Transforming Agriculture to Feed the World Sustainably: A State-of-the-Art, Drone-Enabled Precision Agriculture End-to-End Solution

Kollipara, Veenadhari (School: Interlake High School)

By 2050, global population is projected to reach 9 billion people. Farmers need to implement innovative methods like Precision Agriculture to produce 70% more food to feed everyone on existing acreage. Precision Agriculture is an efficient farm-management methodology which comprises of a cluster of tools and technologies such as Unmanned Aerial Systems, on-farm sensors, data-collection, and decision support systems to better measure and control crop production on a site-specific basis. Despite the many advantages, the adoption rate of this game changing technology amongst the farmers has been quite low due to high-cost and lack of proper end-to-end Precision Agriculture solutions. The aim of this project is to design, fabricate and test a drone-enabled Precision Agriculture system that can carry a soil-sampler payload with onboard Arduino sensors, IR camera, GPS and a sprayer system. A farmer-friendly dashboard powered by data-driven decision support system enables visualization of field data so that farmers can make better and more informed decisions, adjust the farm practices, apply precise inputs to aid in right planting and harvesting decisions. The end-to-end solution was tested on apple, peach orchards and alfalfa farms located in various counties in real-time. The 3D-printed multi-rotor, multi-functional (Soil-Sampling, Crop-Surveying, Disease-Detection and Aerial-Spraying) Agricultural Drone along with Farm Data Analytics increases the adoption rates of the Precision Agriculture, optimizes returns on farm inputs, minimizes environmental impacts and saves both money and crops. This one-of-a-kind solution has the potential to transform agriculture to feed the world sustainably and help tackle the global food security challenge.

Awards Won:
First Award of $5,000
Ricoh USA, Inc: Ricoh Sustainable Development Award of $10,000