अर्धन: *Labs*

Ardhan: *Labs*

Bringing Collaborative Autonomy

Investor Presentation

March 2023

At A Glance

Ardhan: *Labs*

Company Overview

Founded in 2022, Ardhan Labs is an Aerospace & Defence Start Up with focus on bringing autonomous AI-driven system to the frontline. Our Goal is to create truly innovative, 'Make In India' AI driven Infrastructure independent solutions.

Dehradun

Dharamsala

Team

Vaibhav Bhatnagar

Sales, Marketing & Business Dev.

- 13+ Years Experience
- Ex-Symphony Teleca
- VIT University, Vellore

Arunabh Ghosh

Software & Product Management

- 19 Years Experience
- Ex-Siemens
- Harcourt Butler, Kanpur

Elevator Pitch

Improve Detection, Tracking and Striking capabilities with **Autonomous Platforms** that reduce cognitive load and optimize on-ground decision-making allowing for efficient resource deployment and outcomes.

Problem

Cheap Drones are used to facilitate Cross border infiltration, Weapons & Narcotics Smuggling & Infrastructure Surveillance.

In a report by India Millitary Review and the Tribune, over 250 drone incursions were recorded and of these 95% have been able to safely travel back across the border after performing their tasks, a large majority of these drones are operated directly by Border Protection Agencies of the neighboring countries.

Despite having **high-end detection equipments**, border and infrastructure protection agencies are unable to intercept majority of these threats. Main pain points for the Indian Border Protection Agencies are:

- Lack of Trained Resources.
- Extensive Training Time.
- Technical understanding required for current systems.

Insufficient Anti-Drone Systems Giving Tough Time to BSF on Indo-Pak Border, Advantage to Enemy

• By: Ankur Sharma • News18.com • Last Updated: JUNE 24, 2022, 08:51 IST

The BSF DG had earlier said small Chinese-made drones, carrying narcotics in 95% of cases, are flying from across the border into Punjab and Jammu, and these flights are a 'cause of concern' for which technology solutions are being scouted actively. (Representational Image)

The documents accessed by News18 revealed that current systems have a limited range, and sometimes miss movements or suspicious objects. They have to be placed in the right direction with an accurate angle to work efficiently

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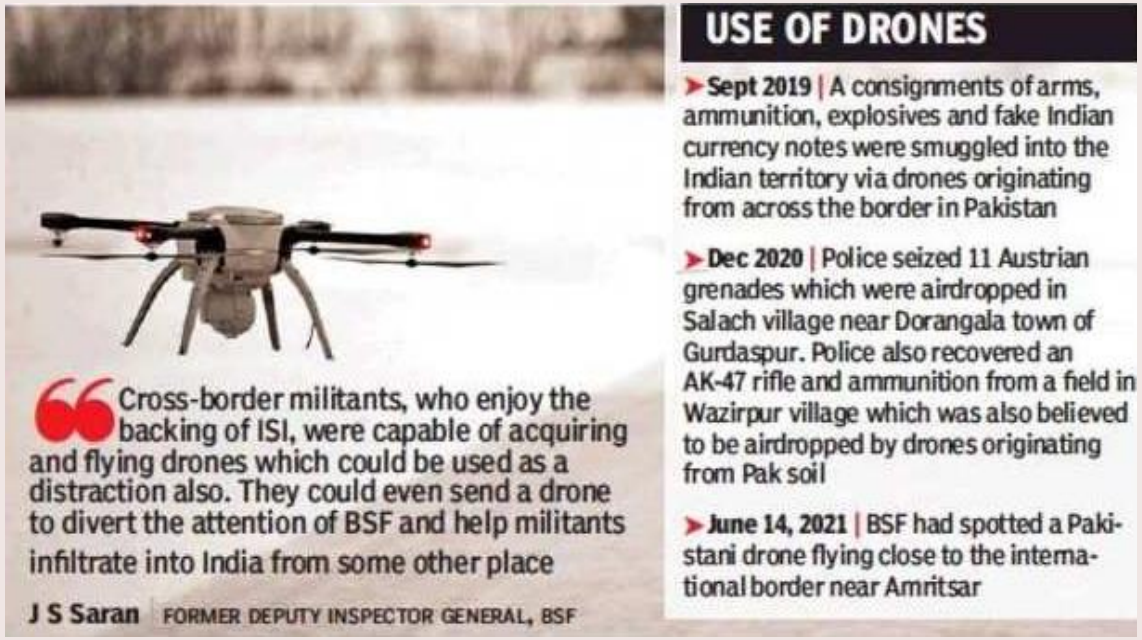


Cross-border militants, who enjoy the backing of ISI, were capable of acquiring and flying drones which could be used as a distraction also. They could even send a drone to divert the attention of BSF and help militants infiltrate into India from some other place

J S Saran FORMER DEPUTY INSPECTOR GENERAL, BSF

USE OF DRONES

➤ **Sept 2019** | A consignments of arms, ammunition, explosives and fake Indian currency notes were smuggled into the Indian territory via drones originating from across the border in Pakistan

➤ **Dec 2020** | Police seized 11 Austrian grenades which were airdropped in Salach village near Dorangala town of Gurdaspur. Police also recovered an AK-47 rifle and ammunition from a field in Wazirpur village which was also believed to be airdropped by drones originating from Pak soil

➤ **June 14, 2021** | BSF had spotted a Pakistani drone flying close to the international border near Amritsar

Opportunity

Government enabling Creation of Drone ecosystem

with '**Drone Shakti**', concessions and PLI Schemes in the **Budget 2022**

Source: Hobitech

Solutions

Autonomous Platforms with a powerful ***AI Core***

for optimized decision-making, faster response time and precision targeting.

Counter Drone UAS

Seek & Destroy Counter UAS

- Detection Antenna
- On-board Radar
- On-board Compute
- Kinetic Defeat
- In-built illuminator

Loitering Munitions

Loitering Munition

- Backpackable
- ISR Capability
- Strike Off & Re-commit Capability
- Swappable Payload
- Pneumatic Launch

Modular ISR Drones

Autonomous Modular ISR Drone

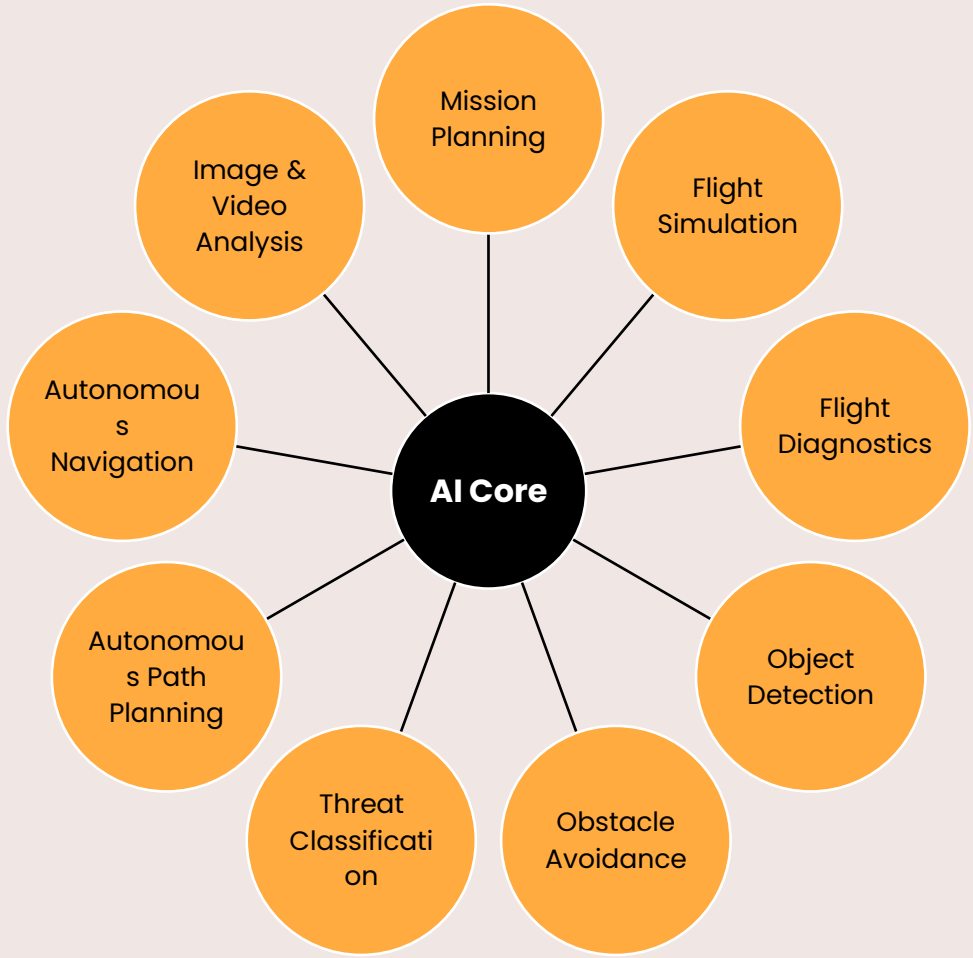
- Multi-domain Ops
- Tool Less Assembly
- Rapidly Deployable
- Networked Payload Bays
- Modular Payloads

Persistent Perimeter

Persistent Perimeter Protection

- Rapidly Deployable
- Infrastructure Independent
- Long Range Radar & HD Camara
- Object Detection
- All Domain Capable

+



Immediate Focus

Planned Products

Solutions

Why Autonomous Systems?

There has been a rapid transition from traditional conventional system that extensively relied on human inputs to Smart IoT based systems that were able to reduce human workloads. Today these systems are becoming obsolete with new age Autonomous Systems that bring collaborative autonomy for improved surveillance, detection, tracking, precision targeting and much more. Here we trace the transition from Conventional to Autonomous Systems and how the technology is shaping the frontlines.

Conventional Systems

- Inaccurate & Ineffective
- Low Training Costs
- Low Procurement Cost
- Low Physical Footprint
- No Customization Scope
- Standard Technology

Smart Systems

- Accurate Detection
- Higher Training Cost
- High Procurement Cost
- High Implementation Cost
- Limited Customization Scope
- Outdated Technology

Autonomous Platforms

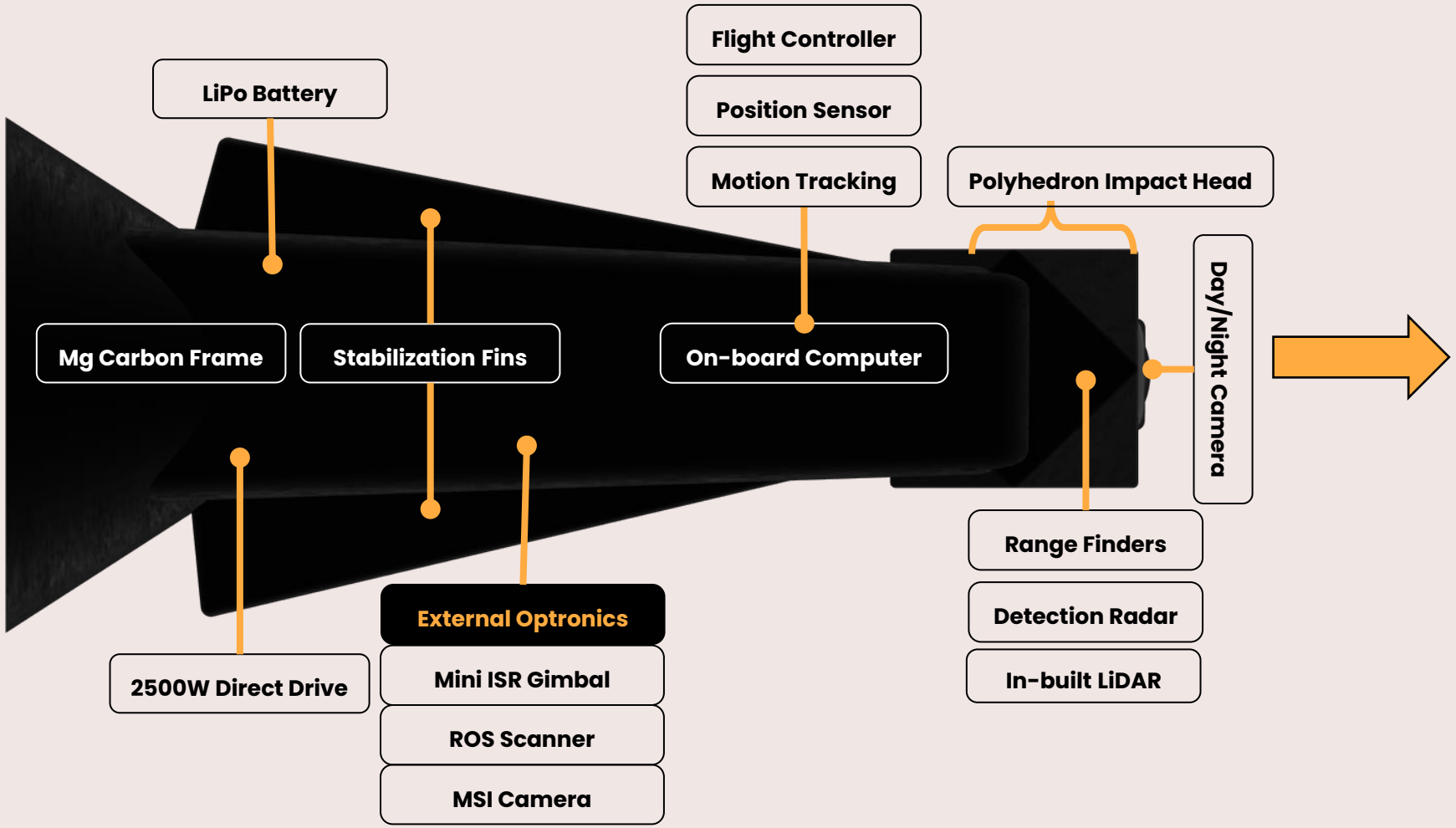
- Reduced Cognitive Load
- Low Training Costs
- Low Procurement Costs
- No or Minimal Human Inputs
- Negligible Footprint
- Embedded AI w/ Deep Learning

Autonomous VTOL c UAS

Vajra

Seek & Destroy counter UAS drone with Autonomous Intrusion Detection & Interception capabilities.

Base Weight: 4.5Kgs | **Dimensions:** 1.6ft x 1.3ft x 1.2ft | **Flight Time:** 140min | **Link Range:** 20 Kms | **Max Speed:** 120kms



RudraOS

Unified Command & Control System.

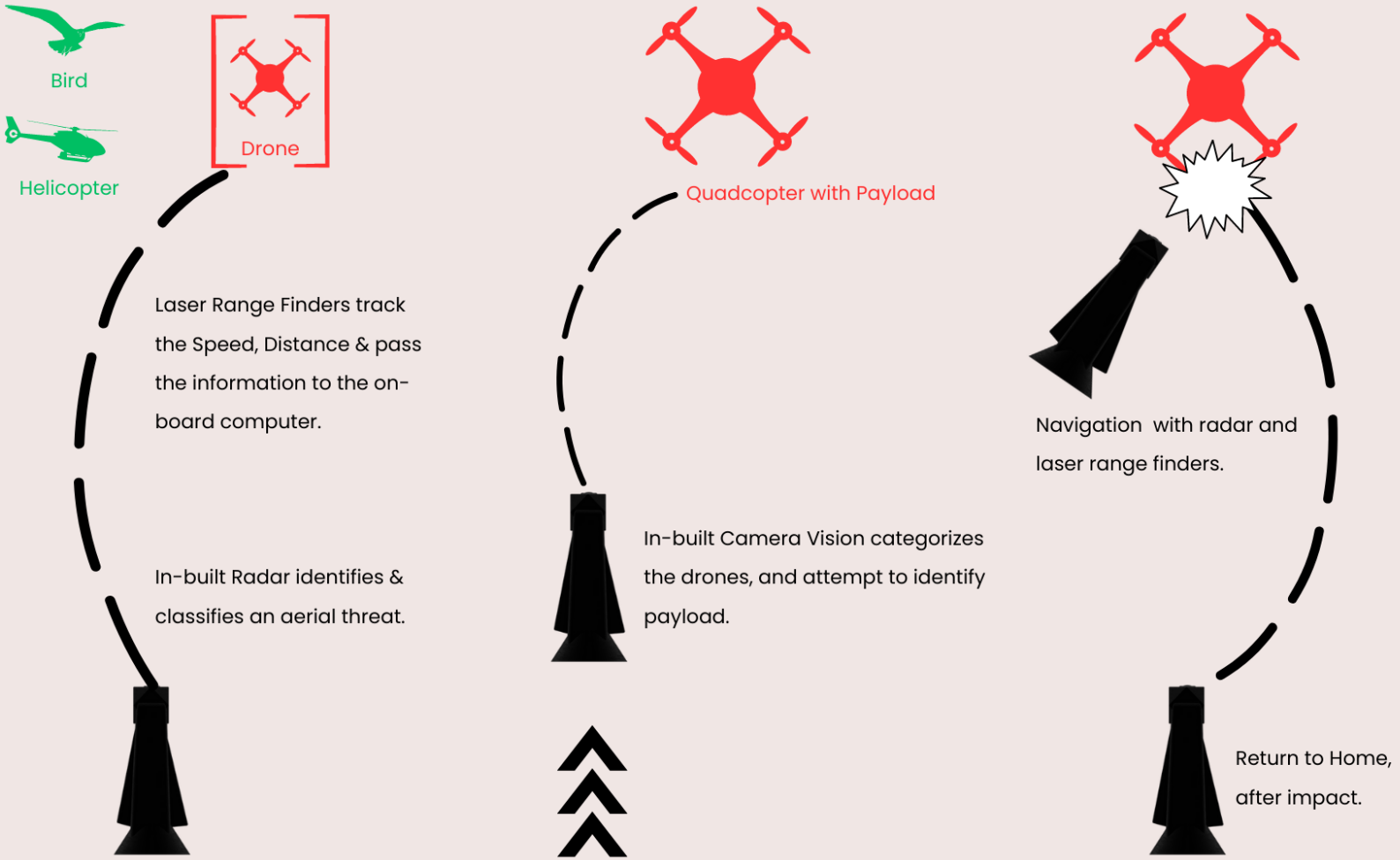
Parse data from multiple sources into a single Unified command-and-control system with simplified on-boarding.

- Onboarding
- Flight Diagnostics
- Telematics & Payloads
- Media Analysis

Vajra

Counter Intrusion Detection, Tracking & Interception

Use Cases

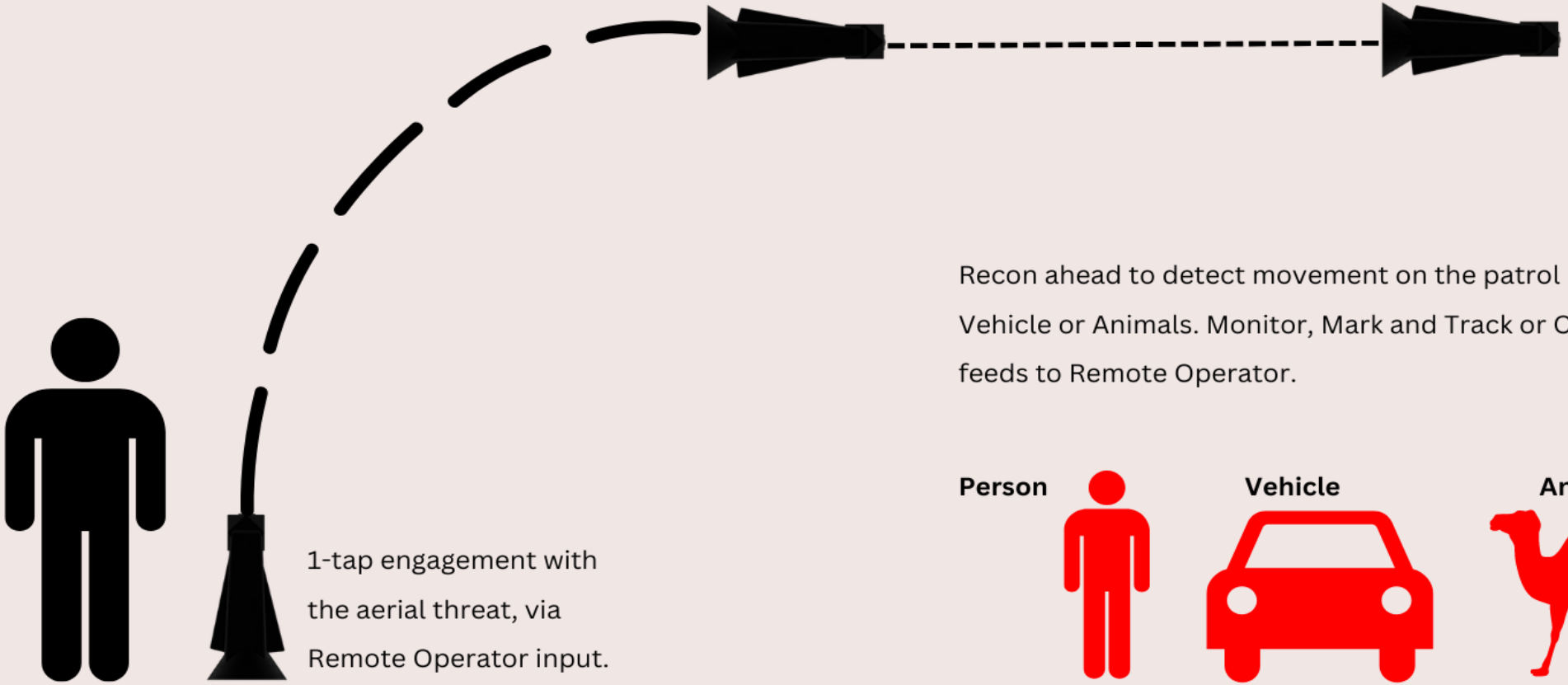


Vajra

Short Range Reconnaissance and Threat Detection during Patrolling

Use Cases

Drone Detected.



Autonomous Return to home, once patrolling route has been covered

Recon ahead to detect movement on the patrol route. Classify objects as People, Vehicle or Animals. Monitor, Mark and Track or Clear threat remotely with live feeds to Remote Operator.

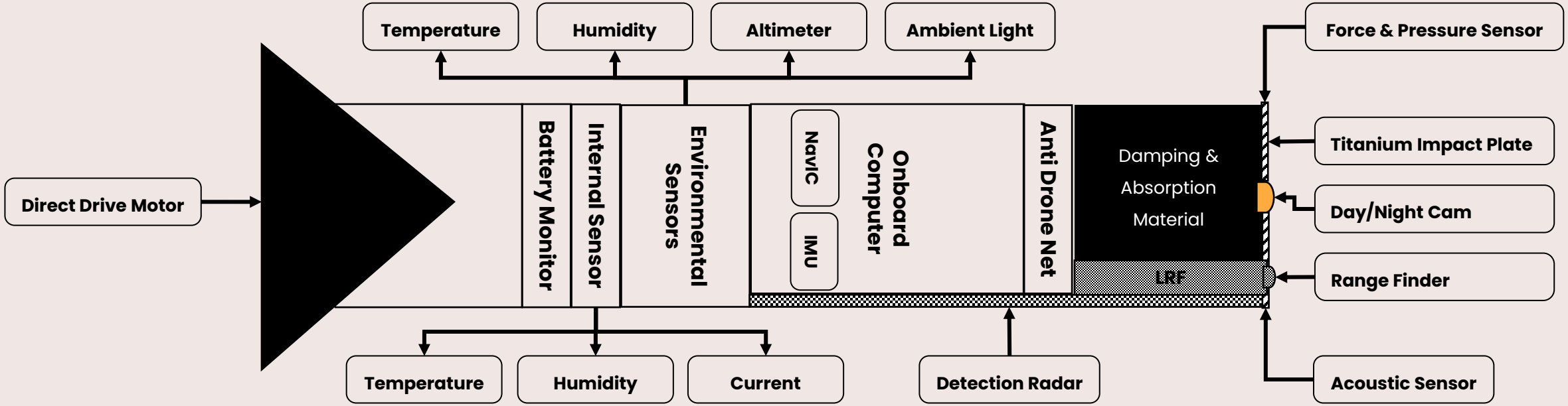
Person

Vehicle

Animal

1-tap engagement with the aerial threat, via Remote Operator input.

Schematics



Data Acquisition + Processing using SensorFusion with Kalman Filter and CNN

NVIDIA CUDA · C++ · Python · NixOS

RudraOS: Command & Control System for Drones

React · TypeScript · aws

Unique Value Proposition

01

Autonomous Vertical Take Off & Landing.

02

All Domain Threat Detection with In-built Radar

03

Autonomous Navigation with Patrolling Mode.

04

Kinetic Energy to defeat Group 1 & Group 2 Threats.

05

1-tap 3D Mapping of Critical Infrastructure.

06

Intelligent Teaming for Mission Continuity.

07

On-board Data Processing for Low Radio Signature.

08

Infra Independent with In-built Solar Charging.

Market Information

Millitary Drone Market

Global Drone Market was around $22 Billion in 2020 and estimated to reach ~$43Billion by 2025[1] at CAGR of 13.8%. Nearly 53% of this growth is expected in the Asia-pacific (APAC) region, estimated to grow from $8.62 Billion in 2020 to $17.89 Billion by 2025. Within the APAC, the Indian market is one of the fastest growing markets at $900 million in 2022 and is expected to grow at a CAGR of 14.5% Y-o-Y.

~$45Billion TAM by 2025

Loitering Munitions	ISR Drones	Counter Drone
~$2.0 Billion [2]	$30 Billion [3]	$12.6 Billion [4]

1. THE DRONE MARKET SIZE 2020-2025: 5 KEY TAKEAWAYS
2. The Business Research Company: Precision Guided Munitions
3. iMarc Group: Airborne ISR Global Industry Trends
4. Precedence Research: Anti-Drone Market Trends

Market Trends for Unmanned Aerial System over the next 10 Years.

Huge Demand

$82Billion+

In sales over the next 10 Years

$43Billion

Global Market Size by 2025

13.8%

CAGR from 2020-2025

Fastest Growing Markets

China: $9 Billion

India: $3.5Billion

Oceania: $8 Billion

Europe: $12 Billion

Export Growth

US & Israel

Continue export dominance

APAC

Emerging as one of the fastest growing market.

India

Emerging as one of the fastest growing market in the APAC.

Revenue – India ~3 to 5 Years

30%	Homeland Security
20%	Agriculture
20%	Infrastructure
5%	Rural & Urban Management
5%	Mining
5%	Cinematography
15%	Others

Competition

Indian-made

Foreign Made

Expensive

Affordable

adani Defence and Aerospace

TATA ADVANCED SYSTEMS

Elbit Systems

LOCKHEED MARTIN

Ardhan: *Labs*

Garuda aerospace

ZAS

NewSpace RESEARCH & TECHNOLOGIES

ideaForge Create. Inspire

ANDURIL

AeroVironment PROCEED WITH CERTAINTY

Business & Financial Projections

5 Year Projections for the Product Portfolio

Marketing & Sales

Capital Ask

Current Status: Bootstrapped

- **Pre-Seed:** Rs. 15 to 20 Lakhs (Micro VCs or Grants) for Prototyping & MVP with 8 Months Runway.
- **Seed:** Rs. 1.5 to 1.7 Crore (Equity or Convertible Note) for Commercialization with 18 to 24 months Runway.

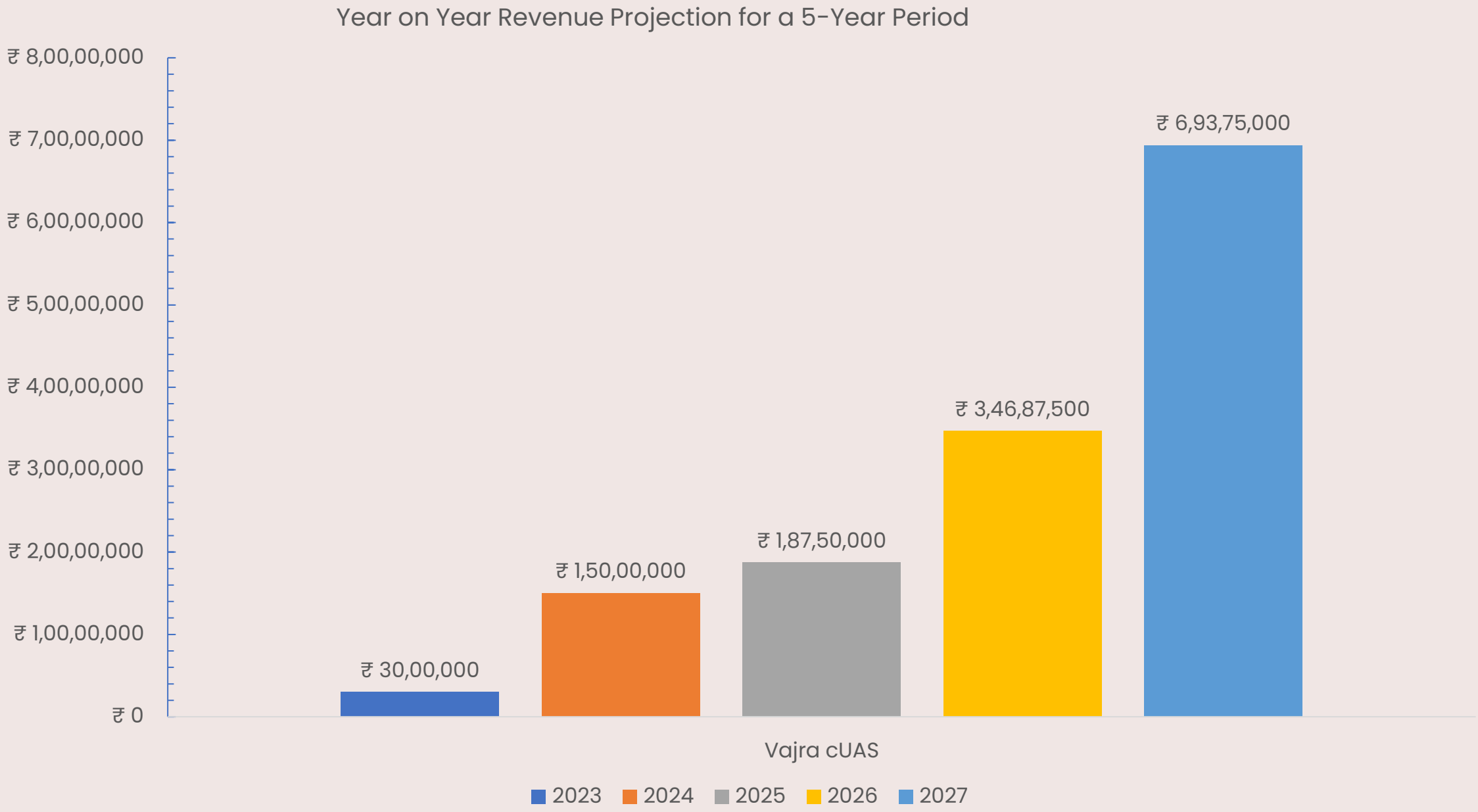
Income Statement

Revenue		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
	INR	**0**	**30,00,000**	**1,50,00,000**	**1,87,50,000**	**3,46,87,500**	**6,93,75,000**
Vajra cUAS	INR	0	30,00,000	1,50,00,000	1,87,50,000	3,46,87,500	6,93,75,000

Cost of Goods Sold		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Raw Materials	**INR**						
Raw Material Costs	INR	89,750	89,750	89,750	89,750	89,750	89,750
Labor Cost	INR	4,091	4,500	4,950	5,445	5,990	6,588
Packaging	INR	2,500	2,500	2,500	2,500	2,500	2,500
Shipping & Logistics	INR	5,000	5,000	5,000	5,000	5,000	5,000
Manufacturing Cost by Unit	INR	1,01,341	1,01,750	1,02,200	1,02,695	1,03,240	1,03,838
COGS	INR	0	10,17,500	51,10,000	64,18,438	1,19,37,067	2,40,12,642
Gross Profit	**INR**	**0**	**19,82,500**	**98,90,000**	**1,23,31,563**	**2,27,50,433**	**4,53,62,358**
Gross margin	***%***	***#DIV/0!***	***66%***	***66%***	***66%***	***66%***	***65%***

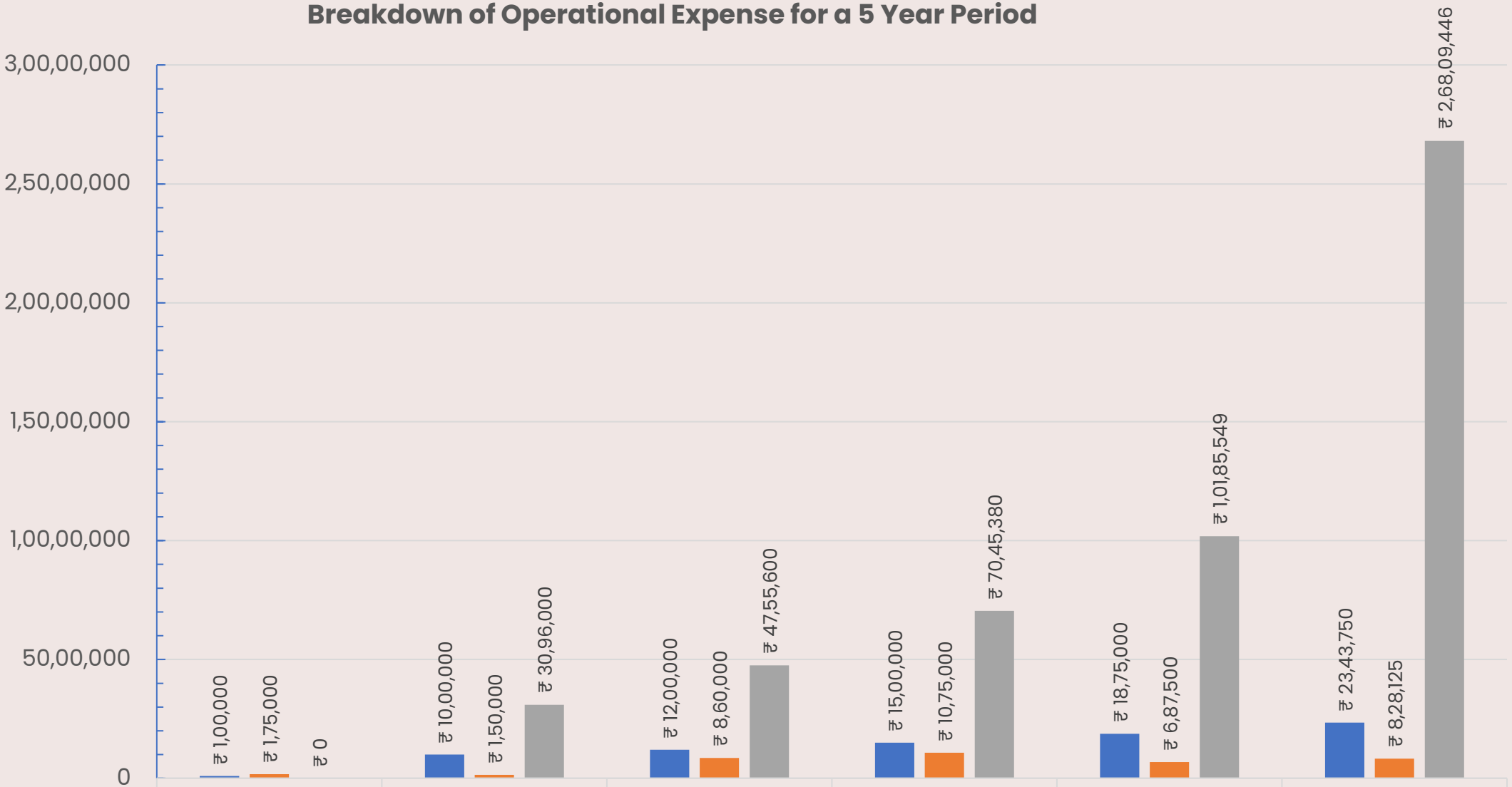
Operating Expense		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Selling & Distribution		**1,00,000**	**10,00,000**	**12,00,000**	**15,00,000**	**18,75,000**	**23,43,750**
Events & Expos	INR	1,00,000	7,00,000	8,40,000	10,50,000	13,12,500	16,40,625
Marketing Agency	INR	0	3,00,000	3,60,000	4,50,000	5,62,500	7,03,125
General & Administrative	**INR**	**1,75,000**	**1,50,000**	**9,10,000**	**11,37,500**	**7,65,625**	**9,25,781**
Rentals	INR	0	0	5,00,000	6,25,000	1,25,000	1,25,000
Utilities	INR	0	0	1,80,000	2,25,000	2,81,250	3,51,563
Travel & Transportation	INR	1,50,000	1,50,000	1,80,000	2,25,000	2,81,250	3,51,563
#REF!	INR	0	0	50,000	62,500	78,125	97,656
Licenses	INR	25,000	75,000	90,000	1,12,500	1,40,625	1,75,781
Wages & Salaries	**INR**	**0**	**30,96,000**	**47,55,600**	**70,45,380**	**1,01,85,549**	**2,68,09,446**
	INR	**2,75,000**	**42,46,000**	**68,65,600**	**96,82,880**	**1,28,26,174**	**3,00,78,978**

Revenue Projections



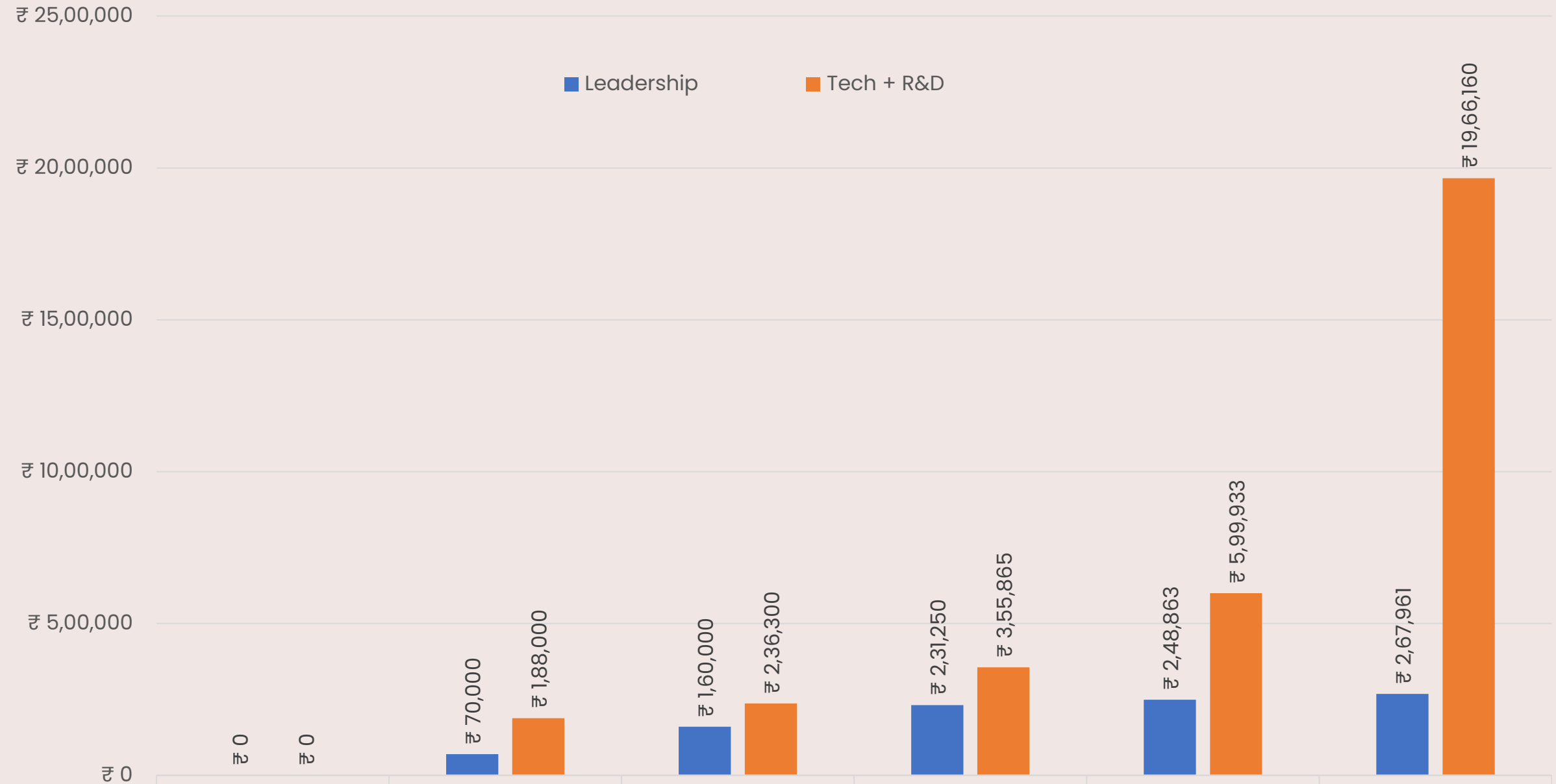
OPEX Projections

Breakdown of Operational Expense for a 5 Year Period



	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Selling & Distribution	₹ 1,00,000	₹ 10,00,000	₹ 12,00,000	₹ 15,00,000	₹ 18,75,000	₹ 23,43,750
General & Administration	₹ 1,75,000	₹ 1,50,000	₹ 8,60,000	₹ 10,75,000	₹ 6,87,500	₹ 8,28,125
Wages & Salaries	₹ 0	₹ 30,96,000	₹ 47,55,600	₹ 70,45,380	₹ 1,01,85,549	₹ 2,68,09,446

Payroll Projections



	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Leadership	₹ 0	₹ 70,000	₹ 1,60,000	₹ 2,31,250	₹ 2,48,863	₹ 2,67,961
Tech + R&D	₹ 0	₹ 1,88,000	₹ 2,36,300	₹ 3,55,865	₹ 5,99,933	₹ 19,66,160

THANK YOU.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Future Roadmap

Planned Products

2025

Vel 'Swappable' LMs.
Pinaka Surveillance UAS

2026

Ajana Autonomous IDS
Netra800 EO/IR Day/Night

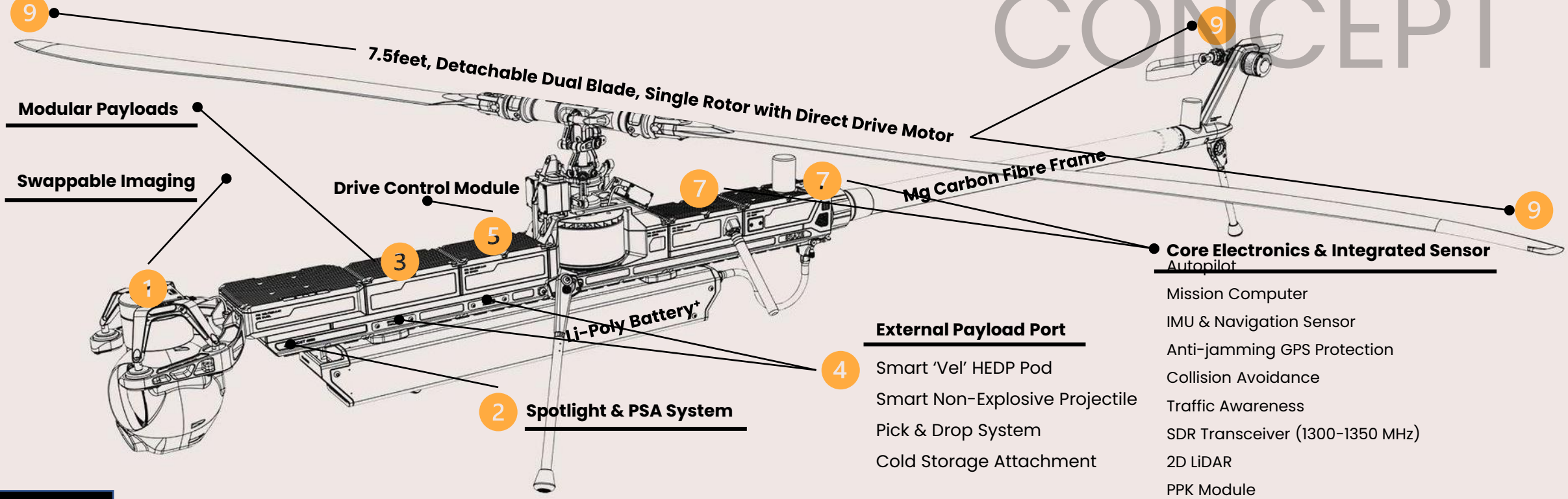
2027

Rudra Open & Extensible OS for Millitary.

Varuna Surveillance UAS

Autonomous Multi-role Surveillance UAS

Base Wt: 18 Kgs	**Altitude:** 12,000ft.	**Range:** 25 Kms LOS	**Wind Tol.:** 40 Knots		
Tool-less Assembly	Backpackable	8.4 x 2.2 x 1.9 ft	**P/L Capacity:** 21kg	**Duration:** 140 mins	**Temp:** -40* to 45*C	**Battery:** Li Poly*
On-board Data Processing	SWARM Enabled				



External Payload Port

- Smart 'Vel' HEDP Pod
- Smart Non-Explosive Projectile
- Pick & Drop System
- Cold Storage Attachment

Core Electronics & Integrated Sensor

- Autopilot
- Mission Computer
- IMU & Navigation Sensor
- Anti-jamming GPS Protection
- Collision Avoidance
- Traffic Awareness
- SDR Transceiver (1300-1350 MHz)
- 2D LiDAR
- PPK Module

Uses

- Armed Forces
- Law Enforcement
- Search & Rescue
- Disaster Response
- Survey & Mapping
- Wildlife Monitoring
- Agriculture

Modular Networked 'Swappable' Payloads

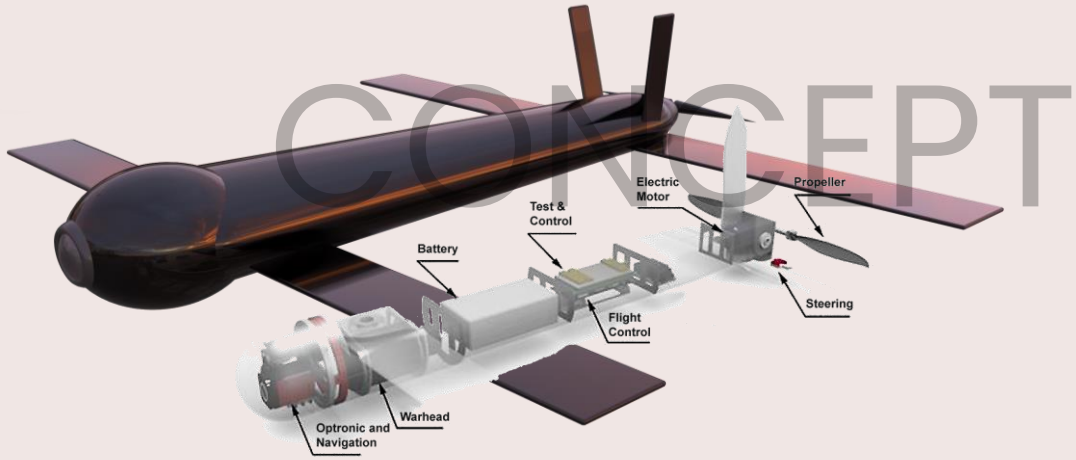
Imaging	EW Suite	DR Suite	SLAM
EO with Designator	DF Antenna	Gas Detection	Tracking Camera
Thermal Camera	IMSI Catcher	Cell Geolocation	3D LiDAR Dome
MSI Camera	U/VHF Geolocation		

Loitering Munition

Vel 1.0

Autonomous Loitering Munitions

Vel TMS is a backpackable, rapidly deployable, ‘switch-wing’ loitering ammunition, designed to support conventional and special operations forces in the field or from fixed defensive positions. All electric operations creates extremely small visual, thermal and acoustic signature making Vel ideal for precision strikes again BLOS targets. Vel TMS can be launched from a man-portable launcher, air or marine vehicle or a multi-pack.



Key Features

- **Rapidly Deployable**
- **All Electric**
- **1-Man Operation**
- **Multi-domain Ops**
- **Bag packable**
- **Intelligent Teaming**
- **Anti-personnel**
- **Anti-Armor**
- **Strike Off Capability**
- **Swappable Payload**

Specification

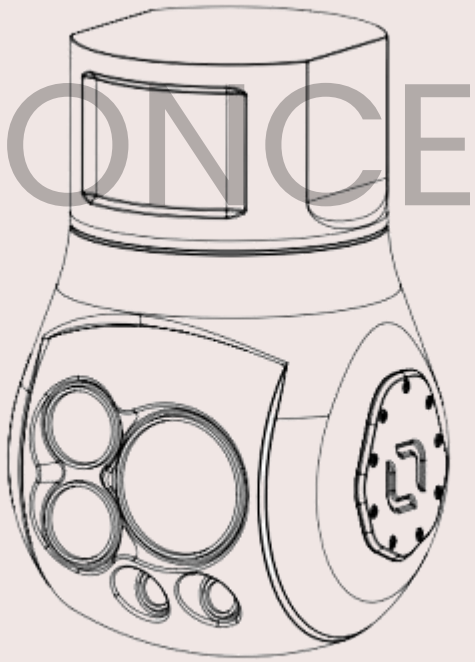
- **Range:** 15kms
- **Weight:** 3 Kgs
- **Endurance:** 20mins
- **Cruise Speed:** 100k
- **Dash Speed:** 125k
- **Dive Speed:** 150k
- **Diameter:** 2in
- **Cam.:** 12MP CMOS
- **Microbolo:** 640x480
- **Altitude:** 600ft
- **Encryption:** AES256
- **P/L:** 40mm HEDP
- **Targeting:** GPS, Image & Video
- **Launch:** Pneumatic & Multipack

Electro Optical Systems

Netra800

EO/IR Optical Payload for ISR & Tactical Ops

Ajana800 is a miniature MEMS Gyro stabilized payload offering high level stabilization and day/night operations capability for tactical UAVs and Loitering Munitions. Ajana800 is MEMS Gyro stabilized payload equipped with Full HD Day Camera and Thermal Camera utilizing an uncooled microbolometer for day/night surveillance, ultra-fast panoramic photography and target geo-location. Laser Rangefinder, Illuminator and Pointers allow greater functionality, improved ISR capabilities and precise targeting.



Product Specs.

Size: 4in	**Base Wt:** 2.5 Kgs	**Stabilize:** MEMS Gyro
Camera: HD1080p	**FOV:** 3.3* to 59*	**PAN:** n x 360*
Tilt: +20*	**Detector:** microbolo	**IR Range:** 3-5micron
A/ Vel: 150*/sec	**Comms:** RS485	**Ops Voltage:** 9-13V
Illum.: Class 3B	**Rangefinder:** Class 1	**Designator:** Class 4
Mapping: PPK	**Modelling:** LiDAR	**Imaging:** MSI Cam

Autonomous IDS

Ajana

Autonomous, Rapidly Deployable Security Network

Ajana is an autonomous, persistent awareness system that helps detect, track and classify objects across Sea, Land & Air. With an AI-enabled edge processing, continuous 360* pan/tilt, a variety of radars and sensors, Ajana can bring increased security to borders, military bases, oil and gas pipelines, airports and other critical infrastructure. Ajana can be deployed in extreme environments and for long range monitoring.

Key Features

- **Rapid Assembly**
- **Powerful Cameras**
- **Night Vision System**
- **Long Range Radar**
- **Solar Powered**
- **Infra Independent**
- **Customizable**
- **AI on Edge**
- **All Domain Capable**

Detection Ranges

- **Footprint:** 30ft x 30ft
- **Person Detection:** 4kms
- **Vehicle Detection:** 6 kms
- **Boat:** 5 kms
- **Aerial Threats:** 3 to 10 kms

Uses

- **Intrusion Detection**
- **Drone Detection**
- **Infra Security**

Image for Reference