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Drone Based Plant Phenotyping System

A drone-based system integrates portable hyperspectral imaging for high-throughput, high-resolution plant data collection, optimizing large-scale agricultural phenotyping.

Plant phenotyping, once only available to research scientists, now plays an important role in data collection and predictive modeling for agriculture. Hyperspectral imaging allows for collection of data on a plant's nitrogen, water and chlorophyll content, as well as ambient data on air pressure, ultraviolet radiation and humidity. Recent improvements in the industry have included the introduction of handheld sliding imaging systems which can collect distribution data over a given plant, as well as remote aerial imaging systems capable of imaging whole plots at a time. However, both of these systems are flawed; handheld solutions have limited throughput and require high volumes of human labor to sample an entire field while remote systems are subject to lower resolution and large quantities of ambient noise due to variations in plant architecture or other such factors.

Researchers at Purdue University have developed a drone-based plant phenotyping system which integrates a small, portable hyperspectral imaging system and a drone. The drone carries the imaging system from plant to plant, where the device is then able to collect high-quality data at close range from both a single leaf and the whole plant. Together, the pair are able to achieve high throughput without compromising on resolution and noise.

Advantages:

-Reduce noise compared to remote sensing systems for large-scale phenotyping

-Increase throughput compared to manual close-range sensing systems

Potential Applications:

-Efficient large-scale plant phenotyping (i.e. agriculture)

Technology ID

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Category

Agriculture, Nutrition, & AgTech/Precision Agriculture & Smart Farming
Aerospace & Defense/Autonomous Systems (UAVs & AVs)
Robotics & Automation/Autonomous Systems & Perception AI

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