Case Study
BON-TAG

Background

Bonsai trees are captivating due to their intricate designs and origins in ancient Chinese and Japanese horticulture. They are considered living art and can vary significantly in cost, with some valued at hundreds to thousands, and even millions, of pounds, influenced by age, design, and ownership history. Many bonsai trees live for centuries, enhancing their allure.

Bonsai trees have become popular targets for theft due to their high value, with reported incidents in countries such as the UK, America, and Japan. The rarity and craftsmanship of bonsai cultivation make them appealing to thieves, raising concerns in the horticultural community.

Martin Unwin has been passionately involved with bonsai trees for over 30 years, beginning his journey in 1993. Throughout this time, he has engaged with numerous local and national bonsai clubs, meeting fellow enthusiasts, including the renowned Peter Chan in the UK. Whilst on a visit to Peter Chan's nursery in 1993 Martin became aware of the theft of £30,000 worth of Bonsai from his nursery.

This theft of bonsai trees deeply resonated with Martin, who became motivated to address this problem and launched BON-TAG, a specialised theft deterrent and identification system for bonsai trees.

BON-TAG offers an unobtrusive, easy-to-install solution, utilising Radio Frequency Identification (RFID) transponder tags that ensure bonsai trees are identifiable throughout their lifetime with minimal effort. BON-TAG has become well known and regularly attends and trades at numerous Bonsai shows in the UK every year.

Challenge

For many bonsai tree owners, these trees hold immense financial but also sentimental value, cultivated over years of care and the development of unique styles and designs. Martin currently offers bonsai kits that create a distinctive ID for ownership proof rather than tracking the plants themselves.

Business owner Martin identified a significant gap in the market: a dedicated GPS tracking device that can be discreetly hidden in the soil, so thieves may not realise it exists. This would utilise geo-fencing technology, functioning effectively through the soil while remaining small and unobtrusive.

BON-TAG aims to enhance its theft deterrent and identification system by integrating advanced sensor technology, GPS tracking, and a dedicated mobile application for real-time management of tagged bonsai trees and pots.

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Delivery Partner

VEC

Solution

The new device must meet the following technical specifications:

- Fully waterproof to ensure functionality in outdoor environments and various weather conditions
- Capable of operating at specified soil depths without signal degradation
- Designed with a low form factor for discreet integration with bonsai trees and pots
- Prioritising low power consumption to support extended operational lifespans without frequent maintenance or battery replacement, ensuring reliability and convenience for users.

The main stages of analysis include:

- Planning and roadmap for BON-TAG
- Analysis of approach (i.e., suitable technology)
- Feasibility of sensor requirements
- Cost analysis of sourcing and manufacturing
- Develop a proof-of-concept device to test and validate the application theory

The VEC's team of innovative engineers worked closely with BON-TAG to understand the needs of the product and the conditions under which the device would need to work effectively and efficiently.

Undergoing further research of current state-of-the-art tracking technology for understanding the possible, and what solutions were available to best match the needs of the project, the VEC developed a prototype sensor model that can be used for tracking devices.

To achieve this, the VEC defined the system requirements, acquiring the necessary data for the sensor technology, introducing new data analysis and visualisation techniques for quick access to the data being collated by the device.

Challenges faced in this development phase included the dashboard development, battery life capabilities, discreet design, signal accessibility, and environmental conditions. The VEC also demonstrated a proof-of-concept website to showcase the GPS tracking and user-friendly features, including plant tracking within specified geo-fencing areas, and the inclusion of individual designated serial numbers and images for each plant.

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Additional data which can be overlayed onto the site includes tree maps, movement speed during transportation, and historical data for a complete dataset oversight.

Lastly, the VEC presented BON-TAG with a comprehensive report, listing the results of all research and suggestions for further developments to enhance the product and appeal to customers.

Impact

Once live, the device will offer enhanced security and traceability, leading to improved customer satisfaction and increased confidence in the safety of their trees. This device is not only innovative but also the first of its kind on the market.

BON-TAG plans to further develop the device and site, including battery life notifications to inform customers when this is low or needs changing. The VEC teams had considered incorporating solar panels, but this would necessitate wiring, which could potentially reveal the device's location.

BON-TAG also wish to utilise the dedicated platform and website to showcase and sell the product to customers, particularly when remote or at shows and exhibitions, for example. In addition to this, the platform could be shown to potential funders, supporting the expansion and scale-up of the initiative.

There is also great potential to develop a mobile app that would provide additional value and convenience for subscribers, allowing them to access their data remotely for enhanced confidence. The VEC team has also emphasised that a subscription service and plan could support the growth of this initiative, allowing customers to unlock various levels of the platform based on different packages, whilst supporting BON-TAG to further commercialise their idea.