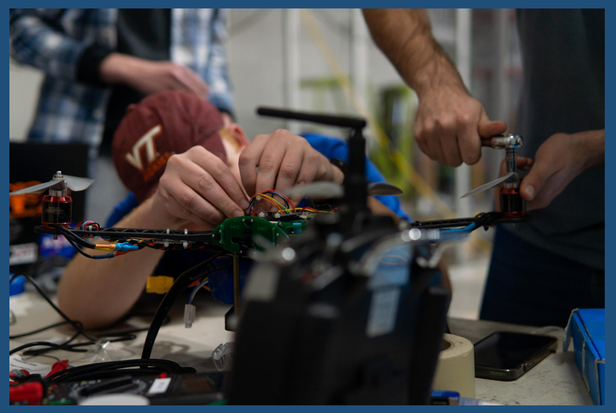
Team Auto Delivery

Joe Bottino | Raf Balderas | Troy Johnston | LeAnn Rhoades | Kyle Jarrett | Ryan Popp |

Faculty Advisor: Dr. Andrea L'Afflitto | Project Sponsor: Lockheed Martin

Problem Statement

To **design, build, and test** an autonomous delivery system for **small lightweight parts** to be delivered by UAVs across a **square mile facility.**



Project Description

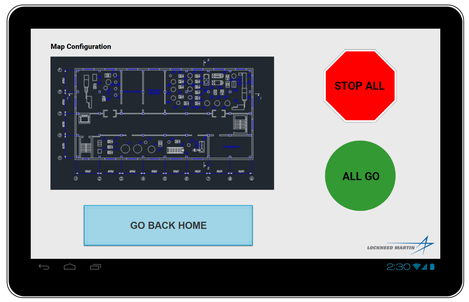
- Scalable system of 4 fully autonomous UAVs
- Capable of holding a payload of 2 lbs.
- Sustainment dock for UAV autonomous charging
- Autonomous mission planning
- Dynamic obstacle detection and avoidance
- Design for user safety and hazard mitigation

Sub Teams

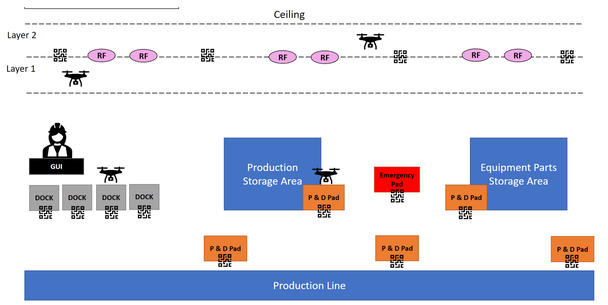
UAV Design

Sustainment Dock

User Interface (UI)



Navigation & Guidance



Impacts

- Lower labor cost
- Sets a standard for automated infrastructure
- Reduced part delivery time
- Flexible and scalable

Results

Engineering Characteristic	Verification Device	Units	Marginal Value	Ideal Value	Actual Value
Risk Level	Risk Assessment Matrices	Rank: Low, Moderate, High	Moderate	Low	Moderate
UAV Weight	Scale	(lbs)	8	6	5.7
Level of Autonomy	Comparison to SAE Standards	(SAE Level)	3	4	Not Yet Validated
Carry Capacity	Drone	(lbs)	2	2	2
Positional Accuracy	Tape Measure and/or Lane markings	(% Error)	10	1	Not Yet Validated
Charging Speed	Stopwatch	(Minutes to charge)	36	30	59
Duty Cycle	Stopwatch	%	50	60	29
Drone Orchestration	Run defined set of simulated tasks	(Number of Drones)	2	4	Not Yet Validated
Delivery Time	Stopwatch	(Minutes)	15	10	13.4
Non-stop flight time	Stopwatch	(Minutes)	30	40	24
UAV and Dock Assembly Costs	BOM and Procurement Spreadsheet	(USD)	5000	4000	7931.48
Landing Accuracy	Measuring Tape	(inches)	0.50	0.25	Not Yet Validated

Lessons Learned

- Budget Accordingly
- Plan out test and build cycles
- Always coordinate with teammates
- Document everything