with spatio-temporal global attention mechanism which is designed for realizing a component decomposition unmixing algorithm for scanning Raman imaging of 2D materials **MoS<sub>2</sub>/WSe<sub>2</sub>**. We have compared traditional machine learning **NMF** non-negative matrix decomposition and K-hype kernel abundance estimation algorithm with traditional and deep learning algorithms to realize the reconstruction of the **Raman** scanning imaging on **SOTA** level.
- **Publish:** Co-authored a manuscript (*targeting IEEE T-IP, under review*).
- **Achievement:** This is supported by *National Natural Science Foundation Project (500210181) with Dr. Ping Tang*

Guangdong Provincial Key Laboratory of Information Photonics Technology, *Research Assistant* 06/2024-present

Reinforcement Learning-Driven Super-Resolution Imaging (5x Resolution)

- **Content:** Proposed Markov Decision Process (MDP) framework to iteratively optimise system imaging to achieve super-resolution imaging from **MoS<sub>2</sub>/WSe<sub>2</sub>** heterojunction at the electron microscope level, reducing imaging noise by 40%+. Developed a custom RL agent (PyTorch) to shape rewards based on spectral signal-to-noise ratio (SNR).
- **Achievement:** A patent for an invention is being drafted as the first author.

Shanghai Zhangjiang Institute of Mathematics, *Core Member*

07/2024 - 10/2024

Diffusion Models for ISPRS Remote Sensing Data Augmentation

- **Content:** Training a state-of-the-art generative model based on stable diffusion on the ISPRS dataset generates synthetic images to improve semantic segmentation accuracy (mIoU +7.0%), comparing the generative stability of stable diffusion models with adversarial neural network **GANs**, integrating of diffusion-generated data into a U-Net pipeline (PyTorch), and explore the prospects of applying the stable diffusion model to different semantic segmentation networks(**Swin-Unet**, **DeepLab v3**, etc).
- **Achievement:** This work reduced annotation costs by **30%+**.

## PROJECT EXPERIENCE

IoT Temperature and Humidity Sensor Based on STM32F1 and OneNet(coursework)

09/2023 - 11/2023

- The hardware adopts STM32F1 main control chip, ESP8266 module and DHT11 sensor.
- The software is based on Uniapp to develop the mobile terminal.
- responsible for embedded code writing and PCB circuit design, through the MQTT protocol to achieve real-time synchronous monitoring of sensor data to OneNet platform.

### **Matlab-based GPU programming for optoelectronic image acceleration processing(graduation) 01/2024-05/2024**

- This project is based on parallel computing, image processing algorithms, and deep learning networks dataset.
- pre-processed the open source MRI dataset, did work of data enhancement and feature value extraction to achieve the image for classification tasks.
- designed experiments to compare the use of GPU programming and CPU programming for classification of big data image dataset to prove the speed superiority of parallel computing programming.

### **LLaMA 2-7B Base Deployment & Quantization Engineering**

**06/2025 - 07/2025**

- The project adopts Meta LLaMA 2-7B open-source model as the core, with NVIDIA RTX 5090 as the hardware carrier.
- Responsible for full-process engineering implementation: model weights acquisition, environment configuration (PyTorch 2.1 + Hugging Face Transformers), and deployment debugging.
- Achieved 4-bit AWQ quantization via AutoAWQ tool, reducing memory usage by 60% while maintaining >90% original performance; built text generation demo with Gradio interface for real-time inference testing.

### **Qwen-7B Open Source LLM Deployment & Function Verification**

**07/2025 - 08/2025**

- Selected Alibaba Qwen-7B base model (open-source) for deployment practice, targeting general text generation scenarios.
- Responsible for model loading (using Hugging Face Transformers), context window tuning, and inference parameter optimization.
- Completed functional verification through 500+ test cases (including story continuation, code snippet generation), and documented deployment workflow for reproducibility.