

# PURPLE HIVE PROJECT

**Joel Kuperholz**  
**Vimana Tech**  
*Purple Hive Project*





It all starts with a bee



# Co-Founded First Australian Mars Rover Team



# Ian Cane & Vimana Tech



# Why Bega?... B Honey



# THE VARROA THREAT

## WHAT IS IT?

There are 2 species of varroa mite: *Varroa destructor* and *Varroa jacobsoni*.

## THE EFFECT

It kills the bees (they're born with defects and susceptible to disease).

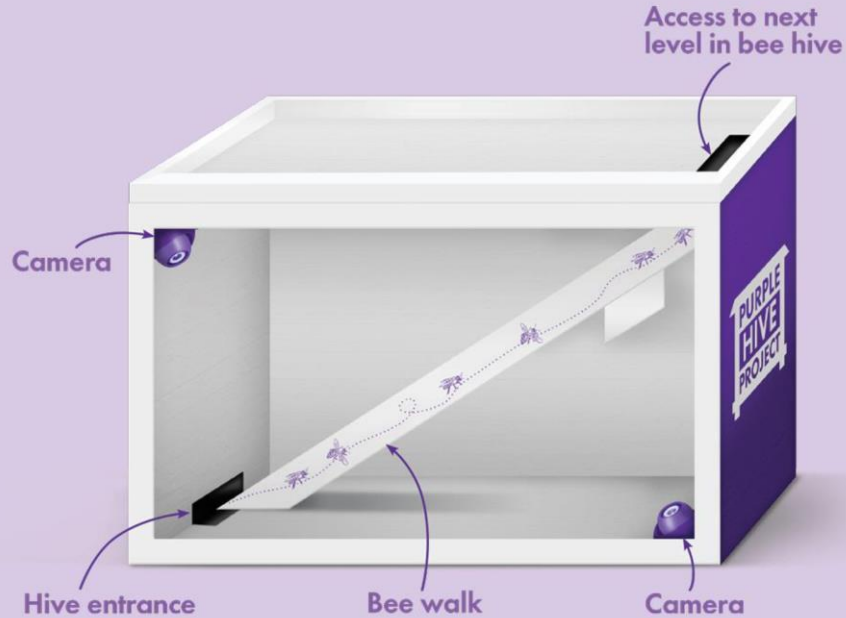
## DETECTION

Alcohol wash/ sugar shake:  
"Not the most sensitive means"  
(it's ~.5% to ~1.5% effective)



OUR RESPONSE  

# INSIDE THE HIVE



## How does it work?

Over 67.2% effective, per image set.



# Varroa In Townsville

Townsville is the only port to have made multiple detections, multiple proven eradication efforts and the only Port that adopted Purple hive.

Varroa mites (*Varroa jacobsoni*) have been detected in Townsville in 2016, 2019 and 2020. The 2016, 2019 and 2020 incidents have been formally declared eradicated thanks to the work of the National Varroa Mite Eradication Program.





# The purple hive project – initial reveal

When Bega revealed the Purple Hive Project in July 2020, it wanted to share an important message with Australians:

- That the Purple Hive Project is committed to supporting the beekeeping industry and investing in the industries fight against *Varroa destructor*.
- The Purple Hive Project is a world-first innovation for the honey industry.

The message resonated with media and news of the Purple Hive Project's arrival was covered by key publications, including national print news coverage across a key Australian newspaper network.

52 million potential PR reach

42 million potential digital reach

Media coverage across TV, radio, online and print

Key Australian agricultural news program, ABC Landline, aired a segment that covered the Purple Hive Project in depth. The segment explained its importance, as well as the role that bees play in our ecosystem in-depth. You can watch the segment here:

<https://www.facebook.com/LandlineABC/videos/protecting-bees-from-varroa-mite/324560055333963/>

## BEGA FLIES TO BEES' RESCUE

AUSIE technology and funding could halt one of the 21st century's most troubling trends – the sudden and drastic decline in bee populations around the world.

The decline, which began about 15 years ago, is driven by two main honey bee pests: a mite and a viral parasite. In Australia, the contribution has been to honey crop degradation worth \$4.56bn a year.

While Bega Foods is exploring a possible solution as it pushes into the \$500m Australian honey market, Dubbed the Purple Hive Project, the company will use 5G-degree cameras and artificial intelligence Melbourne-based.

To catch the mite, Varroa mite, which collapses bees used the world.

It will be scanned in about 10 minutes, enabling it to be used for a range of tests.

From a small sample in 2016, he analysed in the early 2017 effort to release here.

entire had been of Australia for surveillance and



My program, I enjoy honey on her walls. Picture: JAKE NOWAKOWSKI

country, it has so far proven impossible to eradicate it.



## Bee pest real buzz kill

### New tech to save vital insects



Beekeeper, Ian Cane, says Australia has not been subjected to the Varroa mite which cripples bee colonies.

**DAVID MILLS**

NEW Aussie technology and funding could halt one of the 21st century's most troubling trends: the sudden decline in bee populations around the world.

The phenomenon is serious because honeybees pollinate one third of the food we eat each day. The contribution they make to Australian agriculture alone has been valued at between \$4.56 billion.

Now Bega is exploring a possible solution as it pushes into the \$500 million Australian honey market.

Dubbed the Purple Hive Project, the company will use 360-degree cameras and artificial intelligence developed by Melbourne-based start-up Varroa Tech, to scan bee colonies for the Varroa mite, which has caused the collapse of bee populations around the world.

The technology will be used to scan each bee in the hive, and if the mite is detected, an alert will be triggered, enabling it to be quickly quarantined.

The mite has not yet taken hold in Australia, apart from one small isolation in Townsville in 2018, but its arrival in New Zealand in the early 2000s invigorated efforts to monitor bee colonies here.

Ian Cane, a third generation bee-

keeper from Baramnda, Victoria, said the fact that the mite had been largely kept out of Australia so far was partly good surveillance and partly good luck.

"We're the only continent on Earth now where the bee populations are not subjected to this parasite," he said.

If the mite got in, he said, "our honey production would drop significantly from where it is today and the wide range of honey-bee-pollinated dependent food crops would be impacted as well."

But he warned that Australia's climate, particularly in the tropical north, made it extremely susceptible to introduction of the mite.

"If you move further north, bees don't go to hives, so they keep nesting baby bees all year round, and that gives the opportunistic mite the chance to breed, even more because they get more life cycles within a period. So we think it would have a devastating impact in that sense," he said.

Adam McNamara, the executive general manager of Bega Foods, said the technology was being tested in Australia using "artificial Varroa" and in New Zealand, where they have the real thing.

"The ability to detect and then ultimately manage Varroa we believe is just a massive step forward for the industry," he said.

NSA, it rapidly wiped out almost all fired bees across the entire country. Current containment methods include pesticides and decaying breeding boxes for a 'clean gene' that means they attack no mite. However, once the mite has reached a country, it has far proven impossible to eradicate it or stop its spread.

Australia is the only island continent to escape the mite's rigorous biosecurity measures, defence systems run by Plant Health and the Purple Hive Project. Created by Bega by its newly launched product, allowing collaboration between of companies, two start-up tech keeper", says Ian with a smile.

to bees from the varroa mite.



Aphelut Ian Cane and Joel Kuperholz install one of the new solar-powered Purple Hive units, capable of detecting varroa mites, into a beehive.

fit an Internet of Things [internet-connected] devices. And our breakthrough is exactly that. It's the world's smallest and most efficient computer vision."

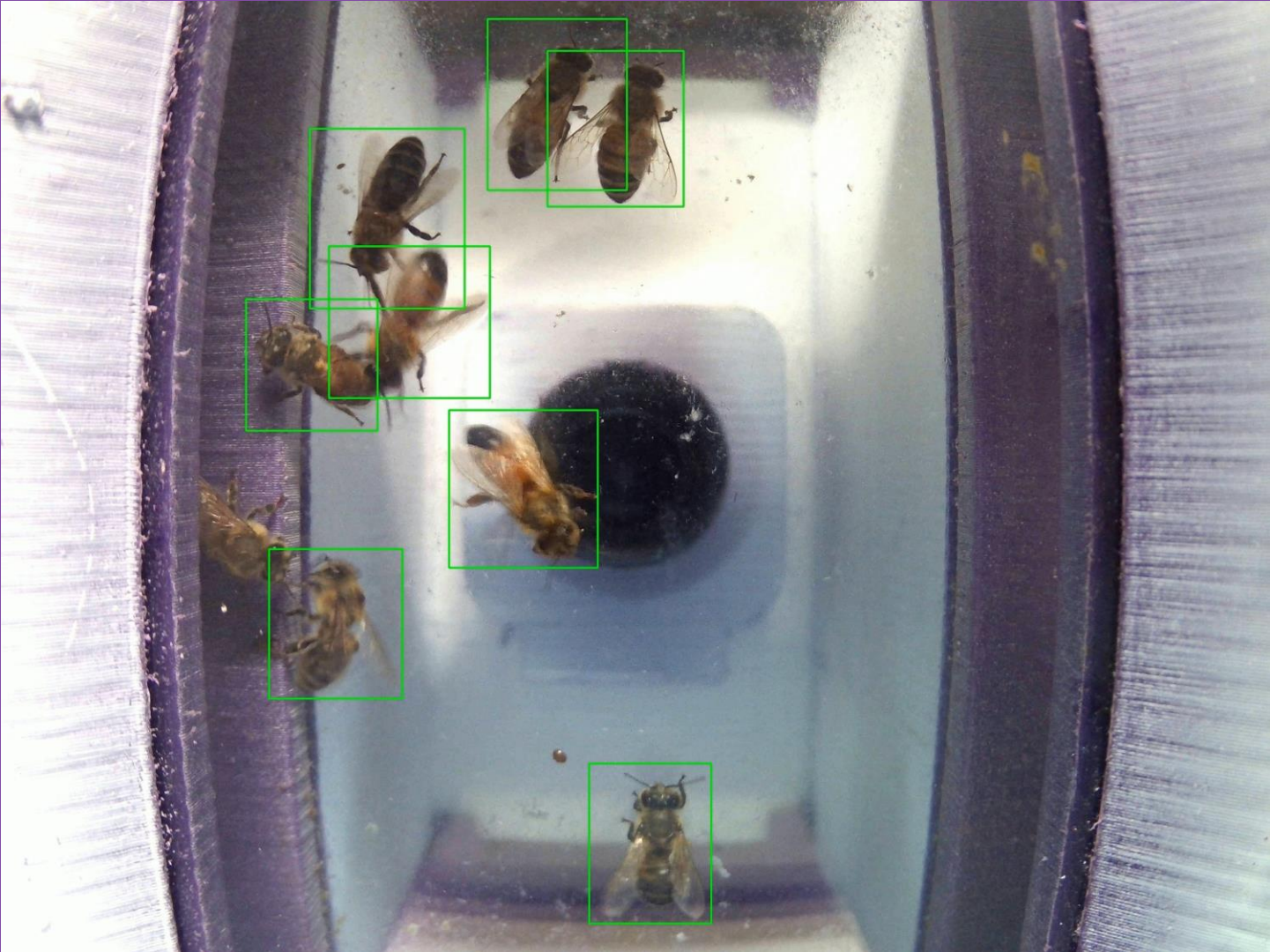
The company was particularly well qualified, its co-founder and chief technology officer Shrey Yohannan is a neuroscientist and a bioengineer who has PhD in AI and worked on Australia's first home eye.

Lans explains: "The challenge of Purple Hive is to be able to see the bees and the mites as they come in and out of the hive. And to do that we needed an artificial intelligence that's trained on specifically that problem. That didn't exist anywhere in the world."

Not only did the Xallent team create the AI from scratch, it also devised a suite that uses a field energy as possible so it can operate on a solar-powered 12-volt car battery, the most reliable and efficient power source in the remote areas where bees are often kept. The unit also has to work with limited internet access, so that if it does detect a mite, it can send urgent alerts to beekeepers in real time (it is vital in tackling a mite infestation).

"If you've ever tried answering Netflix on your phone in the middle of the outbreak, you know





Images from the New Zealand trial, evolves so quickly



Your turn



# Abnormality Detection

- Real-time notification
- Image shared
- Remote Human Review
  - “Human In The Loop”
- No action taken.



# Worlds Most Advanced & Accessible Hive Monitoring\*

Neural Network AI @ Edge, Data Processing @ Cloud



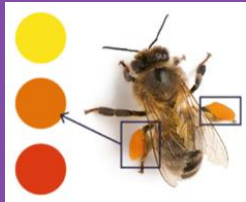
## BEE DETECTIN

Hive Health,  
Hive Activity,  
Queen Status,  
Bee Age Distribution,  
Swarming Status,  
Dead Out



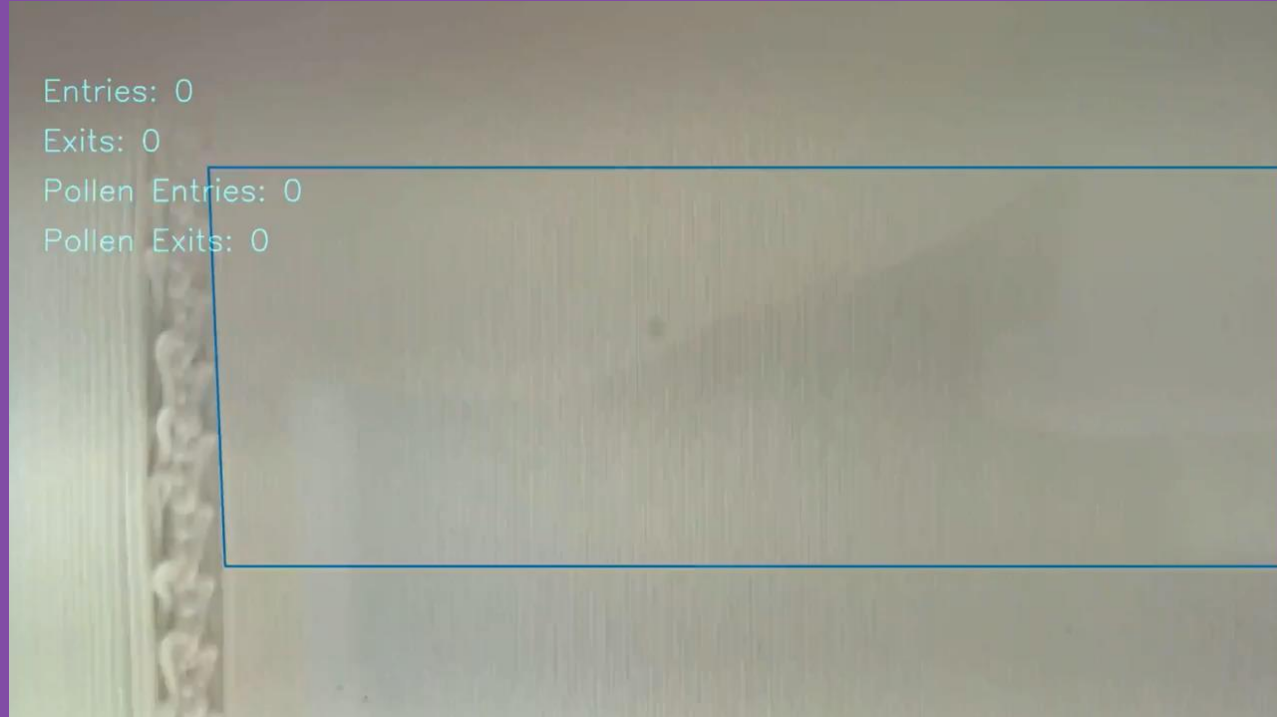
## BEE ACTIVITY

Foraging Efficiency  
Net bee Movement  
Pollination Efficiency  
Hive Placement  
Optimisation  
Optimised Harvesting  
Schedule



## Bee POLLEN

Biodiversity Requirement  
Maximised Land Use  
Pollination Efficiency





We aren't giving up. Watch this space.

