# 3D OPEN COTTON BOLL DETECTION USING UNMANNED AERIAL SYSTEM (UAS) DATA

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## Abstract

Thanks to advances in Unmanned Aerial System (UAS) and sensor technologies, acquiring ultra-high resolution remote sensing data in 3D is becoming a reality, rather than science fiction. We previously developed a 2D open cotton boll detection algorithm, and the results were used to estimate harvest yield. Although previous results showed significant potential in estimating harvest yield from a single UAS data acquisition date right before the harvest, the 2D approach is limited to bolls visible from the top-down view, and may not account for bolls that are located lower in the canopy. To address this, we proposed a new 3D open cotton boll detection approach in this study. We used a custom UAS platform with a Sony RX1R II sensor (43 MP, RGB) and DJI Matrice 100 with a SlantRange 3p sensor. The UAS data were processed using the Agisoft Photoscan Pro software to generate 3D point cloud, Digital Surface Model (DSM), and orthomosaic images. The 2D open cotton boll detection algorithm was used to determine the adoptive threshold value to detect open cotton bolls, and the threshold values were applied to the 3D point cloud data. This study will compare the proposed 3D open cotton boll detection approach with the previous 2D open cotton boll detection method in terms of estimating harvest yield.