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Malaysia's position as the world's leading palm oil country has allowed the industry to flourish in the way it has never been before. The results in the churning out of a wide variety of products as a result of continuous R&D efforts. With the escalation in the volume of palm oil products and the fruit itself, it becomes necessary to produce high quality seedlings from high yield trees by automating and transforming the current process of pollination to meet growing demands.

The current methods of pollination involve tacit knowledge of checking whether a palm is suitable for pollination and manual labour being deployed in fields of vast sizes spanning over thousands of hectares in the nation itself. The drawbacks of such a system is late bagging during the pollination process that ultimately impacts overall yield and the process, being labour dependent, relies on a sizeable number of foreign manpower to work the fields.

Challenge

Current pollination processes for oil palm pollination relies heavily on human dependence. It involves manual checking of trees for pollination readiness and is more of a guessing game rather than an exact science. For the process of oil palm pollination to be efficient and cost-effective, a logical solution would be to automate the process and reduce dependence on human tacit knowledge by transferring it into a system. The current gaps are:

- Human dependence to monitor trees for within the plantation and determine of they are ready for pollination.
- Inaccurate human-based decision making based on the determining of the pollination window.

• Vast plantation areas to be monitored to catch the pollination window to maximise yield.

CURRENT GAPS

- Human dependence
- Inaccurate human-based decision making
- Vast plantation areas to be monitored

INTELLIGENT PLANTATION MANAGEMENT SOLUTION

- Robust wireless network system
- Sensor system to monitor 'mother' palm
- Decision support system to process data and accurately determine pollination cycle
- Intelligent dashboard pinpoint trees' readiness for pollination

Solution

MIMOS' Intelligent Plantation Management solution provides an intelligent method to manage vast areas of oil palm plantations. It allows plantation managers to remotely check on the overall pollination status of their palms and triggering them once ready for pollination. Once ready for pollination, only then will workers be deployed to the field to carry out the necessary processes and effort is not wasted to check on palms which may have passed or have not come into the pollination window.

The solution consists of:

- Robust wireless network system that provides coverage the plantation area.
- Sensor system installed on each flowering 'mother' palm.
- Decision support system to process the data and accurately determine the pollination cycle.

• Intelligent dashboard to pinpoint the trees' readiness for pollination in the plantation.



Intelligent Plantation Management solution

Solution Highlights

Wireless Sensor Network

A sensor network located at the oil palm sites consists of nano temperature sensors, repeaters/routers and wireless gateways. The sensors are fixed to the centre of a mother palm and transmits data to the gateway which then transmits to a regular telecommunications network.

Sensor Management System

The sensors sense the oil palms' readiness for pollination through changes in the mother palm's temperature and the status of the sensor whether transmitting or functioning will be tracked on the management system.

Central Application Database

The central database server records all sensor data from the oil palm site and filters and structures the information. The information is then visualised in the form of charts and indicators for the users of the system.

Mobile Web Services

Mobile web services receive trigger alerts from the system when the pollination window opens for an oil palm as well as enables the user to see the status of the other palms.

Impact

Efficient Knowledge-Based Pollination

- Reduction on dependency on human tacit human knowledge to scientifically determine the pollination window.
- Precisely pinpoint the exact tree that is ready for pollination to reduce the number of visits by workers to trees.

Improved in Yield and Reduction in Fall Out

- Fall out rate has the potential to be reduced as a result of identifying the right time to pollinate.
- The increase in sellable seedlings from the annual fruit bunch when the oil palm is accurately pollinated.

Efficient and Remote Operations

- Ability to remotely monitor palm oil sites rain or shine through smart mobile applications.
- Effective deployment of personnel to the plantation and precision sensing of the trees' pollination readiness.





Sensor on a mother palm





Plantation dashboard on PC and mobile device

MIMOS

Drawing from MIMOS' experience of more than 30 years in R&D in ICT, industrial electronics and nano-semiconductors with a core of over 700 researchers and scientists producing world-class design and R&D, a plethora of technologies with more than 900 patents filed to-date is now in motion to spearhead the proliferation of next-generation systems.

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