CURRICULUM VITAE – QIANQIAN ZHANG

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Education

- **[PhD Candidate (Continuous Postgraduate and Doctoral Programs)]**
  Number of Patents: 6, *SCI Papers*: 1, *Conference Papers*: 2 (EI: 1, Best Paper: 1), *National Competition Wins*: 1
  [Supervisor]: Junshe An, Li ZHou
  Dates: 2024 – Present
  [Joint Cultivation by Projects During PhD]:
  [Institution]: Tsinghua University, AIR, Efficient Inference Group for Large Vision Models
  [Supervisor]: Yunxin Liu
  Dates: June 2024 – January 2025
- **[Master's Degree]**
  [University]: University of Chinese Academy of Sciences (UCAS), NSSC (Recommended Postgraduate Admission, Academic Master)
  [Major]: Computer Application Technology
  [GPA]: 3.7/4.0
  Dates: September 2021 – February 2024
- **[Bachelor's Degree]**
  [University]: Hefei University of Technology
  [Major]: Electronic Information Science and Technology
  [Average Score]: 92.274, **[Graduation Project Rank]**: 1st in the Grade
  Dates: September 2017 – June 2021

Relevant Experience

Mathematical Theory Learning Experience

[Advanced Mathematics] (99/100), **[Linear Algebra]** (92/100), **[Probability Theory]** (95/100)

Reinforcement Learning, AI Deep Learning Principles, and Computer Object Detection Theory Learning Experience

[Computer Architecture] - under the tutelage of Weiwu Hu from Loongson (91/100),
[Intelligent Computing System] - under the tutelage of Yunji Chen from Cambricon (94/100),
[Brain Cognitive Mechanism and Computational Model (Vision)] - under the tutelage of Peng Zhang from the Institute of Biology, Chinese Academy of Sciences (93/100),
[System-on-Chip Design in the Big Data Era] - under the tutelage of Chunzhang Chen from Pengcheng Laboratory (90/100),
[Image Processing] - under the tutelage of Weiqiang Wang from the Institute of Computing Technology,
[Advanced Artificial Intelligence](Principles of Artificial Intelligence and Reinforcement Learning) - under the tutelage of Huawei Shen, Ping Luo and Gaowei Wu from the Institute of Computing Technology,
[Computer Algorithm Design and Analysis] - under the tutelage of Dongbo Bu from the Institute of Computing Technology,
[Advanced Computer Architecture (GPU)] - under the tutelage of Haihua Shen from the University of Chinese Academy of Sciences,
[Programming and Algorithm Training](Excellent),
[Electronic Design Training](Excellent),
[Digital Circuit Course Design](Excellent),
[Analog Circuit Course Design (EDA)] (Excellent)

Practical Experience in PyTorch, Computer Vision, Video, and Multimodal Areas

- **Video**:
    1. Two invention patents: "A Heterogeneous H.264 Video Compression Encoding System and Encoding Method for Spaceborne Applications" and "A Heterogeneous H.264 Video Compression Decoding System and Decoding Method for Spaceborne Applications"
    2. One conference paper: "Design of H.264 Video Compression System Based on Domestic CPU+GPU"
    3. Key project of the Chinese Academy of Sciences: Responsible for experimental platform deployment, delivery of 3GB H.264 video compression source code, and technical report compilation
- **Multimodal**:
    1. "ESM-YOLO: Enhanced Small Target Detection Based on Visible and Infrared Multi-modal Fusion" - ACCV 2024
    2. Two invention patent: "A Small Target Detection Method and System Based on Visible and Infrared Multi-modal Fusion" and "A pixel-level multi-spectral fusion small target detection method and system based on mask enhancement"
- **Object Detection**:
    1. One SCI paper: "Real-time Recognition Algorithm of Small Target for UAV Infrared Detection" on drone infrared small target real-time detection
    2. One invention patent: "A Real-time Recognition Method for Small Targets Oriented to UAV Infrared Detection"
    3. Video stream defect detection based on FPGA hardware lightweight deployment (pinhole small targets)
- **PyTorch**:
    1. Real-time detection algorithm implementation for small targets using visible and infrared multi-modal fusion
    2. Comparison of FFT algorithm execution time on domestic Loongson and AMD platforms in PyTorch environment (CAS project)
- **PaddlePaddle**:
    1. Image classification based on improved MobileNet V2 with 72% accuracy (Chinese Navy competition)
    2. Pinhole small target detection with detection accuracy above 90% using MobileNetV1, YOLOv3 MobileNetV1, and PicoDet networks
- **TensorFlow**:
    1. CAS project: "Bayesian Deep Learning Model for Geomagnetic Storm - DstForecast of Storm-time Disturbance Index"
        (a) TensorFlow code porting to domestic Loongson 3A6000 CPU
        (b) Model performance comparison across multiple platforms, including AMD CPU, Intel CPU, and domestic CPUs
        (c) Compilation of error messages and solutions during the Loongson porting process (nearly 50 pages of environment deployment error screenshots), project technical report, and manual
- **Deep Learning**:
    1. Cambricon Top Developer Certification with full marks in all 15 deep learning experiments in 5 chapters, familiar with Cambricon cloud platform resources
- **Model Lightweighting**:
    1. Participation in fund application writing for deep learning model compression and lightweighting (42 pages, 20,000 words)

2. Quantization and pruning of MobileNet V1 network based on PaddlePaddle framework. Before quantization, the nb size was 21.3MB, after quantization, it was 5.98MB, and after pruning, it was 3.64MB, with a 19.3% reduction in parameters

- **Linux**:

1. Ubuntu as the operating system during competitions (practical), excellent performance in Linux courses and projects during undergraduate studies (theoretical)

- **Under Review Papers**:

1. "Mamba-based Small Target Detection for Visible and Infrared Modal Fusion" CVPR 2025
2. One invention patent: "An Improved Infrared Small Target Detection Method and System Based on Visual State Space Model"

- **Pre-submission Paper**:

1. ACCV conference paper extended by 30%, intended for submission to Remote Sensing journal

- **I am the first author of the above patents and papers**

Academic Exchange Related Experiences

- Best Paper Award at the 35th National Space Exploration Academic Conference
- Infrared Dim Small Target Technology Exchange in the Second Academy of CASIC (Research of 120 literatures, 47-page PPT summary)
- "Research on Detection Model Compression Technology for Hardware Heterogeneous Deployment" Jichuang Star Youth Sharing Forum (Chongqing, Offline + Online Live Broadcast)
- International Meridian Circle Summer School 2023
- Microsoft Ada Workshop 2024
- Zhongguancun Forum 2024
- Baidu Large Model Technology Sharing Session 2024 (Baidu Headquarters)
- IEEE GRSS Summer School 2024
- Tsinghua University AIR Summer Camp 2024
- Reviewer for Applied Sciences Journal (in cooperation with master's supervisor)

Internship Experiences

- **International Meridian Circle Plan Project Office**
  Internship Content: Participated and assisted in organizing the International Meridian Circle International Forum and Yanqi Youth Forum, as well as the "Belt and Road" International Training Course on Space Weather, at the headquarters building of the International Meridian Circle Plan in Huairou Science City.
  Honors: Recognized as an Outstanding Intern.
  Media Coverage: China News Service, Huanqiu.com, Guangming Daily, Xinhua News Agency, etc.
- **International Space Science Institute Office**
  Internship Content: Actively engaged in promoting projects, facilitating international cooperation, and assisting in the preparation of the international conference "Exploring Terrestrial-like Planets in the Universe." Gained a comprehensive understanding of the actual progress of scientific projects and effectively collaborated with prominent researchers in the field of space science.

Robot Control Competition Experiences

- **National Third Prize and North China Region First Prize (Team Leader)**
  7th Integrated Circuit Innovation and Entrepreneurship Competition (Master's and Doctoral Track)
  Responsibilities: Cloud FPGA remote debugging, domestic PaddlePaddle framework development and deployment, small target detection in video streams, model quantization, pruning, and distillation
  Date: August 2023
- **Provincial Project (Host)**
  "*Intelligent Wheelchair Based on Mecanum Wheel and LPC54606 Chip Control*"
  Project Achievements: 1 paper published in a national journal, 1 provincial award
  Date: 2019

- **Provincial First Prize (co - first author)**
  14th Anhui Provincial University Student Electronic Design Contest
  Topic: Electromagnetic Deflection Cannon
  Date: October 2019
- **Provincial Second Prize (Team Leader)**
  Anhui Provincial Robot Contest - Microcontroller and Embedded System Category
  Platform: A-platform 51 Microcontroller
  Date: May 2018
- **Provincial Second Prize (Team Leader)**
  13th iCAN International Innovation and Entrepreneurship Contest - Anhui Region
  Project: Smart Lock Based on 51 Microcontroller - "Removing Input Devices"
  Date: September 2019
- **School Silver Award (Team Leader)**
  5th Internet+ Innovation and Entrepreneurship Contest
  Project: A New Generation of Unmanned Supermarket System with Automatic Stock Allocation
  Date: August 2019
- **School Second Prize (Individual Contestant)**
  University Student Physics Academic Contest
  Date: December 2019

Team Collaboration Experience

- Served as team leader and first author for all competitions, papers, and patents during my master's and doctoral studies, collaborating harmoniously with various supervisors.
- Received honors such as Excellent Student Cadre and Meritorious Student from the University of Chinese Academy of Sciences.
- Led all competitions and projects during my undergraduate studies, functioning as team captain and maintaining positive relationships with diverse team members.
- Awarded Meritorious Student for three consecutive years, Technology Activity Award for three years, Star of Scientific and Technological Innovation (top 1%) for three years, served as Student Leader of the Undergraduate Electronic Innovation Laboratory and Deputy Class Monitor.

Other Activities

- Contributed one artwork to the Third International Academic Forum on "The Intersection of Art and Science" and Excellent Student Works Exhibition. Participating institutions included the Central Academy of Fine Arts, Tsinghua University, Peking University, etc. Media support included People's Daily Online, People's Art Online, Tencent, and others.
- Participated in the "Marching into the New Era" Achievements Exhibition and cooperated with reporters from Xinhua Daily and Jiangsu Broadcasting Corporation.
- Took part in the taping of CCTV's "Open Talk" program hosted by Sa Beining.
- Served as a student judge for the evaluation of the Graduate National Scholarship and Zhu Li Yuehua Scholarship at the National Space Science Center of the Chinese Academy of Sciences in 2024.

Full list of my publication

[Published paper]

- **[ACCV'24]** "ESM-YOLO: Enhanced Small Target Detection Based on Visible and Infrared Multi-modal Fusion" **Qianqian, Zhang**, and Linwei, Qiu and Li Zhou, and Junshe An. in Proceedings of the Asian Conference on Computer Vision (ACCV),2024,1454-1469
- **[Sensors'24]** "Real-Time Recognition Algorithm of Small Target for UAV Infrared Detection" **Qianqian, Zhang**, Li Zhou, and Junshe An. Sensors, 24, 3075. https://doi.org/10.3390/s24103075

[Published Chinese patent, First inventor]

- **[1] Public number :CN118470557A;** Release Date :2024.08.09; Invention name: A small target detection method and system based on visible light and infrared multi-mode fusion; Inventor: **Qianqian, Zhang**, Li Zhou, and Junshe An.
- **[2] Public number: CN118314477A;** Release Date :2024.07.09; The invention discloses a small target real-time recognition method and system for UAV infrared detection; Inventor: **Qianqian, Zhang**, Li Zhou, and Junshe An.
- **[3] Public number :CN116527896A;** Release Date: 2023.08.01; The invention discloses a space-borne heterogeneous H.264 video compression and decoding system and a decoding method; Inventor: **Qianqian, Zhang**, Li Zhou, and Junshe An.
- **[4] Public number :CN116527895A;** Release Date: 2023.08.01; The invention discloses a space-borne heterogeneous H.264 video compression coding system and a coding method; Inventor:**Qianqian, Zhang**, Li Zhou, and Junshe An.

[Filed, unpublished patent, first inventor]

- **[1] Application number: 2024117851620;** Application date: December 06, 2024; Patent name: A pixel-level multi-spectral fusion small target detection method and system based on mask enhancement; Inventor: **Qianqian, Zhang**, Li Zhou, and Junshe An.
- **[2] Application number: 2024117698796;** Application date: December 04, 2024; Patent name: An improved infrared small target detection method and system based on visual state space model; Inventor: **Qianqian, Zhang**, Li Zhou, and Junshe An.

[papers under review and to be submitted]

- **[CVPR'25]** "Selective Structured State Space for Multispectral-fused Small Target Detection"(arxiv is about to be submitted, and the title of the paper will be changed when submitted. It was never filed because the patents were pending at the time)
- **[Remote Sensing'24]**After adding 30% content on the basis of ACCV24 paper, I will submit it. My supervisor has received an invitation form the journal.