Georgios Kiritsis

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Education

Hellenic Air Force Academy, Dekeleia, Attica, Greece Sep 2022 – Jul 2026
B.Sc., Computer Science. GPA: 8.978/10.0 - Excellent (≈ 4.0/4.0 WES equivalent).

Diploma Thesis (100/100): "Ikaros & Skyris: An Integrated Flight Data Recorder and 3D Replay Engine with Phase-Aware Anomaly Detection." Awarded **Best Thesis of Class 2026**—one student per graduating cohort.

Selected coursework: Machine Learning, Neural Networks, Computer Architecture, Microprocessors, Linear Algebra, Discrete Mathematics, Signals and Systems, Information Theory, Cloud Computing, Big Data Analysis.

Athens University of Economics and Business, Athens, Greece 2021 – 2022
Prior studies in Computer Science; transferred to Hellenic Air Force Academy.

Selected coursework: Python, Java, Calculus I & II, Theoretical Computer Science, Differential Equations, Numerical Analysis.

Professional Experience

Hellenic National Meteorological Service (EMY), Athens, Greece Jul 2026 – Present
Computer Science Officer; Machine Learning and Big Data Analysis. Operational responsibility for the EUMETSAT satellite ground station.

- Support and operation of the EUMETSAT ground station at EMY, ingesting operational satellite feeds (Meteosat / MetOp) for meteorological and climatological use across Greek airspace.
- Machine learning and big-data analysis on operational meteorological and satellite datasets, in direct collaboration with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT, 27 EU member states).
- Enrolled in official EUMETSAT training courses for ground-station operators.

Honors and Awards

- **Best Thesis of Class**, Class of 2026, Department of Computer Science, Hellenic Air Force Academy.
- **Perfect Thesis Grade** (100/100), *Ikaros & Skyris* thesis project, examination committee award.
- **Certificate of Proficiency in English with Honors** (ECPE), University of Michigan; C2 level.
- **Top of Class Standing**: final undergraduate GPA 8.978/10.0 (≈ 4.0/4.0 WES equivalent).
- **Panhellenic University Entrance Examinations** (2021): scored 18,600–18,800/20,000 (depending on coefficient weighting); top 0.7% of approximately 75,000 national candidates—Greece's nationwide standardised university admissions examination.

Research

Hellenic Air Force Academy, Diploma Thesis Project Jul 2025 – May 2026
Lead Graphics Engine Developer and Lead Flight Computer Hardware/Firmware Engineer. Advisor: Assoc. Prof. P. Karampelas.

- Designed and fabricated a custom multi-layer flight computer PCB integrating an STM32F405 ARM Cortex-M4 MCU with BMI088 6-axis IMU, LIS2MDL magnetometer, BMP280 barometer, NEO-6M GPS, and SD logging over SPI/I^2C, under strict power, thermal, and signal-integrity constraints.
- Authored bare-metal embedded C firmware implementing a Mahony AHRS attitude estimator, per-channel 1-D Kalman filtering, hardware sensor drivers, and FatFs-based persistent CSV logging at 100 Hz across full flight envelopes.
- Architected and implemented *Skyris*, a custom C++20 OpenGL 4.6 graphics engine featuring a physically-based rendering pipeline, an EnTT-based Entity-Component-System, a QuadTree-driven adaptive LOD terrain renderer for SRTM/OpenStreetMap data, an event-driven layered architecture, an embedded Lua scripting layer, and an ImGui-based in-engine editor.
- Built a fully-integrated debriefing platform comparing real flight data against a synthetic "ideal" reference trajectory, with a phase-aware Isolation Forest anomaly-detection pipeline (Local Outlier Factor and One-Class SVM as comparative baselines) for automatic flagging of pilot-error events during training sorties.

- Authored a 250-page bilingual (Greek/English) thesis covering the full hardware–firmware–graphics–ML stack, with 80 IEEE-style references and end-to-end system validation results; awarded 100/100 and Best Thesis of Class 2026.

FLARES: Flight Logs for Anomaly Research and Evaluation Suite. *2026 – Present*
Lead developer of an open-source synthetic-to-real benchmark for anomaly detection in general-aviation pilot training, targeting the NeurIPS Datasets and Benchmarks Track. JSBSim-based 6-DOF flight dynamics with five physically-grounded anomaly categories across three severity tiers; synthetic-to-real validation against the NGAFID-MC real Cessna 172 dataset (28,935 flights, 31,177 hours).

Doctoral Research Pipeline. *2026 – Present*
Authored a portfolio of 13 paper proposals derived from the diploma thesis, spanning aerospace machine learning, graphics and systems, embedded TinyML, and explainable AI. Currently developing the first papers in collaboration with Assoc. Prof. P. Karampelas (HAFA) and Assoc. Prof. G. Pappas (Purdue University).

Research interests: aerospace machine learning; meteorological and satellite data analytics; time-series anomaly detection; deep learning for sensor fusion; embedded ML deployment; synthetic-to-real transfer; autonomous-systems benchmarks.

Publications

- Kiritsis, G. and Karampelas, P. "The Use of Artificial Intelligence in Military Simulation Training: Techniques, Applications, and Future Directions." In *Advances in Defense Technology and Simulation Systems*, Chapter 7. Springer, 2026. [Forthcoming]

In preparation:

- Kiritsis, G., Vakrakos, F., Lappas, D., Pappas, G., and Karampelas, P. "From Generic Simulator to Mission Debriefing: A 3D Visualization Engine for Drone SAR Training Analysis." Target: *IEEE Computer Graphics and Applications*. [Under Review]
- Kiritsis, G. and Karampelas, P. "Skyris: A Deterministic-Replay Engine for Real-Time Aircraft Flight-Training Debriefing." Target: *IEEE Transactions on Visualization and Computer Graphics*.
- Kiritsis, G., Lappas, D., Pappas, G., and Karampelas, P. "Drone Pilot Self-Training, Debriefing, and Assessment: Bridging Training Gaps Through an Aviation-Inspired Framework." Target: *Drones* (MDPI).
- Kiritsis, G. and Karampelas, P. "FLARES: A Synthetic-to-Real Validated Benchmark for Anomaly Detection in General-Aviation Flight Training." Primary target: *NeurIPS Datasets and Benchmarks Track* (with Georgia Institute of Technology and Purdue University collaborators). Fallback aerospace venues: *IEEE Trans. Aerospace and Electronic Systems*; *Aerospace Science and Technology* (Elsevier); *AIAA Journal of Aerospace Information Systems*.
- Kiritsis, G., Pappas, G., *et al.* Machine Learning / Computer Vision paper (in collaboration with Purdue University and Georgia Institute of Technology). Target: applied ML/CV venue.
- Kiritsis, G., Pappas, G., *et al.* Simulation systems paper (in collaboration with Purdue University and Georgia Institute of Technology). Target: aerospace/simulation venue.

Planned work (2027–2030), derived from the 13-paper portfolio:

- Phase-Aware Isolation Forest for time-series anomaly detection in pilot training telemetry — methods paper extending the thesis contribution, evaluated on FLARES and NGAFID-MC.
- Synthetic-to-real transfer for aerospace anomaly detection — robotics/ML venue, leveraging FLARES as the synthetic substrate.
- On-device TinyML for embedded flight computers — deployment study on the Ikaros platform, evaluating quantised detectors under real-time constraints.
- Explainable anomaly detection via SHAP-driven instructor feedback — human-AI interaction angle on the debriefing pipeline.
- Multi-modal anomaly detection combining flight telemetry with EUMETSAT satellite meteorological data — joint work with the Hellenic National Meteorological Service.

Technical Skills

Programming languages: C, C++, Python, Java, JavaScript, Kotlin, PHP, x86 Assembly, ARM Assembly, MATLAB.

ML and scientific computing: PyTorch, TensorFlow, scikit-learn, Keras, NumPy, Pandas, OpenCV, Matplotlib, JSBSim.

Systems and graphics: OpenGL, SDL, EnTT, ImGui, GLM, THREE.js, Pygame.

Web and applications: Django, Flask, Tkinter, BeautifulSoup, Selenium.

Tools: KiCad, Android Studio, Logisim, GDB, LLDB, Git, LaTeX.

Human languages: English (C2, ECPE Honors, University of Michigan); Greek (native); German (B2, Goethe-Institut).