hmarichal93@gmail.com
www.github.com/hmarichal93
www.linkedin.com/in/henry-marichal
Tel (+598) 91373664

# Henry Marichal

## About

**Computer Vision Engineer | PhD in Image Processing**
I am a Computer Vision Engineer with more than four years of experience across academia and industry, holding a PhD in Image Processing and Machine Learning. My doctoral research focused on developing efficient and explainable algorithms for tree-ring detection in wood cross-section images. Beyond academia, I have applied these skills to real-world projects involving video analysis, object detection, visual tracking, and pose estimation. I have strong expertise in OpenCV, PyTorch, TensorFlow, NumPy, MediaPipe, and Docker. I am also pursuing the Google Cloud Professional Machine Learning Engineer certification to further strengthen my knowledge in MLOps, Vertex AI, and pipeline automation on Google Cloud Platform (GCP).

## Education

**Instituto de Ingeniería Eléctrica, Facultad de Ingeniería, Universidad de la República**
Montevideo, Uruguay
*Ph.D. in Electrical Engineering* 2021 - 2025

- Thesis Advisor: Prof. Dr. Gregory Randall
- Research area: Image processing and Machine Learning

**Instituto de Ingeniería Eléctrica, Facultad de Ingeniería, Universidad de la República**
Montevideo, Uruguay
*B.E. in Electrical Engineering* 2012 - 2018

## Consulting Experience

**IATech-Conaprole** | Montevideo, Uruguay 2024.07 - 2024.08

- Developed an image analysis tool to estimate the share of shelf space occupied by specific Conaprole products in grocery store images. The problem was tackled using an object detection strategy as a Dense Object Detection Task.
- **Skills** GCP, Yolo, Numpy, OpenCV, Python

**MISMO** | San Francisco, USA. 2025.03 - 2025.04

- Designed and implemented a containerized (Docker) application that automatically detects and crops the primary speaker in long-format videos, delivering high-quality outputs tailored for social media platforms such as Instagram and TikTok.
- The system addressed a multi-scene, multi-person challenge by integrating MediaPipe BlazePose for precise subject localization. Linear interpolation and scene change detection techniques were applied to smooth bounding box transitions, creating fluid virtual camera movements across different segments.
- Met strict performance requirements by processing 2-hour videos in under 45 minutes. Employed ImageIO and OpenCV for efficient video reading, writing, and frame manipulation.
- Produced broadcast-quality cropped videos in vertical (9:16) format, optimized for digital marketing and social media publishing. The entire application was developed in Python and fully containerized with Docker to ensure portability and reproducibility
- **Skills** Docker, Mediapipe, OpenCV, Python

## Work History

**Digital Sense** | Montevideo, Uruguay 2021.11 - 2024.06

*Front Facing Camara Workout Feedback. 2023.04 - 2024.06*

- Use pose detection models to analyze the video stream and build rules over the detected pose landmarks to estimate the quality of the movement execution.
- Present state-of-the-art papers related to human pose estimation
- Developed dashboards using Looker and LookML, integrating data from Snowflake databases to provide actionable performance insights.

*Multiband Satellite Image Registration. 2022.06 - 2023.04*

- Achieved high-quality image registration by using deep learning models to extract and filter matches and adapting classical global and local model fitting for multiband images
- Introduced robust match filtering techniques to remove outliers and proposed new metrics, such as a gradient metric and Voronoi-based matches distribution, to evaluate registration quality.
- Developed a sub-pixel homography annotator and calculated homography distance to assess model accuracy.

*Performing object detection over Android Device. 2022.04 - 2022.06*

- Adapted an OpenCV-based object detection library for use on a GPU-enabled Android device
- Compared inference performance of the object detection library on both CPU and GPU

*Object detection over Edge Device. 2021.11 - 2022.04*

- Implemented a body and TV detector on the client's edge device using YOLOv5 with pre-trained weights.

*Speed Object analysis over Surveillance Cameras. 2021.11 - 2022.04*

- Identified unusual events based on object speed from surveillance cameras by refining the object tracking algorithm for stability and using the Kalman Filter for speed calculation.

**Skills** Docker, PyTorch, TensorFlow, Scikit-Learn, Linux, Deep-Learning, Mediapipe, Looker, LookerML, Snowflake, Python, C++

**Isbel S.A.** | Montevideo, Uruguay 2018.02 - 2021.10

*Service Engineer. 2018.06 - 2021.10*

- Performed post-sales tasks in various telecommunications projects, focusing on supporting the Advanced Metering Infrastructure (AMI) telemeasurement platform.
- Worked on streaming live and VOD multimedia content, requiring expertise in signal transport protocols (UDP, RTP, RTMP), encoding standards (H.264, HEVC), containers (MPEG-2 Transport Stream), and adaptive bitrate techniques (HLS, DASH).
- Developed a monitoring dashboard using Grafana, Prometheus, and Node Exporter to supervise server performance in video processing clusters.

*Junior Developer. 2018.02 - 2018.06*

- Developed a prototype to enhance the user experience in public transportation. The edge system consisted of a border computer, GPS, and sensors installed on a public bus. Meanwhile, the centralized system processed real-time data to estimate bus passenger capacity.

**Skills** Docker, Linux, Python, C++, Grafana, Prometheus.io

**Instituto de Ingeniería Eléctrica, Facultad de Ingeniería, UdelaR** | Montevideo, Uruguay 2016.08 - 2017.11

*Assistant teacher.*

- Design lesson plans and coordinate lesson activities, consistently noting successful ideas and identifying areas for improvement.
- Researched on detecting anomalous electrical consumption using a pattern recognition approach.

## Publications

1. **Henry Marichal**, Diego Passarella, Gregory Randall. TRAS: An Interactive Software for Tracing Tree Ring Cross Sections. *Dendrochronologia Special Issue Trace 2024*. In Review.
2. **Henry Marichal**, Candice Power, Urs A. Treier, Giulia Resente, Signe Normand, Gregory Randall. Assessing automatic ring detection on microscopy images of *Salix glauca*. *Dendrochronologia Special Issue Trace 2024*. In Review.
3. **Henry Marichal**, Verónica Casaravilla, Candice Power, Karolain Mello, Ludmila Profumo, Joaquín Mazarino, Christine Lucas, Ludmila Profumo, Diego Passarella, Gregory Randall. DeepCS-TRD, a Deep Learning-based Cross-Section Tree Ring Detector. *International Conference on Image Analysis and Processing (ICIAP)*, 2025. Accepted.
4. **Henry Marichal**, Diego Passarella, Gregory Randall. CS-TRD: a Cross-Section Tree Ring Detection Method. *Image Processing On Line* (IPOL), 2025. Accepted.
5. **Henry Marichal**, Diego Passarella, Christine Lucas, Ludmila Profumo, Verónica Casaravilla, María Noel Rocha Galli, Serrana Ambite, Gregory Randall. UruDendro, a public dataset of 64 cross-section images and manual annual ring delineations of *Pinus taeda L.*. *Annals of Forest Science* (ANFS), 2025.
6. **Henry Marichal**, Diego Passarella, Gregory Randall. Automatic Wood Pith Detector: Local Orientation Estimation and Robust Accumulation. *International Conference on Pattern Recognition (ICPR)*, 2024.
7. Fabian Vique, **Henry Marichal**, Leonardo Steinfeld. Inline mastitis detection system measuring the electrical conductivity of quarter milk. *IEEE International Conference on Industrial Technology (ICIT)*, 2020.
8. Pablo Massaferro, **Henry Marichal**, Matias Di Martino, Fernando Santomauro, Juan Pablo Kosut and Alicia Fernandez. Improving electricity non technical losses detection including neighborhood information. *IEEE Power Energy Society General Meeting (PESGM)*, 2018.

## Certifications

1. Google Cloud Professional Machine Learning Engineer (In Progress)
2. D0180 - Red Hat OpenShift I: Containers and Kubernetes
3. D0280 - Red Hat OpenShift Administration II: Operating a Production Kubernetes

## Skills

**Languages**: Spanish, English.

**Programming**: Python, PyTorch, scikit-learn, numpy, OpenCV, Mediapipe, streamlit, Docker, C++, Grafana, Looker, LookerML, SnowFlake, GCP, SQL.