Jiacheng Cheng

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Research Statement / Interests

I am a second-year PhD student in Computer Science at Newcastle University. My research focuses on advancing **Generative Adversarial Networks (GANs)** for controllable and stable image synthesis. Specifically, I study latent space disentanglement for fine-grained control, stable training strategies, and integration with **Human–Computer Interaction (HCI)** contexts.
Beyond research, I have strong engineering competence with **diffusion models, large language models (LLMs), and AI agent frameworks**, which I use to integrate practical generative systems. This includes building my own interactive AI image synthesis systems and providing AI engineering support for **collaborative lab projects** in education and music. My long-term vision is to bridge high-quality, specialized, and lightweight generative models with usability, enabling AI systems that are both efficient and human-centered.
Keywords: Image synthesis, GAN controllability, GAN stability, diffusion models, AI–HCI integration, AI agents.

Education

- **Newcastle University** *Apr 2024 – Present*
  PhD in Computer Science Newcastle upon Tyne, UK
  - Research focus: Generative Adversarial Networks (GANs), controllability, efficient training, and Human–Computer Interaction (HCI) applications.
  - Supervisors: Dr. Lei Shi, Prof. Boguslaw Obara
- **Newcastle University** *Sep 2021 – Aug 2022*
  MSc in Computer Science – Distinction (79.2/100) Newcastle upon Tyne, UK
  - Dissertation: *Data Analysis with Ensemble Machine Learning Models* (82/100). Supervisor: Dr. Paolo Zuliani.
  - Selected modules: Advanced Programming (90/100), Software Development Techniques (93/100), Computer Networks (90/100).
- **University of Liverpool & Xi'an Jiaotong-Liverpool University** *Sep 2016 – Jul 2020*
  BEng in Computer Science and Technology Liverpool, UK & Suzhou, China
  - Joint degree program between University of Liverpool (UK) and Xi'an Jiaotong-Liverpool University (China).

Publications

- **[Second Author]** *FretMate: ChatGPT-Powered Adaptive Guitar Learning Assistant. IUI 2024.*
- **[Second Author]** *Plot & Palette: Weaving Personalised Narratives through an Affective Dialogue with Art. IUI 2025* (planned submission).
- **[First Author]** *A Comprehensive Review of GANs for Image Generation: Stability, Key Variants, and Comparisons. JMLR 2025* (submitted).

Research Projects

- **GANs Review (Nov 2024 – Mar 2025)** – First-author comprehensive survey on GAN stability, controllability, and comparisons with diffusion models; submitted to JMLR.
- **GANs Research Space (Jul 2025 – Present)** – Investigating fine-grained control and hybrid GAN–Diffusion models, with a focus on achieving stable training and high-quality, controllable image synthesis. Implemented in PyTorch with StyleGAN2 as the baseline; preliminary experiments reached an FID of 10.5 on a 4,000-image dataset at 128×128 resolution.
- **AI Agent Systems for HCI (Aug 2025 – Present)** – Designing interactive systems that integrate fine-tuned LLMs and agent frameworks (LlamaIndex, LangChain, SmolAgent) for creative tasks such as AI image synthesis. In parallel, providing AI engineering support to collaborative lab projects in education and music, contributing to HCI-driven system controllability and usability.

Skills

- **Deep Learning & Generative Models:** GANs (StyleGAN2/3, ProGAN), Diffusion, VAE, Transformer, ViT, CNN
- **Model Engineering:** PyTorch, LoRA fine-tuning, LLM pretraining, RAG & AI agents (LlamaIndex, LangChain, SmolAgent), MCP
- **Software & Systems:** Full-stack (Vue, SpringBoot, MySQL, Android), API development, model deployment
- **Tools & Platforms:** Docker, Conda, Linux, GitHub, VS Code, HPC clusters
- **Foundations:** Gradient Boosting, Random Forest, SVM, Probabilistic Graphical Models, HMM, Linear Algebra, Probability & Statistics, Bayesian Methods
- **Research Skills:** Model implementation from scratch, Experiment design, Paper writing & review

Engineering Projects

- **Web Game for Accent Research** *Sep 2024 – Oct 2024*
  Tools: Vue, SpringBoot, MySQL, Apache, Linux [Frontend] [Backend]
  - Independently built a full-stack web game supporting a linguistics study led by **Dr. Cong Zhang**, used by 50+ participants (BBC coverage).
  - Implemented Vue front-end, SpringBoot APIs, and MySQL persistence; developed a lightweight task/response game for experiments.
  - Deployed on a Linux server via Apache reverse proxy for external participant access.
- **Booking Ticket Android App** *Mar 2022 – May 2022*
  Tools: Android Studio, Java, MySQL [ ]
  - Led a 5-member multicultural team to deliver an Android ticket-booking application end-to-end.
  - Implemented core back-end services in Java with MySQL, including booking workflow and simple admin dashboard.
- **Financial Analysis Agent** *Jul 2025 – Present*
  Tools: Python, LlamaIndex, OpenAI API [ ]
  - Implementing an AI agent system for company stock analysis, integrating LlamaIndex retrieval with LLM reasoning to generate structured insights.
  - Automated fetching and parsing of financial documents (e.g., filings/news) and produced templated reports for quick review.
  - Demonstrates practical integration of LLMs with retrieval pipelines; aligns with long-term interest in financial AI.

Extracurricular Interests

- **Tennis Player** – Intermediate level; capable of consistent forehand and backhand rallies, actively engaging in practice matches and community activities.
- **Cosplayer** – Experienced in cosplay photography, with knowledge of cultural context and visual composition from extensive photoshoot collaborations.
- **Long-term Investor** – Focused on technology equities, with a long-term investment approach based on financial reports and analysis of competitive strengths.
- **Singer** – Mid-to-high vocal range with a style oriented toward rock and pop; trained through consistent practice and small-scale performances.