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Press Information Bureau
Government of India

Ministry of Defence

Wed, 22 Dec 2021 1:12PM

DRDO conducts maiden launch of indigenously developed new generation surface-to-surface missile 'Pralay'

Defence Research and Development Organisation (DRDO) successfully conducted maiden flight test of indigenously developed surface-to-surface missile 'Pralay', from Dr A P J Abdul Kalam Island off the coast of Odisha on December 22, 2021. The mission has met all its objectives. The new missile followed the desired quasi ballistic trajectory and reached the designated target with high degree accuracy, validating the control, guidance and mission algorithms. All the sub-systems performed satisfactorily. All the sensors deployed near the impact point across the eastern coast, including the down range ships, tracked the missile trajectory and captured all the events.

The Missile is powered with solid propellant rocket motor and many new technologies. The missile has a range of 150-500 kilometre and can be launched from a mobile launcher. The missile guidance system includes state-of-the-art navigation system and integrated avionics.

Raksha Mantri Shri Rajnath Singh congratulated DRDO and associated teams for this maiden development flight trial. He complimented DRDO for the fast track development and successful launch of modern surface-to-surface missile.

Secretary Department of Defence R&D and Chairman DRDO, Dr G Satheesh Reddy appreciated the team and said that this is a new generation surface-to-surface missile equipped with modern technologies and induction of this weapon system will give the necessary impetus to the Armed Forces.



<https://pib.gov.in/PressReleasePage.aspx?PRID=1784136>



Wed, 22 Dec 2021 1:12PM

डीआरडीओ ने स्वदेश में ही विकसित नई पीढ़ी की सतह से सतह पर मार करने वाली मिसाइल 'प्रलय' का पहला सफलतापूर्वक परीक्षण किया

रक्षा अनुसंधान और विकास संगठन (डीआरडीओ) ने स्वदेश में ही विकसित सतह से सतह पर मार करने वाली मिसाइल 'प्रलय' का पहला सफलतापूर्वक परीक्षण 22 दिसंबर 2021 को ओडिशा तट पर डॉ ए पी जे अब्दुल कलाम द्वीप से किया। परीक्षण के दौरान इसने अपने सभी उद्देश्यों को पूरा किया है। प्रलय मिसाइल ने वांछित अर्ध बैलिस्टिक प्रक्षेपवक्र का अनुसरण किया और इसने नियंत्रण, मार्गदर्शन तथा मिशन एल्गोरिदम को प्रमाणित करते हुए पूर्ण सटीकता के साथ निर्दिष्ट लक्ष्य को हासिल किया। परीक्षण के समय सभी उप-प्रणालियों ने संतोषजनक प्रदर्शन किया। डाउन रेंज के जहाजों सहित पूर्वी तट पर केंद्र बिंदु के पास तैनात सभी सेंसरों ने मिसाइल प्रक्षेपवक्र को परखा और सभी घटनाओं को कैचर किया।

प्रलय मिसाइल ठोस प्रॉपेलेंट रॉकेट मोटर और कई नई तकनीकों से संचालित होती है। इस मिसाइल की रेंज क्षमता 150-500 किलोमीटर है और इसे मोबाइल लॉन्चर से लॉन्च किया जा सकता है। प्रलय मिसाइल गाइडेंस प्रणाली में अत्याधुनिक नेविगेशन और एकीकृत एवियोनिक्स प्रणाली शामिल हैं।

रक्षा मंत्री श्री राजनाथ सिंह ने इस मिसाइल के पहले सफल परीक्षण के लिए डीआरडीओ एवं संबंधित टीमों को बधाई दी है। उन्होंने तेजी से विकास और सतह से सतह पर मार करने वाली आधुनिक मिसाइल के सफल परीक्षण के लिए डीआरडीओ की सराहना की।

रक्षा अनुसंधान एवं विकास विभाग के सचिव तथा डीआरडीओ के अध्यक्ष डॉ जी सतीश रेड्डी ने टीम की सराहना की और कहा कि यह आधुनिक तकनीकों से लैस सतह से सतह पर मार करने वाली नई पीढ़ी की मिसाइल है। उन्होंने कहा कि इस हथियार को सैन्य प्रणाली में शामिल करने से सशस्त्र बलों को आवश्यक प्रोत्साहन मिलेगा।



<https://pib.gov.in/PressReleasePage.aspx?PRID=1784190>



డెఆర్డీఓ దేశీయంగా అభివృద్ధి చేసిన క్రొత్త తరం ఉపరితలం నుండి ఉపరితలానికి వరయ్యగించే క్షిపణి 'వరళయ్' తొలి వరయ్యగన్నని నిర్వహించింది

రక్షణ పరిశోధన అభివృద్ధి సంస్థ (డెఆర్డీఓ) డిసెంబరు 22, 2021న ఒడిశా తీరంలోని డక్కటర్ ఏవిజ్ అబ్దుల్ కలాం ద్వీపం నుండి నవదేశీ పరిజ్ఞానంతో అభివృద్ధి చేసిన ఉపరితలం నుండి ఉపరితలానికి వరయ్యగించే క్షిపణి 'వరళయ్' తొలి గగన పరీక్షను విజయవంతంగా నిర్వహించింది. మిషన్ దుని లక్ష్మయాలన్ నీటిని నడిచింది. క్రొత్త క్షిపణి కవలనిన వకషిక బాలిస్టిక్ పథన్ అనుసరించింది. అధిక నడయి ఖచ్చితతలతో నిర్దేశిత లక్ష్మయన్ చేరుకుంది, నీయంతరణ, మరగదర్శకత్వం, మిషన్ అల్గరిథమలను ధృవీకరించింది. అన్ అప వయవనధలు సంతృప్తికరంగా పనిచేశయి. డెన్ రేంజ్ షివలతో సహా తూర్పు తీరంలోని ఇంపకోట్ వయింట్ దగ్గర మహరించిన అన్ సన్సర్లు క్షిపణి పథన్ ట్రాక్ చేతయి.

క్షిపణి సలిడ్ వొరొఫెల్లెంట్ రకట్ మోటరు మరియు అనేక క్రొత్త సంకేతికలతో పనిచేతుంది. క్షిపణి 150-500 కిలోమీటర్ల పరిధిని కలిగి ఉంది. మ్యైల్ అంచర్ నుండి వరయ్యగించవచ్చు. క్షిపణి మరగదర్శక వయవనధలే అత్యధునిక నవిగేషన్ సెన్సర్లు, ఇంటిగ్రేటెడ్ ఏవియనికన్ ఉన్నయి.

ఈ తొలి డెవలప్ మెంట్ ఫ్లైట్ ట్రయల్ కేసం రక్షణ మంతరి శ్రీ రజనధ్ నింగ్ డెఆర్డీఓ అనుబంధ బృందలను అభినందించరు. ఆధునిక ఉపరితలం నుండి ఉపరితల క్షిపణిని వేగంగా అభివృద్ధి చేసి విజయవంతంగా వరయ్యగించినందుకు ఆయన డెఆర్డీఓని వరశంనించరు. రక్షణ శఖ కరయదర్శి, డెఆర్డీఓ చైర్మన్, డక్కటర్ జి.సతీష్ రెడ్డి బృందన్ అభినందించరు మరియు ఇది క్రొత్త తరం ఉపరితలం నుండి ఉపరితల క్షిపణి అని అన్సరు. ఆధునిక సంకేతికలతో కూడిన ఈ ఆయుధ వయవనధ వల్ల నయుధ దళలకు మరింత బలం చేకూరినట్టయింది.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1784470>

THE TIMES OF INDIA

Thu, 23 Dec 2021

DRDO conducts maiden launch of indigenously developed new generation surface-to-surface missile 'Pralay'

NEW DELHI: The Defence Research and Development Organisation (DRDO) on Wednesday successfully conducted the maiden flight test of indigenously developed surface-to-surface missile 'Pralay', from Dr APJ Abdul Kalam Island off the coast of Odisha.

The Union Ministry of Defence, in a press release, said, "The mission has met all its objectives. The new missile followed the desired quasi ballistic trajectory and reached the designated target with high degree accuracy, validating the control, guidance and mission algorithms."

"All the sub-systems performed satisfactorily. All the sensors deployed near the impact point across the eastern coast, including the downrange ships, tracked the missile trajectory and captured all the events," they added.

The ministry also informed that the missile is powered by a solid-propellant rocket motor and many new technologies. "The missile has a range of 150-500 kilometres and can be launched from a mobile launcher. The missile guidance system includes state-of-the-art navigation system and integrated avionics," they said.

Defence minister Rajnath Singh congratulated DRDO and associated teams for this maiden development flight trial.

He also complimented DRDO for the fast track development and successful launch of the modern surface-to-surface missile.

Secretary Department of Defence R&D and chairman DRDO, Dr G Satheesh Reddy appreciated the team and said that this is a new generation surface-to-surface missile equipped with modern technologies and induction of this weapon system will give the necessary impetus to the Armed Forces.

As per sources, the advanced missile has been developed in a way to able to defeat interceptor missiles. It has the ability to change its path after covering certain range mid-air.

<https://timesofindia.indiatimes.com/india/drdo-conducts-maiden-launch-of-indigenously-developed-new-generation-surface-to-surface-missile-pralay/articleshow/88430908.cms>



DECCAN Chronicle

Thu, 23 Dec 2021

Vizag's NSTL handovers Infrared system for INS Vikrant being built at Cochin

The NSTL is naval research laboratory of the Defence Research & Development Organisation (DRDO)

By V.Kamalakara Rao

Visakhapatnam: Vizag based Naval Science and Technological Laboratory (NSTL) handed over the 3MW Diesel Engine Infrared Suppression Signature (IRSS) system for the indigenous Aircraft Carrier project of the Indian Navy at a function here on Wednesday.

The NSTL is naval research laboratory of the Defence Research & Development Organisation (DRDO).

NSTL outstanding scientist and director Y. Sreenivas Rao said NSTL-designed and developed systems have been integrated onboard INS Vikrant, which is under construction at Cochin Shipyard Limited, Kochi and have completed all performance trials successfully.

The Navy's chief of material vice admiral



Vizag NSTL team handing over the system to Indian Navy team. (DC Image)

Sandeep Naithani received the IRSS system. He said that stealth is a key factor for the survivability of ships at sea. He said that the Indian Navy maintains a close partnership with NSTL in the development of various systems critical to achieving strategic independence.

Samir V Kamat, scientist and director general (Naval systems and materials) said that the handing over of IRSS systems to the Indian Navy signifies a major milestone in achieving Atma Nirbharta in the design and development of naval stealth systems.

<https://www.deccanchronicle.com/nation/current-affairs/221221/vizags-nstl-handovers-infrared-system-for-ins-vikrant-being-built-a.html>

THE TIMES OF INDIA

Thu, 23 Dec 2021

BEL's AERV inducted into Army

Bengaluru: The first batch of next-generation armoured engineer reconnaissance vehicles (AERV), indigenously designed and developed by DRDO and manufactured by defence PSU Bharat Electronics Limited (BEL) has been formally inducted into Indian Army.

The induction was done by chief of army staff Gen Manoj Mukund Naravane on Monday, BEL said in a statement.

“Manufactured by BEL’s Pune unit with more than 90% indigenous content, the AERV is a versatile BMP-IIK amphibious Infantry Combat Vehicle (ICV) fitted with instruments for water reconnaissance, land reconnaissance, navigation and data backup,” BEL added.

The vehicle is capable of measuring soil bearing capacity on riverbanks to determine if they are motorable for military vehicles on Go-No Go basis (critical parameters for bridge laying), dry and wet gaps in day and night conditions, slopes and height of river banks / canals.

<https://timesofindia.indiatimes.com/city/bengaluru/bels-aerv-inducted-into-army/articleshow/88442147.cms>

DRDO on Twitter





Defence News

Defence Strategic: National/International



Press Information Bureau
Government of India

Ministry of Defence

Wed, 22 Dec 2021 4:35PM

Hon'ble President witnesses Naval OP Demo and visits IAC Vikrant

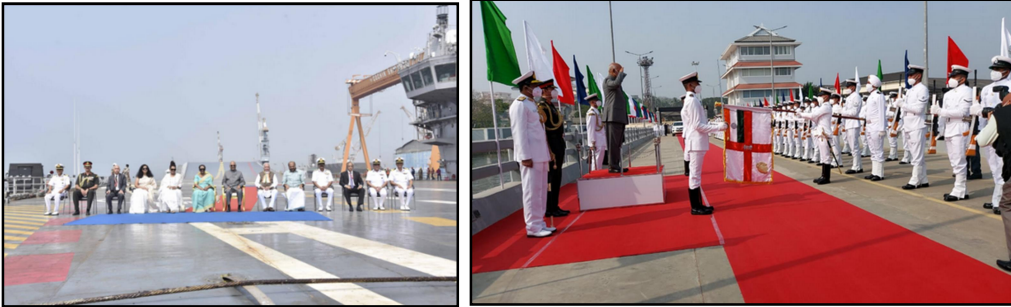
The Hon'ble President of India Shri Ram Nath Kovind witnessed Naval Operations Demonstration in the Ernakulam channel, which showcased naval prowess and operations, on 22 Dec 21. The Hon'ble President was accompanied by the Hon'ble Governor of Kerala Shri Arif Mohammad Khan and Flag Officer Commanding-in-Chief Vice Admiral MA Hampiholi, AVSM, NM.

The spectacular event which lasted for 40 minutes displayed the combat capability of ships and aircraft which included simulated beaching reconnaissance and assault, high speed runs by fast interceptor crafts, shore bombardment, helobatics, sonar dunk operations, boarding operations and cargo sling operations by Naval helicopters. The highlights of the day were manning of the yard and arms of the Sail Training Ship 'Tarangini' along with steam past by Naval ships which manoeuvred in a column formation shouting Three *Jai* in the honour of The President. The event concluded with a band performance by the Naval band and fly past by aircraft.

The Hon'ble President further visited the Indigenous Aircraft Carrier 'Vikrant' under construction at Cochin Shipyard Ltd., Kochi. This was the Supreme Commander's first visit to the ship. He was provided a first hand brief on the progress of trials towards commissioning of the ship.

Indigenous content in construction of IAC is close to 76% of overall project cost of Rs 19341 Crs. IAC has large number of indigenous material such as steel, besides other equipment manufactured by Indian industrial houses and about 100 MSMEs. The indigenous construction of the carrier has generated employment opportunities and bolstered plough back effect on the domestic economy. Close to 2000 shipyard and 13000 non-yard personnel have been employed per annum towards construction of IAC.

After a brief walk around of the mighty warship, the Hon'ble President expressed satisfaction on the progress and appreciated the efforts of Indian Navy and Cochin Shipyard towards development of indigenous capabilities in shipbuilding as a shining example of the nation's quest for 'Atma Nirbhar Bharat'.



<https://pib.gov.in/PressReleasePage.aspx?PRID=1784218>



पत्र सूचना कार्यालय
भारत सरकार
रक्षा मंत्रालय

Wed, 22 Dec 2021 4:35PM

राष्ट्रपति ने नौसेना संचालन का प्रदर्शन देखा और स्वदेशी विमान वाहक पोत विक्रान्त का दौरा किया

राष्ट्रपति श्री राम नाथ कोविंद ने 22 दिसंबर 2021 को एर्णाकुलम खाड़ी में नौसेना संचालन का प्रदर्शन देखा, जिसमें नौसैन्य कौशल और कार्य प्रणाली को दर्शाया गया। राष्ट्रपति के साथ केरल के राज्यपाल श्री आरिफ मोहम्मद खान और फ्लैग ऑफिसर कमांडिंग-इन-चीफ वाइस एडमिरल एम.ए. हम्पीहोली, एवीएसएम, एनएम भी उपस्थित थे।

40 मिनट तक आयोजित हुए इस शानदार कार्यक्रम में नौसैनिक पोतों और विमानों की युद्ध क्षमता प्रदर्शित की गई, जिसमें कृत्रिम समुद्र तट टोही गतिविधि और घात लगाकर हमला, तेज इंटरसेप्टर छोटे विमानों द्वारा उच्च गति से उड़ना, तटीय बमबारी, हेलोबैटिक्स, सोनार डंक ऑपरेशन, बोर्डिंग संचालन और नौसेना के हेलीकॉप्टरों द्वारा कार्गो स्लिंग ऑपरेशन आदि शामिल थे। आज दिन के मुख्य आकर्षण थे, नौसेना के जहाजों द्वारा स्टीम पास्ट के साथ-साथ सेल समुद्री प्रशिक्षण जहाज 'तरंगिनी' के यार्ड और हथियारों की मैनिंग, जो राष्ट्रपति के सम्मान में तीन बार जय का उद्घोष करते हुए एक कॉलम फॉर्मेशन में अपना कौशल प्रदर्शित कर रहे थे। कार्यक्रम का समापन नौसेना बैंड के बेहतरीन धुन प्रदर्शन और विमान द्वारा फ्लाय पास्ट के साथ हुआ।

राष्ट्रपति ने कोच्चि के कोचीन शिपयार्ड लिमिटेड में निर्माणाधीन स्वदेशी विमान वाहक 'विक्रान्त' का भी दौरा किया। यह राष्ट्रपति की इस पोत की पहली यात्रा थी। श्री कोविंद को जहाज क्रियान्वित करने की दिशा में परीक्षण की प्रगति के बारे में जानकारी प्रदान की गई।

स्वदेशी विमान वाहक पोत के निर्माण में स्वदेशी सामग्री 19341 करोड़ रुपये की कुल परियोजना लागत का 76% के करीब है। आईएसी में भारतीय औद्योगिक घरानों और लगभग 100 एमएसएमई के द्वारा निर्मित उपकरणों के अलावा बड़ी संख्या में स्वदेशी सामग्री जैसे स्टील का इस्तेमाल किया गया है। पोत के स्वदेश में ही निर्माण होने से रोजगार के

अवसर पैदा हुए हैं और घरेलू अर्थव्यवस्था पर इसका मजबूत प्रभाव पड़ा है। विमान वाहक पोत के निर्माण कार्य के लिए प्रति वर्ष लगभग 2000 शिपयार्ड और 13000 गैर-यार्ड कर्मियों को रोजगार प्रदान किया गया है।

शक्तिशाली युद्धपोत के संक्षिप्त भ्रमण के बाद, राष्ट्रपति ने कार्य प्रगति पर संतोष व्यक्त किया और स्वदेशी विमान वाहक पोत के निर्माण में स्वदेशी क्षमताओं के विकास की दिशा में भारतीय नौसेना तथा कोचीन शिपयार्ड के प्रयासों की सराहना की, जो 'आत्मनिर्भर भारत' के लिए देश की खोज का एक बेमिसाल उदाहरण है।

<https://pib.gov.in/PressReleasePage.aspx?PRID=1784336>

TIMESNOWNEWS.COM

Thu, 23 Dec 2021

Indian Army plans to buy Medium Range Precision Kill System with 'loitering munitions'

Indian Army is planning to buy Medium Range Precision Kill System that can be used in plains, deserts, semi desert, mountainous terrain.

New Delhi: Keeping in mind the needs of modern-day warfare, the Indian Army is planning to buy Medium Range Precision Kill System (MRPKS) so that it can destroy enemy targets with precision and minimum collateral damage. The Army said there is an urgent requirement to procure MRPKS capable of day and night acquisition and precision engagement of targets.

MRPKS are unmanned combat aerial vehicles (UCAV) that can provide a breakthrough against dynamic and well protected static targets by real-time acquisition and precision strike. MRPKS once launched can 'loiter' in the air and provide real-time imagery to the operator on the ground.

The Army's Request for Information clearly stated that the weapon system should be indigenously designed and the 'Indian vendors' will have to participate in the Make II Category for development and procurement of 10 sets of MRPKS under Buy Indian (IDDM) category of Defence Acquisition Procedure 2020 (DAP-2020).



Harop Loitering Munition System (Representational photo - www.iai.co.il)

The MRPKS will be used to equip the artillery units to engage the following types of permanent and dynamic targets in plains, deserts, semi desert, mountainous terrain and high altitude areas.

The Army has listed the following characteristics which MRPKS should possess:

Range - 40 Km.

Accuracy - 5 meters CEP.

Launch Altitude - 4000 meters or more.

Warhead Weight - > 8 kg.

Warhead Types - High Explosive Pre Fragmented (HEPF) and anti-armour.

Endurance. The munition should have endurance of minimum 2 hours.

Loiter Altitude. Capability to loiter above ground level at an altitude of minimum 1000 meters.

<https://www.timesnownews.com/india/article/indian-army-plans-to-buy-medium-range-precision-kill-system-with-loitering-munitions/842902>

Indian Army Conducts Airborne Exercise In Andaman And Nicobar Islands

The Shatrुjeet Brigade of the Indian Army conducted airborne exercises during the Multidomain Tri-Service Exercise at the Nicobar group of islands.

By Apoorva Kaul

The Shatrुjeet Brigade of the Indian Army conducted an airborne exercise to review the readiness of its rapid response capabilities. The airborne exercise was carried out during the Multidomain tri-service exercise which is under progress at the Nicobar group of islands of Andaman and Nicobar Islands. For the exercise, the troops of the Indian Army, Naval and Air Force were moved for an amphibious landing.

Taking to Twitter, the Additional Directorate General of Public Information, IHQ of MoD (Army) shared a video of the airborne exercise carried out by the Shatrुjeet Brigade. The ADG PI tweeted, "Airborne Exercise to validate Rapid Response Capability of #ShatrुjeetBrigade was carried out during Multi-Domain Tri-Service Exercise which is under progress at the strategically important Nicobar group of islands of Andaman and Nicobar."

The troops of Indian Army, Navy and Air Force were mobilised in close coordination with the para drop of airborne troops.



The Shatrुjeet Brigade validated its rapid response capability wherein the paratroopers moved from mainland and conducted an airborne drop in an island region of Andamans. The exercise was carried out under the control of Andaman and Nicobar Command. The airborne exercise was witnessed by Lieutenant General Ajai Singh, Commander-in-Chief of Andaman Nicobar command. General Ajai Singh appreciated the paratroopers for their preparedness for battle.

Indian Army conducts airborne insertion

Earlier in November, the Shatrुjeet Brigade of the Indian Army conducted an airborne insertion along the Northern Borders in Eastern Ladakh, according to ANI. The airborne insertion was carried out by Shatrुjeet Brigade to review its rapid response capabilities, as part of an airborne exercise and combat manoeuvres. For the airborne insertion, pre-acclimatised troops with specialist vehicles and missile detachments were transported to the region through C-130 and AN 32 aircrafts, as per the ANI report. The exercise included Oxygen Combat Free Fall jumps and the force also integrated battle drills, mechanised columns and attack helicopters, validating capabilities.

<https://www.republicworld.com/india-news/general-news/indian-army-conducts-airborne-exercise-in-andaman-and-nicobar-islands.html>

China's largest, most-advanced frigate touted as 'carrier killer' to boost Pakistan's Naval Defense against India

Pakistan received, what is being described as the most advanced Chinese warship, in November. The first of the four Type 054A warships, named PNS Tughril by the Pakistan Navy, was commissioned just a little over a month ago.

The mammoth warship has since gone to several countries on friendly visits, with Sri Lanka playing the most recent host. While the warship possesses capabilities that give a major fillip to Pakistan's maritime power, its commissioning had evoked strong reactions from India.

The Indian Navy Chief had earlier remarked that India was constantly monitoring the naval cooperation between Pakistan and China. He had also expressed apprehensions about China's sale of military hardware to Pakistan affecting the security dynamics in South Asia.

Pakistan was slated to receive its largest-ever warship, PNS Tughril on December 20 after it left the Sri Lankan dock 2 days ago. The warship was received by Colombo for a friendly visit and flag showing mission after which the navies of both countries conducted joint drills called 'Exercise Lion Star' so as to enhance interoperability between the two navies, as reported by the Associated Press of Pakistan.

This warship, which was commissioned into the Pakistani Navy in a ceremony held in China, has made several port-calls including in Malaysia and the Philippines, apart from Sri Lanka.

This hints at a Pakistani effort to court the Southeast and South Asian countries even as the cooperation between ASEAN and India deepens and there's increasing alienation between them and China, Pakistan's all-weather ally. It is also indicative of the objective to balance India's engagement with the countries in the Indo-Pacific.

The Tughril Class or Type 054A/P frigate, which is a state-of-the-art, multi-role, and most advanced frigates ever created by China, will arrive in Pakistan on December 20, according to The News. This warship has also been hailed as a game-changer and one that is expected to give a quantum-leap to Pakistan's Naval Air defenses.

PNS Tughril

The Tughril Class warship, also known as the Type 054A/P frigate, is China's most advanced, multi-role, and modern frigate. With long-range missiles, an enhanced radar system, electronic warfare, air and surface surveillance and acoustic sensors, and other battle management systems, the guided-missile frigate is designed for intense anti-air, anti-surface, and anti-submarine operations in the high seas.

The battleship is equipped with rapid-reaction, vertical launch system-based SAMs to operate in South Asia's dense missile threat environment. HHQ-16 SAMs, which are equipped with medium-range air defense missiles, would provide omnidirectional coverage, boosting the Navy's anti-air warfare/air defense capabilities against aircraft, helicopters, inbound anti-ship missiles and even cruise missiles.

The frigate also has sophisticated sensors and weapons, such as the long-range SR2410C and Type 517/SUR17B air-surveillance radars.



File Image: China's Y-8Q anti-submarine aircraft.

The new Tughril is equipped with electronic warfare systems, the newest surface, subsurface, and anti-air weapons, as well as battle management systems, and is seen as a Chinese-supplied successor to the F-22P frigate. The warship is primarily designed for anti-air warfare, but it can also execute anti-surface and anti-submarine tasks.

It includes anti-ship cruise missile launchers armed with the CM-302/ YJ-12 supersonic anti-ship cruise missiles, known as Yu-8 ASROCs. The YJ-12 is regarded as “the most dangerous anti-ship missile China has ever created”. With a range of 400-500 km and a payload of 200 kg, it is often called a ‘carrier killer’ capable of posing a ‘significant danger’ to even the most powerful air defense systems, outranking the US’s primary ASCM, the RGM-84 Harpoon.

Indian observers are concerned that the YJ-12 might endanger India’s own fleet of seven frigates being created under Project 17A, which will be equipped with hypersonic BrahMos cruise missiles.

Anti-submarine torpedo launchers, anti-submarine rocket launchers, and decoy rocket launchers are also on board Tughril. The Type 054A also includes world-class stealth features such as a sloped hull design, radar-absorbent materials, and a smaller superstructure to reduce radar cross-section.

It includes a stern flight deck and a hangar large enough to house a helicopter, enhancing Pakistan’s offensive power against any hostile maritime interdiction for decades.

Potential Geopolitical Impact

The Pakistani media has reflected some concerns that the Pakistani security ecosystem has been guided by the pursuit to modernize its navy. According to some quarters in Pakistan, India’s centrality and role in the Indo-Pacific region and India’s newly gained access to the Duqm port of Oman — all have a bearing on the Gwadar port and the China-Pakistan Economic Corridor (CPEC).

This is indicative of Pakistan’s willingness to acquire advanced and lethal warships in order to create deterrence against its arch-rival in the Indian Ocean region. China, too, has been invested in modernizing Pakistan’s military as India forge closer military ties with the United States.

The polarization between the Pakistan-China and India-United States makes it imperative for China to create a balance of power so as to counter its rivals. Beijing has also reportedly agreed to supply more frigates and J-10C aircraft to Pakistan.

<https://eurasianimes.com/chinas-to-boost-pakistans-naval-defense-pak-media/>

Science & Technology News



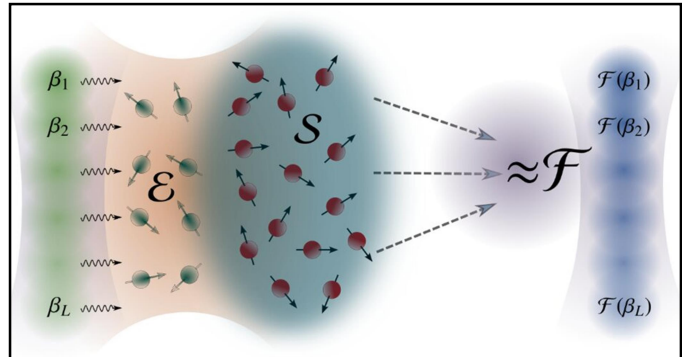
Thu, 23 Dec 2021

Novel algorithm allows for efficient and accurate verification of quantum devices

Technologies that take advantage of novel quantum mechanical behaviors are likely to become commonplace in the near future. These may include devices that use quantum information as input and output data, which require careful verification due to inherent uncertainties. The verification is more challenging if the device is time dependent when the output depends on past inputs. For the first time, researchers using machine learning dramatically improved the efficiency of verification for time-dependent quantum devices by incorporating a certain memory effect present in these systems.

Quantum computers make headlines in the scientific press, but these machines are considered by most experts to still be in their infancy. A quantum internet, however, may be a little closer to the present. This would offer significant security advantages over our current internet, amongst other things. But even this will rely on technologies that have yet to see the light of day outside the lab. While many fundamentals of the devices that can create our quantum internet may have been worked out, there are many engineering challenges in order to realize these as products. But much research is underway to create tools for the design of quantum devices.

Postdoctoral researcher Quoc Hoan Tran and Associate Professor Kohei Nakajima from the Graduate School of Information Science and Technology at the University of Tokyo have pioneered just such a tool, which they think could make verifying the behavior of quantum devices a more efficient and precise undertaking than it is at present. Their contribution is an algorithm that can reconstruct the workings of a time-dependent quantum device by simply learning the relationship between the quantum inputs and outputs. This approach is actually commonplace when exploring a classical physical system, but quantum information is generally tricky to store, which usually makes it impossible.



B and F represent the input and output states, respectively, of a quantum system. E is an auxiliary system necessary to pass the sequence of input states B to the quantum reservoir S. S can then be read to emulate F without disrupting the system. Credit: ©2021 Tran et al.

"The technique to describe a quantum system based on its inputs and outputs is called quantum process tomography," said Tran. "However, many researchers now report that their quantum systems exhibit some kind of memory effect where present states are affected by previous ones. This means that a simple inspection of input and output states cannot describe the time-dependent nature of the system. You could model the system repeatedly after every change in time, but this would be extremely computationally inefficient. Our aim was to embrace this memory effect and use it to our advantage rather than use brute force to overcome it."

Tran and Nakajima turned to machine learning and a technique called quantum reservoir computing to build their novel algorithm. This learns patterns of inputs and outputs that change over time in a quantum system and effectively guesses how these patterns will change, even in situations the algorithm has not yet witnessed. As it does not need to know the inner workings of a quantum system as a more empirical method might, but only the inputs and outputs, the team's algorithm can be simpler and produce results faster as well.

"At present, our algorithm can emulate a certain kind of quantum system, but hypothetical devices may vary widely in their processing ability and have different memory effects. So the next stage of research will be to broaden the capabilities of our algorithms, essentially making something more general purpose and thus more useful," said Tran. "I am excited by what quantum machine learning methods could do, by the hypothetical devices they might lead to."

The study is published in *Physical Review Letters*.

More information: Learning Temporal Quantum Tomography, *Physical Review Letters*, DOI: [10.1103/PhysRevLett.127.260401](https://doi.org/10.1103/PhysRevLett.127.260401)

Journal information: *Physical Review Letters*
<https://phys.org/news/2021-12-algorithm-efficient-accurate-verification-quantum.html>

