

# Antonio Reche García

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AI researcher working on computer vision for space weather forecasting as a PhD candidate at University of Alcalá, with research published in Astronomy & Astrophysics and presented at ESA. Previously led AI development at medical startup Medicsen, where I built an autonomous glucose prediction system that achieved regulatory certification (AEMPS) and was deployed to patients. Interested in efficient AI systems and solving scientific problems with small, capable models.

## Experience

Nov. 2023 – present **Research Fellow (PhD Candidate from Dec. 2024)**, *University of Alcalá*, Alcalá de Henares

Computer vision and deep learning research in solar physics within the Space Weather Group, focused on solar filament detection and space weather forecasting.

- **Published first-author paper in Astronomy & Astrophysics** on polar faculae and their relationship to the solar cycle (2025).
- Developed DETR-based framework for automated solar filament detection, classification, and tracking to study their temporal evolution and relationship to space weather phenomena.
- Created and released open solar filament dataset (**SWEFil**) for object detection.
- Presented research at European Space Agency (SPAICE 2024) and additional conferences.

2017 – 2022 **Chief Analytics Officer**, *Medicsen*, Madrid

Led AI and data analysis R&D for this medical technology startup developing a needle-free drug delivery device and solutions for chronic diseases patients.

- **Developed SugginAI, an AI-powered glucose prediction system that earned official AEMPS medical device certification**, obtaining 97 – 99% clinically safe predictions. It was served via cloud-based APIs and used by 100+ patients through a mobile application, using a self-learning architecture that enabled continuous model improvement from real-world patient data without manual retraining.
- Built suite of AI solutions: anomaly detection models for medical time series, voice-based NLP system for conversational data logging with automatic nutritional extraction, and recommendation algorithms for personalized health interventions.
- Initiated development of closed-loop artificial pancreas system integrating prediction models with automated insulin delivery, and simulations of the human metabolism pharmacokinetic system for drug delivery optimization.
- Designed and conducted a clinical trial for device validation; provided statistical analysis support for additional trials.
- Built and maintained medical databases (1M+ records) including ETL pipelines and visualization dashboards.
- Supervised 3 intern students in AI model development and data analysis projects.

## Education

Dec. 2024 – present **PhD Candidate in Science**, *University of Alcalá*.

Specialization: Computer vision for solar physics and space weather forecasting.

2022 – 2023 **Master's Degree in Astronomy and Astrophysics**, *International University of Valencia*.

Thesis: The Great Solar Migration: Transporting Magnetic Field to the Poles. (Detection and analysis of magnetic structures in solar images using deep learning).

2015 – 2016 **Master's Degree in Physics and Mathematics (FisyMat)**, *University of Granada*.

Thesis: Emerging Phenomenology in a Physical-Mathematical Model of a Degenerative Neural Network.

2010 – 2015 **Bachelor's Degree in Physics**, *University of Granada*.  
Erasmus Programme at Università Degli Studi di Torino (Italy).  
Thesis: Dynamic Light Scattering and Brownian Motion for Measuring the Size of Colloidal Particles.

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## Publications

- [1] **A. Reche**, A. Pastor Yabar, and A. B. Griñón-Marín. *Polar faculae and their relationship to the solar cycle*, *Astronomy & Astrophysics*, vol. 699, p. A340, Jul. 2025.

### Conference papers

- [2] **A. Reche** and C. Cid, *Solar filament detection, classification, and tracking with deep learning*, Zenodo, 2024.

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## Seminars and Conferences

October 2025 **ESWW25**, *Umeå, Sweden*, Solar filament framework and polar faculae research.  
April 2025 **MCH25**, *Sofia, Bulgaria*, Solar filament framework and polar faculae research.  
September 2024 **SPAICE 2024**, *ESA ECSAT, Harwell, UK*, Solar filament detection, classification, and tracking with deep learning  
July 2024 **XVI SEA**, *Granada, Spain*, Solar filament detection, classification, and tracking with deep learning  
July 2023 **VIII REFSH**, *Granada, Spain*, The Great Solar Migration: Transporting Magnetic Field to the Poles.  
June 2023 **Stanford Solar Seminar**, *Stanford, CA, USA*, The Great Solar Migration: Transporting Magnetic Field to the Poles.  
May 2022 **CEU San Pablo University**, *Madrid, Spain*, Needle-Free Medicine and the Development of an Artificial Pancreas.

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## Projects

2025 – present Building **Paper Pivot**, an AI tool that automatically formats academic manuscripts to journal-specific submission requirements.  
2016 – 2017 Part of the development team for **Necrococosmos** science fiction video game: pixel art, Kickstarter campaign design, scientific advising, and beta testing.

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## Technical Skills

AI/ML PyTorch, Keras/TensorFlow/JAX, scikit-learn, computer vision, NLP, time series forecasting.  
Languages Python, R, HTML, CSS, SQL, JavaScript, LaTeX.  
Engineering Docker, Git, API & cloud deployment (GCP/Fly.io), full-stack web development.  
Domain Medical device development, clinical trials, regulatory compliance, scientific computing.

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## Volunteering

2023 – 2024 Citizen scientist for ESA's STARS project, screening literature on space radiation health effects to inform spaceflight medical operations.