

# Aerial Pathfinding Reconnaissance

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## **EXECUTION AND VALIDATION PLANS**

REVISION 1 – Draft  
20 September 2020

# Execution Plan

Milestone	Assigned To	Week 1 24-Aug-20	Week 2 31-Aug-20	Week 3 7-Sep-20	Week 4 14-Sep-20	Week 5 21-Sep-20	Week 6 28-Sep-20	Week 7 5-Oct-20	Week 8 12-Oct-20	Week 9 19-Oct-20	Week 10 26-Oct-20	Week 11 2-Nov-20	Week 12 9-Nov-20	Week 13 16-Nov-20	Week 14 23-Nov-20
Understand Project	All														
Initial planning/research	All														
Draft Conops Report	All														
Source Lab Materials (Drone/Sensors)	All														
Draft FSR Report	All														
Draft ICD Report	All														
Draft Exection Plan	All														
Draft Validation Plan	All														
Prepare Midterm Presentation	All														
Design Server-Side Architecture	Jason														
Remove Moving Obstacles from Data	Mark														
Increase familiarity with Python	Max														
Implement Sever-Side	Jason														
Map Environment from Data	Mark														
Create algorithm for valid accessible path	Max														
Research/Order Parts	Dilanka/Jason														
Create error handling for inaccessible path	Max														
Implement Client-Side/UI	Jason														
Estimate Depth on Path Sections	Mark														
Research Drone SDK / stm32 / Sabretooth	Dilanka														
Add flight mapping functionality	Jason														
Research software interaction with drone	Max														
Design Aerial/Land Electrical Schematics	Dilanka														
Program manual override of drone	Max														
Testing Electrical Off Drones	Dilanka														
Merge Depth Estimates with Map	Mark														
Build Air Drone	Dilanka														
Build Land Drone	Dilanka														
Prepare Status Update Presentation	All														
Implement Server on drone	Jason														
Test Flight of Air Drone	Dilanka														
Normalize Depth Field for Drone Altitude	Mark														
Program movement of drone	Max														
Test Travel of Land Drone	Dilanka														
Communicate with server on drone	Jason														
Derive Gradient Field From Elevation Map	Mark														
Program: Data Retrieval of Air Drone	Dilanka														
Test Drone Simulation Programs	Dilanka														
Test Data Retrieval From Drone	Dilanka														
Implement Obstacle Delineation	Mark														
Program drone path from map input	Max														
Package Software/Create Installer	Jason														
Prepare Final Presentaion	All														
Test and modify Air system	Dilanka														
Program: Autonomous Flight of Air Drone	Dilanka														
Draft Final Report	All														
Prepare Final Demo	All														

Legend	
	Completed
	Deadline
	Planned Work Time
	In Progress
	Late

# Validation Plan

Legend	Complete	Incomplete
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Subsystem	Test	Deadline	Status
Data Collection and Drone Control	Aerial Drone flies from Point A to Point B	8-Nov	
	Drone stops at midpoint locations on the map and records video and GPS location	8-Nov	
	Drone stops at user shutoff switch	15-Nov	
	Land Drone Moves	2-Nov	
	Drone detects obstacles in front view using Ultrasonic Sensors.	31-Oct	
	Electrical Systems Connected without Error	23-Oct	
	Drones Built and Power on	27-Oct	
Computer Vision and Mapping	Removes moving objects from videos to produce still frames of path sections	27-Sep	
	Produces a single image map of the environment from overhead views	4-Oct	
	Infers depth of a path section from an overhead stereographic perspective	11-Oct	
	Merges individual depth maps into a single depth map of the whole environment	25-Oct	
	Normalizes depth fields for altitude	1-Nov	
	Derives a gradient field from a height map	8-Nov	
	Delineates obstacle boundaries from an elevation gradient field	15-Nov	
Pathfinding and Drone Detection	Greedy algorithm for traversable path gives a valid path given a valid input	4-Oct-20	
	Create error handling for an inaccessible path	7-Oct-20	
	Manual override of drone works by controller by controller	23-Oct-20	
	Drone can move given basic commands basic commands	1-Nov-20	
	Movement of drone given from algorithmically designed path	13-Nov-20	
Device Networking and UI	Communicate with server using HTTP methods (Postman)	31-Sep-20	
	Communicate with server through UI	8-Oct-20	
	Complete intuitive UI design	8-Oct-20	
	Plot flight endpoints and return to user	15-Oct-20	
	Communicate with drone's server using HTTP methods through UI	5-Nov-20	
	Install software via encapsulated windows installer	16-Nov-20	