Universidad Politécnica de Aguascalientes

Timelapse de Crecimiento de Plantas

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Product Name, Description, and Scalability as a SaaS Solution

Product Name:

PlantGuard – Intelligent Monitoring System for Indoor Plants.

Product Description:

PlantGuard is an application connected to a Raspberry Pi equipped with sensors that measure temperature, humidity, light, and periodically capture photos of plants. The data is analyzed using Azure AI to provide personalized care recommendations, and the app generates GIFs to show visual plant evolution. The product is designed as a scalable SaaS solution, accessible from any internet-connected device.

Scalability as a SaaS Solution:

The PlantGuard SaaS solution allows multiple users to subscribe and monitor their plants individually, taking advantage of cloud infrastructure. The platform can easily scale to serve users globally without the need for complex local installations.

PlantGuard offers two subscription tiers:

- **Basic Plan (MVP)**: Real-time environmental data monitoring, data history, AI-based recommendations, and GIF generation.
- **Premium Plan**: Includes automated control of devices like humidifiers, fans, or lights to automatically adjust environmental conditions based on monitored data.

The **MVP** will focus on delivering the Basic Plan, which includes all key functionalities up to GIF generation and AI-based recommendations.

2. Competitive Analysis

Identified Competitors:

1. **Grobo**

   Description: Grobo is a smart gardening system designed to automate plant growth through remote control of light, irrigation, temperature, and ventilation. It offers an app that allows users to monitor and adjust their plant environment in real-time.

   - **Advantages of Grobo**:
     - Provides full control over the plant's growing environment, with the ability to adjust parameters like light and watering.
     - Ideal for plants requiring precise environmental control, such as medicinal or exotic plants.
   - **Disadvantages of Grobo**:
     - It's an expensive system, both in hardware and subscriptions, making it less accessible to casual gardeners or beginners.
     - It lacks detailed AI-based analysis, limiting its ability to offer personalized recommendations.

- It does not offer visual plant progress tracking, such as GIF generation, which PlantGuard provides.

2. **Click & Grow**

Description: Click & Grow is an indoor gardening system that uses plant pods and an automated watering system. The app notifies users about light and water levels but does not have advanced monitoring capabilities for other environmental parameters.

- **Advantages of Click & Grow**:
  - It is very easy to use and geared towards beginners.
  - Offers an attractive and minimalist design, suitable for users seeking simplicity.
- **Disadvantages of Click & Grow**:
  - It lacks advanced monitoring features, such as temperature and humidity tracking.
  - It doesn't have AI to provide personalized recommendations, limiting its utility to basic care notifications.
  - It does not allow automation or external device control (humidifiers, fans).

Comparative Analysis:

PlantGuard offers advanced features that surpass both Grobo and Click & Grow in key areas:

- **AI-Based Personalized Recommendations**:

  While Grobo and Click & Grow focus primarily on automating aspects of the plant environment, PlantGuard stands out by analyzing sensor data and providing specific recommendations using AI. This gives users a deeper understanding of their plant's condition, allowing for proactive care adjustments.

- **Accessibility and Cost**:

  Unlike Grobo, which requires a significant hardware investment, PlantGuard is more accessible and cost-effective as users can set up their own system using a Raspberry Pi and sensors. This makes it appealing to both beginners and advanced plant enthusiasts.

- **Plant Progress Visualization (GIFs)**:

  A unique feature of PlantGuard is its ability to generate GIFs that show the plant's evolution over time, a feature that neither Grobo nor Click & Grow offer. This not only provides practical value by allowing users to monitor growth but also fosters an emotional connection with the plants, enhancing user engagement.

- **Automated Device Control (Premium Plan)**:

  PlantGuard's Premium Plan offers the ability to integrate external devices like humidifiers, fans, and lights, which automatically adjust environmental conditions based on monitored data. This brings it on par with Grobo in terms of automation but with a more flexible and scalable approach as a SaaS service.

- **Usability and Flexibility**:

  As a SaaS solution, PlantGuard is accessible from any internet-connected device, meaning users can monitor and adjust plant care from anywhere. Grobo and Click & Grow require specialized hardware and proprietary apps, limiting their flexibility and scope of use.

3. Advantages and Disadvantages

Advantages of PlantGuard over the competition:

- **Advanced AI**: PlantGuard offers personalized recommendations based on AI, a feature neither Grobo nor Click & Grow offer.
- **Automated Control** (Premium Plan): It automatically adjusts the plant environment using devices like humidifiers or lights, providing superior control compared to Click & Grow and at a lower cost than Grobo.

- **Plant Progress Visualization**: The GIF generation feature offers a unique way to track plant progress, fostering a stronger connection between users and their plants.
- **Accessibility and Flexibility**: As a SaaS solution, PlantGuard is accessible from any device, unlike Grobo, which requires specific hardware setups.
- **Lower Initial Costs**: Using affordable Raspberry Pi and sensors, PlantGuard allows users to build their own system at a lower cost, compared to the high entry price of Grobo due to its specialized hardware.

Disadvantages:

- **Dependence on Internet Connectivity**: As a cloud-based solution, PlantGuard relies on a stable internet connection, which can be a challenge in areas with connectivity issues.
- **Initial Hardware Cost**: Although more accessible than Grobo, users still need to purchase Raspberry Pi and sensors, which could be a barrier for some.

4. Market and Monetization Strategy

Target Market:

- **Indoor gardening enthusiasts** looking for advanced tech solutions to improve plant care.
- **Tech-savvy households** interested in integrating IoT solutions to automate plant care.
- **Beginner gardeners** who need personalized assistance and recommendations to keep their plants healthy.

Monetization Strategy:

- **Subscription Model**:
    - **Basic Plan (MVP)**: Provides access to real-time data monitoring, data history, GIF generation, and AI-based recommendations.
    - **Premium Plan**: Adds automated control of devices like humidifiers and lights to automatically adjust plant conditions based on environmental data.

The SaaS model ensures recurring revenue and allows flexibility for users to upgrade as their needs grow.

Cost Structure and Subscription Plans for PlantGuard

1. Subscription Plans

PlantGuard offers two subscription levels, with monthly prices justified by comparison with similar products in the market.

Plan	Features	Monthly Price (MXN)	Justification with Real Examples
Basic Plan	- Real-time monitoring of temperature, humidity, and light. - Environmental data history. - AI-based tips. - GIF generation with photos.	$149 MXN	**Real Example:** "PlantSnap" charges approximately $130 MXN per month for plant recognition and care tips, without real-time monitoring. **Justification:** PlantGuard offers continuous monitoring and real-time AI recommendations, justifying a slightly higher price.
Premium Plan	- Includes all features of the Basic Plan. - Automatic control of external devices (e.g., humidifiers) based on data. - Proactive alerts for critical conditions.	$249 MXN	**Real Example:** "Parrot Flower Power" offers plant monitoring and device control for $250 - $300 MXN per month in its full version. **Justification:** Our premium plan adds the value of automatic control, allowing environmental conditions to be adjusted automatically, aligning with the cost of advanced solutions.

Price Justification: Based on these market examples, PlantGuard is competitively positioned. Additionally, the use of AI to generate personalized recommendations and the capability to generate a GIF of the growing plant are innovative features that add value, especially for indoor gardening enthusiasts.

2. Hardware Cost (Raspberry Pi and Sensors)

The following components are required to set up the PlantGuard monitoring system. Prices are based on recent listings from popular suppliers in Mexico, such as Amazon and Mercado Libre.

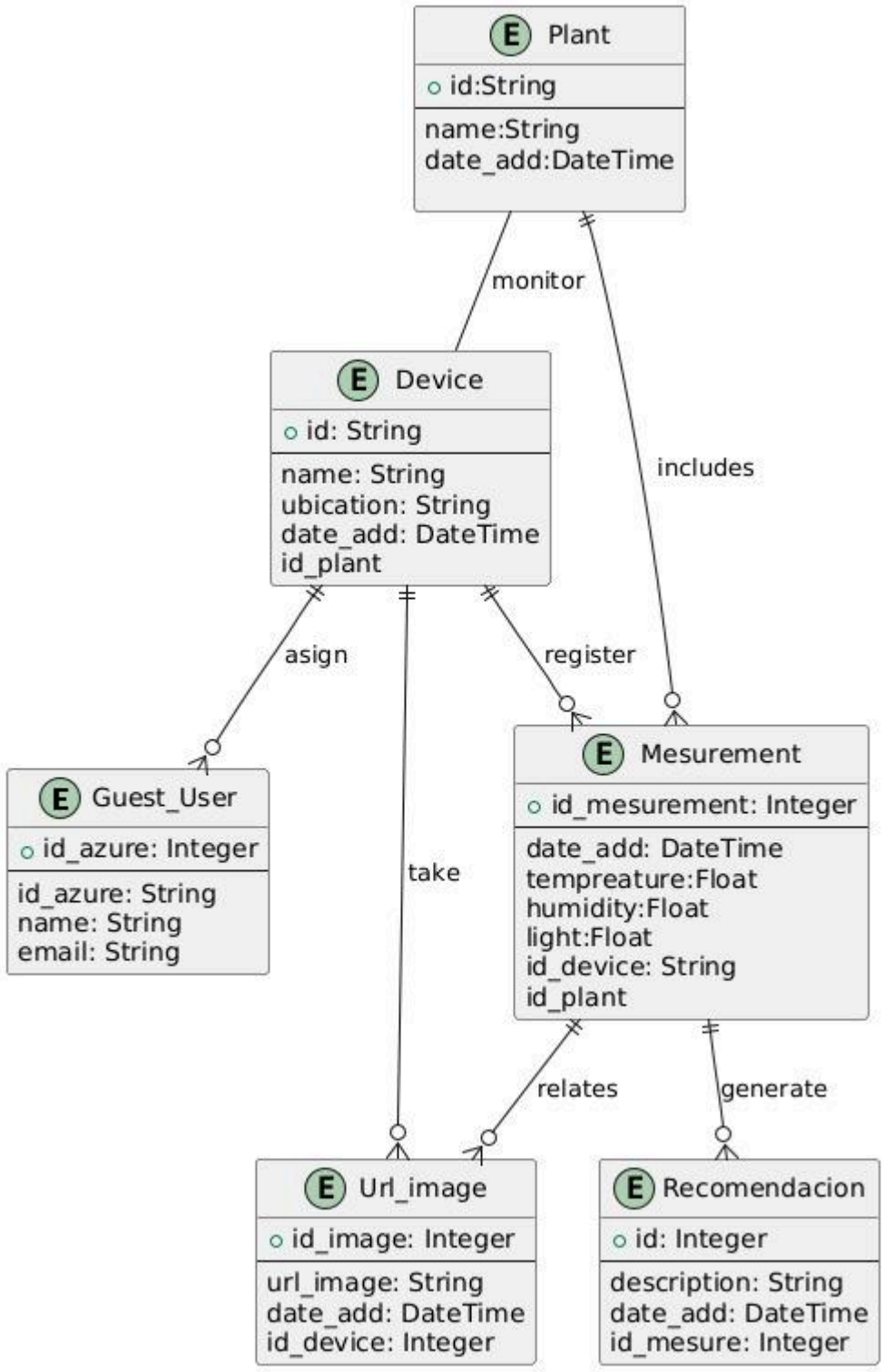
Component	Description	Estimated Price (MXN)
Raspberry Pi 4 Model B (4GB RAM)	Base processing unit for data collection and connection with the app	$1,700 - $2,000 MXN
DHT22 Sensor (Temperature and Humidity)	Precise measurement of temperature and humidity	$200 - $300 MXN
Light Sensor (BH1750)	Digital light sensor for precise lighting measurement	$180 - $270 MXN
Raspberry Pi Camera	Captures periodic images for GIF creation	$500 - $700 MXN
MicroSD Card (32GB)	Storage for system data and software	$150 - $200 MXN
Power Supply (5V, 3A)	Essential power source for the Raspberry Pi	$150 - $180 MXN
Cables and Resistors	Wiring and connections for sensor integration	$100 - $150 MXN

Estimated Total Hardware Cost

- **Minimum Configuration**: $2,980 - $3,800 MXN

Justification: This hardware investment is essential for the MVP, enabling key functions such as data monitoring, AI-based recommendations, and GIF generation.

Entity relationship diagram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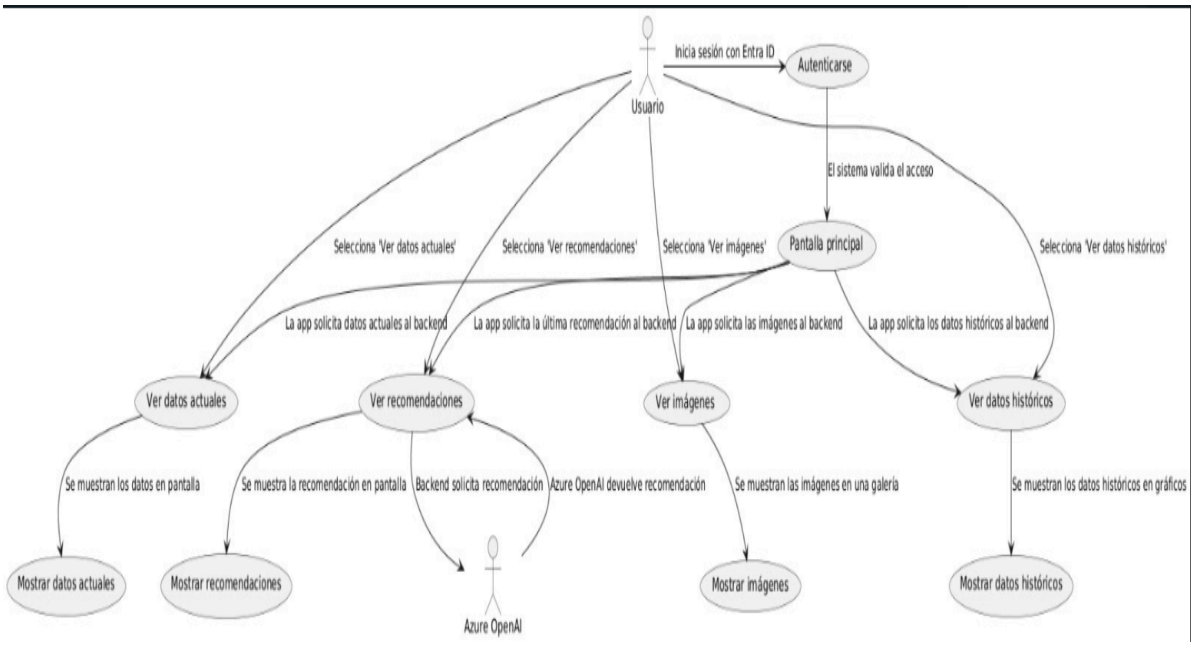
Use case diagram



Architecture diagram