

July
2022

समाचार पत्रों से चयित अंश Newspapers Clippings

A Daily service to keep DRDO Fraternity abreast with DRDO
Technologies, Defence Technologies, Defence Policies,
International Relations and Science & Technology

खंड : 47 अंक: 143 28 जुलाई 2022

Vol.: 47 Issue: 143 28 July 2022



रक्षा विज्ञान पुस्तकालय

Defence Science Library

रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र

Defence Scientific Information & Documentation Centre

मेटकॉफ हाउस, दिल्ली - 110 054

Metcalfe House, Delhi - 110 054

CONTENTS

| S. No. | TITLE | Page No. |
|--|--|-----------------------------------|
| DRDO News | | 1-3 |
| DRDO Technology News | | 1-3 |
| 1. | Army to Get Major Firepower Boost with DRDO-Developed Guided Rockets for Pinaka Weapon System | <i>The Print</i> 1 |
| 2. | How India is Gearing up for its own Hypersonic Ballistic Missile | <i>India Today</i> 1 |
| DRDO On Twitter | | 3-3 |
| Defence News | | 4-26 |
| Defence Strategic: National/International | | 4-26 |
| 3. | उन्नत आयुध नये युग के युद्ध की वास्तविकता हैं; राष्ट्रीय सुरक्षा के लिये नवोन्मेषी और आत्मनिर्भर आयुध की रचना जरूरी: 'एमो-इंडिया' में रक्षा मंत्री श्री राजनाथ सिंह | <i>Press Information Bureau</i> 4 |
| 4. | Advanced ammunition is the reality of new age warfare; Need to create an innovative & self-reliant ammunition base for national security: Raksha Mantri Shri Rajnath Singh at 'Ammo India' | <i>Press Information Bureau</i> 7 |
| 5. | Country's Economic Prowess Gets Reflected in its Ammunition: Defence Minister Rajnath Singh | <i>The Hindu</i> 9 |
| 6. | Tata Group Delivers Indigenously Developed Quick Reaction Fighting Vehicle to Indian Army | <i>The Economic Times</i> 10 |
| 7. | HTT-40 Trainers will be Powered by Honeywell Engines | <i>Financial Express</i> 11 |
| 8. | State-of-the-Art Hypersonic Vehicles by 2024-25 in India: Defence Ministry | <i>The Hindu</i> 12 |
| 9. | Coimbatore: Experts Talk on Ways to Improve Defence Sector | <i>The Times of India</i> 13 |
| 10. | पूर्वी लद्दाख में चीन सीमा पर ठहर सकेंगे 35 हजार सैनिक | <i>Navbharat Times</i> 14 |
| 11. | India Kick Starts Programme to Build Armed Drone Swarms Indigenously | <i>Business World</i> 15 |
| 12. | Years After Kargil, India Yet to Put in Place Comprehensive Weapon & Strategic Planning | <i>News Nine</i> 16 |
| 13. | Chinese Spy Vessel's Expected Sri Lanka Entry Keeps India on its Toes | <i>The Economic Times</i> 19 |
| 14. | भारत-पाक के विदेश मंत्री मिलेंगे आज! | <i>Navbharat Times</i> 20 |
| 15. | NDA Amendment Stresses Why India-US Defence Partnership is More Critical than Ever | <i>News 18</i> 20 |
| 16. | US Seeks to Add India for NATO Plus: Lawmaker Ro Khanna | <i>The Print</i> 22 |
| 17. | Indo-Pacific Defence Chiefs Meet Against Backdrop of Rising China | <i>Business World</i> 23 |
| 18. | The Hypersonic Race: A Case for Guarded Optimism | <i>Defense News</i> 24 |
| Science & Technology | | 26-31 |
| 19. | Researchers 3D Print Sensors for Satellites | <i>MIT News</i> 26 |
| 20. | An Alternative Superconducting Qubit Achieves High Performance for Quantum Computing | <i>Phys.Org</i> 28 |
| 21. | Research Finds Bacteria Can Remove Plastic Pollution from Lakes | <i>The Indian Express</i> 29 |
| 22. | China Spacecraft Returns Amid Booster Rocket Concerns | <i>Phys.Org</i> 30 |

Tue, 26 Jul 2022

Army to Get Major Firepower Boost with DRDO-Developed Guided Rockets for Pinaka Weapon System

Defence Ministry on Tuesday approved Defence Research and Development Organisation (DRDO) projects which would give a significant boost to the Indian Army's firepower as Guided Extended Range ammunition along with area denial munition rockets for Pinaka rocket launchers were cleared by it. "The proposals approved by Defence Acquisition Council include three proposals of the Indian Army including Guided Extended Range Rocket Ammunition, Area Denial Munition Type I and Infantry Combat Vehicle – Command," the Defence Ministry said.

All three of these products have been designed and developed by DRDO. The total value of these three proposals is Rs 8,599 crore, they said. The Guided Extended Range Rocket Ammunition has a range of 75 km with an accuracy of 40 meters. The Aerial Denial Munition Type I Rocket Ammunition contains dual-purpose submunitions that are capable of neutralizing both tanks and armoured personnel carriers as well as vehicle entrenched troops, the Ministry said. The Infantry Combat Vehicle – Command is equipped with technology to collect, disseminate, share and present real-time information to commanders to facilitate quick decision-making for the execution of tasks. (ANI)

<https://theprint.in/india/army-to-get-major-firepower-boost-with-drdo-developed-guided-rockets-for-pinaka-weapon-system/1056491/>



Tue, 26 Jul 2022

How India is Gearing up for its own Hypersonic Ballistic Missile

By Pradip R. Sagar

In March this year, Russia announced it had fired a hypersonic ballistic missile, the Kinzhal, to destroy a huge underground arms depot in western Ukraine. In India, military planners have been keenly awaiting the dawn of the country's own hypersonic missile. Missile scientists associated with the Indo-Russian joint venture BrahMos are working on the hypersonic missile technology,

which only Russia and China possess. Even the US is still developing the technology. A hypersonic missile travels at the speed of at least Mach 5. Unlike a ballistic missile, which follows a defined trajectory, it is highly maneuverable. In India, the BrahMos-2 will be the hypersonic version of the missile and will probably have a range of 1,500 km. Trials have put its speed at almost Mach 8, making it the fastest in the world. “BrahMos-2 is a hypersonic version of the missile. It is likely to enter the prototype stage in the next three years,” said a top defence ministry official, adding that a series of tests of the missile were conducted at the speed of Mach 6.5.



DRDO successfully flight tests New Generation Agni P Ballistic Missile, in Balasore.

In 2020, the Defence Research and Development Organisation (DRDO) had tested the hypersonic air-breathing scramjet system for propulsion, called the Hypersonic Technology Demonstration Vehicle or HSTDV. According to a defence official, the HSTDV attained a speed of Mach 6 for 23 seconds during the testing. “India has joined a select group of countries, including the United States, Russia, and China, that have indigenously developed technology capable of making the HSTDV take an unpredictable trajectory and elude interceptor detection,” a defence official said, adding that the test-firing might be related to the BrahMos-2 hypersonic missile, which is expected to be modelled on Russia’s Zircon hypersonic missile.

BrahMos is the only cruise missile to be exported by India. The Philippines will be its first foreign buyer while countries like Indonesia have shown keen interest in it. The current versions of the BrahMos have a range of about 500 km, with the export variant having a range of 290 km to keep it under the MTCR (Missile Technology Control Regime) restrictions of 300 km. The MTCR lays down regulations to limit the proliferation of missiles and missile technology. “Although not legally binding on members, the informal political set-up has ensured every country enjoys the right to protect itself using ballistic missiles while ensuring only responsible members can develop ballistic technologies that might be used for attack, not defence,” says Indian defence expert Girish Linganna.

Also in the works is the BrahMos NG (next generation), which is smaller in size (6 metres long) than the original BrahMos and weighs 1.6 tonnes. The original BrahMos weighs three tonnes and is nine metres long. The BrahMos NG boasts of a range of 290 km and can attain speeds of up to Mach 3.5. Due to its lesser radar cross-section, the BrahMos NG is more difficult for enemy air defence systems to locate and engage. The BrahMos NG will have an active electronically scanned array (AESA) radar instead of the mechanically scanned radar on the BrahMos PJ-10. Every armed force is envisioned as a user of the BrahMos NG. The earlier

BrahMos PJ-10 could be carried only by the Sukhoi Su-30 MKI. The BrahMos NG also suits the Indian Navy's Project 75 India (P75I) submarines. The BrahMos NG will have a land-based variant for the Indian Army, a variant for the Indian Air Force and a ship and submarine-compatible variant for the Navy.

The Sukhoi Su-30 MKI will be able to carry five BrahMos NGs at a time, instead of only one BrahMos. MiG-29s and the indigenous LCA Tejas will also benefit from the BrahMos NG, as will be the newly inducted Rafales reportedly. "India's combat power will increase exponentially with the lethality, versatility and portability of the BrahMos NG and BrahMos-2. With the threat from China growing by the day, the BrahMos NG will potentially be a force multiplier for the Indian armed forces," said another senior defence official.

<https://www.indiatoday.in/india-today-insight/story/how-india-is-gearing-up-for-its-own-hypersonic-ballistic-missile-1980239-2022-07-26>

DRDO On Twitter

DRDO @DRDO_India

#DRDOforIndia | DRDO salutes the valour & sacrifice made by the brave-hearted soldiers of the #KargilWar to safeguard our country. Pledging to deliver state-of-the-art fighting capability to the armed forces. Jai hind 🇮🇳 #KargilVijayDiwas @DefenceMinIndia @SpokespersonMoD

26 July 2022
Kargil Vijay Diwas
Remembering the bravehearts of the Nation

2:38 PM · Jul 26, 2022 · Twitter for iPhone

DRDO @DRDO_India

A visionary #scientist, President, and the #MissileManofIndia, #DrAPJAbdulKalam is fondly remembered today, on his death anniversary. We remain grateful for his outstanding contribution for the development of advanced defence technologies as DRDO Chief.

Fondly Remembered
Dr. A.P.J. Abdul Kalam
—15 Oct 1931 - 27 July 2015

3:31 PM · Jul 27, 2022 · Twitter for iPhone



पत्र सूचना कार्यालय
भारत सरकार

रक्षामंत्रालय

बुधवार, 27 जुलाई 2022 12:05 अपराह्न

उन्नत आयुध नये युग के युद्ध की वास्तविकता हैं; राष्ट्रीय सुरक्षा के लिये नवोन्मेषी और आत्मनिर्भर आयुध की रचना जरूरी: 'एमो-इंडिया' में रक्षा मंत्री श्री राजनाथ सिंह

रक्षामंत्री ने निजी सेक्टर से उन्नत तैयारी के मद्देनजर सशस्त्र बलों की आयुध आवश्यकताओं को पूरा करने के लिये सरकार के साथ मिलकर काम करने का आग्रह किया

आत्मनिर्भरता की दिशा में भारत की यात्रा में स्थानीय प्रयास और विदेशी सहयोग का बेहतर समिश्रण उसका आधार है

रक्षामंत्री श्री राजनाथ सिंह ने मजबूती और आत्मनिर्भरता की स्थापना के लिये आयुध के क्षेत्र में नवोन्मेष किये जाने का आह्वान किया, जो भावी चुनौतियों का सामना करने के सम्बंध में सशस्त्र बलों को हमेशा चाक-चौबंद रखेंगे। वे आज 27 जुलाई, 2022 को नई दिल्ली में आयोजित 'मेक इन इंडिया अपॉर्ट्यूनिटीज एंड चैलेंजेस' (मेक इन इंडिया अवसर और चुनौतियां) विषयक सैन्य आयुध (एमो-इंडिया) के दूसरे सम्मेलन के उद्घाटन सत्र को सम्बोधित कर रहे थे। रक्षामंत्री ने कहा कि उन्नत आयुध नये युग के युद्ध की वास्तविकता है। क्षेत्रीय व वैश्विक अनिवार्यताओं और रक्षा चुनौतियों को देखते हुये यह भारत के लिये अत्यंत जरूरी है।

रक्षामंत्री ने कहा, "किसी राष्ट्र का वैज्ञानिक व प्रौद्योगिकीय के साथ-साथ आर्थिक विकास, उस राष्ट्र के हथियारों और आयुधों की क्षमता में परिलक्षित होता है। आयुध का विकास न केवल सुरक्षा के लिये जरूरी है, बल्कि देश के सामाजिक-आर्थिक प्रगति के लिये भी जरूरी है। भारत को विश्व शक्ति बनाने और रक्षा उत्पादन में अग्रणी देश बनने के लिये जरूरी है कि हम स्वदेशी डिजाइन, आयुध का विकास और उत्पादन की दिशा में आगे बढ़ें।"

श्री राजनाथ सिंह ने कहा कि सरकार यह बात भली-भांति जानती है कि रक्षा सेक्टर को मजबूत बनाने और आयुध के क्षेत्र में भागीदारी बढ़ाने के लिये निजी सेक्टर की महत्त्वपूर्ण भूमिका है। इस दिशा में कई बाधाएँ थीं, जो पहले अड़चनें पैदा करती थीं। इन सबको अब हटा दिया गया है। उन्होंने कहा कि बोलीकर्ताओं की भागीदारी की सीमा तय करने से लेकर वित्तीय योग्यता के मानक या ऋण चुकता करने की क्षमता के आकलन तक को ध्यान में रखते हुये सरकार ने काफी छूट दी है। श्री राजनाथ सिंह ने सार्वजनिक एवं निजी सेक्टरों, अनुसंधान एवं विकास प्रतिष्ठानों, स्टार्ट-अप, अकादमिक जगत और वैयक्तिक नवोन्मेषकों का आह्वान किया कि वे नये रास्ते खोजें, जिनसे ऐसी बुनियाद तैयार हो सके, जो हमारे सशस्त्र बलों की जरूरतों को पूरा कर सकें तथा उनकी तैयारी को बढ़ा सकें।

रक्षामंत्री ने आयुध की सटीकता के महत्त्व पर जोर देते हुये कहा कि भावी युद्धों में यह प्रमुख भूमिका निभायेगा। उन्होंने कहा कि आयुध हमेशा प्रगति करते रहते हैं, नये-नये रूप लेते रहते हैं, इसलिये यह बहुत जरूरी है। उन्होंने कहा, “सटीकता आधारित आयुध की ‘मुनथो ढालो’ बेस पर तैनाती ने 1999 के करगिल युद्ध में भारत की विजय में महत्त्वपूर्ण भूमिका निभाई थी। वर्ष 2019 में बालाकोट के आतंकी ठिकानों पर आयुधों के सटीक वार ने इस अभियान में हमारी सफलता को सुनिश्चित बनाया था। आधुनिक युद्ध के मैदानों में आयुध नये अवतार में सामने आ रहे हैं। इनकी एक बार प्रोग्रामिंग कर दी जाये, तो उसके बाद ये स्वयं जानकारी ले लेते हैं, सुधार कर लेते हैं और सही समय पर सही निशाने पर जाकर वार करते हैं। इसके पहले, बमों के आकार और उनकी विस्फोट क्षमता पर ही सारा जोर दिया जाता है, लेकिन अब उनका चाक-चौबंद होना भी जरूरी हो गया है।”

स्मार्ट, सटीकता और स्वचालित हथियार प्रणाली पर प्रकाश डालते हुये श्री राजनाथ सिंह ने कहा कि ये हथियार केवल इच्छित लक्ष्यों को ही बेधते हैं। उन्होंने कहा, “अगर दुश्मन के ठिकाने को तबाह करना है, तब सटीक आयुध ऐसी स्थिति में लक्ष्य तय करता है। वह नागरिक ठिकानों को निशाना नहीं बनाता। पारंपरिक हथियारों के साथ ऐसा नहीं है। हम दुश्मन देश की सेना से लड़ते हैं, उसके नागरिकों से नहीं। सटीक आयुधों के जरिये, नागरिक प्रतिष्ठानों की तबाही से बचा जा सकता है तथा युद्धकाल में भी शांति और मानवता के मूल्यों को बचाया जा सकता है।”

रक्षामंत्री ने सरकार की प्रतिबद्धता को दोहरते हुये कहा कि देश ‘रक्षा में आत्मनिर्भरता’ को प्राप्त करेगा। उन्होंने कहा कि स्वदेशी उद्योग को क्षमतावान बनाने के लिये सभी प्रयास किये जा रहे हैं। स्वदेशी उद्योग देश में ही उत्पादित विश्वस्तरीय हथियारों/प्रणालियों से सशस्त्र बलों को लैस कर सकते हैं, जो हमारी राष्ट्रीय सुरक्षा को मजबूत बनाने के लिये बहुत जरूरी है। उन्होंने बताया कि रक्षा मंत्रालय ने सकारात्मक स्वदेशीकरण सूची को अधिसूचित किया है, जिससे पता चलता है कि सरकार हथियारों के स्वदेशी निर्माण के लिये कटिबद्ध है। उन्होंने कहा, “चाहे वह उन्नत हल्का टारपीडो पिनाक के लिये गाइडेड रेंज रॉकेट हो, एंटी-रेडियेशन मिसाइल या लॉयटरिंग म्यूनिसन हो, तीसरी सूची में ऐसे 43 आयुध हैं। इससे पता चलता है कि हम रक्षा क्षेत्र में आत्मनिर्भरता प्राप्त करने के लिये प्रतिबद्ध हैं। इससे हमारे

आत्मविश्वास का भी पता चलता है कि हमारा स्वदेशी रक्षा उद्योग अनुसंधान, विकास और निर्माण में कितना सक्षम है। मौजूदा आयुध प्रणालियों और हथियारों की इन सूचियों से हमारे उद्योग को प्रोत्साहन मिलेगा कि वे नई चुनौतियों का मुकाबला कर सकें। इससे उनकी प्रगति भी सुनिश्चित होगी।”

श्री राजनाथ सिंह ने इस तथ्य की सराहना की कि सात में से छह नई रक्षा कंपनियां, जिन्हें पूर्व के आयुध फैक्ट्री बोर्ड से निकालकर बनाया गया है, उन कंपनियों ने अपनी शुरुआत के छह महीनों में ही लाभ दर्ज कर लिया है। म्यूनिशंस इंडिया लिमिटेड को 500 करोड़ रुपये के निर्यात आर्डर मिले हैं। उन्होंने कहा कि यह देश के आयुध उद्योग की अपार क्षमता का द्योतक है।

रक्षामंत्री ने ऐसे तमाम सुधारों का ब्योरा दिया, जिन्हें रक्षा मंत्रालय ने शुरू किया है। इसमें वित्त वर्ष 2022-23 में स्वदेशी उद्योग को आबंटित बजट के मद्देनजर 68 प्रतिशत पूंजी प्राप्ति तथा निजी उद्योग, एमएसएमई और स्टार्ट-अप को प्रोत्साहन देने के लिये स्वदेशी पूंजी प्राप्ति का 25 प्रतिशत आबंटन शामिल है। उन्होंने उस नीति पर भी प्रकाश डाला, जिसके तहत डीआरडीओ-उद्योग विशेष उद्देशीय संस्था की अनुमति दी गई है, ताकि महत्पूर्ण उन्नत रक्षा उत्पादों को विकसित किया जा सके। उन्होंने बताया कि सरकार रक्षा सेक्टर में एमएसएमई और स्टार्ट-अप की भूमिका को समझती है, इसलिये रक्षा नवोन्मेष स्टार्ट-अप चुनौती एवं प्रौद्योगिकी विकास निधि का विस्तार किया गया है, ताकि इनके लिये ज्यादा अवसर पैदा हो सकें।

श्री राजनाथ सिंह ने कहा कि रक्षा मंत्रालय एक तरफ आत्मनिर्भरता प्राप्त करने पर ध्यान दे रहा है, वहीं दूसरी तरफ वह विदेशी मूल उपकरण निर्माताओं को प्रोत्साहित कर रहा है कि वे भारत में निवेश करें, निर्माण करें और यहीं से निर्यात करें। यह प्रयास प्रधानमंत्री श्री नरेन्द्र मोदी की ‘मेक इन इंडिया, मेक फॉर दी वर्ल्ड’ की परिकल्पना के अनुरूप है। श्री सिंह ने कहा, “सैन्य खर्च के मामले में भारत दुनिया के दस देशों में शीर्ष पर है, जो उसे रक्षा के मामले में बहुत आकर्षक बाजार बनाता है। हम मानते हैं कि आत्मनिर्भरता की दिशा में भारत की यात्रा में स्थानीय प्रयास और विदेशी सहयोग का बेहतर समिश्रण उसका आधार है। शिक्षित श्रम-शक्ति, कम विकास खर्च और खपत क्षमता के मामले में भारत इस प्रयास में अग्रणी है। हमारी आत्मनिर्भरता वैश्विक उद्योगों के साथ सहयोग, समन्यवय और साझीदारी पर आधारित है।”

इस अवसर पर रक्षा मंत्री ने एक प्रदर्शनी का भी उद्घाटन किया, जहां भारतीय नौसेना, डीपीएसयू और निजी सेक्टर द्वारा विकसित उत्पादों को प्रदर्शित किया गया है। उन्होंने सम्मेलन में ‘नॉलेज पेपर’ भी जारी किया। सम्मेलन में रक्षा मंत्रालय के वरिष्ठ असैन्य और सैन्य अधिकारी तथा उद्योग, अकादमिक जगत, स्टार्ट-अप के प्रतिनिधियों के साथ नवोन्मेषक भी उपस्थित थे।

इस दो-दिवसीय सम्मेलन का आयोजन फिक्की और संयुक्त युद्ध अध्ययन केंद्र (सीईएलजोओडब्ल्यूएस) ने संयुक्त रूप से किया। इसके तहत सशस्त्र बलों की आयुध जरूरतों पर विस्तार से विश्लेषण किया जायेगा। सम्मेलन में टैंकों और बख्तरबंद गाड़ियों के लिये हथियारों के विषय पर सत्र होगा, जिसमें

तोपखाने को भी शामिल किया गया है। साथ ही सम्मेलन में वायु रक्षा, वायु शस्त्र, ड्रोन तथा ड्रोन-रोधी प्रणालियों के लिये सटीक हमला करने वाले हथियार, नौसेना के हथियार और छोटे हथियारों के आयुध, विस्फोटक तथा बारूदी सुरंगों पर सत्र शामिल हैं। यह सभी हितधारकों, जैसे उद्योग, उपयोगकर्ता, डीआरडीओ, अकादमिक जगत को एक अनोखा मंच करायेगा, जहां वे आयुध निर्माण में आत्मनिर्भरता प्राप्त करने के लिये काम कर सकेंगे तथा रक्षा सेक्टर में 'आत्मनिर्भरता' की दिशा में अग्रसर होंगे।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1845360>



Press Information Bureau
Government of India

Ministry of Defence

Wed, 27 Jul 2022 12:50 PM

Advanced ammunition is the reality of new age warfare; Need to create an innovative & self-reliant ammunition base for national security: Raksha Mantri Shri Rajnath Singh at 'Ammo India'

Exhorts private sector to work with the Government in catering to the ammunition needs of the Armed Forces for enhanced preparedness

Healthy mix of local endeavours & foreign collaboration is the bedrock of India's journey of self-reliance: RM

Raksha Mantri Shri Rajnath Singh has called for innovations in the field of ammunition for the creation of a strong and self-reliant base that keeps the Armed Forces fully prepared to deal with future challenges. He was addressing the inaugural session of the second conference on Military Ammunition (Ammo India) on the theme 'Make in India Opportunities and Challenges' in New Delhi on July 27, 2022. The Raksha Mantri described advanced ammunition as the reality of the new age warfare, which is a must for India, given its regional & global imperatives and security challenges. "Scientific & technological as well as the economic development of a nation is reflected in the capacity of its weapons and ammunition. The development of ammunition is crucial not only for security, but also for socio-economic progress of the country. For India to become a world power and one of the leading countries in defence production, we must move forward in the indigenous design, development & production of ammunition," said the Raksha Mantri.

Shri Rajnath Singh asserted that the government understands the crucial role private sector can play in strengthening the defence sector and to enhance their participation in the field of ammunition, many barriers, which were earlier prevalent, have been removed. He said, from capping the participation of bidders, criteria of financial eligibility or the issue of credit ratings, the government has given considerable relaxation. He exhorted the public & private sectors, research & development establishments, start-ups, academia and individual innovators to explore

newer avenues which can create a base that caters to the needs of the Armed Forces, ensuring their enhanced preparedness.

The Raksha Mantri also emphasised the importance of precision guided ammunition, saying that it will play a major role in future warfare, equal to weapons/platforms due to its constantly-evolving nature. “The employment of precision guided ammunition at ‘Muntho Dhalo’ base played an important role in India’s victory in 1999 Kargil war. Precision strike of ammunition during 2019 strikes on terror camps in Balakot also ensured our success in the operation. Ammunition in modern battlefields is emerging in its new avatar, which once programmed can automatically take inputs, make course corrections and target the appropriate location at the right time. Earlier, only the size and explosive capacity of bombs mattered, but now their smartness is equally important,” he said.

Elaborating further on the advantages of a smart, precision and autonomous weapon system, Shri Rajnath Singh stated that it only targets desired areas. “If any enemy base is to be destroyed, then precision ammunition will selectively target it and not any civil establishments. This is not the case with traditional ammunition. Wars are fought with the country’s military, not with its people. Through precision ammunition, destruction of civil establishments can be avoided and the values of peace & humanity in times of war can be preserved,” he said.

The Raksha Mantri reiterated the Government’s commitment to achieve ‘Aatmanirbharta in Defence’ and said that all efforts are being made to empower the domestic industry, which can equip the Armed Forces with home-grown world-class weapons/systems, crucial for bolstering national security. He pointed out that the three positive indigenisation lists notified by Ministry of Defence clearly indicate the Government’s emphasis towards indigenous manufacturing of ammunition. “Be it Guided Extended Range rockets for Pinaka, Advanced Light Weight Torpedo, Anti-Radiation Missiles or Loitering Munition, there are 43 such items in the third list. This reflects our commitment to achieve self-reliance in the field and indicates our confidence in the research, development and manufacturing prowess of the domestic defence industry. These lists of existing weapon systems and ammunition will encourage our industry to take up new challenges and ensure their progress,” he said.

Shri Rajnath Singh appreciated the fact that six of the seven new defence companies, which were carved out of the erstwhile Ordnance Factory Board, have reported profit within six months of their inception. Munitions India Limited has received export orders worth Rs 500 crore, he said, terming the achievement as an indicator to the huge potential of the ammunition industry in the country. The Raksha Mantri listed out many other reforms taken by Ministry of Defence, including earmarking of 68 per cent of the capital acquisition budget for the domestic industry in 2022-23 and allocating 25 per cent of the domestic capital procurement budget for promotion of private industry, MSMEs and start-ups. He also shed light on the policy which allows DRDO-Industry Special Purpose Vehicle to develop essential advanced defence products. He added that the Government fully understands the role of MSMEs and start-ups in the defence sector, therefore, the scope of Defence Innovation Start-Up Challenges and Technology Development Fund has been expanded to create more opportunities for them.

Shri Rajnath Singh maintained that while Ministry of Defence is focusing on achieving self-reliance, it is encouraging foreign original equipment manufacturers to invest, manufacture and export from India, in line with ‘Make in India, Make for the World’ vision of Prime Minister Shri Narendra Modi. “India ranks among the top 10 countries in the world in terms of military

spending, which makes it one of the most attractive markets for defence. We believe in having a healthy mix of local endeavours and foreign collaboration in this journey of self-reliance. India is at the forefront of this effort in terms of educated manpower, lower development costs and consumption capacity. Our self-reliance is based on collaboration, coordination and partnership with global industries,” he said. On the occasion, the Raksha Mantri also inaugurated an exhibition showcasing products developed by the Indian Navy, DPSUs and the private sector. He also released a ‘Knowledge Paper’ at the conference. Senior civil and military officials of Ministry of Defence and representatives from the industry, academia, start-ups as well as innovators were present.

The two-day conference, jointly organised by Federation of Indian Chambers of Commerce & Industry (FICCI) and Centre for Joint Warfare Studies (CENJOWS), will cover an extensive range of ammunition requirements of the Armed Forces. The conference comprises sessions on ammunition for tanks and armoured fighting vehicles; artillery including fuses; air defence, aerial munitions; munitions for precision attacks by drones & counter drone systems; naval munitions and ammunition for small arms; explosives and mines. It provides a unique platform to all stakeholders i.e. industry, users, DRDO and academia to meet and work towards achieving self-reliance in Ammunition manufacturing and moving towards ‘Aatmanirbhar’ in the defence sector.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1845258>



Wed, 27 Jul 2022

Country’s Economic Prowess Gets Reflected in its Ammunition: Defence Minister Rajnath Singh

A country's economic prowess gets automatically reflected in the field of ammunition and India must focus on boosting research and development as well as manufacturing capability in this area, Defence Minister Rajnath Singh said on July 27. "We have come far ahead of those times when a bomb's size and explosive capacity were the only things that mattered. Now, their smartness is as important," Mr. Singh said in his speech during the second Military Ammunition Conference ‘Ammo India 2022’, by industry body Federation of Indian Chambers of Commerce and Industry (FICCI). “If advanced ammunition is the reality of new-age warfare, then the country should focus its attention on where it is standing today in terms of research and development, indigenous capacity and manufacturing capability in this area,” he said.

"A country's economic development and progress in the field of science and technology gets automatically reflected in the capacity of its weapons and ammunition," Mr. Singh noted. He said one should learn the right lessons from history to forge a new path towards the future. "History teaches us that whenever anyone was able to dominate the world, it was because they did various experiments and research in the field of ammunition," the Minister added. The employment of precision-guided munitions at the Muntho Dhalo base had played a significant role during the Kargil war, he pointed out. "As a result, we were able to achieve a very big

victory in this war. And only yesterday (July 26), we celebrated the 23rd anniversary of the Kargil war," Mr. Singh said.

"After the Pulwama terror attack in 2019, India again saw the precision capability of these munitions, which helped the armed forces achieve success in their mission," he said. Mr. Singh said one should keep in mind that in the future too, the ammunition — in accordance with their changing specialities — will continue to play a major role in wars. "In the modern battlefields, the ammunition are coming forward in their new avatar," he mentioned.

"They are able to take inputs by themselves, do course correction and target a particular place at a specific time once they have been programmed to do so," the Minister noted. "Like any capable hunter, these ammunition are able to keep their sight at the target for a very long time," Mr. Singh said.

<https://www.thehindu.com/news/national/countrys-economic-prowess-gets-reflected-in-its-ammunition-defence-minister-rajnath-singh/article65688793.ece>

THE ECONOMIC TIMES

Wed, 27 Jul 2022

Tata Group Delivers Indigenously Developed Quick Reaction Fighting Vehicle to Indian Army

Tata group's arm for aerospace and defence, Tata Advanced Systems Limited (TASL), on Monday transported an indigenously developed Quick Reaction Fighting Vehicle-Medium (QRFV) to the Indian Army. According to the company, the vehicle will enhance the operational capabilities of the Indian Army in future conflicts and war-like situations. TASL took to Twitter to share the achievement. The company tweeted, "TASL has successfully delivered the QRFV to the Indian Army."

On the same day, Ajay Bhatt, Minister of State for Defence of India, had said that the BJP-led government in Centre has taken several policy initiatives in the past few years and brought in reforms to encourage indigenous design, development and manufacture of defence equipment in the country, thereby expanding the production of indigenous defence equipment.

<https://economictimes.indiatimes.com/news/defence/tata-group-delivers-indigenously-developed-quick-reaction-fighting-vehicle-to-indian-army/articleshow/93154271.cms?from=mdr>

Wed, 27 Jul 2022

HTT-40 Trainers will be Powered by Honeywell Engines

The Basic Trainer Aircraft (HTT-40) for the Indian Air Force (IAF) being built indigenously by state-owned Hindustan Aeronautics Limited (HAL) is going to be powered by TPE331-12 family of engines from Honeywell. A contract worth more than USD 100 million has been firmed up with Honeywell and HAL for HTT-40 Engines. The contract is for supply and manufacture of 88 TPE331-12B engines/kits along with maintenance and support services to power the basic trainers which are being built for the Indian Air Force (IAF). In the presence of R Madhavan, CMD, HAL, the contract was exchanged by Eric Walters, Sr Director OE Sales, Honeywell and B Krishna Kumar, Executive Director (E & IMGT) at a ceremony in Bengaluru. According to CMD, HAL, "To address the training requirements of the IAF, HAL has successfully developed Basic Trainer Aircraft (HTT-40). And there is a potential requirement of 70 aircraft." The talks and the contract for 70 Basic Trainers for the IAF are at an advanced stage.

Talking about the TPE331-12 family of engines, Eric Walters, Senior Director OE Sales, Honeywell Defense & Space said "It has proven itself in operations all over the world. To meet the requirements of the IAF, we have committed to support and deliver engines as well as kits within the stipulated schedule." "In the coming years, Honeywell is committed to support export of HTT-40 aircraft along with other engine programmes which are currently on radar," he said.

More about TPE331-12B

This is a single shaft turboprop engine with integral inlet and gearbox. It has a two stage centrifugal compressor, power turbine, and gearbox. For outstanding operational characteristics, three stage axial turbine and turbine exhaust diffuser; EEC for reliable power. According to an official statement from HAL, the Basic Trainers are powered by TPE331-12B engines and have been serving well since 2014. And both companies are exploring other areas including Repair & Overhaul of TPE 331-10GP / 12JR engines for variants of Dornier and 1 MW Turbo Generators, manufacturing. The 'Manufacturing & Repair license agreement for Honeywell TPE331-12B Turboprop engine' is a major milestone in the execution of 70 HTT-40 aircraft contracts with IAF.

In 2021, HAL had received a Request for Proposal (RFP) from the IAF for basic trainer HTT-40. And once the contract is finalised, the trainer will have more than 60 percent indigenous content and is supported by agencies such as Aircraft and Systems Testing Establishment (ASTE), Centre for Military Airworthiness and Certification (CEMILAC), and Regional Director Aeronautical Quality Assurance (RDAQA). Initially some of the 70 trainers will be built in Bengaluru where it has been designed and then it will be moved to Nasik for series production. The HAL is hoping to get an order for 106 trainers from IAF. These trainers built indigenously will be used not only for basic flight training but also for aerobatics, instrument flying and close formation flights. And its secondary roles would include night flying and navigation. This aircraft can be flown continuously for almost six hours and an additional oxygen cylinder.

<https://www.financialexpress.com/defence/htt-40-trainers-will-be-powered-by-honeywell-engines/2608570/lite/>

State-of-the-Art Hypersonic Vehicles by 2024-25 in India: Defence Ministry

High-end hypersonic [glide] vehicles that can cross Mach 6 and 8 are expected to be developed by 2024 or 2025, Kailash Kumar Pathak, Director of Futuristic Technology Management under the Defence Ministry, said here on Wednesday. Speaking on the sidelines of the Coimbatore Defence Conclave 2022 at Kumaraguru Institutions, Mr. Pathak said that various programmes are coming up for dealing with extreme cold conditions for jawans, including developing new jackets for them. Multiple indigenous agencies have come together with academia for development of these. The conclave was held to mark the seventh death anniversary of former President A.P.J Abdul Kalam.

A plaque for the new Coimbatore regional centre of the Aerospace Industry Development Association of Tamil Nadu (AIDAT) was unveiled by S. Christopher, AIDAT Chairman and former DRDO Head. B. Krishnamoorthy, Project Manager of Tamil Nadu Industrial Development Corporation (TIDCO), said an aero-engine components manufacturing unit was coming up at Hosur. The State plans to set up a semiconductor fabrication plant in association with IGSS Ventures, a Singapore-based technology investment holding company.

“The space sector economy forecast is targeted at \$ 700 million by 2030,” he said. “The Defence Ministry envisions manufacturing Rs. 1,75,000 crore-worth items and Rs. 25,000 crore export under the Aatma Nirbhar Bharat [Abhiyan]. Tamil Nadu, which houses the largest industries, can contribute to a major chunk of this and Coimbatore can help further this goal,” he said. “We have identified various theme-based parks to cater to the needs of Indian Space Research Organisation facilities like manufacturing launch vehicles and for fabrication,” he added.

“Roughly only 50% of the total trained pilots required for the country is sent from Tamil Nadu. To develop a new aviation training facility, over four foreign firms have inked MoUs with the State. Tidco is in the process of identifying and developing airstrips for this facility. We are in talks with various foreign agencies and Indian Offset Partners (IOP) under the Defence sector so that Tamil Nadu can hit the projected \$1 trillion economy,” Mr. Krishnamoorthy said.

<https://www.thehindu.com/news/cities/Coimbatore/state-of-the-art-hypersonic-vehicles-by-2024-25-in-india-defence-ministry/article65689842.ece>

Coimbatore: Experts Talk on Ways to Improve Defence Sector

Kumaraguru Institutions hosted Coimbatore Defence Conclave-2022 on Wednesday to discuss ways to strengthen the defence industries in the district. Experts talked on the theme 'defence indigenisation requirements, opportunities, and industry capabilities'. The event also observed the seventh death anniversary of former President Dr A P J Abdul Kalam. The college also launched a new MTech postgraduate programme on defence technology. Besides, the Coimbatore regional centre of the Aerospace Industry Development Association of Tamil Nadu (AIDAT) was inaugurated.

Chairman of AIDAT and former chairman of DRDO Dr S Christopher and former director of Aeronautical Development Establishment (ADE) Dr S Venugopal said there are plenty of requirements and opportunities in the defence sector and the industries should capitalise on them. Christopher also stressed on the need for support and expertise in critical decision-making in terms of defence technology. B Krishnamoorthy, additional secretary and project director of TIDCO (Tamil Nadu Industrial Development Corporation) said that AIDAT will connect all defence industries in Tamil Nadu. "With the Atmanirbhar Bharat (self-reliant India campaign), the Centre is pushing to improve the defence sector in the country. Setting up more centres of excellence in different specialisations will help strengthen the sector," he said. Shankar Vanavarayar, president of Kumaraguru Institutions, said such conclave will help bring together people in the defence sector. C Vasantharaj, director of Kumaraguru Centre for Industrial Research and Innovation, was present.

<https://timesofindia.indiatimes.com/city/coimbatore/experts-talk-on-ways-to-improve-defence-sector/articleshow/93172656.cms>

पूर्वी लद्दाख में चीन सीमा पर ठहर सकेंगे 35 हजार सैनिक

Poonam.Pandey@timesgroup.com

■ नई दिल्ली : पूर्वी लद्दाख में एलएसी पर जब दो साल पहले तनाव शुरू हुआ था तो उस वक्त वहां भारतीय सेना के करीब 10 हजार सैनिकों के रहने के लिए स्थायी ठिकाने थे, लेकिन तनाव बढ़ने के साथ जब सैनिकों की तैनाती बढ़ी तो तेजी से उनके रहने का इंतजाम भी किया गया। इस वक्त एलएसी के पास करीब 35 हजार सैनिकों के रहने के लिए स्थायी ठिकाने बन गए हैं, जिनमें उनकी जरूरत की सभी सुविधाएं भी हैं।

सेना के सूत्रों के मुताबिक, 2019 में पूर्वी लद्दाख में सैनिकों के लिए करीब 91 कंपनी मॉड्यूल थे। स्थायी आवास को कंपनी मॉड्यूल कहा जाता है, जिसमें एक साथ करीब 100-130 सैनिक रह सकते हैं। सेना ने टैंक, आर्टिलरी गन और दूसरे उपकरणों की तैनाती भी बढ़ाई है। इनके लिए बतौर गैराज काम करने वाले 180 नए ठिकाने भी एलएसी पर बनाए गए हैं।



1.5 लाख सैनिकों के लिए रसद का इंतजाम

लेह-लद्दाख में तैनात सैनिकों के लिए सर्दियों की जरूरत का सामान जमा करने का काम भी तेजी से चल रहा है। यह काम मार्च से शुरू होता है और इसे सितंबर तक पूरा करना होता है। जाड़ों में जब भारी बर्फबारी की वजह से आवाजाही नहीं हो पाती तो ये इलाके पूरी तरह कट जाते हैं। 2019 में जितने सामान का भंडारण किया गया था, इस बार उससे करीब 25-30 परसेंट ज्यादा किया जा रहा है क्योंकि सैनिकों की तैनाती बढ़ी है। सेना की 14वीं कोर में इस बार 1.5 लाख सैनिकों के लिए करीब 220 दिन के लिए सभी जरूरी चीजें स्टॉक की जा रही हैं।

- 2019 में करीब 10 हजार सैनिकों के लिए थे स्थायी ठिकाने
- अब 35 हजार सैनिकों के लिए बन चुके हैं स्थायी ठिकाने
- टैंक, गन रखने के लिए गैराज, वर्कशॉप के भी नए 180 स्ट्रक्चर
- सर्दियों की जरूरत का करीब 45 परसेंट सामान पहुंच चुका सीमा पर

India Kick Starts Programme to Build Armed Drone Swarms Indigenously

By Vishal Thapar

India has kicked off an indigenous programme to acquire Autonomous Surveillance and Armed Drone Swarms for the Army under the Buy (Indian-Indigenously Designed Developed and Manufactured) category. This programme was accorded Stage 1 approval – or Acceptance of Necessity (AON) – by the Defence Acquisition Council (DAC), which on July 26 approved the initiation of a host of military procurement programmes worth Rs 28,732 Crore (USD 3.6 billion). “In the recent conflicts across the world, drone technology proved to be a force multiplier in military operations. Accordingly, to augment the Indian Army’s capability in modern warfare, AoN for procurement of Autonomous Surveillance and Armed Drone Swarms has been accorded by the DAC under Buy (Indian-IDDM) category,” a Ministry of Defence spokesperson stated in a press release. DAC approvals include procurement of Guided Extended Range Rocket Ammunition, Area Denial Munition Type I and Infantry Combat Vehicle – Command for the Army. These systems have been designed and developed by the Defence Research and Development Organisation (DRDO). The total value of these three proposals is Rs 8,599 crore.

“Guided Extended Range Rocket Ammunition has the range of 75 kms with accuracy of 40 metres. The Aerial Denial Munition Type I Rocket Ammunition contains dual purpose sub-munitions capable of neutralizing both tanks and armoured personnel carriers as well as B vehicle entrenched troops. The Infantry Combat Vehicle – Command is equipped with technology to collect, disseminate, share and present real time information to commanders to facilitate quick decision making for execution of tasks,” according to the official statement

AON was accorded for 400,000 Close-Quarter Battle Carbines, upgraded 1250KW capacity Marine Gas Turbine Generators for power generation application onboard Kolkata class warships, 14 14 Fast Patrol Vessels (FPVs) for the Indian Coast Guard and an unspecified number of Bullet Proof Jackets built to Indian specifications. All approvals are under the Make in India categories of the Defence Acquisition Procedure 2020.

“In the recent conflicts across the world, drone technology proved to be a force multiplier in military operations. Accordingly, to augment the Indian Army’s capability in modern warfare, AoN for procurement of Autonomous Surveillance and Armed Drone Swarms has been accorded by the DAC under Buy (Indian-IDDM) category,” a Ministry of Defence spokesperson stated in a press release. “DAC also approved the Navy’s proposal to procure an upgraded 1250KW capacity Marine Gas Turbine Generator for power generation application onboard Kolkata class of ships through Indian Industry. This will give a major boost to the indigenous manufacturing of gas turbine generators,” the statement added.

“In order to enhance the security in the coastal region of our Country, DAC also approved the proposal of procurement of 14 Fast Patrol Vessels (FPVs) for the Indian Coast Guard under the

Buy (Indian-IDDM) with 60 per cent Indigenous Content (IC),” it further elaborated. “Considering the demand of enhanced protection against the threat of enemy snipers to our troops deployed along the Line of Control, and in close combat operations in counter-terrorism scenario, DAC accorded AoN for Bullet Proof Jackets with Indian Standard BIS VI level of protection,” the spokesperson stated. The AoN for induction of approximately 400,000 Close-Quarter Battle Carbines was explained in terms of the need “to combat the current complex paradigm of conventional and hybrid warfare and counter-terrorism at the LAC and Eastern Borders”. The spokesperson stated that this would provide an impetus to the small arms manufacturing industry in India and contribute to AtmaNirbharta (self-reliance) in small arms.

<https://www.businessworld.in/article/India-Kick-Starts-Programme-To-Build-Armed-Drone-Swarms-Indigenously/26-07-2022-438862/>



Tue, 26 Jul 2022

Years After Kargil, India Yet to Put in Place Comprehensive Weapon & Strategic Planning

By Prashant Saxena

As the grateful nation bows in reverence to the sacrifices of young Indian defence forces' officers and soldiers – officially, 527 killed and 1,363 injured – in the 1999 Kargil conflict, the lessons drawn are stark and well-acknowledged. From acclimatisation of soldiers for taking on the well-entrenched enemy at 16,000-18,000-foot heights to weaponry and strategies, the Indian defence forces have come a long way, though substantially, yet not comprehensively, a lookback would suggest. CDS post still lying vacant The first was the need to have a Chief of Defence Staff (CDS) for greater coordination, inducing 'jointness', carrying out reforms and optimum utilisation of infrastructure. The appointment of a CDS was one of the most significant recommendations made by the K Subrahmanyam-led Kargil Review Committee (KRC) that came into being in the immediate aftermath of the 1999 Kargil war. Its mandate was to examine lapses that allowed Pakistani soldiers to occupy strategic heights, the initial sluggish Indian response, and suggest measures to strengthen national security.

The fact that it took almost two decades for the government to appoint a CDS (late Gen Bipin Rawat) reflects the casual approach to matters of defence paramountcy. Today, seven months after Gen Rawat died in a tragic helicopter crash, India has no CDS. Defence Minister Rajnath Singh said in June that the "process to appoint the CDS is on" and that such an appointment would be made "soon." That is the state of a defence force, which has a strength of over 1.4 million active personnel -- the world's second-largest military force. Defence theaterization is a work in progress The 'defence theaterization' too is a work in progress. This is supposed to be India's biggest military transformation exercise meant to integrate all the forces into theatres. The differences between the three forces and the death of Gen Rawat have prolonged the theaterization exercise. Growing defence budget In 1999, India's military spending was \$13.90 billion and it rose to \$ 49.6 billion in 2021-22. The growing defence budget points at massive defence buys along with a rise in salaries and pensions in line with the Seventh Pay Commission.

The salary and pension component in the 2021-22 defence budget constituted 30 per cent and 28 per cent respectively.

Agnipath scheme Enter the new Agnipath scheme. Notwithstanding the countrywide protests and pandemonium in Parliament, the first objective of bringing the scheme is to lower the age profile of the armed forces. Secondly, Agnipath proposes to bring down the pension payout by the government. What the government would save through the pension payout route can be invested in capital expenditure to modernise our armed forces, which according to experts, is the "need of the hour." As the country continues to debate over the Agnipath scheme, the Modi government can safely claim to have expedited major defence deals, which are still import-oriented despite a continuous emphasis on 'atmanirbharta' (self-reliance). No doubt, the new weapons and systems can be game-changers in the event of a short-duration war (like the Kargil conflict) and long stand-off situations (like in eastern Ladakh along the LAC with China). On January 1, 2014, Major General Raymond Joseph Noronha hoisted the flag of the newly-sanctioned XVII mountain strike Corps in Ranchi. The XVII Corps' principle is: 'The best defence is in offence'. Military planners expected a corps of 90,000 men for the Himalayan frontiers, with two divisions armed with integral air assets like attack and transport helicopters and drones. But, the XVII Corps, also known as Brahmastra Corps, has only one infantry division with 16,000 men in Panagarh, West Bengal. The proposed second division in Pathankot has reportedly been shelved. With the ongoing border tensions with China, the Army has added 10,000 more troops to the XVII Corps. The Army's Operation Snow Leopard, to occupy Kailash Ridge in August 2020, is projected as proof that a defensive strategy no longer works with China.

Decoding India's ammo The following are some of the weapons/equipment/machines that have sharpened the Indian defence forces' response since 1999, giving the much-needed reassurance to itself as well as the people who place immense trust in the strength of our forces: Helmets/body armour In 2020, the Indian Army started the process to acquire over one lakh 'AK-47 protected' helmets. It is one of the world's largest procurements of these specialized ballistic helmets. The Army soldiers are now protected against 9 mm carbine bullet strikes with the new 'Made in India' bulletproof helmets. The new helmets were the first major contract for modern composite helmets placed under the Make in India initiative, and the contract between UP's Kanpur-based MKU Ltd and the Ministry of Defence was signed during the tenure of the then defence minister Late Manohar Parrikar in 2016. The contract was for over 1.5 lakh Bullet Proof Helmets (BPH). Early this year, some terrorists in the Kashmir valley used American armour-piercing bullets in encounters with Indian security forces and were successful in breaching the bulletproof jackets of soldiers. "The terrorists have used these bullets during the encounters and they breached the jackets in a few cases. We were using level 3 jackets till now and from now on, we would soon be getting the level 4 jackets which provide protection against these bullets," the top officer from the Srinagar-based Chinar Corps told news agency ANI.

Reports said the Indian Army was on the verge of inducting 'Sarvatra Kavach', a full-body armour suit, for its soldiers which will not carry any Chinese raw material and is designed, developed and manufactured in India. Besides, an exclusive armour unit to manufacture bulletproof jackets of international standards and protective gear and to supply bulletproof vehicles will come up at Mishra Dhatu Nigam Ltd (Midhani) in Hyderabad's Kanchanbagh area. The bulletproof jackets are named 'Bhabha Kavach' since the Bhabha Atomic Research Centre (BARC) developed the technology. These jackets can even stop a bullet fired from an AK-47 as well. Hundreds of such body armour are said to be already in use, media reports said. SiG Sauer

and AK-203 rifles In 2019, the Indian Army decided to replace its glitch-prone indigenous INSAS rifle (which saw action in the Kargil war, though these guns were not a favourite with soldiers) with the US-supplied SiG Sauer rifles for its frontline troops. The deal was worth Rs 90 million. Reports say a repeat order of 73,000 SiG Sauer 716 G2 rifles is on the cards even after "operational glitches," which included jamming while firing locally produced 7.62-millimetre rounds. Reports said India has already received 70,000 AK-203 rifles from Russia. Sources said that the first batch is likely to be used by the air force, while the rifles to be manufactured at UP's Amethi factory will be delivered to the Army, which is the main customer, with a requirement of over 6 lakh AK-203s. Swathi gun-locating radar The Army plans to acquire 12 Swathi Weapon Locating Radars (WLRs) indigenously developed by the Defence Research and Development Organisation (DRDO) at a cost of around Rs 950 crore in a major boost for the Army on the China front.

The Swathi WLRs will help the forces to know the exact location of the artillery guns fired by the enemy, media reports said. The radar can also simultaneously handle multiple projectiles fired from different weapons at different locations. Ultralight Howitzer guns The Indian Army has received in batches 145 M777 Ultra Lightweight Howitzers from BAE Systems at a cost of about \$750 million under the Pentagon's Foreign Military Sales (FMS) program. The M777 is the world's first 155-millimetre howitzer weighing less than 10,000 pounds (4,218 kg). Partly made of titanium, the gun can be airlifted swiftly to high-altitude terrain and is ideally suited for mountain warfare. The M777 has a firing range of up to 25 km. The Indian Army plans to induct the new gun into its new 17 Mountain Strike Corps. Quadcopters Defence Ministry has issued a request for information for the purchase of two versions of surveillance quadcopters. The Army is seeking new drones that can operate in extreme weather conditions found at high altitudes. The Defence Ministry has issued a request for information (RFI) for the purchase of two versions of surveillance quadcopters or drones which can be deployed above as well as below 4,000 meters above mean sea levels. The surveillance quadcopters should have a self-destruction mechanism in case of capture by hostile persons and should be hardened against electromagnetic (EW) interference with anti-jamming and anti-spoofing properties, media reports said quoting the RFI.

Advanced Light Helicopter (ALH) During the Kargil war, Indians did not have a chopper to operate at those heights. Besides, the Air Force had to contend with deadly Stinger and SAM missiles. It took almost two decades for India-made helicopters to support troops deployed at forward posts through the winter season in Ladakh. Two new types of choppers have proved their worth during flights in the high-altitude cold desert. The in-service Advanced Light Helicopter (ALH), has successfully undertaken supply missions to the Siachen Glacier, the world's highest battlefield. It is manufactured by Hindustan Aeronautics Limited (HAL). Rafale with stand-off weapons The Indian Air Force has added two squadrons of Rafale fighter jets to its armoury.

The IAF has hardly 30 squadrons (each consisting of around 18 fighters) against the sanctioned strength of 42 squadrons. The 36 French Rafale are equipped with air-to-surface Hammer all-weather smart weapons apart from air-to-air MICA, METEOR missiles and air-to-ground SCALP stand-off weapons. The Hammer is a fire-and-forget weapon that can be launched from a very short range to a very long range of 70 km without the availability of GPS and has high resistance to jamming and target location errors.

<https://www.news9live.com/opinion-blogs/post-kargil-india-yet-to-put-in-place-comprehensive-weapon-strategic-planning-185146?infinite-scroll=1>

Chinese Spy Vessel's Expected Sri Lanka Entry Keeps India on its Toes

India is keeping a close watch across its southern neighbourhood following a report that a Chinese scientific research vessel 'Yuan Wang 5' will enter Hambantota port on August 11 for a week to allegedly conduct satellite control and research tracking in the Indian Ocean Region. What has raised eyebrows here is the timing of the docking of the vessel at the port built by China, probably taking advantage of the political crisis in the island nation, ET has learnt. New Delhi is examining the level of local political and military support that China has received for the proposed plan, ET has learnt. India has long been worried about dual-use facilities of Chinese infrastructure projects spanning Myanmar to Eastern African states in what comes as a direct challenge to New Delhi's interests. The ship is expected to depart Hambantota on August 17 after replenishment. The ship could conduct satellite control and research tracking in the north-western part of the Indian Ocean region, according to Y Ranaraja, Director, Belt & Road Initiative, Sri Lanka (BRISL). This is the first time since 2014 that such a Chinese naval vessel is visiting Lanka. In 2014, a Chinese submarine had docked at Colombo drawing India's ire and the matter was raised at the highest level. "China's Yuanwang-5 space-tracking vessel conducting a space-ground information exchange and specially provide significant data support to Zhongxing-2E satellite's orbit determination and entry. Now the vessel is sailing pass Taiwan towards Hambantota in Sri Lanka," Ranaraja tweeted.

China has a major say in the Hambantota Port area and much of its activities in the area remain under wraps, according to critics both local and foreign. Sources explained that Yuan Wang 5 is also potentially violating innocent passage requirements in territorial seas as per UNCLOS. The vessel, according to experts, has a capability to snoop on a coastal state. Yuan Wang 5 is the third-generation tracking ship of the Yuan Wang series and entered service in 2007. Built by Jiangnan Shipyard, Yuan Wang 5 has a displacement of 25,000 tonnes and can withstand wind scale up to 12. It is important to note that the Yuan Wang class is not a single class of identical design, but a group of different designs under the same series that share one name.

<https://economictimes.indiatimes.com/news/india/chinese-spy-vessels-expected-sri-lanka-entry-keeps-india-on-its-toes/articleshow/93170797.cms>

नवभारत टाइम्स

गुरुवार, 28 जुलाई 2022

भारत-पाक के विदेश मंत्री मिलेंगे आज!

■ आईएनएस, दिल्ली: भारत के विदेश मंत्री एस. जयशंकर उज्बेकिस्तान में होने जा रही शंघाई सहयोग संगठन के विदेश मंत्रियों की बैठक में हिस्सा लेंगे। यहां वह पाकिस्तानी विदेश मंत्री बिलावल भुट्टो से मुलाकात करेंगे। यह पहला मौका होगा, जब जयशंकर पाक में नई सरकार बनने के बाद भुट्टो से मिलेंगे।

उज्बेकिस्तान में शंघाई सहयोग संगठन की बैठक होनी है

पाक में शहबाज शरीफ के नेतृत्व में नई सरकार के गठन के बाद बिलावल ने भारत के साथ फिर से मैत्री संबंध बनाने की चाहत जताई थी। हालांकि, एससीओ के इतर भारत-पाक की द्विपक्षीय बैठक के कोई संकेत नहीं हैं। बैठक में चीन के विदेश मंत्री भी शामिल होंगे। जयशंकर और वांग भारत-चीन सैन्य कमांडरों की हाल में संपन्न बैठक की समीक्षा कर सकते हैं।



Wed, 27 Jul 2022

NDAA Amendment Stresses Why India-US Defence Partnership is More Critical than Ever

The Amendment to National Defense Authorization Act (NDAA), which was authored and introduced by US Congressman Ro Khanna, promises to bolster defence partnership between India and the US. The Amendment, which was approved by the US House of Representatives on July 14, waived CAATSA sanctions against India for its purchase of S-400 Russian missiles. "The reason it's in the interests of the United States is we need a strong partnership with India. Defence partnership, a strategic partnership, especially because we are two democratic nations and with the rise of China and with the rise of Putin, this alliance is critical for the United States," Ro Khanna told news agency ANI. The Amendment is now awaiting the US Senate's nod.

What is NDAA?

NDAA is the annual budget of the US. The Senate Armed Services Committee released its version of the NDAA last week, which includes enhancing major defence partnership with India with regards to more cooperation in the fields of intelligence, drones and fourth and fifth generation aircraft. The section also asks the defence secretary to look out for other areas of strengthening cooperation between the two countries, and also explaining security considerations including protection of research and development and intellectual property. It also seeks opportunities to work with the defence ministry of India. It also covers military-related works run by the Department of Energy's nuclear weapons programmes and Federal Bureau of Investigation's counterintelligence activities. The bill provides opportunities to other congressmen who make an impact on the foreign policy.

how will india gain from this?

Former US President Donald Trump had warned India that the S-400 missile deal with Russia, worth \$500 billion, will invite sanctions against India, the Ministry of External Affairs (MEA) had stated the New Delhi follows an independent foreign policy and its defence agreements are guided by the interests of the national security. President Joe Biden was reportedly to take a decision on the matter in March, 2022. Amidst all this, it was quite apparent that the US sees India as its ally against nemesis China, and sanctioning India would have also affected the Quad, which was built to counter China in the Indo-Pacific region. Ro Khanna said, "What was relevant is you have 300 House members, the vast majority going on referencing that the US-India relationship is critical. In saying that the sanctions should be waived. And that gives a very clear, resounding message to the President of the United States to waive the sanctions."

Why us imposes CAATSA sanctions on countries?

The Countering America's Adversaries through Sanctions Act is a federal law that was created to punish Russia for its Crimea annexation in 2014. The Donald Trump administration signed the law in 2017, which allowed financial and economic sanctioning on countries transacting with Russia on arms and weapons. Under this law, the American government can impose sanctions on any country that has "significant transactions with Iran, North Korea or Russia". The US penalised Turkey in December 2020 by imposing CAATSA for buying S-400 missile defence system from Russia. In 2021, the US sanctioned China for its purchase of 10 SU-35 Russian combat aircraft in 2017 and S-400 system in 2018.

<https://www.news18.com/news/india/ndaa-amendment-stresses-why-india-us-defence-partnership-is-more-critical-than-ever-news18-5634241.html>

US Seeks to Add India for NATO Plus: Lawmaker Ro Khanna

Adding India as the sixth country to the North Atlantic Treaty Organization (NATO) plus would move New Delhi towards a Defense Security alignment with the United States,” said American Congressman Ro Khanna. In an exclusive interview with ANI, Khanna said that NATO Allies get quick approval on defence agreements and further said that the US have the same agreement with Australia, Japan New Zealand, Israel and South Korea.

“I have worked on trying to add India as the sixth country to that and that would facilitate and make it easier to have this growing Defense Partnership and make sure that we’re moving India towards more of a Defense Security alignment with the United States and Russia. I introduced that two years ago. I’m going to continue to work on it. Hopefully, we can get that amendment passed in subsequent congresses,” he added.

This comes after the United States (US) House of Representatives on July 14, approved an amendment with an overwhelming majority to the National Defence Authorization Act (NDAA) that proposes the deepening of India-US defence ties. This amendment was offered by Khanna, a progressive Democrat from California. Speaking about the waiver in the national security interests of the United States, Khanna divulged that it was the most significant vote to strengthen the US-India relationship since the civilian nuclear deal that was passed with overwhelmingly 300 bipartisan votes. “The reason it’s in the interests of the United States is we need a strong partnership with India. Defence partnership, a strategic partnership, especially because we are two democratic nations and with the rise of China and with the rise of Putin this alliance is critical for the United States,” said the Indian American Congressman.

The India-US nuclear cooperation agreement was signed in 2008 under UPA government led by Manmohan Singh, which gave a fillip to the ties between the two nations, which since then have been on an upswing. A major aspect of the India-US nuclear deal was the Nuclear Suppliers Group (NSG) gave a special waiver to India that enabled it to sign cooperation agreements with a dozen countries. It enabled India to separate its civilian and military programmes and placed its civilian nuclear facilities under the International Atomic Energy Agency (IAEA) safeguards.

The NDAA amendment is politically significant and the overwhelming 300-plus bipartisan votes send a strong message to US President Joe Biden which will give him the political support for waiving the sanctions. Khanna has been in coordination and conversation with top officials at the White House. During an interview, Khanna said that waiver to India of Countering America’s Adversaries through Sanctions Act (CAATSA), which penalises countries that engage in significant defence transactions with Russia, is in the best national interest of the US and the US-India defence partnership. Khanna also said, “The amendment would never have passed if the

White House was not open to its passing,” adding that this gave US President Joe Biden, the political support for him, to waive the sanctions. It makes it all but certain that he will waive the sanctions.

However, the amendment is not yet a part of the law. The NDAA amendment needs to clear the Senate and be signed by President Joe Biden, only then India will avoid US sanctions for its weapons systems relationship with Russia. Khanna told ANI that Congress has given a “very clear and resounding message” to the President of the United States, “What was relevant is you have 300 House members, the vast majority going on referencing that the The US-India relationship is critical. In saying that the sanctions should be waived. And that gives a very clear, resounding message to the President of the United States to waive the sanctions.”

Of late the two democracies have made significant strides in defence cooperation and the NDAA amendment will give a big push to make a robust India-US defence partnership. Speaking about it to ANI, Khanna said, “Remember, it goes beyond waving sanctions. It talks about the importance of strengthening the defence partnership that we have with India. The challenge is that right now; Russian weapons are cheaper. But Russian weapons are also inferior as we’re seeing in the war in Ukraine, the SU 57 in my view, just simply can’t compete with the F 22 or the F 35, or the US military equipment. It is in America’s interest to get the talent from the brilliant engineers and scientists in India so that we can make sure that we continue to lead the highest technology and ultimately, it’s India’s interest to an American technology which is superior to Russian technology.”

He said that the US is figuring out ways to have an appropriate price point that incentivizes India to transition that will protect the American sensitive technology and it will be negotiated through bilateral communication. Talking about the Chinese threat to India that was underscored in the amendment, Khanna said to ANI, “You look at India as the threats that they face at the border. And you know the biggest guarantor of the security has been the United States. A few years ago, the United States assisted India with those border skirmishes. So the US-India alliance in my view is not just in the United States interest but also the security interests of India and that the United States will be a much more reliable and stronger partner.”

<https://theprint.in/world/us-seeks-to-add-india-for-nato-plus-lawmaker-ro-khanna/1056937/>

Business Standard

Wed, 27 Jul 2022

Indo-Pacific Defence Chiefs Meet Against Backdrop of Rising China

Defence chiefs from across the Indo-Pacific gathered this week to bolster their connections against a backdrop of China's ongoing campaign to expand its influence and military presence in

the region. Gen. Mark Milley, chairman of the U.S. Joint Chiefs of Staff, said the military leaders meeting for three days in Sydney are focused on the whole situation with the rise of China, a free and open Pacific and ensuring a peaceful and stable Indo-Pacific region. It's a big conference to coordinate our mutual security interests and discuss national security issues that apply to all of us, said Milley. Military leaders from 26 nations are participating in the conference, and most of those are chiefs of defense. China was invited but said it would be unable to attend.

During a press conference Wednesday, Milley said the chiefs of defense discussed how they can cooperate more and make their militaries more interoperable, including with advanced technologies. He added that they also talked about military exercises. He and Gen. Angus Campbell, Australia's chief of defense, didn't go into details. But Milley expanded on comments he made late last week about China's increasing aggressiveness in the region and the need for nations to ensure that the Pacific remains free and open to all. Chinese intercepts of allied and partner aircraft in international airspace in the Pacific region have increased several-fold over the last five years, Milley said, calling Beijing's behavior much more confrontational than five to 15 years ago.

China's activity, he said, seems to imply that they want to bully or dominate, as opposed to having a free and open Pacific. Asked whether the U.S. would increase its military presence in Australia or in other partner nations, Milley and Campbell said the discussions are ongoing and no decisions have been made. There are about 2,200 U.S. Marines in Darwin. En route to the conference, Milley told reporters traveling that the Chinese military has become significantly more aggressive and dangerous in recent years. U.S. President Joe Biden plans to speak to Chinese President Xi Jinping on Thursday, according to a U.S. official who declined to be identified ahead of the public announcement. The U.S. is also grappling with reports that House Speaker Nancy Pelosi is considering a trip to Taiwan roiling China and setting off waves of worry in the Biden administration.

Asked about the potential Pelosi trip, Milley would only say that discussion of any specific travel is premature. But, he added, if there's a decision made that Speaker Pelosi or anyone else is going to travel and they asked for military support, we will do what is necessary to ensure a safe conduct of their visit. And I'll just leave it at that. The conference also coincides with the massive Rim of the Pacific naval exercise going on near Hawaii. RIMPAC is the world's largest maritime exercise and is hosted by the U.S.

https://wap.business-standard.com/article-amp/current-affairs/indo-pacific-defence-chiefs-meet-against-backdrop-of-rising-china-122072700176_1.html

DefenseNews

Thu, 28 Jul 2022

The Hypersonic Race: A Case for Guarded Optimism

By Douglas A. Birkey

America's hypersonic enterprise appears to be crossing a key juncture this summer. After years of struggle, including numerous test failures, programs like the Air-launched Rapid Response

Weapon and Hypersonic Air-breathing Weapon Concept appear to be hitting their strides — including full-up test flights at hypersonic speed. This concrete progress, paired with continued support from Congress and the Biden administration's decision to sign Defense Production Act initiatives targeting the hypersonic industrial base, give reason for optimism. However, it's far too early to claim victory, and we must stay focused on the end objective. The United States finds itself clawing from behind in the current hypersonic race with China and Russia for a very simple reason: Leaders squandered the decisive hypersonic advantage America gained in the 1960s through programs like the X-15. Irregular funding, scattershot hypersonic efforts, and a lack of urgency yielded an array of haphazard programs.

Most failed to deliver as advertised, while the on-again, off-again approach made it incredibly hard to maintain and sustain expertise. Even as recently as 2013, the Air Force chose to conclude its X-51 hypersonic test program after four flights, even though two were successful and the final one set a record for the longest air-breathing hypersonic flight. Despite this promising trajectory, the team was disbanded and funding distributed to other priorities. By contrast, the X-15 flew 199 times between 1959 and 1968. This afforded tremendous learning and secured concrete progress. With China and Russia progressing rapidly on their own hypersonic programs, U.S. leaders were shocked into action a few years after the X-51 effort concluded. The military launched numerous programs, involving multiple services are involved.

Making up for decades lost is a difficult, costly proposition. Military officials worked incredibly hard to generate a new bench of talent, fight for ample funding, and educate key audiences about the hypersonic imperative. We are just beginning to see positive results from this surge, and we must maintain this sense of urgency. Launching multiple lines of effort provided leaders with a set of options. Successful programs could be scaled up and underperforming programs terminated. The military deserves credit for allowing teams the opportunity to learn through failure. While initial hypersonic successes should be celebrated, it is crucial to recognize that America is still in a very tight race. Positive test results should not be conflated with an operational set of capabilities.

Pentagon officials, the services, Congress, and the various teams developing the technology must maintain a laser focus to move from the lab to the front lines. From a government perspective, this demands stable requirements, bureaucratic top cover and funding that is both predictable and ample. Industry needs to keep pressing hard, ensure smart execution and deliver results that will translate effectively to the operational realm. Amid the rush for hypersonic technology, it is also important for military strategists and planners to think about how it would best be employed. This is not a race for technology's sake; it is all about pragmatic combat results. The first application of hypersonic technology will be strike. Given that, what are the specific applications where hypersonic attributes will net significant results for the combatant commands? Flying above Mach 5 obviously compresses the kill chain, conquers distance challenges, and circumvents most enemy defenses. Cost also must factor into the equation. Different approaches — namely air-launched versus ground-launched — produce vastly different expense figures. They also yield different employment considerations. Military leaders need to think about these factors now.

Finally, it is crucial to consider the broader enterprise that will be required to transform a host of research and development efforts into operational scale. We need to bolster the ground test and flight test infrastructure, consider the advantages afforded by digital engineering, invest in production centers and cultivate necessary human capital at scale. All of these challenges are

surmountable, but success demands careful consideration and smart execution. We cannot assume it will just happen. This hypersonic journey has been far from easy, but the threat environment demands we stay the course.

<https://www.defensenews.com/opinion/commentary/2022/07/27/the-hypersonic-race-a-case-for-guarded-optimism/>

Science & Technology News



Wed, 27 Jul 2022

Researchers 3D Print Sensors for Satellites

By Adam Zewe

MIT scientists have created the first completely digitally manufactured plasma sensors for orbiting spacecraft. These plasma sensors, also known as retarding potential analyzers (RPAs), are used by satellites to determine the chemical composition and ion energy distribution of the atmosphere. The 3D-printed and laser-cut hardware performed as well as state-of-the-art semiconductor plasma sensors that are manufactured in a cleanroom, which makes them expensive and requires weeks of intricate fabrication. By contrast, the 3D-printed sensors can be produced for tens of dollars in a matter of days. Due to their low cost and speedy production, the sensors are ideal for CubeSats. These inexpensive, low-power, and lightweight satellites are often used for communication and environmental monitoring in Earth's upper atmosphere.

The researchers developed RPAs using a glass-ceramic material that is more durable than traditional sensor materials like silicon and thin-film coatings. By using the glass-ceramic in a fabrication process that was developed for 3D printing with plastics, they were able to create sensors with complex shapes that can withstand the wide temperature swings a spacecraft would encounter in lower Earth orbit. "Additive manufacturing can make a big difference in the future of space hardware. Some people think that when you 3D-print something, you have to concede less performance. But we've shown that is not always the case. Sometimes there is nothing to trade off," says Luis Fernando Velásquez-García, a principal scientist in MIT's Microsystems Technology Laboratories (MTL) and senior author of a paper presenting the plasma sensors. Joining Velásquez-García on the paper are lead author and MTL postdoc Javier Izquierdo-Reyes; graduate student Zoey Bigelow; and postdoc Nicholas K. Lubinsky. The research is published in *Additive Manufacturing*.

Versatile sensors

An RPA was first used in a space mission in 1959. The sensors detect the energy in ions, or charged particles, that are floating in plasma, which is a superheated mix of molecules present in the Earth's upper atmosphere. Aboard an orbiting spacecraft like a CubeSat, the versatile instruments measure energy and conduct chemical analyses that can help scientists predict the weather or monitor climate change. The sensors contain a series of electrically charged meshes

dotted with tiny holes. As plasma passes through the holes, electrons and other particles are stripped away until only ions remain. These ions create an electric current that the sensor measures and analyzes. Key to the success of an RPA is the housing structure that aligns the meshes. It must be electrically insulating while also able to withstand sudden, drastic swings in temperature. The researchers used a printable, glass-ceramic material that displays these properties, known as Vitrolite.

Pioneered in the early 20th century, Vitrolite was often used in colorful tiles that became a common sight in art deco buildings. The durable material can also withstand temperatures as high as 800 degrees Celsius without breaking down, whereas polymers used in semiconductor RPAs start to melt at 400 degrees Celsius. “When you make this sensor in the cleanroom, you don’t have the same degree of freedom to define materials and structures and how they interact together. What made this possible is the latest developments in additive manufacturing,” Velásquez-García says.

Rethinking fabrication

The 3D printing process for ceramics typically involves ceramic powder that is hit with a laser to fuse it into shapes, but this process often leaves the material coarse and creates weak points due to the high heat from the lasers. Instead, the MIT researchers used vat polymerization, a process introduced decades ago for additive manufacturing with polymers or resins. With vat polymerization, a 3D structure is built one layer at a time by submerging it repeatedly into a vat of liquid material, in this case Vitrolite. Ultraviolet light is used to cure the material after each layer is added, and then the platform is submerged in the vat again. Each layer is only 100 microns thick (roughly the diameter of a human hair), enabling the creation of smooth, pore-free, complex ceramic shapes.

In digital manufacturing, objects described in a design file can be very intricate. This precision allowed the researchers to create laser-cut meshes with unique shapes so the holes lined up perfectly when they were set inside the RPA housing. This enables more ions to pass through, which leads to higher-resolution measurements. Because the sensors were cheap to produce and could be fabricated so quickly, the team prototyped four unique designs. While one design was especially effective at capturing and measuring a wide range of plasmas, like those a satellite would encounter in orbit, another was well-suited for sensing extremely dense and cold plasmas, which are typically only measurable using ultraprecise semiconductor devices.

This high precision could enable 3D-printed sensors for applications in fusion energy research or supersonic flight. The rapid prototyping process could even spur more innovation in satellite and spacecraft design, Velásquez-García adds. “If you want to innovate, you need to be able to fail and afford the risk. Additive manufacturing is a very different way to make space hardware. I can make space hardware and if it fails, it doesn’t matter because I can make a new version very quickly and inexpensively, and really iterate on the design. It is an ideal sandbox for researchers,” he says. While Velásquez-García is pleased with these sensors, in the future he wants to enhance the fabrication process. Reducing the thickness of layers or pixel size in glass-ceramic vat polymerization could create complex hardware that is even more precise. Moreover, fully additively manufacturing the sensors would make them compatible with in-space manufacturing. He also wants to explore the use of artificial intelligence to optimize sensor design for specific use cases, such as greatly reducing their mass while ensuring they remain structurally sound.

This work was funded, in part, by MIT, the MIT-Tecnológico de Monterrey Nanotechnology Program, the MIT Portugal Program, and the Portuguese Foundation for Science and Technology.

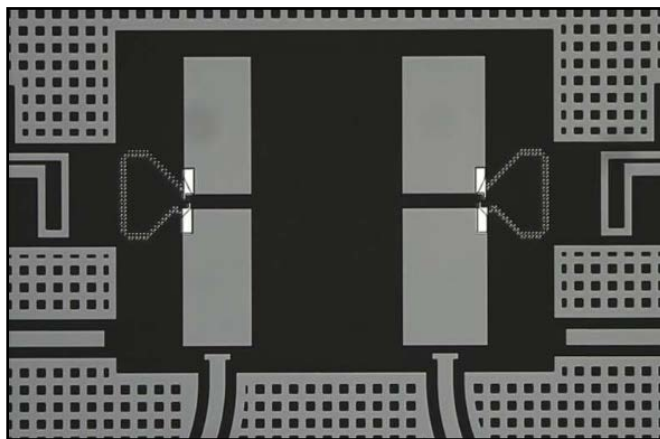
<https://news.mit.edu/2022/rpa-sensors-satellites-3d-print-0727>



Wed, 27 Jul 2022

An Alternative Superconducting Qubit Achieves High Performance for Quantum Computing

Quantum computers, devices that exploit quantum phenomena to perform computations, could eventually help tackle complex computational problems faster and more efficiently than classical computers. These devices are commonly based on basic units of information known as quantum bits, or qubits. Researchers at Alibaba Quantum Laboratory, a unit of Alibaba Group's DAMO research institute, have recently developed a quantum processor using fluxonium qubits, which have so far not been the preferred choice when developing quantum computers for industry teams. Their paper, published in Physical Review Letters, demonstrates the potential of fluxonium for developing highly performing superconducting circuits.



SEM image of the two-qubit fluxonium processor.

"This work is a critical step for us in advancing our quantum computing research," Yaoyun Shi, Director of Alibaba's Quantum Laboratory, told Phys.org. "When we started our research program, we decided to explore fluxonium as the building block for future quantum computers, deviating from the mainstream choice of the transmon qubit. We believe that this relatively new type of superconducting qubit could go much further than transmon." "While some past studies had already explored the potential of quantum processors based on fluxonium qubits, most of them primarily offered proofs of concept, which were realized in university labs. For these "artificial atoms" to be implemented in real quantum computers and compete with transmons (i.e., widely used qubits), however, they would need to demonstrate a high performance on a wide range of operations, within a single device. This is precisely the key objective of this work.

Fluxonium qubits have two characteristics that set it apart from transmons: their energy levels are far more uneven (i.e., "anharmonic") and they use a large inductor to replace the capacitor used in transmon. Both contribute to fluxonium's advantage, at least theoretically, in being more resilient to errors, leading to better "coherence," i.e., holding quantum information for a longer time, and "higher fidelity," i.e., accuracy, in realizing elementary operations."One can picture the energy levels forming a ladder," Chunqing Deng, who led the study, explained. "The energy gaps are important, because each quantum instruction has a 'pitch,' or frequency, and it triggers transitions between two levels when the pitch matches their energy gaps."

<https://phys.org/news/2022-07-alternative-superconducting-qubit-high-quantum.html>



Wed, 27 Jul 2022

Research Finds Bacteria Can Remove Plastic Pollution from Lakes

A research study involving 29 European lakes has found that some naturally-occurring freshwater bacteria grow faster and more efficiently on the remains of plastic bags than they do on plant matter like leaves and twigs. The scientists behind the research believe that enriching water bodies with these species of bacteria could be a way to remove plastic pollution from the environment. The results of the study, published in Nature Communications, suggest that plastic pollution in the lakes is "priming" the bacteria for rapid growth. Not only are the bacteria breaking down the plastic, but they are better able to break down other natural carbon compounds in the lake. The researchers believe this is happening because the carbon compounds from plastics are easier to break down as food for the bacteria.

"It's almost like the plastic pollution is getting the bacteria's appetite going. The bacteria use the plastic as food first, because it's easy to break down, and then they're more able to break down some of the more difficult food – the natural organic matter in the lake," said Andrew Tanentzap, one of the co-authors of the study, in a press statement. Tanentzap is part of the University of Cambridge's Department of Plant Sciences. A study by the same authors published last year discovered that European lakes are potential hotspots of microplastic pollution. When plastics break down over the years, they release simple carbon compounds. These compounds are different from those that are released by organic matter like leaves and twigs. The carbon compounds released by plastics were shown to be derived from additives added to plastic products, including adhesives and softeners.

For the study, researchers sampled 29 lakes across Scandinavia between August and September 2019. They ensured that the lakes differ in latitude, depth, area, average surface temperature and diversity of dissolved carbon-based molecules so that the results would be applicable to a wider range of water bodies. Researchers filled glass bottles with water from each lake. After this, they cut up plastic bags from four major UK shopping chains and shook these separately in water until the bags released carbon compounds. A small amount of this "plastic water" was added to half the glass bottles and the same amount of distilled water was added to others. After keeping the bottles in the dark for 72 hours, bacterial activity in each of the bottles was measured. In the

lake water bottles with the “plastic water,” the bacteria had doubled in mass very efficiently. Around 50 per cent of this carbon was incorporated into the bacteria in 72 hours.

<https://indianexpress.com/article/technology/science/research-finds-bacteria-can-remove-plastic-pollution-from-lakes-8054781/lite/>



Wed, 27 Jul 2022

China Spacecraft Returns Amid Booster Rocket Concerns

A Chinese cargo spacecraft that serviced the country's permanent orbiting space station has largely burned up on reentering the atmosphere, amid separate concerns over China's decision to allow a massive booster rocket to fall to Earth uncontrolled. Only small parts of the Tianzhou-3 ship survived to fall safely Wednesday into a predetermined area of the South Pacific, the China Manned Space Agency said. Until July 17, the spacecraft had been docked with the station's Tianhe core section and its return follows the addition of a laboratory module on Monday as China moves to complete the station in the coming months.

China's space program is run by the ruling Communist Party's military wing, the People's Liberation Army, and has largely proceeded with the space station program without other nations' assistance. The U.S. excluded China from the International Space Station because of its military ties. The booster that has drawn attention from the space community was part of the massive 23-ton Long March 5B-Y3 rocket—China's most powerful—that carried the Wentian module to the station, aboard which three astronauts currently reside. China decided not to guide the booster back through the atmosphere and it's not clear exactly when or where it will come down to Earth. While it will largely burn up on return, there remains a slight risk of fragments causing damage or casualties.

While China is not alone in such practices, the size of the Long March rocket stage has drawn particular scrutiny. China has allowed rocket stages to fall back to Earth on their own at least twice before, and was accused by NASA last year of "failing to meet responsible standards regarding their space debris" after parts of a Chinese rocket landed in the Indian Ocean.

China also drew heavy criticism after using a missile to destroy one of its defunct weather satellites in 2007, creating a massive debris field. Foreign Ministry spokesperson Zhao Lijian on Wednesday rejected such concerns. "Since the development stage of the space engineering program, China has taken into consideration the debris mitigation and return from orbit into atmosphere of missions involving rocket carriers and satellite sent into orbit," Zhao said at a daily briefing Wednesday. "It is understood that this type of rocket adopts a special technical design that most of the components will be burnt up and destroyed during the reentry process,"

Zhao said. "The possibility of causing damage to aviation activities or on the ground is extremely low."

<https://phys.org/news/2022-07-china-spacecraft-booster-rocket.html#:~:text=A%20Chinese%20cargo%20spacecraft%20that,to%20fall%20to%20Earth%20uncontrolled.>

