

Multisensor Field Phenotyping Pipeline Using Unmanned Aircraft Systems (UAS) at the Indiana Corn and Soybean Innovation Center (ICSC) at Purdue University

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Abstract

Unmanned aircraft systems (UAS) are now widely used in field phenotyping by industry and academia because they are convenient, fast, and require less labor than manual phenotyping methods. UAS-based phenotyping requires significant effort in data collection, processing, and resource management, as well as specialized expertise in flight operation and remote sensing. The Indiana Corn and Soybean Innovation Center (ICSC) at Purdue University operates multisensor platforms to provide reliable field phenotyping services to many clients in academia and industry. According to the experience with our multisensor platforms to date, we present practical data collection and processing pipelines for (a) creating geospatial datasets from RGB, hyperspectral, lidar, and thermal sensors, (b) extracting plant phenotypes from the multisensor datasets, and (c) combining the resultant datasheets with ground truth and treatment information. While processing techniques may vary depending on the vendor or sensing mechanisms, the general concept is up-to-date and can be relevant to those who are currently operating or planning to adopt UAS phenotyping systems in the near future.

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