smartHive
Smart Monitoring for Thriving Hives.

Bees are our Future

and they are being threatened,

Bees are a cornerstone species of any ecosystem, responsible for the production of over **75%** of global crops and maintaining biodiversity worldwide. They contribute **billions to the economy** through pollination and the valuable products they produce.

Varroa detected **in VIC** this Aug

Bee populations face many threats, particularly the recent introduction of Varroa mites to Australia, **constantly endangering** these crucial species.

so we devised a solution.

We wanted to develop a comprehensive system that would allow us to monitor hives **automatically**. By utilizing a system of cameras to scan individual bees leaving and entering the hive, smartHive is able to detect Varroa mites on bees **far earlier** than regular testing.

We reached out to experts

To ensure we were focusing in the right areas, and had a **practical** solution, we consulted with biosecurity officers and beekeepers in NSW, and also conducted surveys in VIC.

and refined our approach.

"The **biggest** biosecurity problem [in NSW] is Varroa. **Absolutely**." After collecting valuable feedback, we refined our approach, shifting our focus to better meet the needs of beekeepers.

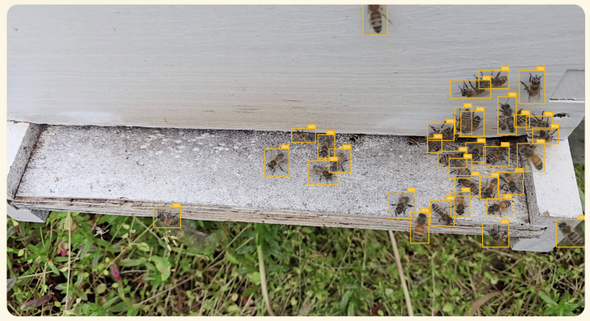
We're watching and learning

Our Varroa detection system is comprised of two main models. One to **detect** individual bees, and another to **identifies Varroa-affected bees**. We're constantly working to iterate and improve on our project.

for healthier, happier hives.

By integrating **weight**, **temperature** and **humidity** sensors to the hive alongside our Varroa detection system. We're able to provide beekeepers with **real-time** metrics of their hive for easy monitoring. Our goal is not just healthier individual hives, but a healthier bee population **as a whole**.

Artificial intelligence model detecting bees.



Source: github.com/smartHiveProject/smartHive-vision

By utilising YOLO v10 and our custom dataset of bees, we were able to develop a highly accurate vision model for real-time detection of bees. After multiple iterations, our system is able to accurately detect multiple bees simultaneously, with a overall mAP50 accuracy of over 96%.

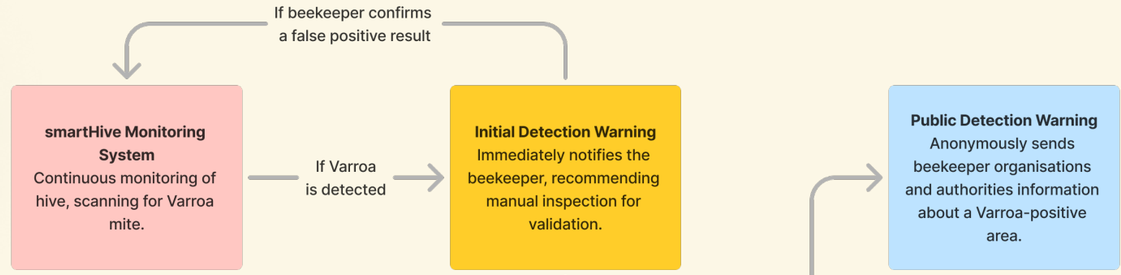
Our monitoring system.

Developed in consultation with biosecurity officers and beekeepers in NSW and VIC, our system has been designed to be a efficient and effective monitoring system in any apiary. With temperature, humidity and weight sensors, the system provides a real-time overview of hive conditions, allowing beekeepers to track the health and wellbeing of their colonies in real-time from anywhere.

By providing an accessible, user-friendly solution, smartHive allows beekeepers of all scales to maintain healthier hives and contribute to the overall sustainability of bee populations.

Rapid Detection Framework

Current Sentinel hive programs in New South Wales and Queensland rely on manual inspections every six weeks. However, "[this] is too long. In six weeks the mite levels can explode." Our system addresses this by providing constant, real-time monitoring, turning every equipped hive into a highly responsive Sentinel hive. Immediate alerts allow for swift action, protecting bee populations and supporting the beekeeping industry.



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Bees are our **future**, so we need to **protect** them.

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