# Camilo AGUILAR, Ph.D.

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## PROFESSIONAL SUMMARY

Senior Machine Learning Engineer (Ph.D.) with 10+ years of experience in computer vision, real-time tracking systems, and edge AI deployment. Specialized in sensor fusion, 3D estimation, and deep learning for defense and surveillance applications. Published researcher with expertise spanning embedded systems (Jetson), multi-modal AI (vision + NLP), and full-stack development. Proven track record delivering mission-critical systems from research to production.

## EXPERIENCE

### Senior Machine Learning Engineer

*MARSS Group, Monaco | Oct 2024 - Current*

- Contributed to developing real-time guidance systems combining monocular 3D target estimation with camera-radar sensor fusion (UKF, EKF).
- Prepared datasets and trained custom deep neural networks tailored to mission-specific detection and tracking requirements.
- Deployed and optimized CNN models on NVIDIA Jetson edge devices, ensuring real-time inference for mission-critical embedded systems.

### Machine Learning Research Engineer - Surveillance Videos

*Digital Barriers, France | Oct 2022 - Sept 2024*

- Used Natural Language Processing (NLP) and Computer Vision (CV) to create video-text multi-modal applications in surveillance cameras.
- Managed large scale ground truth data collection using AWS Mechanical Turk and Generative AI Models.
- Created data management/visualization tools using web-based technologies.

### Computer Vision Postdoc - Satellite Videos

*Inria - Airbus Defense & Space, France | Jan 2021 - Sept 2022*

- Developed machine learning models to detect and track vehicles from satellite videos.
- Optimized code for on-board satellite video applications.
- Published and presented academic research articles.

### Django Cloud Developer - Ecommerce Applications

*Freelance, Ecuador | Aug 2020 - Dec 2020*

- Implemented full stack web development using the Django Python web framework.
- Handled database management with PostgreSQL.
- Deployed cloud applications using Docker containers.

### Class Instructor - Data Structures and Algorithms

*Purdue University, United States | Jun 2018 - Aug 2018*

- Led a class of 30 students teaching Data Structures and Algorithms.
- Delivered TA lectures to classrooms of 100+ students.

### Computer Vision Researcher - Microscopy Volumes

*Purdue University - Airforce Research Laboratory, United States | Aug 2015 - Aug 2020*

- Applied classical signal processing to detect 2D objects in microscopy images.

- Utilized machine learning to detect 3D objects from tomography scans.
- Parallelized code to reduce computational times.

### Full Stack Web Developer

*Broadcom Corporation, United States | Jun 2013 - Dec 2014*

- Created web applications to manage and visualize hardware data of novel products.

## EDUCATION

### Ph.D. in Electrical Engineering

*Purdue University, United States | 2015 - 2020*

Thesis: 'Novel Model-Based and Deep Learning Approaches to Object Detection in Microscopy Volumes.' Honors: Direct-PhD 5 year program.

### B.S. Electrical Engineering

*University of California, Irvine, United States | 2010 - 2015*

Specialization: Signal Processing. Honors: Cum Laude.

## SKILLS

**Languages:** English, Spanish, French
**Coding:** Python, C, C++, Matlab, HTML, Javascript, LaTeX
**Machine Learning:** PyTorch, Numpy, OpenCV, LLMs, Transformers, CNNs, Scikit-learn
**Distributed Programming:** OpenMP, MPI, CUDA, Celery
**Backend Web Dev:** Django, Flask, FastAPI, Nginx Server
**Databases:** MySQL, PostgreSQL, SQLite
**Miscellaneous:** Docker, Kubernetes, Git version control

## PUBLICATIONS

- C. Aguilar, M. Ortner, and J. Zerubia, 'Enhanced gm-phd filter for real-time satellite multi-target tracking,' ICASSP 2023, IEEE, Jun. 2023. [Link]
- C. Aguilar, M. Ortner, and J. Zerubia, 'Adaptive birth for the glmb filter for object tracking in satellite videos,' MLSP 2022, IEEE, Aug. 2022. [Link]
- C. Aguilar, M. Ortner, and J. Zerubia, 'Small object detection and tracking in satellite videos with motion informed-cnn and gm-phd filter,' Frontiers in Signal Processing, vol. 2, Apr. 2022. [Link]
- C. Aguilar, M. Comer, I. Hanhan, R. Agyei, and M. Sangid, '3D fiber segmentation with deep center regression and geometric clustering,' CVPR 2021. [Link]
- C. Aguilar, M. Ortner, and J. Zerubia, 'Small moving target motion tracking with gm-phd filter and attention-based cnn,' MLSP 2021, IEEE, Oct. 2021. [Link]
- C. Aguilar, 'Novel model-based and deep learning approaches to segmentation and object detection in 3D microscopy images,' Ph.D. dissertation, Purdue University, 2020. [Link]
- C. Aguilar, M. Comer, I. Hanhan, R. Agyei, and M. Sangid, 'Void detection and fiber extraction for statistical characterization of fiber-reinforced polymers,' IS&T;/SPIE Electronic Imaging, Jan. 2020. [Link]
- T. Li, C. Aguilar, R. Agyei, I. Hanhan, M. Sangid, and M. Comer, 'Connected-tube mpp model for unsupervised 3D fiber detection,' Electronic Imaging, Jan. 2020. [Link]
- D. Kim, C. Aguilar, H. Zhao, and M. Comer, 'Narrow gap detection in microscope images using marked point process modeling,' IEEE Transactions on Image Processing, vol. 28, no. 10, 2019. [Link]
- C. Aguilar and M. Comer, 'A marked point process model incorporating active contours boundary energy,' IS&T;/SPIE Electronic Imaging, Feb. 2018. [Link]

- C. Aguilar, O. Shanta, T. Tran, D. Reinkensmeyer, and S. Norman, 'Towards a low-cost alternative for BCI-aided neurorehabilitation,' American Society of Neurorehabilitation Annual Meeting, Chicago, IL, 2015.

## PEER REVIEWING

- Journal of Marine Science and Engineering (MDPI)
- Remote Sensing (MDPI)

## REFERENCES

**Kieron Messer, PhD** - CTO of Video Analytics, Digital Barriers | kieron.messer@digitalbarriers.com
**Josiane Zerubia, PhD** - Directeur de Recherche (DRCE), Inria | josiane.zerubia@inria.fr
**Mary Comer, PhD** - Associate Professor, Purdue University | comerm@purdue.edu