Eywa

Eywa is our project and vision of a new interaction between humans, technology and nature.
Its **objective** is to fill the gap between nature and humans, which is caused by a **lack of communication**. It serves as a translator for plants. Our vision is of turning the plants into **pseudo-sentient beings**, able to share their status and their needs.
Eywa will follow these three fundamental principles:

- **Learn**, from the biological signals sent by the plants;
- **Launch**, towards bigger environments, moving from house plants to space applications;
- **Lead**, towards an ethical and sustainable agriculture.

Data

We have created an interpreter that uses local and global **data from NASA satellites** to improve communication with your plants, translating the complex biological information into simple dialogue.

We obtained the local data through sensors:

- **Biometric data**, the biological characteristics and information: bioelectricity, the chlorophyll's fluorescence and ultrasonic sounds
- **Environmental and communication parameters**: temperature, the ground's pH levels and VOC (Volatile organic compound), the chemical language through which plants communicate.

We obtained global data from NASA Open Data:

- **GOES** (Geostationary Operational Environmental Satellites) - real time data regarding the weather and UV radiations;
- **NDVI/EVI** (Normalized Difference Vegetation Index/Enhanced Vegetation Index) - data about the health status and the blooming of vegetation in our plant's region;
- **MODIS** (Moderate Resolution Imaging Spectroradiometer) - data about blooming in our climatic area;
- **Kp Index** - extraterrestrial meteorology.

Sensore/Fonte Dati	Unità	Crescita Ottimale	☀ Ondata di Calore	Variazioni Pressione Aria	Terremoto Imminente	⚔ Guerra Chimica	Carenza Nutrizionale	Stress da Eccesso Acqua	Inquinamento Luminoso
DHT11 Temp.	°C	24.5	**35.0**	18.0	24.5	24.0	24.0	22.0	24.5
DHT11 Umidità	%	68	20	92	68	65	65	**95**	68
Bioelettricità	V	0.40	**0.95** (picco)	0.70	**1.50** (picco forte)	**0.80**	0.55	**0.90** (alto)	**0.65**
Movimento	g	±0.01	±0.03	**±0.08** (irregolare)	**±0.25** (picco)	±0.02	±0.01	±0.01	**±0.02**
VOC (BME680)	ppm	0.25	**0.60**	0.35	0.30	**1.20**	0.30	**0.80**	0.25
Fluorescenza	nm	690	670	685	690	680	**650** (molto bassa)	660	680
Suoni Ultrasonici	dB	<30	>45	<30	**>80** (forte)	>40	<30	>40	<30
Pressione Atmosf.	hPa	1013	1010	**990** (in calo)	1013	1013	1014	1013	1013
Umidità Suolo	%	75	**20** (molto bassa)	80	75	70	68	**95** (saturazione)	75
Conducibilità (EC)	dS/m	1.2	1.8	1.2	1.2	**2.5** (alta)	**0.8** (bassa)	**2.0** (alta)	1.2
Luce Ottica	lux	3000	5000	1000	3000	3000	3000	3000	**150** (bassa, notturna)
NDVI (NASA)	Indice	0.85	0.40	0.80	0.85	0.75	0.30	0.75	0.85
Kp Index (NASA)	Indice	2	2	3	2	2	2	2	2

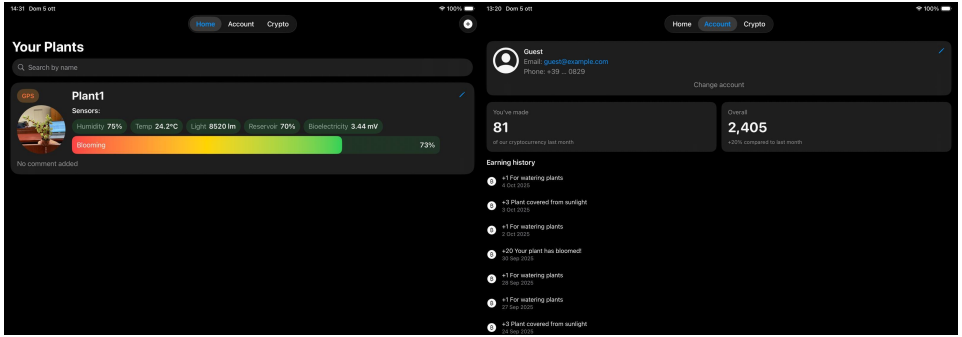
The product: Site and App

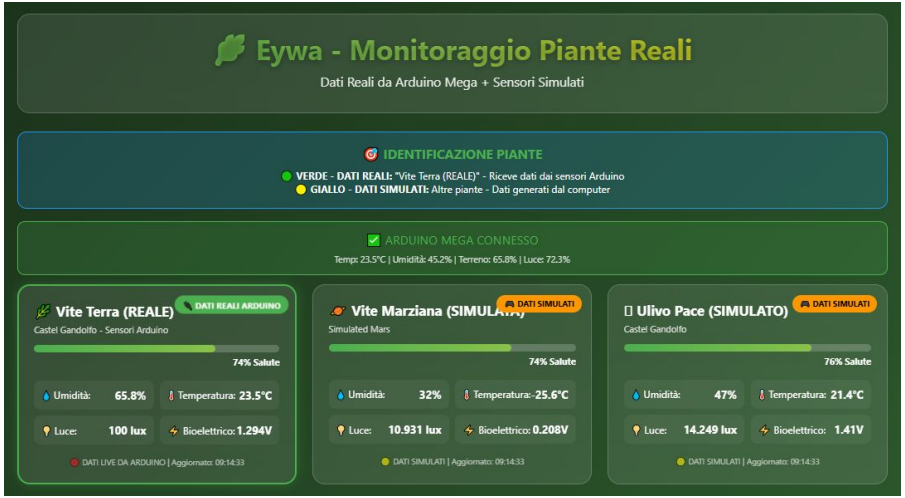
Eywa is a **deep reinforcement learning model**, simulating a learning process to make the plants “sentient” which consists of three phases:

- **State** - Eywa analyzes all the data, creating an “image” of the state and environment of the plant;
- **Action** - based on the state, the AI decides the optimal action to take;
- **Reward** - to provide long-term wellbeing and to strengthen the symbiotic relationship between plants and humans.

The real innovation is Eywa’s ability to **translate analytical data into human interaction**, through:

- **Verbal communication** - Eywa shares the data with the user in the form of a human conversation;
- **Data sonification** - the plants will emit music reflecting their status: a healthy ecosystem will play an harmonious melody while a stressed ecosystem will play an untuned one;
- **Digital memory** - Eywa records the plants’ data and their melodies, creating a biography of the plant.

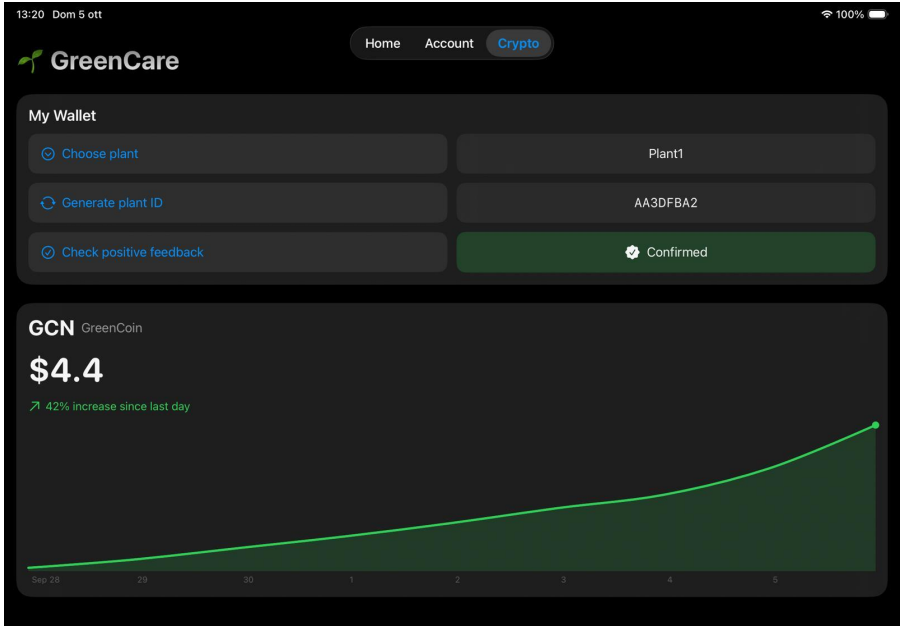




The product: Reward system

Just like we help the plants, the plants help us: That’s why we implemented a **blockchain reward system** that prizes you with **crypto coins**, strengthening the symbiotic relationship between humans and plants.

This system can also be helpful for **struggling people** who can receive economic benefits in exchange of helping nature, but also for the **environment**, saving on the water and paper used to produce physical money.



The product:
The parts

The product: Packaging

The product could be sold and commercialized as a pack containing either an Arduino or a Raspberry Pi and multiple sensors: the **bioelectricity** sensor, the **temperature** sensor, the **light** sensor and the **hygrometer**.

And then?

Eywa is a **prototype** for something bigger and impactful:

- In terms of **sustainability and inclusivity** we aim towards precision agriculture, a simpler and less overwhelming approach to science, and the sonification makes understanding the ecosystem accessible to everyone, like blind people.
- It can improve **psycho-physical wellness**, promoting a deep connection with nature, becoming a tool for meditation and mindfulness.
- It's an **adaptive framework**, it's a vision meant to take off into bigger things, to monitor bigger ecosystems, even future extraterrestrial ones.

Thank you all for the attention.
We'd also like to thank our school, the principal, the vice-principal Barbato and professor Colamaria for giving us this opportunity.