Fabio Arnez

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Google Scholar
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Experience

Research Engineer in AI — *Palaiseau, France*
Commissariat à l'énergie atomique et aux énergies alternatives (CEA), DRT.LIST.DILS.LSEA — *Oct 2019 – present*
Research on DNNs/LLMs/VLMs confidence representation (uncertainty estimation) for out-of-distribution/hallucination detection, runtime monitoring in complex computer vision tasks (demo object detection), embedded uncertainty estimation, safe and robust end-to-end DNN-based UAV navigation, and AI Safety.

- Trustworthy/Safe deep learning team leader, Ph.D. Theses and interships supervison
- Contributing to the PRIMaL project: Developed and uncertainty-based method for LLM extrinsic & intrinsic hallucination detection, developed OoD object detection methods, collected a dataset for UAV navigation using the PyBullet simulator (gym-pybullet-drones)
- Contributing to the DeepGreen project for embedded AI, (France 2030 program): Developed dropout operator for the Aidge library for embedded DNN uncertainty estimation, studied the reliability & robustness of quantized CLIP
- Contributed to the Confiance.ai program, (France 2030 program): Developed an OoD detection method library
- Contributed to the Comp4Drones project (H2020 Program European Union): Led WP4-Task4.4 on UAV Runtime Monitoring, developed a distributed uncertainty runtime monitoring system for DNN-based UAV navigation systems

Data Scientist — *Cochabamba, Bolivia*
Bamboo — *Apr 2019 – Oct 2019*
Enterprise data analysis & data visualization

- Engineering team leader.
- Implemented PowerBI dashboards to support enterprise decision-making

Research Assistant — *Lugano, Switzerland*
University of Applied Arts and Science from Southern Switzerland (SUPSI), ISEA, SMT Lab — *Sept 2016 – Aug 2018*
Part-time embbeded systems development

- Developed embedded machine learning prototypes for signal classification
- Developed embedded system prototypes for wireless IoT applications (LoRaWAN, 802.15.4, Bluetooth)

Unmanned Aerial Systems Researcher — *Cochabamba, Bolivia*
Jalasoft — *May 2014 – May 2016*
Localization & navigation, ROS integration, embedded systems integration, computer vision tasks

- Built a custom UAV from scratch employing the PX4/Pixhawk autopilot
- Integrated software and hardware components (modular system) using ROS on the built UAV
- Implemented computer vision tasks with an onboard computer in the UAV

Adjunct Researcher and Lecturer — *Cochabamba, Bolivia*
Universidad Privada Boliviana (UPB) — *Sept 2014 – Mar 2019*
Reseearch in embedded wireless IoT applications, Lecturer

- Contributed to the Smart Street Lightning project (SRESLi)
- Courses Taught: Embedded Electronic Systems (2016), Microprocessor Architecture and Technology (2015, 2016, 2019), Electronics and Telecom. Project (2018), Telecom. Electronics (2018), Electronic Instrumentation (2014, 2015)

Education

Université Paris-Saclay — *Palaiseau, France*
Ph.D. in Computer Science - Artificial Intelligence — *Nov 2019 – Dec 2023*
Thesis: *Deep Neural Network Uncertainty Runtime Monitoring for Robust and Safe AI-based Automated Navigation*

- DNN uncertainty-based out-of-distribution detection, uncertainty propagation for robust UAV navigation, confidence monitoring in UAV learning-based components for trustworthy navigation.

University of Applied Arts and Science from Southern Switzerland (SUPSI) — *Lugano, Switzerland*
MSc. in Engineering: Embedded Systems & Microelectronics — *Sept 2016 – July 2018*
Thesis Title: *Real-Time Human Footstep Recognition on Smart Anti-Static Floor*

- Signal processing and classification using machine learning targeting resource constrained-hardware

Universidad Privada Boliviana (UPB) *Cochabamba, Bolivia*
BSc. in Electronics and Telecommunications Engineering *Feb 2008 – May 2014*
Grade Project Title: *VIRMS: A Vehicle Information and Road Monitoring System*, paper
- Embbeded systems, RTOS, data acquisition & processing, IoT, embedded GUI development

Skills

Programming: Python (Numpy, Scipy, Matplotlib, Pandas, Seaborn…), C/C++; PyQt5 for GUI dev; Git

Machine Learning & Deep Learning: PyTorch, PyTorch-Lightning, Hydra, MLFlow, Slurm HPC, scikit-learn

Robotics: ROS/ROS 2; PyBullet, MuJoCo, CARLA, and AirSim simulators; Gymnasium; PX4/Pixhawk autopilot

Embedded Systems: ST/SiliconLabs/NXP ARM Cortex (M0+, M3, M4), FreeRTOS

Languages: English (fluent, C1/C2), French (basic-intermediate, B1), Italian (basic), Spanish (native)

Selected Publications

- Hajji, E., Bouguerra, A., **Arnez, F.** (2025, November). *The Map of Misbelief: Tracing Intrinsic and Extrinsic Hallucinations Through Attention Patterns*. In AAAI Fall Symposium Series 2025 - ATRACC. link
- Bouguerra, A., Montoya, D., Gomez-Villa, A., **Arnez, F.**, Mraidha, C. (2025, August). *Can Less Precise Be More Reliable? A Systematic Evaluation of Quantization's Impact on CLIP Beyond Accuracy*. (Under review) link
- Montoya, D., Bouguerra, A., Gomez-Villa, A., & **Arnez, F**. (2025, June). *FindMeIfYouCan: Bringing Open Set Metrics to Near, Far and Farther Out-of-Distribution Object Detection*. arXiv preprint arXiv:2506.14008. (Under review) link
- Rajendran, P. T., **Arnez, F.**, Espinoza, H., Delaborde, A., Mraidha, C. *Oracle-Guided Soft Shielding for Safe Move Prediction in Chess.*, 2025. (Accepted at 24th ICMLA - to be presented soon)
- **Arnez, F.**, Vasquez, D. A. M., Radermacher, A., & Terrier, F. (2024, July). *Latent Representation Entropy Density for Distribution Shift Detection*. In Conference on Uncertainty in Artificial Intelligence (UAI). link
- **Arnez, F.** (2023). *Deep Neural Network Uncertainty Runtime Monitoring for Robust and Safe AI-based Automated Navigation* (Doctoral dissertation, Université Paris-Saclay). link
- **Arnez, F.**, Ollier, G., Radermacher, A., Adedjouma, M., Gerasimou, S., Mraidha, C., & Terrier, F. (2022, August). *Skeptical Dynamic Dependability Management for Automated Systems* In 2022 25th Euromicro Conference on Digital System Design (DSD) (pp. 118-125). IEEE Computer Society
- **Arnez, F.**, Radermacher, A., & Espinoza, H. *Quantifying and Using System Uncertainty in UAV navigation*, in Workshop on Releasing Robots into the Wild: Simulations, Benchmarks, and Deployment at ICRA-2022, 2022. link
- **Arnez, F.**, Espinoza, H., Radermacher, A., & Terrier, F. (2022, September). *Towards Dependable Autonomous Systems Based on Bayesian Deep Learning Components* In 2022 18th European Dependable Computing Conference (EDCC) (pp. 65-72). IEEE. link
- **Arnez, F.**, Espinoza, H., Radermacher, A., & Terrier, F. *Improving Robustness of Deep Neural Networks for Aerial Navigation by Incorporating Input Uncertainty* Proceedings of the Workshop on Artificial Intelligence Safety Engineering WAISE 2021, International Conference on Computer Safety, Reliability, and Security (pp. 219-225). Springer. link
- **Arnez, F.**, Espinoza, H., Radermacher, A., & Terrier, F. *A Comparison of Uncertainty Estimation Approaches in Deep Learning Components for Autonomous Vehicle Applications.* Proceedings of the Workshop on Artificial Intelligence Safety 2020, vol 2640, ISSN:1673-0073. link
- **Arnez F.**, Villazon A. (2014). *VIRMS – A Vehicle Information and Road Monitoring System* Investigacion y Desarrollo, Nr. 14, Vol. 2: 94 −107, Universidad Privada Boliviana, ISSN:1814-6333. link
- Casazola, D., **Arnez, F.**, Espinoza, H., *Design Considerations of an Unmanned Aerial Vehicle for Aerial Filming* Techzone 2014, Jalasoft. link
- Full list of publications in Google Scholar profile

Other Scientific Activities

- **Ph.D. Thesis Supervision:** *Deep Neural Network Uncertainty Estimation on Embedded Targets* (Aymen Bouguerra, 2024 - Present); *Out-of-Distribution Detection with Vision Foundation Models and Post-hoc Methods* (Joaquin Figueira, starting Nov. 2025)
- **Reviewer in Conferences/Workshops:** CVPR (2025), AAAI (2026, 2025), UAI (2025, 2024), WACV (2025), IV (2025, 2022), AI-Safety workshop at IJCAI (2024), Releasing Robots in the Wild Workshop at ICRA (2022)
- **AI Safety Workshop 2024 Organizing Comitee Member**, Workshop on AI Safety and Security at IJCAI 2024