An Autonomous Drone for Water Conservation and Irrigation Location Optimization

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Only 3% of the water on earth is freshwater, and only a third of this is accessible for agricultural use. This poses a difficult problem for the agricultural industry because the technology used to modernize fields and farms in terms of water supply is limited. Currently, agricultural drones are conventional in modern-day agriculture due to their capability in nourishing farm fields. This project proposes a drone that monitors environmental data and optimizes water usage based on the placement of certain irrigation systems. The drone, which I built, surveyed five different plants autonomously by measuring plant moisture, leaf segmentation, infrared output (a satisfactory indication of plant health), and visual properties of plant fruits. Once all these variables were measured, the drone created a visualization of the field and based on the difference between the tested moisture of plants and various hardcoded thresholds (selected based on optimal moisture levels), the software adjusted the placement and amount of water used by the irrigation system. A breed of tomato plant saw an 8.7 % average increase in height over a four week period, and water produced by the irrigation system was reduced by 12%, compared to control data. The results suggest that the drone, in conjunction with the software, successfully maximizes plant health while ensuring a decrease in overall water consumption. This ultimately provides a cost-effective, versatile, and easily-implementable drone with novel software that finds a balance between water-usage and plant nourishment.

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