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**. Experienced across the **full ML lifecycle**, from raw data collection and curation to prototyping and cross-functional stakeholder pitching. Proven track record of designing **data-centric**, **model-agnostic** mechanisms to tackle **data scarcity**, **domain shifts**, and **privacy constraints**.

Skills

- **Domain Expertise:** Multimodal ML (Audio/Video), Self-Supervised & Contrastive Learning, Privacy-Preserving AI, Real-World Robustness, Transfer Learning.
- **Tech Stack:** Python/C++, PyTorch/TensorFlow, W&B/TensorBoard, Docker, Git, GPULab.

Experience

Doctoral Researcher | Ghent University, (*Sep 2019- Nov 2025*)
PyTorch, TensorFlow, Weights&Biases, GPULab, Git
Video/Audio Processing, SSL, Contrastive/Adversarial Learning, Generative Modeling, Domain Adaptation,
Anomaly Detection, Privacy-preserving AI, Real-world Deployment & Benchmarking, Mentorship

- **Large-scale ML Evaluation & Real-world Robustness:**

  Architected a context-aware, **model-agnostic** edge pipeline in collaboration with **industry partner** Asasense for acoustic surveillance. Evaluated the robustness of SOTA **anomaly detection** and **sound classification** against domain shifts with **5000+ hours** of **uncurated real-world audio**. This **edge-to-cloud solution** reduced downstream cloud processing workloads by 90%, ensuring robust deployment.

- **Multimodal Representation Learning:**

  Resolved **false negatives** caused by temporal misalignment in **unlabeled streaming data**, significantly improving **representation generalizability** for resource-efficient deployment. Developed an **embedding-based** pair-generation **mechanism** and novel loss function for **self-supervised** contrastive learning. Enabled a single shared encoder to power multiple downstream tasks, **reducing computing and memory overhead** of deploying separate models. (Published in *Frontiers in Robotics and AI*)

- **Privacy-Preserving AI:**

  Architected a **plug-in framework** to **prevent unauthorized extraction** while providing **frictionless integration** with existing ML pipelines. Designed an opt-in mechanism and leveraged **adversarial learning** and **generative-based models** to actively suppress sensitive attributes. Neutralized unauthorized attribute extraction to **near-random** while preserving downstream utility, completely **bypassing retraining costs**. (Published in *IEEE Pervasive Computing* and *Applied Intelligence*)

- **Model Assessment:**

  Devised a **task-agnostic** assessment for model selection prior to deployment or fine-tuning. Utilized **RINNs** and **embedding similarity metrics** to identify the most informative model without accessing source data. Predicted real-world performance on par with fully supervised baselines while complying with GDPR, enabling data-sovereign model selection for **transfer learning**. (Published in *Sensors*)

Teaching Assistant (Applied Machine Learning) | Ghent University, (*Sep 2021- Feb 2023*)
PyTorch, Scikit-learn, Matplotlib
Textual Data, Computer Vision, Machine Learning, Data Acquisition, Technical Communication, Mentorship

- Co-designed lecture and project for 60+ students in a collaboration with **Sony Depthsensing Solutions**. Translated industrial scripts and hardware capabilities into structured project scopes, guiding teams from sensor data acquisition to the delivery of gesture recognition PoCs.
- Co-directed practical lab sessions and co-designed project for 120+ students across two semesters. Guided cross-functional teams to formulate real-world ML use cases using **textual** and **image data**, resulting in analytical solutions for Airbnb **fraud detection** and Tripadvisor commercial **market strategy**.

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

Technical Communication, Leadership

- **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.
- **Co-President** (Taiwanese Student Association)**:** Served as the primary liaison between the expatriate community (100+ members across 3 years) and government during the pandemic. Coordinated cross-org resources, strengthening cross-cultural communication, incident-response coordination, and prioritization under uncertainty.

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

C++, OpenCV, MATLAB

Facial Analysis, Video Synopsis, Modal Fusion, Spatiotemporal Optimization, Tech Commercialization

- **Intelligent Surveillance Systems:** Co-developed a video synopsis system to assist police departments in identifying events and tracking suspects. **Engineered prototype**, **pitched** business model and won international startup competitions (InnoServe 1st, APICTA Top 3); successfully facilitating **tech transfer.**
- **Spatiotemporal Optimization:** Optimized UI readability for analytic results in smart surveillance. Formulated annotation placement as spatiotemporal optimization problem and solved via **MRF-based energy minimization**. Mitigated visual jittering and label occlusion to **prevent cognitive fatigue** during post-analysis. (Published in *IEEE TCSVT*)
- **Driver Monitoring:** Co-developed a **facial-ECG** monitoring pipeline with national partner ARTC to enhance active road safety. Executed the **end-to-end development lifecycle**, spanning hardware sensor integration, raw data preprocessing, and predictive algorithm prototyping. Delivered a robust solution that won 2nd place globally in a startup competition. (Published in *IEEE TITS*)

Selected Projects

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

Python, Docker, LLM APIs, ChromaDB

Agentic Workflows, AI Orchestration, Mixture-of-Agents, RAG, Clustering

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

Full Portfolio & PhD Research Details: [Personal Website](#)

Selected 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%.

[Embedding-based pair generation for contrastive representation learning in audio-visual surveillance data](#)
   Frontiers in Robotics and AI, 2025. (First author)

[Source-free model transferability assessment for smart surveillance via randomly initialized networks](#)
   Sensors, 2025. (First author)

[Privacy-preserving visual analysis: Training video obfuscation models without sensitive labels](#)
   Applied Intelligence, 2024. (Second author)

[An opt-in framework for privacy protection in audio-based applications](#)
   IEEE Pervasive Computing, 2022. (First author)

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*)