

# Agricultural Drones: The Development of an Unmanned Aerial System for Use in Semi-Autonomous Silo Inspection

Boyea, Samantha (School: Greenwich Junior-Senior High School)

Small scale farms are responsible for producing 70% of food worldwide. Of this food produced a large amount is stored in structures called silos. Silos are agricultural containment vessels often cylindrical in shape that are mainly used for the storage of grain and silage. Inspections are performed in order to ensure the integrity, stability, and safety of the structure. However, these inspections require human risk due low oxygen conditions and the presence of dangerous gases such as nitrogen dioxide within the silo. In order to remedy this a drone or UAV could be employed to enter and autonomously inspect the silo when it is unsafe for a farmer to do so. After determining the UAVs ability to both locate and detect damage within the silo while the inspector is a significant distance away, the next goal proposed is to improve the accessibility through use of a semi-autonomous function. The first step in constructing a UAS capable of accomplishing this objective would be to, using computer software, pre-program flight paths based on inputs of diameter and height of the silo to be inspected. In order to accomplish this objective a quadcopter was designed and constructed that utilizes both a Navio 2 flight controller and Raspberry Pi. The combination of these devices allows for instructions regarding flight paths to be sent between the ground station and UAV.

## Awards Won:

Second Award of \$2,000

China Association for Science and Technology (CAST): Award of \$1,200