# NASA SpaceApp Challenge – 42 Barcelona

## Team SWAI

### Subject

A World Away: Hunting for Exoplanets with AI

### Scope

Silent Watcher AI (SWAI) is an interactive project that combines artificial intelligence with NASA’s open datasets (Kepler, K2, TESS) to classify and explore exoplanets. The goal is to make space science accessible through an intuitive web interface, encouraging curiosity, learning, and engagement in the discovery of new worlds.

### Features

* AI Classification Model: A supervised machine learning model capable of distinguishing between candidate planets, confirmed planets, and false positives.
* Real NASA Data Integration: Training data is drawn from the NASA Exoplanet Archive, ensuring real-world scientific accuracy.
* Interactive Web Application: A lightweight web interface (Flask/Streamlit) allows users to input data points, test classifications, and visualize results in real time.
* Educational Accessibility: Designed for students, researchers, and space enthusiasts, the interface makes advanced concepts approachable.
* Silent Watcher Concept: Inspired by the idea of continuous, patient observation of stellar data, detecting the subtle dips in light curves that reveal hidden planets.

### Challenges

* Data Preprocessing: Cleaning and structuring large NASA datasets to make them usable for machine learning.
* Model Optimization: Iteratively training and tuning hyperparameters to improve accuracy on imbalanced datasets.
* Web Integration: Deploying the AI model in a functional web interface that remains responsive and user-friendly.
* Educational Focus: Balancing scientific accuracy with accessibility for users at different knowledge levels.

### Team Members

Luis Prieto – Developer, 42 Bcn (lprieto-)  
AI Teammates – ChatGPT 5.0 & Gemini (NotebookLM)  
  
Together forming Team SWAI (Silent Watcher Artificial Intelligence).

### Management

The project was developed under a strict 48-hour hackathon timeframe, optimizing tasks by combining manual development with AI-assisted workflows. Data handling and preprocessing were streamlined with Python libraries, while the integration of AI ensured rapid prototyping and refinement.

### Final Results

* A functional machine learning classifier for exoplanets.
* A web-based interface to interact with the model.
* Clear documentation, citations, and a demo video to present the solution.
* The project showcases how AI can accelerate discovery and education in astronomy.

### Webgraphy and References

#### Documentation & Open-Source Principles

https://k12cs.org/navigating-the-practices/  
Principle of Citation/Code Use: incorporate existing code, media, and libraries into original programs while citing their source.  
Use of Digital Tools: employ computational tools to analyze very large datasets for patterns and trends.

#### Scientific Data & Exoplanet Context

https://exoplanetarchive.ipac.caltech.edu/  
https://es.wikipedia.org/wiki/Planeta\_extrasolar  
https://es.wikipedia.org/wiki/M%C3%A9todos\_de\_detecci%C3%B3n\_de\_planetas\_extrasolares  
https://www.esa.int/Science\_Exploration/Space\_Science/Cheops/How\_to\_find\_an\_exoplanet

#### Hackathon & NASA Resources

https://www.spaceappschallenge.org/  
https://exoplanets.nasa.gov/