

Antonios Tragoudaras

🏠 <https://antragoudaras.github.io/> | 🌐 [antragoudaras](#) | 📄 [Antonios-Tony-Tragoudaras](#) | 📧 [Antonios-Tragoudaras](#)

Education

University of Amsterdam (UvA)

Amsterdam, Netherlands

MSc in Artificial Intelligence (Informatics Institute)

Aug. 2023 - Present

GPA: 8.28/10 - In track to graduate with cum-laude (highest distinction).

Thesis: Physics Plausible World Simulators for Embodied and Physical AI.

Thesis Fellowship: [ELLIS MSc Honors](#) Student program.

King Abdullah University of Science and Technology (KAUST)

Jeddah, Saudi Arabia

Visiting Student & Research Assistant in Electrical and Computer Engineering

Aug. 2022 - Aug. 2023

Research projects and publications in efficient AI, AutoML for interdisciplinary application (e.g. Brain Signal Decoding) and Visual Perception for Autonomous Applications.

University of Thessaly

Volos, Greece

BEng in Electrical & Computer Engineering (5-years studies; 300ECTS)

Sep. 2016 - Nov. 2021

GPA: 7.88/10, Thesis Grade: 10/10 (Excellent), Supervisor: Prof. George Stamoulis.

Research Experience

Physics Based Dynamics

University of Amsterdam (UvA)

Master thesis research project - [ELLIS MSc Honors Student](#). Main Advisor: Professor [Efstratios Gavves](#).

Jan. 2025-Present

ELLIS co-advisor: [Francesco Locatello](#).

Description/Goals:

- Transforming Video Generative Models (VGMs) to (Compositional) World Simulators and scaling them for robotics and physics applications.
- A framework consisting of a neural model for capturing the visual and collision geometry (through dynamic scene reconstruction), which can interact with differentiable physics engines to achieve accurate physics parameter identification.
- Leveraging insights from [previous research experience](#), to address fundamental challenges in VGMs regarding physical consistency and physical parameter estimation.
- Building upon [DreMa](#), a compositional world model, to learn efficient object-centric representations from limited viewpoints. Ultimately, this can also improve the imitation learning downstream capabilities of DreMa (or any arbitrary Vision-Language Action) in simple pick-and-place manipulation task, or relax the need of dense multiple poses of the environment and the object.
- Design *Physically-controllable VGMs* that can be conditioned on (intermediate) Real2Sim representations, aiming at building a framework that can properly estimate the physical dynamics of the real world.

Physical Reasoning of Video Generative Models (VGMs)

University of Amsterdam (UvA)

Research Project led by Associate Professor [Efstratios Gavves](#) - Benchmark for evaluating contemporary video

Jul.2024- Feb. 2025

generation models (VGMs), like [SORA](#) and [Veo-2](#), in understanding real-world phenomena. Pre-print available in [arXiv](#).

Duties/Tasks:

- Real-world dataset & Benchmark: capturing simple physical phenomena (falling ball, projectile motion, holonomic/nonholonomic pendulums) under controlled laboratory conditions, with varying initial conditions per experiment.
- Evaluating recent developments in Video Generative Models (VGMs), with particular emphasis on assessing the physical reasoning and plausibility of contemporary methods such as [COSMOS](#), which claims to be real-world simulators. The study also explores innovative hybrid approaches, including the integration of flow matching techniques with diffusion-based architectures as demonstrated in [Pyramid Flow](#).
- Video Generation: Conditioned the sampling process of VGMs on initial frame(s) both in real-world videos and in-the-wild data. Combined different prompting approaches, while utilized textual prompt enhancers.
- Trajectory Extraction Pipeline: A key aspect is the pipeline to extract relevant physical information from both real and generated videos. This involves calculating the 3D trajectory of objects over time/frames, using self-supervised methods in a zero-shot fashion, building upon automated object segmentation [SAM-2](#) and open-vocabulary trackers like [DEVA](#).
- 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 outputs.
- This work serves as a stepping stone in understanding and addressing the domain gap, as to transform VGMs from capturing the mere visual and aesthetic cues of in-the-wild data, into simulators that can accurately model the physical parameters that govern our world.

Visual Perception for Autonomous Vehicles - Brightskies Inc.

External Collaboration

Remote Collaboration, monitored by Mahmoud Serour (Autonomous Driving Team Lead - CTO of BrightDrive) and

Mohamed Ezzat (Perception Engineer in Brightskies Inc.). Collaboration Initiated by Research Scientist Hakim Ghazzai

Mar.2023-Jun.2023

(AI Team Lead of our research group).

Duties/Tasks:

- Combining methods for better Representation Learning and Early Fusion of the sensor data modalities used in autonomous cars, targeting to acquire better accuracy in downstream Computer Vision tasks.
- Multi-Task Learning Hydra network with multiple heads, each corresponding to a different downstream task, to achieve real-time performance on computationally constrained systems.

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 Charalampos Antoniadis.

Sep. 2022 - Feb.2023

Projects:

- 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 (ISCAS'23)

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:

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

Accelerating Inference of Deep Neural Networks on FPGAs

University of Thessaly

Undergraduate Researcher, mentored by Prof. George Stamoulis and Postdoc Fellow George Floros

Jul. 2021 - Jan. 2022

Journal Publication:

- Design Space Exploration of a Sparse MobileNetV2 Using High-Level Synthesis and Sparse Matrix Techniques on FPGAs (MDPI Sensors'22)

Publications

Full list is available at [Google Scholar](#)

- [1] Zhang, Cherniavskii, Zadaianchuk, **Tragoudaras**, et al. ... Efstratios Gavves. "MORPHEUS: Benchmarking Physical Reasoning of Video Generative Models with Real Physical Experiments in [arXiv 2504.02918](#).
- [2] **Antonios Tragoudaras**, Charalampos Antoniadis, Yehia 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
- [3] **Antonios Tragoudaras**, Charalampos Antoniadis, Yehia Masoud. "TinyML for EEG Decoding on Microcontrollers," in
- [4] Konstantinos Fanaras, **Antonios Tragoudaras**, Charalampos Antoniadis, Yehia 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), Fukuoka, Japan, 2022*, pp. 1-42023 *IEEE 56th International Symposium on Circuits and Systems (ISCAS)*
- [5] **Antonios Tragoudaras**, Pavlos Stoikos, Konstantinos Fanaras, Athanasios Tziouvaras, George Floros, Georgios Dimitriou, Kostas Kolomatsos, Georgios 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

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|----------------------|--|----------------|
| Dec. 2024 - Present | ELLIS MSc Honours Program: Award and funding for excellent MSc students to conduct their thesis under their joint supervision of UvA ELLIS unit at an ELLIS partner institution outside of the Netherlands. | <i>UvA IvI</i> |
| Aug. 2022- Aug. 2023 | KAUST Graduate Fellowship: Full tuition support, living allowance, housing, and medical coverage. | <i>KAUST</i> |

Teaching Experience

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)