TONGYAO LIU

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RESEARCH INTERESTS

Computer Vision · Multimodal Deep Learning · Audio-Visual Speech Recognition · Vision-based Human-Computer Interaction

EDUCATION

National University of Singapore — Singapore
Master of Technology in Software Engineering, Institute of Systems Science — Aug 2026 – Jul 2027
Specialisations: Architecting AI Systems; Engineering Big Data
Key Modules: Architecting Agentic AI Solutions; Explainable and Responsible AI; Deploying and Operating AI Solutions; Big Data Engineering for Analytics; Architecting Systems for Real-Time Data Processing; Software Design Patterns; Cloud Native Solution Design

University of East Anglia (UEA) — Norwich, United Kingdom
BSc (Hons) Computing Science with Software Development, School of Computing Sciences — Sep 2023 – Jul 2026
Programme: Articulation programme — Years 1–2 at Qingdao University of Technology, final year at UEA
Classification: First Class Honours | **GPA:** 4.0 | **QUT stage:** average 90.48/100, rank 1/43
Key Modules: Artificial Intelligence; Audiovisual Processing; Ubiquitous Computing; Game and Mobile App Development; Systems Analysis; Systems Engineering; Mathematics for Computing; Data Structures; Object-Oriented Programming; Object-Oriented Analysis & Design; Relational Database Management Systems

SELECTED PROJECTS

Robust Audio-Visual Speech Recognition via Multimodal Feature Fusion — Oct 2025 – Nov 2026
Python · PyTorch · TensorFlow/Keras · MediaPipe · OpenCV
- Designed and implemented an end-to-end audio-visual speech recognition system that combines acoustic and lip-motion features to stay accurate in noisy environments.
- Implemented MFCC feature extraction from scratch for the audio branch; for the visual branch, tracked the mouth region with MediaPipe face-mesh landmarks and extracted 2D-DCT and lip-shape features. All branches use temporal CNN models.
- Designed and compared feature-level early fusion and decision-level late fusion, with entropy-based adaptive weighting that favours audio when video quality drops.
- Ran comparative experiments across noise types and SNR levels; multi-condition training raised audio recognition accuracy at 0 dB from 30.5% to 77.7%. Implemented the models in both PyTorch and Keras and exported them to ONNX/TFLite.

Real-Time Hand Gesture Recognition with MediaPipe and Machine Learning — Oct 2025 – Nov 2026
Python · MediaPipe · OpenCV · scikit-learn
- Built an end-to-end real-time gesture recognition system for touch-free human-computer interaction in complex scenes.
- Extracted MediaPipe hand landmarks and normalised them for position and scale; compared Logistic Regression, a Decision Tree and a k-nearest-neighbours classifier written from scratch.
- Achieved 93.8% end-to-end test accuracy; applied adaptive gamma correction and median filtering to improve hand detection in low-light and noisy conditions.

Hinger AI: Search, Exact Solving and Game-Playing Agents — Oct 2025 – Nov 2026
Python · pytest · GitHub Actions
- Reduced winning-position detection to finding articulation points in the board graph, implemented in linear time with Tarjan's algorithm.
- Derived and proved an admissible and consistent heuristic for A* search; solved the full 5×5 board exactly using memoised negamax with symmetry reduction.
- Implemented minimax, alpha-beta and Monte Carlo tree search agents, and evaluated their move quality against the exact solution.

SERMS — Shared Equipment Reservation & Maintenance System — Aug 2026 – Nov 2026
Scrum Master · Java 17 · Spring Boot · React/TypeScript · PostgreSQL · Docker
- Led a five-member agile team: allocated work through GitHub Issues/Projects, coordinated integration of five use-case modules, and reassigned tasks when a member became unavailable.
- Owned the fault-reporting & maintenance module end to end, from analysis and design diagrams through the Spring Boot REST API and database migration to the React UI, and took over the search & reservation module.
- Built the integration line and front-end foundation, and led the production release to an HTTPS server through a GitHub Actions pipeline gated by CodeQL, Trivy, gitleaks and a coverage threshold.

INTERNSHIP EXPERIENCE

East China Oil & Gas Branch, China Petroleum & Chemical Corporation (Sinopec) — Information Management Center — Nanjing, China
Software Testing Intern, Data Application Department — Jun 2025 – Aug 2025
- Conducted software testing and log analysis for the East China Oil & Gas Business System Integration Platform Construction Project, tracing interface latency, data-transfer errors and instability under peak load.
- Refined data-transmission logic and supported code optimisation, reducing error frequency during concurrent access.
- Documented deployment scenarios and mapped integration-risk patterns between legacy business modules and real-time monitoring systems.
- Assessed system performance indicators to improve the reliability of cross-department data synchronisation.

Jiance (Shandong) Information Technology Co., Ltd. Qingdao, China
Front-End Development Engineer, Intelligent Detection Cloud Platform Project Team Jan 2025 – Feb 2025

- Built core front-end modules (user authentication, task management, data visualisation) with Vue.js and Element UI, completing page-structure design and component encapsulation.
- Collaborated with back-end engineers to debug and integrate RESTful APIs, resolving data-format compatibility and exception-handling issues.
- Developed reusable UI components and refactored legacy code to improve rendering efficiency and maintainability.
- Designed and executed functional test cases, helping locate and fix front-end defects to ensure release quality.
- Produced front-end development documentation, API usage guides and module user manuals.

Shengli Oilfield Branch, China Petroleum & Chemical Corporation (Sinopec) — Audit Department Dongying, China
IT Audit Intern Jul 2024 – Aug 2024

- Participated in the branch's IT audit project, assisting with internal-control environment testing and data collection.
- Audited system permissions and role-based access control (RBAC), identifying mismatches between authorisation levels and actual business scope.
- Traced cross-department data flows to reveal gaps in accountability and digital-audit traceability.
- Compiled evidence for internal governance review and improved digital audit trails through clearer log-classification and verification procedures.

Sinopec Shengli Petroleum Administration Bureau Co., Ltd. — New Energy Development Center Dongying, China
New Energy Systems Intern Jun 2024 – Jul 2024

- Supported control-system maintenance of the 106 MW photovoltaic power station at Gudong Oilfield, tracking inverter-output stability and data consistency.
- Assisted in grid-connection testing of the energy-storage system, analysing state-of-charge (SOC) fluctuations and charge–discharge curves.
- Consolidated multi-source data (irradiance, inverter output, SOC) for Shengli Oilfield's Source-Grid-Load-Storage intelligent control platform.
- Organised the data structures required by dispatch-forecasting and operational-control modules, improving data standardisation and usability.

Shengli Oilfield Branch, China Petroleum & Chemical Corporation (Sinopec) — Offshore Oil Production Plant Dongying, China
IT Operations Intern Jan 2024 – Feb 2024

- Supported operation and maintenance of the production-command information system, verifying real-time sensor alarms against equipment-status output.
- Identified recurring abnormal and duplicate alarms caused by calibration drift and signal noise.
- Helped refine equipment-maintenance workflows and alarm-classification rules.
- Documented SCADA data routing and fault-response logic.

HONOURS & AWARDS

- International Undergraduate Merit Scholarship (£4,000), University of East Anglia 2025
- China Student Ambassador, University of East Anglia 2025
- Third Prize, Java Software Development (University Group B), Shandong Division, 16th Lanqiao Cup National Software and IT Professional Talent Competition (co-organised by the MIIT Talent Exchange Center) 2025
- Excellent Graduate, Qingdao University of Technology 2025
- Outstanding Student, Qingdao University of Technology 2023, 2024

TEST SCORES & CERTIFICATIONS

- **GRE General Test:** 335 (Verbal Reasoning 169, 99th percentile | Quantitative Reasoning 166) Dec 2025
- **Languages:** English — full professional proficiency; all higher education taught entirely in English (undergraduate studies in China and the UK, master's in Singapore). Mandarin — native.
- **IITC Industrial & Information Technology Talent Job Capability Certificate:** Industrial Internet Platform Development Engineer (Ministry of Industry and Information Technology) Jul 2025

TECHNICAL SKILLS

- **Machine Learning & Vision:** TensorFlow/Keras, PyTorch, scikit-learn, OpenCV, MediaPipe, ONNX/TFLite; CNNs, MFCC/DCT/PCA feature extraction, multimodal fusion
- **Programming:** Python, Java, C/C++, JavaScript/TypeScript, SQL, C#
- **Software Engineering:** Spring Boot, React, Vue.js, Element UI, RESTful APIs; PostgreSQL, MySQL, Oracle
- **DevOps & Tools:** Git, GitHub Actions, Docker, Unity, Microsoft Project
- **Methods:** Agile/Scrum, UML modelling, software testing

LEADERSHIP & ACTIVITIES

China Student Ambassador — University of East Anglia Sep 2025 – Jun 2026

- Selected by the university to support student recruitment, advise prospective students and run China-focused outreach and exchange activities.

Assistant to the President — UEA Chinese Students and Scholars Association (CSSA) Sep 2025 – Jun 2026

- Assisted the president in planning cultural and academic events, coordinating logistics, communication and attendee management.
- Partnered with other student societies to strengthen community engagement and increase event participation.