The Boeing Company VTOL Cargo Mission

Overview
The team’s goal is to design an unmanned aerial vehicle (UAV) capable of carrying an unmanned ground vehicle (UGV). The team must design a UAV that is capable of securing the UGV while in flight so that the UGV can be transported to a safe zone to retrieve cargo. The UGV will then return to the UAV and the UAV must again secure the UGV for flight back to the start point.

Objectives
Cargo will be trapped within a maze that will be surrounded by terrain that neither the UGV nor the UAV can touch. The blocks, 2” mahogany cubes, can be identified by the magnet encapsulated inside the block. These blocks will be hidden throughout the maze and must be retrieved by the UGV/UAV pair. The goal is to transport as many block from the maze to the base point in a specified amount of time.

Approach
• A top-down approach was taken to the problem which utilized a V-Diagram
• Weekly meetings with the customer established key requirements and goals
• Initial motor testing and system characterization were considered the first phase of testing
• A review of relevant patents and analyse existing products provided a good starting point for design
• A Pugh Concept Selection Matrix was used to finalize concept selection
• CAD models were created to create a detailed concept
• UAV main structure was purchased from a vendor and assembled by the team
• New motors and props were purchased and assembled to the UAV structure
• Testing and PID tuning was completed to verify all requirements were met
• Testing with the UGV qualified the UAV for competition after the UAV proved capable of lifting the UGV

Outcomes
• The team won the completion between another team tasked with the identical project and goals
• Project approach, management, and results were well documented and provided to the vendor for review and critique