

फरवरी

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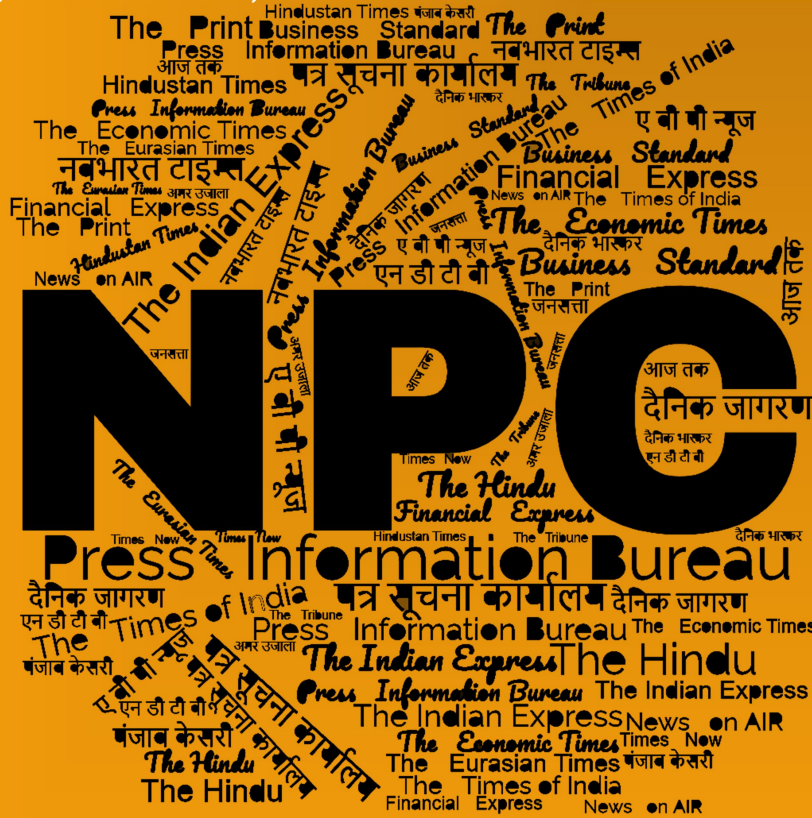
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What is DRDO's New D4 Anti-Drone System? Key Features Explained

DRDO's Drone, Detect, Deter and Destroy system was one of the products to be displayed at Aero India 2023. This is the first indigenously developed anti-drone system to be inducted into the Indian Armed Forces that is able to tackle any security threat within a 4 km radius. The D4 Drone System Developed by the DRDO and manufactured by Bharat Electronics Limited (BEL) is the first indigenously built anti-drone system to be inducted into the Indian armed forces.

Features of DRDO's Drone, Detect, Deter and Destroy System

Using multiple sensors and two different counterattacks, the drone system can detect, track and identify rogue drones within the 4km range. The D4 drone system is capable of destroying micro drones by jamming the command and control links and further damaging the hardware of the drones.

Once this system identifies the aerial threat, the drone system transfers the information to its associated systems. This information enables counter techniques of the either hard or soft kill. For soft kill, the system instantly detects and jams micro drones or uses a laser-based kill mechanic to terminate targets for the hard kill.

The system can lase a target up to 1.25 km far depending on its wattage. It uses the Global Navigation Satellite System (GNSS) to detect the frequency which is being used by the controller and then the systems are jammed.

It has drone detection and tracking radar, a day and night camera, a communication channel and jamming system, a GPS jamming and spoofing system and a command and control centre with power sources for the complete system. These features makes it a deadly counter against drone threats.

Why India needed a Drone, Detect, Deter And Destroy System

The Drone menace is on the rise in India. The D4 anti-drone system is a much-needed technological piece the country's defence infrastructure had long been looking for. Drone sightings have recently increased along the Line Of Control (LOC). The BSF, in 2023, has shot down 22 such drones and seized almost 45 kilograms of heroin in addition to seven grenades, 60

rounds of ammunition and two magazines. These drones have been used to drop weapons, drugs and explosives across the border into the Indian side.

<https://www.republicworld.com/india-news/general-news/aero-india-2023-drdo-displays-its-indigenously-developed-d4-anti-drone-system-for-forces-articleshow.html>

DRDO on Twitter

 **DRDO** ✓
@DRDO_India

#DRDOUpdates | Hon'ble Member of Parliament Shri Jual Oram, Chairperson Standing Committee on Defence (SCoD) visited DRDO Pavilion during #AeroIndia2023 and took keen interest in DRDO developed technologies and products.
@DefenceMinIndia
@jualoram
@SpokespersonMoD



2:06 PM · Feb 17, 2023 · 25.1K Views

THE ECONOMIC TIMES

Mon, 20 Feb 2023

Godrej Aerospace to Manufacture 8 Modules of DRDO Turbojet Engine

In a first for an Indian private company, Godrej Aerospace has bagged the order to manufacture eight modules of the DRDO's turbojet engine.

On Monday, Godrej & Boyce, the flagship company of the Godrej Group, announced that its business Godrej Aerospace is the first Indian private company to win the order for manufacturing eight modules of the DRDO Engine for aerial applications.

Godrej Aerospace won the order competing with over 25 companies owing to its strong infrastructure, proficiency in working with unique materials, and decades of experience in producing liquid engines for rockets, as well as its service to global aviation majors.

This venture opens up a world of opportunities for future projects to be manufactured indigenously in India, the company noted. Commenting on this milestone, Maneck Behramkamdin, AVP & Business Head, Godrej Aerospace said: "We are thrilled to have won the project to manufacture the DRDO Engine modules, which is a testament to our capabilities and expertise in the aerospace sector. This achievement reinforces our commitment to making India self-reliant in aerospace manufacturing thereby, contributing to the country's economic growth.

"We look forward to leveraging our extensive experience and competencies to serve the needs of global majors in the aviation & defence sector and contribute to the growth of the industry."

This experience will pave the way for future projects to develop modules for civil aviation engines as well, the release noted.

The company has made an investment of around 500 crores for aerospace and defence projects and has incorporated new processes into its manufacturing processes.

<https://economictimes.indiatimes.com/news/defence/godrej-aerospace-to-manufacture-8-modules-of-drdo-turbojet-engine/articleshow/98089624.cms>

Sat, 18 Feb 2023

IAF Pilots will soon have Indigenous Aviation Helmets, to be Made MKU Sub-Brand KAVRO

For the first time Indian armed forces will be equipped with high-quality, aviation helmets which will be made by MKU under its sub-brand Kavro.

Common Aircrew Helmet for different aircraft including Advanced Jet Trainer (AJT) 'Hawk' and Kiran trainers, for MiG-21, and Jaguar fighters, Lightweight Integrated Aircrew Helmet for the Su30 and MiG series fighters will be made by the company under 'Make in India' initiative at its facility located in the UP Defence Industrial Corridor.

MKU and Defence Bio-Engineering and Electro Medical Laboratory (DEBEL), Defence Research and Development Organization (DRDO) have signed a Transfer of Technology agreement (ToT) agreement to indigenously manufacture Common Aircrew Helmets and Lightweight Integrated Aircrew Helmets.

These helmets have been designed and developed by one of DRDO lab DEBEL. This helmet is expected to provide more protection to aircrews as there is a combination of high-performance fibres and an EPS liner. This combination can withstand high wind blast tests and these helmets are also equipped with mountings for securing oxygen masks/NVG/HPS and also R/T communication.

Stating that the ultimate goal is self-reliance, robust indigenous defence manufacturing industry in India, according to Neeraj Gupta, Managing Director, MKU Limited, "The agreement will facilitate a transfer of technology and expertise between the two companies."

More about the agreement

With this landmark agreement in place MKU Ltd aims to reduce dependency on imports and also contribute to the growth of the Aerospace and Defence industry in the country.

MKU's commitment to 'Atmanirbhar Bharat' initiative was also witnessed during DefExpo 2022 when Financial Express Online had reported that the company was awarded the contract to design, develop, and manufacture indigenously Aviation Night Vision Goggles (ANVGs) by state-owned Hindustan Aeronautics Limited (HAL) under its sub-brand, Netro. These are meant for the Light Utility Helicopter pilots.

Present in over 100 countries, MKU Ltd has their operations based in India and Germany and provides protection to more than three million soldiers and 3000 plus platforms across 230 forces.

<https://www.financialexpress.com/defence/iaf-pilots-will-soon-have-indigenous-aviation-helmets-to-be-made-mku-sub-brand-kavro/2985486/>

Fri, 17 Feb 2023

TurboTech Showcases New Systems

Indian firm TurboTech Defence & Aerospace Pvt Ltd has displayed an air cycle machine (ACM) for cooling electronic countermeasure (ECM) pods and an air compressor for Tatra military trucks at the Aero India 2023 show in Bangalore, held from 13 to 17 February.

The ACM provides 3.5 kW of cooling and can reduce the temperature inside the pod by -30° during operation. The ACM, which is powered solely by the ram air effect utilising the forward speed of the aircraft, is an integral component of ECM pods being developed by the state-owned Defence Research and Development Organisation (DRDO).

TurboTech Defence & Aerospace said that the ACM is undergoing testing, followed by certification.

The newly developed air compressor is mounted on the main engine of the Tatra military trucks. The compressed air developed through the system is used to support the truck's brakes and other applications. This compressor is designed for Tatra truck types built by India's state-owned company BEML (formerly Bharat Earth Movers Limited).

The company said that the air compressor system is in the final stage of testing.

<https://www.janes.com/defence-news/news-detail/aero-india-2023-turbotech-showcases-new-systems>



Mon, 20 Feb 2023

IIT Roorkee, IAF Sign MoU to Develop Indigenous Defence Technologies, Equipment

The Indian Institute of Technology, Roorkee and Indian Air Force (IAF) have joined hands to develop indigenous defence technologies and equipment through Research and Development. The two organisations have signed an MoU for the same on February 14 at the Aero India 2023 event in Bengaluru.

The aim is for a self-reliant Indian defence system. The MoU outlines the collaborative effort between IIT Roorkee and IAF to achieve the government's 'Make in India, Make for the World' vision and create a domestic defence industry. IAF will also partner with IIT Roorkee, and other agencies designated by the institute.

The rationale behind the partnership is to establish long-term relationships and work together to promote the development of indigenous technologies and equipment in the areas of obsolescence management, self-reliance, upgradations, and digitalisation through indigenisation of airborne equipment.

IIT Roorkee will provide its expertise and cooperation in research for feasibility studies and prototype development. The institute is already equipped with 'The DRDO Industry Academia-Centre of Excellence' (DIA-CoE), which is capable of addressing critical and futuristic defence technology requirements of the armed forces.

<https://indianexpress.com/article/education/iit-roorkee-iaf-sign-mou-to-develop-indigenous-defence-technologies-equipment-8456292/>



Mon, 20 Feb 2023

Role of AI Integration in Indian Military Ops amid Modernisation of Tri-services: Report

Artificial Intelligence (AI) integration is a key aspect of India's defence modernisation efforts, which aim to enhance the country's military capabilities and strengthen its national security. India has identified AI as a strategic area for investment as it takes steps to integrate it into various aspects of defence operations. Certain modern militaries have already incorporated the military application of AI in fields like logistics support, cyber defence, robots for medical evacuation and integrated surveillance, Indian think-tank dealing with national security and conceptual aspects of land-based warfare CLAWS stated in its June 2022 report.

The Indian Ministry of Defence is invested in a range of AI-enabled systems, including unmanned aerial vehicles (UAVs), surveillance systems, and autonomous weapons systems due to the commercial and military applications of AI systems. However, AI's weaponisation in achieving a strategic advantage in cyber, space, land, air and maritime domains will likely "accelerate the tempo of operations and simultaneously impact the force survivability in both offensive and defensive operations," the CLAWS report stated. According to the think tank, "AI and robotics paradigm is yet to become a key component and a

driving force in doctrinal thinking and perspective planning of the Indian Armed Forces." However, it states that the Indian military begun using certain Commercially-Off-The Shelf (COTS) equipment on a limited scale to enhance security.

AI integration transforming warfighting

The induction of Artificial Intelligence in combat scenarios is assisting in enhancing situational awareness, improving decision-making, and enabling faster response times in combat operations. Notably, one of the key areas where AI integration is being utilised is in the development of next-generation weapons systems. As per the current data of the Indian Defence Ministry, the Indian Armed Forces are engaged in the Research and Development (R&D) of several AI-powered weapons with the potential to improve the accuracy and precision of strikes, while reducing the risk to human personnel. These include smart bombs, autonomous drones, and unmanned ground vehicles (UGVs).

Notably, the Indian Tri-services have already incorporated a range of AI-based weapon systems such as the Combat Management System (CMS) for the Indian Navy's surface ships, developed

by the Defence Research and Development Organisation (DRDO). The CMS uses AI and machine learning algorithms to analyze data from various sensors and provide the crew with real-time situational awareness. Meanwhile, the Astra Mk1 air-to-air missile, has an onboard computer that uses AI algorithms to guide the payload to its target.

Developed by the DRDO and equipped with advanced sensors and cameras that use AI algorithms to detect and identify targets, the Rudra drones prove significant to Indian Army in combat scenarios. Additionally, another innovative solution by the DRDO, the Autonomous Robotics for Counter-Terrorism Operations (ARC) robot, assists Indian Army troops soldiers in counter-terrorism operations and is equipped with a variety of sensors and cameras that use AI algorithms to detect and track targets. These systems have AI is also being used to enhance cyber defence capabilities, with the development of advanced cybersecurity systems that can identify and respond to threats in real-time. These systems use machine learning algorithms to detect and respond to cyber-attacks, helping to safeguard India's critical infrastructure and national security assets.

In addition to its direct application in military operations, AI is also being used to support logistics, supply chain management, and other non-combat functions. By leveraging AI-powered predictive analytics and automation tools, the Indian military is able to improve the efficiency of logistics planning and reduce the time and cost required to move personnel and equipment across the country. Overall, the integration of AI is a key component of India's defence modernisation efforts and has the potential to significantly enhance the country's military capabilities and strengthen its national security.

<https://www.republicworld.com/india-news/general-news/role-of-ai-integration-in-indian-military-ops-amid-modernisation-of-tri-services-report-articleshow.html>



Fri, 17 Feb 2023

Bharat Electronics' Communication and Combat Systems for P-75I Submarine will be Indigenous, Says BEL CMD Srivastava

Bhanu P. Srivastava, Chairman and Managing Director, Bharat Electronics Limited speaks with Manish Kumar Jha on a range of technologies in aerospace and defence. On the sidelines of Aero India 2022, he outlines some of the cutting-edge technologies, including integrated EW systems, submarine communications, C-4I, radar, tank electronics, electro-optics, lasers and naval systems. Srivastava stresses that the highest spending on R&D will drive the next-generation AI-based unmanned and air-defence systems at BEL.

Bharat Electronics: What are you showing at Aero India 2023?

We are showcasing all our new equipment in a broad spectrum of technologies in which we are working. We are working on radar technology, communication technology, and naval projects. We are also working on many artificial intelligence-related cases and products, and electro-

optics projects besides systems. So, in all those areas, whatever we are, we have come up with new products and new technologies.

Electro-optics and lasers are some of the advanced areas where cutting-edge technology is shaping the new dimensions of warfare. How the BEL is addressing such futuristic technologies?

In electro-optics, there are two technologies— one is image intensification where you have small star lights and you intensify using image intensification tubes and another is thermal imaging, which uses that heat which is coming out of the object and then it converts into optics which you are able to see. So, in both these areas, we are making mini light present devices for our defence forces, and night vision goggles which can be used on weapons. It can be used on tanks. So, we are supplying all these products to defence forces.

We have also tied up with Elbit Systems for the night vision device which is used on the nose of the helicopter. It's called a COMPASS. It gives a panoramic image of day and night. A pilot can navigate at night.

We have our plant and machinery and we are coming up with a new factory near Nimmalur which will have a state-of-the-art manufacturing facility. We are the only company in India for manufacturing basic image intensifier tubes for companies which are making that night vision devices. So, we have our subsidiary company in clinical or electronic devices, which manufactures these image intensifier tubes, of course, with the TOTs arrangement with the Photonics of France.

Could you talk about the latest development in avionics and electronic warfare (EW) systems as these remain the flagship line of the BEL?

It is important as IAF will have about 500 aircraft, including MRFA, AMCA and Tejas MK2.

All the avionics package for LCA Tejas is from the BEL. So, we are contributing to LCA. For MiG-29 Upgrade also, we have tied up with two foreign companies in giving the electronic warfare equipment to IAF. So, these are all airborne EW equipment.

We are also in a new field for land-based systems and ship-based systems which is being done by our Hyderabad unit. We have mostly tied up with the DLRL of DRDO. So, we have an electronic warfare system like Nari Shakti for the ship-based system, where we scan the communication segment and non-communication segment and we try to find out what type of signals are coming as we try to detect the enemy positions and communications. So, we have provided a total communication system both internal and external for INS Vikrant. We have also provided a shipboard data network— the SDN system— and the flight deck communication system which controls the landing and takeoff as the pilot communicates with the centralized radio communication channel. In the flight deck communication system, we tied up with Motorola.

What is the update on sonar and radar which are the core areas of your expertise?

All the frontline ships and submarines of various types have built sonar from us. In fact, very few ships may have imported one. Otherwise, most of the ships and submarines of the Indian navy have BEL sonars, of course, designed in collaboration with NPL. It was only the P-75 which is manufactured in collaboration with DCNS [Naval Group] which has its own. Otherwise, all other submarines including the strategic platforms have BEL's communication systems and combat management systems (CMS) as well.

So, can the BEL provide such a system for the upcoming P-75 I submarine?

We are working with DRDO and even we had a discussion with Mazagon Dock (MDL) and other indigenous platform manufacturers about to what extent indigenous solutions can be given for P-75I.

What about the electronics for tanks which you have focused on in your display? Could you talk about gun upgrades and the elements?

Tank electronics have stabilizers and systems. Other electronic equipment includes the Commander Sight of battle tanks-T-90 for the Indian army. Our special unit in Chennai unit is dedicated to supporting tanks whether it is T-90 tanks or T-72 upgrades. Along, we have supplied all electronic equipment for Arjun MK1 or MK1A. We have upgraded the L-70 gun as we got the other from the army. We have replaced the old Russian systems with the latest mechanical systems and electronic systems.

While BEL's AKASH air missile system has gone through many upgrades, could you also throw light on the next-generation air defence system which is underway?

In the air defence, we have got two parts– air defence sensors and integration of air defence. So, one is the missile system where you have a surveillance radar and a tracking radar for the aircraft coming from objects. Then, you take the corrective action with a firing missile or engagement and that is partly similar to many ground-based sensors which we are supplying like surveillance radars and various types of surveillance data to the armed forces.

EW Suite For Fighter Aircraft

But more on the advanced level, we are integrating all these sensors and giving real-time air situation pictures to the IAF. Another big project is called the integrated air command and control system (IACC). It is a state-of-the-art fully indigenous system. The whole application in software is done based upon the basic structure in 2005. Now, we are in phase five. So, there we are building it up a few nodes and our objective is to make all nodes fully operational within three years.

Technology is moving at a fast pace in aerospace especially, in artificial intelligence (AI), robotics and machine learning. How are you incorporating such new-age technologies in your assembly line — systems and equipment?

You use robotics in assembly lines when you use massive-scale manufacturing. In defence, we don't have that massive scale manufacturing where we use robots in our office. So, where the quantities are limited. So, we have the latest equipment which is used to manufacture critical assemblies and sub-assemblies.

For AI, we have dedicated so many groups which are working on various aspects of AI. we have developed two-three languages specifically Chinese language where any communication coming in the Chinese language is decoded. it's real-time. So, it is a voice recognition system based on AI. We have also given integrated perimeter security systems to the IAF and naval air bases. So, we are installing that system which has got that this aspect of AI where you analyze the image. So, it keeps on learning which type of intrusions– whether it is a wild animal or a human being and human under camouflage. So, all these things are an intelligence-based system that can detect the intrusion and take corrective action. Under BEL's structure, we have three-tier R&D centres. We have a central research laboratory, which is working only on futuristic technologies.

We have close to around 600 Scientists working and the product development and Innovation Center for the subsystems and modules. And then we have Development and Engineering groups, which develop the usable products.

On R&D?

We spend more than 7% of our turnover on R&D. So, in the Indian context, it is the highest spending.

What is the BEL's export target and how are you progressing towards achieving the export target?

Under the current geopolitics, we intend to export only to friendly countries. There are other considerations like the line of credit and strategic alignment. To promote export, we have opened regional offices in Sri Lanka, Vietnam, Oman and Nigeria. So, these are some of the countries where we see the opportunity. There are other countries also where opportunities are there. We'll see how the business grows.

There are challenges as we lack the capability of sensors and semiconductors in India. How do you address that situation?

In the 80s and 90s, we lag behind in developing the ecosystem of semiconductor manufacturing did not develop in. Now, it is a costly affair and fab if you want to establish it requires a \$15-20 billion of investment. So, the government has come up with a scheme where it is giving incentives to a company or group of the company for semiconductor manufacturing, which also includes the semiconductor design houses and packaging industry. We need wafer manufacturing, chip manufacturing, chip packaging, testing and supply.

Could you also give us an update on the financial performance and your order book?

Our focus is always on R&D as we are able to customize the product for the armed forces. And our strength helps us to customize the solutions to their requirements. The second strength is our long-term association and product support. Even as the technology gets obsolete, we upgrade its obsolescence. If is there a new development, we give an add-on solution. So, we don't come to defence forces and say that is obsolete but provide solutions and upgrade; it saves huge cost as well. Many times, you see that we will get single tender, single vendor status, it is because BEL is offering value-added services right at the optimum cost with long-term support.

<https://www.financialexpress.com/defence/bharat-electronics-communication-and-combat-systems-for-p-75i-submarine-will-be-indigenous-says-bel-cmd-srivastava/2984823/>

THE TIMES OF INDIA

Fri, 17 Feb 2023

Trends of India Defence Budget 2023 Onwards: Will it Deter China's Misadventure?

By Dr Anil Kumar Lal

India's case is very unique in the present global geo-political set up being the dominant power in the Indo-Pacific Theatre and facing a direct land and sea threat from China. The dynamics of a

comprehensive threat emanating from its neighbors needs to be balanced by an equally responsive military and countering the grey-zone warfare emanating from China. John F Kennedy had famously said that “If you want peace prepare for war”. This dictum becomes all the more relevant when facing China, a revisionist nation, who believes in the fundamental approach of the old Mao saying that “Power flows through the barrel of a Gun”. This philosophy of China has assured a constant high funding of the PLA budget. For instance, the fiscal year 2023 Operation and Maintenance recommendation is \$278.1 billion, an increase of \$6.8 billion above the budget request and an increase of \$21.8 billion above the fiscal year 2022 base enacted level. These high numbers directly message to India the forthcoming perils. India has no option but to prepare or perish. They have to fight back with a higher defense preparedness of at least 3% military expenditure of its total GDP.

In India’s case budget estimates are calculated by the three services based more on the operational voids rather than creating a mid-term deterrence capacity. But whatever gets actually sanctioned is more politically dominant. This has resulted in the allocations (or the amount apportioned) hovering around 1.5 % of the GDP, which is neither adequate for capability enhancement nor for meeting the prevailing security challenges. Revised budgetary estimates, year on year, are testimony to this. Of the Union Budget’s total outlay of Rs 45,03,097 crore for financial year 2023-24, the Ministry of Defense has been allocated Rs 593,373 crore (\$72.6 Bn). This amounts to 1.97 per cent of GDP, where as a minimum 3% of GDP has been the Forces demand. This should be met for at least a time spectrum of five years (Till 2028), because of the extra-ordinary danger since the enemy is standing on the gates of India. A budget allocation, formulated over at least a five-year horizon, linked to prioritized acquisitions across each service and each domain, and creating matching capabilities could be considered as a “minimum” allocation.

Because China’s threat to India is likely to precipitate before 2030 as per their declared objectives and the multiple statements by their political leadership from time to time. However, a guaranteed allotment of 3% GDP of a rising India can actually prevent a war. Because it will enable India to not only modernize the forces but also allow India to raise more conventional strike corps capabilities and upgrade India’s nuclear TRIAD.

Redefining the Threats: Shaping A New Strategic Direction (under direct Chairmanship of the CDS)

The concept of ‘strategic space’ of India’s interest, as defined on the Ministry of Defense website: “India’s size, strategic location, trade interests in a security environment that extends from Persian Gulf in the West, to the Straits of Malacca in the East and from the Central Asian Republic (CAR) in the North to near the equator in the South, underpin India’s security response. In view of the strategic spread, it is essential for the country to maintain a credible land, air and maritime force to safeguard its security interests.” The threats range from the LAC to the non-contact domain. Therefore, the spectrum of threats for which the nation must prepare, besides the collusive and collaborative threats from its two major adversaries were broadened to include technological threats such as cyber, space and information warfare besides non-contact or non-conventional threats and security within the geographic space as described above. Nevertheless this, the current military standoff between India and China demands more focused analyses of the military transformation and dedicated funding.

The increased impact of Precision Guided Munitions (PGMs) with higher Lethality and longer ranges dictates the reduction in manpower. Even assimilation of the force multiplication effect of the 'Space Based Assets' needs to be factored in. This leads to the necessity of restructuring and resizing manpower in this legacy based ossified organizations. Simple analyses will lead to reduction in manpower all across the army and other services, while embedding force structure with niche technologies. Manpower reduction will save recurring revenue. The budgets, thus saved can enable better modernization in weapons and equipment or maybe for raising additional structures as per the changing threat perceptions.

The allocations of defense budget over last 5-8 years have fallen lesser than 2% of the GDP. This Falls Much Short to Quell the Coming Chinese misadventure. Analyses and Adapting innovative Out of the Box or Lateral Thinking Measures can help India to do one time financing of a five-year Perspective Plan. The funding can be guaranteed for this 5-year perspective plan or the mid-term perspective plan (MTPP).

One Time Funding Initiatives

There are four initiatives which need to be taken:

- (a) First could be to harness the already sanctioned Pacific Deterrence Initiative (PDI) by the US DOD for the FY 2022-2023 as well as explore central military funding within the QUAD grouping. These could be called as Sectoral or Indo-Pacific equipment.
- (b) Second could be to de-link defense pensions from India's Defense budget up to 2030 period or less.
- (c) Third could be to create a Bharat Raksha Fund (BRF) which Indian citizen's/NRI can donate funds and get the Rebate for Income Tax under section 80cc.
- (d) Fourthly, create Raksha Bonds akin to the Infrastructure Bonds, which India raises every second day.

The Pacific Deterrence Initiative (PDI), created by USA/QUAD Partnership. The intent of these guidelines is to ensure 'PDI' serves as a regionally-focused and useful framework for understanding and measuring specific investments. Additionally, consistent with legislation, DoD has organized PDI investment displays for six categories. Out of this there is a category for "Building the Defense and Security Capabilities, Capacity and Cooperation of Allies and Partners". India's geostrategic location should enable India to be the fulcrum for any such initiative. The investments under PDI develop capabilities, operational concepts, and planning to strengthen deterrence in the Indo-Pacific. The FY 2023 PDI is a \$6.1 billion subset of the Department's FY 2023 PB request, not a separate fund. This funding is for building the Defense and Security Capabilities, Capacity and Cooperation of Allies and Partners category is for prioritized security cooperation activities in support of strengthening alliances and includes building the defense and security capability, capacity, and cooperation of ally and partner national-level security forces, international professional military education, institutional capacity building, and human rights training. Even if India gets half of this money to develop capacities against its Northern/Eastern borders amounts to approx. \$280 million (Amounts to Rs 23,096,948,000.00). Similarly, India should leverage its position in QUAD for funding against military contingencies which can get some theatre specific military equipment. These could be like communication and surveillance command centers, drones and integration of missiles and high-flying aircrafts.

Secondly, Merging Defense Pensions with the the central govt pensions releasing Present burden of Rs India's defense budget for 2022-23 has been Rs 5,25,166 crore (\$70.6 billion). Majority of it has gone to Salaries (31%) and Pensions (23%). About 24% of defense budget is allocated for weapons, equipment for modernization. R&D gets a small share. Of the MoD's total allocations, the pension bill is paid under the Defense budget. The reform, which is required, is to merge the Defense Pension Head with the Central Government Pension Head, thus delinking the defense budget from being underfunded due to the manifestation of the live dual threat coupled with India's aspirations of being an Asian power. This change of sub-head is permissible under Article 150 of the constitution as deemed necessary by appropriate authorities. Let us not overplay and consider the pension bill as a burden because the great Indian soldier is the cause of our strength.

Lastly, India should create a Bharat Raksha Fund (BRF) which Indian citizen's/NRI can donate funds and get the Rebate for Income Tax under section 80cc. India is an extremely patriotic country as during all the wars. Which India has seen, that all the political parties unite and the nation becomes one. One is sure that Every year India would be able to budget for military capabilities. Similarly, we should float a Bharat Raksha Infrastructure Bonds akin to the many Infrastructure Bonds we issue every year for roads/bridges etc.

Conclusion

Thus, cumulatively India can harness at least the defense budget equivalent to almost 3 % of GDP enabling India to fill the existing voids. Thereafter as soon the voids are filled the methodology can then be reversed to what it is now.

<https://timesofindia.indiatimes.com/blogs/rakshakindia/trends-of-india-defence-budget-2023-onwards-will-it-deter-chinas-misadventure/>



Sun, 19 Feb 2023

Explained: US Air Force Tests AI-Controlled F-16 Fighter Jet Trainer

By Arnav Jha

The story

On February 13, the US Air Force announced that it had successfully executed 12 test flights in which artificial intelligence (AI) pilots flew the X-62A Variable Stability In-flight Simular Test Aircraft (VISTA). The test fighter jet, a modified F-16, was used to perform advanced fighter manoeuvres at the Edwards Air Force Base in California between December 1 and 16 last year.

The tests involved the use of two different AI 'agents', the Air Force Research Laboratory's Autonomous Air Combat Operations and the Defence Advanced Research Projects Agency's Air Combat Evolution, with both AIs performing different roles in controlling the jet. According to reports, while the former, AACO performed simulated beyond visual range engagements, the

latter, ACE, performed simulated within visual range engagements, typically referred to as ‘dogfighting’.

As per the Air Force report, ‘both team’s AI agents executed autonomous tactical manoeuvring while maintaining real-world airspace boundaries and optimising aircraft performance.’

It should be noted that a human pilot was still present in the AI-controlled aircraft during these tests, ready to take control at a moment’s notice if the need arises.

Rising tide

As impressive as the X-62A VISTA test was, it is still nowhere near the science fiction imagination of fully autonomous killer robots that one may see in movie franchises such as the Terminator series. But it is, undeniably, a major step in the general direction of such warfighting systems.

Militaries worldwide are now increasingly invested in developing autonomous systems for use in warfare. Between 2016 and 2020, the US alone reportedly spent as much as \$16 billion on the research and development of such systems.

These autonomous weapons systems can range from weaponised drone swarms to next-generation combat vehicles with an optional drone operation mode that will enable them to operate with varying degrees of autonomy without any human crews.

And, of course, as is indicated by the recent US Air Force test, these new weapon systems will also include next-generation fighter aircraft that are capable of everything from providing AI assistance to human pilots to even fully autonomous flight and combat.

The US, of course, is not alone in pursuing such technologies, with major military powers such as China and Russia having their own military development programmes for autonomous weapon systems.

As a major military and economic power, India too is invested in the use of such systems. In 2021, the Indian Army carried out a demonstration using indigenously developed drone swarms with autonomous capabilities. In 2022, the Army reportedly began formally inducting such systems in its mechanised forces.

According to the reports, while the system does make use of an AI, it is not fully autonomous as it still requires a minimal level of human intervention at this stage.

In 2022, the Defence Research and Development Organisation (DRDO) also expressed its intent to develop a new unmanned ground vehicle (UGV) based on the Arjun main battle tank. The idea behind this development is to use such fully-weaponised UGVs to reinforce India’s western border with Pakistan which features desert terrain.

Again, at this stage, the programme is meant to develop a UGV that is still remotely operated by a human pilot though there is likely room for the development of autonomous systems for the same. With all that said, it is important to note that militaries worldwide are not simply developing AI-based systems to use in so-called ‘killer robots’.

AIs are also being developed to improve cybersecurity for critical military systems, develop better combat simulation systems for training soldiers and provide better battlefield logistics and transportation, among other things.

A question of ethics

According to the International Committee of the Red Cross (ICRC), an autonomous weapon system is one that can select and apply force to targets without human intervention. By this definition, one can technically consider the decades-old landmine as a rudimentary form of an autonomous weapon though it would technically be defined as an automated weapon.

Regardless, once it is planted, a landmine operates without any oversight or command of a human operator. When it is subjected to certain external stimuli, the landmine detonates its deadly payload without any operator intervention.

The landmine does not discriminate against what type of targets it is deployed against, it does not struggle with questions of ethics as a human soldier might and it cannot be charged with war crimes for horrific acts such as the killing and maiming of civilians.

This, in a nutshell, also describes the ethical issues of deploying autonomous weapon systems. Of course, technology has come a long way since the days of the landmine that does not make use of any advanced sensors to discriminate against targets and it certainly does not have algorithms that allow its systems to have a semblance of ‘thought’ when making the decision to explode or not to explode.

But the presence of sensors and algorithms does not guarantee that an autonomous weapon system is safe from misidentification errors that could have disastrous consequences on modern battlefields.

To be clear, humans misidentify targets on battlefields as well but the presence of humans in the decision-making process at least makes it more likely that such errors will be recognised and even rectified to possibly manage the scale of the tragedy that could result in such events.

An autonomous system, on the other hand, may not be capable of recognising such errors (if at all) in a timely manner and rectifying them.

Beyond the possibility of targeting errors, autonomous weapon systems also create dilemmas over accountability for their actions. When a soldier commits a war crime, there is a clear line of accountability that can be followed to assign blame for the action.

But who is to blame for the actions of an autonomous system? The operators of such systems? The military commanders that gave the operators orders? The makers of the system or will it be the system itself that will be put on trial?

The legal and moral challenges related to assigning blame for the wartime actions of such systems will only get more complicated in the future as such weapon systems potentially achieve greater levels of autonomy and distance from any human operators.

To be sure, while the use of such systems will reduce battlefield risks for human soldiers, it will also lower the threshold for the use of violence in confrontational situations as militaries will no longer be held back by considerations such as loss of life on their own side.

As technology for the same advances, there is a general recognition worldwide of the dangers such weapon systems could hold in the future. On February 16, representatives from more than 60 countries including the US and China gathered in Hague and signed a joint statement endorsing the ‘responsible use’ of artificial intelligence for military purposes.

The signatories promised to ensure the development of military AIs in a way that " does not undermine international security, stability and accountability." With all that said, the statement in Hague was notably non-binding on the signatories and major military powers such as Russia and Israel did not even sign it.

A more binding attempt to ban or even regulate the use of autonomous weapon systems failed in December 2021. During a review meeting for the United Nations Convention on Certain Conventional Weapons, critics of lethal autonomous weapons attempted to push nations to agree to formulate new rules for regulating the use of such systems.

Talks for the same fell through with no conclusion as several nations, including India and the United States expressed doubts over the need for a new treaty to regulate such weapon systems.

<https://www.news9live.com/deep-dive/explained-us-air-force-tests-ai-controlled-f-16-fighter-jet-trainer-au36-2054529>

THE ECONOMIC TIMES

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Finland could Join NATO Ahead of Sweden: Defence Minister

Finland's defence minister said Saturday that his country will join NATO without waiting for Sweden if its Nordic neighbour's accession is held up by the Turkish government. Mikko Savola told The Associated Press on Saturday that Finland would prefer that the two countries join the alliance together, but it wouldn't hold up the process if Turkey decides to approve Finland, but not Sweden, as it has warned.

"No, no. Then we will join," Savola said in an interview on the sidelines of a security conference in Munich.

Since they broke with decades of non-alignment in the wake of Russia's invasion of Ukraine last year, Finland and Sweden have insisted they want to join NATO together. But Turkey's reluctance to accept Sweden unless it steps up pressure on Kurdish exile groups has made it more likely the two will have to join the alliance at different speeds.

"Sweden is our closest partner," Savola said. "Almost every week our defence forces are practising together and so on. It's a very deep cooperation and we also trust each other fully. But it's in Turkiye's hands now."

Speaking later Saturday at a panel in Munich, Finnish Prime Minister Sanna Marin struck a similar note.

"Of course, we cannot influence how some countries would ratify, but our message is that we are willing to join and would prefer to join together," she said.

All NATO countries except Turkey and Hungary have already given both countries the green light to join the alliance. Hungary has said it will do so soon, but Turkey says Sweden hasn't done enough to meet Turkish national security concerns, causing a rift in NATO at a time when the U.S. and other allies are seeking to project a united front against Russia.

In recent weeks, NATO officials have played down the significance of the two nations joining simultaneously.

"The main issue is not whether Finland and Sweden are joining at the same time. The main issue is that Finland and Sweden join as soon as possible, and it is of course a Turkish decision whether to ratify both protocols or only one protocol," NATO Secretary-General Jens Stoltenberg told reporters in Munich on Friday.

Savola said he hopes Finland, which shares a 1,340-kilometre (830-mile) border with Russia, will become a member of the alliance before a NATO summit in July. Until then, Savola said, Finland isn't worried about the security situation, noting Finland has a conscription army with a wartime strength of 280,000 soldiers, 95% of them reservists, and plans to buy F-35 fighter jets from the U.S., while also investing in its naval and land forces.

"We are strong and our willingness to defend the country is also strong," Savola said.

Finland has supported Ukraine with weapons from the start of the war. Savola said the military support amounts to 600 million euros so far. The country has said it will participate in a joint effort by European countries to deliver Leopard 2 tanks to Ukraine, but hasn't specified whether it will hand over any of its own tanks.

"There are many ways to join. There are those tanks, of course, training, spare parts and logistics," he said. "We are making those decisions quite soon in Finland."

<https://economictimes.indiatimes.com/news/defence/finland-could-join-nato-ahead-of-sweden-defence-minister/articleshow/98045061.cms>

Science & Technology News

THE TIMES OF INDIA

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Need a Culture of Innovation among Youths: Satheesh

There is a need for a culture of innovation among the youth, said G Satheesh Reddy, scientific adviser to Raksha Mantri. Addressing at the valedictory function in the symposium on 'Electronics for Self-Reliance' organised by CASEST and University of Hyderabad, Reddy urged researchers to work on sensors, terahertz and quantum technologies. He also gave examples of successful start-ups supported by the DRDO that are now doing business across the world.

<https://timesofindia.indiatimes.com/city/hyderabad/need-a-culture-of-innovation-among-youths-satheesh/articleshow/98076985.cms>

Lack of Understanding Leads to Inadequate Funding in Deep Science Ventures, says IISc. Professor

The funds that are currently received by deep science ventures floated by startups in India are inadequate due to the lack of understanding of the science and technology spectrum, said Prof. B. Gurumoorthy, Chief Executive, Society for Innovation and Development (SID), Indian Institute of Science (IISc.), Bengaluru.

Deep Science start-ups were problem-oriented and map to at least one of the sustainable development goals, he said.

“Support for such ventures is inadequate. One of the reasons is the lack of understanding of the underlying science and technology that tends to be diverse and complex,” he added.

According to Prof. Gurumoorthy, Honeywell’s CSR grant has helped nine start-ups and three EIRs (entrepreneur in residence) in diverse areas such as energy, water, medtech, and packaging materials.

Honeywell’s philanthropic arm, Honeywell Hometown Solutions India Foundation (HHSIF), in partnership with SID, has funded and incubated 30 start-ups since 2019. These start-ups are focused on finding solutions in the fields of biotechnology, healthcare, and nanotechnology that have the potential to offer advanced scientific solutions to some of the pressing needs in healthcare and environment.

They include Azooka Labs, HealthSeq Precision Medicine, Equine Biotech, Protein Design, Siamaf Healthcare, Mimyk Medical Simulations, PathShodh Healthcare, Theranutilus and OpenWater, which focus on subjects ranging from highly advanced healthcare to sustainability.

Interestingly, most of these startups are led by either women or teams that are from the underprivileged communities.

Pooja Thakran, director, HHSIF, said, “Deep science start-ups are the engine of innovation, and they are critical to shaping the future. By supporting these start-ups, Honeywell is trying to tap into the boundless potential of the research ecosystem, and support development of solutions through premier research institutes, like IISc., in India. By funding these start-ups, we are fostering the next generation of game-changing technologies that will address some of the world’s most pressing health and environmental challenges.”

<https://www.thehindu.com/news/cities/bangalore/society-for-innovation-and-development-sid-honeywell-hometown-solutions-india-foundation-hhsif-iisc-bengaluru-deep-science/article66531572.ece>

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