Drones for Invasive Species Monitoring

Hohl, Zachary (School: Edgewood Junior Senior High School)

Lygodium Microphyllum is an invasive species relatively new to Central Florida. It out-competes and destroys varieties of plants in multiple ecosystems. Currently, detection in Central Florida is limited to visual reports. A composite map made from imagery collected from a drone was made to highlight potential stands of Lygodium. Multiple zones were tested. Hundreds of both Near Infrared Images and standard RGB images were assembled into different maps. All locations were synchronized in reflectance in QGIS using objects appearing in both, such as a truck. An NDVI raster was calculated for both NIR maps, and a custom NDVI raster calculation was determined to offer the most contrast between Lygodium, normal plants, and dying plants. The composite maps were made from the modified NDVI filter combined with a visual base. An imagery processing program, Octave, was coded to scan through smaller sub-sects of GPS tagged portions of the composite map. The program was able to assign a Lygodium or non Lygodium identification with 88.3% accuracy. Further improvement could be made by accounting for the cluster like nature of Lygodium and give greater weight to sections adjacent to sections with high confidence levels. Such a workflow could be used to combat further infestations of Lygodium in Brevard, as Lygodium often grows rampant in remote areas. Once epicenters are located, counter measures such as sterilized Brown Lygodium Moths can be implemented.

Awards Won:

Fourth Award of $500