Antonios Tragoudaras

https://antragoudaras.github.io/ | antragoudaras | Antonios-Tony-Tragoudaras

Education

Inria, Paris Center — *Paris, France*

PhD in Artificial Intelligence — Nov. 2025 - Now

Physics-Grounded Vision Foundation Models

University of Amsterdam (UvA) — *Amsterdam, Netherlands*

MSc in Artificial Intelligence — Aug. 2023 - Sep. 2025

GPA: 8.35/10 - Graduated Cum Laude (Term for outstanding performance)

Thesis Project: Physics Informed Representation Alignment kippo

ELLIS MSc Honors Award

King Abdullah University of Science and Technology (KAUST) — *Jeddah, Saudi Arabia*

Visiting Student & Research Assistant in Electrical and Computer Engineering — Aug. 2022 - Aug. 2023

Neural Architecture Search, Efficient Deep Learning & TinyML, Voice Activity Detection, and Visual Perception for Autonomous Driving Applications

University of Thessaly — *Volos, Greece*

BEng in Electrical & Computer Engineering (5-years studies; 300ECTS) — Sep. 2016 - Nov. 2021

Thesis Grade: 10/10 (Excellent),GPA:Upper Second-Class Honors.

Undergrad. Research Project: Design Space Exploration of MobileNetV2 and inference acceleration on FPGAs.

Research Experience

Physics-Informed Representation Alignment — *University of Amsterdam (UvA) / Institute of Science & Technology (ISTA)*

Instilling targeted, physical knowledge into pre-trained Video Diffusion Models — Feb. 2025- Sep.2025

Check my thesis website for upcoming updates.

Project conducted under the joint-supervision of A. Zadaianchuk, D. Cherniavskii, E. Gavves. Visiting Student @ ISTA in F. Locatello's group.

Physical Reasoning of Video Generative Models (VGMs) — *University of Amsterdam (UvA)*

Quantifying physics-reasoning as an emergent property in video generative modeling — Jul.2024- Feb. 2025

Pre-print available in arXiv.

Duties/Tasks:

- Real-world dataset: Capturing simple Newtonian dynamics (falling ball, projectile motion, chaotic pendulum) from real-world controlled experiments.
- Assessing the physical reasoning and plausibility inherent in contemporary Video-Generative (world) Models (VGMs), like COSMOS.
- 10k generated videos: Conditioned the sampling process of four contemporary diffusion-based video generative models (trained with (conditional) flow-matching objectives) on either single or multiple frame(s) for inferring real-world initial conditions (like velocity and acceleration).
- Trajectory Extraction Pipeline: Key aspect for extracting relevant physical information from both real and generated videos. Calculating the 3D trajectory of objects over time/frames, using self-supervised methods in a zero-shot fashion, building upon Vision Foundational Models (for automated object segmentation and open-vocabulary trackers).
- Going beyond mere pixel-to-pixel evaluation, with the introduction of dynamical and physical invariance scores, for deriving interpretable metrics and faithfully assess the physical reasoning and consistency of VGMs.

Key Findings:

- Current video generative models often fail to accurately represent physical laws, generating implausible behaviors despite visually realistic and aesthetic outputs.
- MORPHEUS serves as a stepping stone in understanding and addressing the domain gap as to transform generative models into world models with reliable physical cognition capabilities.

Neural Architecture Search, Meta-Heuristic Optimization, Transformers for Brain Signal Decoding — *King Abdullah University of Science and Technology (KAUST)*

Graduate Student in applied AI, supervised by Postdoc Fellow. Sep. 2022 - Feb.2023

Projects/Publications:

- Enhancing DNN models for EEG/ECoG BCI with a Novel Data-Driven Offline Optimization Method.
- Data-Driven Offline Optimization of Deep CNN Models for EEG and ECoG Decoding.

AutoML, Efficient Deep Learning Techniques, and Voice Activity Detection — *VSPR - KAUST*

Visiting Student Research Intern, mentored by Postdoc Fellow Charalampos Antoniadis Feb. 2022 - Jul. 2022

Projects/Publications:

- TinyML for EEG Decoding on Microcontrollers.
- Audio-visual Speaker Diarization: Improved Voice Activity Detection with CNN based Feature Extraction.

Publications

Full list is available at Google Scholar

[1] C. Zhang, D. Cherniavskii, **A. Tragoudaras**, et al. ... E. A. Zadaianchuk, Gavves. "MORPHEUS: Benchmarking Physical Reasoning of Video Generative Models with Real Physical Experiments" in *arXiv.2504.02918*

[2] **A. Tragoudaras**, T. Aslanidis, E. G. Lionis, M. Orozco González, P. Eustratiadis. "Information Leakage of Sentence Embeddings via Generative Embedding Inversion Attacks", accepted in *SIGIR 2025*, available as pre-print in *arXiv.2504.16609*

[3] **Antonios Tragoudaras**, C. Antoniadis, Y. Masoud. "Enhancing DNN models for EEG/ECoG BCI with a Novel Data-Driven Offline Optimization Method" in *IEEE Access, vol. 11, pp. 35888-35900, 2023, doi: 10.1109/ACCESS.2023.3265040*

[4] **A. Tragoudaras**, C. Antoniadis, Y. Masoud. "TinyML for EEG Decoding on Microcontrollers" in *2023 IEEE 56th International Symposium on Circuits and Systems (ISCAS)*

[5] K. Fanaras, **A. Tragoudaras**, C. Antoniadis, Y. Masoud. "Audio-visual Speaker Diarization: Improved Voice Activity Detection with CNN based Feature Extraction" in *2022 IEEE 65th International Midwest Symposium on Circuits and Systems (MWSCAS)*

[6] **A. Tragoudaras**, P. Stoikos, K. Fanaras, A. Tziouvaras, G. Floros, G. Dimitriou, K. Kolomvatsos, G. Stamoulis. "Design Space Exploration of a Sparse MobileNetV2 Using High-Level Synthesis and Sparse Matrix Techniques on FPGAs" in *MDPI Sensors 22, no. 12: 4318*

Awards and Honors

Dec. 2024 - Sep. 2025 — ELLIS MSc Honours Program: Awarded to excellent MSc students which have conducted their thesis under their joint supervision of UvA ELLIS unit at an ELLIS partner institution outside of the Netherlands. — *UvA IvI*

Aug. 2022- Aug. 2023 — **KAUST Graduate Fellowship**: Full tuition support, living allowance, housing, and medical coverage. — *KAUST*

Teaching Experrience

Graduate Teaching Assistant at UvA's MSc AI Program — *UvA, Amsterdam, Netherlands*

Assisted in teaching graduate-level (first-year) courses by making sure students understood the material, answering their questions, creating assignments, giving feedback, and grading exams. Aug. 2024 - Present

Courses:

- Computer Vision 1 (MSc AI) (Aug. 2024 - Oct.2024)
- Deep Learning 1 (MSc AI) (Oct. 2024- Dec.2024)
- Fairness, Accountability, Confidentiality & Transparency in AI (MSc AI) (Jan. 2025 - Feb. 2025)
- Information Retrieval 1 (MSc AI) (Feb.2025 - Mar. 2025)