

# Tianyi (Bruce) Chen

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## EDUCATION

### University of California at Santa Barbara

Santa Barbara, CA, USA

Master's in Electrical and Computer Engineering

09/2025 - Current

- **GPA:** 3.80/4
- **Relevant Courses:** Tensor Computing, Advanced Control Lab Design, ML Design & Test

### Northern Arizona University

Flagstaff, AZ, USA

Bachelor of Science in Computer Engineering

09/2020-06/2024

- **GPA:** 3.97/4 (Summa Cum Laude)
- **Relevant Courses:** Artificial Intelligence, Capstone Design, Electric Drives, Web Programming

### Chongqing University of Posts and Telecommunications

Chongqing, China

Bachelor of Science in Electronic and Information Engineering

09/2020-06/2024

- **GPA:** 3.14/4
- **Relevant Courses:** Fundamentals of Electronic Circuit, Fundamentals of Computer Engineering, Probability and Mathematical Statistics, Data Structure, Java Programming, etc

## PUBLICATION ([Google Scholar](#))

1. Tuy Tan Nguyen, **Tianyi Chen**, Ian Philippi, Quoc Bao Phan, Shunri Kudo, Samsul Huda, and Yasuyuki Nogami, "A Highly Secure and Accurate System for COVID-19 Diagnosis from Chest X-Ray Images," 67th IEEE International Midwest Symposium on Circuits and Systems (MWSCAS 2024), Springfield, MA, 11–14 Aug. 2024. ([Flagship Conference Published](#))
2. **Tianyi Chen**, Ian Philippi, Quoc Bao Phan, Linh Nguyen, Ngoc Thang Bui, Carlo daCunha, and Tuy Tan Nguyen, "A Vision Transformer Machine Learning Model for COVID-19 Diagnosis Using Chest X-Ray Images," Healthcare Analytics, vol. 5, pp. 100332, Jun. 2024. ([Journal Link](#))

## INTERNSHIP

### Collaborative Innovation Center for New Generation Information Network and Terminal, Chongqing University of Posts and Telecommunications

Chongqing, China

Research Assistant

08/2024-present

- Research on satellite-to-ground and unmanned aerial vehicle (UAV) wireless communication, specifically in the image transmission tasks with energy and latency optimization by reinforcement learning.
- Configured GPU clusters for distributed-data-parallel training, based on both PyTorch and Huggingface's Accelerate repository.
- Fine-tuned large language models, such as GATO (decision model), GPT-2, Llama3.1, and Llama3.2, aimed to solve DRL-based tasks, such as super-resolution-based video transmission.
- Deployed the Whisper-Base model and Llama3.2 on the server as a web chatbot for continuous conversation responses to both audio and text inputs, targeting to provide service to robots.

**Research Assistant**

01/2024-05/2024

- Several quintessential models, such as DenseNet, ResNet, EfficientNet, and Vision Transformer, are assayed in classification accuracy with the COVID-19 chest X-ray dataset.
- Programmed GradCAM analysis code based on a paper's theory, with extensive modifications on processing the Vision Transformer, which deepened my understanding of patch division and the encoding process of the Vision Transformer.
- Programmed R with GradCAM results and animint2 (a package based on ggplot2) to present a website visualization about how models make diagnoses, called [Animated2GradCAM](#).
- Implemented Kyber cryptography, a post-quantum encryption method, to encrypt the X-ray images into wrapped chunks and decrypt predicted results back, with a specific key pair.
- Flask is utilized to host the server service, and Fast Reverse Proxy (FRP) is used to realize public accessibility.
- The complete AI-telehealth diagnosis system, which has 95.79% accuracy and 5s processing time, is published and [accepted](#) as a conference paper in the 2024 IEEE 67th International Midwest Symposium on Circuits and Systems (MWSCAS).

**PROJECT(more at [GitHub](#))****PEFT on Swin Transformer by Tensor Decomposition**

09/2025 - 12/2025

Decomposed the Swin Transformer model through CP decomposition during fine-tuning, where the trainable parameters have reduced from 27.52M to 45.5K with ~1.8% accuracy improvement.

**Pendubot Upright Swing-up Control through PFL/TO and LQR**

11/2025 - 12/2025

Control the pendubot's shoulder joint to swing its two arms upright by PFL/TO and keep its state by LQR.

**SwinJSCC-based Image Compression and Transmission on LEO Satellite**

12/2024 - 06/2025

Utilizes the PPO algorithm to control the joint-source-channel-coding with the SwinJSCC model and transmission on the simulated LEO2Ground channel, which includes several losses and fading.

**AI auxiliary medical diagnosis research at Northern Arizona University**

09/2023-01/2024

- Several pyramid and transformer-based models, such as EfficientViT, MViT, EfficientNet, and ViT, have been experimented on COVID-19 chest X-ray image four-class classification.
- Meticulous evaluations, such as receiver operating characteristic (ROC), confusion matrix, recall, precision, specificity, and accuracy, are conducted based on each model.
- Early stopping, weight decay, dataset balancing, and structure optimization are implemented to mitigate the observed overfitting.
- The proposed model has 99.57% accuracy in the binary classification of chest X-ray images with 264.79s training per epoch efficiency on the selected dataset with a 1080ti GPU.
- The [presentation](#) was awarded third place at the NAU Engineering Festival, and the result was published as an [article](#) in the Healthcare Analytics journal.

**Reconfigurable Wheel AI Robot Project at Imperial College (UK)**

01/2023-03/2023

- Engaged in reconfigurable wheel robot blueprint designation, with a specific discussion on the freedom of wheel track, wheel base, and wheel direction.
- Programmed a random forest algorithm to study decision patterns in simulated cases, where the raggedness, obstruction size, and vehicle velocity are considered as factors, and each combined movement is viewed as the decision.
- Simulated the designed reconfigurable robot in the software, called Gazebo.

**FPGA-based Alarm System Design Competition at CQUP, China (Third Prize)**

10/2022-12/2022

- Programmed the clock-based FPGA platform in Verilog with timer block, switch block, alarm block, and bond buttons, LEDs, and pins to interfaces.
- Programmed the ESP8266 board in C, handling temperature and light sensor signals, connecting to WiFi, and hosting the HTML server to enable information to be accessible.
- Connected interfaces on an Intel Cyclone-V FPGA, ESP8266, and sensors through a breadboard.

## RESEARCH SKILLS

**AI Programming & Research:** computer vision ([medical diagnosis](#), [integrated system with cryptography](#), and [visual understanding](#) with vision transformers and CNN), wireless communication system control with reinforcement learning, large language models (GPT-2 and [web chatbot by Llama3.2](#)), deep reinforcement learning ([DQN](#)).

**Linux Server-side Manipulation:** distributed-data-parallel configuration ([tutorial](#)), Docker Composing, and HPC programming.

**Web Development:** HTML, CSS, Java, JavaScript ([personal site](#) and [in-school project](#)), Flask, PHP, SQL, Apache, XAMPP ([file system server](#), ai-telehealth service on [local server](#), and [Azure](#)).

**LaTeX paper writing:** three papers published and one in process.

**Data processing using R:** Data visualization in R, specifically with ggplot2 ([Animated2GradCAM](#)).

**Embedded Systems & IoT Design:** C, C++, and Verilog ([FPGA alarm platform](#)).