# Drones for Precision Agriculture

**Drone Technology Development Program for Precision Agriculture Aims to Help Farmers Reduce Environmental Impact and Increase Crop Yields**

In Brazil, a global agricultural superpower, family farms account for approximately 85 percent of all rural properties and produce more than 70 percent of food consumed domestically. In collaboration with the Brazilian Agricultural Research Corporation (Embrapa) and the Institute of Solidarity Socioeconomics (ISES) on the Drone Technology Development Program for Precision Agriculture this program innovates drone technologies that will provide accurate, real-time agricultural intelligence to farmers, enabling them to reduce environmental impact and increase crop yields. Ultimately, the program aims to demonstrate how drones for precision agriculture may reduce the negative impact of climate change by providing timely and accurate information to farmers, allowing them to take immediate actions in favor of the environment and their business.

## BRAZIL

### 2018 Statistics*

**Population** (2017 est.)    **207.3 million**

**Life Expectancy**    **74 years**

**GDP Per Capita** (2016 est.)    **$ US$15,500**

**Mobile Penetration**    **112.54%**

*Sources: CIA World Factbook (https://www.cia.gov/library/publications/the-world-factbook); Mobile penetration data provided by Ovum World Cellular Information Service and based on market intelligence.

## Challenge

- Brazilian farmers would benefit greatly from access to real-time reports of the environmental condition of their fields, processed by drones for precision agriculture. But today, high costs, the need for specialized operators and technicians, and access to powerful computers make the use of drones in agriculture inaccessible to most of the nation's farmers.

- For farmers who are able to use drone technology, intelligence data gathering and reporting is a four-step process that can take hours, or even days, to run a complete cycle:

  ○ Fly the drone over the land to capture a set of images;

  ○ Extract the memory card with captured images from the camera on the drone; transfer it to a web-connected device and upload the images to a processing server;

  ○ Wait for the server to complete the data analysis;

  ○ Read the analysis and take necessary actions, such as irrigating areas that appear dry, fertilizing areas that are producing little crop and spraying pesticides in bug-contaminated areas.

- Agrochemicals are widely used in Brazil to protect crops from pests, disease and invading species. Indiscriminate use causes unnecessary accumulation of those substances in the soil, water and air.

## Solution

- For this program, a research laboratory will be installed within Embrapa's National Precision Agriculture Laboratory (LANAPRE) in São Carlos to enable the development of on-board systems that will be embedded in commercially available lightweight drones.

- The on-board systems will combine Embrapa's expertise in agriculture and image processing algorithms with Qualcomm's® Snapdragon Flight™ drone platform and advanced wireless technologies to collect, process, analyze, and transmit real-time crop intelligence data to farmers while flying over their fields. The on-board systems will serve as proof-of-concept for a flying drone that will provide image-based agriculture intelligence.

- Farmers will have access to precise crop intelligence metrics and recommendations for taking specific actions corresponding to this intelligence, such as irrigate, fertilize or spray pesticides, in order to produce higher crop yields. The ability to pinpoint areas needing action allows for spot application rather than whole-field treatment, which reduces negative impacts to the environment.

- Farmers will access the information via a user-friendly web interface, accessible by a 4G, WiFi or LAN capable device, such as a smartphone, tablet or PC.

## Technology

- Qualcomm® Snapdragon Flight™ drone platform
- Embrapa's image processing algorithms
- On-board system with a user-friendly web interface accessible by a 4G, WiFi or LAN capable device
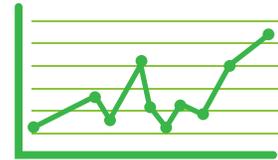
## Impact

### Accelerating Adoption

By developing robust on-board systems for drones and providing a proof-of-concept, this program can accelerate the widespread adoption of drone technology in the farming industry.

### Demonstrating a Wide Range of Benefits

Ultimately, the program aims to demonstrate to Brazilian regulators, researchers, environmentalists, farmers, agriculture service providers and drone manufacturers the innovative use of drones to improve agricultural yields as well as to monitor and reduce environmental impacts.

### Economic and Social Impact

Future phases of this program will include field testing and an evaluation that measures economic and social impact.

## Program Stakeholders

**Embrapa**
Instrumentação

**ISES**
INSTITUTO DE
SOCIOECONOMIA SOLIDÁRIA

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