

Smart beehive monitoring for remote regions

The CRC for Honey Bee Products has developed a new sensor monitoring system to help Australian beekeepers easily, accurately and cheaply measure beehive health, including beehive weight, even in remote areas.

A healthy and well-spread honey bee population is crucial for the pollination of local crops and native flora. The recent decline in the global bee population and an increase in colony collapse disorder and other honey bee diseases threatens honey bee pollination services. Monitoring the health of beehives is more important than ever for managing the sustainability of the Australian honey bee industry. However, monitoring widely dispersed hives can be time consuming and expensive.

Advances in sensor-network based systems have helped beekeepers monitor factors that affect beehive health, such as temperature, humidity, hive acoustics and weight, and forager traffic to and from the hives. Aided by wireless communication technologies, beekeepers can continuously monitor multiple hives from a distance, with little human intervention.

However, there are limitations in these monitoring systems which, when combined with the vast Australian landscape (some with no cellular coverage) and the high costs, present major challenges to local beekeepers.

The CRC for Honey Bee Products has developed a cost-effective remote honey beehive monitoring system that can collect data from inside the hive.



CRC HBP
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Yanchep beach joint venture



bee health



remote sensing



hive weight



A trial beehive monitoring system collects information from inside hives at Jurien Bay, Western Australia.





The new monitoring system is suitable for long-distance transmission, requires little power and generates less data without compromising the information content or quality.

Hive weight has traditionally been measured using weighing scales that are difficult to use and require human intervention with each hive.

The CRC's new monitoring system uses Artificial Intelligence and sensor data from inside the hive to estimate hive weight, potentially eliminating the expensive and difficult to deploy weighing scales. This significantly reduces the cost of beehive monitoring systems.

To determine the best sensor monitoring design, the CRC trialed 8 sensor systems in multiple hive sites over 18 months at different locations and environments.

The trials produced a high-resolution dataset that was used to train and test machine learning algorithms to estimate daily hive weight variations.

The resulting CRC beehive monitoring system uses the latest long-range technology - the Narrow Band Internet of Things (NB-IoT). It is suitable for communications from remote sites and is the first system to use machine learning to remotely measure beehive weight - a critical measurement of beehive health and activity.

Research by the CRC for Honey Bee Products has developed a low-power, long-range smart monitoring system for cost-effective monitoring of beehives. The system can generate beehive weight estimates and can be deployed in remote regions for easier adoption in Australian conditions.



CRC PhD student, Omar Anwar, setting up his monitoring system at an experimental pollination event