

Figure 6: A screenshot from the NEUROiD in silico movement platform with the spinal cord controller(left) and the natural robot - a human hand (right)



Drone Based Sensing and AI Driven High-Throughput Phenotyping for Agriculture
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In recent years, automation, imaging solutions have paved the way for many high throughput phenotyping studies in agriculture. In the current scenario, the standard phenotyping methodologies (i.e., manual observations or laboratory assessments) are costlier, time-consuming, labor-intensive, destructive, and are frequently not standardized. Semi-automated systems have also been applied to investigate various components of plant

growth and development, thus contributing to crop improvement programs. Researchers used ground-based platforms like handheld, fixed position static cameras, ground-based imagery sensors to capture the images of the crop fields. However, the field of view of the static cameras is minimal, and hence these techniques are not widely adopted in the real-time scenario.

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In recent times, the usage of unmanned aerial vehicles (UAV) equipped with cameras and sensors have become very popular in remote sensing and monitoring applications. The UAVs equipped with cameras can have a wide field of view with broad coverages, and also have advantages such as low cost, easy deployment, and high spatial, as well as temporal resolutions when compared to airborne or space-borne remote sensing. Recently, non-invasive methods, based on UAV

imaging techniques such as RGB, multispectral, hyperspectral, IR cameras, etc. are used to study the anatomical and physiological traits like crop health, crop nutrients, disease tolerance, water stress, crop yield, etc. Figure 1 using AI/ML-based algorithms. The workflow for High Throughput Phenotyping through UAV-based on-board sensors is shown in Figure 2.

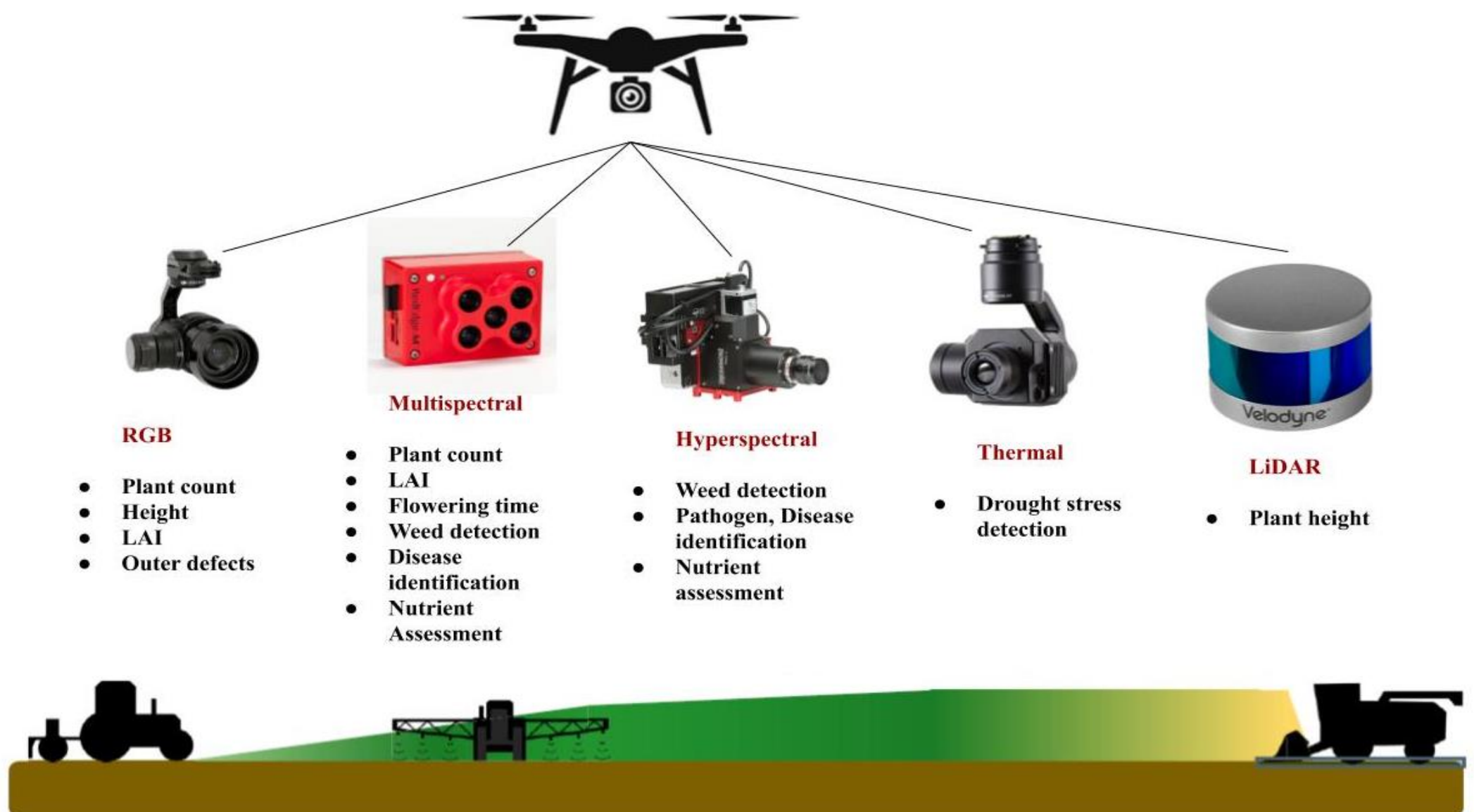


Figure 1: Sensors integrated with UAV and their application in Agriculture

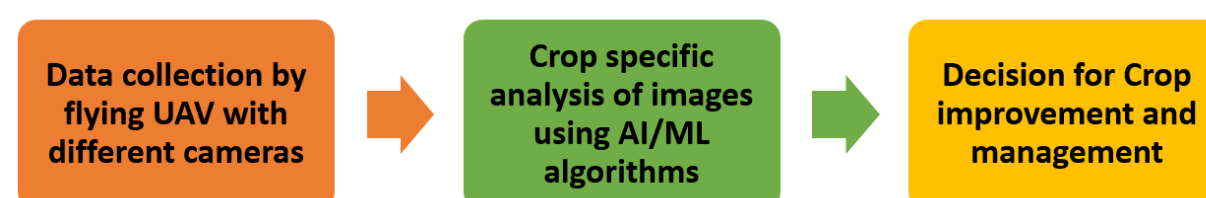


Figure 2: Workflow of High Throughput Phenotyping through UAV