DEFENCE INNOVATION ORGANISATION

(Under the aegis of Department of Defence Production)

Ministry of Defence, Government of India
New Delhi -110002

Defence India Startup Challenge 14

DISC 14

Problem Statements

S. No.	Name of Agency	Number of Problem Statements
1	Indian Army	26
2	Indian Navy	24
3	Indian Air Force	25
4	Indian Coast Guard	07
Total		82

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21	21	AI Enabled Multi Agent Module for UAS Function	Indian Army
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23	23	Indigenous development and manufacturing of the Mirror Unit used in the Thermal Imager ESSA of Tank T-90	Indian Army
24	24	Indigenous development and manufacturing of Radiator Block used for ranging in the Range Finder module of Gunner Sight 1G46 installed on the T-90 Tank	Indian Army
25	25	Fire Control System for Sniper Rifle	Indian Army
26	26	Fire Assistance System for Assault Rifle	Indian Army
27	27	Design & Development of Long-Range Surveillance and Targeting Drone (LR-STD)	Indian Navy
28	28	Ship Launched Multi Domain Autonomous Naval Tactical Attack Drone (MANTA-Drone) for ISR and Targeting	Indian Navy
29	29	Design and Development ship borne Autonomous Aerial Vehicle (AAV) to deploy, recover and re-deploy AS sensor(s)/payload (s) from platforms at sea	Indian Navy
30	30	Secure indigenous AIS for platform identification	Indian Navy
31	31	Radio Frequency (RF) Emulator for Deception	Indian Navy

32	32	Development of EMP Payload for C-UAS Operations	Indian Navy
33	33	Design and Development of Control and Monitoring unit for MiG-29K Aircraft Engine.	Indian Navy
34	34	Design and Development of Sovereign Multi-Modal Foundation Model	Indian Navy
35	35	Rearming by Drone (REARM-D) at Sea	Indian Navy
36	36	Electro Magnetic Launch System for Maritime Operations	Indian Navy
37	37	Safety Round Logging and Monitoring System (SRLMS)	Indian Navy
38	38	Development of software for P8I sonobuoy data	Indian Navy
39	39	Design and development of a universal digital gauge to monitor firing pin efficiency in weapon systems employing electrical and percussion mode of firing (Torpedo tubes / gun mounts/chaff launchers)	Indian Navy
40	40	New age DC repair kit	Indian Navy
41	41	Underwater Welding Electrode	Indian Navy
42	42	Non-Destructive Test for weld Joints in Afloat Condition	Indian Navy
43	43	Specialized Indigenous Hardware, AI & Storage computing based Layered Solution for Collating data from ships for analytics and deep Learning	Indian Navy
44	44	Inflatable Hatch Sealer	Indian Navy
45	45	Development of Doppler Velocity Log	Indian Navy
46	46	Fire Fighting Drone for High-Rise buildings	Indian Navy
47	47	Sensing Transformer to Convert Angular Motion to Electrical Signals for MiG 29K Aircraft Engine	Indian Navy
48	48	Indigenous development of Pressure Transmitter for MiG 29K	Indian Navy
49	49	Universal fire Sensor for MiG 29K Aircraft Engine	Indian Navy
50	50	Virtual Walkthrough Model for P-75 Submarines	Indian Navy
51	51	Pan-IAF Wargaming tool	Indian Air Force
52	52	Composite situational awareness picture (CSAP)	Indian Air Force
53	53	UAS-Borne NBC Detection Capabilities along with ALS equipped UAS (modular)	Indian Air Force
54	54	Ku Band radar for drone detection	Indian Air Force
55	55	Combat Controlling Simulator	Indian Air Force
56	56	Multi-Purpose All-Terrain Vehicle (Hybrid, Modular Mission-Kit Equipped) for Mobile Military & Multi Agency Operations. Mobile Air Traffic Control (MATC)	Indian Air Force
57	57	Development of anti-drone munition of following types to be fired from 7.62/ 5.56 mm calibre rifles for countering drones. 1.1 Development of Anti-Drone Air Burst Munition. 1.2 Multi bullet rifle cartridge designed to split in parts after being fired from a rifle	Indian Air Force
58	58	Drone based calibration for MAFI navigational system	Indian Air Force
59	59	Automated Decision Tool, to conduct Helicopter and Fixed wing operations in Himalayan Belt of Indian region, based on the Weather Conditions of Passes and Valleys estimated by the module	Indian Air Force
60	60	Development of Next Generation Compact Universal Test Equipment (NGCUTE) for ALMs of lAF	Indian Air Force
61	61	RF jamming Equipment Compatible with kinetic weapons	Indian Air Force
62	62	Design and Develop a retractable mesh door to cover mouth of aircraft Shelter (Hardened aircraft shelter and sun shelter) with opacity to EO/IR/SAR	Indian Air Force
63	63	Integrated CUAS system on existing vehicle	Indian Air Force

64	64	Design and development of "Canopy Lift Check Device" in Fighter aircraft	Indian Air Force
65	65	To design and develop Camouflage solution for solar panels installed at Defence Installations	Indian Air Force
66	66	Indigenous GIS based OFC Network Management System (NMS)	Indian Air Force
67	67	Indigenous High-Capacity Ethernet LOS Radio	Indian Air Force
68	68	Indigenous Network Monitoring Solution	Indian Air Force
69	69	Secure Information Exchange Platform for Military Units (SIEPMU) on public internet	Indian Air Force
70	70	AR/VR Armament training and demolition simulator	Indian Air Force
71	71	Man-portable (Manpack) Tactical Air Navigation (TACAN)	Indian Air Force
72	72	Indigenous Dense Wavelength Division Multiplexing (DWDM)	Indian Air Force
73	73	Development of indigenous secure HDD with central management solution	Indian Air Force
74	74	Indigenous Cyber Deception Framework	Indian Air Force
75	75	AI based Airway assessment tool in Pre anaesthesia check-up	Indian Air Force
76	76	Stern tube Shaft Seals for propulsion system onboard Sachet class ships	Indian Coast Guard
77	77	Fuel consumption optimization using AI-based tools	Indian Coast Guard
78	78	Indigenisation & development of Integrated Bridge System (IBS) along with repair services	Indian Coast Guard
79	79	Development of Indigenised Power Management System (PMS)	Indian Coast Guard
80	80	Non availability of Indigenised Fire Detection System (FDS) installed onboard ICG ships (FPVs/ IBs)	Indian Coast Guard
81	81	Indigenisation of Personal Locator Beacon (PLB)	Indian Coast Guard
82	82	Maritime Security Analytics Software (MSAS) with Artificial Intelligence and Machine Learning for Coastal Surveillance Network of Indian Coast Guard	Indian Coast Guard

Problem Statement 1: AI Module for UAS for Autonomous Recognition, Identification and Targeting.

Organization Name	**Indian Army**
Challenge title	AI Module for UAS for Autonomous Recognition, Identification and Targeting.
Problem Statement/	Modern Combat environment present complex battlefields, which are data-dense and time compressed. It creates tremendous cognitive burden for decision makers during operations. Rapid, precise target detection, recognition, identification and targeting is one such critical operational function. Existing systems are either manual or semi-automated, resulting in delays and inaccuracy. There is a critical need to develop an AI module which can integrate AI in existing Svl, Targeting and C4ISR processes and undertake autonomous Tgt Detection, Recognition, Identification and Targeting
Challenge brief/ definition	Current and future battlefields will demand rapid interpretation of huge amount of information and data in compressed time to execute time sensitive missions. Existing human Centric Sys and processes are not likely to sustain and execute ISR, DOOAF or other Targeting functions from UAS platforms in a fast pace operational environment. Rapid interpretation and accurate time bound analysis is an imperative. These inputs will be required to be processed and synthesised seamlessly to aid decision makers at the Edge as well as at C2 Nodes. Bridging this gap by leveraging AI / ML and associated Technology is essential. There is a reqmt to develop an AI Module to process multi sensor ISR inputs at the Edge on various types of ISR platforms to enable autonomous target detection, recognition and identification. The AI Module is required to classify and prioritise potential targets and accurately acquire targeting coordinates to facilitate fast and efficient sensor shooter cycle.
Existing Solution (if any)	No AI enabled solution exists in service.
Technology domain (s)	AI /ML.
Application/Use Case	Potential use Case. AI Integrated / Enabled ISR Platforms or sensors. AI Integrated / Enabled DOOAF / Targeting Platforms. AI enabled Grnd Cont Stns of UAS, LMs, AOS, RWI AeSS.

Project Outcome	AI Module Capable of Autonomous Target Recognition, Identification and Targeting. A Modular Ruggedised (Mil grade) Edge deployable, AI module which can be Integrated with existing and future UAS Sys.	
Testing /Certification	AI Risk Management	ISO / IEC 42001 or equivalent. ISO / IEC 23894 : 2023 or equivaler ETAI criteria by DRDO or equivaler
	IS / IEC Safety	IEC 62040-1:2017 or equivalent.
	ICT Parameters	IS / IEC 62368 or equivalent.
	Functional Safety	IEC 61508 or equivalent.
	EMI / EMC Tests.	
	Cyber Aspects -ISO / IEC 27001 or equivalent.	
	STQC Certification - (EAL1-7).	
	CeRT-in / SAG / ACG Eval.	
	JSS 55555.	
	MIL-STD-810H.	
	MIL- STD-882E.	
	BIS / NABL accredited Components.	
	Bis / NABL Components.	
Future Expectation from the prototype / Technology developed	Indigenous Capb Devp. Integration with existing and Future UAS Sys.	
Potential Market	Indigenous Capb for AI enablement of all UAS Sys- Existing & Future. Prospective Export Potential.	
Business Case	Potential Integration with Tri-service UAS Sys feasible.	

Problem Statement 2: Modular and scalable multi-role ammunition for Unmanned Aerial Systems

Organization Name	**Indian Army**
Challenge title	Modular and scalable multi-role ammunition for Unmanned Aerial Systems
Problem Statement	To develop modular and scalable multi-role ammunition for Unmanned Aerial Systems for use across diverse combat scenarios requiring rapid mission reconfiguration.
Challenge brief/definition	Current Unmanned Aerial Systems (UAS) lack flexible, modular ammunition systems capable of performing multiple roles (anti-personnel, anti-materiel, anti-armour) with scalable payloads, limiting operational effectiveness and increasing logistical complexity across diverse combat scenarios requiring rapid mission reconfiguration.
Existing Solution (if any)	Current Solutions. Fixed-payload munitions (specific to single target type). Platform-specific proprietary ammunition systems. Imported guided munition kits adapted for UAS. Limitations. No modularity - separate munitions needed for different target types. Limited scalability across various UAS platforms (payload constraints). High logistical burden with multiple ammunition types in inventory. Lack of mission adaptability in dynamic combat environments High cost per unit for specialised munitions. Heavy dependence on foreign suppliers for precision-guided ammunition. Integration challenges with indigenous UAS platforms.
Technology domain (s)	Expected Key Technologies. Advanced Materials : Lightweight composite structures, additive manufacturing for complex components. Smart Fuses : Programmable multi-mode proximity/impact/delay fuses with electronic safe-arm devices Miniaturized Guidance : MEMS-based INS, miniaturized GPS

	receivers, compact laser seekers Warhead Technology : Optimized fragmentation patterns, shaped charge liner design, insensitive munitions compliance Digital Interface : MIL-STD-1760 compliant data bus, software-defined configuration protocols AI/ML : Target classification algorithms for autonomous engagement Modular Electronics : Plug-and-play mission computer interface.
Application/Use Case	Close Air Support (CAS) operations. Precision strike against high-value targets. Counter-insurgency operations with minimized collateral damage. Anti-armour engagements in combined arms scenarios. Interdiction of enemy logistics and infrastructure.
Project Outcome	A production ready, multi-role precision ammunition system that transforms UAS strike capabilities, achieves 70% indigenization, and positions India as a leader in advanced munitions technology.
Testing /Certification	Phase 1 : Component Testing. Warhead Module Interchangeability Test : 100% success in < 5 min. Guidance System Accuracy : CEP verification across 50 trials. Fuse Reliability : 99.9% arming success rate. Environmental stress testing per MIL-STD-810. Phase 2 : Integration Testing. Platform Compatibility Verification : Electrical, mechanical, software. Flight Envelope Testing : Release at various speeds, altitudes, angles. Datalink Integrity : Command/control under jamming conditions. Safety Mechanism Validation : 1000+ simulated scenarios. Phase 3 : Live Fire Testing. Accuracy Trials : Minimum 30 shots across target types. Target Effectiveness : Blast radius, penetration, fragmentation pattern. Multi-role Performance : Each warhead variant against designated targets. Operational Scenario Testing : Day/night, weather conditions.

Future Expectation from the prototype / Technology developed	Scalable across current and future UAS platforms. Future-proof architecture for emerging technologies. Compatible with indigenous platforms: future MALE/HALE UAS. Should give out product improvement roadmap for future variants.
Potential Market	Present and Future Requirement of the Product in Service. Indian Air Force. Indian . Indian Navy. Paramilitary Forces. Export Market. South East Asian Nations. Middle East (Non- aligned Nations). African & Central Asian Countries.
Business Case	Give an estimate of future potential demand (Expected bulk orders / chances of repeat orders / scope of export). (NA as of Now)

Problem Statement 3: Development of Standard GCS for UAS

Organization Name	Indian Army
Problem Statement	Presently, a large number of vendors are dealing in Unmanned Aerial Vehicles (UAVs). However, each vendor provides a GCS which is suitably synchronised to the Aerial Vehicles (AVs) provided with the GCS. This entails training of crew and Unmanned Aerial System (UAS) Operators on each specific type of GCS to be able to operate different AVs.
Challenge brief/definition	• **Standardisation of GCS**. The variety of GCS, available in Indian Army, need to be standardised to one type of GCS. • **Type of Standardisation**. • **Existing GCS**. Development of such mod/module to convert existing GCS to a common GCS applicable to all Avs. • **GCS being Inducted into Indian Army in Near Future (Beyond RFP Stage)**. Development of such mod/ module to convert forthcoming GCS to a common GCS applicable to all Avs. • **GCS being Inducted into Indian Army in Future**. Lay down certain standardised conditions which, when followed by vendor will result in development of standard GCS.
Existing Solution (if any)	Nil
Technology domain (s)	Synchronisation ability in each GCS to include similar op controls, screens & outputs.
Application/Use Case	Operator & Instructors of various UAS platforms being inducted in SATA Regts, Shaktibann Regt and Divyastra Btys, who are actually operating various UAS or training the UAS operators.
Project Outcome	**Contemporary Solns by Other Countries/ Org**. The US Army has also identified the requirement of a common universal controller that can run unmanned systems agnostic of commercial origin and the same has been shared as a Problem Statement for the next edition of INDUS-X Mutual Promotion of Advanced Collaborative Technologies (IMPACT) challenge (Refer DDP MoD mail dt 13 Jun 2024).
Testing /Certification	List of testing required from accredited agencies - NK
Future Expectation from the prototype / Technology developed	Should be able to house every avbl GCS & make avbl similar op controls, screens & output.
Potential Market	Present and future requirement of the product in service (from procurement perspective). • **Existing GCS**. Development of such mod /module to convert existing GCS to a common GCS applicable to all Avs.

	• **GCS being Inducted into Indian Army in Near Future (Beyond RFP Stage)**. Development of such mod/ module to convert forthcoming GCS to a common GCS applicable to all Avs. • **GCS being Inducted into Indian Army in Future**. Laydown certain standardised conditions which, when followed by vendor will result in development of standard GCS. • Possibility of commercial adoption. **High**. • Will the developed product be able to strengthen the defence export of India? **NK**
Business Case	• Present demand @ 1 GCS per AV. • Future demand @ NK

Problem Statement 4: Swarm Technology Based Heavy Payload Logistics Drones With 200 Kg Load Capacity

Organization Name	**Indian Army**
Challenge title	Swarm technology based heavy payload logistics drones with 200 kg load capacity
Problem Statement	• Last-mile delivery of supplies to forward posts, isolated detachments and dynamic operational forces remains a significant challenge due to terrain constraints, weather conditions, hostile action and limited road or air accessibility. • Single-drone logistics solutions suffer from limitations of payload, range, survivability and single-point failure, reducing reliability in contested or adverse environments. • There is a requirement for an indigenous swarm-based unmanned aerial logistics system capable of resilient and scalable last-mile delivery operations.
Challenge brief/definition	• The challenge is to design, develop and demonstrate a swarm drone-based logistics system for autonomous or semi-autonomous last-mile delivery of military supplies. • The system shall consist of multiple cooperative unmanned aerial vehicles capable of coordinated flight, task sharing, dynamic re-routing and mission continuation in the event of individual drone loss. • The solution shall be rugged, secure, scalable and suitable for deployment in varied operational environments including high altitude, jungle, desert and island terrain.
Existing Solution (if any)	• Predominantly single-platform systems with limited payload and operational resilience. • Manned Aerial Resupply remains costly, risky and not optimised for small, frequent last-mile deliveries. • Existing solutions lack redundancy, survivability and scalability in contested environments.
Technology domain (s)	• Swarm Intelligence and Distributed AI • Autonomous UAV Systems • Secure Mesh Communication Networks • Navigation, Obstacle Avoidance and Collision Prevention • Payload Handling and Precision Delivery Systems
Application/Use Case	• Swarm drones shall deliver rations, FOL, ammunition, medical stores, and spares to forward posts with each drone capable of lifting **200 kgs of Composite load with range 30 Km.**

	• The system shall support operations in inaccessible or high-risk operational areas through landing operations in plains and desert terrai006E. • Multiple locations shall be resupplied simultaneously during operational surges or emergencies. • The solution shall support routine and time-critical logistics missions.
Project Outcome	• A validated swarm drone system for reliable last-mile logistics delivery. • The solution shall be suitable for limited induction and future scaling.
Testing/Certification	• UAV flight performance and swarm coordination trials. • Communication security and resilience validation. • User trials and operational evaluation by Indian Army.
Future Expectation from the prototype / Technology developed	• Demonstrate coordinated Swarm Flight and Autonomous task execution. • Self-healing behaviour after individual drone failure. • Secure, resilient communications throughout the mission. • Scalability in swarm size, payload, and range.
Potential Market	• Indian Armed Forces and paramilitary organisations. • Export potential to friendly foreign militaries. • Select humanitarian and disaster-relief applications.
Business Case	• **High potential** for bulk induction and repeat procurement. • Growing demand expected with expansion of unmanned logistics doctrine. • **Export opportunities** exist due to global interest in swarm logistics.

Problem Statement 5: ALS / 2.5 Ton Vehicle Mounted Barrel Handling Swivel Arm

Organization Name	**Indian Army**
Challenge title	ALS / 2.5 Ton Vehicle Mounted Barrel Handling Swivel Arm
Problem Statement	• Loading and unloading filled barrels currently relies on manual handling, risking injury and delays. • Existing handling methods are manpower-intensive and inefficient in field and operational conditions. • A compact, vehicle-mounted mechanical assistance system is required for safe barrel handling.
Challenge brief/definition	• Develop a retrofittable swivel arm for ALS and 2.5 Ton vehicles. • The swivel arm shall assist loading and unloading of fully filled barrels. • The system shall operate using the vehicle's existing engine power. • Fitment shall not increase overall vehicle dimensions or compromise mobility.
Existing Solution (if any)	• Barrels are handled manually using manpower and makeshift lifting aids. • Manual methods increase injury risk and loading time. • No standardised vehicle-mounted barrel handling solution exists.
Technology domain (s)	• Mechanical and Hydraulic Systems • Automotive Power Take-Off • Integration • Structural Design and Load Handling Vehicle Integration and Safety Systems
Application/Use Case	• The system shall support loading and unloading of filled barrels. • The swivel arm shall be used during field logistics and routine replenishment tasks. • The solution shall be functional in extreme cold/hot/humid climate.
Project Outcome	• A validated, retrofittable barrel handling swivel arm for Army vehicles. • The system shall be ready for induction and fleet-wide retrofitting.
Testing /Certification	• Load testing and endurance trials • Vehicle integration and operational trials

	• User validation by the Indian Army
Future Expectation from the prototype / Technology developed	• The prototype shall enable single personnel barrel handling. • The swivel arm shall provide smooth, controlled and safe lifting operations. • The system shall demonstrate reliable operation using vehicle engine power. • The design shall allow quick deployment and stowage during operations.
Potential Market	• Indian Army and other Armed Forces. • Paramilitary and government logistics organisations. • **Huge** civilian logistics applications.
Business Case	• **High potential** for bulk procurement across ALS and 2.5 Ton fleets. • **Repeat orders** expected due to retrofitting across existing vehicles. • **Export potential** exists for similar military vehicle fleets.

Problem Statement 6: Heavy Load Carrying Drone with IC Engine

Organization Name	**Indian Army**
Challenge title	Heavy Load Carrying Drone with IC Engine
Problem Statement/	Indian Army has already inducted logistics drones of various capabilities and characteristics. The logistic drones face various challenges of altitude restrictions, payload capacity and battery endurance. There is a sever effect on the battery capability in High Altitude areas, wherein the present battery packs provide 60 to 90 minutes of endurance, thereby restricting their range. The IC engine-based solutions are likely to provide longer endurance & quick reusability through refuelling.
Challenge brief/definition	
Existing Solution (if any)	There are limited solutions existing for the problem statement. The industry and Academia is at a nascent stage for development of IC engine-based logistics drones.
Technology domain (s)	• UAS – Fixed wing/VTOL/Hybrid. • IC Engine for subzero operations in HAA. • Autonomous navigation and flight control. • Modular Load carrying capability. • Ability to operate in GPS denied environment.
Application/Use Case	• Last mile logistics connectivity. • Other operational necessity – Casualty Evacuation and scalable for weapon carriage.
Project Outcome	Fully operational High Altitude Logistics Drone.
Testing /Certification	As per military grade testing including user trials.
Future Expectation from the prototype / Technology developed	• Reliable operations upto 18000ft. • Payload – 100 kg. • Endurance – 3 hours. • Range – 25 km. • All wx day and night capability. • Autonomous Launch & Recovery. • Modular Payload Bay for scalable logistics. • Ability to operate in GPS denied environment. • All up Weight – Not more than 200 kgs.
Potential Market	• Defence – Indian Army and CAPFs • Commercial – Disaster Relief and remote infrastructure support.
Business Case	• High probability of bulk and repeat orders. • Export potential

Problem Statement 7 Man-portable ELINT System with ESM Capabilities

Organization Name	**Indian Army**
Challenge title	Man-portable ELINT System with ESM Capabilities
Problem Statement	In the realm of modern electronic warfare, the need for effective and adaptable Electronic Intelligence (ELINT) systems is crucial. Current systems often fall short in addressing the diverse and evolving threats faced by defence and intelligence agencies. There is a pressing need for a portable ELINT system that can provide comprehensive Electronic Support Measures (ESM) capabilities, including broad frequency coverage, accurate direction finding and advanced analytical functions. The proposed system aims to address these needs by delivering a robust, scalable and modular solution that enhances electronic surveillance and threat detection capabilities.
Challenge brief/definition	• Limited Frequency Coverage. Many Systems are constrained by narrow frequency ranges, limiting their ability to detect and analyse a broad spectrum of electronic signals. • Static and Non-Portable Design. Traditional ELINT sys are often large, stationary and lack the flexibility required for dynamic field operations. This reduces their effectiveness in rapidly changing environments. • Inadequate Direction Finding (DF) Accuracy. Some systems struggle with precise DF capabilities, impacting the ability to accurately locate and track threat emitters. • Insufficient Scalability and Modularity. Many systems lack modularity, making it difficult to expand or integrate them with other units for enhanced operational coverage. • Basic Analytical Functions. Current systems may only offer basic signal recording without advanced analytical features like RF fingerprinting, which are essential for identifying and classifying complex threats.
Existing Solution (if any)	R & S, Mesolova
Technology domain (s)	EW
Application/Use Case	ELINT
Project Outcome	Man-portable ELINT system with ESM
Testing /Certification	DGQA
Future Expectation from the prototype / Technology developed	Should be able to enhance its technical capabilities and adapt to new war-waging sys of adversary
Potential Market	Present and future requirement of the product in Service. Intelligence is collated and further shared with NSA, R&AW, IAF and Naval Intelligence as part of National Intelligence Grid. This intelligence data is vital for planning Military

	operations and to keep continuous surveillance over enemy emitter activities. • Will the developed product will being able to strengthen the defence export of India? - Yes • Any other relevant info. - Nil
Business Case	Export potential

Problem Statement 8: Helicopter-Mounted Anti-Drone System

Organization Name	Indian Army
Challenge title	Helicopter-Mounted Anti-Drone System
Problem Statement	Helicopter-Mounted Anti-Drone System for helicopter of IA (Army Aviation)
Challenge brief/definition	• Indian Army Aviation helicopters (Attack, Utility and Reconnaissance roles) are vulnerable to emerging small-Unmanned Aerial Systems (UAS) threats due to the following reasons:- • Increasing employment of drones by adversaries. • Modern drone tactics include silent ambush modes and Kamikaze style attacks. • No onboard system providing early warning of drones in vicinity. • Absence of drone detection sensors capable of identifying incoming FPV drones, commercial drones and capability to jam or destroy the drones.
Existing Solution (if any)	Ground based C-UAS available. Imported airborne EW suites exist but are heavy, power intensive and import dependent.
Technology domain (s)	RF Spectrum Monitoring, AI/ML Signal Classification, Embedded Systems, Directional RF/ GNSS Jamming, Avionics Integration.
Application/Use Case	Helicopter Mounted Anti Drone Sys will be utilised on all type of R&O, Utility, Attack Helicopter for detection & jamming of Drones during conduct of flying operations, high altitude missions, logistics missions, armed LCH missions, hover/ low-speed regimes.
Project Outcome	Flight validated lightweight C-UAS meeting PSQR compliance.
Testing /Certification	• Helicopter Airworthiness and integration to be certified by CEMILAC (RCMA). • Counter drone payload performance test to be carried out at as per JSS 55555 Test Facilities at Defence test ranges vis-à-vis eval by evaluation agency as per Qrs/GSQRs. • Safety EMI/EMC and Environmental Qualification will be undertaken by ACE, Mhow as per MIL-STD-810G standards. • Cyber security, software and Data to be certified by Defence CERT/ ACG. • QA and Acceptance will be done by DGAQA (AHSP).
Future Expectation from the prototype / Technology developed	• Indian Army helicopters currently lack an onboard early-warning system to detect & jamming hostile drones. Integration of the system on Indian Army Aviation helicopters will improve survivability, provide early warning, reduce vulnerability and enhance flight safety and mission efficiency. • The anti-drone system should be based on a passive sensor and/ or miniaturized active sensor to detect and jam/ destroy the drones.

	• The anti-drone system should be preferably integrated with the helicopter avionics for displaying the threats via on-board Multi-function Displays. • The anti-drone jamming should not affect any on-board radio systems.
Potential Market	• Helicopter mounted anti drone systems provides significant tactical flexibility as they can be quickly repositioned and deployed with advancing ground forces. They are vital for defending against drone swarms and low-flying threats that traditional static defenses may miss.
Business Case	Bulk orders may be planned later.

Problem Statement 9: Automatic Snow Chain System for Army "B" Vehicles

Organization Name	**Indian Army**
Challenge title	Automatic Snow Chain System for Army "B" Vehicles
Problem Statement	• Indian Army vehicles operate extensively in snow-bound and icy regions where vehicle mobility is severely restricted due to reduced traction, verglas formation and heavy snowfall. • Presently, snow chains are either manually installed or not available on all vehicle types, leading to significant delays, increased manpower effort, safety hazards to personnel, and reduced operational mobility. • There is a requirement for an automatic or rapidly deployable snow chain system compatible across multiple Army "B" vehicle platforms to ensure assured mobility in snow and icy conditions without manual intervention.
Challenge brief/definition	• The challenge is to design, develop and demonstrate an indigenous automatic snow chain system that can be fitted to a wide range of Army "B" vehicles. • The system shall allow 'Electronic On-Demand Engagement and Disengagement' of Snow Chains from within the Driver's cabin, without requiring the crew to dismount in adverse weather conditions. • The solution shall be rugged, reliable, easy to maintain and capable of functioning effectively in extreme cold, snow and icy terrains.
Existing Solution (if any)	• Manual snow chains are presently used on select vehicles in limited areas. • These require vehicle stoppage, crew exposure to extreme weather, and significant time for installation and removal. • No standardised, automatic or universal snow chain system is currently available across the Army "B" vehicle fleet.
Technology domain (s)	• Mechanical and Electromechanical Systems • Automotive Engineering • Cold Weather Materials and Design • Actuation and Control Systems • Vehicle Integration and Safety Systems
Application/Use Case	• The automatic snow chain system shall be applicable to all Army 'B' vehicles including ALS Trucks, 2.5 Ton vehicles, Gypsy, Safari, Scorpio, Force Light Strike Vehicle (LSV), Water Bowsers and Ambulances. • The system shall support uninterrupted vehicle movement in snow-bound areas, icy roads and high-altitude regions during routine operations, convoys and emergency missions. • The solution shall be particularly useful for logistics convoys, casualty evacuation, water supply and emergency response operations where delays can have

	serious operational consequences. • The system shall enhance mobility during training exercises and operational deployments in winter conditions.
Project Outcome	• A validated automatic snow chain system compatible with a wide range of Army "B" vehicles. • The solution shall be ready for induction and retrofitting across existing and future vehicle fleets.
Testing /Certification	• Laboratory and environmental testing for cold-weather performance. • Vehicle-level trials in snow-bound and high-altitude regions. • User trials and validation by the Indian Army. • Lifecycle testing and certification to validate reliability and durability •
Future Expectation from the prototype / Technology developed	• The prototype shall demonstrate automatic or near-instant Deployment and Retraction of snow chains without requiring crew to dismount. • The system shall function reliably across different wheel sizes, axle configurations and vehicle weights within the Army 'B' vehicle category. • The solution shall maintain vehicle safety, stability and braking performance during operation on snow and ice. • The design shall be modular and adaptable for retrofitting on existing vehicles with minimal modification.
Potential Market	• Indian Army and other Armed Forces. • Paramilitary forces operating in snow-bound regions. • Select civilian applications in high-altitude and snow-prone areas.
Business Case	• High potential for bulk induction across the Army "B" vehicle fleet. • Repeat orders are expected due to fleet expansion and vehicle replacements. • Export potential exists for friendly foreign militaries operating in similar environments.

Problem Statement 10: AI Enabled Gun Area Recce System

Organization Name	**Indian Army**
Challenge title	AI Enabled Gun Area Recce Module.
Problem Statement	The success of deployment including night occupation depends to a very large extent on thoroughness of recce carried out. Currently the same is done manually. Significant manpower with large no of stores undertakes recce manually usually under the central command and control of Regt 2IC. This process is time consuming and often becomes extremely challenging specifically during night, adverse wx condition and in difficult terrains. There is an omnipresent threat to life and risk to the entire operation. Thus, there is a felt need to develop an AI Module which makes the entire day & ni recce function more efficient quick and accurate enabled by AI and associated tech.
Challenge brief/definition	• Deploy of Artillery platforms is a vital operational task. It involves diligent trn analysis, detailed review and management of battlespace, selection and assessment of prospective Gun Areas, route management, ascertaining suitability of Gun Areas and Gun Platforms, analysis of threat to life and msn etc. These functions are predominantly being carried out manually and hence are time consuming. In addition, there remains a persistent risk to life of Recce Party and risk to Ops during the entire process of Recce and Deployment. • Process of Recce and Dply involves analysis of large amount of data including conventional paper maps, GIS database, open sources trn Imagery, Satl Imagery (as per avbl) and physical recce on foot or veh. There is a scope of enabling the entire process through AI and associated technologies. The envisaged solution can empower existing/ future UAS Sys and assit decision making with min human intervention.
Existing Solution (if any)	No AI enabled solution exists in service
Technology domain (s)	AI /ML (Software based AI Module interoperable with platforms incl UAS and capable to operate on Edge).
Application/Use Case	AI Integrated / Enabled Recce Platforms incls UAS.
Project Outcome	• AI Enabled Gun Area Recce Module which is ruggedized (Mil grade), Edge deployed and can be integrated with any existing and future UAS Sys.
Testing /Certification	• EMI / EMC Tests. • Cyber Aspects -ISO / IEC 27001 or equivalent. • STQC Certification – (EAL1-7) • CeRT-in / SAG / ACG Eval.

<table>
<tr><td></td><td>

JSS 55555
MIL-STD-810H
MIL- STD-882E
BIS / NABL accredited Components
Bis / NABL Components.

<table>
<tr><td>AI Risk Management</td><td>ISO / IEC 42001 or equivalent.
ISO / IEC 23894 : 2023 or equivalent.
ETAI criteria by DRDO or equivalent.</td></tr>
<tr><td>IS / IEC Safety</td><td>IEC 62040-1:2017 or equivalent.</td></tr>
<tr><td>ICT Parameters</td><td>IS / IEC 62368 or equivalent.</td></tr>
<tr><td>Functional Safety</td><td>IEC 61508 or equivalent.</td></tr>
</table>
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<tr><td>Future Expectation from the prototype / Technology developed</td><td>Prove the concept for AI Enabled Gun Area Recce.
Integration with existing and Future UAS Sys</td></tr>
<tr><td>Potential Market</td><td>Indigenous Capb for AI assisted Gun A Recce in all trns.
Prospective Export Potential.</td></tr>
<tr><td>Business Case</td><td>Potential Gun A Recce Sys for all Arty Regts.
Modular AI Enabled Recce and Trn Assessment Algorithm.</td></tr>
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Problem Statement 11: Integrated Indigenous Development of Germanium Lenses for Thermal Imagers

Organization Name	Indian Army
Challenge title	Integrated Indigenous Development of Germanium Lenses for Thermal Imagers
Problem Statement	The proposed development of indigenous Germanium (Ge) optical lenses for thermal imaging systems (Both Cooled & Un-Cooled Sys) directly supports national self-reliance initiatives and strengthens domestic capability in infrared (IR) optical manufacturing. Germanium lenses are critical components in thermal imagers used across defense, surveillance, and industrial applications. At present, such systems are largely imported due to the complexity of precision and technologies.
Challenge brief/definition	• Thermal imaging systems deployed for surveillance, reconnaissance, targeting, and monitoring rely heavily on infrared-transmissive optical elements, particularly germanium-based lenses, to deliver clear and accurate thermal imagery. These optical components must operate efficiently in the MWIR and LWIR bands while maintaining high transmission and minimal distortion. However, many existing solutions face limitations related to optical losses, surface reflections, and environmental degradation, which can reduce overall system performance. • Germanium, while offering excellent infrared transmission and a high refractive index, is inherently susceptible to surface reflection losses and mechanical fragility. Without advanced coatings and protective treatments, lenses may suffer from reduced transmission efficiency, susceptibility to scratches, moisture damage, and coating delamination under harsh operating conditions. Additionally, temperature variations can introduce focus shift and optical misalignment, impacting image sharpness and detection reliability. • There is a need for a ruggedized, high-precision germanium optical solution with advanced anti-reflective and protective coatings tailored for field deployment. The optical system must maintain stable transmission, optical clarity, and structural integrity across diverse environmental conditions including dust, humidity, vibration, and temperature extremes. •
Existing Solution (if any)	Current Germanium coated infrared lenses used in defense platforms largely rely on imported Thermal Imager assemblies, with domestic efforts focused mainly on system integration rather than subsystem manufacturing
Technology domain (s)	• The proposed development of Germanium coated infrared lenses spans three key technology domains: • Optical Materials & Fabrication Domain – Processing of infrared-grade optical materials, precision machining, grinding, and polishing of lens substrates, and shaping of

	complex IR optical geometries. • Coating & Surface Engineering Domain – Development of durable Germanium-based and multi-layer anti-reflective (AR) coatings, diamond-like carbon (DLC) protective coatings, and surface treatments to enhance infrared transmission and environmental resistance. • Integration & Qualification Domain – Optical alignment, assembly into lens groups, performance validation, environmental testing, and system-level integration into thermal imaging optical modules
Application/Use Case	Application / Use Case • Germanium coated glass lenses will be used as critical optical components in thermal imaging systems for: • Weapon-mounted and handheld thermal sights • Surveillance and border monitoring systems • Driver vision enhancement systems for military vehicles • UAV, airborne, and naval electro-optical payloads • Industrial, firefighting, and search-and-rescue thermal cameras These lenses enable efficient transmission and focusing of long-wave infrared (LWIR) radiation, ensuring high image clarity and performance in low-visibility and night-time conditions.
Project Outcome	The project will result in the establishment of a fully indigenous capability for the design, fabrication, coating, and qualification of defense-grade Germanium optical lenses for thermal imaging systems. It will enable:- • Assured domestic supply of precision IR optical components • Reduction in dependence on imported optical elements • Improved lifecycle support and faster availability of spares • Development of national expertise in infrared optical materials and manufacturing • Strengthening of the indigenous electro-optical supply chain for defense and strategic systems
Testing /Certification	Germanium lenses developed under the project will undergo comprehensive optical, mechanical, and environmental qualification to ensure performance and durability in operational conditions. This includes: - • Optical performance testing (MTF, transmission, wavefront accuracy) • Surface quality and figure measurement using precision optical metrology

	• Coating performance validation (AR/DLC durability, adhesion, spectral response). • Environmental testing (temperature cycling, humidity, sand/dust exposure) • Mechanical robustness testing (shock, vibration, mounting integrity) • These tests will ensure suitability for use in rugged field and battlefield environments.
Future Expectation from the prototype / Technology developed	To overcome current technological dependence, prototype development is expected to deliver:- • Indigenous capability for precision fabrication of infrared optical lenses meeting required surface accuracy and finish. • Development of high-performance AR and protective coatings optimised for LWIR transmission and durability. • Achievement of low optical losses and high transmission efficiency across the operating spectral band. • Demonstration of environmental robustness against humidity, temperature variation, sand, and dust. • Provision for scalability to different lens sizes and optical configurations for various thermal imager models. • Establishment of repeatable manufacturing processes ensuring consistent optical quality and reliability.
Potential Market	Defence Sector:- Army, Navy, Air Force, paramilitary forces, armoured vehicle optics, surveillance systems, UAV payloads. Commercial Sector:- Industrial thermography, energy audits, medical diagnostics, automotive night vision, research laboratories.
Business Case	• Recurring demand for thermal imaging devices across services • Requirement for spares and replacements over system life cycles • Expansion into civilian and industrial IR imaging markets • Export potential to friendly foreign nations using thermal optics

Problem Statement 12: Weaponized HIVE of AI Enabled autonomous Robot for SF with manned & unmanned teaming

Organization Name	Indian Army
Challenge title	Weaponized HIVE of AI Enabled autonomous Robot for SF with manned & unmanned teaming
Problem Statement/	To develop weaponized hive of AI-enabled autonomous robot dogs for special forces with manned – unmanned teaming
Challenge brief/definition	A deployable group of 6-10 autonomous quadruped robots capable of collaborative operation through a secure mesh network. The hive should demonstrate shared mapping, cooperative path planning, dynamic task allocation, role switching if units are degraded and mission continuation even if a node is lost. The system must avoid single points of failure and demonstrate resilient mission continuation under attrition.
Existing Solution (if any)	• India – Nil • Globally - US & China are working & devp similar capbs
Technology domain (s)	• Hive Architecture • Autonomous Navigation in Denied Environments and ECCM Features • Manned Unmanned Teaming • UAS and Loitering Munition integration • Secure Communications & Electronic Resilience • Modular Mission Payload interface
Application/Use Case	The system should act as a force mulitiplier delivering reconnaissance, forward scouting, perimeter security, payload carriage, communications extension, and controlled tactical effects while coordinating with aerial assets. Key outcomes include: • Reduced operator cognitive load. • Greater stand-off distance from threats. • Increased operational tempo. • Expanded operational reach and improved survivability.
Project Outcome	The robots must function as intuitive teammates rather than remote-controlled machines. Desired functions includes Follow / escort, Scout, Hold position, Establish temporary perimeter security, Cover blind zones, and Return-to-operator, Command should be enabled through simplified interfaces to minimize manual control with human authorization mandatory for any

	kinetic, effects.
Testing /Certification	• Requirements Verification & Traceability Review against system specifications & operational requirements. • Thermal & Environmental Testing (high temperature, altitude, humidity). • Software Verification including HIL/SIL testing and cybersecurity assessment. • Validation of systems against representative targets and countermeasures. • Operational User Trials in realistic environments.
Future Expectation from the prototype / Technology developed	Induction into Indian Armed Forces and export to friendly foreign countries.
Potential Market	Defence
Business Case	Yes (High likelihood of bulk orders and export potential due to it being a Niche Technology)

Problem Statement 13: Indigenous Development and Manufacturing of Dewar Detector Cooler Assembly (Nos of detector- 320 x 256) used in HHTI with LRF & HHTI Bi-ocular

Organization Name	**Indian Army**
Challenge title	Indigenous Development and Manufacturing of Dewar Detector Cooler Assembly (Nos of detector- 320 x 256) used in HHTI with LRF & HHTI Bi-ocular.
Problem Statement	Cooled thermal imaging sights are critical for long-range target detection, identification, and precision engagement in defence applications. These systems rely on cooled infrared detectors housed inside a Dewar assembly and maintained at cryogenic temperatures using a miniature detector cooler (cryocooler). The Dewar Detector Cooler Assembly (DDCA) is a highly specialized electro-mechanical system combining vacuum Dewar packaging, cryogenic cooling, detector integration, and high-reliability electronics. At present, such systems are largely imported due to the complexity of precision cryogenics, hermetic vacuum sealing, vibration control, and long-life cryocooler technologies.
Challenge brief/definition	Modern thermal imaging systems depend on Dewar-based cooled infrared detectors that require reliable cryogenic cooling to deliver high sensitivity, low noise, and long-range detection. These detector coolers are mission-critical, yet they are often deployed as standalone subsystems with limited health monitoring and OEM-specific interfaces. This lack of standardised oversight can lead to undetected performance degradation, longer cooldown times, increased power draw, and unexpected failures that reduce operational readiness. An integrated Dewar Detector Cooler management framework is needed to enable real-time monitoring of key parameters such as temperature stability, vibration, power consumption, and operating hours. The system should support predictive maintenance, fault diagnostics, and seamless integration with thermal imager electronics for safe startup and shutdown. A scalable, modular design must accommodate multiple cooler technologies and platforms while ensuring reliable operation in harsh environments. Centralised performance data would improve lifecycle management, reduce downtime, and enhance the overall reliability and availability of thermal imaging assets.
Existing Solution (if any)	Current cooled thermal imaging sights used in defense platforms largely rely on imported Dewar–cooler assemblies, with domestic efforts focused mainly on system integration rather than cryogenic subsystem manufacturing.
Technology domain (s)	• The proposed Dewar Detector Cooler development spans three major technology domains:

	Cryogenic Hardware Domain – Design and fabrication of miniature cryocoolers (Stirling/linear type), compressor assemblies, cold finger integration, Dewar vacuum enclosure, detector mounting, thermal isolation structures, and long-life moving components. Electronics & Control Domain – Cooler drive electronics, temperature control loops, vibration suppression techniques, power conditioning, health monitoring, and start–stop cycle management for reliable field operation. Integration & Packaging Domain – Hermetic vacuum sealing, detector–cold finger integration, optical window integration for infrared transmission, thermal interface engineering, and environmental qualification of the Dewar Detector Cooler Assembly.
Application/Use Case	• The Dewar Detector Cooler Assembly will serve as the core cryogenic subsystem in cooled thermal imaging systems used for:- • Long-range weapon and surveillance sights • Airborne and naval thermal imaging payloads • Missile seekers and target tracking systems • Border surveillance and strategic reconnaissance platforms • High-performance scientific and defense electro-optical systems The assembly enables cryogenic cooling of infrared detectors, significantly enhancing sensitivity, range, and image clarity in demanding operational environments.
Project Outcome	To establish an indigenous capability for the design, development, and production of high-reliability Dewar Detector Cooler (DDC) assemblies for cooled thermal imagers, enabling enhanced detection range, superior thermal sensitivity, and sustained operational performance in demanding defense environments.
Testing /Certification	• The developed Dewar Detector Cooler will undergo comprehensive performance qualification and environmental testing, including:- • Cooling performance validation (cool-down time, operating temperature stability) • Vacuum integrity and hermeticity testing of the Dewar assembly • Vibration, shock, and acceleration tests for field survivability • Thermal cycling and endurance/life testing • EMI/EMC and system compatibility checks with thermal imaging modules • Certification will be carried out as per relevant defense

	and military environmental standards.
Future Expectation from the prototype / Technology developed	• To address current technology gaps, prototype development is expected to achieve the following: • Indigenous development of a miniature cryocooler capable of achieving and maintaining required cryogenic detector temperatures. • Realisation of a hermetically sealed Dewar with long-term vacuum integrity and thermal stability. • Integration of the detector with the cold finger ensuring efficient heat transfer and minimal thermal losses. • Achievement of low vibration and low acoustic noise to preserve image quality and system reliability. • Demonstration of long operational life with high start–stop cycle endurance. • 7.6 Provision for scalability and adaptability to different detector formats and future cooled imaging systems.
Potential Market	Defence Sector: - • Primary users include Army, Air Force, Navy, and CAPFs for integration into: • Weapon sights and surveillance systems • Long-range reconnaissance and border monitoring devices • Airborne and naval EO/IR payloads Commercial Sector: Applications include industrial thermography, scientific instrumentation, aerospace research, and specialised security systems requiring high-sensitivity cooled IR detection.
Business Case	The system has strong demand potential driven by the large inventory of cooled thermal imaging systems across defense platforms. Initial induction across multiple sight and surveillance programs can lead to:- • Recurring bulk orders for new systems • Replacement and lifecycle support demand • Upgrades of existing thermal imagers • Indigenous capability also opens export opportunities to friendly foreign nations using similar thermal imaging technologies

Problem Statement 14: Indigenous Development and Manufacturing of Microbolometer-Based Uncooled Infrared Focal Plane Arrays (FPAs)

Organization Name	Indian Army
Challenge title	Indigenous Development and Manufacturing of Microbolometer-Based Uncooled Infrared Focal Plane Arrays (FPAs)
Problem Statement	Uncooled thermal imaging systems play a critical role in surveillance, reconnaissance, target detection, industrial monitoring, and safety applications. The core sensing element in these systems is the microbolometer infrared focal plane array, which detects thermal radiation without the need for cryogenic cooling. Despite widespread use of thermal imagers across defense and civilian domains, high-performance microbolometer FPAs are largely imported, as their fabrication involves advanced MEMS processes, specialised infrared absorber materials, precision vacuum packaging, and sophisticated read-out electronics. The absence of an integrated domestic manufacturing capability presents a strategic technological gap.
Challenge brief/definition	A large number of thermal imaging systems are currently deployed across surveillance, reconnaissance, perimeter security, and targeting roles. Many of these systems rely on uncooled microbolometer detectors for infrared sensing due to their compact size, low power requirements, and operational simplicity. However, existing solutions often function as standalone imaging units with limited optimisation for performance consistency, environmental robustness, and system-level integration. At present, variations in thermal drift, noise performance, and non-uniformity across operating conditions can affect image clarity and detection reliability. Additionally, many microbolometer modules lack advanced onboard processing for real-time image correction, calibration, and health monitoring, leading to increased dependence on external processing and reduced operational efficiency. There is a need for an integrated, high-reliability microbolometer imaging core that delivers stable thermal imaging performance across diverse environmental conditions. The system should incorporate on-chip or embedded signal conditioning, real-time non-uniformity correction (NUC), and intelligent temperature compensation to ensure consistent image quality. Designed with a scalable and modular architecture, the solution must support seamless integration with optics, processing electronics, and display systems. It should enable low-latency video output, support AI-enabled image enhancement, and ensure compatibility with handheld, vehicle-mounted, and airborne platforms while maintaining low power consumption and high operational durability.
Existing Solution (if any)	Current systems rely predominantly on imported microbolometer FPAs integrated into locally assembled thermal imaging modules. Domestic efforts are largely limited to system-level integration with minimal control over detector fabrication.
Technology domain (s)	Based on established infrared sensor development frameworks,

	the proposed microbolometer programme spans three core technology domains:- Hardware / Sensor Domain – Design and fabrication of microbolometer focal plane arrays (FPA), MEMS absorber structures, thermal isolation legs, vacuum packaging, and pixel-level integration with ROIC (Readout Integrated Circuit). Electronics & Signal Processing Domain – Low-noise ROIC design, bias control, analog-to-digital conversion, non-uniformity correction (NUC), bad pixel replacement, and image processing electronics for real-time thermal imaging. Integration & Packaging Domain – Wafer-level vacuum packaging, hermetic sealing, window integration for LWIR transmission, thermal stabilization, detector calibration, and system-level integration into uncooled thermal imaging modules
Application/Use Case	The indigenous microbolometer detector will serve as the primary sensing element in uncooled thermal imaging systems for: Handheld and weapon-mounted thermal sights Surveillance and border monitoring systems Vehicle driver vision enhancement systems UAV and mast-mounted thermal payloads Industrial inspection, firefighting, and disaster response equipment. The detector enables real-time thermal imaging without cryogenic cooling, supporting compact, low-power, rugged systems suitable for field and mobile deployment.
Project Outcome	To establish indigenous capability for the design and manufacture of high-performance microbolometer detector arrays for uncooled thermal imagers, enabling compact, low-power, and maintenance-free thermal imaging systems suitable for large-scale deployment across defense and civilian applications
Testing /Certification	The developed microbolometer modules will undergo comprehensive performance evaluation and environmental qualification, including: Thermal sensitivity (NETD) and responsivity measurement Pixel operability, uniformity, and noise performance testing Thermal cycling and storage temperature tests Shock and vibration testing for ruggedisation Long-term stability and reliability assessment EMI/EMC compatibility with associated electronics Certification will be conducted as per relevant military and industrial environmental standards.
Future Expectation from the prototype / Technology developed	To overcome current capability gaps, prototype development is expected to deliver: - Indigenous fabrication of microbolometer FPAs with competitive sensitivity (NETD), uniformity, and pixel operability. Development of MEMS-based absorber and thermal isolation structures to maximise responsivity. Integration of a low-noise ROIC for accurate signal readout and on-chip processing support. Establishment of wafer-level vacuum packaging and hermetic sealing for long-term detector stability.

	Demonstration of stable performance across wide ambient temperature ranges without external cooling. Provision for scalability to higher resolutions and smaller pixel pitches in future upgrades.
Potential Market	Defence Sector: - Weapon sights and handheld thermal imagers Surveillance and border monitoring systems Driver vision systems for armoured and tactical vehicles UAV and portable ISR payloads Commercial Sector:- Applications include industrial inspection, firefighting, building diagnostics, medical screening, automotive night vision, and smart security systems
Business Case	The business case is strong due to the widespread adoption of uncooled thermal imagers across services. Demand drivers include:- Large-scale induction of portable and vehicle-mounted systems Replacement and lifecycle support requirements Upgrade of legacy night vision equipment Indigenous manufacturing capability can support repeat orders, cost reduction, and export potential to friendly nations and commercial markets.

Problem Statement 15: Camouflage Concealment and Deception (CCD) against SAR Imagery.

Organization Name	Indian Army
Challenge Title	Camouflage Concealment and Deception (CCD) against SAR Imagery.
Problem Statement	To provide invisibility to ground based systems (Eg: Radars Guns, Tanks etc.) against SAR imagery.
Challenge Brief / Definition	The development of technology of sensors used for observation is faster than the technological advancements to counter it. Presently the ground equipment in all three services is camouflaged using camouflage paints and multi spectral nets. These methods are effective in visible, IR and microwave band depending on the material of the MSCN. However, at present, a very few products are against SAR surveillance, which is one of the most common payload aboard any aerial observation platform. In the recently conducted Camouflage seminar, capability of materials to counter SAR surveillance was brought out. It is suggested that these materials be researched in detail for its effective use in the battlefield.
Existing Solution (if any)	Limited use of Multi Spectral Camouflage Nets.
Technology Domains (s)	Textile and clothing, Artificial Intelligence and Advanced Materials.
Application / Use Case	For camouflage concealment of Tactical Military Targets.
Project Outcome	Develop advanced materials for coating on war like equipment to camouflage and conceal against adversaries SAR surveillance measures.
Testing / Certification	DGQA
Future Expectation from the prototype development	To act as a force multiplier & improve survivability of war fighting assets during hostilities.
Potential Market	Expensive market both Domestically & Internationally. Being niche technology, scope of export is huge.
Business case	Both bulk orders & repeat orders. Repeat orders due to limited shelf life of coatings.

Problem Statement 16: Integrated Drone Management System for Monitoring Decision Support System

Organization Name	**Indian Army**
Challenge Title	Integrated Drone Management System for Monitoring Decision Support System
Problem Statement	The UAS/drones currently deployed in the TBA provide isolated, single-point video feeds limited to localised areas of operation. At present, no centralised drone management system exists that operates on an integrated platform to aggregate, monitor, and analyse data and live video feeds from multiple drones in a coordinated and unified manner.
Challenge Brief/Definition	A large number of Unmanned Aerial Systems (UAS) are currently deployed and are expected to operate simultaneously in the Tactical Battle Area (TBA) for multiple roles such as soldier targeting, intelligence gathering, GIS mapping, surveillance, training assessment, and logistics. At present, these UAS operate as standalone assets, monitored through OEM-specific autopilot platforms, resulting in isolated video and data feeds restricted to local zones and a lack of centralised, real-time information flow to commanders across the chain of command. There is no integrated system to aggregate, monitor, and analyse live video and data from multiple drones in a coordinated manner. To address this gap, an integrated drone-based decision support system is required, deploying tethered and untethered drones over a secure mesh network to provide real-time, high-quality video and sensor data to a centralised command-and-control centre. The system should enable simultaneous monitoring of all drone feeds on a common geospatial interface, support Albased video analytics, track drone health, and deliver realtime situational awareness to local commanders as well as senior headquarters. Designed as a scalable ERP-based architecture, the system must allow future expansion and integration of existing Armyinducted UAS, support flexible deployment by vehicle or personnel, and ensure end-to-end AES-encrypted communications. With consolidated data available at the command-and-control centre, the system should enable actionable inferences, detailed activity analysis, and objective assessment of trainin and o erational ro ression, thereby supporting informed, timely, and data-driven decision-making in the TBA.
Existing Solution (if any)	
Technology Domains	Based on established academic and industry frameworks, the proposed integrated drone-based decision support system spans

	three core technology domains. The hardware domain includes tethered and untethered UAS, EO/IR sensors, onboard computing, positioning systems, and secure communication equipment operating over a mesh network. The software domain comprises the centralised drone nyanagement platform, real-time video aggregation, Al/MLbased analytics, drone health monitoring, and ERP-style decision support and visualisation tools. The integration and networking domain ensures secure, encrypted data flow, interoperability across heterogeneous and legacy IJAS, seamless fusion of multi-source data, and scalable interfaces with existing command-and-control and Army IT systems, thereby enabling coordinated operations, data-driven insights, and future expansion.
Application/ Use Case	Centralised, real-time monitoring of data and live video feeds from deployed tethered and networked IJAS on a unified, integrated platform.
Project Outcome	To establish a centralized, intelligent and secure drone-based monitoring and decision support ecosystem that enhances situational awareness response speed, operational efficiency and decision accuracy across multiple domains.
Testing/ Certification	To Be developed
Future Expectation from the prototype / Technology developed	To overcome the stated deficiencies, there is a requirement to design an " Integrated Drone Management System for monitoring and Decision Support " which will have the following features :- • Network of Tethered and Networked UAS/Drones in the TBA as a integrated platform. • Real time live video feed from these multiple UAS for faster OODA Loop of Cdrs. • Augmenting the ground information with aerial information in single window at the centralised command & control centre. Provision for future scalability through phased integration of other drones already procured from various industry sources, supported by dedicated hardware
Potential Market	In the Defence sector, the primary users include the Army, Navy, Air Force and also, CAPFs/other security agencies for applications such as tactical surveillance, border and perimeter monitoring, training assessment, disaster response, and integrated command-and-control operations. The system's secure, scalable, and platform-agnostic design makes it suitable for deployment at unit, formation, and theatre levels. In the Commercial sector, the technology has potential applications in critical infrastructure security, smart cities, industrial safety, mining, oil and gas, ports, power plants, and large-scale event monitoring, where multiple drones are used

	simultaneously and require centralised monitoring and analytics.
Business Case	The proposed system has a strong business case driven by bulk and repeat orders across formations. An initial MOQ of one system per Corps Headquarters enables phased induction and operational validation. This can be followed by bulk procurement at scale, with approximately three systems per Battalion, ensuring widespread adoption across operational units. The modular, ERP-based architecture supports incremental upgrades, driving repeat orders for expansion, integration of additional drones, and capability enhancements. Given its platform-agnostic and indigenous design, the system also has export potential to friendly foreign militaries and security forces facing similar multi-UAS command-and-control challenges.

Problem Statement 17: Modular Soft-Kill & Hard-Kill Integrated Counter-Unmanned Aerial System (C-UAS) Kit for Regt of Arty

Organization Name	**Indian Army**
Challenge Title	Modular Soft-Kill & Hard-Kill Integrated Counter-Unmanned Aerial System (C-UAS) Kit for Regt of Arty.
Problem Statement	Design and develop an indigenous Modular Soft-Kill & Hard-Kill Integrated C-UAS Kit for Artillery guns, Long Range Vectors (LRVs) & SATA assets, with capability to detect, track and neutralise Nano, micro and small UAS including swarms through selectable soft-kill and/ or hard-kill mechanisms, with open architecture, high indigenous content and rapid field deployability.
Challenge Brief / Definition	There is an increasing threat from nano, micro and small-unmanned aerial systems being employed for surveillance, targeting, payload delivery and swarm attacks against military forces and critical assets like guns, artillery ammunition dumps and LRVs. Existing C-UAS solutions are largely single-mode (only soft-kill or only hard-kill), platform-specific, expensive and limited in indigenous content. A need exists for an indigenous, modular C-UAS kit capable of detecting, tracking and neutralising hostile UAS using selectable soft-kill (RF/GNSS jamming) and hard-kill (kinetic / net /interceptor) mechanisms. The system should be man-portable, vehicle-mountable, battery powered and configurable through plug-and-play modules.
Existing Solution (if any)	**Current Solutions** • Mostly soft-kill only or hard-kill only. • Imported soft-kill jammers with limited configurability. • Hard-kill gun-based or missile-based solutions with high cost. • Platform-centric integrated systems with low portability. **Limitations** • Lack modularity and rapid reconfiguration. • Have limited indigenous content. • High cost and difficult to scale. There is no lightweight, integrated, indigenous plug-and-play C-UAS kit providing both soft-kill and hard-kill capabilities in a single architecture.
Technology Domain (s)	**Broad Technical Requirements (Indicative).** • Multi-band jammer covering 400 MHz to 6 GHz,

	GNSS L1/ L2 and other frequency spectrum being used by enemy UAS. • Directional and/or Omni antenna options. • Open architecture with standard interfaces. • Encrypted data links. • Weight (man-portable configuration): ≤ 25 kg. • Setup time: ≤ 5 minutes. **The System Should.** • Detect and track UAS within 3–5 km range. • Provide RF and GNSS jamming (soft-kill). • Provide optional hard-kill effector (net launcher/ micro interceptor/ kinetic solution). • Allow modular plug-and-play configuration, which can be easily installed by gun crews. • Be man-portable and vehicle mountable. • Operate on battery power with minimum 4 hours endurance. • Provide central control through handheld controller or tablet Support standalone and networked operation.
Application / Use Case	• Various types of Artillery units to include, guns, LRV & SATA assets. • Border and forward posts. • Air bases and naval installations. • Ammunition depots and logistics nodes. • High-value government facilities. • Urban counter-terror operations. • Air defence units. The system must be operable in desert, plains, mountains, high altitude, coastal and urban environments, under day/night and adverse weather conditions.
Project Outcome	• A production ready modular system that transforms CUAS strike capabilities, achieves 70% indigenization, and positions India as a leader in advanced CUAS technology. • Functional prototype C-UAS kits, which are easy to install. • Documentation to include technical manuals, Interface Control Documents, safety cases, support and training packages. • Clear roadmap for productisation, large scale induction and future technology insertion like improved AI.
Testing / Certification	1. EMI/EMC compliance. 2. Environmental testing. 3. Safety and reliability trials.

	4. User field evaluation. • Accuracy Trials. • Target Effectiveness. • Multi-role Performance. • Operational Scenario Testing: Day/night, weather conditions. • 5. Cybersecurity evaluation and certification for communication links and software components.
Future Expectation from the Prototype /Technology Developed	• Validation of modular architecture. • User feedback for operational refinement. • Integration with layered air defence networks. • Pathway for bulk production and induction. • Should give out product improvement roadmap for future variants.
Potential Market	• Artillery Regiments across Indian Army to include towed and self-propelled guns, MBRL units, SATA units. Potential extension of requirement to Air Defence, Armoured Regiments, Para military forces and critical infrastructure protection. • Central Armed Police Forces. • State Police Forces. • Airports and critical infrastructure. • Export to Friendly Foreign Nations.
Business case	High volume demand across multiple agencies, low production cost through COTS components and strong export potential make the solution commercially viable.

Problem Statement 18: SGL Launched Loitering Munition for Tanks

Organization Name	**Indian Army**
Challenge Title	**SGL Launched Loitering Munition for Tanks**
Problem Statement	Devp of an indigenous Loitering Munition Sys capable of being launched from the existing 81mm smoke grenade launchers fitted on T-72, T-90 and Arjun tank. The sys should provide svl and precision strike capb in the imdt tac battle area and incorporate autonomous target search capability along with globally compliant safety and fail-safe mech.
Challenge Brief / Definition	Recent op experiences have highlighted the increased vulnerability of AFVs to :- • ATGM dets op from defiladed positions. • Anti-tank teams. • Lt armoured ambush elements. • Drone assisted recce and targeting. Presently, tanks rely on LoS main armt, secy armt and external UAV support (If avlb) to detect and engage a/m targets. There exists a capability gap in providing Beyond Line of Sight (BLOS) recce and precision strike capability at platform level. The proposed sys aims to utilise the existing 81mm smoke discharger interface without major structural mod to deploy a compact loitering munition capable of the fwg :- • Safe ejection from launcher • Autonomous transition to powered flight. • Real time ISR support. Cont terminal engagement of selected targets.
Existing Solution (if any)	No solution exists
Technology Domain(s)	Armament and Ammunition
Application/Use Case	Platform Integrated Solution
Project Outcome	SGL Launched Loitering Munition for Tanks
Testing/ Certification	As applicable
Future Expectation from the Prototype/Technology Developed	The prototype should:- Be compatible with existing 81mm smoke launcher sys of tank T-72, T-90 and Arjun.

	• Require min mod to the turret & associated sys. • Provide short range svl capb in the tac battle area. • Enable autonomous nav with secure communication link. • Provide day and night op capability. • Incorporate terminal attack mode against selected targets. Include abort, control self neutralisation or msn termination features in case of malfunction or loss of control.
Potential Market	To be explored
Business Case	Bulk Order

Problem Statement 19: Aircrew Protection Vest: Army Aviation Pilots

Organization Name	**Indian Army**
Challenge Title	Aircrew Protection Vest: Army Aviation Pilots
Problem Statement	Aircrew Protection Vest for Army Aviation Pilots
Challenge Brief / Definition	Indian Army Aviation aircrew operate armed helicopters in high-threat, low-altitude environments where exposure to small-arms fire, fragmentation, crash impact, post-crash fire, and harsh climatic conditions is inherent. Existing aircrew clothing and protection arrangements do not provide an integrated, lightweight, and ergonomically optimised personal protection solution tailored for rotary-wing operations. The challenge is to develop an indigenous **Combat Aviator Ensemble** that enhances survivability while preserving mobility, endurance, cockpit compatibility, and mission effectiveness, without introducing additional operational or safety risks.
Existing Solution (if any)	Current protection for Army Aviation aircrew generally comprises: • Standard flame-resistant flying clothing. • Limited or ad-hoc ballistic inserts. • Survival equipment carried separately. These arrangements provide partial protection and are not designed as a holistic, modular protection system. Additionally, dependence on imported or legacy components limits scalability, customisation, and long-term sustainment.
Technology Domain (s)	**Advanced Material** (The primary domain falls under aviation life support equipment and personal protective gear. This encompasses aerospace survivability engineering, focusing on rotary-wing aircrew needs in Army)
Application/ Use Case	Aircrew Protection Vest will be utilised by Army Aviation Pilots.
Project Outcome	• Ballistic and fragmentation resistance. • Flame resistance and thermal performance. • Ergonomic comfort and endurance. • Compatibility with aircrew equipment. Clear pass/fail criteria shall be defined based on safety and functional performance.
Testing/ Certification	• Ground-based fitment and ergonomics trials. • Simulated cockpit evaluations. • Limited flight trials to assess interference and comfort.

Future Expectation from the prototype/technology developed	• Future expectations from aircrew protection vest prototypes focus on transitioning to full scale development through rigorous testing, weight reduction and modular enhancements for improved survivability.
Potential Market	• Present requirement for aircrew protection vests prioritize lightweight ballistic and crash protection with modularity for rotary wing pilots. Future needs emphasize advanced materials and smart features and enhanced multi-threat survivability. • Commercial adoption is likely due lightweight modular designs to enhance rotary-wing survivability, comfort and mission endurance. The developed product will strengthen the defence export of India.
Business Case	Bulk order may be planned later

Problem Statement 20: Development of an autonomous and portable Drone Interception System (The "Drone Catcher") for artillery guns.

Organization Name	**Indian Army**
Challenge title	Development of an autonomous and portable Drone Interception System (The "Drone Catcher") for artillery guns.
Problem Statement/	Design and development of a robust, responsive and field deployable drone catcher system, integrated with artillery guns that can detect, track and neutralize drones at short to medium ranges in complex battlefield environment, including contested electromagnetic spectrum and dense clutter.
Challenge brief/definition	Proliferation of low-cost, high-performance drones has created a significant security gap for critical infrastructure. Conventional "hard-kill" solutions (lasers, projectiles) risk collateral damage from falling debris, while "soft-kill" (jamming) is often legally restricted and ineffective against autonomous, GPS-independent drones. There is an urgent need for a physical capture solution that secures the threat while preserving it for forensic analysis. The challenge seeks development of integrated drone catcher system tailored for artillery guns deployment, capable of protecting gun positions from Unmanned Aerial Systems and Loitering Munitions.
Existing Solution (if any)	**Current Solutions & Limitations** • Current AAD systems are optimized for larger aerial threats and are often not cost effective or responsive against swarms or slow, low altitude drones. • Man portable air defence systems are expensive per engagement and have limited utility against swarms or low altitude drones. • Existing jamming based solutions can be limited by line of sight, frequency agility of hostile drones, collateral interference to friendly systems and lack of precise kill assessment. There is limited capability for integrated, automated and localized protection specifically for dispersed and frequently relocating artillery gun positions.
Technology domain (s)	• Mechanical & Aerospace : Rapid-deployment launchers, aerodynamic projectiles, high-strength and light-weight capturing devices. • Robotics & Autonomous Systems : Navigation in GPS-denied environment, swarm coordination, dynamic path planning. • Computer Vision & AI : Micro-doppler classification, predictive tracking, edge processing. • Material Science : High-tenacity polymers, chemical entanglement options, shock-absorbing shells. Command, Control & Communication : Sensor fusion dashboards, augmented reality tracking, evidence encryption.

Application/Use Case	• Close protection of towed and self-propelled artillery guns, mortars and MBRLs deployed in field, desert, high altitude and semi urban environments from drones, swarms and loiter munitions. • Protection against reconnaissance drones, loitering munitions and swarm drones attempting to locate, track or engage artillery positions. • Local C-UAS bubble around gun areas, ammunition points and Fire Direction Centres. • Collateral damage control in urban warfare scenarios.
Project Outcome	• A production ready, versatile Drone Catcher System for Artillery Guns that meets defined performance parameters against range of target drones in field conditions. • Clear roadmap for productisation, large scale induction and future technology insertion like improved AI. • Documentation to include technical manuals, Interface Control Documents, safety cases, support and training packages.
Testing /Certification	• Field trials in plains, deserts and high altitude area with live or simulated drone targets of various sizes, profiles and tactics (including swarming). • Environmental testing for shock, vibration, temperature, humidity, dust and rain as per relevant JSS/ MIL standards. • EMI/ EMC and safety certification as per defence norms. • Cybersecurity evaluation and certification for communication links and software components. • User evaluation trials with artillery units to validate operational suitability, ergonomics and maintainability.
Future Expectation from the prototype / Technology developed	• Scalable across present and future C-UAS platforms. • Modular design enabling future integration and improvements without extensive redesign. • Clear scalability path from single gun deployment to Battery and Regiment level deployment. • Demonstrated interoperability with existing artillery C2 networks and compliance with defence cyber security standards.
Potential Market	• A production ready, versatile Drone Catcher System for Artillery Guns that meets defined performance parameters against range of target drones in field conditions. • Clear roadmap for productisation, large scale induction and future technology insertion like improved AI. • Documentation to include technical manuals, Interface Control Documents, safety cases, support and training packages.

Business Case	• Substantial scope of export and bulk orders if developed.

Problem Statement 21: AI Enabled Multi Agent Module for UAS Functions.

<table>
<tr><td>Organization Name</td><td>Indian Army</td></tr>
<tr><td>Challenge title</td><td>AI Enabled Multi Agent Module for UAS Functions.</td></tr>
<tr><td>Problem Statement/</td><td>Different types of UAS platforms are under procurement. Current and Future UAS will increasingly have automated functions giving a degree of Platform autonomy to respective platforms but in order to enable integrated operations with complete mission autonomy an AI enabled system will be an imperative and will be essential to achieve multifunction capb in a joint Integrated op envt.</td></tr>
<tr><td>Challenge brief/definition</td><td>To enable integrated UAS functions, a ruggedised AI enabled Multi Agent Module is reqd to be developed. This AI module should be able to provide comprehensive mission autonomy to various UAS functions in any Sensor Shooter architecture including mission plg, flying, search, recee, Tgt DRI, meshed comn architecture, strike and swarming. The AI module should operate on Edge and should be interoperable with various types of platforms.</td></tr>
<tr><td>Existing Solution (if any)</td><td>No AI enabled solution exists in service</td></tr>
<tr><td>Technology domain (s)</td><td>AI /ML (Software based AI Module interoperable with various UAS platforms and capable to operate on Edge)</td></tr>
<tr><td>Application/Use Case</td><td>• Potential use Case - AI enabled Multi Agent Module for UAS functions</td></tr>
<tr><td>Project Outcome</td><td>• AI enablement of UAS functions to achieve an autonomous Sensor Shooter Architecture including Msn Plg, Flying, Search, Recee, Tgt DRI, Meshed Comn Architecture, Strike and Swarming.
• A ruggedised AI Enabled Edge Module interoperable with multiple UAS.
•</td></tr>
<tr><td>Testing /Certification</td><td>
<table>
<tr><td>AI Risk Management</td><td>• ISO / IEC 42001 or Equiv
• ISO / IEC 23894:2023 or
• ETAI Criteria by DRDO c</td></tr>
<tr><td>ISO / IEC Safety</td><td>IEC 62040 – 1:2017 or Equivalen</td></tr>
<tr><td>ICT Parameters</td><td>IES/IEC 62368 or Equivalent</td></tr>
<tr><td>Functional Safety</td><td>IEC 61508 or Equivalent</td></tr>
<tr><td colspan="2">• EMI / EMC Tests.
• Cyber Aspects -ISO / IEC 27001 or equivalent.</td></tr>
</table>
</td></tr>
</table>

	• STQC Certification - (EAL1-7) • CeRT-in / SAG / ACG Eval. • JSS 55555 • MIL-STD-810H • MIL- STD-882E • BIS / NABL accredited components • BIS / NABL components
Future Expectation from the prototype / Technology developed	Prove the concept of AI enabled Multi Agent Module and mission autonomy for UAS functioning.
Potential Market	Indigenous Capb for AI assisted Multi Msn Autonomy.
Business Case	Modular AI Enabled Multi Agent Module for UAS Function.

Problem Statement 22: 360^0 Situational Awareness Kit with Driver Assistance for Protected Mobility Vehicle

Organization Name	**Indian Army**
Challenge title	360^0 Situational Awareness Kit with Driver Assistance for Protected Mobility Vehicle
Problem Statement	Drivers of Protected Mobility vehicles operate in complex operational environments where visibility is restricted due to vehicle structure, blind spots and adverse environmental conditions. Existing systems provide limited situational awareness, increasing the risk of accidents, delayed threat detection and reduced operational effectiveness. There is a requirement of an integrated 360^0 situational awareness system using multi sensor cameras, thermal imaging and AI enabled processing to provide real time monitoring, threat detection and driver assistance.
Challenge brief/definition	Develop an integrated vehicle mounted situational awareness system capable of providing 360^0 coverage around the vehicle through high resolution cameras, thermal sensors and AI based object recognition. The system should assist drivers during day and night operations, improve reaction time and enhance operational safety while reducing blind spots.
Existing Solution (if any)	Limited solutions exist in the commercial automotive sector such as surround view camera systems system and driver assistance technologies.
Technology domain (s)	• Electro Optical and thermal imaging systems.Hybrid • AI based detection and classification. • Embedded video processing and sensor fusion. Augmented systems for driver assistance – Navigation, Safety and Situational Awareness
Application/Use Case	• Driver situational awareness in PMVs. • Enhanced safety during convoy movement and tactical mobility. • Night and low visibility driving assistance. 1. Obstacle detection and threat alerts.
Project Outcome	2. Fully operational 360^0 Situational Awareness Kit with Driver Assistance for Protected Mobility Vehicle
Testing /Certification	3. As per military grade testing including user trials
Future Expectation from the prototype / Technology developed	• 360^0 Field of View with NO blind spots. • Min camera resolution – 2/k (1920x1080p). • Thermal Imaging resolution – Min 640 x 480p. • Low light performance up to 0.01 lux illumination. • IP 67 protection. • Thermal detection capability of not less than 300 m. 4. AI based object detection & identification (human,

	vehicles and obstacles).
Potential Market	• Defence – Indian Army and CAPFs • Commercial – Disaster Relief and remote infrastructure support.
Business Case	• High probability of bulk and repeat orders. • Export potential

Problem Statement 23: Indigenous development and manufacturing of the Mirror Unit used in the Thermal Imager ESSA of Tank T-90

Organization Name	**Indian Army**
Challenge title	Indigenous development and manufacturing of the Mirror Unit used in the Thermal Imager ESSA of Tank T-90
Problem Statement	The Mirror Unit is a critical optical component of the Thermal Imager ESSA system used in the gunner sight of the T-90 Tank. It plays an essential role in directing and stabilizing the infrared optical path within the thermal imaging system to enable accurate target detection and engagement in day and night conditions. The mirror unit must maintain high optical reflectivity, precise alignment, and mechanical stability under harsh battlefield conditions such as vibration, shock, and temperature variations. Currently, these precision optical components are largely sourced from foreign suppliers due to specialised manufacturing requirements. Dependence on imported mirror assemblies leads to long procurement timelines, high costs, and limited repair flexibility, which can affect the operational availability of thermal imaging systems.
Challenge brief/definition	The development of mirror units for military thermal imaging systems involves multiple technical challenges including precision optical fabrication, application of specialised reflective coatings, and accurate mechanical mounting for optical alignment. The mirror must maintain high infrared reflectivity, dimensional stability, and resistance to environmental stress while operating inside a compact electro-optical system. Achieving consistent optical quality and durability under operational conditions requires advanced optical engineering and manufacturing expertise.
Existing Solution (if any)	At present, mirror units used in the Thermal Imager ESSA system of the gunner sight are supplied through foreign OEM channels as part of the integrated electro-optical system. Domestic repair activities are generally limited to replacement of damaged mirror assemblies, as indigenous capability for precision optical mirror manufacturing for such systems remains limited.
Technology domain (s)	**Optical Engineering Domain** Design and fabrication of high-precision optical mirrors suitable for infrared thermal imaging applications. **Optical Coating Technology Domain** Application of specialised reflective coatings that provide high reflectivity and durability under operational conditions. **Electro-Optical System Integration Domain**

	Integration of the mirror unit with the thermal imaging optical path, ensuring precise alignment and compatibility with the existing system architecture.
Application/Use Case	The developed mirror unit can be used in: • Thermal imaging systems used in armoured combat vehicles • Electro-optical surveillance and targeting systems • Defence fire control and observation systems • Military night vision and infrared imaging equipment • Advanced optical imaging systems used in defence platforms The mirror unit ensures accurate redirection of infrared radiation within the optical system, enabling clear thermal imaging for target detection and engagement.
Project Outcome	Successful completion of the project will result in the indigenous capability to design and manufacture precision mirror units used in thermal imaging systems for the T-90 Tank. The developed mirror unit will provide reliable optical performance, improved durability, and stable imaging capability, enabling effective target detection and engagement during day and night operations
Testing /Certification	The developed mirror unit will undergo optical quality testing, including evaluation of surface accuracy, reflectivity, and alignment stability. Environmental qualification tests such as vibration, shock, temperature variation, and humidity testing will be conducted to simulate operational conditions encountered in armoured vehicles. System integration trials will be carried out with the Thermal Imager ESSA module, and certification will be conducted in accordance with relevant defence testing and quality assurance standards.
Future Expectation from the prototype / Technology developed	• Indigenous development of precision mirror units for thermal imaging systems. • Achievement of high infrared reflectivity and optical surface quality. • Mechanical design capable of maintaining stable optical alignment under vibration and shock. • Compatibility with the existing Thermal Imager ESSA optical configuration. • Demonstration of reliable thermal imaging performance during operational conditions. Adaptability of the developed mirror technology for other electro-optical Defence systems.
Potential Market	Defence Sector: - • Weapon sights and handheld thermal imagers • Surveillance and border monitoring systems • Driver vision systems for armoured and tactical vehicles • UAV and portable ISR payloads Commercial Sector:

	• Applications include industrial inspection, firefighting, building diagnostics, medical screening, automotive night vision, and smart security systems
Business Case	The business case is strong due to the widespread adoption of uncooled thermal imagers across services. Demand drivers include:- • Large-scale induction of portable and vehicle-mounted systems • Replacement and lifecycle support requirements • Upgrade of legacy night vision equipment Indigenous manufacturing capability can support repeat orders, cost reduction, and export potential to friendly nations and commercial markets.

24. Indigenous Development and Manufacturing of Radiator Block Used For Ranging in the Range Finder Module Of Gunner Sight 1g46 Installed on the T-90 Tank

Organization Name	**Indian Army**
Challenge title	Indigenous development and manufacturing of Radiator Block used for ranging in the Range Finder module of Gunner Sight 1G46 installed on the T-90 Tank
Problem Statement	The Radiator Block (fitted with Nd YAG Laser Rod) is a critical component of the laser range finder system used in the Gunner Sight 1G46 of the T-90 Tank. It is responsible for generating high-energy laser pulses that are used for accurate target distance measurement. **The Radiator Block operates under high optical and thermal loads and must maintain precise optical quality and dimensional stability to ensure consistent laser output. Presently, such high-quality Radiator Blocks are largely sourced from foreign suppliers due to the complexity involved in crystal growth, optical polishing, and coating processes.** Dependence on imported components leads to long procurement timelines, high costs, and limited repair flexibility, affecting operational readiness of the armoured platforms.
Challenges Brief/Definition	The development of Radiator Blocks for military laser ranging systems involves several technical challenges including growth of high-purity Nd:YAG crystals, precision machining, optical surface finishing, and application of anti-reflective coatings. **The Radiator Block must withstand high laser energy density, thermal stress, vibration, and shock conditions encountered during armoured vehicle operations while maintaining stable laser output and beam quality.** **Achieving consistent optical performance and long operational life under such conditions requires advanced material processing and optical engineering capabilities.**
Existing Solution	Currently, the Radiator Blocks used in the laser range finder module of Gunner Sight 1G46 are supplied through foreign OEM channels as part of the integrated electro-optical system. Domestic maintenance activities are largely restricted to replacement of damaged components or limited repair, as indigenous capability for manufacturing high-quality Radiator Blocks remains limited. This dependence creates supply chain constraints and increases lifecycle maintenance costs.
Technology Domains	**Optical Materials Engineering Domain** **Growth and processing of high-purity Nd YAG laser crystals with controlled doping levels suitable for high-energy laser**

	generation. **Optical Fabrication Domain** **Precision machining, polishing, and finishing of Radiator Block surfaces along with application of anti-reflective optical coatings to enhance laser efficiency.** **Integration & System Engineering Domain** Integration of the Radiator Block within the laser range finder module, ensuring stable optical alignment and compatibility with the existing fire control system architecture.
Application/Use Case	The Radiator Block assembly will be used in: - • Laser range finder systems of armoured vehicle gunner sights • Fire control systems used for target engagement • Electro-optical surveillance and targeting systems • Military range finding equipment • Advanced optical and laser-based measurement systems The component enables precise distance measurement between the weapon platform and the target, which is essential for accurate fire control solutions.
Future Expectation from the prototype development	Future Expectation from the Prototype Development **1. Indigenous development of high-quality NdYAG Radiator Blocks suitable for military laser range finder systems.** **2. Achievement of high optical clarity and dimensional accuracy required for stable laser output.** **3. Development of robust Radiator Blocks capable of operating under high thermal and optical loads.** **4. Integration with the existing laser range finder module of Gunner Sight 1G46 without major modification.** **5. Demonstration of stable laser output energy and beam quality during operational conditions.** 6. Adaptability of the developed technology for other defence laser-based systems.
Project Outcome	Successful completionProblem Statement – 12 (Indian Army) :Weaponized HIVE of AI Enabled autonomous Robo Dogs for SF with maned & unmanned teaming of the project will result in the indigenous capability to design and manufacture Radiator Blocks used in military laser range finder systems for the T-90 Tank. The developed component will demonstrate reliable laser pulse generation, high optical quality, and stable performance under operational conditions, enabling accurate target ranging capability during combat operations.
Testing / Certification	The developed Radiator Block will undergo comprehensive optical and laser performance testing, including evaluation of optical transmission, laser output energy, beam quality, and dimensional accuracy. **Environmental testing including vibration, shock, temperature variation, and humidity tests will be conducted to simulate operational conditions experienced in armored vehicles.**

	Integration trials with the laser range finder system of Gunner Sight 1G46 will be conducted to verify compatibility and operational reliability. Certification will be carried out as per relevant Defence testing standards.
Potential Market	Defence Sector: - • Primary users include Army, Air Force, Navy, and CAPFs for integration into:- • Weapon sights and surveillance systems Long-range reconnaissance and border monitoring devices
Business Case	The system has strong demand potential driven by the large inventory of cooled thermal imaging systems across defense platforms. Initial induction across multiple sight and surveillance programs can lead to:- • Recurring bulk orders for new systems • Replacement and lifecycle support demand • Upgrades of existing thermal imagers Indigenous capability also opens export opportunities to friendly foreign nations using similar thermal imaging technologies

Problem Statement 25: Fire Control System for Sniper Rifle

Organization Name	**Indian Army**
Challenge Title	Fire Control System for Sniper Rifle
Problem Statement	In the present battlefield environment, the emphasis on single shot kill probability and increased percentage of hit by sniper detachment is crucial to neutralize high value targets with minimum exposure to crew. Presently, the mission success depends upon skill and training of the firer which is vulnerable to cognitive load, human error or dynamic environment condition which may result in failure of mission. In order to achieve first round hit probability of high value target, which may present itself for a very short time, snipers have to be technologically enabled in modern battlefield. Development of ruggedized Fire control system for sniper rifle will vastly enhance the accuracy and lethality of the sniper detachment.
Challenge Brief/definition	FCS for sniper rifle will provide pinpoint accuracy, thereby increasing first hit probability. FCS will also reduce collateral damage.
Existing Solution	XM 157 NGSW-FC by Vortex optics, USA & SMASH FCS by M/s Smart Shooter Ltd, Israel.
Technology Domain	FCS for sniper rifle will provide pinpoint accuracy, thereby increasing first hit probability. FCS will also reduce collateral damage.
Application/ Use Case	FCS for sniper rifle should be light weight, capable of calculating environment conditions including distance, wind speed and other factors autonomously and project aiming point on sight mounted on weapon and effectively. It should have day and night target acquisition capability with power management system and should be able to operate in extreme temp ranging from min 30^{o}C TO plus 50^{o}C and adverse weather conditions
Future Expectations from the Prototype Devp/ Technology developed	• Single Shot Kill Probability • Minimising Human Error Enhance Accuracy & Consistency of Sniper Fire
Project Outcome	5. Fully integrated FCS System
Testing/ Certification	6. As per military grade testing including user trials
Potential Market	7. Expensive mkt both Domestically & Internationally. Being niech technology, scope of export is huze.
Business Case	8. Both bulk orders & repeat orders.

Problem Statement 26: Fire Assistance System for Assault Rifle

Organization Name	**Indian Army**
Challenge Title	Fire Assistance System for Assault Rifle
Problem Statement	In modern day battlefield environment, there is limited window of opportunity for acquiring and effectively engaging the target. Acquisition of target by firer is also affected by various factors such as reduced visibility and fatigue. Therefore, there is a need to provide assistance to individual firer to enhance accuracy and efficiency of the solider in a given window of opportunity.
Challenge Brief	Fire Assistance System (FAS) for assault rifle will enhance accuracy and quick engagement by providing assistance to individual firer. It will accurately engage the target and in turn reduce requirement of ammunition and collateral damage.
Existing Solution	ARAD Arbel System of Israel
Technology Domain	Fire Assistance System (FAS) for assault rifle will enhance accuracy and quick engagement by providing assistance to individual firer. It will accurately engage the target and in turn reduce requirement of ammunition and collateral damage.
Application/ Use Case	FAS for Assault Rifle with following capabilities :- • Target identification and tracking capability for engagement of target at effective range of in-service Assault Rifle. • FAS should not render the weapon system & the sighting system ineffective for employment. The weapon system should be made adaptable with FAS in a manner that it can be used effectively with or without the FAS. • Capability to engage static and moving target both during day and night. • Should be compatible with 'in-service' Assault Rifles without any major modification or design changes impacting performance of the weapon. • FAS should have the capability to incorporate individual firer variable to include physical and psychological behaviour i.e physical move, heavy breathing, battle fatigue, recoil and allowing the soldier to effectively neutralize the target quickly and efficiently. Should be able to operate in harsh environment conditions such as extreme temperature (minus 30^{o}C TO plus 50^{o}C), humidity and dust.
Future Expectations from the Prototype	• Target detection & Targeting • Minimising Human Error Enhance Accuracy & Consistency of Assault Rifle

Devp	
Project Outcome	• Engage static and moving target • Compatible with 'in-service' Assault Rifles without any major modification • FAS should have the capability to incorporate individual firer variable to include physical and psychological behaviour
Testing/ Certification	• As per military grade testing including user trials
Potential Market	• Expensive mkt both Domestically & Internationally. Being niech technology, scope of export is huze.
Business Case	• Both bulk orders & repeat orders.

Problem Statement 27: Design & Development of Long-Range Surveillance and Targeting Drone (LR-STD).

Organization Name	**Indian Navy**
Challenge title	Design & Development of Long-Range Surveillance and Targeting Drone (LR-STD).
Problem Statement/	The Project aims to develop Ship launched Long Range Surveillance and Targeting Drone (LR-STD) for Intelligence, Surveillance & Reconnaissance (ISR) and providing targeting data to IN units.
Challenge brief/definition	Develop an autonomous VTOL system capable of carrying out ISR and provide targeting data, when required, to own forces at extended ranges. The system shall be capable of operating beyond 700 nm from own ships with capability to undertake horizontal flight post launch, have an endurance of at least 10 hours with AUW ≤ 150 Kgs, have low RCS and payload with following capabilities:- • High resolution EO/ IR camera • Artificial Intelligence for target identification and tracking. • GoI approved high data rate SATCOM for communication and data transfer. • Provision for installing ESM, light weight radar and communication relay set. • On-board AI powered object detection, identification and tracking software enhancing Full- Motion Video (FMV) analysis by accurately identifying and tracking both stationary and moving targets at sea. • Speeds – Max ≥ 100 kn; Transit ≥ 80 kn; Loiter ≤ 40 kn.
Existing Solution (if any)	• **Present capability.** Presently ISR missions in IN are undertaken by LR/MR aircraft, RPAs, helicopters, ships and submarines apart from HUMINT, SIGINT, IMINT etc. • **Limitations of existing solution.** The assets are vulnerable to enemy fire, cannot fly close to enemy coast and are easily picked up on air surveillance and surface surveillance radars due to size.
Technology domain (s)	Core technology areas involved in the solution are AI/ML, Robotics, Advanced Materials, Unmanned/Autonomous Systems etc., high speed encrypted SATCOM link etc.

Application/Use Case	The system is intended to be used for Intelligence, Surveillance & Reconnaissance (ISR) and providing targeting data to IN units for deploying long range vectors at stand-off ranges.
Project Outcome	Long Range Surveillance and Targeting Drone (LR-STD) for Intelligence, Surveillance & Reconnaissance (ISR) and providing targeting data to IN units for deploying long range vectors.
Testing /Certification	List of testing required from accredited agencies – QA checks, Electronic checks, EMI/EMC compliance, communication checks, CEMILAC clearance etc.
Future Expectation from the prototype / Technology developed	The system shall be capable of modification/ upgrade as per future tech advancements in the field of AI, ISR, payload (imaging, radar & munitions) etc.
Potential Market	Limited availability of such drones makes it highly competitive in open market.
Business Case	Defence and Commercial for security purposes.

Problem Statement 28: Ship Launched Multi Domain Autonomous Naval Tactical Attack Drone (MANTA-Drone) for ISR and Targeting.

Organization Name	**Indian Navy**
Challenge title	Ship Launched Multi Domain Autonomous Naval Tactical Attack Drone (MANTA-Drone) for ISR and Targeting.
Problem Statement	IN presently lacks ship launched autonomous surface drone, capable of providing persistent surveillance of adversary's coastline, vessels, VA/VPs and provide targeting data to own forces at extended ranges.
Challenge brief/definition	Develop an autonomous, ship launched surface asset, capable of undertaking persistent surface surveillance and provide targeting data to own forces at extended ranges. The craft shall be capable of being carried and operated from IN ships (Length NMT 7 m, Width NMT 2.8 m and Weight NMT 2.7 Tons).The craft shall have the capability to operate in autonomous mode (navigation and collision avoidance) beyond 750 nm from launch platform and have an endurance of at least 07 days. The operating system shall have AI built in for target identification, coordination with other similar crafts and passing of targeting information. The payload shall consist of EO/IR sensor, LRF, SATCOM with encryption (with high band width), mesh capable V/UHF SDR and two multi copters for enhanced surface surveillance. the system craft incorporate stealth features to ensure low RCS. When in designated station, the craft shall submerge and only the payloads above water on a 1.5 m mast.
Existing Solution (if any)	• **Present capability.** Presently ISR missions in IN are undertaken by LR/MR aircraft, RPA (shore launched), helicopters, ships and submarines apart from HUMINT, SIGINT, IMINT etc. The targeting information is predominantly provided by ships, submarines and aircraft (including RPAs) • **Limitations of existing solution.** The assets are vulnerable to enemy fire, cannot fly close to enemy coast and are easily detected by adversaries' air and surface surveillance radars due to size.

Technology domain (s)	Core technology areas involved in the solution are AI Stack, Robotics, Advanced Materials, Unmanned/Autonomous Systems etc., SATCOM, MESH Topology SDR (encrypted).
Application/Use Case	The system is intended to be used for ISR and targeting missions of enemy coast/ designated areas. They should be capable of being deployed from ships and from shore.
Project Outcome	Long range autonomous system capable of carrying out persistent surveillance and provide targeting data using AI, to own forces at extended ranges.
Testing /Certification	List of testing required from accredited agencies – QA checks, IRPCS compliance, hull and electronic checks, EMI/EMC compliance, communication checks etc.
Future Expectation from the prototype / Technology developed	Capable of autonomous cooperative operations with similar crafts and undertaking LMs strikes.
Potential Market	• Present and future requirement of the product in service (from procurement perspective) - **Yes** • Possibility of commercial adoption – **Yes (with reduced functions)** • Will the developed product be able to strengthen the defence export of India? - **Yes** • Any other relevant info
Business Case	Give an estimate of future potential demand. Expected bulk orders /chances of repeat orders / scope of export) – **If product meets the stated requirements, the business case for future procurements is high.**

Problem Statement 29: Design and Development ship borne Autonomous Aerial Vehicle (AAV) to deploy, recover and re-deploy AS sensor(s) / payload (s) from platforms at sea.

Organization Name	**Indian Navy**
Challenge title	Design and Development ship borne Autonomous Aerial Vehicle (AAV) to deploy, recover and re-deploy AS sensor(s) / payload (s) from platforms at sea.
Problem Statement/	Underwater surveillance & monitoring rely on distributed sensor network for continuous and effective operations. Deployment, recovery and re-deployment of underwater sensors is time consuming and resource intensive. Thus, there is a critical need for a ship based AAV which is capable of deploying, recovery and re-deploying IN defined portable AS sensor(s)/ payload from platform at sea.
Challenge brief/definition	The objective is to design and develop a ship based AAV that can transport multiple AS sensors, deploy them at pre-defined or dynamically assigned locations with positional accuracy, recover sensors after mission completion and re-deploy them as operational requirement evolve. The vehicle must be capable of operate at high seas with reliable precision navigation and ensure safe handling of sensitive sensor payloads
Existing Solution (if any)	Manual deployment from ships, s/m & aircrafts.
Technology domain (s)	• Unmanned/Autonomous Systems • Robotics and intelligent control • Robotic manipulation and payload handling • Use of advanced materials for marine environment • Navigation and localization technologies such as GNSS and vision based navigation • Artificial intelligence and mission planning algorithms

Application/Use Case	AAV is envisaged to be used for following:- • Landing/ take off from platforms at sea. • Deploy IN defined portable AS sensor(s)/ payload (s) from platform at sea to specified area. • Recover the sensor post mission completion onboard platform. • Re-deploy as required
Project Outcome	AAV with a mechanism to handle/ transport/ deploy/ recover a cylindrical weight not exceeding 50 Kgs in area of operations at sea
Testing /Certification	To be ascertained as per user
Future Expectation from the prototype / Technology developed	• Autonomous capability with a minimum endurance of 08 hr • Precise handling of the payload and efficient mission execution • Swarm coordination including longer endurance • Technology demonstrator capable of scalable operational deployment
Potential Market	Defence /Commercial
Business Case	Chances of Repeat Order

Problem Statement 30: Secure indigenous AIS for platform identification

Organization Name	**Indian Navy**

Challenge title	**Secure indigenous AIS for platform identification**
Problem Statement/	IN presently lacks a secure way of exchanging data over AIS between own ships and boats
Challenge brief/definition	Develop an indigenous AIS for secure transmission of positional and navigation data between own ships and boats. This shall include development of a device capable of transmitting data like a regular AIS and secure channel for transferring data between own ships and boats. The system shall be installed onboard boats/ crafts alongwith a ruggedized portable display to enable boats in identifying own ship (over secure trnsmission) and other vessels in vicinity.
Existing Solution (if any)	• **Present capability. -** The present AIS is a COTS based system and transmits own positional and navigational data. • **Limitations of existing solution.-**The COTS AIS does not have secure transmission between ships and is not fitted onboard own boats/ crafts AIS does not have secure transmission between AIS does not have secure transmission between v
Technology domain (s)	Core technology areas involved in the solution (e.g. AI/ML, Secure algorithms, Chip development, indigenous software, IPR etc.)
Application/Use Case	The system is intended for usage between naval ships and boats/ crafts for secure transmission of own positional and navigational data.
Project Outcome	Indigenous AIS capable of secure transmission of positional and navigational data between own ships and boats/ crafts to aid in identification, without compromising own position.
Testing /Certification	Environment, shock, EMI/EMC, 24-bit level encryption etc.
Future Expectation from the prototype / Technology developed	The system is aimed at receiving data of other vessels (like a regular AIS) but transmit own data over secure channel only to own ships and boats/ crafts. It would be strategically advantageous as it would provide means of identification without compromising own position and ensure safety of personnel. The system should also be capable of spoofing own position, to other vessels in vicinity over regular channels of AIS, if required.

Potential Market	• Present and future requirement of the product in service (Yes) • Possibility of commercial adoption (No) • Will the developed product be able to strengthen the defence export of India? (Yes)
Business Case	Expected bulk orders as the IN operates a large number of boats/ crafts

Problem Statement 31: Radio Frequency (RF) Emulator for Deception

Organization Name	**Indian Navy**
Challenge title	Radio Frequency (RF) Emulator for Deception

Problem Statement/	The project aims to develop a portable EM transmitter capable of mimicking transmissions of IN warships and aircraft for the purpose of acting as decoys.
Challenge brief/definition	The project aims to develop a portable EM transmitter capable of following:- • Being installed on ships/ USVs/ vehicle. • Mimicking transmissions of various radars fitted on IN warships and aircraft for the purpose of deception. • Undertake transmission in frequency ranges from 0.05 to 40 GHz with varying parameters akin to modern military radars and missile homing heads for training EW operators.
Existing Solution (if any)	Nil
Technology domain (s)	Modular transmission modules having capability of transmitting in various radar modes and frequencies.
Application/Use Case	The system is envisaged to be used for following:- • Decoys for deceiving enemy platforms. • Testing own ESM systems.
Project Outcome	The project aims to develop an EM transmitter capable of mimicking multiple radar transmissions of warships for the purpose of deception. It should be capable of transmitting in three modes viz, surface mode, air mode and simultaneous air and surface mode of operation of at least two radars. Undertake transmission in frequency ranges from 0.05 to 40 GHz with varying parameters akin to modern military radars and missile homing heads. The Emulator should be lightweight and operate on power supply available onboard the USV/ ship/ integral power supply.
Testing /Certification	To be ascertained as per user.
Future Expectation from the prototype / Technology developed	The equipment is envisaged to be used for following:- • As decoy in place of a ship by transmitting on various types of existing radars in naval inventory • Training of EW operators.
Potential Market	Defence and Commercial
Business Case	NA

Problem Statement 32: Development of EMP Payload for C-UAS Operations

Organization Name	**Indian Navy**
Challenge title	Development of EMP Payload for C-UAS Operations.

Problem Statement/	Design and Development of Uncrewed Aerial System (UAS) mounted Electromagnetic Pulse (EMP) system for Counter UAS (C-UAS) operations.
Challenge brief/definition	Design and Development of UAS mounted EMP system for C-UAS operations. The swarm of UAS should be capable of both ship and land-based operations and have VTOL capability. The swarm of UAS with EMP Payload should have an endurance of >= 60 min, range of > 15 km and fast re-charge and re-deployment capability. The EMP payload should have an effective kill range of >= 125 m. The multi sensor detection suite should be capable of AI based detection and tracking of hostile swarm of UAS at ranges >= 15 km.
Existing Solution (if any)	Nil EMP based solution for C-UAS
Technology domain (s)	Uncrewed Autonomous Systems, EMP based C-UAS Technologies, Secure Communication, AI Enabled UAS Swarm Detection.
Application/Use Case	The system is envisaged to be used for ship and land-based C-UAS operations.
Project Outcome	The project aims to develop a swarm of UAS with EMP payload having a multi sensor detection suite, capable of both ship and land (static and mobile) based deployment for C-UAS operations.

Testing /Certification	To be ascertained as per latest guidelines promulgated by the User.
Future Expectation from the prototype / Technology developed	The system is envisaged for both ship and land based deployment, capable of providing defense against hostile UAS swarm.
Potential Market	Present and future requirement of the product in service – Yes (requirement is High) Possibility of commercial adoption of developed system – Yes Will the developed product be able to strengthen the defence export of India - Yes Any other relevant info - Nil
Business Case	Future potential demand is High

Problem Statement 33: Design and Development of Control and Monitoring unit for MiG-29K Aircraft Engine.

Organization Name	**Indian Navy**
Challenge title	Design and Development of Control and Monitoring unit for MiG-29K Aircraft Engine.

Problem Statement/	MiG-29K/KuB is fitted with qty two Control and monitoring unit, Pt. No. BARK-42 which are designed to monitor and control the power plant with the RD-33MK engine and KCA-33M aircraft accessory drive gear box on aircraft as well as Air Intake of the Aircraft. OEM has not supplied any Test equipment to test the LRU for its serviceability. In addition, limited information is available in Maintenance Manuals about the functions of sub modules and internal circuitry. The OEM provided item is found to have high failure rate. Limited information is available in the Technical Manuals provided by the OEM about the functions of subcomponents and internal circuitry
Challenge brief/definition	In-Country D&D and manufacturing of Control and Monitoring unit, Pt. No. Bark-42 for MiG 29K aircraft.
Existing Solution (if any)	Only OEM provided items are available for use.
Technology domain (s)	Re-engineering/ reverse engineering capability for Control and Monitoring unit, Pt. No. Bark-42
Application/Use Case	To be installed on MiG-29K aircraft
Project Outcome	Indigenous Control and monitoring unit, Part No. BARK-42 for utilization on with MiG-29K aircraft.
Testing /Certification	CEMILAC/ RCMA Certification and QA approval by DGAQA
Future Expectation from the prototype/ Technology developed	Setting up of in-country development and manufacturing facility
Potential Market	Huge requirement in service aircraft: - • Present and future requirement of the product in service (from procurement perspective) – **Yes, for Naval MiG 29K aircraft.** • Possibility of commercial adoption **– product could be suitably modified for utilisation on other military/ civil aircraft**

	• Will the developed product be able to strengthen the defence export of India? – **Possible.** Any other relevant info - **NA**
Business Case	Subsequent bulk procurement will be carried out by *IN* based on the requirement.

Problem Statement 34: Design and Development of Sovereign Multi-Modal Foundation Model

Organization Name	**Indian Navy**
Challenge title	Design and Development of Sovereign Multi-Modal Foundation Model.

Problem Statement/	To develop a fully sovereign, multi-modal AI foundation model for the Indian Navy that is designed, trained, fine-tuned, secured and hosted entirely within national infrastructure, providing trusted AI assistance across operational, technical and administrative domains without dependence on foreign models, APIs or cloud services, with all intellectual property owned by the Indian Navy.
Challenge brief/definition	Design, develop, integrate, validate and operationalise a fully sovereign multi-modal foundation model stack for the Indian Navy covering model architecture, multi-modal encoder integration (text, image, audio and sensor telemetry), data curation, training and fine-tuning pipelines, RAG over naval knowledge repositories, secure APIs, user interfaces, guardrails, evaluation, red-teaming, observability and lifecycle management. The foundation model shall be the primary deliverable with three deployment variants: (a) quantised models for CPU-only office productivity and RAG-assisted workflows, (b) full-scale GPU- hosted models for high-throughput mission-specific requirements, and (c) task-specific fine-tuned small models for edge deployment including sensor data processing, network management, autonomous operations and swarm coordination. The solution shall support English and major Indian languages, naval terminology and procedures, air- gapped operation, classification-aware deployments and tiered runtime profiles from edge to secure data centre, with reproducible builds, auditable supply-chain control and resilient operation under denied, degraded and disconnected conditions. All source code, training data, training pipelines, CLI tooling and model weights shall remain the exclusive intellectual property of the Indian Navy. Navy personnel shall be trained to independently update, fine-tune and re-deploy models without ongoing vendor dependency. GPU compute for model training shall be sourced through the India AI Mission, which provides free GPU access to Indian firms developing sovereign AI models. The Indian Navy shall facilitate the winner in obtaining authorisation for India AI Mission GPU resources.
Existing Solution (if any)	Open-source base models and commercial LLM services exist globally and can demonstrate useful military-adjacent functions, but they do not provide Indian Navy-specific sovereignty, classification-aware deployment, auditable supply-chain assurance, mission-tuned guardrails or assured continuity under denied or disconnected conditions. Domestically, the national AI ecosystem is maturing through government-funded compute initiatives and indigenous foundation model efforts, but no existing solution combines the full stack of sovereign training, defence-grade security, multi-classification RAG, edge-to-data-centre tiered deployment and Navy-specific domain adaptation required by this challenge.

Technology domain (s)	Architecture and modelling, Mixture of Experts (MoE), Transformers and large Multimodal models, self-supervised learning and data augmentation, quantisation and model distillation, retrieval-augmented generation, MLOps and secure deployment
Application/Use Case	Sovereign multi-modal foundation model stack whose data, training, weights, deployment and lifecycle are fully controlled within national infrastructure, with all intellectual property owned by the Indian Navy. Key application areas include: (a) Multi-source intelligence fusion, summarization and order-of-battle extraction. b) Mission planning support, COA generation and wargaming aides. (c) Maintenance, fault diagnosis, logistics and predictive spares estimation. (d) Cyber and electronic warfare threat analysis and indicator enrichment. (e) Doctrine drafting, policy comparison and administrative productivity. (f) Edge deployment for sensor fusion, network management, autonomous operations and swarm coordination. (g) Voice-based operational interaction for bridge, damage control and field environments.
Project Outcome	The sovereign multi-modal foundation model whose data, training, weights, deployment and lifecycle are fully controlled within national infrastructure, with all intellectual property owned by the Indian Navy. Specific outcomes: (a) Foundation model with multi-modal encoders (text, image, audio, sensor), voice interface (STT/TTS), quantised CPU-only variants, GPU- hosted full-scale variants and task-specific edge models. (b) Complete training and fine-tuning pipeline with data governance tooling, delivered as documented toolkit operable by Navy personnel. (c) Secure deployment stack with Profile-A (edge), Profile-B (restricted core) and Profile-C (core) runtime packages. (d) Evaluation, red-team and governance suite for ongoing certification. (e) Agentic framework with function calling tool orchestration and code generation capability. (f) Mechanistic interpretability and explainability toolkit (SAE-based). (g) Knowledge transfer programme enabling independent Navy operation.

Testing /Certification	Testing and certification from accredited agencies through progressive trial phases: (a) Shore/Lab Trials: Air-gapped installation verification, reproducible build checks, dataset provenance audits, mission benchmark runs, latency profiling and security baseline validation. (b) Secure Integration Trials: Validation with classified repositories, RAG citation checks, RBAC enforcement, policy routing and staff workflow exercises. (c) SSCT/Operational Trials: Operational vignette rehearsal with authorised users covering intelligence, mission planning, maintenance and cyber support with red-team adversarial injects. (d) Each phase shall report task accuracy, citation support rate, hallucination rate, jailbreak resistance, latency, throughput and mission success indicators. Detailed metrics as per PDS Section 8.
Future Expectation from the prototype / Technology developed	A major shift towards vertical AI capability within the Indian Navy, with specialised sovereign models serving operational, technical and administrative functions across all tiers from shore establishments to deployed platforms. Specific expectations include: (a) Foundation model demonstrating multi-modal reasoning across text, imagery, audio and sensor data with naval domain competence. (b) Quantised CPU-only variants enabling AI- assisted productivity across all shore offices and shipboard environments without GPU infrastructure. (c) GPU-hosted variants supporting high-throughput intelligence fusion, wargaming and concurrent multi-user mission support. (d) Task-specific edge models for real-time sensor processing, network anomaly detection, autonomous navigation and swarm coordination on constrained hardware. (e) Complete training pipeline transfer enabling Indian Navy personnel to independently curate data, train, fine-tune, evaluate and deploy model updates without vendor dependency. (f) Agentic capabilities with structured function calling, tool use and code generation for IT administration and technical support tasks. (g) Chain-of-thought explainability and mechanistic interpretability (SAE-based) for mission-critical outputs.

Potential Market	To the Indian Navy, sovereign multi-modal foundation models are not just a technological upgrade; they are a strategic necessity for achieving Vision 2027 and maintaining maritime dominance in the Indian Ocean Region. (a) Indian Navy: All shore establishments, ships, submarines, aircraft and UxV platforms across operational, technical and administrative functions. (b) Tri-Service expansion: Indian Army, Indian Air Force and Defence Space Agency adaptation of the sovereign model stack for service-specific use cases. (c) DPSUs and defence ecosystem: Defence public sector undertakings and OFB entities for manufacturing, maintenance and logistics AI applications. (d) Friendly foreign navies: Export potential for nations seeking sovereign naval AI capability without US/China dependency. (e) Civil/Commercial: Maritime domain awareness, port management, coastal security and critical infrastructure protection applications.
Business Case	The sovereign multi-modal foundation model is a software and AI product delivered under a licensing-based model. All intellectual property (source code, training data, pipelines, model weights) shall be exclusively owned by the Indian Navy. (a) The model is a reusable sovereign asset. Once developed, it can be adapted, fine-tuned and deployed across unlimited Navy installations at marginal incremental cost through licensing. (b) Tri-service and DPSU reuse: The sovereign model stack serves as the foundation for Army, Air Force and DPSU AI programmes, multiplying the return on initial development investment. (c) Export licensing: Friendly foreign navies represent an addressable export market under government-to-government licensing arrangements. (d) Long-term cost advantage: Indigenous capability eliminates recurring per-seat or per-API-call costs associated with commercial AI services, which scale rapidly with user base. (e) Post-development support through Annual Maintenance Contract (AMC) covering bug fixes, security patches, model performance updates and technical support under licensing-based terms as specified in PDS.

Problem Statement 35: Rearming by Drone (REARM-D) at Sea

Organization Name	**Indian Navy**
Challenge title	Rearming by Drone (REARM-D) at Sea

Problem Statement/	Navies across the globe are facing omnipresent aerial threats like swarm of low cost drones and missiles, which entails faster depletion of Surface to Air Missiles (SAM) onboard and thus necessitates ability of 'Re-Arming at Sea'. The concept of 'Rearming by Drone at Sea' refers to capability of replenishing the Surface to Air Missiles (SAMs) in ship's VLU cells using a Multi-Rotor Drone.
Challenge brief/definition	Transferring of Missile Canister 3.1 The proposed Multi rotor drone (with IC Engine) shall transfer missile canister from supply ship to a receiving ship at a precise location. 3.2 Drone shall have a gyro stabilised platform to minimize payload swing during takeoff. Loading of Missile Canister to VLU Cell 3.3 Hovering and loading of missile canister in VLU cell shall be a guided high precision operation. Automatic movement cut-off feature shall be embedded in drone to restrict any movement post completion of alignment over VLU cell. 3.4 Suitable Loading Mechanism (portable & removable) shall be provisioned on designated VLU Cell for vertically loading of the missile canister. 3.5 Suitable provisioned for variable speeds finalized during Winch Mechanism shall be lowering of missile canister at inside VLU (Specifications to be design and trial phase). Endurance of Drone 3.6 Robust IC Engine shall sustain prolonged station keeping and flights in various conditions such as controlled ship speeds, wind directions and weather patterns. 3.7 Minimum Endurance ≥ 120 min with payload carrying capacity ≥ 900 Kgs.
Existing Solution (if any)	Existing solution entails conventional replenishment procedure (in harbour) using jetty cranes which incurs significant operational downtime of the ship.
Technology domain (s)	Unmanned Systems/ Drone Technology
Application/Use Case	The drone shall be used for replenishing the Surface to Air Missiles (SAMs) in ship's VLU cells.
Project Outcome	Multi-Rotor Drone capable of replenishing the Surface to Air Missiles (SAMs) in ship's VLU cells at sea.
Testing /Certification	Testing/ Certification required from accredited agencies – QA checks, IRPCS compliance, hull and electronic checks, EMI/EMC compliance, communication checks etc.

Future Expectation from the prototype / Technology developed	The expectation from prototype drone are as follows:- 7.1 Payload carrying capacity ≥ 900 Kgs. 7.2 Flying duration with full charge ≥ 120 min. 7.3 Hovering above Vertical Launch Unit module with guided precision. Automatic movement cut-off feature shall be embedded in drone to restrict any movement post completion of alignment over VLU cell. 7.4 Winch mechanism for lowering operation of payload at variable speeds (Specifications to be finalized during design and trial phase). 7.5 Real time stabilisation feature to counter the motion caused by sea state, vessel dynamics and weather conditions to reduce the sway motion of payload.
Potential Market	The technology/ system will be highly useful for induction onboard all frontline warships of IN. The development of such system will also entail interest of probable buyers, thereby strengthening the Defence export for India.
Business Case	Expected bulk orders for IN ships.

Problem Statement 36: Electro Magnetic Launch System for Maritime Operations

Organization Name	**Indian Navy**
Challenge title	Electro Magnetic Launch System for Maritime Operations
Problem Statement/	Electro Magnetic Launch System for Launching Drones / Projectiles (with variable payload)

Challenge brief/definition	The Indian Navy requires a compact electromagnetic launch system capable of launching unmanned aerial vehicles (UAVs) or mission payload projectiles from naval platforms/ bases without the need for conventional rocket boosters or pneumatic catapult systems. The system should use DC current driven electromagnetic acceleration along conductive rails to impart the required launch velocity. The launcher must support various payload masses depending on mission requirements. The system must be compact, modular and capable of safe operation onboard naval vessels, considering constraints of deck space, power availability and maritime environmental conditions.
Existing Solution (if any)	Nil
Technology domain (s)	Electromagnetic Launch Systems, Pulsed Power Systems, UAV/ Projectile Launch Systems, Control Systems
Application/Use Case	• Launch of UAVs/ Projectile for reconnaissance, surveillance and attack • Launch of loitering munitions or payload delivery drones from naval vessels • Launch of projectiles for Counter UAS operations and other missions
Project Outcome	• Functional prototype of ship-based DC electromagnetic launcher. • Demonstration of launching variable payloads. • Documentation including design specifications, control algorithms and operational procedures.
Testing /Certification	As per IN's requirement during trials. Will be promulgated later.
Future Expectation from the prototype / Technology developed	The prototype development is expected to deliver:- • A working prototype of DC powered electromagnetic launcher capable of accelerating payloads within the specified mass and speed range. • A modular carriage/ interface mechanism capable of handling variable projectile shapes and mounting geometries. • Compact pulsed DC power delivery system compatible with shipboard power supply. • A control and safety system for reliable and repeatable launch operations.
Potential Market	Chances exists for defence export
Business Case	Chances of repeat order

Problem Statement 37: Safety Round Logging and Monitoring System (SRLMS)

Organization Name	**Indian Navy**
Challenge title	Safety Round Logging and Monitoring System (SRLMS)
Problem Statement/	Development of advance Rounds Monitoring System for usage onboard ships

Challenge brief/definition	Currently, ships use manual way of logging and recording of Safety Rounds undertaken onboard ships. The individual presently goes to a compartment and signs a book for recording of the visit. Thereafter, the rounds are registered manually for record keeping. The challenge is to develop a robust, advanced, user friendly Rounds Monitoring System for recording of the visits. It will be able to record the visit to a particular compartment with a timestamp. The equipment shall be robust against marine environments and shall be able to withstand salinity, humidity or vibration over time.
Existing Solution (if any)	No The existing manual way is workforce intensive and time consuming. Additionally, the record keeping does not have time stamp.
Technology domain (s)	Software and RFID
Application/Use Case	Safety Rounds onboard IN ships
Project Outcome	The expected prototype is envisaged to have advance rounds monitoring System. The equipment should be robust and strong withstand vibrations etc.
Testing /Certification	To be mutually agreed upon by firm and IN
Future Expectation from the prototype / Technology developed	The product will be installed onboard all IN ships to replace the existing practice of manually logging of rounds.
Potential Market	• The equipment shall be provisioned onboard all IN ships. • The Indian Coast Guard can also procure the equipment for shipboard usage • The product will be one of its kind, if developed to requisite standards and quality and may have export potential including use case in merchant marine.

Business Case	The equipment will be provisioned onboard all small ships.

Problem Statement 38: Development of software for P8I sonobuoy data

Organization Name	**Indian Navy**
Challenge title	Development of software for P8I sonobuoy data
Problem Statement	The project aims to develop a standalone software that undertakes processing, identification and classification of recorded data of sonobuoys dropped by P8I

Challenge brief/definition	The project aims to develop a software capable of following: • Automatic running of recorded sonobuoy data (waterfall display) to undertake detection of fundamental frequency along with associated harmonics. • Loading of LOFAR database to undertake automatic co-relation of discretes with the library. • Presentation of bearing of all discretes recorded for easy co-relation of the tactical picture. • Processing of multiple buoy data simultaneously in batches of 2,4,8 and 16.
Existing Solution (if any)	Nil
Technology domain (s)	Suitable algorithm to detect and classify data
Application/Use Case	The system is envisaged to be used for post mission analysis of sonobuoy data obtained from P8I
Project Outcome	The project aims to develop a software that can be deployed along with aircrew for ground analysis at air station and at detached locations.
Testing /Certification	To be ascertained by user
Future Expectation from the prototype / Technology developed	The equipment is envisaged to be used for expeditious analysis of sonobuoy data to facilitate aircrew with pre-mission briefs for ASW sorties.
Potential Market	Defence
Business Case	NA

Problem Statement 39: Design and development of a universal digital gauge to monitor firing pin efficiency in weapon systems employing electrical and percussion mode of firing (Torpedo tubes / gun mounts/chaff launchers)

Organization Name	**Indian Navy**
Challenge title	Design and development of a universal digital gauge to monitor firing pin efficiency in weapon systems employing electrical and percussion mode of firing (Torpedo tubes / gun mounts/chaff launchers)
Problem Statement	To develop a universal digital weight of blow gauge for measuring the impact of firing pins of torpedo tubes and gun mounts

Challenge brief/definition	Torpedo tubes and gun mounts employ percussion mode of firing for initiating primer explosive. A firing pin is installed in the weapon system which is released to impact the primer. Based on the impact of firing pin on the primer, the prepellant is initiated to drive the projectile. Towards assessing the serviceability of the firing pins, weight of blow is to be measured as part of inspection routines and post Defect rectification. Towards measuring the weight of blow of the firing pin, it is proposed to develop a digital weight of blow gauge utilising load cells for measuring the impact force of firing pin.
Existing Solution (if any)	Presently copper pellets are utilised to measure the weight of blow in torpedo tubes. By measuring the depression of the copper pellet, weight of blow is measured.
Technology domain (s)	Load cell, weight of blow gauge.
Application/Use Case	The universal digital weight of blow gauge will be utilised to measure impact force of firing pins in torpedo tubes and gun mounts.
Project Outcome	The digital gauge will be utilised for measuring the weight of blow of percussion mode of firing
Testing /Certification	Testing would be undertaken in accordance with QAP/ ATP. Draft QAP/ ATP document shall be prepared by the Development Agency (DA) and submitted to IN for vetting and approval.
Future Expectation from the prototype / Technology developed	Load cell technology can be utilised in all types of percussion mode of firing in weapon system including small arms.
Potential Market	The gauge once developed will be utilised by IN to measure the weight of blow of firing pins of torpedo tubes and gun mounts.
Business Case	Chance of repeat order

Problem Statement 40: New age DC repair kit

Organization Name	**Indian Navy**
Challenge title	New age DC repair kit
Problem Statement	Development of light weight Aramid based pipe repair kit as a compatible replacement of existing metallic Multipurpose bands used for Damage Control onboard ships
Challenge brief/definition	Currently, ships use metallic Multipurpose bands for repair of pipes during damage control and being issued as part of CNAL. The multipurpose bands are made up of Stainless steel and are of varying sizes of diameters ranging from 20 mm to 200 mm. The existing metallic multipurpose bands are heavy and difficult to use. The challenge is to develop a robust, light weight, user friendly aramid fabric make band/ kit to seal damaged pipelines thereby reducing water ingress. The equipment shall be robust against marine

	environments and shall be able to arrest water ingress through damaged pipelines without degradation by salinity, humidity or vibration over time.
Existing Solution (if any)	No. The existing Multipurpose bands are heavy and cumbersome to use. Being metallic, they do not take accurate shape of the pipe and therefore do not achieve proper sealing.
Technology domain (s)	High tensile fabric and designing
Application/Use Case	Damage Control onboard IN ships
Project Outcome	• The expected prototype is envisaged to replace the existing metallic Multipurpose band. • The kit should be of adequate strength, user friendly for tightening, flexible and form a complete seal over a pipe
Testing /Certification	To be mutually agreed upon by firm and IN
Future Expectation from the prototype / Technology developed	The product will replace the vintage multipurpose bands presently available onboard all IN ships, as part of CNAL
Potential Market	• The equipment shall be provisioned onboard all IN ships. • Indian Coast Guard can also procure the equipment for shipboard usage. • The product, if developed to requisite standards and quality and may have export potential including for merchant marine.
Business Case	The equipment will be provisioned onboard all ships.

Problem Statement 41: Underwater Welding Electrode.

Organization Name	**Indian Navy**
Challenge title	Underwater Welding Electrode.
Problem Statement	Development of underwater welding electrodes.
Challenge brief/definition	Presently, in order to undertake structural repairs of the underwater areas, the ship/submarine is required to be docked. While minor breaches in the underwater hull are being repaired using cold repairs/ doublers in the interim to keep up with the operational requirements, final/ complete repairs require docking of the vessel. This leads to unavailability of the vessel for operational requirement. Therefore, development of underwater electrode would not only preclude the necessity of docking of the vessel but also ensure operational availability.
Existing Solution (if any)	NA

Technology domain (s)	Advanced Materials
Application/Use Case	Development of electrodes which can be used for undertaking afloat/ underwater welding/ repairs.
Project Outcome	Development of underwater electrode would not only preclude the necessity of docking the vessel but also ensure operational availability.
Testing /Certification	• Undermentioned test/ certification through any NABL Accredited lab. • Radiographic quality test from a butt-welded plate as per IS: 1182. • Three longitudinal all weld metal tensile test from a butt-welded plate iaw IS 1608. • Three all weld metal charpy impact tests from a butt-welded plate iaw IS 1757. • Three transverse tensile tests from a butt-welded plate. • Three transverse face and three transverse roots bend tests from a butt-welded plate iaw IS 1599. • Diffusible hydrogen estimation test IS 11802.
Future Expectation from the prototype / Technology developed	Induction in the IN inventory for utilisation for afloat repairs.
Potential Market	• Present and future requirement of the product in service (from procurement perspective) – Product can be extensively used for obviating dry docking requirement for underwater repair. • Possibility of commercial adoption – Yes • Will the developed product be able to strengthen the defence export of India? – Yes
Business Case	Chances of repeat orders

Problem Statement 42: Non-Destructive Test for weld Joints in Afloat Condition

Organization Name	**Indian Navy**
Challenge title	Non-Destructive Test for weld Joints in Afloat Condition
Problem Statement	Development of underwater NDT.
Challenge brief/definition	Testing the quality of weld is required to be undertaken post completion of any repairs. Presently, feasibility of undertaking in-water structural repairs of the underwater areas of ships/ submarines is being explored. Accordingly, development of an underwater NDT method would help in substantiating the quality of repair/ weld post completion of afloat repairs
Existing Solution (if any)	NA
Technology domain (s)	Advanced NDT Tech

Application/Use Case	To assess quality of in-water repair/ weld post completion of afloat repairs.
Project Outcome	Should be able to identify weld defects in afloat condition. The defective sample would be in water to test the efficacy of the NDT equipment.
Testing /Certification	Certification of results/ outcome through any IACS membe
Future Expectation from the prototype / Technology developed	Induction in the *IN* inventory for utilisation for afloat repairs.
Potential Market	• Present and future requirement of the product in service (from procurement perspective) – Product can be extensively used for obviating dry docking requirement for underwater repair. • Will the developed product be able to strengthen the defence export of India? – Yes
Business Case	Chances of repeat orders

Problem Statement 43: Specialized Indigenous Hardware, AI & Storage computing based Layered Solution for Collating data from ships for analytics and deep Learning.

Organization Name	**Indian Navy**
Challenge title	Specialized Indigenous Hardware, AI & Storage computing based Layered Solution for Collating data from ships for analytics and deep Learning
Problem Statement	Naval platform requires robust ,on-board data processing capabilities to support increasingly complex missions. Current solutions face a significant limitation: the absence of a single hardware platform capable of simultaneously delivering both scalable, high-capacity storage and high-performance Al inferencing. This creates a bottleneck for real-time data analysis and decision-making.To address this, we propose a ruggedized Al-enabled edge computing and storage system. This solution utilizes a secure, MIL-grade, modular,and decoupled architecture,allowing storage and Al compute resources to be independently provisioned, scaled, upgraded, and managed based on evolving mission requirements. This approach overcomes the limitations of monolithic systems and provides a flexible,resilient,and future-proof solution for naval data processing needs.

Challenge brief/definition	Modern Indian Naval platforms are increasingly dependent on sophisticated embedded systems for critical operational functions. These embedded systems inherently exchange vast amounts of data through internal data streams, which are often visible throughintegrated Human-Machine Interfaces (HMls). Despite this rich and continuous flow of valuable information, there currently exists no standardized mechanism to automatically extract or interpret this data in a universally intelligible format. This creates asignificant gap between the availability of onboard data and its potenal utility inenhancing operational awareness,diagnostics,and decision-making. Additionally, traditional data acquisition methods may interfere with the operational integrity of these systems, potentially disrupting their intended functionality—an unacceptable risk in mission-critical scenarios onboard naval vessels. To overcome the limitations, the challenge calls for the indigenous development of a novel and comprehensive technological solution. This solution should feature an integrated ecosystem of Make in India hardware and homegrown software powered by Atrtificial Intelligence. It must be capable of non-intrusively interfacing with existing embedded systems to capture data flows without impacting their normal operation. The solution should extract, translate, and structure the data in real-time, enabling its synchronized transmission and aggregation using a multi-tier storage and computing architecture. By making this information readily accessible, it can then be utilized for advanced data analytics, Machine Learning (ML), and Deep Learning (DL) applications—ultimately enhancing situational awareness, threat detection, and decision support onboard Indian Naval platforms.
Existing Solution (if any)	No such solution exists for storage and running Al/ML model on a MIL grade hardware.
Technology domain (s)	Al/ML, Edge Al, Hardware Software codesign, Embedded system

Application/Use Case	• Seamless data capture with edge Al Processing • Multi-tier storage computing with cross platform computability • Ruggedized Edge Al hardware with accelerator
Project Outcome	**Hardware.** • Storage cum inference device as per the QRs mentioned above, Qty 04 (four). **Software.** • Application required to for user interference,accessing application, debug or test hardware and to runvarious Al/ML based applications. • User/ operational Manual, Maintenance manual installation manual along with backup CD/DVD for OS/ Applications.
Testing /Certification	The proposed solution shall be designed, manufactured and tested to comply with applicable military and maritime quality assurance standards be designed to conform to the following regulations (or equivalent):- a) MIL-STD-810G/H b) MIL-STD-461E c) JSS:55555 d) FCC Class A e) CE Safety & Emission f) BIS (Vaild license)
Future Expectation from the prototype / Technology developed	• Dedicated Al Accelerators • Event driven architecture for real time inferencing and response
Potential Market	• The solution can be adopted by all three services • Commercially,it can be adopted and utilized byaviation sector for transmission of data • Proposed solution have potential of export also.
Business Case	MPQ: 04 (Four)

Problem Statement 44: Inflatable Hatch Sealer

Organization Name	**Indian Navy**
Challenge title	Inflatable Hatch Sealer
Problem Statement/	Development of lightweight Aramid based hatch sealers for sealing of damaged hatch during damage control onboard ships
Challenge brief/definition	Currently, ships are not inn possession of any damage control item use for sealing hatch in case of damage to the hatch. The existing grid shores are used to strengthen the water tight integrity post-closing the hatch and is of no use if hatch cover is damaged. The challenge is to develop a robust, light weight, user friendly and fabric make inflatable hatch sealer thereby restricting water ingress. The equipment shall be robust against marine environments and shall be able to arrest water ingress through hatch without degradation by salinity, humidity and vibration over time.

Existing Solution (if any)	No. Currently, ships are not in possession of any damage control item use for sealing hatch in case of damage to the hatch. The existing grid shores are used for strengthen the water tight integrity of hatch
Technology domain (s)	High tensile fabric
Application /Use Case	Nil
Project Outcome	Nil
Testing /Certification	Nil
Future Expectation from the prototype / Technology developed	Nil
Potential Market	Nil
Business Case	Nil

Problem Statement 45: Development of Doppler Velocity Log

Organization Name	**Indian Navy**
Challenge title	Development of **Doppler** Velocity Log
Problem Statement/	IN presently does not have an acoustic sensor that measures the vater column by analysing the frequency shift (Doppler effect) of
Challenge	Develop an indigenous DVL, to measure ship's velocity utilising d sound waves. The system should be capable of being integrated ation system to improve the navigation accuracy and robustness.
Existing Solution (if	• **Present capability:** IN presently operated EM logs • **Limitations of existing solution:** The DVLs being used onboard submarines are of foreign make and no such system exists onboard ships
Technology domain (s)	Core technology areas involved in the solution (e.g. Sensor orithms, Chip development, indigenous software, IPR etc.)
Application /Use Case	The system is intended for usage onboard IN ships

Project Outcome	Nil
Testing /Certification	Nil
Future Expectation ogy developed	The system is aimed at improving navigational accuracy in GPS
Potential Market	Nil
Business Case	Nil

Problem Statement 46: Fire Fighting Drone for High-Rise buildings

Organization Name	**Indian Navy**
Challenge title	Fire Fighting Drone for High-Rise buildings
Problem Statement/	Development of FF Drone for fire fighting in high rise buildings in shore establishments

Challenge brief/definition	Fire fighting in a high rise building is a challenge and often constrained by a reach of an FF Truck/ ALP.However, with increase in the number of high rise buildings in IN, the necessity exists to ensure a delivery medium for a fire extinguishing media/foam to high rise buildings in IN.Development of firefighting drone capable of delivering foam for upto 150m height with horizontal foam throw distance of atleast 5m at (90deg) with a minimum capacity of 60ltr/min is envisaged. The system shall be provided with a carrying vehicle with an integrated water and foam tank which shall provide a fire fighting endurance of not less than 20min. The flight endurance of drone shall not be less than 45minutes and payload carrying capacity of 150kg. It shall also be provided with optical and IR camera for remote viewing. The system shall be provided with a pump of adequate capacity to ensure foam delivery and an integrated control panel. The deployable time for the system from cold state using not more than two personnel shall not exceed more than five minutes.
Existing Solution (if any)	NA
Technology Domain	• Drone/ Quadcopter • Fluid Dynamics • Fire Fighting
Application /Use Case	Fire fighting in high rise buildings.
Project Outcome	Development of effective firefighting solution for High rise buildings in IN.
Testing /Certification	Certification from NABL accredited labs and other associated agencies will be mandated and will be indicated by IN subsequently.
Future Expectation from the prototype / Technology developed	The system shall provide effective fire fighting for atleast 20min in high rise buildings at 150m height by delivering foam at atleast 60l/min.

Potential Market	The proposed technology has potential market for both Defence and Commercial
Business Case	rExport potential with bulk orders from civilian and commercial so has a capability for repeat order from IN and other sister services

Problem Statement 47: Sensing Transformer to Convert Angular Motion to Electrical Signals for MiG 29K Aircraft Engine

Organization Name	Indian Navy

Challenge title	Sensing Transformer to Convert Angular Motion to Electrical Signals for MiG 29K Aircraft Engine
Problem Statement/	MiG-29K/KuB is fitted with RD 33MK engine which has one Transformer(Pt no. DBSKT-650-1SH-02) that measures angle of fan Inlet guide vane of engineand transmits signal to the BARK-42 Automatic Control and Monitoring Unit. The OEM provided item is found to have high failure rate. Limited information is available in the Technical Manuals provided by the OEM about the functions of sub components and internal circuitry
Challenge brief/definition	Indigenous Design & Development of Transformer (Pt no. DBSKT-650-1SH-02)
Existing Solution (if any)	Only OEM provided item is available for use
Technology domain (s)	Re-engineering/ reverse engineering capability preferably in the field of RVDT for aviation use.
Application /Use Case	To be fitted on RD-33MK engine of MiG-29K aircraft

Project Outcome	Availability of indigenously developed Transformer for utilisation on MiG 29K engine
Testing /Certification	CEMILAC/ RCMA Certification and QA approval by DGAQA
Future Expectation from the prototype / Technology developed	High Availability of Manufacturing facility will reduce the turnaround time and reduce OEM dependency.
Potential Market	Huge requirement in service aircraft:- Present and future requirement of the product in service (from procurement persepective) –Yes,for Naval MiG 29K aircraft. Possibility of commercial adoption – product could be suitably modified for utilisation on other military/ civil aircraft Will the developed product be able to strengthen the defence export of India? – Possible. Any other relevant info - NA
Business Case	Subsequent bulk procurement will be carried out by INbased on the requirement.

Problem Statement 48: Indigenous development of Pressure Transmitter for MiG 29K

Organization Name	**Indian Navy**

Challenge title	Indigenous development of Pressure Transmitter for MiG 29K
Problem Statement/	MiG-29K/KuB is fitted with RD 33MK engine which has six RAPRIZ Pressure transmitters. Part no.s of the same are as follows:- RAPRIZ-A-2,00-2-C1(Qty 02) RAPRIZ-A-10,0-2-C1(Qty 02) RAPRIZ-A-100-2-C1 (Qty 01) RAPRIZ-A-60,0-2-C1(Qty 01). Pressure transmitter RAPRIZ measures air, oil and fuel pressure in engine and transmits signal to the Automatic Control and Monitoring Unit (BARK-42). The OEM provided item is found to have high failure rate. Limited information is available in the Technical Manuals provided by the OEM about the functions of sub components and internal circuitry
Challenge brief/definition	In-country D&D along with manufacturing of Pressure Transmitters RAPRIZ.
Existing Solution (if any)	Only OEM provided item is available for use.
Technology domain (s)	Manufacturer of pressure transmitters.Re-engineering/ reverse engineering capability for pressure transmitter.
Application/Use Case	To be fitted on RD-33MK engine of MiG-29K aircraft
Project Outcome	Indigenous Pressure Transmitter for utilisation on engine of MiG 29K aircraft
Testing /Certification	CEMILAC/ RCMA Certification and QA approval by DGAQA
Future Expectation from the prototype / Technology developed	Setting up of in-country development and manufacturing facility.

Potential Market	Requirement in service aircraft:- • Present and future requirement of the product in service (from procurement perspective) – **Yes, for Naval MiG 29K aircraft.** • Possibility of commercial adoption **– product could be suitably modified for utilisation on other military/ civil aircraft** • Will the developed product be able to strengthen the defence export of India? – **Possible.** Any other relevant info - **NA**
Business Case	Subsequent bulk procurement will be carried out by ***IN*** based on the requirement.

Problem Statement 49: Universal fire Sensor for MiG 29K Aircraft Engine

Organization Name	**Indian Navy**
Challenge title	Universal fire Sensor for MiG 29K Aircraft Engine
Problem Statement/	MiG-29K/KuB is installed with qty 40 universal Fire Detectors, Pt. No. USP-4. The item provides input to the aircraft's fire protection system is used for fire detection and fire extinguishing in main engine compartment and aircraft accessory gear box compartment on ground/ during flight. The present challenge is to develop an indigenous substitute for the existing Universal Fire Detector, Part No. USP-4 that resembles form, fit and functionality of original. Limited information is available in the Technical Manuals provided by the OEM about the functions of sub components and internal circuitry
Challenge brief/definition	In-Country D&D and manufacturing of Universal Fire Detector, Part No. USP-4 for MiG 29K aircraft.
Existing Solution (if any)	Only OEM provided item is available for use.
Technology domain (s)	Re-engineering/ reverse engineering capability for Universal Fire Detector, Pt. No. USP-4
Application/Use Case	To be installed on MiG-29K aircraft
Project Outcome	Indigenous Universal Fire Detector, for utilisation on MiG 29K aircraft.

Testing /Certification	CEMILAC/ RCMA Certification and QA approval by DGAQA
Future Expectation from the prototype / Technology developed	Setting up of in-country development and manufacturing facility
Potential Market	Huge requirement in service aircraft:- • Present and future requirement of the product in service (from procurement persepective) – **Yes, for Naval MiG 29K aircraft.** • Possibility of commercial adoption **– product could be suitably modified for utilisation on other military/ civil aircraft** • Will the developed product be able to strengthen the defence export of India? – **Possible.** • Any other relevant info - **NA**
Business Case	Subsequent bulk procurement will be carried out by IN based on the requirement.

Problem Statement 50: Virtual Walkthrough Model for P-75 Submarines

Organization Name	**Indian Navy**
Challenge title	Virtual Walkthrough Model for P-75 Submarines
Problem Statement/	The primary basic training of all submariners is undertaken at the Submarine School (SMS), INS Satavahana (Vishakhapatnam). While, sufficient training aids for the training on SSK and EKM Class of submarines exists at SMS,no training aids except PPTs, Technical manuals and in-house models of the Kalvari Class submarines are available for the training of Officers and Sailors of the Kalvari Basic Course (KBC) and the Kalvari Conversion Courses (KCC).Furthermore, the traditional training methods are heavily reliant on limited physical access to operational submarines,resulting in reduced familiarization,restricted procedural practice, and a longer learning curve. A secure, scalable, and immersive training solution is urgently required to address this capability gap and improve training value.
Challenge brief/definition	The challenge invites the development of an Interactive Virtual Walkthrough Trainer (IVWT) specifically tailored for the Kalvari Class submarines. The IVWT will digitally replicate the submarine both externally and internal including the bridge-fin, casing & casing fittings, layouts of all compartments including essential equipment and systems of the submarine within an interactive 3D/VR environment. The trainees should be able to

	navigate through a submarine using computer screens/ VR/ AR gadgets. They should be able to understand and appreciate the placement of various equipment, systems and its components. The trainees should be able to interact and operate systems/equipment upto a certain extent (for eg. opening/closing of hatches, lifting of deck plates, interact with IPMS, equipment controls panels etc with appropriate feedback/response from these systems such as glowing of lamps/indications, changes in pressure/temperature gauges etc). The IVWT should provide immersive training experience that enhances spatial awareness, while reducing dependency on real -world assets for initial training.	
Existing Solution (if any)	The training of Officers and Sailors of the Kalvari Basic Course (KBC) and the Kalvari Conversion Courses (KCC) is presently being undertaken with the help of traditional training aids such as printed Training Manuals and 2D schematics, limited inhouse models of certain equipment and Power point presentations etc.	
Technology domain (s)	**Technology Area**	**Role in IVWT**

	Computer Graphics & Real time 3D Modelling and Simulation	Accurately recreating the interior and exterior of the submarine a. 3D CAD models of components (eg. Outer casing with all casing fittings, bridge fin with all appendages like masts etc, compartments, systems and equipment within the compartments etc) b. High level texture for realism Interactive IPMS, Steering Console and equipment panels, switches and gauges The user can sit in a control seat and interact with displays & controls
	AI/ML for adaptive learning and trainee analytics	**Enhancing user interaction and simulating real-world behaviors** a. AI crew avatars or instructors for guided training b. ML models simulating ocean conditions c. Anomaly detection in simulatedsystem

		diagnostics
	VR/AR/MR	Immersive, spatially accurate training. a. complete IMPS,Steering console, Periscope and Navigation watch post simulations for operator training b. AR overlays showing part info during walkthroughs c. VR simulation as per SOPs followed onboard submarines (Diving,Surfacing etc)
	Robotics	Modeling robotic subsystems within the submersible a. Virtual replicas of planes/rudders, hatches b. Real time operation of running machinery and equipment to an extent feasible.

	Advanced Materials	Physical immersions (Haptics, Wearables) a. VR gloves for realistic touch simulations if feasible Haptics feedback Simulating b. motion, turbulence & pressure etc.
	Cloud Computing, Data And Networking	Processing large 3D environments, multiuser walkthrough a. Cloud-hosted walkthroughs for teams b. Integration with real-time submarine telemetry c. Data logging for training analytics
Application/Use Case	The proposed IVWT will be used for foundational training covering basic design and construction aspects of a submarine. Detailed overview of submarine compartments, machinery and equipment layout. Training on S/M evolutions and operation of machinery. Virtual	

	training on Damage control and Firefighting. Tracing of engineering and electrical systems. The potential Use Cases are as below **a.** Pre-boarding familiarization for new submariners **b.** Compartment wise orientation (e.g. Control room, Engine room, Torpedo room etc.) **c.** Procedural training as per SOPs (Dive, Surface, Snorting etc) **d.** Team coordination exercises **e.** Emergency procedure drills **f.** Safety Training and Simulations **g.** Maintenance and Repair simulations **h.** Mission planning and rehearsal **i.** Repetitive, risk free practice or critical high stress scenarios **j.** Real time Evaluation of trainees
Project Outcome	a. A validated and end user tested IVWT prototype simulating the exteriors/ & interiors of a Kalvari class submarine b. Documentation and framework or scaling and upgrade roadmap. c. Lifecycle sport Contracts including maintenance, upgrades and training services will be included along with the IVWT
Testing /Certification	The prototype will be evaluated by subject matter experts from Kalvari class background and certified by authorized naval QA agencies. Following testing/certifications are required to be undertaken: -

	a. Functional Testing - Ensure all interactive elements, navigation and system components work as intended –Testing by QA team, developers and end user b. Usability Testing –To test how easy and intuitive the system is for the end users (trainers and trainees) –Testing by UX designers and end users c. Performance Testing –Test smooth operations acrossall devices/platforms (Desktops,Web, VR headsets etc.)-Testing by Technical QA d. Effectiveness Test –Whether the prototype teaches what it is intended to teach –Testing by Instructors and trainees e. Accuracy Validation –Testing of technical accuracy ofhe submarine layout,equipment behavior and SOPs –Testing by submarine SMEs f. Security Tests –Safety and security of User Data and Content –Testing by Cybersecurity specialists
Future Expectation from the prototype / Technology developed	The future expectations from the prototype of IVWT Model would be both strategic and practical – focusing on validation, scalability, and learning outcomes. A well-designed prototype will act as both a proof of concept and a foundation for full scale development. Long term vision would be: a. To develop a modular and scalable digital twin platform adaptable to various classes of submarines (SSNs, SSBNs

	etc.) b. Multiplatform deployment:VR headsets,computers,tablets etc. c. To develop a Multi-scenario,multi user environment d. A Standardized basic training platform for submariners e. Educational export for maritime programs worldwide
Potential Market	a. The IVWT will be utilized extensively for the initial training of young submariners at Submarine School, INS Satavahana. b. In future upgraded more operation intensive models can be developed for regular harbor training of submariner's onboard operational submarines at Mumbai and Vizag. c. Further, similar trainer models can be developed or the existing models can be upgraded to include training on strategic submarine programmes (SSNs and SSBNs).
Business Case	Repeat order for development of similar or upgraded IVWT for deployment across submarine bases, training academy, operational commands and for platform specific expansions and version upgrades can be envisaged. There is a significant export potential to other navies operating submarine. Additionally, Lifecycle sport contracts including maintenance, upgrades and training services will be included along with the IVWT

Problem Statement 51: Pan-IAF Wargaming tool

Organization Name	IAF
Challenge Title	Pan-IAF Wargaming tool
Problem Statement	Indian Air Force (IAF) is a critical component of India's national security, responsible for protecting the country's airspace and supporting ground and maritime operations. To maintain its edge in air warfare, the IAF must continually assess its capabilities, identify vulnerabilities, and develop effective strategies to counter emerging threats. War gaming software can play a vital role in this process, enabling the IAF to simulate complex air warfare scenarios, test hypotheses, and refine its operational plans.
Challenge Brief / Definition	An advanced war gaming software is required to enhance operational planning and decision-making capabilities. The proposed war gaming software should enable the IAF to conduct thorough assessments of its capabilities, identify vulnerabilities, and develop effective strategies to counter emerging threats. It should include following. 1. Simulation Capabilities: Ability to simulate complex air warfare scenarios, including multiple aircraft types, radar systems, and communication networks. Support for various combat aircraft, including fighter jets, transport aircraft, and helicopters. Integration with existing air traffic control systems and command and control centres. 2. Real-time Analysis and Feedback: Ability to provide real-time analysis and feedback during simulations, enabling the IAF to assess the effectiveness of its operational plans. Support for data visualization, including 3D graphics and interactive displays. Integration with data analytics tools to provide insights into simulation results. 3. Suitable Interface for Integration with Existing Systems: Solution should provide suitable interface to integrate with existing IAF systems, including air traffic control systems, command and control centres, and logistics management systems. Support for data exchange and synchronization between systems. 4. Advanced Features: Support for advanced air warfare tactics, including beyond-visual-range (BVR) combat and close air support (CAS). Ability to simulate complex weather conditions, including thunderstorms, fog, and turbulence. Integration with artificial intelligence (AI) and machine learning (ML) algorithms to enhance simulation realism and provide predictive analytics. 5. User Interface and Training: Intuitive user interface, enabling IAF personnel to easily operate the software and conduct simulations. Comprehensive training program, including online tutorials, user manuals, and instructor-led training sessions. Support for multiple user roles, including simulation

	administrators, scenario designers, and analysts. Scalability and Flexibility: Ability to scale simulations to accommodate large numbers of users and complex scenarios. Support for customization and modification of simulation scenarios, including the ability to add or remove aircraft, radar systems, and other assets. Integration with cloud-based services, enabling IAF personnel to access simulations from anywhere, at any time.
Existing Solution (if any)	Nil
Technology Domain	AI/ML/Software
Application/Use Case	The war gaming software would enable the IAF to conduct through assessment of its capabilities identify vulnerabilities & develop effective strategies to counter them.
Future Expectation from the prototype development	Ability to upgrade to include evolving situations/capabilities/vulnerabilities. Integration with other branches of the Indian Armed Forces, including the Indian Army and Indian Navy.
Project Outcome	The developed war gaming software will enhance IAF's operational planning & decision making capabilities.
Testing Certification	All relevant applicable tests as defined by certifying / QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	Defence
Business Case (Bulk Order/ report order/export potential)	Can be utilised by other defence services.

Problem Statement 52: Composite situational awareness picture (CSAP)

Organization Name	**IAF**
Challenge Title	Composite situational awareness picture (CSAP)
Problem Statement	Development of a display module/ solution for integration of inputs from Counter Unmanned Aerial System (CUAS) and its integration with the sensors of Intrusion Protection Security System (IPSS) thus providing a Composite Situational Awareness Picture(CSAP).
Challenge Brief / Definition	1. The proposal is to have an integrated Situational Awareness (SA) display in form of CSAP at Ground Defence Control Centre (GDCC). The said integrated picture should be capable of receiving, processing and fusing the inputs from the sensors of CUAS and IPSS. The system should also have the capability of indicating the location of Static/ Patrolling guards and QRT. These deployed personnel should also have a facility to generate and communicate an alarm, which should be displayed at GDCC with location data. 2. **Integration Capability.** The system should be capable of integrating inputs from the following:- 2.1. Sensors of CUAS both Passive (RF) and Active Radar. 2.2. Location data of Static/ Mobile/ Patrolling/ QRT personnel (a module in this regard also needs to be developed) 3. **Composite Picture**. The picture should be high-resolution and targets picked up by CUAS server be indicated by symbols on a layered map of the layout of the Station. This display should also indicate real time location data of static and mobile guards patrolling parties. 4. **Alarm Generation**. Facility to generate alarm (both audio and visual) as and when received from guards and on the pickup reported by CUAS Sensors. 5. **Zoom In/ Out.** The CSAP should have feature of Zoom in/ out without comprising the picture resolution. 6. **Layering**. The display should have a provision of allowing the user to select/ deselect the layers in the display. 7. **Size**. The size of display should be not less than 65 inch. 8. **No. of Display**. The display needs to be replicated with

	independent control for minimum of two additional users. 9. **Remote Display**. Facility of extending a display at the S/by location. This may be available either on wireless mode (to be confirmed for its feasibility subject to existing IT regulations (in IAF) or wired. 10. **COTS**. Software used/ sub parts/ peripherals/ major/ minor components to be COTS with module based feature to address future additions/ speedy rectification etc. 11. **Up-gradation Feature**. The system as a whole need to have feature of upgrading in terms of both hardware and software as per the contemporary requirements of CUAS equipment, concept and IT/ CERT requirements. 12. **Software**. Windows/ Linux based software with up gradation facility having the shelf life of equipment (min 10 Years). 13. **Alarm Generation (External)**. The system to have a feature of generating alarm around various locations in the base both in forming Siren/ pre feed voice messages. 14. **GUI.** GUI should be Icon driven for each facility for ease of Operations by the user.
Existing Solution (if any)	Nil
Technology Domain	Network Centric Warfare
Application/Use Case	Will be employed at each airbase for generating CSAP.
Future Expectation from the prototype development	The product should be upgradable to incorporate future CUAS system likely to be procured by IAF.
Project Outcome	Availability of a CSAP at each GDCC which will enable ground defence Cdr to counter ground as well as UAS threat effectively and simultaneously.
Testing Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	Dual use by defence as well as civilian establishments employing multiple CUAS within limited area.
Business Case (Bulk Order/ report order/export potential)	Can be utilised by other services for base defence. Can be considered for export to friendly foreign countries.

Problem Statement 53: UAS-Borne NBC Detection Capabilities along with ALS equipped UAS (modular)

Organization Name	IAF
Challenge Title	UAS-Borne NBC Detection Capabilities along with ALS equipped UAS (modular)
Problem Statement	UAS-Borne NBC Detection Capabilities along with ALS equipped UAS (modular)
Challenge Brief / Definition	1. Indian Air Force (lAF) operates a fleet of helicopters, including the MLH and ALH MK Ill which are used for various missions, including reconnaissance, transport, and combat. With the increasing threat of NBC (Nuclear, Biological and Chemical) agents, there is a growing need for UAS-mounted NBC detector that can provide real-time detection and identification of NBC agents, with a high degree of accuracy and reliability. Additionally, helicopters undertake SAR and CSAR missions rescuing individuals or groups in distress both in peace and combat scenarios. Hence, the UAS should have an ALS equipment as a **roll on-roll off capability** for SAR/ CSAR operations. The benefits of having these systems are as elaborated below:- 1.1 Enhanced Situational Awareness. 1.2 Improved Response Time. 1.3 Reduced Casualties both in NBC and in SAR/CSAR environment. 1.4 Improved Intelligence Gathering. 1.5 Enhanced Force Protection. 1.6 Improved Command and Control. 1.7 Multipurpose utilisation of the platform for both NBC detection and SAR/CSAR capability. 2. Phase –I: The specifications expected from such a NBC detector system are as elaborated: 2.1 Real-time Detection. The NBC detector should be able to detect NBC agents in real-time, allowing for immediate response and mitigation. 2.2. High Accuracy. The detector should have a high degree of accuracy, with a low false alarm rate. 2.3. Wide Range. The detector should be able to detect NBC agents over a wide range, including urban and rural areas. 2.4. Reliability. The detector should be reliable and require

	minimal maintenance. 2.5. Portability. The detector should be lightweight and portable, allowing for easy transportation and deployment. 2.6. Power requirements. Payloads should be able to run using on-board power supply systems. 2.7. EMl/EMC. Nil interference from on-board systems. 3. Phase-II: The specifications expected from such a ALS equipped module are as elaborated: 3.1 Sensors. Camera for live feed to station is desirable. Communication equipment for real-time data transmission. The module should be compatible with existing programming units and PRC. 3.2 Communication Capabilities: The system should be able to communicate with:- 3.2.1 PRC to coordinate response efforts. 3.2.2 SARFIND to share critical information and coordinate operations. 3.2.3 Ability to carry out radio relay functions between ground, RESPLAT/RESCORT/Survivor. 3.2.4 Provision of datalink and encrypted transmission. 3.3 Operational Altitude. Ability to operate up to 16000 feet AMSL (mandatory) and desirable up to 25,000 ft. The system should be capable of operating from temperature ranges from +/- 50^{o} C. 3.4 Minimum Endurance. 2 hours. 3.5 Weather Resistance. Operate effectively in harsh weather conditions, strong winds up to 25 kts, heavy rain, and extreme temperatures (as defined above). 3.6 Night Vision. Should be capable of night operations thereby, enabling rescue operations to be conducted 24/7.

	3.7 Autonomous Navigation. Capable of autonomous navigation as per pre-fed route and with provision to alter the route in air as per requirement. Capable of navigating in GPS denied environment on INS or other system. 3.8 Integration with Existing Rescue Infrastructure. Seamlessly integrate with existing programming unit, PRC etc. 3.9 Real-time Video Feed. The drone may be equipped with a camera for real time video feed to JCSARS/ other users as deemed fit. 3.10 Certification and Compliance: The drone must comply with all relevant regulations and standards, including those related to aviation, safety, and environmental protection. 3.11 Data Secrecy. Provision to purge the audio/visual/navigation data remotely, in case of UAS being captured by the enemy during CSAR.
Existing Solution (if any)	Nil
Technology Domain	UAS / Sensors
Application/Use Case	The dual use UAS would be of extreme importance during an NBC scenario and also in a SAR/CSAR scenario owning to its roll on roll off capability.
Future Expectation from the prototype development	Improvement in sensor detection and rescue capabilities
Project Outcome	A UAS capable of providing functionality of ALS + NBC detection using modular payloads.
Testing Certification	All relevant applicable tests as defined by certifying / QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	Defence
Business Case (Bulk Order/ repeat order/export potential)	Can be utilised by all three services. Can be considered for export to friendly foreign countries.

Problem Statement 54: Ku Band radar for drone detection

Organization Name	**IAF**
Challenge Title	Ku Band radar for drone detection
Problem Statement	Capability of drone detection based on Ku-Band frequency detection
Challenge Brief / Definition	At present IAF has limited capability of drone detection in other bands except X-Band. Hence, there is a requirement to design Ku-Band radar for drone detection. Since there are limited radars available in Ku-Band, the developer need to focus on developing radar based on Ku- band with an assured pick up range of at least 3-5 Km for low RCS tracks. The radar should be capable of picking up low RCS threats up to 0.01 sq m and have an elevation coverage of up to 70^{o} minimum.
Existing Solution (if any)	Nil
Technology Domain	Radar
Application/Use Case	The project will be deployed for low RCS drone detection & form part of CUAS grid.
Future Expectation from the prototype development	The system should have capability for rapid mobility and quick deployment. The system should be able to integrate with the existing systems. The system should also be scalable and upgradable.
Project Outcome	Development of drone detection radar in Ku band that will be able to successfully detect low RCS targets.
Testing Certification	All relevant applicable tests as defined by certifying/ QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	Since the cases of drone attacks have been witnessed during recent armed conflicts, Armed forces is the potential market for this technology if it is successfully demonstrated.
Business Case (Bulk Order/ report order/export potential)	Can be utilised by other defence services. Can be considered for export to friendly foreign countries.

Problem Statement 55: Combat Controlling Simulator

Organization Name	IAF
Challenge Title	Combat Controlling Simulator
Problem Statement	A Virtual & Mixed Reality training simulator is required for Combat Controlling and Terminal Attack Control with embedded software and associated hardware. It is to also include pilot consoles with limited flight control to play aircraft in the simulation. Custom built specialised equipment as per user specifications that can be added to the system as and when required.
Challenge Brief / Definition	User should be able to select one of the two simulations from the system software. Also, tactical radio sets with wired connection, VR & MR Sets should be available with a provision to connect with the terminals provided. Two pilot console stations with limited flight controls with VR & MR sets also to be provided to simulate aircraft (user selectable). For display, large size LED video wall is to be provided along with acoustic speaker system. 1. The Virtual cum Mixed Reality based Simulator system is required for conducting training of Special Forces operators on Combat Controlling (CCT) and Terminal Attack Control (TAC) with aircrafts. 2. The system software should have user selectable option to play CCT / TAC simulations as per the requirement. Users are connected to the system terminal using VR/MR sets and tactical radio (wired to terminal). Similarly, pilot consoles are also connected to the simulation play using VR/MR sets and through pilot flight control terminals, with user selectable options to pick and play different types of aircrafts, data for which is to be pre-fed in the system. 3. Custom built specialised equipment, i.e. tough pads for LZ marking lights, LWPLTDS console with limited functions, and other special equipment (user selectable) in virtual world. 4. High speed and ultra-realistic graphics to be used to create the virtual world. 50 different missions (each for CCT and TAC) to be preferred in the software, that should be user selectable. 5. Large size video wall for display of first person/ third person view, mission replay, flight data and user selectable VR/MR picture of any individual selected, along with high end acoustic

	speakers. 6. Required display terminals, monitors, processors, servers, and other hardware as required. 7. User evaluation will be conducted at every stage of development. Missions will be loaded on user requirements with varied levels of difficulty, as envisaged. 8. Detailed user specifications will be shared at the time of development by the winner. Integration of aircraft parameters will be done at / with the assistance from SDI, Bengaluru. 9. Final evaluation will be conducted once all aspects related to user requirement are integrated in the system. First set of simulator system will be set up at GRTC for functional evaluation. Upgradation, wherever necessary is to be carried out and re-tested on-site.
Existing Solution (if any)	Nil
Technology Domain	Virtual & mixed reality simulator
Application/Use Case	The CCT TAC simulator will be utilised by special forces fro for Combat Controlling and Terminal Attack Control.
Future Expectation from the prototype development	Customised software and related hardware that allows integration of special equipment virtually and in reality.
Project Outcome	A fully function VR & MR based combat controllers tactical simulator that can be utilised for realistic training of specialist forces.
Testing Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service (from procurement perspective) **Yes** 2. Will the developed product will be able to strengthen the defence export of India? **Yes** Any other relevant info. IAF along with other services will be able to utilise the product
Business Case (Bulk Order/ repeat order/export potential)	Can be considered for export to friendly foreign countries with similar philosophy of combat simulator.

Problem Statement 56: Multi-Purpose All-Terrain Vehicle (Hybrid, Modular Mission-Kit Equipped) for Mobile Military & Multi Agency Operations. Mobile Air Traffic Control (MATC)

Organization Name	**IAF**
Challenge Title	Multi-Purpose All-Terrain Vehicle (Hybrid, Modular Mission-Kit Equipped) for Mobile Military & Multi Agency Operations. **Mobile Air Traffic Control (MATC).**
Problem Statement	1. During hostilities, Air Traffic Control (ATC) tower is one of the prime targets which the enemy attempts to destroy. Considering the vulnerability, a mobile fully equipped alternative is envisaged to be available to continue seamless operations in such eventualities. Considering ever increasing requirement of Advanced Landing Grounds (ALGs) / Emergency Landing Facilities (ELFs) operations and HADR activities etc, MATC can be gainfully utilised.
Challenge Brief / Definition	1. All-terrain vehicle with HVAC. ATC cabin mounted and equipped with V/UHF communication sets to have seamless Ground-Air communication at least 20 Nm around. Four controller's work position (CWP) required, out of which two adapted to the operator roles. 2. Portable communication sets (both vehicle mounted and handheld) for ground to ground communication and intercom facility with GCA and TWCC for each CWP. 3. Digital automatic voice recording facility of all background communication and aural environment inside cabin with minimum 30 days storage. 4. 360-degree day and night CCTV coverage with high resolution outdoor PTZ cameras, 30 days storage and associated large screen stitched display. 5. The design of the controller's cabin should provide unrestricted all around visibility of the manoeuvring area and easy access to all equipment required for performing duty in seated position. 6. It should have independent power supply unit to conduct sustained operation. Additional provision to draw requisite power supply from nearby locations
Existing Solution (if any)	Nil
Technology Domain	Op Capability
Application/Use Case	MATC will be utilised as standby to existing ATCs as well as

	for ALGs/ELFs operation.
Future Expectation from the prototype development	1. The Mobile ATC would be used as a standby to Main ATC Tower as when required. • Additionally, it can be gainfully utilised at temporary landing strips and Advanced Landing Grounds (ALGs) where there is no ATC Tower.
Project Outcome	• A fully functional mobile Air Traffic control that can provide unrestricted operations during contingencies/ while operating from ALGs/ELFs.
Testing Certification	• All relevant applicable tests as defined by certifying/ QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	1. A total 50 units of MATCs are envisaged for future deployment. 2. Will the developed product be able to strengthen the defence export of India? YES. 3. Any other relevant info.
Business Case (Bulk Order/ report order/export potential)	Can be utilised by other services also for operations. Can be considered for export to friendly foreign countries.

Problem Statement 57: Development of anti-drone munition of following types to be fired from 7.62/ 5.56 mm calibre rifles for countering drones.

Organization Name	**IAF**
Challenge Title	Development of anti-drone munition of following types to be fired from 7.62/ 5.56 mm calibre rifles for countering drones. 1.1 Development of Anti-Drone Air Burst Munition. 1.2 Multi bullet rifle cartridge designed to split in parts after being fired from a rifle
Problem Statement	1. Rapid proliferation of Unmanned Aerial Systems (UAS) and its wide application both in conventional and sub conventional scenarios is an area of concern for defence services and security agencies. 2. Existing Counter Unmanned Aerial Systems (CUAS) are often expensive, complex, have technological limitations and require dedicated trained manpower for operations. Hence, there is a need to develop a cost effective, short range, kinetic anti drone air burst ammo capable being fired from existing weapons (7.62/5.56 mm calibre rifles) for neutralising the UAS with high probability of kill (Pk) against drones.
Challenge Brief / Definition	1. Design and develop a specialized anti-drone munition compatible with existing weapons (7.62/5.56 mm calibre rifles) 2. The round should be able to detonate at a certain point from the UAS an generate pellet /splinter for engaging multiple drones. 28. Solution should ensure high hit probability against manoeuvring aerial targets within the kill envelope.
Existing Solution (if any)	1. Current solutions include electronic jamming systems, directed energy weapons, interceptor drones and hard kill using the conventional small arms fire (not effective against drone in its present configuration). • Standard issue ammunition is not specifically for aerial drone interception.
Technology Domain	• CUAS / Anti-Drone munition
Application/Use Case	• Product will utilised for protection of military bases, critical infrastructure and training/ demonstration of consistent drone neutralisation within specified range.
Future Expectation from the	1. Pellet/ splinter dispersion for hard kill

prototype development	of aerial targets within the envelope. 2. Integration with existing weapon systems. • 3. Scalable and manufacturable design and compliance with military safety standards
Project Outcome	Design and Development of Anti –drone Air Burst Munition round compatible with existing weapons that will enhance counter UAS capability of IAF.
Testing Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	Friendly foreign forces may be considered as potential clients, thereby bolstering Indian Defence Exports.
Business Case (Bulk Order/ repeat order/export potential)	1. Case has a potential for bulk order for all exiting weapons utilisation by security personnel depending upon the process of D&D. 2. Can be exported to friendly foreign countries.

Problem Statement 58: Drone based calibration for MAFI navigational system

Organization Name	**IAF**
Challenge Title	Drone based calibration for MAFI navigational system
Problem Statement	Drone based calibration for MAFI navigational system
Challenge Brief / Definition	1. MAFI infrastructure comprises of Nav-Aids (ILS, TACAN, DME (LP/HP) & DVOR) which require periodic air calibration to ensure the accuracy of the parameters. To undertake the periodic calibration task, UNIFIS- 3000 (Flight Inspection system) has been installed on Do-228 aircraft. The task of calibration of MAFI assets has increased manifold with commissioning of large number of MAFI bases. The issue of non-availability of calibration facility at high altitude regions as well as to explore the alternate means of calibration to reduce the workload of FIS, drone based air calibration system is being perused.
Existing Solution (if any)	29. Existing solution is based on Do-228 mounted equipment such solution has a huge drain of flight hour of the aircraft.
Technology Domain	30. Navigation System/UAV
Application/Use Case	31. Product will be utilised for calibration of IAF MAFI airfields.
Future Expectation from the prototype development	32. The drone based calibration equipment can be improved for its endurance & performance in future.
Project Outcome	33. Drone based calibration for MAFI navigational system.
Testing Certification	34. All relevant applicable tests as defined by certifying / QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	35. Dual Use
Business Case (Bulk Order/ report order/export potential)	Dual use equipment. 36. Can be utilised by civil operators for navigational equipment calibration.

Problem Statement 59: Automated Decision Tool, to conduct Helicopter and Fixed wing operations in Himalayan Belt of Indian region, based on the Weather Conditions of Passes and Valleys estimated by the module

Organization Name	**IAF**
Challenge Title	Automated Decision Tool, to conduct Helicopter and Fixed wing operations in Himalayan Belt of Indian region, based on the Weather Conditions of Passes and Valleys estimated by the module.
Problem Statement	Development of AI/ ML based location specific automated real time estimation of the weather condition of the passes and Valleys, using Weather Satellite Imageries.
Challenge Brief / Definition	The Himalayan belt of Indian region constitutes several passes and valleys. Due to the inhospitable terrain, high variability in the weather conditions and less number of Met Observation posts, it is difficult to assess the weather suitability for entire area of air operations. 1. The module should automatically provide the weather conditions of the Passes in terms of 1 (clear), 0.5 (Partially clear) & 0 (not clear). 2. It should have provision to plot the Cloud Image extracted from the Weather Satellites on the Digital Elevation Model (DEM) (preferably with a resolution of < 100 m). Satellite image grid values to be interpolated on finer resolution DEM using a Literature reviewed interpolative technique, suited for the hilly areas. It should have provision to provide the Cloud amount in the valleys or any region selected on DEM based on the latest satellite Image. Tool must be compatible with any Satellite Image like Himawari, Meteosat, MODIS or INSAT-3DR which has a coverage on the Indian region.
Existing Solution (if any)	Nil
Technology Domain	AI / Software
Application/Use Case	The tool will be utilised as a meteorological aid in decision making for assessing weather in Himalayan passes and improving efficiency of flying operations in affected region.
Future Expectation from the prototype development	Currently the Met observer at the point location estimates the weather conditions over Passes and Valleys and disseminates it telephonically to various agencies. With help of the proposed prototype, decision makers shall have the additional tool for taking decision to launch the mission in the hilly terrain for envisaged route at any location over the hills. This tool shall be available at the Sqn/ Unit/ Command/ Air HQ level and

	shall not require any inputs from the Met Observer from the posts.
Project Outcome	Development of an AI/ML based tool that can carry out real time estimation of weather condition of the passes & valleys, using weather satellite imageries.
Testing Certification	All relevant applicable tests as defined by certifying / QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	This is a new proposal and once the algorithm and module/ tool is stabilised over the region it shall add value addition in Met observation and reporting on the hilly areas from remote location thereby increasing op-efficacy.
Business Case (Bulk Order/ repeat order/export potential)	Can be utilised as a dual use product for utilisation by civil helicopters operating in Himalayan belt.

Problem Statement 60: Development of Next Generation Compact Universal Test Equipment (NGCUTE) for ALMs of lAF

Organization Name	**IAF**
Challenge Title	Development of Next Generation Compact Universal Test Equipment (NGCUTE) for ALMs of lAF
Problem Statement	lAF uses Air Launched Missiles (ALMs) and Guided Bombs (GBs) from different OEMs. Computerised Automatic Test Equipment (ATE) are used for carrying out I-level Tests (troubleshooting till card level) on the said ALMs and GBs. These ATEs are Specific to type, bulky, difficult to transport, difficult to install and give limited information (Go/ No-Go) about the health of the ALM/ GB being tested.
Challenge Brief / Definition	Development of NGCUTE for ALMs and GBs of lAF would envisage the following capabilities. 1. The computerised ATEs should be compact and miniaturised. 2. Light weight. 3. Easily transportable by air, land, rail and sea. 4. Should have ruggedized design. 5. Minimum power requirement. 6. Should have software and algorithms for I- level testing of all ALMs and GBs. The software/ algorithms will be co-developed with lAF inputs. 7. Should have enough capacity for future additions and upgrades. 8. Should be able to give detailed report of parameters. 9. Should use future technologies for miniaturization (Nano technology), Quick computing (Quantum Computing), Health analysis of ALMs and GBs (Al based). 10. Cost effective
Existing Solution (if any)	Weapon specific test equipment available. No universal test available.
Technology Domain	TTGE (Tool tester & ground Equipment)
Application/Use Case	The developed product will be utilised for carrying out computerised automatic test of ALMs of IAF.

Future Expectation from the prototype development	The Prototype/ Technology so developed is expected to find extensive use in all weapon systems used across the world.
Project Outcome	Computerised automatic test equipment (ATE) capable of carrying out I level testing of ALMs/GBs of IAF and generating desired health reports.
Testing Certification	All relevant applicable tests as defined by certifying/ QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service (from procurement perspective). 2. Domestic market is expected from all major weapon manufacturing industries in India. 3. Will the developed product will be able to strengthen the defence export of India? Depending on the cost and reliability, the said indigenously developed NGCUTE can become the testing philosophy for all future weapon acquisitions.
Business Case (Bulk Order/ repeat order/export potential)	Can be adopted for all fleets of IAF subject to successful D&D. Can be utilised by sister services. Can be considered for export to friendly foreign countries.

Problem Statement 61: RF jamming Equipment Compatible with kinetic weapons

Organization Name	**IAF**
Challenge Title	RF jamming Equipment Compatible with kinetic weapons
Problem Statement	Provisioning of a RF Jamming equipment compatible with the presently held kinetic weapons (AK-103, AK-203 and Sig Sauer).
Challenge Brief / Definition	The proposal is to have an attachable/ detachable preferable cylindrical/ suitably shaped RF emitter that can easily be operated against Drone threats without causing hindrance to the use of primary weapon. The system should have following features/ characteristics:- 1. Size. Small form factor similar to the weapon. 2. Shape. Preferably cylindrical. 3. Weight. Not more than 1.5 Kg, preferably less than 1 Kg. 4. Compatibility. Should be like an accessory which can be attached/ detached to the rifles (AK-12,203 and Sig Sauer) similar to a UBGL. 5. Power. Rechargeable and COTS available. 6. Continuous Ops. Capable of emitting short bursts/ continuous RF signal for period not less than 45 min (in total). 7. Range. Capability to Jam the RF signals of Drone at a distance not less than 1 Km. 8. Spare Battery. At least Two (2) spare batteries with each system and charging system for all these. 9. Recharge time. Not more than 1 Hr 10. Any other requirements/ additional features emerging during the phase of discussion for finalising the QRs for the envisioned role of proposed equipment.
Existing Solution (if any)	Presently RF Jammer are available as independent weapons to be utilised as CUAS.
Technology Domain	CUAS
Application/Use Case	The product will be utilised by security personnel to tackle both ANE as well as drones threats simultaneously.
Future Expectation from the prototype development	The product can be enhanced to provide soft will solution at larger distances.

Project Outcome	Development of RF jamming equipment with existing kinetic weapon of IAF.
Testing Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	The capability is dual use. Once developed successfully, can be utilised by other services as well as paramilitary/Police forces engaged in CUAS role.
Business Case (Bulk Order/ report order/export potential)	Can be utilised by all armed forces/paramilitary Can be considered for export to friendly foreign countries.

Problem Statement 62: Design and Develop a retractable mesh door to cover mouth of aircraft Shelter (Hardened aircraft shelter and sun shelter) with opacity to EO/IR/SAR

Organization Name	**IAF**
Challenge Title	Design and Develop a retractable mesh door to cover mouth of aircraft Shelter (Hardened aircraft shelter and sun shelter) with opacity to EO/IR/SAR
Problem Statement	Mouth of aircraft shelters and sun shelter are open to attack by FPV/ programmable drones. A system is required to prevent imaging/ attack/ disruption of aircraft operations from HAS and sun shelter
Challenge Brief / Definition	1. Design and develop a system to rapidly cover Hardened aircraft shelter and sun shelter. 2. The system should be able to install on existing Hardened shelters made of concrete and industrial sheds. 3. It should provide automated and remote operation capability. 4. Integrated power supply/battery/ any other technology to work when power disrupted. 5. Opaque/ disruption to IR/ SAR/EO imaging systems. 6. Sufficient strength to prevent damage to aircraft in case of a loitering munition attack on the mouth of aircraft shelter. 7. System to be repairable in parts in case of damage to the covering structure.
Existing Solution (if any)	Nil
Technology Domain	CUAS
Application/Use Case	Will be utilised as a layer of protection against FPV/ programmable drones.

Future Expectation from the prototype development	The system may be expanded to be installed in aircraft parking hangars.
Project Outcome	Retractable mesh door which will provide protection against FPV/ programmable drones along with opacity to EO/SAR/IR.
Testing Certification	All relevant applicable tests as defined by certifying/ QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service (from procurement perspective). 2. For all hangars and HAS in India with IAF. 3. Will the developed product will be able to strengthen the defence export of India? Yes, similar requirements exist in most countries.
Business Case (Bulk Order/ report order/export potential)	Dual use capability can be utilised by civilian operators also for CUAS protection.

Problem Statement 63: Integrated CUAS system on existing vehicle

Organization Name	**IAF**
Challenge Title	Integrated CUAS system on existing vehicle.
Problem Statement	Capability of providing portable CUAS system on existing vehicles of mobile units.
Challenge Brief / Definition	At present Armed forces have limited capability to employ CUAS solution on existing vehicle of mobile units, hence there is a requirement of such system. Since this kind of system is not employed in IAF, the developer need to give a comprehensive CUAS solution which will provide protection to mobile units up to a range of at least 5 Km. The comprehensive solution should include means of detection, soft kill and hard kill on the same vehicle including power supply for the system.
Existing Solution (if any)	Nil
Technology Domain	CUAS System
Application/Use Case	The product will be utilised on existing vehicles of IAF as a comprehensive CUAS system.
Future Expectation from the prototype development	The system should have capability for rapid mobility and quick deployment. The system should be able to integrate with other existing CUAS system.
Project Outcome	The project would result in integration of CUAS system on existing vehicles of IAF. Thereby, increasing CUAS capability of mobile units.
Testing Certification	All relevant applicable tests as defined by certifying/ QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	Since the case of drone attacks have been witnessed during recent armed conflicts, Armed forces is the potential market to this technology if it is successfully demonstrated.

Business Case (Bulk Order/ repeat order/export potential)	Can be utilised by other sister services also Can be considered for expect to friendly foreign countries.

Problem Statement 64: Design and development of "Canopy Lift Check Device" in Fighter aircraft

Organization Name	**IAF**
Challenge Title	Design and development of "Canopy Lift Check Device" in Fighter aircraft.
Problem Statement	1. Measurement of canopy lift of fighter aircraft during pressurisation check is done manually by fixing graph paper at 12 points on canopy bubble. 2. Once the canopy glass lifts upon pressurisation, its corresponding movement is measured against a fixed reference using the graph paper. 3. The graph paper has the least count of 1 mm (One mm). Therefore, any deviation less than 1mm cannot be ascertained accurately. Also, the inherent factor of parallax error cannot be ruled out.
Challenge Brief / Definition	1. As per the existing maintenance procedure of canopy lift check, the lift of canopy bubble is measured using the conventional graph papers fixed on the canopy front and rear glass and canopy frame (06 points on each side). 2. The measurement of lift is by visual inspection of the graph paper on the reference marked before the canopy pressurised and after pressurisation this canopy lift is visually checked at each points on the graph. In case of deviation of 1.5 mm from the previous value at any location in canopy is observed, it is declared unserviceable. 3. This visual inspection of deviation (Lift) value is prone to parallax error. Also, the least count of graph paper is 1mm. Hence, to avoid the chances of error and to have more accurate reading, a sensor based system with high precision is required. 4. Design, development, testing and certification of suitable sensor based device having capability to detect and measure the canopy lift upon pressurisation at multiple location (at least twelve points simultaneously) on the canopy gIass with up to 0.1 mm as least count (least count of 0.01 mm is desirable). This will help in monitoring the canopy lift very precisely and there will be no chance of parallax error. It should have: -

	4.1 Facility to visually depict canopy lift i.e. if within limits then Green colour and if not within limit then Red colour at each measuring point. 4.2 Device installation and its operation should be user friendly. 4.3 Device mounting and measurement system should not cause any abrasions/scratches/damage to canopy bubble as well as canopy/aircraft surface. 4.4 The system should have facility to store at least twenty previous recordings of the lift check, aircraft wise, in order to depict the trend of the lift check. 4.5 Sensor should be designed in manner that. It can be mounted on the aircraft frame or kept near the aircraft.
Existing Solution (if any)	Nil
Technology Domain	Sensors/Sustenance
Application/Use Case	The canopy lift jack device will be utilised for carrying out canopy assessment during pressurisation check for fighter aircraft.
Future Expectation from the prototype development	1. ln future prototype, it should utilise artificial intelligence to predict canopy de-bonding based on increase in lift values observed in comparison to previously recorded readings. 2. Once it is proven on a particular type of aircraft, it should be customised/modified as per the requirement of other aircraft fleet also.
Project Outcome	Successful D&D will result in a safe and more efficient means of carrying out canopy lift check in fighter aircraft.
Testing Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)

Potential Market for product/ technology (Defence/ Commercial)	Present and future requirements of the products in Service (from procurement perspective). 1. This sensor based system will detect the canopy lift accurately at the field units and any abnormality wrt canopy bubble/ Lavson tape can be identified easily. This should arrest the cases of canopy failure. 2. Will the developed product be able to strengthen the defence export of India 3. Fighter aircraft are being flown by other countries and issues related to canopy must be faced by those countries also. This device will assist in reducing the chances of canopy failures, and has good export potential for countries utilising similar type of aircraft. Any other relevant info - Nil.
Business Case (Bulk Order/ repeat order/export potential)	Can be adopted by other fighter fleet of IAF Can be considered for export for friendly foreign Countries operating Su-30 aircraft.

Problem Statement 65: To design and develop Camouflage solution for solar panels installed at Defence Installations.

Organization Name	**IAF**
Challenge Title	To design and develop Camouflage solution for solar panels installed at Defence Installations.
Problem Statement	1. As part of green energy drive, large number of solar panels are either installed or planned to be installed at various defence installations. These solar panels have bright reflective surfaces, giving away the location of the installation from large distances. 2. The efficiency of solar panels depends upon the intensity of incident solar radiation. Thus, in present form no existing camouflage measures (painting, camouflage nets etc.) can be applied. 3. Application of any kind of available paint over the solar panel surface blocks/ significantly reduces the efficiency of solar panel. 4. The available camouflage nets, which are designed to provide camouflage cover to the installations, block the lR solar radiation and hamper the solar panel functioning. Additionally, the camouflage nets/ Multi Spectral Camouflage Nets (MSCN) are designed to even block lR radiation, thereby making them unsuitable for covering the solar panels.
Challenge Brief / Definition	To design and develop Camouflage solution for solar panels installed at Defence Installations which should include the following: - 1. Create a non-reflective disruptive pattern for solar panels and its associated accessories/ equipment. 2. The repair and maintenance must be possible in case of damage. 3. The solution should be modular to permit small scale to large scale deployment. 4. Should be easily deployable and removable over solar panels 5. Capability to camouflage existing/ upcoming solar panels.

	6. Should be weather tolerant so as to be used in different weathers. 7. Should have capability of selecting required disruptive pattern, so as to merge with surrounding (covering topography along length and breadth of India). 8. Should be durable and have less maintenance cost. 9. Easily implementable/ deployable over solar panels of variable dimensions.
Existing Solution (if any)	Nil
Technology Domain	CCD
Application/Use Case	The system will be deployed for ensuring camouflage of solar panel installed at defence locations.
Future Expectation from the prototype development	The system can be improved to have least effect as the efficiency of solar panel.
Project Outcome	Comprehensive camouflage system for solar panel installed at various IAF bases.
Testing Certification	All relevant applicable tests as defined by certifying / QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in R Service (from procurement perspective). For all defence installation and civil VA/VPs having solar panels. 2. Will the developed product will be able to strengthen the defence export of India? Yes, will provided the solution for other friendly foreign countries. Any other relevant info - Nil

Business Case (Bulk Order/ report order/export potential)	Dual use technology. Can be employed by all organisations that intend to camouflage existing solar panel.

Problem Statement 66: Indigenous GIS based OFC Network Management System (NMS)

Organization Name	**IAF**
Challenge Title	Indigenous GIS based OFC Network Management System (NMS)
Problem Statement	OFC is an Important part of Optical Transmission Network. Indigenous GIS based OFC NMS will ensure high serviceability state of OFC which in turn results in higher availability of optical network. Presently OFC maintenance are done manually which is tedious and time consuming task.
Challenge Brief / Definition	Design and development of Indigenous GIS based OFC NMS 1. OFC NMS will monitor OFCs and will have following features: - 1.1 OFC cut will be depicted on Map with Alarm. 1.2 OFC health status and availability report generation. 1.3 Direction/Order for OFC repair team can be generated. 1.4 Effective monitoring of OFC from centralised location. 1.5 System should have redundancy at all levels.
Existing Solution (if any)	Nil
Technology Domain	Communication
Application/Use Case	GIS based OFC NMS will be utilised at IAF bases for effective optical network management.
Future Expectation from the prototype development	The GIS based OFC network management system can include features for improving network efficiency.
Project Outcome	GIS based OFC network management.

Testing Certification	All relevant applicable tests as defined by certifying / QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	Present and future requirements of the products in Service (from procurement perspective) defence.
Business Case (Bulk Order/ repeat order/export potential)	Can be utilised by all services using optical network.

Problem Statement 67: Indigenous High Capacity Ethernet LOS Radio

Organization Name	**IAF**
Challenge Title	Indigenous High Capacity Ethernet LOS Radio.
Problem Statement	Radio is essential alternate media in Network Centric Warfare. It ensures reliable service in case of failure of optical media i.e. OFC based communication and provide effective overlay over OFC based communication infrastructure. Presently Foreign OEM equipment being used to provide radio communication.
Challenge Brief / Definition	Design and development of High capacity and spectral efficient Ethernet LOS Radio Equipment to provide effective BW of 1 Gbps or more. 1. Indigenous High capacity Ethernet Radio should provide 1 Gbps or more bandwidth in given standard environment (good weather condition) and support following 1.1 Modulation Techniques: BPSK, QPSK, QAM-4 to QAM-1024, OFDM or latest modulation techniques 1.2 Forward Error Correction: Latest Forward Error Correction 1.3 Adaptive Code Modulation (ACM) 1.4 Automatic Transmit Power Control (ATPC)
Existing Solution (if any)	No Indigenous solution exists
Technology Domain	Communication
Application/Use Case	The application will be utilised to provide alternate/standby means of communication in IAF.
Future Expectation from the prototype development	Field trials and implementation of indigenous radio at all existing sites where Foreign OEM radios are deployed.
Project Outcome	Development of an indigenous high capacity Ethernet LOS radio capable of providing communication in case of failure/ non-availability of optical network.

Testing Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service (from procurement perspective) Radio is essential for strategic and tactical communication, there will be continuous requirement of Radio. 2. Will the developed product will being able to strengthen the defence export of India? **Yes, Indigenous Radio will definitely strengthen the defence export of India as it is required by all defence services in multiple domains** Any other relevant info - **Nil.**
Business Case (Bulk Order/ repeat order/export potential)	Can be utilised by all defence forces.

Problem Statement 68: Indigenous Network Monitoring Solution

Organization Name	**IAF**
Challenge Title	Indigenous Network Monitoring Solution
Problem Statement	Air Force Network presents Net-Centric Operations communication. The complete network monitoring solutions give different dashboards which are to be monitored. Air Force intends to club all these dashboards into single glass pane monitoring solution so as to make it more beneficial and help the organisation to take decision quicker.
Challenge Brief / Definition	Design and development of Indigenous Network Monitoring Solution in a single glass pane display which collects inputs from all different applications of different origin and from different OEM make. 1. Single glass pane Network monitoring solution should 1.1 Collect inputs from different applications and servers 1.2 Applications and servers are from different OEM make and model 1.3 Present monitoring system as a single entity instead of observing multiple dashboards for each application/solution. 1.4 Redundancy at all levels
Existing Solution (if any)	Nil
Technology Domain	Communication
Application/Use Case	The developed application will provide network monitoring of complete IAF network over single glass plane improving efficiency operations.
Future Expectation from the prototype development	Field trial and implementation of indigenous Network monitoring solution which demonstrates single glass pane display by collection various inputs from different OEM make servers/applications.

Project Outcome	Development of an Indigenous monitoring solution that allows IAF to collect inputs from different secure/application and present holistic network monitoring solution.
Testing Certification	All relevant applicable tests as defined by certifying/QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service (from procurement perspective). **Monitoring solutions are essential for strategic and tactical communications, there will be continuous requirement of Monitoring solutions.** 2. Will the developed product will being able to strengthen the defence export of India? **Yes, Indigenous Network Monitoring system will definitely strengthen the defence export of India as it is required by all defence services in multiple domains.** Any other relevant info **Nil**
Business Case (Bulk Order/ repeat order/export potential)	Can be utilised by all defence services

Problem Statement 69: Secure Information Exchange Platform for Military Units (SIEPMU) on public internet

Organization Name	**IAF**
Challenge Title	Secure Information Exchange Platform for Military Units (SIEPMU) on public internet
Problem Statement	Develop a secure and reliable platform for sharing sensitive information between military units on public internet, ensuring the confidentiality, integrity, and authenticity of data while protecting against cyber threats and unauthorized access.
Challenge Brief/ definition	The Indian military requires a secure information exchange platform to facilitate real-time communication and collaboration between unit on public internet. The platform must ensure the security and integrity of sensitive data while allowing for seamless communication and information sharing. The proposed solution will include: 1. Cloud-based architecture with micro services-based design. 2. End-to-end encryption with multi-factor authentication. 3. Secure communication protocols with real time monitoring and threat detection capabilities. 4. Role-based access control with granular permissions. 5. Integration with existing military communication systems and networks. 6. Encryption algorithm should be SAG graded.
Existing Solution (if any)	Nil
Technology Domain	Cyber Communication
Application/ Use Case	The developed application will be utilised at various IAF units to provide safe means for sharing information between military units over public internet.

Future Expectation from the prototype development	The proposed platform should demonstrate, the secure data transmission and storage, Robust authentication and access control mechanisms, Real-time monitoring and threat detection capabilities, Scalability and flexibility to accommodate varying user requirements, Integration with existing military communication systems and networks.
Project Outcome	Development of a secure information exchange platform for military units.
Testing/ Certification	All relevant applicable tests as defined by certifying/QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	The potential market for the Secure Information Exchange Platform for Military Units (SIEPMU) over public internet is vast, with opportunities in both domestic and international markets. **Domestic Market:** The Indian military is expected to be the primary customer for SIEPMU, with potential applications in various branches, including the Army, Navy, Air Force, and Coast Guard. The platform can also be used by other government agencies, such as the Ministry of Home Affairs, Ministry of Defence, and intelligence agencies. **International Market:** The global defence market is expected to grow, with a growing demand for secure communication technologies. The platform can also be marketed to other government agencies, such as law enforcement and border control, that require secure communication solutions.
Business Case (Bulk Order/ repeat order/ export potential)	Can be utilised by all defence paramilitary and Gov't agencies. Can be considered for export to friendly foreign countries.

Problem Statement 70: AR/VR Armament training and demolition simulator

Organization Name	**IAF**
Challenge Title	AR/VR Armament training and demolition simulator
Problem Statement	Presently, the training for Explosive Ordnance Disposal / Bomb Disposal (EOD/BD), is provided through workshops conducted quarterly at various nodal bases of IAF. The demolition practice during these workshops are carried out on life expired bombs. However, until date, no such practice has been undertaken on missiles. It is pertinent to note that, the future wars will be fought predominantly with missiles and drones. This will definitely entail a situation of unexploded own missile stores alongside the missile stores of adversary on own terrain. This necessitates adequate demolition knowledge and practice of own as well as adversary's missile stores.
Challenge Brief/ definition	It is required to fabricate an AR/VR armament simulator to practice demolition of own and adversary's missile stores. This simulator should be based on AR/VR headset and cater for all types of missiles, bombs and rockets of own and adversary. The simulator must contain a training module that guides the technicians systematically to undertake the demolition task. The fabrication of such a simulator will go a long way in benefitting the IAF, as it will provide adequate training to air warrior to undertake demolition on live stores. This will also improve their muscle memory thereby mitigating the chances of error which otherwise is life threatening. This will also benefit in enhancing their knowledge on enemy stores and will come very handy during actual Ops. Considering the new induction process of air warriors, the training imparted on armament through AR/VR will enhance the operation capability of IAF.
Existing Solution (if any)	Nil
Technology Domain	AR/VR Simulator
Application/ Use Case	Will be utilised for training of air warrior for EOD/BD duties.

Future Expectation from the prototype development	Ability to upgrade & include newer weapons in the package.
Project Outcome	An EOD/BD simulator capable of imparting realistic training to air warriors.
Testing/ Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	Defence. Can be utilised by other armed personnel engaged in EOD/BD duties.
Business Case (Bulk Order/ repeat order/ export potential)	Can be utilised by all 3 services. Can be considered for export to friendly foreign countries.

Problem Statement 71: Man-portable (Manpack) Tactical Air Navigation (TACAN)

Organization Name	**IAF**
Challenge Title	Man-portable (Manpack) Tactical Air Navigation (TACAN)
Problem Statement	During operations in Emergency Landing Facility (ELFs), Advance Landing Grounds (ALGs) and in border areas where nearby navigation facilities are not available, the military aircraft require bearing to identify their exact locations in GPS denied environment. The solution can also be utilised while operating from foreign airbases.
Challenge Brief/ definition	The proposed manpack TACAN system will operate between 962-1312 MHZ in pulse pairs to provide bearing and distance based on request by the Aircraft. The bearing should have bearing accuracy of $\pm$ 2 Deg. The system should transmit the station code in Morse. The system should be manpack, have independent power supply facility to cater for at least 6 hours. The system is to be suitable for all terrain / climatic conditions i.e -40 to +55 Deg C with inbuilt / independent power supply.
Existing Solution (if any)	Nil
Technology Domain	Radio and Radar
Application/ Use Case	Can be used to meet urgent Ops Commitment in a terrain where no navigation facility is available. Can be used in ALGs, ELF and any terrain near border areas to guide Military aircrafts.
Future Expectation from the prototype development	Can be deployed in ALG, ELF, abroad operations.

Project Outcome	The project will assist in development of man portable TACAN system with independent power supply system.
Testing/ Certification	All relevant applicable tests as defined by certifying/ QA agencies during D&D. (including compliance to specific Mil Stds / EMI-EMC / JSS 55555 etc.)
Potential Market for product/ technology (Defence/ Commercial)	Defence
Business Case (Bulk Order/ repeat order/ export potential)	Can be considered for export to friendly foreign countries.

Problem Statement 72: Indigenous Dense Wavelength Division Multiplexing (DWDM)

Organization Name	**IAF**
Challenge Title	Indigenous Dense Wavelength Division Multiplexing (DWDM)
Problem Statement	DWDM is an important equipment of Optical Transmission Network. It ensures reliable service of optical communication. Present DWDM which is deployed have only 10G BW per lambda insufficient to future requirement of Air Force.
Challenge Brief/ definition	Design and development of Indigenous High capacity DWDM Equipment to provide effective BW of 100 Gbps or more Indigenous High capacity DWDM Eqpt should provide 100Gbps or more bandwidth per lambda and support following:- 1. Latest optical Modulation Techniques. 2. Latest Forward Error Correction. 3. Support multirate client interface 1G, 10G, STM1/4/16 etc. 4. System should support multiple lambda. 5. Redundancy at all levels.
Existing Solution (if any)	Present solution has limited bandwidth to meet IAF future requirements.
Technology Domain	Communication
Application/ Use Case	The Indigenous DWDM will be utilised to provide effective bandwidth of 100 Gbps or more per lambda for optical transmission network.
Future Expectation from the prototype development	Field trials and implementation of indigenous DWDM eqpt at all existing sites where low capacity DWDM are deployed.
Project Outcome	The product will be an indigenous dense wavelength division multiplexing technology that will allow data transfer to high rates.
Testing/ Certification	All relevant applicable tests as defined by certifying/ QA agencies during D&D.

Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service (from procurement perspective) Radio is essential for strategic and tactical communication, there will be continuous requirement of Radio. 2. Will developed product will being able to strengthen the defence export of India? **Yes, Indigenous Radio will definitely strengthen the defence export of India as it is required by all defence services in multiple domains.** Any other relevant info **Nil**.
Business Case (Bulk Order/ repeat order/ export potential)	Can be utilised by all 3 services. Can be considered for export to friendly foreign countries.

Problem Statement 73: Development of indigenous secure HDD with central management solution.

Organization Name	**IAF**
Challenge Title	Development of indigenous secure HDD with central management solution.
Problem Statement	Presently data transfer from outside agencies to IAF and vice versa has following issues: - 1. Authorization and authentication of user of outside agency with user trust verification mechanism (using bio metric for stipulated time period). 2. Malware 3. AV scan in internet is to be associated. 4. Sanitization AV scan to be associated. 5. DAP-PC AV scan to be associated.
Challenge Brief / Definition	An indigenous secure HDD with central management solution may be developed with the following functionality: 1. Centralized Management console 2. On-board Anti-Malware 3. Encryption Standards 4. Authentication Remote wipe and Lock 5. Auditing and Logging 6. Secure Firmware Updates 7. Data Loss Prevention (DLP) Compliance and Reporting.

Existing Solution (if any)	Nil
Technology Domain	Data Security
Application/Use Case	Secure HDD will be utilized for safe data transfer mechanism for IAF with proper accounting and security of data.
Future Expectation from the prototype development	Regular upgradation of secure HDD to meet evolving malware threats.
Project Outcome	Development of secure HDD that provides care of data transfer while adhering to laid down functionalities.
Testing Certification	All relevant applicable tests as defined by certifying / QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service (from procurement perspective). Requirement is at all the data transfer points with outside agencies. 2. Will the developed product will being able to strengthen the defence export of India. Any other relevant info
Business Case (Bulk Order/ repeat order/export potential)	Can be utilised by all defence services.

Problem Statement 74: Indigenous Cyber Deception Framework

Organization Name	**IAF**
Challenge Title	Indigenous Cyber Deception Framework
Problem Statement	Indigenous Cyber Deception Framework
Challenge Brief / Definition	Cyber security threats continue to evolve and traditional defence mechanisms alone are insufficient to protect sensitive information. The proposal outlines the development and implementation of and indigenous Cyber Deception Framework leveraging honeypots and various other methodologies. This framework aims to enhance IAF's ability to detect, analyse and respond to cyber threats proactively. 1. Technical Requirements. 1.1 Customised honeypot deployment. 1.2 Integration with existing SIEM and threat intelligence platforms. 1.3 AI/ML based algorithms for anomaly deception, deployment and expansion. 1.4 Automated incident response mechanisms. 2. Compliance. 2.1 Ensure compliance with data protection regulations. 2.2 Regular audits, updates and tech support to maintain compliance 3. Adequate awareness/training on the framework
Existing Solution (if any)	Nil
Technology Domain	Cyber Security
Application/Use Case	Will be utilised in IAF for enhancing cyber security.
Future Expectation from the prototype development	Initial focus is on deploying honey pots. Further feasibility to be assessed for extending the framework to internet facing assets. Include regular assessment by conducting exercises to validate the effectiveness of the deception strategy.

Project Outcome	Development of an Indigenous cyber security framework that will enhance IAF's cyber Security.
Testing Certification	All relevant applicable tests as defined by certifying /QA agencies during D&D.
Potential Market for product/ technology (Defence/ Commercial)	Defence
Business Case (Bulk Order/ repeat order/export potential)	Can be utilised by all defence forces.

Problem Statement 75: AI based Airway assessment tool in Pre anaesthesia check-up

Organization Name	**IAF**
Challenge Title	AI based Airway assessment tool in Pre anaesthesia check-up
Problem Statement	Pre anaesthesia check is the keystone to deliver a safe anaesthetic during any surgical procedure. Assessment of Airway is an extremely critical step towards delivery of a safe anaesthesia to a patient. In modern practice, it is increasingly common that the providers who actually administer an anaesthetic are different from the clinicians performing the initial pre-anaesthesia assessment. Presently all the tests for Airway assessment are subjective and can lead to observer bias depending upon the expertise of the anaesthesiologist doing the exam and the one actually delivering the Anaesthetic. Hence a more objective assessment of the airway which is reliable and dependable is the need of the hour. This project aims at development of one such AI based tool which can effectively resolve the clinical dilemma every Anaesthesiologist faces in the Operation theatre every day.
Challenge Brief / Definition	Development of a universal prediction score for Airway management (Difficult Airway Score) It will help in reducing inter-observer variability, allowing telemedicine reference from remote locations & data incorporation in electronic health record for future reference. Development and validation of an Artificial Intelligence based difficult airway assessment tool and a 'Difficult Airway score' using three different photos of the patients face, utilizing Mallampati Score, Sternomental distance, Thyromental distance and Upper lip bite test.
Existing Solution (if any)	Nil
Technology Domain	Medical Data Science
Application/Use Case	The product has usage across both military as well as civilian hospitals as an assessment tool in pre-anaesthesia check-up.
Future Expectation from the prototype development	The 'Difficult Airway score' will allow each practitioner to be his or her own observer rather than relying on another individual's airway assessment. Accurate prediction of difficult airway will help improving patient safety and reducing complications during airway management. The

	future AI based mobile app based on present proposal which will unfailingly generate a 'Difficult Airway Score' with easy to use 'numerical input parameters', will aid the anaesthesiologist towards management of a difficult airway, thus improving perioperative patient safety and care. As a second step, when the tool and score are validated and tested, a mobile based App can be developed for its easy and wide spread use. A mobile based App can anonymize and aggregate data to contribute to research and quality improvement initiatives. Analysing trends and outcomes can help improve airway management protocols. In situations where remote consultation with airway experts is necessary, the App can also facilitate real-time communication and data sharing to receive guidance on complex cases.
Project Outcome	Create a user-friendly interface for healthcare providers to input patient information and receive the AI-based assessment by obtaining protocoled three different pose photos) and estimation of various measurements (namely Mallampati Score, Sternomental distance, Thyromental distance and Upper lip bite test). Develop a consolidated 'Difficult Airway Score' with easy to use 'numerical output parameter', to influence the clinician's approach towards management of this difficult airway, thus improving perioperative patient safety and care. As a second step, when the tool and score are validated and tested, a mobile based App can be developed for its easy and wide spread use. A mobile based App can anonymize and aggregate data to contribute to research and quality improvement initiatives. Analysing trends and outcomes can help improve airway management protocols. In situations where remote consultation with airway experts is necessary, the App can also facilitate real-time communication and data sharing to receive guidance on complex cases.
Testing Certification	All relevant applicable tests as defined by certifying / QA agencies during D&D
Potential Market for product/ technology (Defence/ Commercial)	1. Present and future requirements of the products in Service – Yes 2. Will the developed product be able to strengthen the defence export of India? Yes 3. Any other relevant info – No such system exists
Business Case (Bulk Order/ repeat order/export potential)	Dual use technology. Can be widely adopted by both military as well as civil hospitals.

Problem Statement 76: Stern tube Shaft Seals for propulsion system onboard Sachet class ships.

Organization Name	**Indian Coast Guard**
Challenge title	Stern tube Shaft Seals for propulsion system onboard Sachet class ships.
Problem Statement/	The Seal are procured from OEM. Generally, the seals has long lead time procurement and also items are exorbitantly priced. Any defect in operation cycle of ship will affect operational limitation of ships.
Challenge brief/definition	Shaft seals for Sachet Ships to be indigenously developed and should be readily available with CGSD.

Existing Solution (if any)	Not known
Technology domain (s)	**Mechanical Engineering & Material Science**
Application/Use Case	Onboard ships
Project Outcome	Indigenous stern tube shaft seal will reduce import dependency for services & spares of existing fleet. This will eventually bring down the life cycle cost of ships and reduce the lead time for supply of spares.
Testing /Certification	Certification by class society
Future Expectation from the prototype / Technology developed	Development of shaft seals for main propulsion system indigenously will be beneficial for readily availability and cost effective.
Potential Market	1. Present and future requirement of the product in service (From procurement prospective)- Yes 2. Will the developed product will being able to strengthen the defence export of India.- Yes Any other relevant info- Nil
Business Case	ICG fleet is having approx. 150+ ships and stern tube shaft seal is being used in majority of vessels. The assessment of seals are generally being undertaken during drydock period falling after every 18-24 months. The replacement of stern tube shaft seal carried out based on any known ship defect or on obsolescence management. On successful completion of prototype development followed by trials, there is a potential for export market also.

Problem Statement 77: Fuel consumption optimization using AI-based tools.

Organization Name	**Indian Coast Guard**
Challenge title	Fuel consumption optimization using AI-based tools.
Problem Statement/	The marine industry faces increasing pressure to reduce fuel consumption due to rising fuel costs, environmental regulations, and the global push for sustainability. Fuel consumption is a significant operational expense for ships, and optimizing fuel usage can lead to substantial cost savings, lower emissions, and improved efficiency. However, many vessels operate with conventional systems, and real-time data analysis and optimization methods are often not fully utilized.
Challenge brief/definition	The challenge is to develop and implement AI-based tools to optimize fuel consumption on ships in the marine industry. The objective is to create systems that intelligently adjust fuel use based on a wide range of factors, including weather conditions, engine performance, cargo load, operational maneuvers, and more. AI - based solutions should focus on minimizing fuel consumption while ensuring compliance with environmental regulations (such as IMO standards), maximizing cost-effectiveness, and enhancing overall operational efficiency.
Existing Solution (if any)	The existing solution regarding optimizing fuel consumption onboard ships includes improvement in hull performance, using hybrid propulsion system, route optimization, fuel forecasting and fuel consumption data compilation and analysis using analytical software. However, no such tool exists which uses AI based tools for monitoring fuel consumption in ships.
Technology domain (s)	Use of Artificial intelligence to optimise the fuel consumption onboard ships.

Application/Use Case	The technology will be used for data integration and analysis, predictive maintenance and engine optimization, weather and route planning, operational optimization, environmental norms compliance,real time decision support and cost effectiveness. AI tools should enable real-time, actionable insights and recommendations for the crew or vessel operators to adapt and optimize fuel usage based on continuously changing conditions during the voyage.
Project Outcome	The development of a solution for optimizing fuel consumption in the marine industry using AI-based tools aims to deliver a comprehensive, data-driven system that enhances operational efficiency, reduces costs, and meets environmental regulations.
Testing /Certification	A detailed testing procedure is required to be followed for the implementation of the project. The sequence is as follows: Baseline Fuel Consumption Sea Trial with disabled AI optimisation functions. AI Optimised Sea trial. Voyage and adaptive learning test Safety, Compliance & Navigational Integrity Test Fault Tolerance & Degradation Test Crew Feedback & Usability Trial Safety & Override Validation
Future Expectation from the prototype / Technology developed	As the prototype for fuel consumption optimization in the marine industry is developed, there are several key expectations for its performance, scalability, and impact. These expectations are based on the goal of leveraging AI to make real-time, data-driven decisions that reduce fuel consumption, improve operational efficiency, and support environmental sustainability. **1. Real-Time Fuel Consumption Monitoring and Optimization** • **Expectations**: The prototype should be capable of continuously monitoring fuel consumption in real time, analyzing the data, and adjusting operations to optimize fuel use based on current conditions.

	• **Future Vision:** The system will be able to provide actionable insights to the crew, enabling them to make on-the-spot decisions, such as adjusting speed, route, or operational parameters to minimize fuel usage without compromising safety or schedule. 2**. Predictive Maintenance and Performance Insights** • **Expectations:** The AI system should include predictive capabilities to monitor engine performance, identify potential issues early, and recommend maintenance or adjustments to maintain optimal fuel efficiency. • **Future Vision**: The prototype will evolve into a fully predictive maintenance system, where the AI can not only detect potential problems but also recommend specific maintenance schedules and adjustments to ensure the engine runs efficiently, reducing fuel consumption and downtime. 3. **Weather and Environmental Adaptation** • **Expectations**: The prototype should integrate real-timen weather data and environmental factors (such as sea currents, wind speed, and temperature) to optimize fuel consumption based on the voyage's route. • **Future Vision:** The AI will evolve to predict and adapt to changing environmental conditions dynamically, offering route recommendations in real-time that minimize fuel consumption while considering vessel-specific constraints and operational needs. **4. Adaptive Operational Parameters** • **Expectations:** The prototype should allow the dynamic adjustment of operational parameters, such as vessel speed, throttle settings, and cargo load distribution, based on real- time fuel consumption analysis. • Future Vision: As the system learns from historical data and real-time operations, it will automatically adjust operational parameters, achieving continuous optimization of fuel consumption without manual intervention, further improving efficiency. 5. **Seamless Integration with Ship's Existing Systems** • **Expectations:** The prototype should seamlessly integrate with existing ship systems, such as navigation, engine control, and fuel monitoring systems, to gather necessary

	data for optimization. • **Future Vision:** The AI system will become fully integrated into the ship's operational framework, interacting autonomously with all critical systems (engine, navigation, cargo management) to implement real-time decisions that maximize operational efficiency and minimize fuel costs. 6. **Compliance with Environmental Regulations** • **Expectations:** The prototype should ensure that fuel consumption optimization efforts are fully compliant with international environmental regulations (such as IMO's Energy Efficiency Existing Ship Index - EEXI) and emission standards. • **Future Vision:** The AI system will proactively adapt fuel usage strategies to ensure ongoing compliance with evolving environmental regulations, such as emission limits and carbon intensity, without compromising operational goals. 7**. Cost Savings and ROI Analysis** • **Expectations:** The prototype should provide clear insights into potential cost savings from optimized fuel consumption, as well as a preliminary ROI estimate, taking into account fuel savings, maintenance reduction, and operational efficiency. • Future Vision: Over time, the system will offer a comprehensive cost-benefit analysis tool, forecasting long- term savings and ROI, and providing detailed reports for decision-makers on the financial impact of fuel optimization strategies. 8. **Scalability and Flexibility** • **Expectations:** The prototype should be scalable, capable of being implemented across different types of vessels, including cargo ships, tankers, and passenger ships, with minimal adjustments. • **Future Vision:** The solution will be flexible and adaptable to various ship sizes, operational models, and geographical regions, with the ability to scale across entire fleets and integrate with different fleet management systems. 9**. User-Friendly Interface for Crew and Operators** • **Expectations:** The prototype should have an intuitive, user- friendly interface that provides actionable

	recommendations in an easy-to-understand format for crew members and operators. • **Future Vision:** The system will evolve into a comprehensive decision support system, offering clear, concise, and visualized data that can be quickly interpreted by operators and crew members, enhancing situational awareness and improving decision-making. **10. Long-Term Data Learning and Continuous Improvement** • **Expectations:** The prototype should be capable of learning from both historical and real-time data to continually improve its fuel consumption optimization strategies. • **Future Vision:** The AI system will evolve into a self-improving tool, leveraging continuous feedback to refine its algorithms and optimize fuel consumption in more sophisticated ways, adapting to emerging technologies, new environmental regulations, and changing operational conditions. **11. Collaboration with Fleet Management and Stakeholders** • **Expectations:** The prototype should enable communication and collaboration between the ship's crew, fleet management, and other stakeholders to implement fuel consumption strategies effectively. • **Future Vision:** The AI tool will be integrated into a fleet-wide system, providing insights and optimization strategies across all vessels, allowing fleet operators to monitor fuel consumption in real time, compare vessel performance, and make fleet-wide operational adjustments.
Potential Market	The market for AI-based fuel consumption optimization technologies in the marine industry holds significant growth potential due to a variety of factors, including rising fuel costs, increasing environmental regulations, and the push for digitalization within the maritime sector. The demand for solutions that help shipping companies reduce fuel consumption, lower costs, and comply with sustainability targets is growing, creating a wide and diverse market for such products. From a **user perspective,** the potential market can be segmented into different groups based on company size, geographical location, and operational focus. Below is an overview of the key target markets for this technology:

1. **Shipping Companies (Commercial and Cargo Vessels)**

- **Size and scope :** The commercial shipping industry is vast, with over 50,000 merchant vessels operating globally. Large shipping companies with large fleets, as well as smaller operators with a limited number of vessels, all face pressure to optimize fuel consumption and reduce operating costs.
- **Pain Points:**
  - Rising fuel prices and the fluctuating costs of global oil supplies.
  - Increasing fuel consumption due to inefficient operational practices.
  - Compliance with stricter environmental regulations, such as IMO 2020, the Energy Efficiency Existing Ship Index (EEXI), and the Carbon Intensity Indicator (CII).
- **Market Opportunity:**
  - Fuel optimization solutions help shipping companies reduce fuel usage, lower costs, and ensure compliance with regulations. Given that fuel is one of the largest operating expenses, the potential savings from using AI-driven optimization tools are significant.
  - The market includes both **large, international shipping fleets** (such as container shipping giants, bulk carriers, and oil tankers) and smaller regional operators that may operate specialized vessels or freight ships.
- **User Benifits:**
  - **Cost Reduction:** AI-based tools help optimize fuel consumption, leading to significant cost savings.
  - **Regulatory Compliance:** The technology helps users comply with environmental regulations related to emissions and fuel usage.
  - **Operational Efficiency:** Improved fuel efficiency and predictive maintenance capabilities reduce downtime and maintenance costs.

2. **Fleet Operators and Managers**

- **Size and Scope:** Fleet operators managing

multiple vessels, including those in the offshore, cargo, and logistics sectors, are a key market segment. These operators manage fleets ranging from a handful of vessels to large international operations.

- **Pain Points:**
  - Ensuring fuel efficiency across an entire fleet.
  - Managing fuel consumption and maintenance for multiple vessels, each with different operational characteristics.
  - Lack of centralized visibility and control over fuel consumption and optimization strategies.
- **Market Opportunity:**
  - AI-based optimization tools provide fleet operators with centralized control and monitoring of fuel consumption across multiple vessels, allowing them to optimize fuel use at the fleet level.
  - The technology can help with the dynamic adjustment of operational parameters across vessels, minimizing fuel consumption on a global scale.
  - The ability to track and compare fuel efficiency across a fleet also enables fleet managers to identify underperforming vessels and implement corrective actions.
- **User Benefits:**
  - **Fleet-Wide Optimization:** The ability to optimize fuel consumption across multiple ships in real-time.
  - **Data- driven Decision making: I**nsights and predictive analytics help fleet managers make better operational decisions.
  - **Scalability:** The technology can be implemented across small fleets or large, global operations.

3. Cruise Lines and Passenger Vessels

- **Size and Scope:** The cruise and passenger vessel market is another significant segment. Cruise lines operate large fleets of ships, often with high operational and fuel costs, and are increasingly adopting technologies to improve efficiency and reduce their carbon footprint.
- **Pain Points:**
  - High fuel consumption due to the large size of cruise ships and passenger vessels.

- Environmental pressures to reduce emissions and comply with international regulations.
- Competitive pressures to offer affordable services while keeping operating costs low.

- **Market Opportunity:**
  - AI optimization tools can help cruise lines optimize fuel consumption without compromising the comfort and experience of passengers.
  - The technology can help cruise operators adjust routes and speeds based on weather conditions and fuel efficiency needs, reducing fuel usage on longer voyages.
  - There is also increasing demand for sustainability in the tourism sector, and fuel optimization tools can support cruise lines in meeting these expectations.
- .**User Benefits:**
  - **Reduced Fuel Costs:** Significant savings on fuel consumption for large vessels.
  - **Sustainability:** Help cruise lines meet environmental sustainability goals and regulatory requirements.
  - **Operational Efficiency:** Improving fuel efficiency without affecting passenger experience or operational schedules.

4. Offshore and Oil & Gas Industry

- **Size and Scope:** The offshore and oil & gas industries rely on a variety of specialized vessels (e.g., oil tankers, drilling rigs, and supply vessels). Fuel optimization is critical due to the long durations and often challenging operational environments of offshore operations.
- **Pain Points:**
  - High fuel consumption in remote offshore operations.
  - Significant operational costs due to fuel-intensive equipment and machinery.
  - Compliance with offshore emissions regulations, which are becoming increasingly stringent.
- **Market Opportunity:**
  - AI-based optimization can help reduce the overall fuel usage of offshore vessels by optimizing speed, engine load, and operational settings based on real- time data from the environment and vessel conditions.

	○ Offshore operators can achieve better fuel consumption predictions, avoid overconsumption, and cut down on unnecessary fuel waste, which is vital for cost control in these high-cost operations. • **User Benefits:** ○ **Fuel Savings:** More efficient operations lead to significant reductions in fuel costs. ○ **Maintenance Efficiency:** Predictive maintenance and engine performance monitoring prevent costly downtime. ○ **Compliance:** Ensure that offshore operations meet environmental and emissions standards. **5. Environmental and Regulatory Agencies** • **Size and Scope:** Governments and regulatory bodies worldwide, such as the International Maritime Organization (IMO) and regional environmental organizations, play a significant role in pushing for fuel consumption reductions in the shipping industry. • **Pain Points:** ○ Pressure to enforce stricter environmental standards and reduce the carbon footprint of the maritime industry. ○ Need for transparent reporting on emissions, fuel consumption, and environmental compliance. • **Market Opportunity:** ○ Regulatory bodies can leverage AI-based solutions to monitor fuel consumption and emissions on a global scale. These tools can provide accurate and transparent reports that help enforce compliance with environmental standards. ○ By promoting or incentivizing the adoption of fuel optimization technologies, governments can support the broader industry in meeting sustainability goals. • **User Benefits:** ○ **Regulatory Compliance:** Enabling the industry to meet emissions targets and reduce its environmental impact. ○ **Data Transparency:** Providing accurate and real-time data on fuel consumption and emissions for regulatory oversight.

	6. Fuel Suppliers and Alternative Energy Providers • **Size and Scope:** Companies involved in the production and supply of marine fuel (conventional or alternative) are also key players in the fuel optimization market. This includes traditional fuel suppliers, LNG providers, and those involved in biofuels or green technologies. • **Pain Points:** o Volatile fuel prices and the transition to more sustainable fuel types. o Competition among traditional and alternative fuel suppliers for market share. • **Market Opportunity:** o Fuel optimization technology provides fuel suppliers with insights into how their products perform in real- world conditions, allowing them to improve their offerings based on customer needs. o The rise of alternative fuels (e.g., LNG, biofuels) presents an opportunity for fuel suppliers to diversify their product lines and reduce reliance on traditional fossil fuels. • **User Benefits:** o **Efficient Fuel Usage:**AI tools help optimize the usage of both traditional and alternative fuels. o **Market Insights :** Fuel suppliers can use data-driven insights to better understand demand for specific fuel types and improve their offerings.
Business Case	NA

Problem Statement 78: Indigenisation & development of Integrated Bridge System (IBS) along with repair services.

Organization Name	**Indian Coast Guard**
Challenge title	Indigenisation & development of Integrated Bridge System (IBS) along with repair services.
Problem Statement/	Need development and establishment of Integrated Bridge System along with repair and services (hardware and software) facilities in India (presently IBS system working with Window XP OS software)
Challenge brief/definition	This ship is fitted with various navigational equipment like X-band Radar, Gyros, DGPS, EM log, Echo Sounder, ECDIS etc, all this equipment are integrated through IBS system. IBS system (Make: M/s Sperry Marine) which presently runs on 'Windows –XP' OS software. Needs timely upgradation of the system software and hardware to the latest version of Operating System. In addition to OS upgradation, the repair and supply of spares are imported from abroad (e.g. CPU, Monitor). Also, the wear and tear of the components and obsolesce of software of IBS system required additional maintenance for improving their performance. Indigenization & improvisation of the existing repair/ updation of software is very important to reduce expenses and save defence expenditure in this area.
Existing Solution (if any)	Nil existing solution from our end and other are not applicable.
Technology domain (s)	Hardware & software including navigation, communication system etc.

Application/Use Case	Onboard ships
Project Outcome	Indigenous IBS will reduce import dependency for equipment and also supply of spares for existing fleet. This will eventually bring down the life cycle cost of equipment and reduce lead time for supply of spares.
Testing /Certification	System design and certification iaw IMO regulations (SOLAS) and Class society rules/guidelines.
Future Expectation from the prototype / Technology developed	Existing application software is not available in India. Indigenised IBS system lead to self-reliance, innovation & economic benefits to the country.
Potential Market	i. Present and future requirements of the products in service (for procurement perspective) **Presently repair and updation of software in IBS system are dependent to imported spares from other countries and procurement of spares get delayed due the procedure and time duration required for the import of spares. Existing repair and updation of software technology requires more R&D to understand & customize IBS system and develop productivity of the spares in this country.** ii. Will the developed product being able to strengthen the defence export of India? It can be lead self-reliable, innovation & economic benefits for the country. iii. Any other relevant info.
Business Case	After successful completion of prototype development followed by trials, imported IBS may be replaced with indigenous IBS due obsolescence and the firm may be considered as probable vendor for all new construction ships and also as an export equipment.

Problem Statement 79: Development of Indigenised Power Management System (PMS)

Organization Name	**Indian Coast Guard**
Challenge title	Development of Indigenised Power Management System (PMS)
Problem Statement/	The main purpose of Power Management System is to seamlessly control, protect the Generators and combine various functions of the Generators and Main/Alternate switchboards into one interactive system on a dedicated Network. Power Management System is present in all the new generation of ICG Ships with latest configuration and specification. The PMS is a very critical system onboard the ICG Ships for smooth control and proper functioning of Power Generation and Distribution, which includes the Main switchboards onboard ships. The Power Management System (PMS) are not being manufactured in India and needs to be Indigenised.
Challenge brief/definition	Non availability of Indigenised Power Management System (PMS) installed onboard ICG Capital ships (OPVs/ PCVs)
Existing Solution (if any)	The Power Management System (PMS) is installed onboard all the new generation of ICG ships with latest configuration and specification. The PMS is a very critical system for smooth control and proper functioning of Power Generation and Distribution, which includes the Main switchboard onboard ships. PCV class of ICG ships are equipped with Delomatic-3 (DM-3) Power Management System which enables ship to perform automated operations of all DAs control, load sharing & monitoring, safeties/ protections of MSB etc. PMS system is also interfaced with IPMS system and engine controls for execution of various modes of propulsion.
Technology domain (s)	Automation & control system

Application/Use Case	Onboard ships
Project Outcome	Indigenous PMS will reduce import dependency for equipment and also supply of spares for existing fleet. This will eventually bring down the life cycle cost of equipment and reduce lead time for supply of spares.
Testing /Certification	As per Class recommendation
Future Expectation from the prototype / Technology developed	Production of the Power Management System (PMS) for usages onboard ships
Potential Market	Present and future requirements of the products in Service (from procurement perspective) – **Recurring requirement.** Will the developed product being able to strengthen the defence export of India – **Yes** Any other relevant info - **Nil** The developed product will be able to strengthen the defence export of India to other nations, in addition to meeting the domestic requirements
Business Case	The system has strong potential for bulk procurement for usage onboard Indian Coast Guard ships. There is also export potential to friendly foreign nations operating helicopters on ships and offshore platforms. Repeat orders are expected due to fleet expansion and lifecycle replacement requirements.

Problem Statement 80: Non availability of Indigenised Fire Detection System (FDS) installed onboard ICG ships (FPVs/ IBs).

Organization Name	**Indian Coast Guard**
Challenge title	Non availability of Indigenised Fire Detection System (FDS) installed onboard ICG ships (FPVs/ IBs).
Problem Statement/	Development of Indigenous Fire Detection System (FDS) for ICG ships
Challenge brief/definition	The Fire Detection System (FDS) onboard ships is a crucial safety system designed to detect and alert the crew members about the potential hazards of fire at an early stage. Thereby, facilitate the ship in protection of human lives and valuable assets onboard from unforeseen fire incident. The Fire Detection Systems (FDS) are currently manufactured in India. FDS needs to be indigenised for better product support, in order to keep the equipment operational by early provisioning of spares required for maintenance.
Existing Solution (if any)	Fire Detection systems are consisting of network of sensors, alarms and manual call points integrated across the ships and connected to central alarm panel located on the bridge. When sensors detect the fire, it sends a signal to the fire alarm panel, which provides both visual and audible alerts, indicating the exact location of the incident. Manual call points allow crew to raise an alarm if they spot a fire before the automatic system activates.

Technology domain (s)	Sensors
Application/Use Case	Onboard ships
Project Outcome	Indigenous FDS will reduce import dependency for spares of existing fleet. This will eventually bring down the life cycle cost of equipment and reduce the lead time for supply of spares.
Testing /Certification	Class Certification
Future Expectation from the prototype / Technology developed	Production of the Fire Detection System (FDS) for usages onboard ships.
Potential Market	Present and future requirements of the products in Service (from procurement perspective) – Recurring requirement Will the developed product will be able to strengthen the defence export of India – Yes. Any other relevant info - Nil The developed product will be able to strengthen the defence export of India to other nations, in addition to meeting the domestic requirements.

Business Case	The system has strong potential for bulk procurement for usage in Indian Coast Guard. There is also export potential to friendly foreign nations operating helicopters on ships and offshore platforms. Repeat orders are expected due to fleet expansion and lifecycle replacement requirements.

Problem Statement 81: Indigenisation of Personal Locator Beacon (PLB)

Organization Name	**Indian Coast Guard**
Challenge title	Indigenisation of Personal Locator Beacon (PLB)
Problem Statement/	Personal Locator Beacon (PLB) is a compact and portable emergency Beacon transmitter device installed in the aircrew life jackets. It is mandatory to carry this device by all aircrew during flying operations. PLB transmits distress signal on international distress frequencies when activated. The transmitted distress signal sends a global alarm via the COSPAS-SARSAT satellite system to Local User Terminal (LUT) and subsequently the alert is passed on to Mission Coordination Center (MCC) and Rescue coordination Center (RCC). The PLB operates on the international distress frequency 406 MHz and 121.5 MHz designated exclusively for emergency use. 406 MHz frequency can be received by COSPAS-SARSAT satellite system. Upon activation, the PLB transmits a unique digital code, known as Hex ID on 406 MHz, which helps to identify the specific PLB (Survivor) location. It also provides crucial coordinates of the survivor to Search and SAR) authorities Rescue. The PLB plays a crucial role to ensure life and safety of an aircrew in distress by transmitting his accurate location to RCC and significantly reduces the search and rescue response time. The PLB is also designed to provide two way voice communications AM-VHF or AM- UHF) on 121.5 MHz and 243 MHz in addition to distress transmission. PLB can be operated manually with rotary switch or automatically by water sensor activation switch. The set is waterproof upto 10 meter of depth.
Challenge brief/definition	PLB sets used in ICG aviation and in other sister services are of foreign origin. No Indian firm is manufacturing PLB sets with requisite technical specifications.

Existing Solution (if any)	Nil
Technology domain (s)	Personal Locator Beacon (PLB) is a compact and portable emergency Beacon transmitter device installed in the aircrew life jackets. PLB transmits distress signal on international distress frequencies when activated. The transmitted distress signal, sends a global alarm via the COSPAS-SARSAT satellite system to Local User Terminal (LUT) and subsequently the alert is passed on to Mission Coordination Center (MCC) and Rescue coordination Center (RCC). The PLB operates on the international distress frequency 406 MHz and 121.5 MHz designated exclusively for emergency use. 406 MHz frequency can be received by COSPAS-SARSAT satellite system. Upon activation, the PLB transmits a unique digital code, known as Hex ID on 406 MHz, which helps to identify the specific PLB (Survivor) location.
Application/Use Case	Personal Locator Beacon (PLB) is a compact and portable emergency Beacon transmitter device installed in the aircrew life jackets.
Project Outcome	Successful development of an indigenous, reliable and cost effective PLB suitable to carry by aircrew during flying operations. PLB transmits distress signal on international distress frequencies (406 MHz) when activated. The PLB is also provide two way communications (AM-VHF or AM-UHF) on 121.5 MHz and 243 MHz.
Testing /Certification	Registered with INMC, Bangalore and certified by DGAQA.
Future Expectation from the prototype /Technology developed	Prototype set is to undergo and pass all relevant and mandatory test prior to induction in service

Potential Market	1. Since the items are a life equipment, requirement of the product in service is inevitable and persistent. 2. The developed product will strengthen the Defence export capability of India. 3. The product will be utilised across all Defence services.
Business Case	The PLB has strong potential for bulk procurement by Indian Coast Guard future and adoption by sister services also.

Problem Statement 82: Maritime Security Analytics Software (MSAS) with Artificial Intelligence and Machine Learning for Coastal Surveillance Network of Indian Coast Guard.

Organization Name	**Indian Coast Guard**
Challenge title	Maritime Security Analytics Software (MSAS) with Artificial Intelligence and Machine Learning for Coastal Surveillance Network of Indian Coast Guard.
Problem Statement/	As part of Coastal Security mechanism, a surveillance system called Coastal Surveillance Network was sanctioned by Govt of India in 2010. In phase-I, 46 Radar stations (RS) having Radar (X & S band), AIS Receivers, Electro Optical (EO) camera, Met Equipment and VHF Radio have been established. In order to achieve gap free Surveillance, of entire coastline, 38 additional Radar Stations and 04 Mobile Surveillance Systems have been set up. In addition, feed of VTMS Gulf of Khumbat, VTS Gulf of Kutch and ICSS sites of DRDO is also being integrated. Thereafter, there will be 104 RS in the chain of static sensors. The large volume of data from static sensors is disseminated to ROSs, ROCs and CC for fusion and correlation on software developed by M/s BEL known as CSN software, which is static in nature and does not provide advance analytical tools to classify the tracks as 'Vessels of Interest (VOI)'. The sensor data provides largely positional and kinematic information. Further, The maritime traffic for entire coastal state, entire regional coast and entire Maritime Zones of India traffic is monitored at ROS, ROC and CC respectively. The classification of tracks relies on operators for manual interpretation. Therefore, there is high cognitive load and fatigue view manual correlation which impacts decision quality. So, there is high chance of missing subtle but important patterns during busy periods. Therefore, the integration of Artificial Intelligence and Machine Learning (AI/ML) technologies can improve speed and accuracy of analysis.

Challenge brief/ definition	The following areas have been selected for integration of AI/ML in CSN software:- 3.1 **Classification of Radar Data.** Presently, Radar Data provides kinematics and positional information of the vessel. It does not classify the type of vessel, activities and interaction between vessels. Hence, AI/ML software is required for classification of type, activities and interactions between vessels at sea. 3.2 **Automatic Detection, Classification by EO Sensor and Association with Radar/AIS Track.** Presently, the EO sensors are manual and required to be operated by watchkeepers. There is no automatic capturing of image of Radar/AIS track, classification of type & identity w.r.t. library, tagging to track and alerting on mismatch if any. Hence, AI/ML software is required for automatic capturing without operator intervention, tagging to track, building image library for classification of type, activities, interactions between vessels and alert on mismatch/interaction. **3.3 Multilingual ASR & NLP Solution for VHF Radio communication.** VHF Radio is installed on all Radar Stations and software has inbuilt feature to record the conversation. Presently, there is no software to covert the analogue voice to digital and text form. Hence, multilingual ASR & NLP Solution is required to convert all Indian languages(especially used in coastal states) voice to digital form in English which can be searched by key word to generate intelligence form open broadcast. **3.4 Predictive Analysis for AIS tracks.** Presently, AIS Data provides kinematics, positional information and some static information of the vessel as transmitted on AIS. However, the software is not able to classify authenticity of static information transmitted on AIS and activities of the vessels. Hence, AI/ML software is required for anomaly detection in static information and vessel activities based on track.

	3.5 Retrieval Augment Generation (RAG) Application for PANS Data. Presently, PANS data is being rendered in PDF, Word, XLS format on mail to ICG. The PANS data has vital information but could not be stored is structured database and fused to AIS database due to format. Hence, AI based RAG Application for converting Unstructured data (PANS and other sources) to structured database and fusing the information to AIS data for generating risk intelligence. Further, software should be compatible for integration of e-PANS from National Logistics Portal (Marine) of Indian Port Association as and when available. **3.6 AI Based MDA Assistant for Helping Watchkeeper to Investigate Suspicious Vessels.** Presently, watchkeeper investigate the vessel over radio for suspicious movement. However, operator may miss certain activities of the vessel. Hence, AI based MDA Assistant may be designed to find out factors of suspicion for investigation of the vessel and initiation of AI based investigation if required.
Existing Solution (if any)	The large volume of data generated by static sensors fitted all along the coast is being transferred to ROSs, ROCs and Control Centre for fusion and correlation on a software developed by M/s BEL known as CSN software, which is static in nature and does not provide advance analytical tools to classify the tracks as 'Vessels of Interest (VOI)'. The sensor data provides largely positional and kinematic information. Further, the maritime traffic for entire coastal state, entire regional coast and entire Maritime Zones of India traffic is monitored at ROS, ROC and CC respectively. The classification of tracks relies on operators for manual interpretation.
Technology domain (s)	Artificial Intelligence and Machine Learning

Application/Use Case	The envisaged application will be integrated into Coast Surveillance network of Indian Coast Guard to monitor maritime traffic. The AI/ML- enabled maritime surveillance application will actively fuse multi-sensor inputs, automatically detect, classify vessels (including dark vessel), and continuously analyse behaviour to flag anomalies such as loitering, boundary incursions, suspicious meetings and spoofing of identity. It will also generate dynamic risk scores and rank 'Vessels of Interest' with supporting evidence (tracks, imagery, radio transcripts), dramatically reducing operator workload and improving response time. By learning from local historical data, the software will not only deliver richer, area-specific operational intelligence but also will strengthen maritime security capabilities
Project Outcome	Maritime Security Analytics Software (MSAS) is an AI/ML-enabled maritime surveillance platform actively fuses these multi-sensor inputs, automatically detects, classifies vessels (including dark vessel), and continuously analyses behaviour to flag anomalies such as loitering, boundary incursions, suspicious meetings and spoofing of identity. It also generates dynamic risk scores and ranks 'Vessels of Interest' with supporting evidence (tracks, imagery, radio transcripts), dramatically reducing operator workload and improving response time. By learning from local historical data, the software not only delivers richer, area-specific operational intelligence but also strengthens maritime security capabilities
Testing /Certification	Software Validation and Verification Test Reports
Future Expectation from the prototype / Technology developed	The Maritime Security Analytics Software(MSAS) is the heart of system to process, correlate, store, fuse the historical/static/dynamic data and present an unambiguous COP. Further, assessment, association and correlation of behavioural data are also to be facilitated. It should be able to handle about 3,50,000 tracks smoothly. The software is to facilitate a batter understanding and assessment of the maritime situation by undertaking analytics, including Big Data Analytics and Artificial Intelligence/ Machine learning for refining of results. The intention is to know as to what the vessel at sea did in the past, doing at present and what could be its intentions. Few of the salient requisite features for situational understanding and

	assessment are as follows. **7.1 Feeds**. Feasibility of Integration of Radar, AIS, EO sensors, SAIS, VTMS/VATMS data, ISRO Fishery transponder data, SAR data, Sat Imagery, weather data etc. Integration with offline Vessel Database (IHS/Lloyds), ReAlcraft Fishery Database, PANS database, NSC database, Sanctioned Vessel database, VOI database etc. **7.2 Map.** The map is a geographical information tool to help user analyse and investigate maritime activities, both ongoing and historical. The map should depict all bodies of water. The important facets of map should include following:- 7.2.1 The map should be fully interactive investigatory tool to view multiple vessels simultaneously anywhere in the world (if data available) at given point of time. 7.2.2 EEZ, TW, CZ, high seas, RFMOs, RFBs, Protected marine zones, Oil terminals, ports area, port limits, anchorage area, SPMs, ISRR, FIR, IMBL, ODAs etc to be drawn and system should be able to extract data based on said zones. 7.2.3 Feasibility of WGS 84 GIS chart/ nautical chart underlay in map for analysis. 7.2.4 Geo-fencing. 7.2.5 Useful geofencing tools, line, circle, polygon, point, curves, EBL,VRM, BRM et **7.3. Watch Keeping Portal.** The watch keeping portal should enable the watch keeper to view live flow of traffic. The portal should have following features:- **7.3.1 Radar**. Classification of radar track i.e. determining the type of vessel and behaviour analysis e.g. dark activity, drifting, loitering, fishing, ship to ship transfer (meetings), parallel, loop and zig-zag pattern etc. based on AI model. **7.3.2 EO.** AI-based ship automation for capturing images through EO camera of Radar/ AIS tracks within range, classifying the class and tagging them to the respective tracks. Further, correlation of image with library and classify the vessel identity. **7.3.3 AIS.**Correlation of AIS contacts with radar for the

	detection of dark vessels and positional spoofing of AIS. The following is envisaged from the software:- 7.3.3.1 General pattern of traffic flow. 7.3.3.2 Multiple symbology which can be configured with various, flags, activities (e.g. anchored, drifting etc) and type (Oil, Container, Bulk, Chemical, LPG, flag,etc) of the vessel. 7.3.3.3 Long term track history of vessel denoting time stamp at each transmission of track. Feasibility of opening of multiple track of vessels simultaneously. 7.3.3.4 Search of vessel by Name, MMSI, Call sign, IMO etc. 7.3.3.5 Vessel card should display all information being transmitted by the vessel and comparison of static information with WRS database. 7.3.3.6 Play back of live as well historical track should be scroll based with date and time. 7.3.3.7 Safety Message. Vessel transmitting distress alert or other safety message at sea. 7.3.3.8 Rule-sets. Software should provide the provision of rule-sets based filtering with multiple conditions. Filter should be able to compile whole of map or includes/ exclude particular area/layer created. The filters should be saved with feasibility to delete if required. Feasibility of application of multiple rule-sets with conditions i.e. AND, OR, NAND, NOR etc. Some of the envisaged use are as follows:- 7.3.3.8.1 Attributes transmitted on AIS. 7.3.3.8.2 Other database added e.g. NSC, PANS, UNSC, IUU, MOU banned vessel, False Flag, NSC Expired etc. 7.3.3.8.3 Spoofing including Call sign/ IMO number/ MMSI

	number mismatch. 7.3.3.8.4 Positional spoofing. 7.3.3.8.5 Age of Vessel. 7.3.3.8.6 Type of Vessel. 7.3.3.8.7 Type of Cargo e.g. Hazardous, Chemical etc. 7.3.3.8.8 Contributing sensors. 7.3.3.8.9 Feasibility of filters based on multiple SI/IMO/Name/call sign which may be VOI for long terms. **7.4 Activity/Analysis Portal.** The activity portal should be able to describe the activities of the vessel using the Artificial Intelligence and Machine Learning. The portal should be able to depict the vessels as per activities as per given input i.e. area, period etc and display the list of vessels which should be exported in CSV format. The following activities are to be considered:- **7 .4.1 Area visit.** The vessels visiting particular area e.g. TW, EEZ, area described by operator. **7.4.2 Maiden Visit.** The vessels entering 1st time in EEZ/TW waters should be depicted. **7.4.3 Fishing.** The vessels engaged in fishing activities should be depicted. **7.4.4 Meeting.** The vessels conducting meeting with another vessel at sea should be depicted. **7.4.5** Research Operation. The vessel engaged in research activities at sea should be depicted.

	7.4.6 Port Calls. Port wise calling of the vessel should be depicted. **7.4.7 Spoofing** of Vessel Name/IMO/MMSI should be depicted. 7.4.8 Vessel doing Zig-Zag/loop/parallel course should be depicted. 7.4.9 Vessel not following ISL should be depicted. 7.4.10 Vessels anchored outside port limits should be depicted. 7.4.11 Vessels transiting through territorial waters but not having PANS should be depicted. 7.4.12 Vessel not following general pattern of historical path should be depicted. 7.4.13 Risk flagging of vessels known to have been involved in Illegal activities/incidents or maritime transgressions. Use of the same in determination of vessel risk profiles. 7.4.14 Switching off AIS voluntarily or loss of AIS should be depicted based on DR and other factors of the vessel. 7.4.15 The vessels loitering without entering port. 7.4.16 Vessel using invalid and duplicate MMSI to be depicted and algorithm based enveloped for differentiating the two vessels transmitting same MMSI at distant place. 7.4.17 Drift pattern should be part of application.

	7.4.18 Vessel transmitting invalid IMO
Potential Market	16.1 The software can be used by Indian Coast Guard, Indian Navy DG Shipping, Port Authorities and NRTO as these organisations are handling the maritime data. 16.2 Will the developed product will be able to strengthen the Defence export of India? Yes, there is potential market for export of software globally. Developing the maritime software for monitoring of Coastal Security Network using maritime data from terrestrial sensors as well as satellite data can indeed play a role in strengthening India's defense exports by :- 16.2.1 **Enhanced Efficacy of Coastal Surveillance.** The software will help to monitor and analyse the maritime picture in efficient manner. 16.2.2 **Technological advancement.** – Offering advanced maritime solution can provide a competitive edge in the global defense market, making Indian defense products more attractive to potential buyers. 16.2.3 **Customization.** - Offering customizable solution can be tailored to specific needs of different defense clients can broaden the market reach. 16.2.4 **Cost Effectiveness.** – Providing high-quality software at competitive prices can make Indian defense products more cost-effective, appealing to countries looking for

	affordable yet reliable solutions. 16.2.5 **Any other relevant information** – No
Business Case	The similar software can be used by organizations (i.e. Indian Navy, DG Shipping etc) handling maritime data. Further, there is scope for export as maritime security is challenging for maritime nations.