

August
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: 160 25 अगस्त 2022
Vol.: 47 Issue: 160 25 August 2022



रक्षा विज्ञान पुस्तकालय
Defence Science Library
रक्षा वैज्ञानिक सूचना एवं प्रलेखन केंद्र
Defence Scientific Information & Documentation Centre
मेटकॉफ हाउस, दिल्ली - 110 054
Metcalf House, Delhi - 110 054

CONTENTS

S. No.	TITLE	Page No.
	DRDO News	1-6
	DRDO Technology News	1-6
1.	Pinaka: रेंज 45 KM, हथियार क्षमता 100 किलो...पिनाका के नए अवतार से 'खौफ' में दुश्मन, कारगिल युद्ध में पाक पर बरपा चुका है कहर	<i>Times Now Navbharat</i> 1
2.	पोखरण में हुआ इस घातक मिसाइल का सफल परीक्षण, चीन के खिलाफ होगी तैनात	<i>News 18</i> 2
3.	Indigenous Pinaka Extended Range Rockets Running Through Trials	<i>Hindustan Times</i> 3
4.	Pinaka Extended Range Rocket Successfully Flight-Tested in Pokhran	<i>Times Now</i> 4
5.	DRDO Successfully Test-fires Pinaka Extended Range Rocket in Pokhran	<i>Republicworld.com</i> 5
	Defence News	6-21
	Defence Strategic: National/International	6-21
6.	SCO Member States Must Fight Together & Eliminate Terrorism in All its Forms: Raksha Mantri During Defence Ministers' Meet in Uzbekistan	<i>Press Information Bureau</i> 6
7.	Afghanistan Must not be Used as Launch Pad for Terror Activities: Rajnath Singh at SCO	<i>The Economic Times</i> 7
8.	Inside Vikrant, India's First Indigenous Airbase on High Seas	<i>The New Indian Express</i> 8
9.	INS Vikrant All Set to be Commissioned Next Week	<i>The Tribune</i> 10
10.	Indian Army Calls Garuda Aerospace Expert Team for Drone Modification	<i>Business Standard</i> 11
11.	At India-Japan 2+2 Meet on Sept 8, Joint Exercises, Defence Cooperation is Focus	<i>Hindustan Times</i> 12
12.	Competition Heats up for Naval Fighter Deal Ahead of Vikrant's Commissioning	<i>Hindustan Times</i> 13
13.	Boeing Says its Super Hornet Fighter Makes Economic and Operational Sense	<i>Business Standard</i> 15
14.	China is 'Exponentially' Increasing its Warship Capability	<i>Wion</i> 16
15.	NATO Countries Need to Spend More on Defence as Alliance Faces Russia's Military Build-Up, Says Head of Organisation	<i>Sky News</i> 17
16.	Taiwan to Deploy Drone Defence Systems After Rock-Throwing Video Emerges	<i>Money Control</i> 19
17.	Ukraine Spy Chief Says Russian Offensive Slowing Due to Fatigue	<i>The Economic Times</i> 20
	Science & Technology	21-24
18.	A Deep Learning Framework to Enhance the Capabilities of a Robotic Sketching Agent	<i>TechXplore</i> 21
19.	Researchers Demonstrate Error Correction in a Silicon Qubit System	<i>Phys.Org</i> 22
20.	Russia Ready to Work With France to Develop India's Shukrayaan Mission to Venus	<i>Republicworld.com</i> 23

Pinaka: रेंज 45 KM, हथियार क्षमता 100 किलो...पिनाका के नए अवतार से 'खौफ' में दुश्मन, कारगिल युद्ध में पाक पर बरपा चुका है कहर

भारत अपने महत्वपूर्ण हथियारों में से एक पिनाका रॉकेट को लगातार आधुनिक बना रहा है। इसे लेकर राजस्थान के पोखरण में पिछले कुछ दिनों से लगातार परीक्षण जारी है। जिसमें इसका सफल परीक्षण किया जा चुका है। पिनाका के नए अवतार से पाकिस्तान और चीन जरूर खौफ में होंगे, कारण इस सिस्टम के जरिए दूर स्थित दुश्मन के बंकरों को ये रॉकेट मिनटों में उड़ा सकता है।

पिनाका का नया अवतार

पिनाका के नए अवतार के टेस्ट के लिए विभिन्न रेंजों के कुल 24 ईपीआरएस रॉकेट दागे गए हैं। इस दौरान सभी रॉकेटों अपने रेंज, सटीकता से लेकर हर पैमाने पर सफल रहे हैं। डीआरडीओ के अधिकारियों ने इस परीक्षण को लेकर कहा- "राजस्थान में पोखरण फायरिंग रेंज में पिनाका एक्सटेंडेड रेंज रॉकेट का परीक्षण चल रहा है और इन परीक्षणों के दौरान कई सफल परीक्षण की गए हैं।"

क्या है खूबियां

भगवान शंकर के धनुष 'पिनाक' के नाम पर इसका नाम रखा गया है। 280 किलो वजनी और 15 फुट लंबी यह मिसाइल 45 किलोमीटर तक हमला कर सकती है। इसमें 100 किलो तक का एमूनेशन लोड किया जा सकता है। इस सिस्टम को फायर करने के बाद भी हवा में ही इसकी दिशा बदली जा सकती है। इसे गाइडेड मिसाइल की तरह से तैयार किया गया है। दुश्मन के बंकर, तोप, गाड़ी, बेड़े किसी को भी यह मिसाइल तबाह कर सकती है। साथ ही रडार के लिए इसे पकड़ना मुश्किल होगा। जब तक रडार इसे पकड़ेगा तब तक यह 4-5 किलोमीटर तक अपनी

दिशा बदल चुका होगा। पहले यह खूबी सिर्फ बोफोर्स में थी। यह रॉकेट सिस्टम पूरी तरह से स्वदेशी है।

कारगिल वॉर में दिखा चुका है अपना जलवा

1999 में हुए कारगिल वॉर के दौरान पिनाका दुश्मनों पर कहर बनकर टूटा था। पाकिस्तानी सैनिक पहाड़ों की ऊंची चोटियों पर बंकर बनाकर भारतीय सेना पर जब गोलियां बरसा रहे थे, तब पिनाका ने उनके बंकरों को तबाह कर दिया था। यह लड़ाई दो महीने तक चली थी। कारगिल युद्ध में बोफोर्स के साथ मिलकर पिनाका दुश्मनों पर कहर बनकर टूटा था। इसी युद्ध के बाद भारत ने इसकी सफलता को देखते हुए इसे और विकसित करने पर काम शुरू कर दिया था।

<https://www.timesnowhindi.com/india/article/kargil-war-pinaka-rocket-system-extended-range-rocket-all-details-new-danger-for-pakistan-china/435212>



Wed, 24 Aug 2022

पोखरण में हुआ इस घातक मिसाइल का सफल परीक्षण, चीन के खिलाफ होगी तैनात

राजस्थान के पोखरण फायरिंग रेंज में बुधवार को पिनाका एक्सटेंडेड रेंज रॉकेट का सफल परीक्षण किया गया है। ANI के ट्वीट के मुताबिक पोखरण फायरिंग रेंज में पिनाका एक्सटेंडेड रेंज रॉकेट का परीक्षण चल रहा है और इस दौरान कई सफल परीक्षण किये गए हैं।

रक्षा अनुसंधान और विकास संगठन (DRDO) द्वारा विकसित किया गया पिनाका रॉकेट एक आर्टिलरी मिसाइल सिस्टम है जो बेहद सटीकता के साथ 75 किलोमीटर की दूरी तक हमला करने में सक्षम है। इससे पूर्व अप्रैल माह में DRDO और भारतीय सेना ने पोखरण फायरिंग रेंज में पिनाका Mk-I (एन्हांसड) रॉकेट सिस्टम (EPRS) और पिनाका एरिया डेनियल मुनिशन (ADM) रॉकेट सिस्टम का सफलतापूर्वक परीक्षण किया था।

रिपोर्ट के अनुसार विभिन्न रेंजों के लिए कुल 24 ईपीआरएस रॉकेट दागे गए थे और सभी रॉकेटों ने परीक्षण के दौरान आवश्यक सटीकता और स्थिरता हासिल की है। EPRS 'पिनाका संस्करण' का उन्नत संस्करण है जो पिछले एक दशक से भारतीय सेना के साथ सेवा में है।

ओडिशा में भी हो चुका है परीक्षण

जून 2021 में, DRDO ने ओडिशा के तट पर एकीकृत परीक्षण रेंज (ITR), चांदीपुर में एक मल्टी-बैरल रॉकेट लॉन्चर (MBRL) से स्वदेशी रूप से विकसित पिनाका रॉकेट के विस्तारित रेंज संस्करण का सफलतापूर्वक परीक्षण किया था. 25 एन्हांसड पिनाका रॉकेटों को विभिन्न रेंजों पर लक्ष्य के विरुद्ध एक के बाद एक त्वरित क्रम में दागा गया था. लॉन्च के दौरान मिसाइल अपने निर्धारित टारगेट पर गिरी थी.

DRDO के साथ ये भी हैं शामिल

इस मिसाइल प्रणाली को विभिन्न डीआरडीओ प्रयोगशालाओं द्वारा संयुक्त रूप से विकसित किया गया है. आयुध अनुसंधान एवं विकास प्रतिष्ठान (ARDE), अनुसंधान केंद्र इमारत (RCI), रक्षा अनुसंधान और विकास प्रयोगशाला (DRDL), प्रमाण और प्रायोगिक प्रतिष्ठान (PXE) और उच्च ऊर्जा सामग्री अनुसंधान प्रयोगशाला (HEMRL) पिनाका के निर्माण में शामिल रही हैं. आपको बता दें कि पूर्वी लद्दाख में चीन के साथ चल रहे सीमा गतिरोध के बीच, भारतीय सेना ने पिनाका और स्मर्च मल्टीपल रॉकेट लॉन्चर सिस्टम (MRLS) को अग्रिम मोर्चे पर तैनात किया है.

<https://hindi.news18.com/news/nation/pinaka-extended-range-rocket-test-successfully-conducted-in-pokhran-will-deploy-against-china-4493933.html>

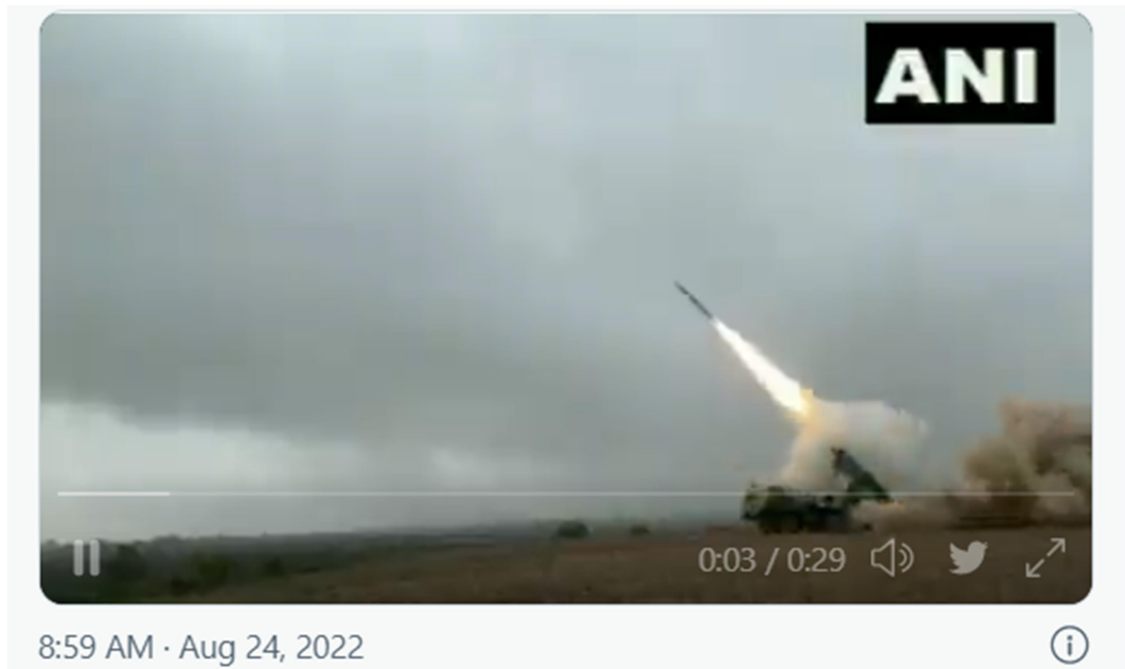


Wed, 24 Aug 2022

Indigenous Pinaka Extended Range Rockets Running Through Trials

The Defence Research & Development Organisation (DRDO) is today running trials of its Pinaka extended range rocket weapon systems at Rajasthan's Pokhran firing range, news agency ANI said quoting DRDO officials. According to reports, multiple successful tests - of indigenously developed rockets for the Army - have already been conducted.

A 28-second slow-motion video uploaded by ANI showed one such test - the rocket makes a fiery getaway from its mobile launcher and is swiftly out of sight as smoke swirls around.



In April, the DRDO and the Army tested the Pinaka Mk-I (an enhanced rocket system) and the Pinaka Area Denial Munition (ADM) rocket. The successful trials gave the defence manufacturing industry a boost and encouraged series production; though the rockets are designed by DRDO, they are being manufactured by a private firm. The Pinaka rockets are an upgraded version of a system that has been in service for over 10 years. Named after Lord Shiva's bow, they are used to attack long-range targets.

The defence ministry has called this and other such projects critical to help fulfill prime minister Narendra Modi's 'Make in India' ambition, and has reiterated also the importance of such endeavours in enabling 'Atmanirbharta' to develop cutting-edge defence equipment.

<https://www.hindustantimes.com/india-news/watch-indigenous-pinaka-extended-range-rockets-running-through-trials-101661315929246.html>

TIMESNOW

Wed, 24 Aug 2022

Pinaka Extended Range Rocket Successfully Flight-Tested in Pokhran

Trials of the Pinaka extended range rocket were carried out at Pokhran Firing Ranges in Rajasthan on Wednesday. Multiple successful test firings were carried out during the tests.

The Pinaka rocket has been developed by Defence Research and Development Organisation (DRDO), however, the rockets are produced by private sector firm. The Pinaka is an Artillery

Missile System capable of striking into enemy territory up to a range of 75 kilometres with high precision. In April 2022, the DRDO and Indian Army successfully flight-tested Pinaka Mk-I (Enhanced) Rocket System (EPRS) and Pinaka Area Denial Munition (ADM) rocket systems at Pokhran Firing Ranges. A total of 24 EPRS rockets were fired for different ranges and all the rockets achieved required accuracy and consistency during the trials.

The EPRS is the upgraded version of Pinaka variant which has been in service with the Indian Army for the last decade.

In June 2021, the DRDO had successfully test fired extended range version of indigenously developed Pinaka rocket from a Multi-Barrel Rocket Launcher (MBRL) on June 24 and 25 at Integrated Test Range (ITR), Chandipur off the coast of Odisha.

Twenty-five Enhanced Pinaka Rockets were launched in quick succession against targets at different ranges. All the mission objectives were met during the launches. The enhanced range version of Pinaka Rocket System is capable of destroying targets at distances up to 45 kms.

The missile system has been jointly developed by various DRDO Laboratories viz. Armament Research & Development Establishment (ARDE), Research Centre Imarat (RCI), Defence Research and Development Laboratory (DRDL), Proof & Experimental Establishment (PXE) and High Energy Materials Research Laboratory (HEMRL).

Amid the ongoing border standoff with China in eastern Ladakh, the Indian Army has deployed Pinaka and Smerch Multiple Rocket Launcher Systems (MRLS) at forward position.

<https://www.timesnownews.com/india/pinaka-extended-range-rocket-successfully-flight-tested-in-pokhran-video-article-93743539>



Wed, 24 Aug 2022

DRDO Successfully Test-fires Pinaka Extended Range Rocket in Pokharan

In a recent update, Defence Research and Development Organisation (DRDO) officials on Wednesday informed that trials of the Pinaka extended range rocket are carried out at the Pokharan firing ranges in Rajasthan. Officials said multiple successful test firings have been carried out during these tests.

The Pinaka rocket has been developed by Defence Research and Development Organisation (DRDO). However, they are produced by private sector firm. The Pinaka is an Artillery Missile System capable of striking into enemy territory up to a range of 75 kilometers with high precision.

Pinaka MK-1 & Pinaka Area Denial Munition Rocket Systems

Earlier in April of this year, DRDO and Indian Army successfully flight-tested Pinaka MK-1 (Enhanced) Rocket System (EPRS) and Pinaka Area Denial Munition (ADM) rocket systems at Pokhran Firing Ranges.

As of now, a total of 24 EPRD rockets were fired for different ranges and all the rockets achieved the required accuracy and consistency during the trials. Reportedly, the EPRS is the upgraded version of the Pinaka variant which has been in service with the Indian Army for the last decade. Last year in June, DRDO successfully test-fired extended range versions of the indigenously developed Pinaka rocket from a Multi-Barrel Rocket Launcher (MBRL) at Integrated Test Range (ITR), Chandipur off the coast of Odisha.

<https://www.republicworld.com/india-news/general-news/rajasthan-drdo-successfully-test-fires-pinaka-extended-range-rocket-in-pokharan-watch-articleshow.html>

Defence News

Defence Strategic : National/International



पत्र सूचना कार्यालय
भारत सरकार

Ministry of Defence

Wed, 24 Aug 2022 4:08PM

SCO Member States Must Fight Together & Eliminate Terrorism in All its Forms: Raksha Mantri During Defence Ministers' Meet in Uzbekistan

India supports a peaceful, secure & stable Afghanistan; National reconciliation can be achieved through dialogue, says Shri Rajnath Singh

“Afghan territory must not be used as launching pads for terrorist activities”

Ukraine situation should be resolved through talks: RM

Raksha Mantri Shri Rajnath Singh has called upon Shanghai Cooperation Organisation (SCO) to unitedly fight against terrorism and eliminate the menace in all its forms. Addressing the SCO Defence Ministers' meeting at Tashkent, Uzbekistan on August 24, 2022, the Raksha Mantri asserted that terrorism in any form, including cross-border terrorism, committed by anyone and for whatever purpose, is a crime against humanity.

“Terrorism is one of the most serious challenges to global peace and security. India reiterates its resolve to fight all forms of terrorism and make the region peaceful, secure and stable. We seek to develop joint institutional capabilities with the SCO member states, which, while respecting the sensitivities of each country, create the spirit of cooperation among individuals, societies and nations,” Shri Rajnath Singh said. In this context, the Raksha Mantri proposed to host a workshop in India in 2023 on the theme ‘Humanitarian Assistance and Disaster Relief - Risk

mitigation and Disaster Resilient Infrastructure’ for the Defence Ministries of SCO Member States. He also suggested an annual seminar on ‘Topic of Interest’ among the defence think tanks of SCO countries. “We propose to organise the first such defence think tank seminar in India in 2023,” he added.

Shri Rajnath Singh voiced India’s full support to a peaceful, secure & stable Afghanistan, while emphasising to respect its sovereignty, independence, territorial integrity, national unity and non-interference in internal affairs. He urged all parties to encourage Afghanistan authorities to achieve national reconciliation through dialogue & negotiation and establish a broad-based, inclusive & representative political structure in the country. He underlined the importance of United Nations Security Council (UNSC) resolutions in this regard.

The Raksha Mantri added that the Afghan territory must not be used to intimidate or attack any country by providing safe havens & training to terrorists and supporting their activities through financial assistance. He stressed on the need to provide urgent humanitarian assistance to the people of Afghanistan and safeguard their fundamental rights.

Expressing India’s concern on the situation in Ukraine, Shri Rajnath Singh stated that New Delhi supports talks between Russia and Ukraine to resolve this crisis. “India is concerned about the humanitarian crisis in-and-around Ukraine. We have extended our support for the efforts of the UN Secretary General, UN agencies and International Committee of the Red Cross (ICRC) to provide humanitarian assistance,” he added.

Shri Rajnath Singh also threw light on India’s age-old ties with SCO countries, asserting that the Member States of the Organisation are common stakeholders in the progress and prosperity of the region. “India accords high priority to SCO because of its unwavering belief in multilateralism. There is a need to strengthen ties with SCO member states bilaterally and within the framework of the organisation on the basis of equality, respect and mutual understanding,” he said. The Raksha Mantri invited all SCO Member States to visit India next year when New Delhi takes over the presidency of the Organisation from Uzbekistan.

After his bilateral meetings with his Uzbek, Kazakh and Belarusian counterparts yesterday, the Raksha Mantri is scheduled to meet Defence Minister of Kyrgyzstan later today. During exchange of pleasantries with Russian Defence Minister Sergey Shoigu this morning, Shri Rajnath Singh conveyed his deep appreciation and thanks for arresting in Moscow a terrorist who was planning attacks in India.

<https://pib.gov.in/PressReleasePage.aspx?PRID=1854128>

THE ECONOMIC TIMES

Thu, 25 Aug 2022

Afghanistan Must not be Used as Launch Pad for Terror Activities: Rajnath Singh at SCO

New Delhi: Defence Minister Rajnath Singh said Afghanistan should not be used as a launch pad for terror activities in the region, calling for national reconciliation and stability in the war-torn

country. The minister was speaking at the Shanghai Cooperation Organisation (SCO) Defence Ministers' meeting at Tashkent, Uzbekistan, on Wednesday.

Singh said the Afghan territory must not be used to "intimidate or attack any country by providing safe havens and training to terrorists and supporting their activities through financial assistance". During his address at the meet, he stressed on the need to provide humanitarian assistance to Afghan citizens.

Voicing India's support for a secure and stable Afghanistan, the minister said a national reconciliation must be reached "through dialogue and negotiation" and "a broad-based, inclusive and representative political structure " be established.

He also expressed India's concern on the Ukraine crisis, saying that talks need to be held between Russia and Ukraine to resolve the situation. "India is concerned about the humanitarian crisis in and around Ukraine. We have extended our support for the efforts of the UN Secretary General, UN agencies and the International Committee of Red Cross to provide humanitarian assistance," he said.

In his address, Singh called on all SCO members to come together in the fight against terror outfits. "Terrorism is one of the most serious challenges to peace and security. We seek to develop joint institutional capabilities with the SCO member states, which, while respecting the sensitivities of each country, create the spirit of cooperation among individuals, societies and nations," he said.

Singh has held several rounds of bilateral meetings with his counterparts from Uzbekistan, Kazakhstan, Belarus and Kyrgyzstan. He also met Russian Defence Minister Sergey Shoigu and conveyed appreciation for the arrest of a terror operative in Moscow who was planning attacks against political leaders in India.

<https://economictimes.indiatimes.com/news/defence/afghanistan-must-not-be-used-as-launch-pad-for-terror-activities-rajnath-singh-at-sco/printarticle/93762053.cms>



Thu, 25 Aug 2022

Inside Vikrant, India's First Indigenous Airbase on High Seas

It is a floating city and, once operational, it will be the mainstay of India's maritime defence. INS Vikrant, India's first indigenous aircraft carrier, is indeed a game changer. Ten days ahead of its induction, the Indian Navy and the Cochin Shipyard facilitated TNIE an opportunity to experience the jaw-dropping facilities and amazing technologies onboard the aircraft carrier.

"The indigenous aircraft carrier provides an airfield in the sea, facilitating to extend our air power beyond natural barriers," said Lieutenant Commander Chaitanya Malhotra leading us through its meandering alleys and the maze of steel cabins.

The flight deck of INS Vikrant has an area equal to two and a half hockey fields which roughly translates into 12,500 sq m. There is a short runway and a long runway equipped with a ski-jump. A red line demarcates the operational area and the technical area. Six helicopters and 12 fighter jets can be parked on the deck and the aircraft will be latched to hold it during rough weather. There are two elevators to move the jets into the hanger located below the deck. “The long, flat deck facilitates short takeoff and arrested landing of aircraft. There is a set of 3 arrester wires for recovery of landing jets onboard,” said Lieutenant Skanda. Below deck on the carrier is a maze of cabins and corridors that descend 10 levels, leading to a miniature city that includes a hospital, a canteen with a modern kitchen, recreation facility, fitness centre, living quarters, fire station, laundry, a desalination plant and RO plant to provide drinking water.

Vikrant has a damage control headquarters that receives signals from 3,000 fire sensors and 700 flood sensors. “The monitoring system has been developed by BHEL and it will alert us in case of a fire or flooding,” said Lieutenant Commander Akhil who heads the wing.

INS Vikrant

There is an integrated platform management system which can start and stop any equipment onboard, including power generation and propulsion. “The ship has a complex optical cable network which is 2,600km long. The platform gives us the facility to switch on the engine which is located 100m away, from the bridge itself. The ship produces 4 lakh litres of fresh water from the RO plant. The power generated by the ship can light up a small town,” said Malhotra.

The flight deck has 270 lights that guide fighter jets and helicopters during the night landings. It is powered by a 380-watt system. The medical complex is spread over 45 compartments running through three decks. There are five medical officers and 15 medical sailors. There is a 64-slice CT scan centre, a dental centre, two operation theatres, X-ray, ultrasound scanning facility, laboratory, blood transfusion and physiotherapy department.

“There is a 16-bed ward and we have an anaesthetist and a surgeon,” he said.

Though the officers were vociferous about its general features of Vikrant, they were tight-lipped on the weaponry.

Features

INS Vikrant is named after its illustrious predecessor which played a vital role in the 1971 war.

Cost: Rs 20,000 crore.
Length: 262 m.
Width: 62 metre.
Height 59 metre.
Displacement: 45,000 tonnes.
Power: 88 MW.
Engine: 4 gas turbines.
Cabling: 2,600 km.
Floors: 14.
Hospital: 16 beds.
Operation theatres: 2.
Compartments: 2,300.
Special cabins for women officers

Capacity: 1,750 sailors.

Flight deck.

Parking for 6 helicopters and 12 fighter jets.

270 lights for night landing.

Speed factor

Top speed: 28 knots.

Cruising speed: 18 knots.

Endurance: 7,500 nautical miles.

Can operate 30 aircraft.

MIG 29K, LCA Navy, Kamov 31.

MH-60R multirole helicopters.

Advanced Light Helicopters.

Warship-grade steel is produced through a partnership between the Navy, DRDO and Steel Authority of India.

21,500 tonnes of special grade steel used for construction.

Sea trials: August 2021-July 2022.

Dates to remember

Keel laid: February 2009.

Launched: August 2013.

Indigenous content: 76%.

<https://www.newindianexpress.com/nation/2022/aug/25/inside-vikrant-indias-first-indigenous-airbase-on-high-seas-2491046.html>

The Tribune

Wed, 24 Aug 2022

INS Vikrant All Set to be Commissioned Next Week

Aircraft carrier INS Vikrant, the 45,000-tonne warship which is India's biggest-ever indigenous military project, is set to be commissioned next week. The existing aircraft carrier, the Russian-origin INS Vikramaditya, has been operating for the past 10 years. Vikrant beats its older sister in term of technology and also engines. Four LM2500 gas turbines from US company General Electric have been fitted in Vikrant and each generates 30,000 horse power. Vikramaditya is powered by steam boilers — a five-decade-old Soviet-era technology.

Jets can take off in 3 seconds

- After a take-off has been okayed, a MiG 29K jet will take just three seconds to be airborne from its deck
- The ship has a dedicated hospital with CT and ultrasound scanning, X-ray machine, operation theatre and even a dental clinic

Biggest-ever indigenous military project to bolster India's position in sea

1,700	15	4	260	1,34,000	55	45	2,400
crew members, including 110 officers	storey tall warship	LM2500 engines have 30,000 horse power each	metre-long flight deck	square-foot deck, almost equal to two football grounds	kmph top speed	days sailing capacity without refuelling	km of cabling used for power, communication

Vikrant is 262-m-long, and the Russia-made MiG 29K jets, which are already in the naval fleet, will be based on its deck as would specialised submarine-hunting helicopters. Commodore Vidhyadhar Harke, the commanding officer of the warship, told The Tribune, "The warship is capable of undertaking complex operations at sea." Vikrant, once deployed, will lead the carrier battle group at sea. It will expand Navy's arch of surveillance, provide more attack options at sea while having the agility to match latest warships. A carrier battle group would comprise Vikrant, a submarine or two, three or four other warships and a fleet tanker carrying tonnes of food and fuel for mid-sea replenishment.

Besides its own radars, Vikrant will get feed from military satellite Rukmini, surveillance planes, such as Boeing P-8I, and drones like the Predator. The warship will set sail from its manufacturing base at Cochin Shipyard a few days after commissioning, which is scheduled to be done by Prime Minister Narendra Modi. After this, the Navy will start trials for the landing and taking off of fighter jets and also fitting the long range surface to air missiles — the Barak. Sources said Vikrant was expected to be operationally deployed in eight months or so. The Navy has been flying the MiG 29K jets from INS Vikramaditya for 10 years now. Both warships have the same aviation operating system sourced from Russia, making integration easier.

<https://www.tribuneindia.com/news/nation/vikrant-all-set-to-be-commissioned-next-week-425001>

Business Standard

Wed, 24 Aug 2022

Indian Army Calls Garuda Aerospace Expert Team for Drone Modification

The Indian Army has asked the technical team of Chennai-based drone maker Garuda Aerospace to modify drones for security needs, said a top company official. "Garuda Aerospace has created significant traction by deploying drones for unique applications to support the Indian Army and now will be using multiple purpose drones for strategic and tactical operations," Garuda Aerospace Founder and CEO Agnishwar Jayaprakash said.

The army has expressed keen interest to utilise Garuda Aerospace's expertise and technical knowledge in the field of drone technology to use drones more effectively in modern day warfare, he said.

According to Garuda Aerospace, demining is an inherently dangerous operation and the army is constantly endeavoring to improve the speed, cost, and efficacy of this process.

The army also intends to further the usage of drones in integral day to day activities as well as bolster effectiveness of special missions by detecting, deterring, and disrupting transnational organised criminal networks, the company added.

https://www.business-standard.com/article/current-affairs/indian-army-calls-garuda-aerospace-expert-team-for-drone-modification-122082401139_1.html



Wed, 24 Aug 2022

At India-Japan 2+2 Meet on Sept 8, Joint Exercises, Defence Cooperation is Focus

India and Japan will hold their second 2+2 dialogue of the defence and foreign ministers in Tokyo on September 8 to take forward strategic cooperation in key areas such as joint exercises and defence manufacturing. The meeting will be held weeks before an expected visit to Japan by Prime Minister Narendra Modi to attend the state funeral of former prime minister Shinzo Abe on September 27, people familiar with the matter said on Wednesday.

There was no official word from both countries regarding the meeting or PM Modi's expected visit. The Japanese side has been pushing for the holding of the 2+2 since the first quarter of this year. The meeting, which will bring together defence minister Rajnath Singh and external affairs minister S Jaishankar with their Japanese counterparts Yasukazu Hamada and Yoshimasa Hayashi, will chart the course for future cooperation in crucial areas related to defence, emerging technologies and joint exercises, the people said.

Earlier this year, India and Japan operationalised a key agreement for reciprocal provision of supplies and services between their defence forces, and the 2+2 meeting will look at ways to build on this arrangement, the people said. The Acquisition and Cross-Servicing Agreement (ACSA) between Japan's Self-Defense Forces and India's armed forces was signed in September 2020.

The meeting will be an opportunity for the two sides to review regional security challenges at a time when India and Japan are concerned about China's aggressive actions along the Line of Actual Control (LAC) and in the South China Sea and East China Sea. The 2+2 meeting will also focus on enhancing exchanges between the armed forces and security establishments of the two sides and joint exercises, the people added.

The Japanese side is keen to explore ways to work together on the joint development and manufacturing of advanced military hardware. Though Japan does not have a very well established military manufacturing industry, it has expertise and materials that can be used for the joint development of equipment, the people said.

India currently has 2+2 meetings with only a handful of strategic partners, including the US, Russia, Australia and Japan. Barring Russia, the three other countries are also India's partners in the Quadrilateral Security Dialogue or Quad. The first India-Japan 2+2 meeting was held in New Delhi in November 2019.

Meanwhile, Japan's Kyodo news service quoted unnamed Japanese government officials as saying that Modi is planning to attend the Abe's state funeral in Tokyo next month. Modi, who had a close relationship with Abe, is expected to meet Prime Minister Fumio Kishida during the visit. Modi last travelled to Japan in May for a summit of the Quad that was hosted by Kishida. He had met Abe during that visit. Abe, Japan's longest-serving prime minister, was shot while delivering an election campaign speech last month.

<https://www.hindustantimes.com/india-news/at-india-japan-2-2-meet-on-sept-8-joint-exercises-defence-cooperation-is-focus-101661347630233.html>



Thu, 25 Aug 2022

Competition Heats up for Naval Fighter Deal Ahead of Vikrant's Commissioning

Boeing, one of the two contenders for an Indian order for deck-based fighter jets, on Wednesday made a fresh pitch to equip the navy with its F/A-18 Super Hornet aircraft and dovetailed its offer with the government's Aatmanirbhar Bharat (self-reliant India) strategy, days ahead of the commissioning of indigenous aircraft carrier Vikrant that will operate the new fighters.

India plans to buy 26 carrier-based fighters for Vikrant, the largest warship to be built in the country, through a government-to-government deal to meet the navy's requirements, with the US firm competing with French aircraft maker Dassault Aviation that has pitched its Rafale-M jets to the Indian Navy. Prime Minister Narendra Modi is expected to dedicate Vikrant to the country on September 2 in Kochi. Boeing and Dassault demonstrated the capabilities of their aircraft to the navy at a shore-based test facility in Goa in June and January, respectively. Both claim to have met the navy's requirements, and are hopeful of positive outcomes and an early decision.

"The Block III Super Hornet we are offering to the Indian Navy has the most advanced and critical capability. With its open architecture design and continuously evolving capability suite, the Super Hornet will outpace current threats, facilitate rapid capability insertion and has unmatched affordability," said Steve Parker, vice president, bombers and fighters, Boeing Defense, Space and Security.

Boeing anticipates economic benefits of \$3.6 billion to the Indian economy over 10 years if the Super Hornet is selected as the navy's next carrier-based fighter, with continued investments in manufacturing, engineering and technology transfer, infrastructure, sustainment and training and skilling. The selection of the Super Hornet will help boost investments in India's defence industry in line with the Aatmanirbhar Bharat campaign, said Boeing India president Salil Gupte.

To be sure, the French side stresses that the Rafale-M brings commonality with the Indian Air Force's 36 Rafale fighters, thus offering advantages related to training, maintenance and logistics support. While the Super Hornet operates from all 11 US Navy aircraft carriers, the Rafale-M is deployed on the French Navy's Charles de Gaulle aircraft carrier.

The navy has an urgent requirement for new deck-based fighters, and hopes to shortlist one of the two contenders, navy officials said on the condition of anonymity.

Questions have been raised about the serviceability of the MiG-29K fighters (India has imported 45 of these jets from Russia) that the existing aircraft carrier INS Vikramaditya operates, and the Russia-Ukraine war hasn't helped matters, said former navy chief Admiral Arun Prakash (retd).

"The navy definitely needs another fighter, especially now that we have two decks to operate from," he added.

Like INS Vikramaditya, the fighters on board Vikrant will also use the ski-jump to takeoff and will be recovered by arrestor wires or what is known as STOBAR (short takeoff but arrested recovery) in navy parlance.

Vikrant will operate an air wing consisting of 30 aircraft including the new fighters, MiG-29Ks, Kamov-31 choppers, MH-60R multi-role helicopters and advanced light helicopters.

"Designed from its inception as a carrier-based fighter for high-loading, high stress operations, the Super Hornet will bring advanced capabilities that will help the Indian Navy meet emerging and future threats," said Boeing's India business development vice president Alain Garcia.

To be sure, Vikrant is yet to kick off fighter operations from its deck. Critical flight trials will be conducted in the coming months and will be a top priority for the navy.

Vikrant has put India in a select league as only the US, the UK, Russia, France and China have the capability to build aircraft carriers. It has been named after aircraft carrier INS Vikrant operated by the navy from 1961 to 1997.

<https://www.hindustantimes.com/india-news/competition-heats-up-for-naval-fighter-deal-ahead-of-vikrant-s-commissioning-101661367371014.html>

Business Standard

Wed, 24 Aug 2022

Boeing Says its Super Hornet Fighter Makes Economic and Operational Sense

Just weeks ago, The Boeing Company's F/A-18E/F Super Hornet carrier-deck fighter demonstrated its ability to get airborne from a ski-jump, using the standard launch system that Indian Navy aircraft use. With the French Dassault Rafale fighter having already proved its ability in a similar operational demonstration, these two fighters are going toe-to-toe to convince India's Ministry of Defence (MoD) that their fighter has the teeth to best suit India's defence requirements.

Addressing a media gathering in New Delhi, Boeing officials divulged plans to indigenise components and sub-systems, strengthening the company's Make-in-India claims and building on a successful track record of contributing to India's indigenous aerospace and defence ecosystem.

"As part of this effort, Boeing anticipates \$3.6 billion in economic impact to the Indian aerospace and defence industry over the next 10 years, with the F/A-18 Super Hornet as India's next carrier-based fighter. The economic impact would be over and above Boeing's current offset obligations and plans in the country," said Salil Gupte, President of Boeing India.

Boeing already exports a range of defence and aerospace components worth over \$1 billion each year from production lines in India. The firm employs close to 4,000 people in India, with another 7,000 working in its supply chains.

Boeing sources from more than 300 local companies of which a quarter are Indian firms.

The company points out that these figure will rise significantly if India chooses the Super Hornet for both its indigenous aircraft carriers, Indian Navy Ship (INS) Vikrant and the still-to-be-sanctioned INS Vishal.

The Indian Navy has tendered for 26 fighters, but projects a long-term requirement of 57 carrier-deck fighters. Of these, eight are to be twin-seat variants.

"The Block III Super Hornet we are offering to the Indian Navy has the most advanced and critical capability. Boeing is investing in advanced technologies and capabilities on our Block III Super Hornet and the F-15EX today so we will be ready for the future. The Indian Navy will benefit from these investments for decades to come," said Gupte.

Boeing says it will also leverage investments made in the Boeing India Engineering & Technology Center (BIETC), which has a pool of 3,000-plus engineers and innovators in Bengaluru and Chennai to drive growth and innovation, and advance work in materials, manufacturing technologies and methods, and the "Digital World." Notwithstanding its employment generation figures, Boeing's central argument rests on the Super Hornet's credentials as the world's premier carrier deck fighter.

"Designed from its inception as a carrier-based fighter for high-loading, high stress operations, the Super Hornet Block III will bring advanced, next-generation capabilities for the Indian Navy," said Steve Parker, who oversees bombers and fighters for Boeing Defence.

The Indian Navy is learning the aircraft carrier ropes from the US Navy, which is widely regarded as the world's premier exponent of carrier operations.

Driving cooperation on aircraft carrier design is an Indo-US joint working group on aircraft carrier technology cooperation (JWG-ACTC). It has functioned for over a decade to optimise cooperation. The group looks for ways to enhance the efficiency of India's aircraft carrier, such as getting fighters to take off quickly (the sortie generation rate), the best way of getting aircraft and weapons up onto the deck, what sort of catapult the carrier should have, its arresting gear and how the systems are inter-workable with the Super Hornets that fly off a US carrier. Should the Super Hornet be selected, there are other components that can be installed on a carrier to enhance inter-operability with other US Navy systems. These include a precision landing system called Magic Carpet that is built into the Super Hornet as a standard capability, and is designed to assist the pilot in landing on an aircraft carrier.

Magic Carpet reduces the pilot's workload enormously. In the normal course, the pilot would be making about 300 corrections to the landing gear in about 15-18 seconds. That is reduced to one-third with a Magic Carpet. Even the most difficult night landings start feeling benign. Boeing claims it has shown it to the Indian Navy as part of its operational demonstration – it is so precise that it engages the third wire every time, causing wear and tear on only that wire.

https://www.business-standard.com/article/companies/boeing-says-its-super-hornet-fighter-makes-economic-and-operational-sense-122082401315_1.html



Thu, 25 Aug 2022

China is 'Exponentially' Increasing its Warship Capability

China reportedly has resumed mass production of guided-missile destroyers and is "exponentially" enhancing its warship capabilities, according to local media. The development of a blue-water navy will be part of China's military modernization and expansion by 2035, according to the Global Times, which is published under the control of the Chinese Communist party, in order to better defend the nation's interests and match its international standing.

A navy that travels through deep oceans and conducts operations all over the world is known as a blue-water navy. According to Naval News, five destroyers of type 052D, equipped to fire long-range missiles, are currently being constructed, as The Guardian reported. The Australian National University's Strategic and Defence Studies Center's John Blaxland, a professor of international security and intelligence studies, called China's military buildup "deeply worrying." "When you look at capability, it is growing exponentially," he said.

"Its going from being a brown-water navy designed for close protection of China's shores to a true blue-water navy.

"They are designed to assert China's influence to match its economic growth, not just in the South China Sea, not just in the first island chain [which includes Taiwan], but also more expansively throughout the Indo-Pacific and the Pacific Ocean.

"It's growing the navy to bolster its economic heft with military muscle."

By 2031, according to new modelling from a US think tank, the People's Liberation Army (PLA) of China will rule the region with a variety of deadly warships and submarines, according to The Guardian.

According to the Center for Strategic and Budgetary Assessments, the PLA could possess five aircraft carriers, more than 60 cruisers and destroyers, and a brand-new fleet of submarines in less than ten years.

Teams of national security experts used modelling to project Beijing's behaviour using a simulation of China's \$300 billion defence budget.

According to The Guardian, with enough resources for increased sea and air capability, it was generally agreed that China would become a global military threat beyond the current sabre-rattling about Taiwan.

<https://www.wionews.com/world/china-is-exponentially-increasing-its-warship-capability-509917/amp>



Wed, 24 Aug 2022

NATO Countries Need to Spend More on Defence as Alliance Faces Russia's Military Build-Up, Says Head of Organisation

Member nations have been sending weapons, ammunition, and many types of light and heavy military equipment to Ukraine, including anti-tank and anti-air systems, howitzers and drones, as the Kyiv government battles President Vladimir Putin's forces.

Secretary-general Jens Stoltenberg told presenter Kay Burley that his organisation is helping Ukraine "uphold the right to self-defence" and is preventing the war from escalating beyond the country.

He stressed NATO and allies were "not part of the conflict" - but the alliance has increased its military presence, especially on the eastern flank, to send a "very clear message" to Moscow that if any NATO ally is attacked, the whole alliance will respond.

"The UK is playing an important part in those efforts," he added.

Mr Stoltenberg said "the brutal reality is that faced with **Russia's** military build-up, the will to use force against neighbours, there is a need to invest more in defence".

He said the defence spending guideline for NATO members is 2% of gross domestic product (GDP), and the UK is spending more than that figure, along with "more allies".

However, he stated: "We need to spend more on defence. I have been a politician myself for many, many years. And I know that, of course, it's always more tempting to spend on healthcare, on education, on infrastructure, instead of spending on defence.

"But when we live in a more dangerous world, when we see the aggressive actions of President Putin against a sovereign, peaceful nation in Europe - Ukraine - and all the threatening rhetoric against NATO allies, then we need to invest more.

"And that's exactly what NATO allies are doing."

The former Norwegian prime minister said NATO needs to invest in new and more modern capabilities to "ensure that we are able to also protect all allies in the future".

"The good news is that more allies actually spend 2% or more on defence, and those who are not yet at 2% have, most of them, clear plans in place to reach 2%."

He went on to say that "2% is a minimum. So of course we welcome the UK and others, which are aiming at a higher level of spending than 2%".

Conservative leadership frontrunner Liz Truss has said if she becomes the UK's next prime minister she would raise defence spending to 3% of GDP by 2030.

Her rival in the race for Number 10, Rishi Sunak, views the NATO target of 2% as a "floor and not a ceiling" and notes it is set to rise to 2.5% "over time" - but refuses to set "arbitrary targets".

Finland and Sweden, which had neutral status for decades, have in recent months applied to join NATO.

Mr Stoltenberg said: "Having Finland and Sweden in NATO will strengthen NATO. They have advanced militaries, they have very capable armed forces.

"And the fact that we will also then have these two countries - important for the Baltic Sea, for the Baltic countries - as NATO members will strengthen NATO."

Meanwhile, Ukraine's military has said Russian forces carried out artillery and rocket strikes in the Zaporizhzhia region in southeastern Ukraine, where fighting has taken place near Europe's largest nuclear power plant.

Russia and Ukraine have blamed each other for strikes on the Zaporizhzhia plant, which was captured by Russian forces in March. The UN nuclear watchdog, the International Atomic Energy Agency, will visit the site in days if talks to gain access succeed. It said Ukraine had informed the IAEA that shelling had damaged plant infrastructure including laboratory and chemical facilities. And there are fears of a nuclear catastrophe at the power station where a plume of radiation could be released, potentially westwards to NATO countries.

Situation at nuclear power plant 'dangerous'

Mr Stoltenberg said the situation there was "dangerous" and he called for Russian troops to leave the plant.

He said: "It's reckless of Russia to deploy forces to use the area around the nuclear power plant as a launching pad for artillery, for attacks on Ukrainian forces.

"So therefore, we need the International Atomic Energy Agency to have access to be able to inspect the site. We need the Russians to move their forces away from the nuclear power plant, and we need the Ukrainian operators to be able to do their work in a peaceful and controlled environment.

"Because what Russia does around the power plant is dangerous. And it's dangerous for not only Ukraine, but also for the whole of Europe."

<https://news.sky.com/story/amp/nato-countries-need-to-spend-more-on-defence-as-alliance-faces-russias-military-build-up-says-head-of-organisation-12680085>



Thu, 25 Aug 2022

Taiwan to Deploy Drone Defence Systems After Rock-Throwing Video Emerges

Taiwan will next year begin deploying drone defence systems on its offshore islands, the defence ministry said, after footage emerged of Taiwanese soldiers throwing stones at a Chinese drone that buzzed a guard post near China's coast. Taiwan has complained of repeated Chinese drone incursions near its offshore islands as part of China's war games and drills after U.S. House Speaker Nancy Pelosi's visit to Taipei this month, which infuriated Beijing.

China claims democratically governed Taiwan as its own territory, despite the strong objections of the government in Taipei. The brief video clip, circulated first on Chinese social media before being picked up by Taiwanese media, shows two soldiers throwing stones at a drone that got near their guard post.

In a statement late Wednesday, the defence command of Kinmen, a group of Taiwan-controlled islands that sit opposite China's Xiamen and Quanzhou cities, said the incident occurred on Aug. 16 on Erdan islet, and confirmed the soldiers had thrown stones to see off what it called a civilian drone.

Taiwan's defence ministry said in a separate statement that starting next year it will deploy anti-drone systems, which will first be placed on the smaller islands.

"Officers and soldiers at all levels will continue to implement vigilance in accordance with the principle of "not escalating conflicts or causing disputes," it added.

China has not commented on the footage, which has received millions of views on Chinese social media with users making fun of it.

It has also triggered heated discussion in Taiwan, with some social media users calling the incident a "humiliation" for the island's armed forces and urging the defence ministry to step up its countermeasures to the increasingly frequent drone incursions.

The Kinmen defence command said the footage was another example of China's "cognitive warfare" against Taiwan and an attempt to "denigrate" its armed forces. Wang Ting-yu, a senior lawmaker of Taiwan's ruling Democratic Progressive Party, described the incident as "very serious" and questioned why Taiwan's defence ministry did not respond to the incursion. "The drone was flying on top of our soldiers on guard but there's zero response," he said. "If you just let them come and go freely, this was negligence of duty."

Taiwan has controlled Kinmen, along with the Matsu islands further up China's coast, since the defeated Republic of China government fled to Taipei after losing a civil war with Mao Zedong's Communists in 1949. At its closest point, Chinese-controlled territory is only a few hundred metres from Kinmen.

<https://www.moneycontrol.com/news/world/taiwan-to-deploy-drone-defence-systems-after-rock-throwing-video-emerges-9082481.html>

THE ECONOMIC TIMES

Wed, 24 Aug 2022

Ukraine Spy Chief Says Russian Offensive Slowing Due to Fatigue

Ukraine's top military intelligence official said on Wednesday that Russia's military offensive was slowing because of moral and physical fatigue in their ranks and Moscow's "exhausted" resource base.

The remark on television by Defence Intelligence agency chief Kyrylo Budanov was one of the strongest signals by Kyiv that it believes Russia's offensive power may be waning.

"Russia has rather seriously slowed down the tempo of its assault. The reason for this is the exhaustion of their resource base, as well as a moral and physical fatigue from the fighting," he said.

Russian Defence Minister Sergei Shoigu said earlier that Moscow had deliberately slowed down its campaign in Ukraine, something he said had been driven by the need to reduce civilian casualties.

Russia rapidly captured swathes of southern Ukraine in the beginning of the invasion launched by Moscow exactly six months ago, but was repelled from around Kyiv and withdrew to focus on the east. Moscow claimed the capture of the eastern region of Luhansk in early July after a series of long, bloody battles, but it has not claimed any major territorial gains since.

Separately, Budanov said that the Russian air defence systems in the annexed peninsula of Crimea "don't really work".

The comment, when asked about a spate of explosions on the peninsula for which Ukraine has not claimed responsibility, was one of the clearest hints yet that Ukraine may be conducting strikes there.

"Crimea ... is defended by Russia's best air defence systems," he said. "They don't really work, and they are not able to defend territory captured from Ukraine."

<https://economictimes.indiatimes.com/news/defence/ukraine-spy-chief-says-russian-offensive-slowng-due-to-fatigue/articleshow/93760382.cms?from=mdr>

Science & Technology News



Wed, 24 Aug 2022

A Deep Learning Framework to Enhance the Capabilities of a Robotic Sketching Agent

In recent years, deep learning algorithms have achieved remarkable results in a variety of fields, including artistic disciplines. In fact, many computer scientists worldwide have successfully developed models that can create artistic works, including poems, paintings and sketches.

Researchers at Seoul National University have recently introduced a new artistic deep learning framework, which is designed to enhance the skills of a sketching robot. Their framework, introduced in a paper presented at ICRA 2022 and pre-published on arXiv, allows a sketching robot to learn both stroke-based rendering and motor control simultaneously.

"The primary motivation for our research was to make something cool with non-rule-based mechanisms such as deep learning; we thought drawing is a cool thing to show if the drawing performer is a learned robot instead of human," Ganghun Lee, the first author of the paper, told TechXplore. "Recent deep learning techniques have shown astonishing results in the artistic area, but most of them are about generative models which yield whole pixel outcomes at once."

Instead of developing a generative model that produces artistic works by generating specific pixel patterns, Lee and his colleagues created a framework that represents drawing as a sequential decision process. This sequential process resembles the way in which humans would draw individual lines using a pen or pencil to gradually create a sketch.

The researchers then hoped to apply their framework to a robotic sketching agent, so that it could produce sketches in real-time using a real pen or pencil. While other teams created deep learning algorithms for "robot artists" in the past, these models typically required large training datasets containing sketches and drawings, as well as inverse kinematic approaches to teach the robot to manipulate a pen and sketch with it.

The framework created by Lee and his colleagues, on the other hand, was not trained on any real-world drawing examples. Instead, it can autonomously develop its own drawing strategies over time, through a process of trial and error.

"Our framework also doesn't use inverse kinematics, which make robot movements a bit strict, instead it also lets the system find its own movement tricks (adjusting joint values) to make

movement style as natural as possible," Lee said. "In other words, it directly moves its joints without primitives while many robotic systems commonly use primitives to move."

The model created by this team of researchers includes two "virtual agents," namely the upper class and lower class agent. The upper class agent's role is to learn new drawing tricks, while the lower class agent learns effective movement strategies. The two virtual agents were trained individually using reinforcement learning techniques and were only coupled once they had completed their respective training. Lee and his colleagues then tested their combined performance in a series of real-world experiments, using a 6-DoF robotic arm with a 2D gripper on it. The results achieved in these initial tests were very encouraging, as the algorithm allowed the robotic agent to produce good sketches of specific images.

"We find that the reinforcement learning-based modules trained for each objective can be merged to achieve bigger collaborative objectives," Lee explained. "In a hierarchical setting, decisions from the upper agent can be the 'intermediate state,' which allows the lower agent to observe to make lower decisions. If each agent of levels is well-trained and generalized enough to each state space, then a whole system made of each module can do great things. However, the primal condition is that, as all reinforcement learning approaches have so, reward functions for each agent should be well-shaped (it's not easy)."

In the future, the framework created by Lee and his colleagues could be used to improve the performance of both existing and newly developed robotic sketching agents. In the meantime, Lee is developing similar creative reinforcement learning-based models, including a system that can produce artistic collages.

"We would also like to extend the task to more complicated robotic drawings such as paintings, but I am now focusing more on the practical issues of reinforcement learning applications itself than the robotic drawings," Lee added. "I hope our paper becomes a fun and meaningful example of pure reinforcement learning-based application especially equipped with robots."

More information: Ganghun Lee, Minji Kim, Minsu Lee, Byoung-Tak Zhang, From scratch to sketch: deep decoupled hierarchical reinforcement learning for robotic sketching agent. arXiv:2208.04833v1 [cs.RO], arxiv.org/abs/2208.04833

<https://techxplore.com/news/2022-08-deep-framework-capabilities-robotic-agent.html>



Wed, 24 Aug 2022

Researchers Demonstrate Error Correction in a Silicon Qubit System

Researchers from RIKEN in Japan have achieved a major step toward large-scale quantum computing by demonstrating error correction in a three-qubit silicon-based quantum computing system. This work, published in *Nature*, could pave the way toward the achievement of practical quantum computers. Quantum computers are a hot area of research today, as they promise to make it possible to solve certain important problems that are intractable using conventional

computers. They use a completely different architecture, using superimposition states found in quantum physics rather than the simple 1 or 0 binary bits used in conventional computers. However, because they are designed in a completely different way, they are very sensitive to environmental noise and other issues, such as decoherence, and require error correction to allow them to do precise calculations.

One important challenge today is choosing what systems can best act as "qubits"—the basic units used to make quantum calculations. Different candidate systems have their own strengths and weaknesses. Some of the popular systems today include superconducting circuits and ions, which have the advantage that some form of error correction has been demonstrated, allowing them to be put into actual use albeit on a small scale. Silicon-based quantum technology, which has only begun to be developed over the past decade, is known to have an advantage in that it utilizes a semiconductor nanostructure similar to what is commonly used to integrate billions of transistors in a small chip, and therefore could take advantage of current production technology.

However, one major problem with the silicon-based technology is that there is a lack of technology for error connection. Researchers have previously demonstrated control of two qubits, but that is not enough for error correction, which requires a three-qubit system.

In the current research, conducted by researchers at the RIKEN Center for Emergent Matter Science and the RIKEN Center for Quantum Computing, the group achieved this feat, demonstrating full control of a three-qubit system (one of the largest qubit systems in silicon), thus providing a prototype for the first time of quantum error correction in silicon. They achieved this by implementing a three-qubit Toffoli-type quantum gate.

According to Kenta Takeda, the first author of the paper, "the idea of implementing a quantum error-correcting code in quantum dots was proposed about a decade ago, so it is not an entirely new concept, but a series of improvements in materials, device fabrication, and measurement techniques allowed us to succeed in this endeavor. We are very happy to have achieved this."

According to Seigo Tarucha, the leader of the research group, their "next step will be to scale up the system. We think scaling up is the next step. For that, it would be nice to work with semiconductor industry groups capable of manufacturing silicon-based quantum devices at a large scale."

More information: Kenta Takeda, Quantum error correction with silicon spin qubits, Nature (2022). DOI: 10.1038/s41586-022-04986-6. www.nature.com/articles/s41586-022-04986-6

<https://phys.org/news/2022-08-error-silicon-qubit.html>

R. REPUBLICWORLD.COM

Tue, 23 Aug 2022

Russia Ready to Work With France to Develop India's Shukrayaan Mission to Venus

The Space Research Institute (IKI) of the Russian Academy of Sciences has expressed willingness to work with France in developing the Indian Space Research Organisation's (ISRO)

Shukrayaan mission. 'Shukrayaan' will be India's first mission to Venus to study the planet's atmosphere using an orbiter. Recently, reports revealed that France is refusing to cooperate with Russia on the mission citing the Ukraine crisis.

Some of the orbiter's components were supposed to be contributed by France but the ongoing Ukraine crisis has deteriorated its relations with Russia. Oleg Korablyov, head of the IKI planetary physics department, said that he is ready to cooperate with France despite these conditions and will try to preserve the partnership. However, France is yet to issue any statement on its improved stance.

"We hope that everything will be accomplished with India and will not be cancelled due to any reasons," Korablyov said as per TASS. "We would also like to hope that this will happen rather promptly, that we will be able to produce the instruments and we will have a margin of time for everything," he added.

ISRO's Venus mission under clouds of uncertainty

The Shukrayaan mission is targeted for launch in December 2024, when Earth and Venus will be at their closest, and its entry into the Venusian orbit is planned for 2025. However, the degrading relations between the two parties might delay the launch. Notably, the launch window is strictly limited as the next opportunity with Earth and Venus being this close will occur no earlier than 2031.

During a live programme, titled Outstanding Science Questions on Venus in May this year, ISRO Chairman S Somanath said that the overall plans for the mission are ready. "Work has been going on for years. Currently, the Venus mission is conceived, the project report is made, overall plans are ready, money is identified and all that thing is done," Somanath said.

The mission objective includes investigation of the surface processes, active volcanic hotspots and lava flows, study of the structure, composition and dynamics of the Venusian atmosphere and its interaction with the solar wind. The mission, however, is yet to be approved by the government which could be another reason for the delay of the mission. Talking about the timeline, Korablyov had earlier said, "It depends on the Indian partners, so far they haven't fully decided when".

<https://www.republicworld.com/science/space/russia-ready-to-work-with-france-to-develop-indias-shukrayaan-mission-to-venus-articleshow.html>

