

DEFENCE INNOVATION ORGANISATION

(Under Aegis of Department of Defence Production)

Ministry of Defence, Government of India

New Delhi -110002

Summary of Defence India Startup Challenge – 6 (DISC 6) Problem Statements

Overall No. of challenges proposed: 38 (Thirty Eight)

DPSU/ICG/MHA	No. of Challenges Shortlisted	Challenge Number
ANVL	3	1, 2, 3
BDL	1	4
BEML	1	5
Bharat Electronics Limited (BEL)	3	6, 7, 8
Garden Reach Shipbuilders and Engineers Limited	1	9
Goa Shipyard Limited	1	10
Gliders India Limited	2	11, 12
India Optel Limited	4	13, 14, 15, 16
Mazagon Dock Shipbuilders Limited	2	17, 18
Munitions India Limited	2	19, 20
Troop Comforts Limited	2	21, 22
Yantra India Limited	2	23, 24
Ministry of Home Affairs	1	25
Indian Coast Guard	3	26, 27, 28
Indian Navy	1	29
Indian Army	1	30
Indian Airforce	2	31, 32
Assam Rifles	1	33
Border Security Force	2	34, 35
ITBP	2	36, 37
SSB	1	38

Titles of challenges shortlisted by respective Defence Agencies (DPSUs), Indian Coast Guard, Ministry of Home Affairs and services

ANVL

1. Design and development of track with detachable rubberised track pad for BMP-II
2. Automation of track adjustment mechanism of BMP-II
3. Improved Lighting management system for BMP-II/IJK and its Variants

BDL

4. Scalable Wireless Communication Network for Autonomous Mobile Platforms.

BEML

5. Design of Active Hydro Pneumatic Suspensions with variable dampening characteristics to meet Different Road profiles

Bharat Electronics Limited

6. Indigenous & cost-effective solution for development of Axis MEMS GYRO which has excellent performance in vibration & shock and low bias drift, bit rate and line termination with low noise
7. Indigenous development of Door Control Unit (DCU) and Gear Motor for automatic operation of platform screen doors at metro stations. These platform screen doors are for passenger safety and isolates platform from track
8. Development to achieve uniform circular polarisation in designing a Cavity Backed Spiral antenna (1-18GHz).

Garden Reach Shipbuilders and Engineers Limited

9. Development of AI enabled welder's helmet for real time display of welding parameters like Voltage, Current, traverse speed, electrode stick out etc. for immediate corrective control by welder during MIG & TIG welding processes

Goa Shipyard Limited

10. AI Based Condition Monitoring System for Yard Assets.

Gliders India Limited

11. Design and Development of Parachute for Paragliding
12. Design and Development of Parachute for Parasailing.

India Optel Limited

13. Development of Gyro Motor (GA7/30A-2M) intended for use in Gunner Sight TPKD-1 of Tank T-72.
14. Development of Gyro Chassis intended for use in Gunner Sight of Tank T-90

15. Development of Torque Generator Stator-800 intended for use in Gunner Sight of Tank T-90.
16. Development of Torque Generator Stator-1000 intended for use in Gunner Sight of Tank T-90

Mazagon Dock Shipbuilders Limited

17. Design of a Steering Console for an underwater vessel.
18. Design of Electro-Magnetic Velocity Log for navigation of underwater vessels.

Munitions India Limited

19. Create a safer environment for handling volatile & hazardous chemicals: Development of Suitable Process for Composition Manufacture & Filling of Smoke Shell
20. Development of equipment capable of automatic weighing and filling of powder like substance explosives within 2 mg tolerance (i.e. 28-30 Mg).

Troop Comforts Limited

21. Designing thermal agile mannequin to measure comfort parameter in simulated high altitude environment
22. Designing of ballistic protection portable bunkers with cooling effect

Yantra India Limited

23. Indigenous Development of Oxygen-Free Electrolytic Copper Rods for the production of Ammunition Hardware
24. Vulcanization of 120mm Steel cup, arming device Holder and Fuze Holder.

Ministry of Home Affairs

25. Monitoring to and fro movement of fishing Boats and fishermen at sea. Identification of fishermen at sea.

Indian Coast Guard

26. Mass evacuation and recovery system comprising of inflatable life rafts may be deployed rapidly in case of disaster at sea. The rafts may be deployable by air as well as surface platforms
27. Global Maritime Distress and Safety System (GMDSS) equipment manufacturing in India
28. Drones for operations at sea boarding and oil spill response management.

Indian Navy

29. Design and development of virtual assistant with AI/ML and AR tools, deployed onboard ships/submarines to support maintenance crew for Radar System

Indian Army

30. Continuous Unmanned Surveillance Tied System for Mechanised Forces.

Indian Airforce

31. To develop equipment and procedure for carrying out laser based levelling and harmonization of SU-30 MKI airframe and equipment.

32. Development of a Hand-Held Hard-Kill Counter UAS System.

Assam Rifles

33. Seamless and continuous domination of 1843km of Indo Myanmar Border

Border Security force

34. Tunnel Detection Technology: Should be able to detect dormant tunnels upto 10m in depth

35. Fog penetration radar: Dense Fog in many parts of Western & Eastern border is challenging from a surveillance point of view as it restricts the observation. This vulnerability is often exploited by ANEs to meet their nefarious designs.

ITBP

36. Post corporatization of OFB, drawing methodology to procure ammunition from open market.

37. Providing Fresh Vegetable/Fruit Storage in forward areas (having subzero temperature for long duration where) jawans remain deployed in BOPs.

SSB

38. Indigenous development of Amphibious vehicles.

DISC 6 DETAILED PROBLEM STATEMENTS OF AVNL

CHALLENGE: - 1

Organization Name	Ordnance Factory Medak (A Unit of AVNL)
Problem Statement/ Challenge title	Design and development of track with detachable rubberised track pad for BMP-II
Challenge domain	Track with detachable rubberised pad
Challenge brief/definition	<p>Description:</p> <p>BMP-II track system consists of forged steel track shoes with double pin configuration. The track pad has to be designed to provide grip, prevent road damage and reduce noise & vibration with requisite life.</p> <p>Objectives of the Challenge/Scope of Work:</p> <ul style="list-style-type: none">• To modify the existing track shoe design (only the bottom portion, keeping all other critical dimensions intact) for fitting track pad.• The rubberised track pad should be replaceable (slide in).• The life of the track pad should be the same as that of the track system, i.e 5000 Kms.• Grousers have to be provided in the rubber track pad to improve traction and achieve required amphibious speed of 7Km/hr.• The track pad has to be so designed that vehicle should not have any deteriorated mobility performance compared to existing ones in respect of speed, obstacle crossing capability, amphibious operation, braking, steering etc.• The weight of the track system along with the track pad should be less than 1420 kgs
Future Expectation from the prototype/ Tech developed	It can be used in the existing fleet of BMP-II track system or any newly developed tracked vehicle to reduce noise and vibration level.

CHALLENGE: - 2

Organization Name	Ordnance Factory Medak (A Unit of AVNL)
Problem Statement/ Challenge title	Automation of track adjustment mechanism of BMP-II
Challenge domain	Track tension adjustment
Challenge brief/definition	<p>Description: The existing track tension adjustment mechanism in BMP-II is manual, i.e., through a worm and worm wheel arrangement. After adjustment, the idler wheel crank is locked in its place with the help of lock coupling and lock nut.</p> <p>Objectives of the Challenge/Scope of Work:</p> <ul style="list-style-type: none"> ● To automate the existing manual track tension adjustment mechanism with the help of an electric motor or a linear actuator. However, the mechanism thus developed should be capable of adjusting the tension manually also, in case of failure of automated operation. ● An automatic locking/unlocking mechanism is to be developed. Again, the mechanism should be capable of manual operation. ● Development of control system. ● The mechanism should be designed such that there is no deterioration in the existing performance characteristics of BMP II. ● Apart from OEM specified maintenance interventions, there should not be any major overhaul requirements for a period of 16 years or 3700 kms, whichever is earlier. <p>All electrical and electronic system employed shall be JSS-55555 & EMI/EMC 461 E/F compliant.</p>
Future Expectation from the	It can be used in the existing fleet of BMP-II track system or any newly developed tracked vehicle to

prototype/Technology developed	reduce the time taken to adjust the track tension and enhance its mobility.
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CHALLENGE: - 3

Organization	AVNL
Problem Statement/ Challenge title	Improved Lighting management system for BMP-II/IIK and its Variants
Challenge brief/ definition	<p>The present Lighting system in BMP-II ICV uses incandescent lighting technology which provides low illumination (fixed), consumes high power and also generates heat signature.</p> <p>To update the BMP-II vehicles with the world peers in-terms of power saving, reduction in heat signature, to provide better illumination to crew with intensity control and to use the contour lights for Friend or Foe Identification (IFF) application in addition to the basic purpose, there is a requirement to improve the existing lighting system using latest indigenously available technology.</p> <p>Marker/Contour Lights:</p> <ul style="list-style-type: none">● Levels of Intensity at-least 03 levels● Colour Modes:<ul style="list-style-type: none">○ Red, Green, Amber & White: for 03 lights in the Rear of ICV○ Red, Green, Amber & White: for other 04 lights (front & side)● Control Requirements: On/off, Intensity control & colour control. Colour control may be provided central or local.● Cover of suitable material on each lamp to spread the light uniformly on entire front surface of lamp. <p>Cabin Lighting:</p>

	<ul style="list-style-type: none"> ● LED lighting for sufficient illumination with intensity control option (Uniform spread of light to be ensured). ● Option of Cockpit lighting. ● Covers and reflectors of suitable material to enable uniform spread of light. <p>Head Lights: LED headlights for night driving in three modes Low Beam, High Beam and Combat Driving.</p> <p>Inspection Light: LED inspection lamp with holder, cable and variable focus.</p>
<p>Challenge domain/ Technology</p>	<p>LED Lighting, Electronic Control /Management systems</p>
<p>Future Expectation from prototype / Technology developed</p>	<ul style="list-style-type: none"> ● Reduction in power consumption by illumination devices ● Better illumination for crew/human comfort with associated safety norms. ● Light Intensity & colour control options for IFF.

DISC 6 DETAILED PROBLEM STATEMENTS OF BDL

CHALLENGE: - 4

Organisation	M/s Bharat Dynamics Limited
Problem Statement / Challenge Title	Scalable Wireless Communication Network for Autonomous Mobile Platforms
Challenge Brief / Definition	Real time low latency Wireless Communication Network for secure communication between Autonomous Mobile Platforms and for data transfer to ground stations. Herein, onboard wireless communication modules, ground station and application software will be developed
Challenge Domain / Technology	Wireless Networks, Cryptography, Robotics, Swarm Communications
Future Expectation from the prototype / Technology Developed	This technology will be utilized in autonomous ground vehicles for deployment in various topologies

DISC 6 DETAILED PROBLEM STATEMENTS OF BEML

CHALLENGE: - 5

Organisation	BEML
Challenge title	Design of Active Hydro Pneumatic Suspensions with variable dampening characteristics to meet Different Road profiles
Challenge description	<ul style="list-style-type: none">● Preliminary design calculation to arrive at Suspension initial sizing (Bore and Rod Sizing, Stroke & Mounting lengths) and Layout based on GVW and Wheel geometry (Track & wheel base) to meet roll criteria.● Determine Front and rear suspension cylinder force Vs deflection curves.● Ensure design meets roll stability requirements.● Determine Front and Rear suspension cylinder Damping characteristics, Damping Orifice sizing, etc.● Carry out ADAMS, AMESim, FEA simulations based on design methodology required for design verification.● Sizing of suspension Components like, Piston Rod, Tube, Bearings, sealing configuration etc.

DISC 6 DETAILED PROBLEM STATEMENTS OF
BHARAT ELECTRONICS

CHALLENGE: - 6

Organization	Bharat electronics
Problem Statement/Challenge title	Indigenous & cost-effective solution for development of Axis MEMS GYRO
Challenge brief/definition	<p>MEMS Gyro is a high-end tactical class gyro module consisting of high-performance 2 /3 Axis Gyroscope sensor based on latest MEMS technology. This, generally is equipped with a high-speed processor that runs the digital signal processing algorithms de-livering control grade inertial measurement data. The unit runs off a single +5V supply and communicates via a RS422 interface.</p> <p>The deisgn must be rugged and modular making it suitable for integration with control systems and other application hardware. Every axis must be factory-calibrated for bias, sensitivity, mis-alignment and must compensated for temperature effects to be usable across the entire operating temperature range. The gyro module, must offer excellent bias instability performance (better than 0.5 –/hr) and is suitable for inertial guidance and control applications where size is the constraint. The unit must be able to be put in Service Mode. In this mode all the configuration parameters can be temporarily or permanently changed by overwriting the current settings in the flash memory. Service Mode also must provide the ability to perform single measurements, perform diagnostics and obtain a higher detail in the status byte.</p> <p>Indigenous & cost effective solution; MEMS gyro find applications in Missiles, seekers, Spacecrafts etc.</p>

	<p><u>Critical Specifications:</u></p> <p>The item to be used in aerospace products.</p> <ul style="list-style-type: none"> ● 2/3 Axis, RS422 interface ● 24 bits resolution ● Excellent performance in vibration & shock (Has to qualify for 0.4 g2/Hz vibration for 5 minutes for all axis, Acceleration of 40g, SHOCK 20g, 11 msec) Low bias drift, Low noise
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CHALLENGE: - 7

Organisation	Bharat electronics
Problem Statement/ Challenge title	Indigenous development of Door Control Unit (DCU) and Gear Motor for automatic operation of platform screen doors at metro stations
Challenge brief/definition	Motor Control system with Safety Integrity Level 3 (SIL3) certification
Challenge domain/ Technology	<p>Following are the salient features of DCU</p> <ul style="list-style-type: none"> ● Obstruction detection ● Adjustable opening and closing time of door ● Synchronization of left and right side door during opening and closing operations
Future Expectation from the prototype / Technology developed	DCU and Motor will be used in Platform Screen Door. All upcoming new metro platforms are going to have this requirement of Platform screen doors for safety of passengers.

CHALLENGE: - 8

Organisation	Bharat Electronics Limited
Problem Statement/ Challenge title	Development to achieve uniform circular polarization in designing a Cavity Backed Spiral Antenna (1-18GHz).
Challenge brief/definition	<p>The existing antenna exhibits weak radiation pattern formation up to 2GHz, dip in power levels at bore-sight beyond 13GHz and elliptical polarization all over the frequency band leading to degradation in system Direction finding (DF) accuracy. To improve DF accuracy, it is mandatory to maintain radiation pattern similar to Gaussian-like curve along with uniform polarization characteristic. This improvement needs to be achieved without any deviation to overall dimension of the antenna including radome. The dimension of the CBSA is restricted in diameter to 70mm and height to 75mm (excluding RF feed connector to CBSA).</p>
Challenge domain/ Technology	<p>Domain : Airborne EW Technology: Wide band Spiral Antenna backed by conducting cavity and enclosed by FRP radome is used as an airborne receive antenna to carry out Radar Warning Receiver (RWR) functionality including Direction Finding (DF) of target based on amplitude comparison.</p> <p>Antenna is required to be circularly polarized meeting the radiation pattern characteristics in all other linear planes also (example: Horizontal and Vertical polarizations). The Axial Ratio shall be better than 2dB over azimuth of +90° to -90° from 1-18GHz. Antenna parameters defined (Viz., Gain, Beam width, Back lobe, Squint, etc) shall meet for all polarizations (both circular and linear) except Right Hand Circular Polarization (RHCP). For DF measurement, 4 similar antennas will be used and measured DF shall be 10° rms (max).</p>

**DISC 6 DETAILED PROBLEM STATEMENTS OF GARDEN
REACH SHIPBUILDERS AND ENGINEERS LIMITED**

CHALLENGE: - 9

Organisation	Garden Reach Shipbuilders and Engineers Limited
Problem Statement/ Challenge	<ul style="list-style-type: none">● Welding carried out by welder at about a foot's distance from a blinding bright arc and melting steel of temperature about 1200-1400°C.● Conventional welding Helmet allows the welder to see only the arc and not the job, compelling the welder to use "muscle memory".● No technology available for the welder to view the real time● Welding parameters compared with the ideal range of WPS parameters thus inhibiting immediate corrective action during welding.
Challenge brief/definition	<ul style="list-style-type: none">● Allowing the welder to view both the job as well as arc at the same time.● Capture and display following real time welding parameters.<ul style="list-style-type: none">○ Voltage○ Current○ Traverse speed○ Electrode stick out● Compare the captured data with the ideal WPS parameters and provide feedback to the welder in a color-coded manner, enabling the welder to take immediate corrective action.● A rugged, lightweight and comfortable product for the welder to use for relatively prolonged duration

DISC 6 DETAILED PROBLEM STATEMENTS OF GOA
SHIPYARD LIMITED

CHALLENGE: - 10

Organisation	Goa Shipyard Limited
Problem Statement/ Challenge title	AI based Condition Monitoring System for Yard Activities
Challenge brief/definition	<p>GSL has high valued facilities / assets such as ship lift & transfer system, LLC cranes, etc. which require a generic health monitoring & maintenance that can be used for all yard assets. It is required to acquire equipment health data continuously and autonomously from sensors, which are required to be installed on the equipment (for eg data like vibration acoustics, temperature, etc that provides insights into equipment health). Analyze overall health trends and identifying defects that occur at multiple durations of the equipment using machine and deep learning models. Smart & actionable alerts based on risk and fault is required to be provided by the algorithm, which will replace periodic maintenance to a condition based monitoring.</p> <p>Details of cranes:</p> <ul style="list-style-type: none"> ● 60 Ton LL Crane : The capacity of the crane is 60T , operates at max height of 40 mts with a 30 mts radius. ● 45 Ton LL Cranes : The capacity of the crane is 45T , operates at max height of 25 mts with a radius of 25 mts.
Challenge domain/ Technology	Industrial
Future Expectation from the prototype / Technology developed	Increase the lifetime and Reduce downtime of high valued assets such as ship lift & transfer system and LLC cranes by planned preventive maintenance.

DISC 6 DETAILED PROBLEM STATEMENTS OF GLIDERS
INDIAN LIMITED

CHALLENGES: - 11, 12

Organisation	Gliders India Limited
Problem Statement/Challenge Title	<ul style="list-style-type: none">• Design and Development of Parachute for Paragliding• Design and Development of Parachute for Parasailing
Challenge Brief/Definition	It is an airborne item specially used for sport purpose where Paraglider's and Parasailer's life is involved. Precise design, development and testing are required, which is the main challenge. Certified design/drawing development and product certification is required for bulk production
Challenge Domain/Technology	Technology development
Future Expectation from the prototype/Technology Developed	It has a huge market in India and abroad.

DISC 6 DETAILED PROBLEM STATEMENTS OF
INDIA OPTEL LIMITED (IOL)

CHALLENGE: - 13

Organisation	Indian Optel Limited (IOL)
Problem Statement / Challenge title	Development of Gyro Motor (GA7/30A-2M) intended for use in Gunner Sight TPDK-1 of Tank T-72.
Challenge brief/ definition	<p>Gyro Motor, GA7/30A-2M is intended for use in Gunner Sight TPDK-1 of Tank T-72. This 3ϕ-Asynchronous Gyro Motor rotates at high rpm of approx. 27900 which is utilized for providing stabilized field of view (FOV) (gyroscopic stabilization) to the tank crew irrespective of the movement of Tank in rough terrain. The motor is installed in a gymbal frame and the gymbal-motor assembly (called stabilizer assembly) is than mounted in the sight. A mirror is suspended to the stabilizer assembly with linkages. Once power is supplied to the stabilizer system, the motor attains desired rpm within 3 mins. After this the stabilizer system can be unlocked and the mirror-stabilizer system provides a stabilized FOV to the tank crew.</p> <p>Currently, gyro-motors specific to above application is difficult to arrange from within India. There is a dependency on other nations for such systems. Moreover, due to upgradation and newer technologies coming to fore it is becoming difficult to arrange this critical item within desired time. Therefore, there is a requirement to develop/indigenize the gyro-motor.</p>
Challenge domain/ Technology	Mechanical
Future Expectation from the prototype / Technology developed	Development of indigenous solution of gyro-motor will be beneficial for the user as availability of this critical spare will be easy.

CHALLENGE: - 14

Organisation	Indian Optel Limited (IOL)
Problem Statement/ Challenge title	Development of Gyro Chassis intended for use in Gunner Sight of Tank T-90
Challenge brief/definition	<p>Present Gyro Chassis provides dual axis stabilization to Line of Sight, so that the tank can fire on the run. This stabilization is provided by mechanical gyroscopes stabilizing both horizontal & vertical axis mounted on free Gimbals. The gyroscope has 28000 RPM.</p> <p>Detailed qualitative requirement :</p> <ul style="list-style-type: none">● LoS is stabilized within ± 1.5 Ang Mins , when installed on a rocking stand with angular disturbance ± 2.5 Deg at 120 Hz Frequency. The angular limits are applicable to both horizontal & vertical axis.● Class 6 Bearings of high accuracy are to be used in both Gimbals to minimize the bearing friction.● Static Balancing of both Gyros must be within moment accuracy of 2gcm.
Challenge domain/ Technology	Mechanical
Future Expectation from the prototype / Technology developed	Indigenized Product developed with low cost

CHALLENGE: - 15

Organisation	Indian Optel Limited (IOL)
Problem Statement/ Challenge title	Development of Torque Generator Stator-800 intended for use in Gunner Sight of Tank T-90
Challenge brief/definition	<p>Torque generator Stator -800 is intended for use in Gunner Sight of Tank T-90. Purpose of this item is to move the gyro horizontally. A specified left and right angle is required to be maintained for accurate stabilization. This motor provides the horizontal movement.</p> <p>Currently, torque-generator stator specific to above application is difficult to arrange from within India. There is a dependency on other nations for such systems. Moreover, due to up gradation and newer technologies coming to fore it is becoming difficult to arrange this critical item within desired time. Therefore, there is a requirement to develop/indigenize this motor.</p>
Challenge domain/ Technology	Electro-Mechanical
Future Expectation from the prototype / Technology developed	Indigenized product developed with low cost.

CHALLENGE: - 16

Organisation	Indian Optel Limited (IOL)
Problem Statement/ Challenge title	Development of Torque Generator Stator-1000 intended for use in Gunner Sight of Tank T-90
Challenge brief/definition	<p>Torque Generator Stator -1000 is intended for use in Gunner Sight of Tank T-90. Purpose of this item is to move the gyro vertically. A specified upward and downward angle is required to be maintained for accurate stabilization. This motor provides the vertical movement.</p> <p>Currently, torque generator stator specific to above application is difficult to arrange from within India. There is a dependency on other nations for such systems. Moreover, due to up gradation and newer technologies coming to fore it is becoming difficult to arrange this critical item within desired time. Therefore, there is a requirement to develop/indigenize this motor.</p>
Challenge domain/ Technology	Electro-Mechanical
Future Expectation from the prototype / Technology developed	Indigenized product developed with low cost.

DISC 6 DETAILED PROBLEM STATEMENTS OF
MAZAGON DOCK LIMITED

CHALLENGE: - 17

Organisation	Mazagon Dock Shipbuilders Limited
Problem Statement/ Challenge title	Design & Development of Steering console for maneuvering of underwater vessels.
Challenge brief/definition	<p>The maneuvering of any Underwater vessel requires movement in 6 degrees of freedom to execute maneuvers such as diving, surfacing, change of heading (surface or submerged), etc. as per operator inputs.</p> <p>Console is required to gather information from depth, speed, heading, trim/list, weight/tank levels, Thrust monitoring systems, etc. via serial link.</p> <p>Console should be able to maneuver underwater vessel in Manual, Auto and Emergency mode.</p> <p>Maneuvering includes operation of either linear actuator or stepper motors for two hydroplanes and one rudder.</p> <p>The console should be an integrated interface with following:</p> <ul style="list-style-type: none">● Display Screen● Hand operated controller/Joystick● HMI (Human Machine Interface) Keypad for user inputs● Any other hardware necessary <p>The console must be able to display all parameters in real time, process them and carry out necessary commands in both manual and automatic mode.</p> <p>Processing refers to the collection of real time data, analysis and response to the requirements inputted by the user in light of the current situation of the vessel.</p>
Challenge domain/ Technology	Electromechanical / AI, Marine Platform

CHALLENGE: - 18

Organisation	Mazagon Dock Shipbuilders Limited
Problem Statement/ Challenge title	Design & Development of Electro-Magnetic Velocity Log for measurement of speed of underwater vessel.
Challenge brief/definition	<p>The navigation of any underwater vessel requires effective depth techniques using Electro-Magnetic principle to measure velocity and distance of vessel and log the data in relevance with the recorded movement.</p> <p>The unit is required to gather vessel's speed and distance information in conjunction with external probes and display them locally as well as to the central data Network/repeaters.</p> <p>The unit should be able to operate and measure vessel speed and distance in shallow and deep waters.</p> <p>Probe/sensors should operate in water of varying salinity and depths up to 500 meter.</p> <p>The unit should be an integrated interface with following:</p> <ul style="list-style-type: none">• Display Screen• HMI (Human Machine Interface) Keypad for user inputs• Any other hardware necessary <p>The unit must be able to display all parameters in real time, process them and carry out necessary commands in both OPERATING and SIMULATING mode.</p>
Challenge domain/ Technology	Electromagnetic

DISC 6 DETAILED PROBLEM STATEMENTS OF
MUNITIONS INDIA LIMITED

CHALLENGE: - 19

Organisation	Munitions India Limited
Problem Statement / Challenge title	Development of Suitable Process for Composition Manufacture & Filling of Smoke Shell
Challenge brief/definition	<p>Smoke composition is made of $TiCl_4$ & $CaSiO_3$. $TiCl_4$ is tough to handle, as it is a volatile liquid and in contact with humid air it forms opaque clouds. Reaction of $TiCl_4$ with air is an exothermic reaction and poses a safety hazard if not handled appropriately. Suitable methodology to be devised for :-</p> <ul style="list-style-type: none">● Handling of $TiCl_4$● Absorption of $TiCl_4$ with $CaSiO_3$ (Hydrous Pulverized calcium silicate)● Filling of compositions in the Smoke Shell
Challenge domain/ Technology	Process Development
Future Expectation from the prototype/ Technology developed	Once the process is developed as per the suitability of industries, smoke shell filling can be carried out indigenously.

CHALLENGE: - 20

Organisation	Munitions India Limited
Problem Statement / Challenge title	Development of equipment capable of automatic weighing and filling of powder like substance explosives within 2 mg tolerance (i.e. 28-30 Mg)
Challenge brief/definition	<p>Filling and pressing of explosive powder within 2mg tolerance is required from the automatic system. Variation in manual scooping method is very time consuming and variation happens generally between 5-10 mg.</p> <p>Hence a system is required which is capable of automatic weighing of explosive powder within 2 mg tolerance and able to fill this powder in small metallic components.</p>
Challenge domain/ Technology	Process and equipment Development
Future Expectation from the prototype / Technology developed	In filling of various explosive components of ammunition, very precise weighing and filling is required to produce high quality ammunition. This system has very good scope in ammunition production.

DISC 6 DETAILED PROBLEM STATEMENTS OF
TROOP COMFORTS LIMITED

CHALLENGE: - 21

Organisation	Troop Comforts Ltd
Problem Statement/ Challenge title	Designing Of Thermal Agile Mannequin To Measure Comfort Parameters In Simulated High Altitude Environment
Challenge brief/definition	Objective assessment of functional parameters of clothing ensemble at high altitude, to excel in designing and production of high-altitude garments. Moisture transport, thermal insulation and their interaction influence both the comfort and protective properties of clothing systems. Depending on the environmental conditions and clothing design, wind and repetitive body movements can increase the transport of heat and moisture away from the body. Thus, a thermal manikin designed to test clothing realistically, particularly under extreme conditions, should be able to sweat and perform such movement
Challenge domain/ Technology	Objective assessment of functional parameters of clothing ensemble at high altitude
Future Expectation from the prototype/ Technology developed Absorption of the Solution	To excel in designing and production of high altitude garments

CHALLENGE: - 22

Organisation	Troop Comforts Ltd
Problem Statement/ Challenge title	Designing of ballistic protection portable bunkers with cooling effect
Challenge brief/definition	Objective assessment of Portable Ballistic Protection bunker, to excel in designing and production of portable ballistic bunker. Such bunkers will have integrated mechanical and electronic system hence minimize the need to make/add extra equipments. Being re-usable and portable in nature, they could easily be repaired and transported.
Challenge domain/ Technology	Objective assessment of Portable Ballistic Protection bunker
Future Expectation from the prototype/ Technology developed Absorption of the Solution	To excel in designing and production of portable ballistic bunker

DISC 6 DETAILED PROBLEM STATEMENTS OF
YANTRA INDIA LIMITED

CHALLENGE: - 23

Organisation	Yantra India Limited (YIL)
Problem Statement/ Challenge title	Indigenous Development of Oxygen-Free Electrolytic Copper Rods for the production of Ammunition Hardware
Challenge brief/definition	Manufacturing of oxygen free copper rods by melting, casting and extrusion process.
Challenge domain/ Technology	YIL requires Oxygen Free Copper rods as per specification <ul style="list-style-type: none">● ASTM B 170 Grade I Size: 45 mm Dia● EN 13604-CW009A Condition 'D' Size: 50mm Dia for the production of Ammunition Hardware.
Future Expectation from the prototype / Technology developed	To develop indigenized sources.

CHALLENGE: - 24

Organisation	Yantra India Limited
Problem Statement/ Challenge title	Vulcanization of 120mm Steel cup, arming device Holder and Fuze Holder.
Challenge brief/definition	Vulcanization of 120mm Steel cup, arming device Holder and Fuze Holder is required to be done
Challenge domain/ Technology	The material of the vulcanization shall be chlorosulfonated polyethylene rubber with properties as per Technical specification 301161487 (Material type SUNNEX 66611 / HYPALON 40S grade)
Future Expectation from the prototype / Technology developed	To develop alternate sources.

DISC 6 DETAILED PROBLEM STATEMENTS OF
MHA

CHALLENGE: - 25

Organization	Ministry of Home Affairs, Department of Border Management
Problem Statement/ Challenge title	<ul style="list-style-type: none"> ● Monitoring the movement of fishing boats proceeding to and returning from sea. ● Monitoring the movement of fishermen proceeding to and returning from sea. ● Monitoring the movement of fishing Boats at sea. ● Identification of fishermen at sea.
Challenge domain	AI, ML, Data Analysis, Thermal Imaging
Challenge brief/definition	<ul style="list-style-type: none"> ● India has approx 3.1 Lakh fishing boats. Some of the boats operating close to International Maritime Boundary Line (IMBL) traverse across it and are apprehended by maritime agencies of neighboring countries which may be used for inimical purposes. The 26.11.2008 incident in Mumbai has also highlighted the security-related vulnerabilities of coastal areas. Therefore, monitoring the movement of fishing boats, specially those operating close to IMBL, a security challenge, is essential from Coastal Security perspective. ● Many Technological Solutions, such as installation of Tracking Devices, Transponders of ISRO and other agencies viz. BSNL Skylo etc., have been developed, which have their own limitations with respect to range, carriage on-board medium crafts without cabins, non-availability of feed to the ships of security agency viz. IN/ICG at sea, which is a challenge . ● Besides that, fisherman proceeding to sea are issued with Biometric ID Cards which could not be read at sea due to non-availability of internet at sea, therefore, QR coded PVC Aadhaar cards have been provided to them for confirming identity in offline mode at sea through Android devices/QR code readers. However, the Aadhaar card may confirm the identity of the person, but can not ascertain him being an Indian fisherman, therefore establishing identity of fishermen continues to be a challenge. ● There are 1537 Fish Landing Points but the fishing boats in India are engaged in fishing activities at non-designated landing sites also, which may lead to illegal trans-shipment of men and material which may be used for inimical activities. Certain Coastal States/UTs have developed mobile based Apps. In most of the cases, the arrival and departure details of fishing boats are provided manually by the owner/master of the fishing boats. ● Therefore Automatic accounting of the arrival/departure of the boats and the fisherman remains a challenge.

Future Expectation from the prototype / Technology developed	Automatic accounting of fishermen and fishing boats at sea and in harbours in real time.
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DISC 6 DETAILED PROBLEM STATEMENTS OF
INDIAN COAST GUARD

CHALLENGE: - 26

Organization	India Coast Guard
Problem Statement/ Challenge title	Mass evacuation and recovery system comprising of inflatable life rafts
Challenge Domain	<p>Recovering People from lifeboats or life rafts to any place of safety is time consuming and exhausting. Also, lifting people with a helicopter, or by climbing ladders/scramble nets up ship sides adds to precious recovery and turnaround time. In case of disaster at sea, involving mass rescue and evacuation, there is a need of an alternative Mass evacuation & rescue system which is practically feasible and economically viable.</p> <p>Mass evacuation & recovery system comprising of inflatable liferafts may be deployed rapidly in the area so that persons in water may embark these rafts. The rafts may be deployable by air as well as surface platforms.</p> <p>India is signatory to a number of International Conventions including the International Convention on Maritime Search and Rescue 1979, that oblige it to provide search and rescue services in Indian Search and Rescue Region. Indian Coast Guard has been entrusted with the duties of providing search and rescue in the Indian SRR.</p> <p>Situations at sea may result in a large number of persons requiring simultaneous recovery from water such as during passenger ship/ ferry evacuations.</p>

<p>Challenge brief/ definition</p>	<p>Recovering persons from sea during mass rescue operations is an arduous task as time and speed are of essence for saving precious lives. Mass evacuation & recovery system comprising of inflatable liferafts may be utilised for effecting mass rescue operations.</p> <p>Each liferaft may have following facilities :</p> <ul style="list-style-type: none"> • capacity for about 24-32 persons • Lifiable (with magnetic hook) • Symmetric units, may be combined into sections with four to six units • Fitted with chutes or slides for easy embarkation/ disembarkation. • Robust buoyant base construction with requisite canopy and liftable slings/ points. • Compliant with SOLAS regulations.
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CHALLENGE: - 27

<p>Organization</p>	<p>Indian Coast Guard</p>
<p>Problem Statement/ Challenge Title</p>	<p>Global Maritime Distress & Safety System Equipment manufacturing in India</p>
<p>Challenge Domain</p>	<p>GMDSS represents a worldwide network of automated emergency communications for ships at sea. SOLAS convention Chapter IV states that all ocean-going passenger ships and cargo ships of 300 gross tonnage and upwards are required to carry radio equipment that conforms to international standards. The main purpose of GMDSS is to prevent unanswered distress calls and delay in Search and Rescue actions when distress situations occur. For international operational purposes the GMDSS system sub-divides the World into 4 main geographical Sea Areas that are GMDSS Sea Areas A1, A2, A3 and A4. Every ship is required to carry GMDSS equipment according to the Sea Areas it traverses.</p>

Challenge Brief/Definition	<p>India is signatory to a number of International Conventions including the International Convention on Maritime Search and Rescue 1979, that oblige it to provide search and rescue services in Indian Search and Rescue Region. Indian Coast Guard has been entrusted with the duties of providing search and rescue assistance to mariners and protection to fishermen including assistance to them at sea while in distress and safety of life and property at sea vide section 14(2) (b) and 14 (2) (t) respectively of Coast Guard Act 1978. Consequent to India ratifying SAR convention 1979, Indian Coast Guard has been designated as the nodal agency for coordinating search and rescue in the Indian Search and Rescue Regions (ISRR) encompassing an area of approximately 4.6 million square kilometres.</p> <p>In order to effectively discharge Search & Rescue functions, MRCCs, MRSCs, ICG ships and Establishments are to be provided with latest GMDSS equipment.</p> <p>It should be compliant with the latest IMO/ ITU(R) regulations and guidelines.</p>
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CHALLENGE: - 28

Organization	Indian Coast Guard
Problem Statement/Challenge title	Drones for operations at sea boarding & Oil spill response management
Challenge domain	<p>A drone with expandable payload potentials for multi-mission mainly for detection of hostile targets, presence of oil spills in oceans and assistance for appreciation during VBSS operations and carriage of inflatable life jacket/ buoy for rescue of persons at sea.</p> <p>These drones would allow troops to have high situational awareness without potential risk, would serve as legal evidence in court of law, augmenting training and tactical skills.</p>
Challenge brief/ definition	A short-range drone with high-quality camera (thermal & IR) that collects and transmits real-time, still and recorded video images back to the ships/ launching stations. These drones may be capable of flying for about 30-45 minutes, 1.5-2 kms & up to 500 feet (altitude), have facilities for tracking, homing and auto recovery.

DISC 6 DETAILED PROBLEM STATEMENTS OF
INDIAN NAVY

CHALLENGE: - 29

Organisation	Indian Navy
Problem Statement/ Challenge title	Design and development of virtual assistant with AI/ML and AR tools, deployed onboard ships/submarines to support maintenance crew for Radar System
Challenge brief/ definition	<p>Design and development of a Virtual assistant with AI/ML and AR tools, deployed onboard ships/ submarines to support the maintenance crew for Radar system. The AI and AR based virtual assistant (A2VA) would require to offer the following:</p> <ul style="list-style-type: none">● Enhance self-reliance and self-sustenance at sea.● Enhance safety of men and materiel● Enhance operational efficiency by quick resolution of defects.● Enhance capabilities and upgrade skills of maintainers.● Diagnostics carried out onboard can be recorded and uploaded to QEM for intervention in case of non-resolution.● Automatic logging of defects and maintenance routines.● Include audio visual aids for training and diagnostic thereby precluding the requirement of QEM reps/non-Naval personnel onboard ships/submarines.● Post successful proving of prototypes for one Radar equipment, similar A2V as would be developed for other mission critical equipment.
Future Expectations	The solution is envisaged to be deployed onboard ships in the IN and assist the onboard maintainer in repair and maintenance of radar system onboard the ship.

DISC 6 DETAILED PROBLEM STATEMENTS OF
INDIAN ARMY

CHALLENGE: 30

Organisation	Indian Army
Problem Statement / Challenge Title	Continuous Unmanned Surveillance Tied System for Mechanised Forces.
Challenge Brief / Definition	<p>Acquisition of information and its timely application in the battlefield is of paramount importance for success in today's information centric warfare.</p> <p>It is proposed to develop a system to be employed by Armoured Regiments and Mechanised infantry Battalions for conduct of static surveillance from a height to detect targets which are undetectable by ground-based surveillance devices and also carry out aerial reconnaissance in untethered mode of Beyond Line-of-Sight targets concealed to the crews.</p> <p>The system should consist of a surveillance drone, a portable Ground Control Station (GCS) and a power source.</p> <p>Surveillance drone should be capable of being employed in tethered as well as untethered modes.</p> <ul style="list-style-type: none"> ● Should be able to carry out continuous surveillance by day and night. ● Should be capable of operating from sea level to altitudes upto 4500 mtr. ● Detection ranges for vehicles should be more than 8 km. <p>The system should be able to withstand strong wind currents</p> <p>The GCS should display and record real time day and night video from drone</p> <p>The system should be able to operate from an independent power source as Well as vehicle batteries.</p>
Challenge Domain / Technology	Border security, UAV

DISC 6 DETAILED PROBLEM STATEMENTS OF
INDIAN AIRFORCE

CHALLENGE: 31

Organisation	Indian Airforce
Problem statement/ challenge title	To develop equipment and procedure for carrying out laser based leveling and harmonization of SU-30 MKI Airframe and equipment.
Challenge brief/ definition (Please give details of the innovation to be done by the Start-Up and expected deliverable at the end of the project)	<p>With the exploitation of aircraft over a period of time, the alignment of the structure and the aggregates may get disturbed resulting in sub optimal performance of the systems. Such mis-alignment is also possible during change of fitted components, major scheduled servicing, rectifications and overhaul.</p> <p>In order to check and correct the alignment, levelling and harmonisation is carried out on airframe and on-board equipment to ensure that the reference lines of all the structural parts of the aircraft and the equipment are aligned as per design specifications. Apart from the airframe, harmonisation is carried out on optical sighting equipment, weapon launchers and navigational equipment.</p> <p>Currently, leveling is carried out manually using theodolite by considering the reference of 72 markings on the aircraft. The process is manpower intensive, time consuming and prone to errors. The manual process takes about five days. In order to make the procedure effective and accurate, it is proposed to undertake the procedure with aid of laser.</p>

CHALLENGE: 32

Organisation	Indian Airforce
Problem statement/ challenge title	Development of a Hand-Held Hard-Kill Counter UAS System.
Challenge brief definition	<ul style="list-style-type: none">● Development of a self-contained HandHeld Hard Kill Counter UAS System.● The system should be man portable and operable by a single individual.● Should be capable of repeated use in quick succession.● Should have range better than 300 m.● Should not require any special skills and training for neutralising the drone. The provision of aiming and neutralising drone should be very simple and achievable with minimal training.● The system should require minimum preparation time and equipment for repeated use.● The system should be maintenance friendly; with minimal maintenance requirements.
Future Expectation from the prototype/ Technology developed	Should be capable of integrating to existing CUAS system in IAF inventory and capable of getting inputs from the existing C2 System. Suitable digital display showing relative position of target drone should be available.

DISC 6 DETAILED PROBLEM STATEMENTS OF
ASSAM RIFLES

CHALLENGE: 33

Organisation	Assam Rifles
Problem Statement / Challenge Title	Seamless and continuous domination of 1843km of Indo Myanmar Border
Challenge Brief / Definition	The entire Indo Myanmar Border is porous, suffers from fractured terrain and the altitude differential is from Mean Sea Level to 12000 feet. The entire border is unfenced and due to the provisions of Free Move Regime (move of persons up to 16 km on either side) there are issues pertaining to seamless domination and surveillance of persons crossing the Indo Myanmar Border from security and smuggling point of view.
Challenge Domain / Technology	Artificial Intelligence/Avionic/Satellite.
Future Expectation from the prototype / Technology Developed	Indigenous solution with adequate security and encryption.

DISC 6 DETAILED PROBLEM STATEMENTS OF
BORDER SECURITY FORCE

CHALLENGE: 34

Organisation	Border Security force
Problem Statement / Challenge Title	Tunnel Detection Technology: Should be able to detect dormant tunnels upto 10m in depth
Challenge Brief / Definition	<p>In the recent past, few tunnels have been detected on Western borders with Pakistan. Detection and imaging of underground tunnels is a big challenge especially in the context of border security as the enemy can use his territory to dig a tunnel and open it deep inside our country behind own border security line to clandestinely infiltrate and smuggle narcotics, explosives, arms or ammunitions.</p> <p>Solution should have the following:</p> <ul style="list-style-type: none">• Should be able to detect dormant tunnels upto 15m in depth• Should be able to detect the exact location of any movement inside the tunnel at a distance of at least 100m.• Portable and easy to operate system with user friendly GUI giving exact direction and distance of the source of movement/ sound
Challenge Domain / Technology	Should be able to detect dormant tunnels upto 10m in depth

CHALLENGE: 35

Organisation	Border Security force
Problem Statement / Challenge Title	Fog penetration radar
Challenge Brief / Definition	<p>Dense Fog in many parts of Western & Eastern border is challenging from a surveillance point of view as it restricts the observation. This vulnerability is often exploited by ANEs to meet their nefarious designs.</p> <p>The Fog penetration technology to detect targets under heavy fog and inclement weather conditions in countering the infiltration and smuggling activities in the bordering areas.</p> <p>Static as well as Aerial platform-based Fog penetration equipment with following capabilities: -</p> <ul style="list-style-type: none">● Detection. Detection Range: -<ul style="list-style-type: none">○ Human – 1 Km○ Vehicle – 2 Km● Localization, tracking and recognition of people and vehicles under dense fog conditions.
Challenge Domain / Technology	The Fog penetration technology to detect targets under heavy fog and inclement weather conditions in countering the infiltration and smuggling activities in the bordering areas.
Future Expectation from the prototype / Technology Developed	Static as well as Aerial platform based Fog penetration equipment

DISC 6 DETAILED PROBLEM STATEMENTS OF ITBP

CHALLENGE: - 36

Organisation	ITBP
Problem Statement / Challenge Title	Promote India Arms and Ammunition Industry under Aatmnirbhar bharat
Challenge Brief / Definition	Post corporatization of OFB, drawing methodology to procure ammunition from open market.
Challenge Domain / Technology	No Comments
Future Expectation from the prototype / Technology Developed	This action may be helpful for speedy resolving of the problems/ Challenge being faced by the CAPFs in the procurement process.

CHALLENGE: - 37

Organisation	ITBP
Problem Statement / Challenge Title	Providing fresh vegetable/fruit to Jawans at BOPs instead of tinned ration.
Challenge Brief / Definition	Providing Fresh Vegetable/Fruit Storage in forward areas (having sub zero temperature for long duration where) jawans remains deployed in BOPs.
Challenge Domain / Technology	No Comments
Future Expectation from the prototype / Technology Developed	This action may be helpful for speedy resolving of the problems/ Challenge being faced by the CAPFs in procurement process.

DISC 6 DETAILED PROBLEM STATEMENTS OF SSB

CHALLENGE: 38

Organisation	SSB
Problem Statement / Challenge Title	Indigenous development of Amphibious vehicles.
Challenge Brief / Definition	<p>The development of Sashastra Seema Bal in north Bihar which is well known as India's most flood prone area, with 76% population living under the recurring threat of flood devastation.</p> <p>During flood situations SSB is the first responder for rescue of civilians and these Amphibious Vehicles are required in such situations. Indigenous Amphibious Vehicles may be used for patrolling and other operational duties</p>
Challenge Domain / Technology	Automobile
Future Expectation from the prototype / Technology Developed	Indigenous production of amphibious vehicles