AADYAH Aerospace

Apr 2020

Engineering INTELLIGENCE for Computer Vision, Communication and Motion Control

Our DNA is SPACE

Shaju Stephen
Chairman & Managing Director
shaju.stephen@aadyah.com

AADYAH AEROSPACE

CERTIFIED AS 9100

AS 9100 D certified Deep Tech Aerospace Company

- We are a **Deep Tech** company engaged in **Design to Manufacture** of mission critical, scalable **computer vision, communication and motion control** systems in a Space grade Engineering, Integration & Test facility in Bangalore, India for the **global market**
- Bring over 300 man-years of expertise in Space and Aerospace: pioneers in design and development of control systems of launch vehicles of ISRO
- Set up in 2016, with an investment till date of INR 20 crores

We engineer INTELLIGENCE for computer vision, communication & motion control for unmanned platforms

CERTIFIED AS 9100

SENSE — Optics

PROCESS — Electronics, Embedded

COMMUNICATE — RF, Microwave, IR, Laser

ACTUATE — Mechanical

Unmanned Platforms

Manned Platforms

Our Services for Global Clients

- Design
- Engineer
- Design to Manufacture

AADYAH AEROSPACE

Unmanned technology…growing at breath-taking pace

Product Development lifecycle is multi-vendor:

Design, Engineering, Rapid prototyping, Production

Solution

Customer Pain #1 → One-stop shop for the Product Life Cycle

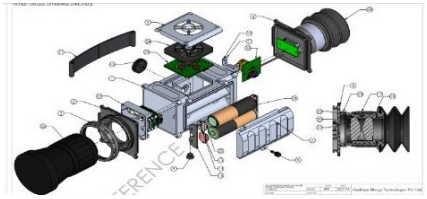
- Coordination & Communication
- Resources
- Time
- Cost

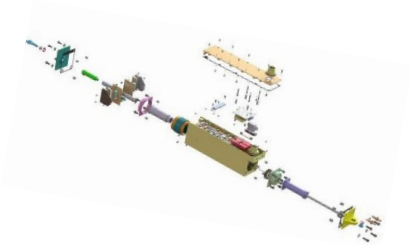
AADYAH AEROSPACE

Customer Pain #2 → Multi-disciplinary engineering under one roof

Product Engineering lifecycle is multi-disciplinary:

Mechanical, Electronics, Embedded Software, Optics



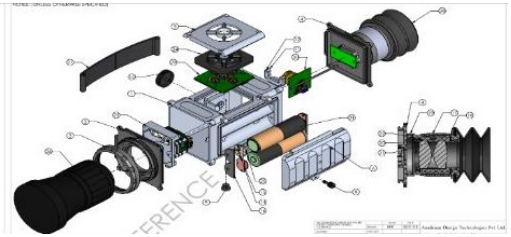


AADYAH AEROSPACE

AADYAH's Technology Offering

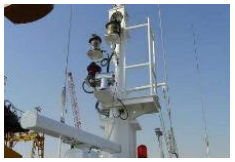
Computer Vision

- Seeks to automate tasks that the human visual system can do
- Interdisciplinary scientific field that deals with how computers can be made to gain high-level understanding from digital images or videos



Day/Night Monocular Binocular

Thermal Imager for Automotive /Surveillance

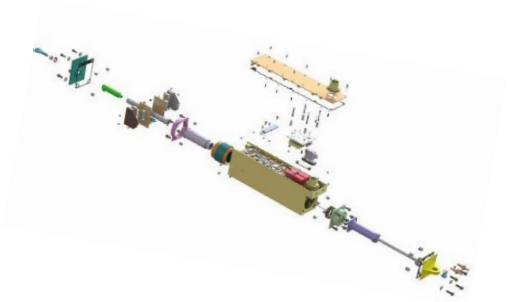


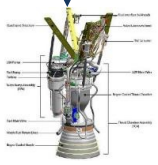
Marine Mounted Thermal Image Camera- Navy/Coast Guard

Airborne Electro Optic / Infrared Payload

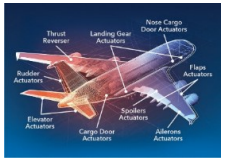
Motion Control

- Motion control is a sub-field of automation, sub-systems involved in moving parts of machines in a controlled manner
- The focus of motion control is the special control technology of motion systems with electric actuators such as dc/ac servo motors.



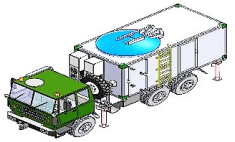


Thrust Vector Control (TVC) Actuator - Space Launch Vehicles (Rockets)



Aircraft Primary, Secondary and Tertiary Controls - Aircrafts

Solar Array Antenna tracker - Satellites



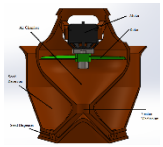
EMA Jack - Radar Truck Platform

AADYAH AEROSPACE

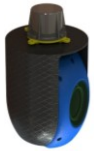
Pivoting to 2 core sectors: Small Satellites, Drones

Agri Payload Control Unit

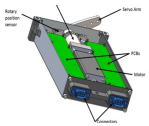
Atomizer



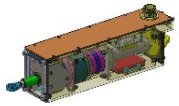
Seed Dispenser



Optical Payload

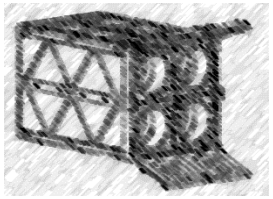


Rotary Actuator

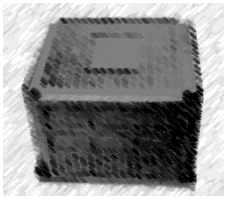


Linear Actuator

SENSE	Computer Vision	PROCESS	Motion Control	ACTUATE
Optics		Electronics, Embedded		Mechanical

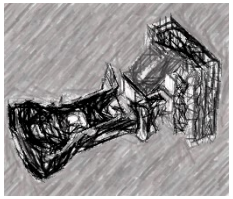


Satellite Dispenser

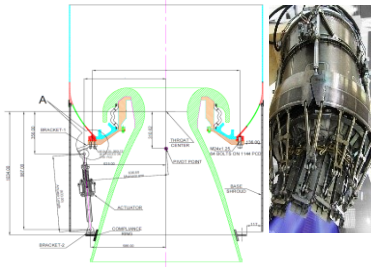


Fibre Optic Gyroscope

Star Tracker



Satellite Optical Payload



Thrust Vector Control

AADYAH AEROSPACE

Our Services for Global Clients

With a vision to move into Cubesats & Nano-satellites over the next couple of years

SENSE — Computer Vision — PROCESS — Motion Control — ACTUATE

Optics

Electronics, Embedded

Mechanical

AADYAH AEROSPACE

Our Services for Global Clients

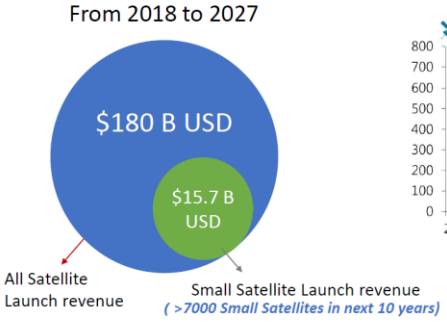
Design → Model → Engineer → Analyze → Prototype → Test → Manufacture

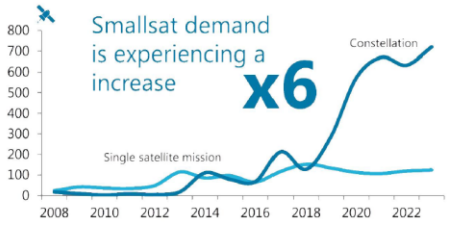
Small Satellites market: booming at CAGR of 20.1%

- The small satellite market was valued at $3,632.4 million in 2018
- Expected to reach $15,686.3 million by 2026, registering a CAGR of 20.1% from 2018 to 2026.
- Small Satellites are satellites with masses lower than 500 kg.

Drones market: growing at 15.5%

- The UAV market is estimated at USD 19.3 billion in 2019
- Projected to reach USD 45.8 billion by 2025, at a CAGR of 15.5% from 2019 to 2025





Morgan Stanley estimates Space Market to hit $1.1 trillion by 2040
Bank of America estimates Space Market to hit $2.7 trillion in 30 yrs.

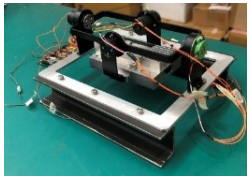
https://www.goldmansachs.com/insights/technology-driving-innovation/drones/

AADYAH AEROSPACE

Gaining market traction with first in the market, home-grown technologies

General Aeronautics

Drone Joystick Control



AIRBUS

Gimbal & UV Light Positioning System

#	Customers	Technology/ Products developed
1	General Aeronautics	Drone Joystick Control
2	Airbus Innovation	Gimbal & UV Light Positioning System
3	Larsen & Toubro Defence	Light Source
4	Bharat Electronics Limited	12 Ton Electromechanical Jack
5	General Aeronautics	Precision Spray Control Unit for Drones
6	Garden Reach Ship Engineers	Night Vision Binocular
7	Aeronautical Development Establishment	Nose Wheel Steering & Brake Rotary Actuator
8	Hyderabad Batteries Limited	Laser Range Finder Binocular
9	Skyroot Aerospace	Flex Nozzle Controller Actuator
10	Marine Care	Repair & Overhaul of Infrared Camera
11	Larsen & Toubro Shipyard	Infrared Camera
12	Larsen & Toubro Shipyard	Repair & Overhaul of Infrared Camera

Skyroot Aerospace

Flex Nozzle Controller Actuator

ADE

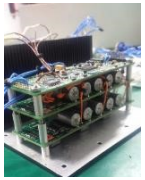
Nose Wheel Steering & Brake Actuator

L&T

Light Source

BEL

12 Ton Electromechanical Jack



General Aeronautics

Precision Spray Control Unit for Drones

GRSE

Night Vision Binocular

AADYAH AEROSPACE

We focus on key markets of India, US, UK, France and Israel

Andrew Rogers
Ex President, Qinetiq Americas

Maj Gen (Retd.) Eiland Giora
Ex-NSA, Government of Israel

Andrew Powell
Ex-Airbus, Boeing

BOEING
EATON
Collins Aerospace
INSITU
MOOG
Parker
Honeywell
THE POWER OF CONNECTED
AADYAH AEROSPACE

IAI
RAFAEL
ADVANCED DEFENSE SYSTEMS LTD.
SCL SemiConductor Devices
SENSOPTICS
SENSING YOUR TARGET

इसरो इसरो
DRDO
BHARAT DYNAMICS LTD.
(A Govt. of India Enterprise)
General Aeronautics
TATA
TATA ADVANCED SYSTEMS
LARSEN & TOUBRO
भारत इलेक्ट्रॉनिक्स
BHARAT ELECTRONICS
QUALITY. TECHNOLOGY. INNOVATION.

MBDA
MISSILE SYSTEMS
AIRBUS
SAAB

We are focused on 5 global and 5 Indian accounts with a sales target of ₹ 20 Cr/annum/account using our scalable technologies and services

In INR Cr		2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
BHARAT ELECTRONICS	EM Jacks	1	10	10	20	30	50
	Income (@38L)	0.38	3.80	3.80	7.60	11.40	19.00
DEFENCE R&D ORGANISATION	EM Actuator	15	30	30	100	150	200
	Income (@9L)	1.35	2.70	2.70	9.00	13.50	18.00
SKYROOT AEROSPACE	Flex Nozzle	1	1	4	8	14	23
	Income (@90L)	0.90	0.90	3.60	7.20	12.60	20.70
LARSEN & TOUBRO	EO Units		30	60	150	300	500
	Income (@4L)		1.20	2.40	6.00	12.00	20.00
ISRO	EO PAYLOAD			8	16	32	40
	Income (@50L)			4.00	8.00	16.00	20.00
TOTAL		2.63	8.60	16.50	37.80	65.50	97.70

Service In INR Cr		2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
BOEING	D2M			2.00	5.00	8.00	10.00
	DE		1.00	4.00	6.00	8.00	10.00
Collins Aerospace	D2M			2.00	4.00	6.00	8.00
	DE		2.00	2.00	6.00	8.00	12.00
AIRBUS	D2M			2.00	4.00	6.00	8.00
	DE			2.00	4.00	8.00	12.00
MBDA	D2M			2.00	4.00	6.00	10.00
	DE						
IAI	D2M		1.00	2.00	6.00	12.00	20.00
	DE						
TOTAL			4.00	18.00	39.00	62.00	90.00

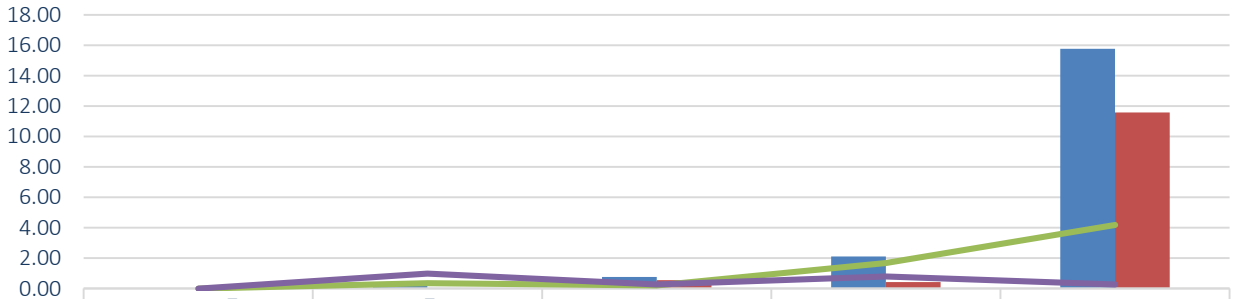
AADYAH AEROSPACE

Revenue Target FY20-21: INR 15.77 Cr

- Entering FY20-21 with a **strong sales funnel**
- Projecting a **revenue of INR 15.77 Cr for FY20-21** (INR 2.10 Cr, FY19-20)
  - INR 3.00 Cr of Order backlog
  - INR 3.89 Cr of proposals in Negotiation phase; to close in Q1
  - INR 26.91 Cr in Technical Evaluation
  - INR 79.93 Cr Proposals submitted
- Higher Gross Margin in current year due to Build to Spec projects

SALES FUNNEL, 1 Apr 2020	COUNT	VALUE (INR Cr)
1. Prospect	0	-
2. Unqualified Lead	8	1.70
3. Qualified Lead	20	8.52
4. Proposal/Tender	5	5.75
5. Proposal/Tender Submitted	30	79.93
6. Technical Evaluation	9	26.91
7. Commercial Evaluation/Negotiation	13	3.89
8. Verbal Confirmation	2	2.04
9. WIN	11	2.83

Revenue Projection FY20-21



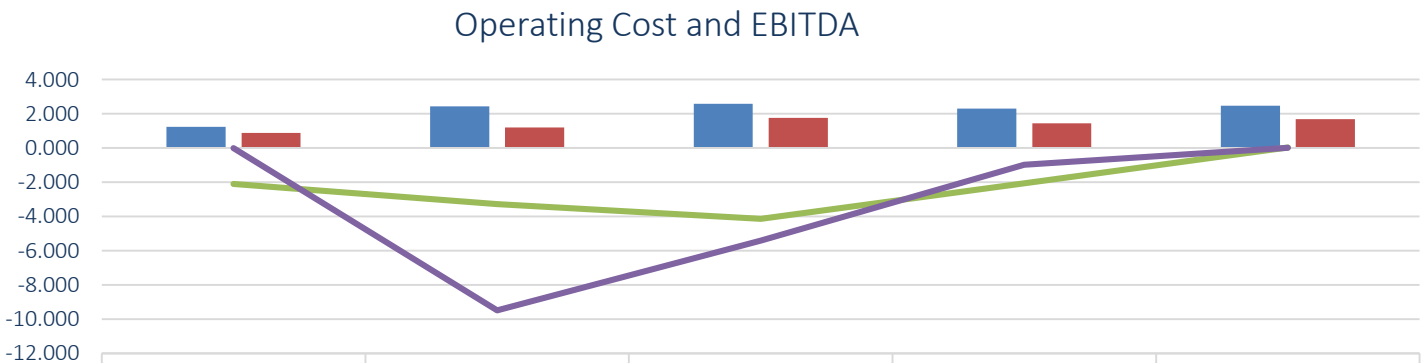
	2016-17	2017-18	2018-19	2019-20	2020-21
Revenues	-	0.346	0.766	2.105	15.770
Total Cost of the Product Sold	0.000	0.002	0.555	0.431	11.591
Gross Margin	-	0.344	0.210	1.674	4.179
Gross Margin %	0.00%	99.30%	27.48%	79.54%	26.50%

AADYAH AEROSPACE

FY 20-21 Operating Cost: INR 4.146 Cr; EBITDA 0.22%

- Aiming to achieve EBITDA Neutral operation in FY20-21
- Payroll is moving up 6.7% in the coming financial year to include 4 new team members; this is inclusive of the performance based annual increment
- In the current financial year, achieved significant cost reduction in Overheads: INR 1.763 Cr to INR 1.439 Cr; we anticipate this to increase 16% in the coming financial year

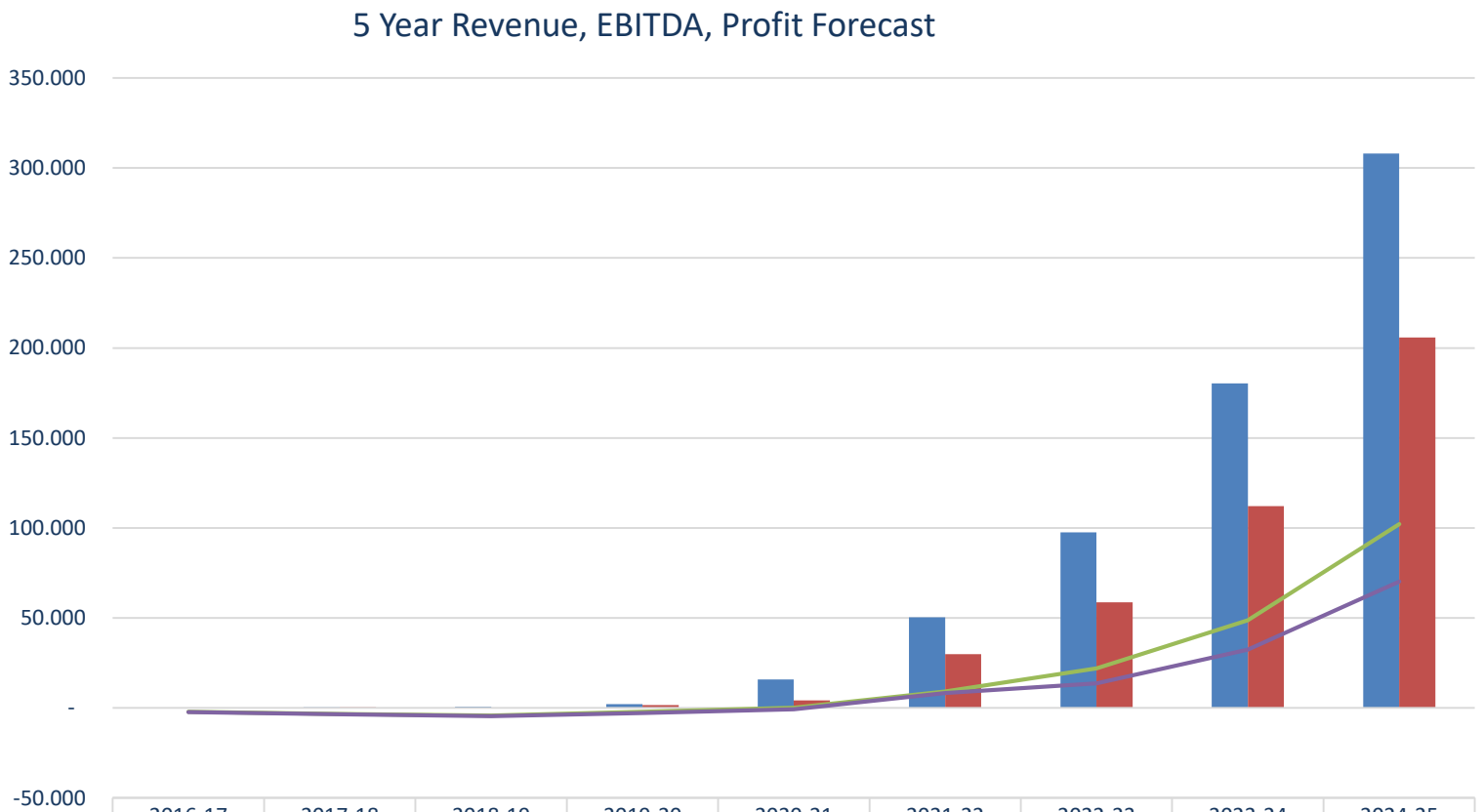
Team	2019-20	2020-21
General Management	2	2
People & Culture	2	2
Procurement	0	1
Finance	0	0
Operations	1	1
Sales	3	3
S/W	2	2
H/W	7	8
Mechanical	7	7
Electro Optics	2	3
Quality	1	2
Total	**27**	**31**



	2016-17	2017-18	2018-19	2019-20	2020-21
Total Payroll	1.230	2.426	2.592	2.308	2.464
Overheads	0.872	1.203	1.763	1.439	1.682
EBITDA	-2.102	-3.285	-4.145	-2.073	0.034
EBITDA %	0.00%	-948.52%	-541.37%	-98.46%	0.22%

AADYAH AEROSPACE

FY20-21: Laying foundation for strong growth in future



	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Revenues	-	0.346	0.766	2.105	15.770	50.390	97.624	180.267	308.100
Gross Margin	-	0.344	0.210	1.674	4.179	29.889	58.673	112.102	205.853
EBITDA	-2.102	-3.285	-4.145	-2.073	0.034	9.217	22.054	48.770	102.179
Net Income/Net profit	-2.306	-3.574	-4.644	-2.813	-0.697	8.284	13.576	32.425	70.206

AADYAH AEROSPACE

5 Year P&L Forecast

Year	2016-17	2017-18	2018-19	2019-20 Provisional	2020-21 (P)	2021-22 (P)	2022-23 (P)	2023-24 (P)	2024-25 (P)
Revenues	-	0.346	0.766	2.105	15.770	50.390	97.624	180.267	308.100
Total Cost of the Product Sold	0.00	0.00	0.56	0.43	11.59	20.50	38.95	68.16	102.25
Gross Margin	-	0.344	0.210	1.674	4.179	29.889	58.673	112.102	205.853
Gross Margin %	0.00%	99.30%	27.48%	79.54%	26.50%	59.31%	60.10%	62.19%	66.81%
Total Payroll	1.23	2.43	2.59	2.31	2.46	15.12	29.29	54.08	92.43
Overheads	0.87	1.20	1.76	1.44	1.68	5.55	7.33	9.25	11.24
EBITDA	-2.102	-3.285	-4.145	-2.073	0.034	9.217	22.054	48.770	102.179
EBITDA %	0.00%	-948.52%	-541.37%	-98.46%	0.22%	18.29%	22.59%	27.05%	33.16%
Depreciation Expense	0.14	0.29	0.40	0.67	0.67	1.61	1.43	1.42	1.40
Amortisation Expense	0.00	0.00	0.00	0.00	0.00	1.19	1.39	1.49	1.61
EBIT	-2.240	-3.572	-4.544	-2.740	-0.633	6.423	19.233	45.867	99.170
Interest	0.00	0.00	0.10	0.07	0.06	0.08	0.08	0.12	0.12
EBT	-2.240	-3.574	-4.644	-2.813	-0.697	6.343	19.153	45.747	99.050
Tax	0.07	0.00	0.00	0.00	0.00	-1.94	5.58	13.32	28.84
Net Income/Net profit	-2.306	-3.574	-4.644	-2.813	-0.697	8.284	13.576	32.425	70.206
Net Profit %		-1032.1%	-606.49%	-133.63%	-4.42%	16.44%	13.91%	17.99%	22.79%

AADYAH AEROSPACE

Our facility

- Space grade integration and testing facility located in Bangalore
- AS9100 D certified integration & test facility
- Land and building is leased built over 20,000 square feet
- Clean room class 1000 (EMA) and class 100 (EO)
- Completely equipped EO Lab
- In house ESS facility
- In house tool room for rapid prototyping
- Vacuuming and Nitrogen filling facility

AADYAH AEROSPACE

Backed by a strong promoter team

Shaju Stephen
(Chairman & MD)

- AMP, Harvard Business School
- MBA, University of Hull
- Ex-MD & CEO(India), Spanish Multinational
- Ex-Investment Manager, Masdar (Abu Dhabi), Mubadala (Abu Dhabi)
- Ex-Board Member: Torresol Energy SA(Spain), Winwind OY(Finland)

V Sunderarajan
(CEO)

- BTech (Mechanical, Kerala)
- Chartered Engineer
- PMP, CMQ-OE, MAeST, MIE
- Master in Business Administration (UNVA, USA)
- Ex-Lt. Commander, Indian Navy
- Ex-Director, Aerospace & Defense, Spanish Multinational

Pradeep Kumar
(CTO)

- BTech (Mechanical), IIT Roorkee
- Retired as Group Director, Control Actuation Group from VSSC – ISRO (Indian Space Program)

Sabu Joseph
(Director, People & Culture)

- Masters in HR
- 20 years of professional experience in Indian & Multinational cos

Earlier

- Director, Persons, SENER
- SC Johnson
- Eureka Forbes

Amarnath Reddy
(GM, Program Management)

- MTech (Mechatronics), VIT, Vellore
- Previously, Technical Manager – Aerospace, Spanish Multinational

Varun Kurup, Director, Finance

- CFA Level II
- BTech(Electronics), Master's in International Business
- 12 years of business development experience

AADYAH AEROSPACE

With Technology leadership from Indian Space program

Pradeep Kumar
(CTO)
BTech (Mechanical), IIT Roorkee

Group Director, Control Actuation Group from VSSC – ISRO (Indian Space Program)

Prof (Dr)Thomas Kurian
(Advisor, Design Review)
BSc(Engg) (Kerala), MTech(IIT Kanpur), PhD(Kerala)

Group Director, Computer and Digital Systems Group
VSSC, ISRO Trivandrum

Indian Institute of Space Science and Technology

- Senior Professor and Head of the Dept of Avionics
- Dean R&D

PM Kumar (VP, Embedded Systems)
BSc(Engg) (Kerala)

Deputy Division Head
VSSC, (ISRO) Navigation and Control Systems

Tata Elxsi – Practice Head , Modelling and Simulation Automotive systems , 5 years

Honeywell , India – Systems Engineer , Aerospace domain, 7 years

KM Bharadwaj
M.Sc. (Physics) from Agra College, Agra
M.Tech. IISc, Bangalore

Head, Test Systems Section, ISAC, ISRO Bangalore

Deputy Project Director, Chandrayaan-1

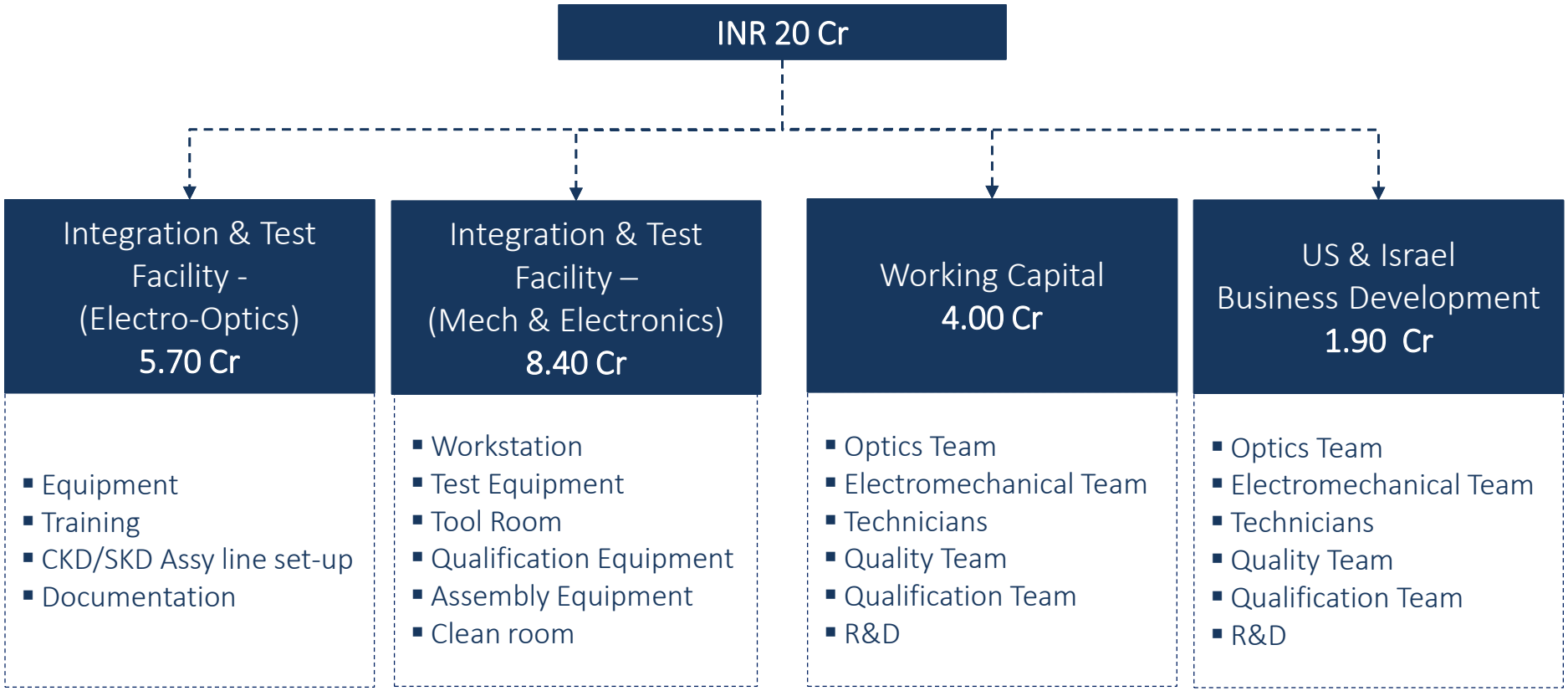
Chandran KM (Consultant, Design Realization & Testing)

37 years in Vikram Sarabhai space centre, ISRO Trivandrum

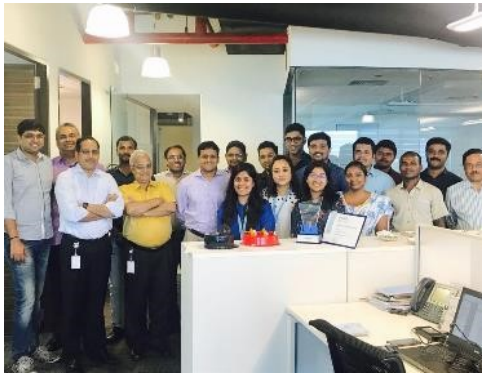
Project manager for the Control Electronics

AADYAH AEROSPACE

Fund requirement of Rs 20 Cr for growth



AADYAH AEROSPACE



THANK YOU

We are grateful
for the time taken
by YOU
to know AADYAH,
YOUR Engineering Lifecycle Partner

AADYAH AEROSPACE

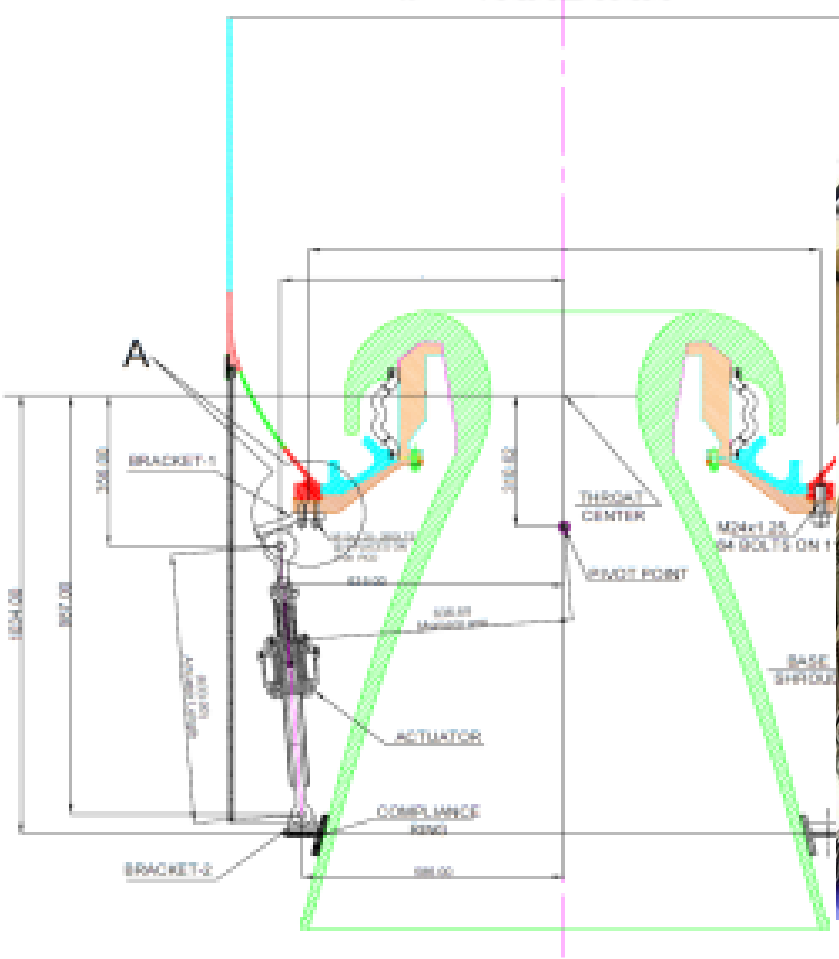
AADYAH AEROSPACE

CERTIFIED LR AS 9100

Project References

Flex Nozzle Control Actuation System for Small Satellite Launch Vehicle (SSLV)

- **Customer: Indian Small Satellite Launch Vehicle Company**
- Critical component of the Thrust Vectoring of the SSLV
- **Status:** Preliminary Design Review completed; Realization in progress



Mechanical

Electronics

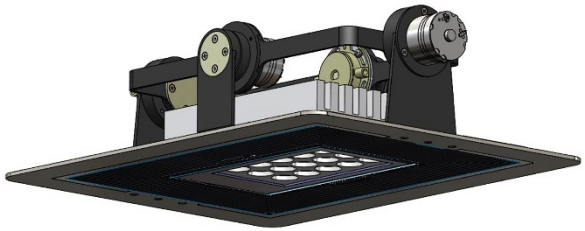
Embedded Software

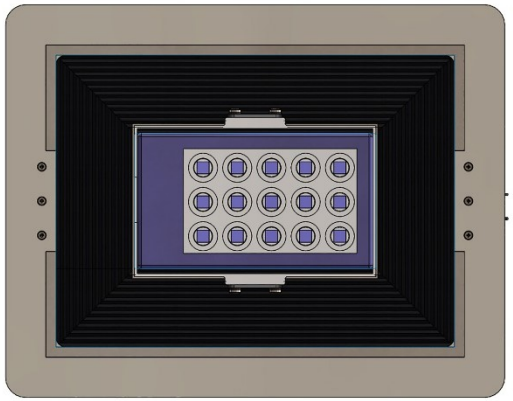
2 Axes UV light positioning system

- **Customer: Global Aerospace OEM**
- To sanitize the seats using UV rays after passenger disembarkation from the Aircraft. To reduce human interface, increase efficiency and reduce cost.

- **Status:** Hardware Prototype delivered

Sl. No.	Specification	Requirement
1	Operating Temperature	-40 to +50 deg C
2	Weight	2.1kg
3	Rotation along two axis	+/-65 deg
4	Angular Velocity	30 deg/sec
5	Angular Acceleration	60 deg/sec.sq
6	Position Feedback	Rotary Pot
7	Operating Voltage Range	22 to 28V





Mechanical

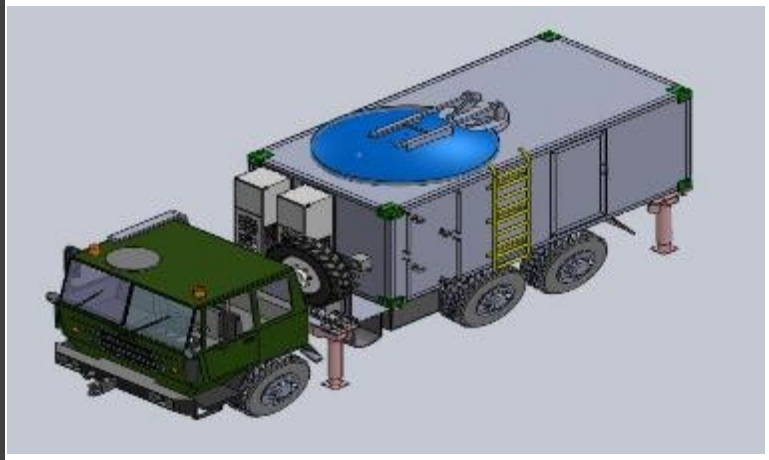
Electronics

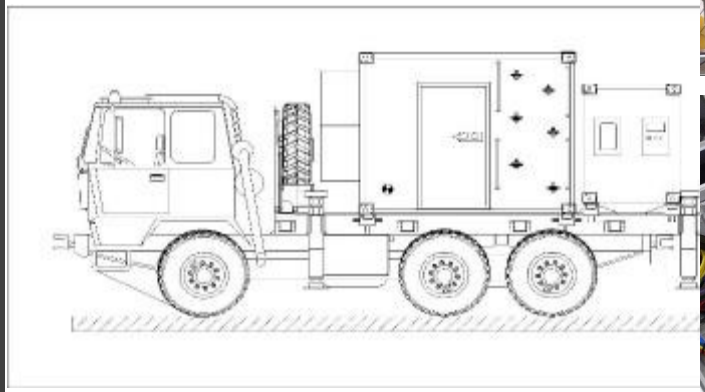
Embedded Software

Electromechanical Jacks for Military Applications

- **Customer:** Indian Defense Lab
- **Status:** Prototype Integration and Testing in progress

Sl. No.	Specification	Requirement
1	Lifting Capacity	10 tons
2	Deployment Time	60 sec
3	Closed Length	1060 mm
4	Stroke Length	780 mm
5	Operational Temperature	-30 to +55 deg C
6	Max. Weight	160 kg
7	Operating Voltage	415V, 3 phase





Mechanical

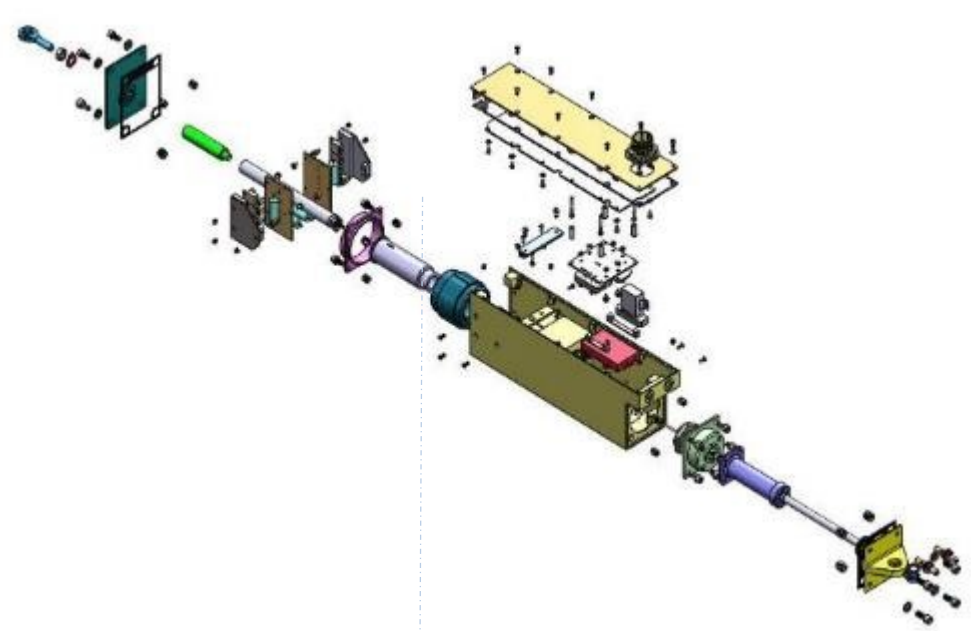
Electronics

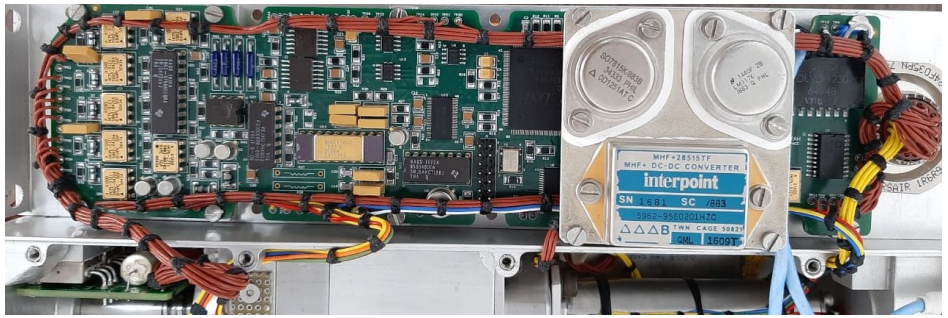
Embedded Software

SMART Linear Direct Drive FLAP Actuator for MALE UAV

- **Customer:** Indian Aeronautical Design Authority
  - Actuator for the deflection of the control surfaces i.e. FLAPS of the UAV. The R-2 actuator has a BLDC motor-based position servo system(the main drive element, a frameless BLDC torque motor and a high precision nut driven ball screw direct drive mechanism in closed loop position control to achieve best accuracy).
- **Status:** MIL qualification in progress

Sl. No.	Specification	Requirement
1	Stroke	+/- 25mm
2	Peak Force	1400 N
3	Continuous Force	400N
4	Band width @ Ni load	<=10 @ 2.2mm amp
5	Band width @ 350N No load	<=5 @ 2.2mm amp
6	Power Supply	28V DC
7	Operational Temperature Range	-40 degC to +70 degC
8	Envelope size	90mm X 70 mm
9	Center to center distance	350mm
10	Actuator Mass	3.25 kg





Mechanical

Electronics

Embedded Software

Payload Interface Module for Agricultural UAV

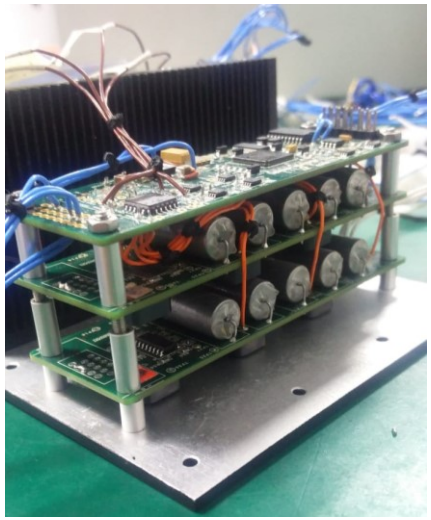
- Size: 120mm X 80mm x 70mm
- Weight: 400 gm
- Application: Rotary wing UAV; Variant available for fixed wing

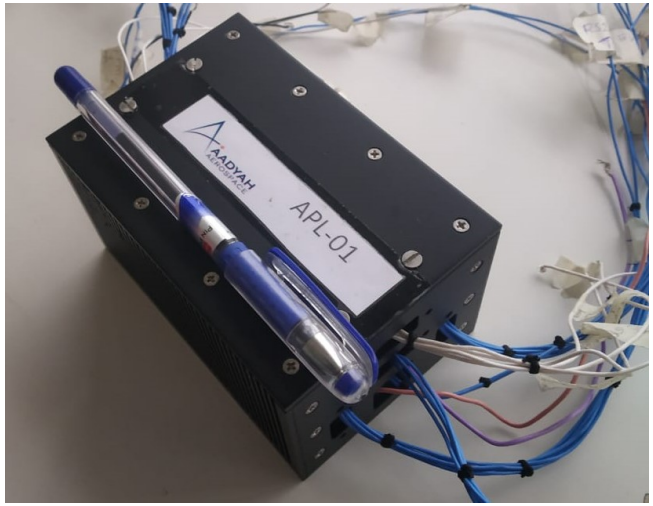
Package dimension: 120mm X 80mm X 70mm				
OUTPUT FROM THE BOARD				
	INPUT		OUTPUT	
	Voltage	Current	Voltage	Current
Aux. output1	28-50V		5V	3A
Aux. output2	28-50V		5V	3A
Aux. output3	28-50V		12V	5A
Aux. output4	28-50V		24V	5A
Atomiser 1	6-24V	<2A		
Atomiser 2	6-24V	<2A		
Atomiser 3	6-24V	<2A		
Atomiser 4	6-24V	<2A		
Atomiser 5	6-24V	<2A		
Atomiser 6	6-24V	<2A		
Pump1	12V	8A		
Pump2	12V	8A		
INPUT TO THE BOARD				
Power Supply	28-50V			
RS232				
Command for Atomiser	0V (1000 µsec) to 24V (2000 µsec), 50Hz			
Command for pump	0% duty ratio, 0V (1000 µsec) to 100% duty ratio, 12V (2000 µsec)			

Feedbacks

1. Analog f/b 1- Atomiser Current (1-6) - 6 Nos.
2. Analog f/b 2- Pump Current (1-2) -2 Nos.
3. Analog f/b 3- Flowmeter (1-2)-2 Nos.
4. Digital f/b RPM f/b from Atomiser

AADYAH AEROSPACE





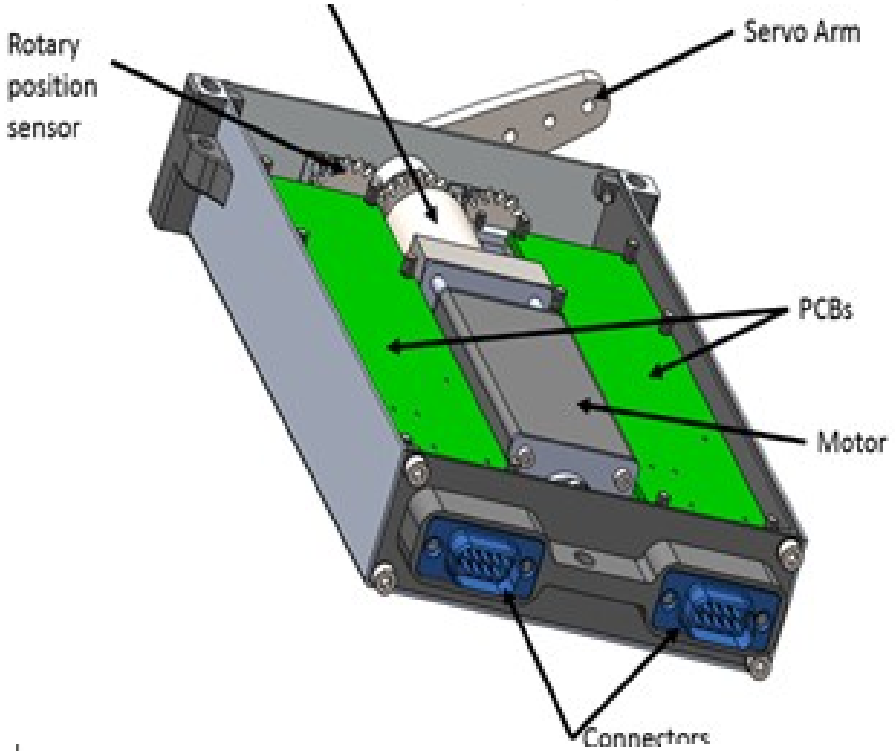
Electronics

Embedded Software

+/- 85 deg Redundant Rotary Actuator (95Nm & 24Nm)

- **Customer: Overseas Drone Company**
- To control the rotary movement of the Flaps and other moving parts of the Unmanned Arial vehicle fixed and rotary wing.
- **Status:** Detailed design in progress

AADYAH AEROSPACE



Sl. No.	Specification	Requirement
1	Operating Temperature	-30 to +70 deg C
2	Supply Voltage Range	12 to 32 VDC
3	Rated Torque	60 Nm
4	Peak Torque	96Nm
5	No Load Speed	200 deg/sec
6	Rated Speed	110 deg/sec
7	Max Travel Angle	=/- 85 deg
8	Case Dimention	185x135x44mm
9	Splash Water Resistance	IP67
10	Salt Water Resistance	>100 hours
11	Weight	1800g

Sl. No.	Specification	Requirement
1	Operating Temperature	-30 to +70 deg C
2	Supply Voltage Range	12 to 32 VDC
3	Rated Torque	10 Nm
4	Peak Torque	24 Nm
5	No Load Speed	250 deg/sec
6	Rated Speed	170 deg/sec
7	Max Travel Angle	=/- 85 deg
8	Case Dimention	140x118x26mm
9	Splash Water Resistance	IP67
10	Salt Water Resistance	>100 hours
11	Weight	720g

Mechanical

Electronics

Embedded Software

Field Programmable Joystick Control for UAV

- **Customer: Indian UAV Company**

- Manual control of UAV and Payload in case of autopilot failure
- Pulse position modulation output
- Built-in-self test
- Field Programming capability
- **Status:** Product delivered

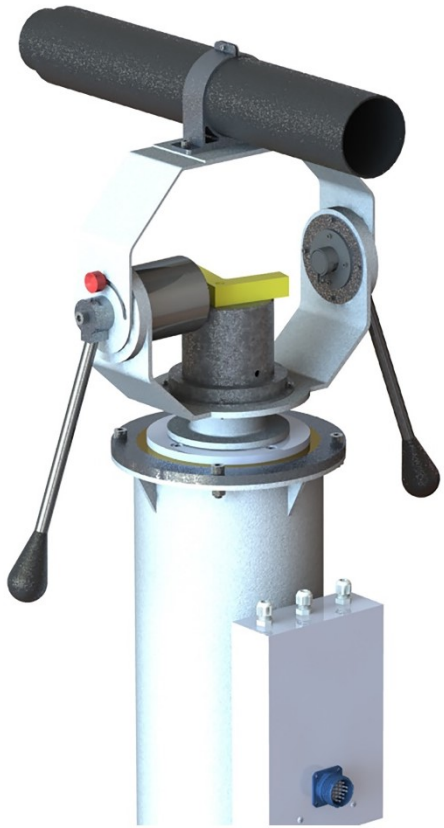
Electronics

Embedded Software

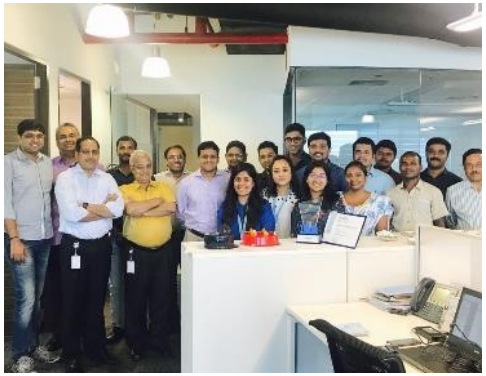
2 Axes Open Sight System for C-Band

- **Customer: Indian Defence Contractor**
- Open sight Unit for C Band Tracking Radar to track the preliminary targets.
- **Status:** Product delivered

Sl. No.	Specification	Requirement
1	Azimuth Travel	0 to360 deg Cont.
2	Elevation	-30 to +85 deg
3	Operating Temperature	0 to +50 deg C
4	Storage Temperature	-20 to +70 deg C
5	Angular Position	Through encoders
6	Angular Accuracy	6arc min
7	Tilt Accuracy	2 mrad max
8	Orthogonality	1 mrad max
9	Mechanical Height Adjustment	1400mm to 1850mm
10	Weight	20kg
11	Surface Levelling	Spirit Levels



Mechanical



THANK YOU

We are grateful
for the time taken
by YOU
to know AADYAH,
YOUR Engineering Lifecycle Partner

AADYAH AEROSPACE

CERTIFIED AS 9100