Wei-Cheng Wang, Ph.D.

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Summary

Ph.D. in Computer Science Engineering with expertise in multimodal representation learning (audio, video), generative models, and privacy-preserving ML. Designed model-agnostic mechanisms for unconstrained real-world environments, focusing on domain adaptation, privacy constraints, and robust representations that explicitly factor in real-world uncertainties and practical use-case constraints.

Skills & Expertise

Technical Skills

- **ML Stack**: Python, PyTorch, TensorFlow, OpenCV, Weights&Biases, TensorBoard, GPULab, LLM APIs
- **Infrastructure & Tools**: C++, Docker, Git, Linux

Core Expertise

- **Modalities**: Computer Vision (Image/Video), Audio, Text, Multimodal (Audio-Visual)
- **Learning Paradigms**: Unsupervised Learning, Self-supervised & Contrastive Learning, Domain Adaptation, Generative Modeling, Adversarial Learning
- **Specialized Domain:** Large-scale ML Evaluation Pipeline (5000+ hrs real-world data), Surveillance, Anomaly Detection, Privacy-Preserving ML
- **Model Assessment**: Performance Benchmarking (Detection, Classification, Recognition, Localization)
- **Others:** Agentic Workflows, AI Systems & Orchestration

Leadership & Professional Impact

- **Technical Communication:** ML Mentorship (TA), Thesis Co-advised, Strategic Tech Briefs (Editor)
- **Stakeholder Coordination & Leadership:** Expat-Govt Liaison, Crisis Coordination (TSA Co-President)
- **Technical Pitching:** Award-winning AI Prototypes (Intl. Startup Competitions), Tech Transfer

Experience

Doctoral Researcher | Ghent University, (*2019-2025*)

Addressed the fundamental challenges of transitioning AI from academic benchmarks to real-world deployment with **data-centric** mechanisms and system-level architectures. Formulated **model-agnostic** solutions to tackle extreme **data scarcity**, environmental **domain shifts**, and strict **privacy constraints**.

- **Large-scale ML Evaluation & Real-world Robustness:**
  - Collaborated with industry partner **Asasense** to analyze how state-of-the-art models behave on **5000+ hours of real-world audio**, informing robustness requirements for deployment. Architected a **context-aware edge pipeline** that mitigates real-world domain shifts and drastically **reduces computing overhead**, ensuring robust deployment.
- **Multimodal Representation Learning:**
  - Developed a **pair-generation mechanism** for self-supervised multimodal representation learning on **unlabeled surveillance data**, resolving **false negatives** from temporal misalignment and the **information bottleneck** in contrastive learning. (Published in *Frontiers in Robotics and AI*)
- **Privacy-Preserving AI:**
  - Architected a plug-in, "opt-in" privacy framework leveraging **adversarial learning** and **generative-based models** to actively suppress sensitive attributes. Secured data against unauthorized extraction, ensuring **compliance-ready** deployment **without** incurring **backend retraining** costs. (Published in *IEEE Pervasive Computing* and *Applied Intelligence*)
- **Model Assessment:**
  - Validated robustness of learnt **multimodal representations** on multiple downstream tasks including **anomaly detection**, event localization and classification.

- Evaluated the field performance of SOTA sound tagging and **generative-based anomaly detection** models and stress-tested performance degradation against **temporal**, **spatial**, and **context shifts**.
- Devised a **task-agnostic** assessment utilizing RINNs and **embedding similarity metrics** to evaluate models across unknown downstream tasks **prior to deployment**. (Published in *Sensors*).

- **Mentorship:** Co-advised an M.Sc. thesis, guiding research directions, model evaluation, and case studies.

Teaching Assistant | Ghent University, (*2021-2023*)

Guided students from conceptual research to technical implementation, covering the complete workflow of sensor data acquisition, preprocessing, and model training for validated PoCs.

- **Technical Communication:**
  - Collaborated with **Sony Depthsensing Solutions** to co-design deep learning coursework, digesting their proprietary scripts, devices into project scopes and delivering gesture recognition prototypes.
  - Translating complex concepts into actionable frameworks and guiding teams to build real-world application with text/image data (e.g., fraud-risk detection, commercial market analysis).

Co-President & Editor | UGent TSA & Taiwan Science and Technology Division, (*2020-2022*)

- **Technical Communication** (Contributing Editor | Taiwan Science and Technology Division)**:**
  - Analyzed key technology and policy developments within the European Union, translating complex technical frameworks into concise strategic briefing reports for government and enterprise stakeholders.
- **Stakeholder Coordination & Leadership** (Co-President | Taiwanese Student Association)**:**
  - Served as the primary liaison between the expatriate community and government during the pandemic. Coordinated cross-org resources during the pandemic, strengthening cross-cultural communication, incident-response coordination, and prioritization under uncertainty.

Selected Research Experience (pre-PhD) | NCKU, (*2014-2016, 2017-2019*)

- **Facial Analysis:** Developed **hierarchical model** with **temporal facial sparse representations** to reduce computational overhead and improve performance under lighting/pose variations. (Published in *IEEE TITS*)
- **Intelligent Surveillance Systems:** Optimized UI readability via **MRF-based energy minimization**, significantly mitigating visual jittering and label occlusion to **prevent cognitive fatigue** during post-analysis. (Published in *IEEE TCSVT*)
- **Technical Communication:** Co-developed a driver monitoring system with national-level partner ARTC, spanning physical sensor deployment and raw data acquisition to final prototype analysis.
- **Technical Pitching:** Directed student teams in engineering and pitching award-winning AI prototypes at international startup competitions (InnoServe 1st , APICTA Top 3); facilitated tech transfer.

Selected Projects

Agentic AI System (*Self-initiated*, *2025-2026*)

Architected a cost-aware Multi-Agent system featuring a hybrid orchestration gateway and ChromaDB-backed RAG. Automated semantic data triage by implementing a MoE routing strategy, significantly optimizing API quota consumption and system latency.

Full Portfolio & PhD Research Details: Personal Website

Publications

Authored 12 publications (140 citations), featuring 7 journals with 3 in Scopus Top 10% (including *IEEE TIP*, *TITS*, and *TCSVT*) and 3 in Top 25%. For a complete list of publications, see: Google Scholar

Education

Ph.D. in **Computer Science Engineering**	Ghent University, Belgium (*2019-2025*)
M.Sc. in **Computer and Communication Engineering**	NCKU, Taiwan (*2014-2016*)
B.Sc. in **Electrical Engineering**	NCKU, Taiwan (*2010-2014*)