Bringing Safety to Our Skies

The Platform for Autonomy

Autonomy | The Future is Now

Autonomous Cars & Autonomous Flight Vehicles

Problem | Drone Performance Costs Lives

25,000 Life Saving
Blood Deliveries

Forest
Fires

Solution | Software for Autonomy & Safety

Cloud-Based Flight Controls Platform

AI/ML calibration uses flight data to enhance performance of all UAV on the platform

DOWNLOAD AUTOPILOT

Platform for Drones & Complete Autonomy

Adaptive Controls

Uniquely Ideal for AI/ML Optimization

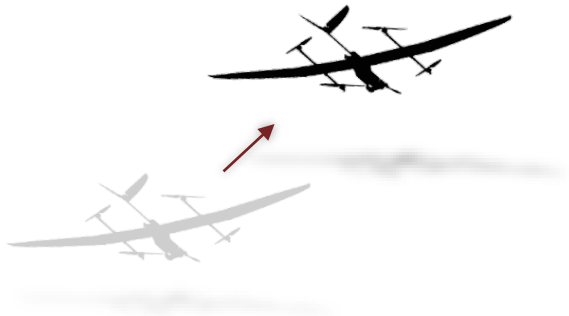
Rhoman Cloud System

Create ecosystem for autonomous skies

Impact | The Future of Flight

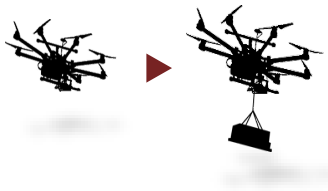
RHOMAN AEROSPACE

Get Flying



Fly Safely & Legally

Deploy Cargo



Synthetic GPS

Drone-Drone Interaction & Swarms

Safe & Complete Autonomy

Future AI, 3rd Party Tech

Impact | Ecosystem for Autonomous Skies

RHOMAN AEROSPACE

Get Flying

Fly Safely & Legally

Deploy Cargo

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Safe & Complete Autonomy

Future AI, 3rd Party Tech

Value | Benefits

- Get Flying ASAP
- Increase Performance
- Safety Approval
- Complete Autonomy

0 → 1

1 → Many

Deploy Faster

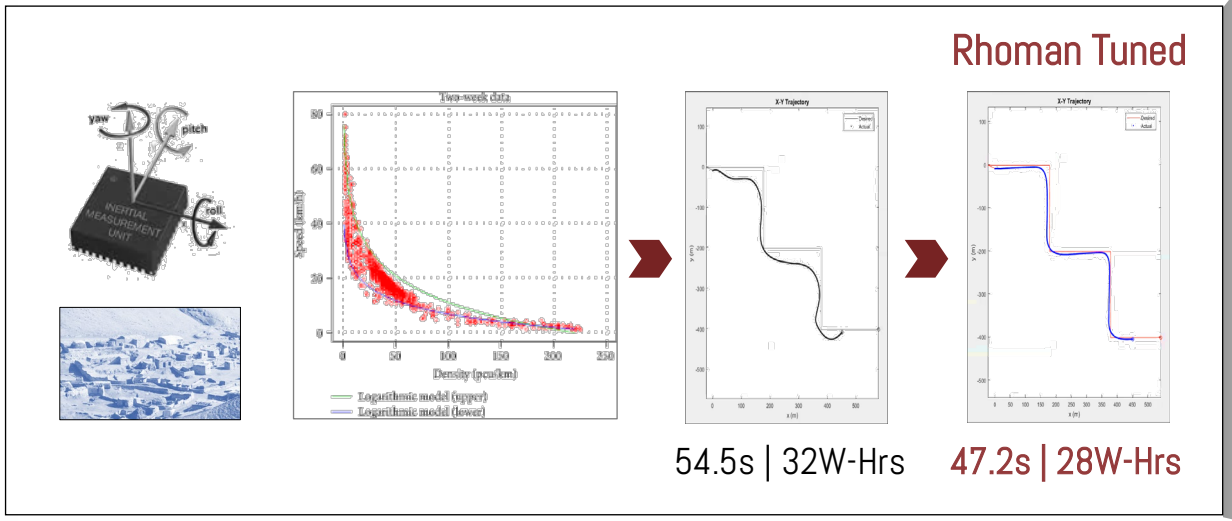
SCALE Safely

Magic | How it Works

Deep Learning
AI/ML Systems

Connect Drones to Cloud → **Deploy Adaptive Controls** → Store Performance Data in Cloud → Optimize controls for increased performance

Software Download



Calibrate flight data, sensors, control system and navigation

Reduce Dynamics Model v. Reality variance

Merge image & optical data

Deploy drone-drone interaction models

Improved Performance

Verified Safety

Complete Autonomy

PATENTS: Rhoman has 2 issued and 7 pending non-provisional patents around our technology, UAV control and UAV payloads

SaaS Business Model | Recurring & Scalable

License/Cloud Subscription

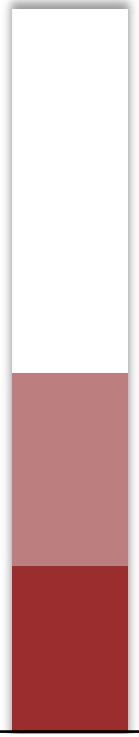
- Standard & Unique Drone Configurations
- Increase Performance
- Cloud Tuning
- Safety & Autonomy

$500-$3,000 annual
$100-$500 monthly/drone

**Optional NRE/Integration of $15k-$45k pending drone configuration*

Market | Rhoman Opportunity

2025



TAM $65B 30% CAGR
Unmanned Autonomous Robotic Vehicles

SAM $26B
Unmanned Autonomous Flight Vehicles (UAV)

SOM $157M
Rhoman ARR
Control systems for high-need and obtainable UAV customers

$74B Total Drone Spend 2020-2030

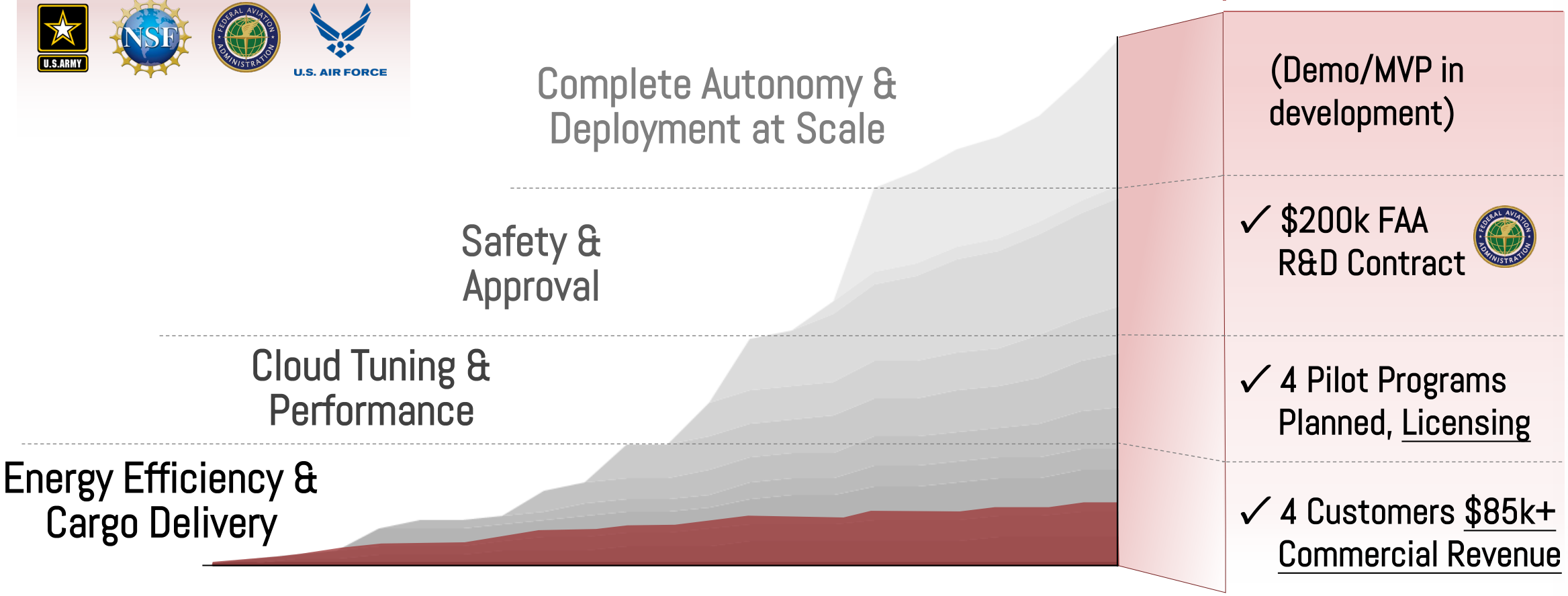
Go-to-Market & Traction

RHOMAN AEROSPACE

Gov & DoD Funding

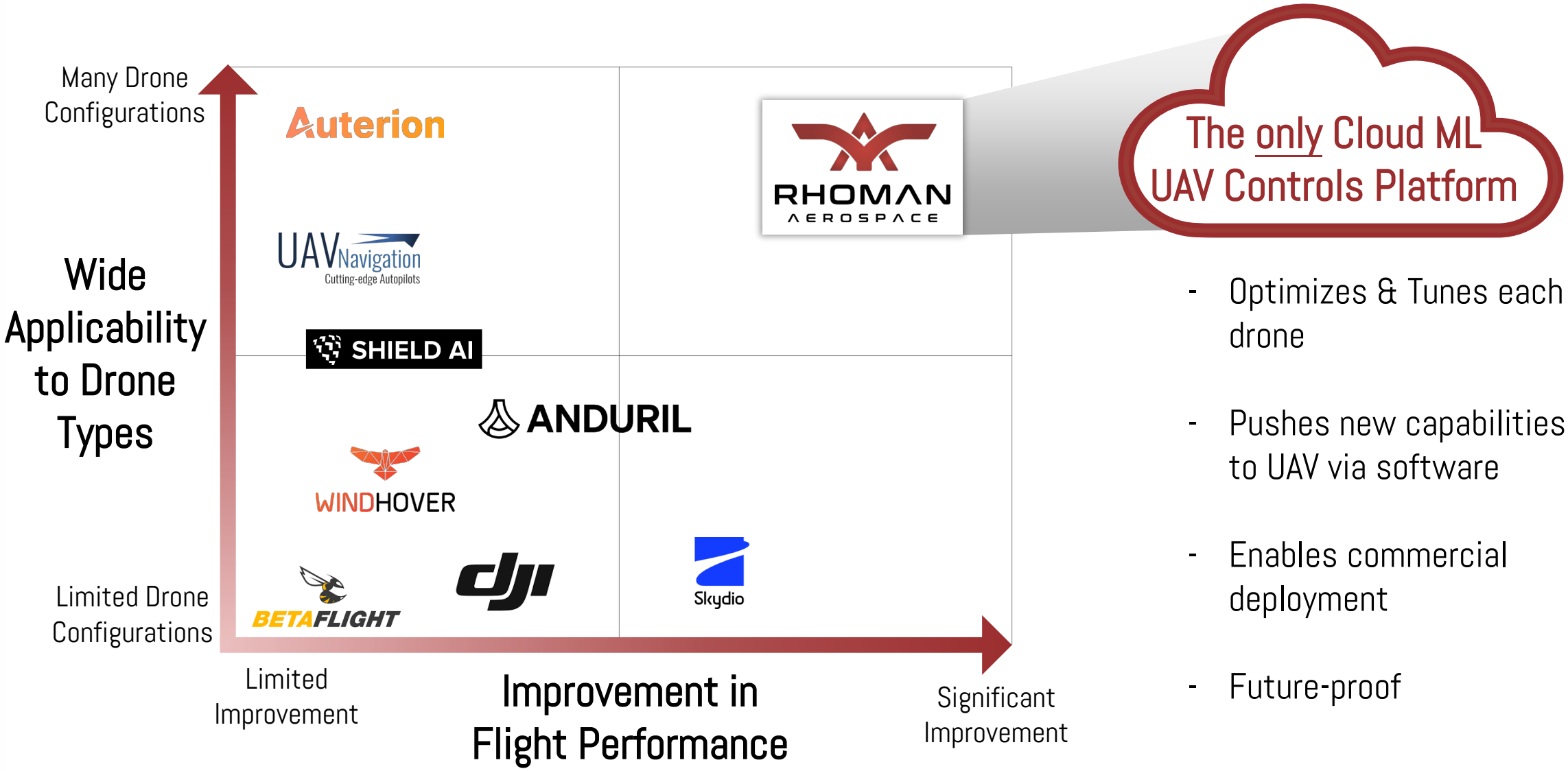
U.S.ARMY · NSF · FEDERAL AVIATION ADMINISTRATION · U.S. AIR FORCE

$390K Total Revenue



SOLVE PAIN POINTS → EXPAND SERVICES → AUTONOMY ECOSYSTEM & SUBSCRIPTION

Competition | Rhoman is Unique



The only Cloud ML UAV Controls Platform

- Optimizes & Tunes each drone
- Pushes new capabilities to UAV via software
- Enables commercial deployment
- Future-proof

Team | The Best in Autonomy & Controls

RHOMAN AEROSPACE

Thomas Youmans
Co-Founder & CEO
NASA Data Sci/Sys Eng
US Peace Corps

James Croughan
VP of Engineering
PhD Aerospace Eng., USC
BS Aerospace, UC Berkley

Pedram Safi
Head of Programming
M.S. CS, M.S. & B.S. MechE
Founder, Machine Analytics

Thomas Callen
Co-Founder & Advisor
Management Consultant
United Airlines

Dr. Aaron Ames
Adviser, Adaptive Cntrls
Caltech, World Leader
Adaptive Controls

James Henderson
COL, DoD Advisor
75th Innovation Command
CIO, Harris County, TX

Partners & Collaborators:

NSF · U.S. AIR FORCE · FEDERAL AVIATION ADMINISTRATION · STI · LACI · AFWERX · MC

Advisors & Affiliations:

U.S.ARMY · USC · NASA · Caltech · JPL

Investment | Path to Series A

Seeking Seed Round: $2.3M, 24 months

Seed:

2021 — 2022

Scalable Product

- Commercial Ready: Tethered Payload Software
- Commercial Ready: Cloud-based AI/ML Optimization Platform

Market & Customers

- Pilots: Marines, AirForce, Lockheed Martin
- Onboard 100 UAVs to the platform
- Strategic Partnership UAV Firm & Large Defense Firm

Expand Team

- Networks/Hybrid Cloud/Cyber Security
- DoD & Commercial Sales Lead

MILESTONES MET

- ✓ Scalable Product
- ✓ Traction & Commercial Scalability
- ✓ Series A Team

Series A: 2023

SCALE & Expand

- Scale Distribution
- FAA-Approved toll system
- Pilots with Tier 1 Aerospace

RHOMAN
AEROSPACE

APPENDIX:

Traction | Revenue & Contracts

RHOMAN AEROSPACE

Gov & DoD Funding

3 Pilots Rhoman Cloud
- Tune path planning with Rhoman Cloud (License)
- 2x Flight performance tuning with Rhoman Cloud (License)

4 Pilots Enhanced Performance
- Stability with hanging payload (License)
- Lower payloads to the ground from hover (License)
- More flight time (License)
- Adaptive controls to handle changing vehicle CG (License)

4 Customers Get to Market ASAP
- 3x Complex flight vehicles need to get off the ground (2 Licenses)
- CG systems and vehicle controls

MARKET TRACTION

(Demo/MVP in development)

✓ $200k FAA R&D Contract

✓ 4 Pilot Programs Planned, Licensing

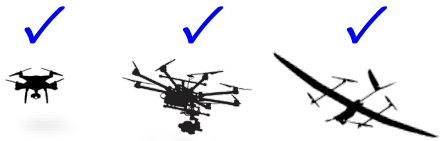
✓ 4 Customers $85k+ Commercial Revenue

$250K TOTAL REVENUE TO DATE | $200K ESTIMATE 2021 REVENUE

Benefits & Capabilities | Essential Solutions

Get Flying ASAP

DEPLOYMENT:
Rhoman Software Download

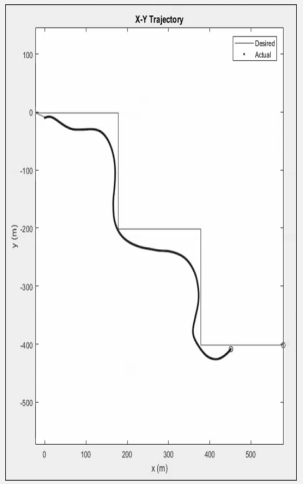


Drone Flies

Fits Multiple Configurations

Increased Capabilities

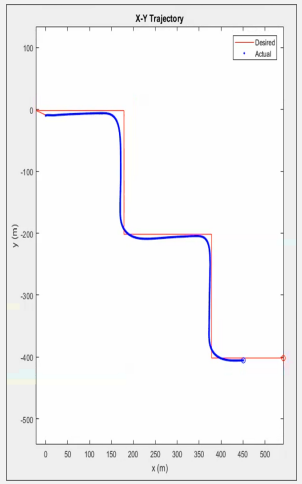
Competitor



Time: 54.5s
Energy: 32W-Hrs

- Slower
- More energy

Rhoman



Time: 47.2s
Energy: 28W-Hrs

- 15% Faster
- 15% Less energy

Heavy Lift UAV

Install Rhoman Software

Cargo Capabilities

Commercially Deploy ASAP

Tracks prior flights
Compares to Safety Models

✓ *Flight Approval*
✓ *Commercial Ops*

Safety Verification for Flight Approval

IP | Issued & Pending IP, Caltech Collaboration

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Key Enabling Control System Technology

Adaptive Flight Control Systems

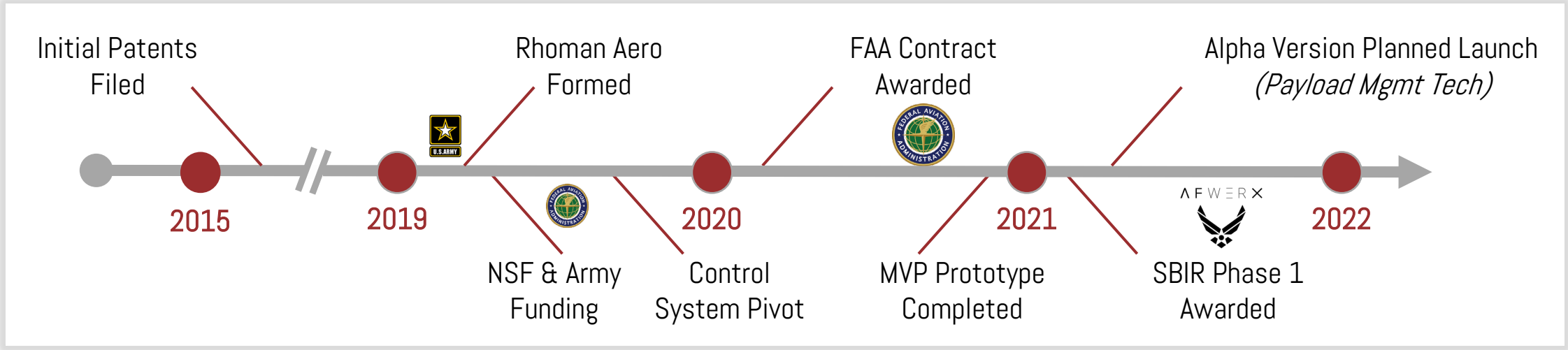
Proprietary, Patents en Route

- UAV Flight Controls with Stable Hanging Payload
- Adaptive Flight Controls for Power Efficiency
- Adaptive Flight Controls for Safety
- Adaptive Control Systems – augment robotic systems

	Type of Patent	Patent #	Title
Cloud-based AI/ML Control System			
Cloud Deployment System	Pending Provisional	#63196689	Cloud-based Flight Vehicle Control System
Autonomy in GPS Denied Environments	Pending Utility	#16/845,667	Method and Algorithm For Flight…in GPS denied environments…
Flight Enhancement Modules	Pending Utility	#16/837,902	Modular Apparatus, Design, Concept For Flight Vehicle…
Baseline Flight Vehicle Stability & Control			
Stability of UAV	Pending Utility	#16/270,478 #16/270,473	Control and Stabilization of a Flight Vehicle…
Center-of-Gravity & Payload Detection Systems	Issued Utility	#US 9,946,267 B2	Control and Stabilization of a Flight Vehicle…
	Issued Utility	#US 10,901,433 B2	Control and Stabilization of a Flight Vehicle…
	Pending Utility	#62/742,363 #62/827,863 #62/831,804	Apparatus For Detecting Tilt, Lean, Movement…

Development | Commercial & Gov Customers

Company Timeline:



PATENTS: Rhoman has 2 issued and 7 pending non-provisional patents around our technology, UAV control and UAV payloads

Why Now? | A Convergence of UAV Trends

Regulations

- Regulations for commercial UAVs are in flux
- Rhoman is working with FAA to aid in developing UAV & payload regulations

Technology

- UAV batteries, software, and electronic tech advancing at a rapid pace
- Decreasing cost of COTS software and hardware

Public Acceptance

- UAV use cases and mission profiles becoming ubiquitous
- UAV Ag. and Aerial surveying, data analytics, mapping, surveillance, etc.

Rhoman Solution

✓ Technical capability
✓ Regulatory safety
✓ Scalability

Impact | UAV Cargo Delivery

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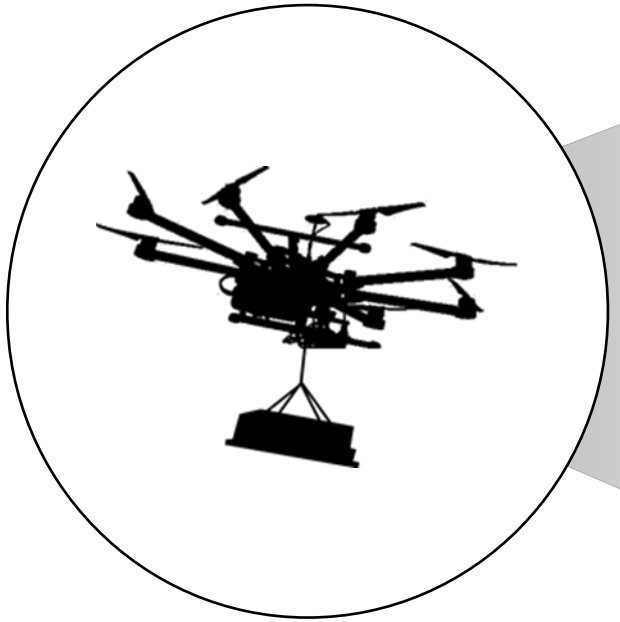
Add $300M+ to UAV Package Delivery Market

*Based on Amazon expected drone delivery market**



Flight Efficiency & Payload Deployment

- *Revenue* ***+$70M-$210M/yr****
- ***Save $270M*** *NRE**

Enhances Fixed-wing VTOL

- *Next wave of commercial drones*
- ***Double-digit growth***

Robust & Safer Autonomy

- ***30x reduction in*** *cost per mile*
- *Revenue* ***+$100M-$150M/yr****

**2030*

UAV Cargo Delivery | Saves $250M per Year

RHOMAN AEROSPACE

	Savings per year:	$70M & $270M				$155M			$180M & $270M			$210M		
	Baseline, 500M pckgs 2030, Price point $4.20/dlvry		Increased Efficiency, Shifting CG, Hanging Payloads			Increased Autonomy			Shifting CG, Hanging Payloads, Increased Autonomy			Increased flight time by 10% Increased deliveries by 10%		
Drone Package Delivery by 2030, Yearly Estimates	Delivery Metrics	Revenue/ Cost per Year	Rhoman Efficiencies	Revenue/ Cost per Year	**Savings per Year**	Rhoman Efficiencies	Revenue/ Cost per Year	**Savings per Year**	Rhoman Efficiencies	Revenue /Cost per Year	**Savings per Year**	Rhoman Efficiencies	Revenue /Cost per Year	**Added Revenue per Year**
Packages Delivered by Drone, 2030	500M	$2.1B										550M	$2.3B	**$210M**
Package Deliveries per Day	1,388,889	$5.3M										1,527,778		
Deliveries per Drone per Day	30											33		
Active Drones per Day	46,296		41,667						41,667			46,296		
Drones per Operator	9		9			15			15			9		
Operators per Day ($75k Annual)	5,556	$422M	4,630	$352M	**$69M**	3,086	$235M	**$155M**	2,778	$212M	**$178M**	5,144		
Hardware/Non-Recurring														
Total Delivery Drones, $10k/Drone	50,000	$500M	45,000	$450M	**$50M**				45,000	$450M	**$50M**			
Receiving Vessel Cost	$12,500													
Number of Receiving Vessels	175,000	$2.19B	157,500	$1.97B	**$219M**				157,500	$1.97B	**$219M**			

Shifting CG, Hanging Payloads: *5%-15% better flight efficiency reduces required drones to meet customer need, drop payloads in tight driveways*

Increased Autonomy: *Increased autonomous capabilities mean more drones per operator*

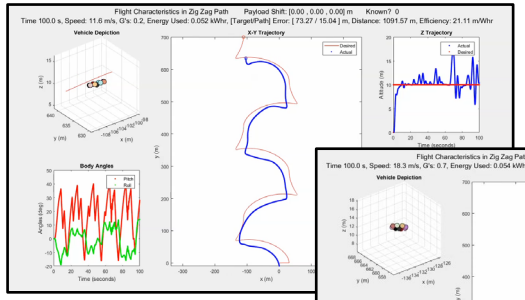
COMBINE, Shifting CG, Hanging Payloads & Increased Autonomy: *Fewer drones are needed and operators can handle more drones*

Shifting CG, Hanging Payloads: *5%-15% better flight efficiency enables 10% more customers with the same hardware capabilities*

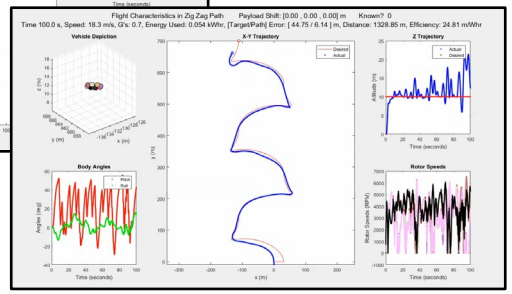
Sources: NASA & McKinsey Study, Ark Investments Study, IEEE The Economics of Drone Delivery, Guest Article, Deutsche Bank/Motley Fool

Solution | Rhoman Adaptive Flight Controls

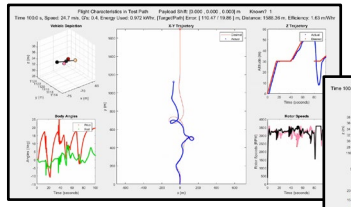
21.11 m/Whr



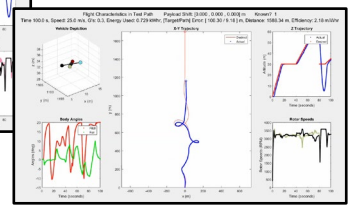
24.81 m/Whr



1.63 m/Whr



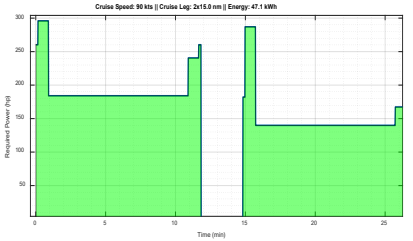
2.18 m/Whr

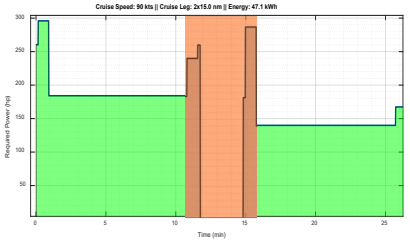


Including
key payload information and using our **unique turning methods** makes flight more efficient

Total Energy Saved: **10-30%**

Benefits of Hovering to Deploy Payload Instead of Landing





	Takeoff	Cruise	Land	Unload	Takeoff	Return	Land
Power Level (hP)	293	184	240	0	288	138	181
Total Power (hP) (Pwr*Time)	271	1845	223	0	266	1384	109
Energy Allocation (kWh)	6.6%	45.0%	5.4%	0.0%	6.5%	33.8%	2.7%
Energy Used (kWh)	3.1	21.2	2.6	0.0	3.1	15.9	1.2
Mins	0.93	10.05	0.93	2.78	0.93	10.05	0.60
%-Time	3.5%	38.3%	3.5%	10.6%	3.5%	38.3%	2.3%

Hover and Lower Payload

Hover-Power, Lower Payload	170	Conservative	
Time to Lower Payload	0.67	Conservative 40 second	
% of Total Energy (47 kWh)	2.8%		
kW Energy Used	1.31		

Energy Savings

% Energy Removed	6.6%	45.0%	5.4%	0.0%	6.5%	33.8%	2.7%
kWh Energy Removed	3.1	21.2	2.6	0.0	3.1	15.9	1.2
% Energy Added	0.0%	0.0%	0.0%	2.8%	0.0%	0.0%	0.0%
kW Energy Added	0.0	0.0	0.0	1.31	0.0	0.0	0.0
Total Energy Saved			**4.3 kWh,**	**9.2%**			