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भारत सरकार

रक्षा मंत्रालय

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रक्षा मंत्री श्री राजनाथ सिंह ने आज नई दिल्ली में पहली बार आयोजित 'एआई इन डिफेंस' संगोष्ठी और प्रदर्शनी के दौरान 75 आर्टिफिशियल इंटेलिजेंस उत्पादों/प्रौद्योगिकियों को लॉन्च किया; उन्होंने आर्टिफिशियल इंटेलिजेंस को मानवता के विकास में एक क्रांतिकारी कदम बताया

आर्टिफिशियल इंटेलिजेंस और बिग डेटा जैसी प्रौद्योगिकियों का समय रहते समावेश प्रौद्योगिकीय प्रगति के स्तर पर बने रहने के लिए समय की आवश्यकता है : रक्षा मंत्रालय

उन्होंने कहा कि भारत वर्चस्व की इच्छा नहीं रखता है; राष्ट्र को भविष्य के खतरों से बचाने के लिए ही आर्टिफिशियल इंटेलिजेंस का विकास किया जा रहा है

आर्टिफिशियल इंटेलिजेंस का उपयोग केवल मानवता के विकास और शांति के लिए ही किया जाना चाहिए : श्री राजनाथ सिंह

रक्षा मंत्री श्री राजनाथ सिंह ने आज नई दिल्ली में रक्षा मंत्रालय द्वारा आयोजित पहली 'एआई इन डिफेंस' (एआईडीईएफ) संगोष्ठी और प्रदर्शनी के दौरान अभी हाल में विकसित 75 आर्टिफिशियल इंटेलिजेंस (एआई) उत्पादों/प्रौद्योगिकियों का शुभारंभ किया। 'आजादी का अमृत महोत्सव' समारोह के हिस्से के रूप में लॉन्च किए गए उत्पाद विभिन्न क्षेत्रों के अंतर्गत आते हैं। इन उत्पादों में एआई प्लेटफॉर्म ऑटोमेशन; स्वायत्त/मानवरहित/रोबोटिक्स प्रणालियां; ब्लॉक चेन आधारित स्वचालन; कमान, नियंत्रण, संचार, कंप्यूटर और इंटेलिजेंस, निगरानी और टोही; साइबर सुरक्षा; मानव व्यवहार संबंधी विश्लेषण; बुद्धिमान निगरानी प्रणाली; घातक स्वायत्त हथियार प्रणाली; लॉजिस्टिक्स और आपूर्ति श्रृंखला प्रबंधन, परिचालन

डेटा विश्लेषिकी; विनिर्माण और रखरखाव; प्राकृतिक भाषा प्रसंस्करण का उपयोग करते हुए सिमुलेटर/परीक्षण उपकरण और समभाषण/आवाज विश्लेषण शामिल हैं।

रक्षा सार्वजनिक क्षेत्र उपक्रमों (डीपीएसयू) द्वारा ऐसे तीन एआई उत्पाद विकसित किए गए हैं जिनमें दोहरे उपयोग के अनुप्रयोग और अच्छी बाजार क्षमता है, अर्थात् भारत इलेक्ट्रॉनिक्स लिमिटेड द्वारा विकसित एआई-सक्षम वॉयस ट्रांसक्रिप्शन/विश्लेषण सॉफ्टवेयर; भारत अर्थ मूवर्स लिमिटेड द्वारा विकसित ड्राइवर थकान निगरानी प्रणाली और गार्डन रीच शिपबिल्डर्स और इंजीनियरों द्वारा विकसित गैर-विनाशकारी परीक्षण के एक्स-रे में वेल्डिंग दोषों के एआई-सक्षम मूल्यांकन की कार्यक्रम के दौरान जांच की गई। इन उत्पादों से रक्षा सार्वजनिक उपक्रमों के लिए व्यापार के नए रास्ते खुलने की उम्मीद है।

रक्षा मंत्री ने इन 75 उत्पादों के विवरण वाली एक पुस्तक के भौतिक के साथ-साथ ही ई-संस्करण का भी विमोचन किया। इस पुस्तक में सेवाओं, रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ), रक्षा सार्वजनिक क्षेत्र के उपक्रमों (डीपीएसयू), आईडीईएक्स, स्टार्ट-अप्स और निजी उद्योग द्वारा एआई क्षेत्र में पिछले चार वर्षों के दौरान किए गए सामूहिक प्रयासों को प्रदर्शित किया गया है। इन प्रयासों की सराहना करते हुए श्री राजनाथ सिंह ने अपने संबोधन में एआई को मानवता के विकास में एक क्रांतिकारी कदम बताते हुए कहा कि यह प्रमाण है कि मनुष्य इस ब्रह्मांड में सबसे विकसित प्राणी है। उन्होंने आश्चर्य व्यक्त किया कि एक मानव मस्तिष्क ने न केवल ज्ञान का सृजन/पुन:उत्पादन किया है, बल्कि ऐसी बुद्धि का विकास किया है जो ज्ञान का सृजन कर रही है।

श्री राजनाथ सिंह ने कहा कि एआई ने रक्षा, स्वास्थ्य और चिकित्सा, कृषि, व्यापार और वाणिज्य तथा परिवहन सहित लगभग हर क्षेत्र में अपनी पहचान बना ली है। उन्होंने सभी रक्षा हितधारकों से मानव चेतना की संयुक्तता के बंधन को बढ़ाने तथा एआई की योग्यता को इस क्षेत्र में महत्वपूर्ण परिवर्तन के रूप में शामिल करने का आह्वान किया। जब युद्धों में पूर्ण मानव भागीदारी रही है, एआई अनुप्रयोगों की सहायता से नए स्वचालित हथियार/प्रणालियां विकसित की गई हैं। वे मानव नियंत्रण के बिना ही दुश्मन के प्रतिष्ठानों को नष्ट कर सकती हैं। एआई-सक्षम सैन्य उपकरण बड़ी मात्रा में डेटा को कुशलतापूर्वक संभालने में समर्थ हैं। यह उपकरण जवानों को प्रशिक्षण देने में भी काफी मददगार साबित हो रहे हैं। आने वाले समय में ऑगमेंटेड और वर्चुअल रियलिटी तकनीकों का भी प्रभावी ढंग से उपयोग किया जाएगा।

रक्षा मंत्री ने इस बात की सराहना की कि रक्षा मंत्रालय, सशस्त्र बल, डीआरडीओ, डीपीएसयू और उद्योग रक्षा के लिए नवाचार और स्वदेशी एआई समाधान प्रदान करने के लिए सार्थक प्रयास कर रहे हैं और भविष्य की प्रौद्योगिकी भी विकसित कर रहे हैं। उन्होंने सामाजिक कल्याण और राष्ट्रीय सुरक्षा सुनिश्चित करने तथा भारत को 'एआई का ग्लोबल हब' बनाने के लिए एआई-सक्षम और एआई-आधारित अनुप्रयोगों को विकसित करने के लिए प्रधानमंत्री श्री नरेन्द्र मोदी के दृष्टिकोण की प्रशंसा की। उन्होंने यह उम्मीद जाहिर की कि भारत जल्द ही एआई के क्षेत्र के अग्रणी देशों में शामिल हो जाएगा।

श्री राजनाथ सिंह ने इस बात पर जोर दिया कि भविष्य के युद्ध में एआई की महत्वपूर्ण भूमिका को ध्यान में रखते हुए हथियारों/प्रणालियों का विकास किया जा रहा है। "हमने रिमोट पायलट मानव रहित हवाई वाहनों आदि में एआई अनुप्रयोगों को शामिल करना शुरू कर दिया है। हमें इस दिशा में आगे बढ़ने की जरूरत है ताकि हम स्वचालित हथियार प्रणाली विकसित कर सकें। रक्षा क्षेत्र में एआई और बिग डेटा जैसी प्रौद्योगिकियों का समय पर समावेश अत्यंत महत्वपूर्ण है, ताकि हम प्रौद्योगिकी प्रगति में पीछे न रहें और अपनी सेवाओं के लिए प्रौद्योगिकी का अधिकतम लाभ उठाने में सक्षम हो सकें।

रक्षा मंत्री ने यह भी कहा कि रक्षा सेवाओं में एआई अनुप्रयोगों को तेजी से बढ़ावा देने के लिए उद्योग के साथ कई समझौता ज्ञापनों पर हस्ताक्षर किए गए हैं। इनोवेशन फॉर डिफेंस एक्सीलेंस (आईडीईएक्स) पहल के तहत एआई से संबंधित कई चुनौतियां भी सामने आई हैं। रेडियो फ्रीक्वेंसी स्पेक्ट्रम मैनेजमेंट, अंडरवाटर डोमेन अवेयरनेस, सैटेलाइट इमेज एनालिसिस और फ्रेंड या फ्यू आइडेंटिफिकेशन सिस्टम सहित विभिन्न क्षेत्रों में ऐसी चुनौतियां हैं। उन्होंने उद्योग और स्टार्ट-अप से नए रास्ते तलाश करने और पूर्ण आत्मनिर्भरता सुनिश्चित करने के लिए सरकार के साथ मिलकर काम करने का अनुरोध किया।

श्री राजनाथ सिंह ने कहा कि रूस प्रौद्योगिकी रूप से उन्नत देश है और विज्ञान और प्रौद्योगिकी के क्षेत्र में लगातार प्रगति कर रहा है। एआई के बारे में रूस के राष्ट्रपति श्री व्लादिमीर पुतिन ने कहा था कि जो कोई भी इस क्षेत्र में दिग्गज बनेगा वहीं दुनिया का शासक बन जाएगा। हालांकि भारत 'वसुधैव कुटुम्बकम' (पूरी दुनिया एक परिवार है) के सिद्धांत में विश्वास करता है और उसका दुनिया पर शासन करने का कोई इरादा भी नहीं है। हमें अपनी एआई प्रौद्योगिकी क्षमता विकसित करनी चाहिए ताकि कोई भी देश हम पर शासन करने के बारे में सोच भी न सके।

रक्षा क्षेत्र को मजबूत बनाने में शिक्षाविदों की महत्वपूर्ण भूमिका पर प्रकाश डालते हुए रक्षा मंत्री ने कहा कि रक्षा मंत्रालय अनुसंधान मंच, डीआरडीओ और रक्षा क्षेत्र सार्वजनिक उपक्रम अत्याधुनिक एआई अनुसंधान को आगे बढ़ाने में विभिन्न संस्थानों को सहायता प्रदान कर रहे हैं। उन्होंने कहा कि डीआरडीओ द्वारा तकनीकी विकास कोष परियोजनाओं और 'डेयर टू ड्रीम' प्रतियोगिताओं के माध्यम से एआई के क्षेत्र में प्रगति करने के प्रयास किए जा रहे हैं। देश में कई रक्षा-उद्योग-अकादमिक उत्कृष्टता केंद्र स्थापित किए गए हैं और उनमें से अधिकांश के मांगपत्रों में एआई को प्रमुखता दी जा रही है।

श्री राजनाथ सिंह ने कहा कि हमारे देश में वैज्ञानिक और तकनीकी रूप से प्रशिक्षित युवाओं की कोई कमी नहीं है, उन युवाओं के पास नवाचारी दिमाग है और उनमें राष्ट्र निर्माण के लिए योगदान करने की इच्छा है। ऐसे में हम आने वाले समय में अपने देश के साथ-साथ दुनिया की तकनीकी जरूरतों को पूरा करने की दिशा में भी आगे बढ़ सकते हैं। यद्यपि रक्षा मंत्रालय के संगठनों का ध्येय सशस्त्र बलों के लिए भविष्य की प्रौद्योगिकियों का विकास करना है, जिसके लाभ नागरिकों को भी उपलब्ध होंगे।

रक्षा मंत्री ने अपनी रक्षा और सुरक्षा के साथ-साथ मानवता और विश्व शांति के बारे में सोचने की जरूरत पर बल दिया। उन्होंने कहा कि प्रारंभिक अवस्था में ए आई की नैतिकता और इसके संभावित खतरों के बारे में भी विचार करने की जरूरत है। जब भी कोई नई तकनीक पेश की जाती है, तो समाज को उसके अपनाने में समय लगता है। इस संक्रमण की अवधि में कभी-कभी चुनौतीपूर्ण स्थिति भी उत्पन्न हो जाती है। चूंकि एआई एक ऐसी प्रौद्योगिकी है जो व्यापक बदलाव लाती है। हमें किसी भी कानूनी, नैतिक, राजनीतिक और आर्थिक चुनौतियों के लिए अग्रिम रूप से तैयार रहना होगा। हमें एआई के भविष्य को सकारात्मक दृष्टिकोण से भी देखना चाहिए, लेकिन इसके साथ-साथ हमें तैयार भी रहना चाहिए। हमें इस प्रौद्योगिकी का उपयोग समाज के कल्याण, विकास और शांति के लिए करना चाहिए। हमें इसके लोकतांत्रिक उपयोग को सुनिश्चित करने की दिशा में भी काम करना चाहिए।

अपना स्वागत भाषण देते हुए रक्षा सचिव डॉ अजय कुमार ने एआई के उपयोग को प्रोत्साहित करने की आवश्यकता पर जोर दिया। उन्होंने इस दिशा में प्रयास करने के लिए रक्षा मंत्रालय की प्रतिबद्धता को दोहराते हुए कहा कि सशस्त्र बल अत्याधुनिक उपकरणों से लैस हैं। उन्होंने कहा कि रक्षा क्षेत्र में एआई के रणनीतिक एकीकरण के लिए 2018 में एक टास्क फोर्स की स्थापना की गई थी और तीन महीने में ही उसने अपनी सिफारिशें प्रस्तुत की थीं। इन सिफारिशों को रक्षा मंत्री की अध्यक्षता में रक्षा एआई परिषद के माध्यम से लागू किया गया था। डॉ. अजय कुमार ने इन 75 उत्पादों को विकसित करने और राष्ट्रीय सुरक्षा को मजबूत बनाने में अपना योगदान देने के लिए तीनों सेवाओं, डीआरडीओ, डीपीएसयू और उद्योग के सक्रिय प्रयासों की प्रशंसा की। उन्होंने कहा कि 100 से अधिक परियोजनाएं विकास के विभिन्न चरणों में हैं।

रक्षा राज्य मंत्री श्री अजय भट्ट, नौ सेनाध्यक्ष एडमिरल आर हरि कुमार, सेनाध्यक्ष जनरल मनोज पांडे, रक्षा अनुसंधान एवं विकास विभाग के सचिव और डीआरडीओ के अध्यक्ष डॉ. जी. सतीश रेड्डी, वायु सेना के उप प्रमुख एयर मार्शल संदीप सिंह, रक्षा मंत्रालय के अन्य वरिष्ठ नागरिक और सैन्य अधिकारी, विदेशों के राजदूत, अनुसंधान संस्थानों के प्रतिनिधि, शिक्षाविद और उद्योग के साथ-साथ छात्र भी इस अवसर पर उपस्थित थे। 2025 तक 35,000 करोड़ रुपये के रक्षा निर्यात को हासिल करने और घरेलू उद्योग को बढ़ावा देने के लिए रक्षा मंत्रालय के दृष्टिकोण के अनुरूप, सार्वजनिक क्षेत्र से भारत इलेक्ट्रॉनिक्स लिमिटेड और निजी क्षेत्र से इंडो-एमआईएम को 'रक्षा निर्यात रत्न' पुरस्कार प्रदान किए गए। इन्होंने हाल के वर्षों में सबसे अधिक रक्षा निर्यात किया है।

भविष्य के एआई समाधानों पर बेहतर नवाचारी विचारों को प्राप्त करने के लिए आयोजित की गई 'जेननेक्स्ट एआई' समाधान प्रतियोगिता के तीन श्रेष्ठ छात्रों को रक्षा मंत्री द्वारा सम्मानित किया गया। रक्षा क्षेत्र में एआई के नए विचारों को प्रोत्साहित करने के लिए सशस्त्र सेवाओं, शिक्षाविदों, छात्रों, अनुसंधान संगठनों और उद्योग की सक्रिय भागीदारी के साथ तीन पैनल चर्चाएं भी आयोजित की गईं।

एक प्रदर्शनी भी आयोजित की गई, जिसने नवप्रवर्तकों को अपनी क्षमताओं, उत्पादों और अत्याधुनिक प्रौद्योगिकियों को प्रदर्शित करने का एक सुनहरा अवसर प्रदान किया।

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Government of India

Ministry of Defence

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Raksha Mantri Launches 75 Artificial Intelligence Products/Technologies During First-Ever 'AI in Defence' Symposium & Exhibition in New Delhi; Terms AI as a Revolutionary Step in the Development of Humanity

Timely infusion of technologies like AI & Big Data need of the hour to stay level with technological curve: RM

"India does not desire domination; Developing AI capability only to protect the Nation from future threats"

AI should only be used for development & peace of humanity, says Shri Rajnath Singh

Raksha Mantri Shri Rajnath Singh launched 75 newly-developed Artificial Intelligence (AI) products/technologies during the first-ever 'AI in Defence' (AIDef) symposium and exhibition, organised by Ministry of Defence in New Delhi on July 11, 2022. The products, launched as part of 'Azadi Ka Amrit Mahotsav' celebrations, fall under various domains. These includeAI Platform Automation; Autonomous/Unmanned/Robotics systems; Block Chain-based Automation; Command, Control, Communication, Computer & Intelligence, Surveillance & Reconnaissance; Cyber Security; Human Behavioural Analysis; Intelligent Monitoring Systems; Lethal Autonomous Weapon Systems; Logistics and Supply Chain Management, Operational Data Analytics; Manufacturing and Maintenance; Simulators/Test Equipment and speech/voice analysis using Natural Language Processing.

Three AI products developed by the DPSUs having dual use applications and good market potential, namely AI-enabled Voice Transcription/Analysis software developed by Bharat Electronics Limited; Driver Fatigue Monitoring System developed by Bharat Earth Movers Limited and AI-enabled evaluation of Welding defects in X-rays of Non-destructive Testing developed by Garden Reach Shipbuilders & Engineers were screened during the event. These products are expected to open up new business avenues for the Defence PSUs.

The Raksha Mantri released the physical as well as e-version of the book comprising the details of these 75 products, showcasing the collective efforts put on by the Services, Defence Research & Development Organisation (DRDO), Defence Public Sector Undertakings (DPSUs), iDEX start-ups and the private industry in last four years in the field of AI. Appreciating the efforts, Shri Rajnath Singh, in his address, described AI as a revolutionary step in the development of humanity; a proof that a human being is the most evolved creature in the universe. He was

amazed that a human mind has not only created/reproduced knowledge, but is developing intelligence that creates knowledge.

Shri Rajnath Singh pointed out that AI has built inroads in almost every sector, including defence, health & medicine, agriculture, trade & commerce and transport. He called upon all the defence stakeholders to enhance the jointness of human consciousness and the ability of AI to bring a radical change in the sector. "When there has been full human participation in wars, new autonomous weapons/systems have been developed with the help of AI applications. They can destroy enemy establishments without human control. AI-enabled military devices are capable of handling large amounts of data efficiently. It is also proving to be very helpful in training the soldiers. In the coming times, Augmented and Virtual Reality technologies will also be used effectively," he said.

The Raksha Mantri appreciated the fact that MoD, Armed Forces, DRDO, DPSUs and the Industry are making meaningful efforts to provide innovative & indigenous AI solutions for defence and are developing futuristic technologies. He echoed Prime Minister Shri Narendra Modi's vision of developing AI-enabled and AI-led applications to ensure social welfare & national security and making India a 'Global Hub for AI'. He hoped that India will soon be among the leading countries in the field of AI.

Shri Rajnath Singh asserted that weapons/systems are being developed, keeping in mind the crucial role AIcan play in future warfare. "We have started incorporation of AI applications in remote piloted, unmanned aerial vehicles etc. There is a need to move further in this direction so that we can develop autonomous weapon systems. Timely infusion of technologies like AI & Big Data in the defence sector is of utmost importance, so that we are not left behind the technological curve and are able to take maximum advantage of technology for our services," he said.

The Raksha Mantri added that several MoUs have been signed with the industry for faster promotion of AI applications in the Services. Many AI-related challenges under the Innovations for Defence Excellence (iDEX) initiatives have also been given. The challenges are under various domains, including Radio Frequency Spectrum Management, Underwater Domain Awareness, Satellite Image Analysis and Friend or Foe Identification System. He urged the industry and start-ups to explore newer avenues and work hand-in-hand with the Government to ensure complete self-reliance in the field of AI technology.

"Russia is a technologically advanced country and is continuously progressing in the field of Science & Technology. On AI, Russian President Mr Vladimir Putin had said 'Whoever becomes the leader in this sphere will become the ruler of the world'. Although India believes in the principle of 'Vasudhaiva Kutumbakam' (the whole world is one family) and has no intention to rule the world, we must develop the capability of our AI technology so that no country can even think of ruling us," said Shri Rajnath Singh.

Impressing upon the important role academia can play in strengthening the defence sector, the Raksha Mantri stated that MoD research platforms, DRDO and DPSUs are providing support to various institutes in pursuing cutting edge AI research. He added that efforts are being made by DRDO to make strides in the field of AI through Technological Development Fund projects and 'Dare to dream' contests. Several Defence-Industry-Academia Centres of Excellence have been established across the country and AI finds prominence in the charters of many of them, he said.

“Our country is full of scientific & technologically trained youth who have innovative minds and the desire to contribute to Nation Building. In such a situation, we will move towards fulfilling the technological needs of our nation as well as the world in the times to come. Although the mandate of the organisations of MoD is to develop futuristic technologies for the Armed Forces, its spin-off benefits will also be available to the civilians,” said Shri Rajnath Singh.

The Raksha Mantri emphasised on the need to think about humanity and world peace along with one’s own defence & security. “There is a need to think about the ethics of AI and its potential dangers at an early stage. Whenever a new technology is introduced, it takes time for the society to adapt to it. In this transition period, a challenging situation sometimes arises. Since AI is a technology that brings about a massive change, we have to be prepared in advance for any legal, ethical, political and economic challenges. We should look at the future of AI with a positive attitude, but remain prepared as well. We have to use this technology for the welfare, development and peace of humanity. We must work towards ensuring its democratic use,” he said.

Delivering the welcome address, Defence Secretary Dr Ajay Kumar emphasised on the need to encourage the use of AI in defence, reiterating the commitment of MoD to make all efforts in this direction to ensure that the Armed Forces are equipped with state-of-the-art technology. He stated that a task force was established in 2018 for strategic integration of AI in defence and had submitted its recommendations within three months. These recommendations were implemented through the Defence AI Council, headed by the Raksha Mantri. Dr Ajay Kumar lauded the proactive efforts of the three Services, DRDO, DPSUs & the Industry in developing these 75 products and contributing to strengthen national security. He added that over 100 more projects are in various levels of development.

Raksha Rajya Mantri Shri Ajay Bhatt, Chief of the Naval Staff Admiral R Hari Kumar, Chief of the Army Staff General Manoj Pande, Secretary, Department of Defence R&D and Chairman DRDO Dr G Satheesh Reddy, Vice Chief of the Air Staff Air Marshal Sandeep Singh, other senior civil and military officials of MoD, envoys of foreign countries, representatives of research institutes, academia and the industry as well as students were present on the occasion.

In consonance with the vision of MoD to achieve defence exports of Rs 35,000 crore by 2025 and provide boost to the domestic industry, ‘Raksha Niryat Ratna’ awards were conferred on Bharat Electronics Limited from the public sector and on Indo-MIM from the private sector for achieving highest defence exports in recent years.

Top three students of ‘GenNext AI’ Solutions Competition, which was organised to get bright innovative ideas on futuristic AI solutions, were also felicitated by the Raksha Mantri. To stimulate new ideas in the field of AI in Defence, three panel discussions were also organised with active participation from the Services, academia, students, research organisations and industry. An exhibition was also organised which provided a unique opportunity for innovators to display their capabilities, products and state-of-the-art technologies.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1840740

Hindustan Times

Mon, 11 Jul 2022

Rajnath Singh Calls for Tapping AI Potential in Defence Sector

An Artificial Intelligence exhibition was organised which provided an opportunity for innovators to display their capabilities, products and state-of-the-art technologies. Defence minister Rajnath Singh on Monday launched 75 artificial intelligence products at a symposium on 'AI in Defence,' with the products covering areas such as robotics, surveillance and reconnaissance, cyber security, human behavioural analysis, simulators and lethal autonomous weapon systems, even as he called for tapping the potential of AI in the defence sector, the defence ministry said in a statement. "When there has been full human participation in wars, new autonomous weapons/systems have been developed with the help of AI applications. They can destroy enemy establishments without human control. AI-enabled military devices are capable of handling large amounts of data efficiently," the minister said.

He said it was also helpful in training soldiers. The products were launched as part of 'Azadi Ka Amrit Mahotsav' celebrations to mark 75 years of the country's independence. The ministry said three AI products developed by defence public sector undertakings have dual use applications, including AI-enabled voice transcription/analysis software developed by Bharat Electronics Limited and driver fatigue monitoring system developed by Bharat Earth Movers Limited. In his address, the minister described AI as a revolutionary step in the development of humanity, and pointed out that AI has made inroads in almost every sector including defence, health and medicine, agriculture, trade and commerce, and transport. He asked the defence stakeholders "to enhance the jointness of human consciousness and the ability of AI to bring a radical change in the sector."

"We have started incorporation of AI applications in remote piloted, unmanned aerial vehicles, among others. There is a need to move further in this direction so that we can develop autonomous weapon systems. Timely infusion of technologies like AI and big data in the defence sector is of utmost importance, so that we are not left behind the technological curve and are able to take maximum advantage of technology for our services." Singh released the physical as well as e-version of a book comprising the details of the 75 products, showcasing the collective efforts of the services, Defence Research & Development Organisation (DRDO), DPSUs, start-ups and the private industry in the last four years.

https://www.hindustantimes.com/india-news/rajnath-singh-calls-for-tapping-ai-potential-in-defence-sector-101657540436279.html

FINANCIAL EXPRESS
Read to Lead

Mon, 11 Jul 2022

Indian Armed Forces get Ready for Future Warfare! Undergoing Important Changes Due to AI, Says Rajnath Singh

Drawing lessons from the ongoing Russia-Ukraine war, the Indian Armed Forces are pushing for adoption of new technologies. From focusing on Artificial Intelligence (AI), Quantum Labs, Industry 4.0, Machine Learning, Neural Networks and Deep Learning algorithms, Robotics and much more are gradually being introduced and adopted to ensure that the Indian forces are more tech savvy and geared to meet new threats and ready for future wars. To mark 75th anniversary of India's Independence, the defence minister Rajnath Singh on Monday inaugurated the first ever Artificial Intelligence in Defence (AIDef) symposium and exhibition of AI-enabled solutions.

Drawing lessons from the ongoing Russia-Ukraine war, the Indian Armed Forces are pushing for adoption of new technologies. From focusing on Artificial Intelligence (AI), Quantum Labs, Industry 4.0, Machine Learning, Neural Networks and Deep Learning algorithms, Robotics and much more are gradually being introduced and adopted to ensure that the Indian forces are more tech savvy and geared to meet new threats and ready for future wars. To mark 75th anniversary of India's Independence, the defence minister Rajnath Singh on Monday inaugurated the first ever Artificial Intelligence in Defence (AIDef) symposium and exhibition of AI-enabled solutions.

According to him, work on AI needs to be done carefully so that the technology does not get out of control in the near future. "This technology needs to be used for humanity's progress and peace. In his address he urged the industry, Defence Research and Development Organisation (DRDO), DPSUs, academia, as well as those involved in developing such technologies to be careful and to also keep in mind the AI's ethics, and dangers. Stating that the progress of artificial intelligence cannot be stopped, he added, "When a new technology brings a huge change, its transition period is also as huge and serious. He also said that this technology can bring in huge change and there is a need to be ready to face political, economic upheaval as well as legal and ethical fallouts. He further said the society takes time to adjust itself when a new technology comes. The defence sector is undergoing changes due to AI, as AI is also being used to train the soldiers.

Talking about Russia being a technologically advanced country which is progressing continuously in the field of Science & Technology, the defence minister said "India believes in the principle of 'Vasudhaiva Kutumbakam' (the whole world is one family). It has no intention to rule the world." Adding, "We must develop the capability of our AI technology so that no country can even think of ruling us." Today the minister launched 75 defence products which are powered by AI at the event, and some of these are already in use by the armed forces and the rest are in the process of being deployed.

IAF & Technology

The Indian Air Force (IAF) under the aegis of UDAAN (Unit for Digitisation, Automation, Artificial Intelligence and Application Networking) has inaugurated the Centre of Excellence for Artificial Intelligence at Air Force Station Rajokri, New Delhi. The Centre was inaugurated by Air Marshal Sandeep Singh, Vice Chief of the Air Staff (VCAS) on Saturday. It plans to undertake proactive steps to embed Industry 4.0 and Artificial Intelligence (Al) based technologies in its war fighting processes. These applications are being developed in-house and in coordination with leading academia, MSMEs, PSUs who have expertise in AI. For handling all aspects of Analytics, Machine Learning, Natural Language Processing, Neural Networks and Deep Learning algorithms, a Big Data Analytics and Al Platform has been commissioned in the Al Centre. And for handling the high-end compute requirements that will be undertaken by the latest Graphical Processing Unit powered servers.

Technological Leap by the Indian Army

Post Galwan incident in June 2020, Indian Army has been making conscious efforts to incorporate latest technology in the service and has been focusing on setting up Quantum Computing Labs, Real-time application of artificial intelligence in border areas; robotic surveillance platforms, 5G communications, air defence systems which are backed by augmented reality, automated drone detection systems and unmanned combat units for tank formations and more. All these new technologies are being adopted to ensure that the enemy is not able to hack into encrypted data. In the last couple of months the Eastern and Northern Commands of the Indian Army have been holding major technology symposiums with the industry. And the focus has been to identify the requirements of the forces and to help in customising the operational requirements.

Earlier this summer, the focus of the 'North-Tech' symposium was on AI, Virtual Reality, Fire Power, Disruptive Technologies, Fire Power, and Augmented Reality and other security solutions. A similar 'East-Tech' was conducted last week, and according to an official statement, the meeting was to identify cutting-edge technologies which are critical for dealing with operational challenges in the eastern theatre. Focused on 'Battlefield Transparency' – the Eastern Command was interested in identifying the latest solutions in unmanned warfare, chemical-biological-radiological-nuclear (CBRN) Defence, nano-technology, communication systems, electronic warfare, and information systems.

Recommendations made by the Task Force of Ministry of Defence

Headed by N Chandrasekaran, Chairman, Tata Sons, it has recommended the following:

A corpus of Rs 1,000 crore to be provided each year for next 5 years in Defence Budget to support AI activities;

- Organising AI training courses for all defence personnel;
- Integrating and embedding AI strategy with defence strategy;
- Creation of a framework to work with industry;
- And, establishment of a high-level Defence AI Council (DAIC) and a Defence AI Project Agency (DAIPA).

Indian Army & Technology

Financial Express Online reported in 2021, that the Indian Army established the Quantum Lab in 2021 to transform the current system of cryptography — algorithms used to code data and voice for secure transmission. This was set up with the support from the National Security Council Secretariat (NSCS). The biggest advantage of having such a system in place is to ensure secure transmission during conflicts as radio waves are used by all major equipment to communicate. Based on the information available in public domain, world-class surveillance systems that provide live feed to commanders are already embedded along the 3,448-km-long Line of Actual Control (LAC) as well as the 749-km-long Line of Control (LoC) with Pakistan. These systems are relaying real time live feeds to the commanders making their job much easier as it helps to identify the enemy – armed or unarmed, man or machine.

How does AI help?

All the systems that are embedded are AI-oriented machines which are tuned for change and anomaly detection, interpretation, and have the ability to detect intrusions at the LoC and LAC as well as reading drone footage. All these projects are part of the 12 AI domains which have been identified by the NSCS. In recent times, the Indian Army has adopted cutting-edge quantum computing to 5G communications, deployed basic surveillance Quadcopter. These Quadcopters can operate in high altitudes and have the capability to provide real-time information in the radius of 10-20 km.

https://www.financialexpress.com/defence/indian-armed-forces-get-ready-for-future-warfare-undergoing-important-changes-due-to-ai-says-rajnath-singh/2590206/lite/

Hindustan Times

Mon, 11 Jul 2022

'India does not Want to Rule the World...': Rajnath Singh Explains Why

India does not want to rule the world, defence minister Rajnath Singh said on Monday at an event, as he spoke on the growth of Artificial Intelligence while referring to a comment by Russian president Vladimir Putin. “I am reminded of a quote by Putin some time ago. You all know Russia is a technologically advanced country. In the field of science and technology, it has gradually progressed. On artificial intelligence, Putin had once said: ‘Whoever becomes the ruler of the sphere, will rule the world.” “The way this sphere is growing, this possibility can’t be denied. But I want to add, at the same time, that India does not want to rule the world. India has always given one message - The whole world is a family. We have never intended to conquer the world,” the defence minister underlined. “But we also have to strengthen the AI technology in India so that no other country can overpower us.”

Rajnath Singh made the comments while addressing a symposium on ‘Artificial Intelligence in Defence’ in New Delhi. At the special event, the Army also showcased various AI-based solutions for military applications "Multiple DRDO Industry Academia Centres-of Excellence have been installed across the country, having a primary focus on Artificial Intelligence.

Similarly, many such efforts are being done by the Defence sector to promote AI apps The development of artificial intelligence is vital to human civilization; By developing it, man proved his superiority; Artificial intelligence a revolutionary step in the development of humanity," Singh underlined during his address.

https://www.hindustantimes.com/india-news/india-does-not-want-to-rule-the-world-rajnath-singh-explains-why-watch-101657525828292-amp.html

Outlook

Mon, 11 Jul 2022

India Must be Ready to Face Upheaval Due to AI, One Nation Shouldn't Dominate Tech: Defence Minister

India needs to work on artificial intelligence mechanism "extremely carefully" and be ready to face the legal, ethical, political and economic upheaval that may follow the expansion of this technology, Defence Minister Rajnath Singh said on Monday. He stressed that AI technology should not be dominated by a country or a group, as has been the case with nuclear technology, and India needs to make advancements in the field. Singh was speaking after inaugurating an event titled 'AIDef (Artificial Intelligence in Defence)' here. "We have to use artificial intelligence (AI) for humanity's progress and peace. It should not be the case that a country or a group of countries establish their dominance on this technology - just like nuclear power - and the remaining countries are not able to enjoy the fruits of this technology," the defence minister said.

He noted that AI's ethics and possible dangers must be properly thought-out. "We cannot stop the progress of artificial intelligence and we should not try to stop its progress. But we need to be careful about it," he mentioned. When a new technology brings a huge change, its transition period is also as big and serious, he said. "Since AI is a technology that can bring a massive change, we must be ready to face the legal, ethical, political and economic upheaval that may follow," Singh noted. "We need to work on AI extremely carefully so that this (technology) does not go out of our control in the coming times," he added. The defence minister said the arrival of technology is just like the movement of a clock because once it moves forward, it is not possible to turn it back. "Whenever a new technology comes, society takes its time to adjust itself to it," he added.

He also said that the country should ensure democratic use of technology. The defence sector is undergoing important changes due to AI. The training of soldiers is also being improved with the help of AI, he said. Referring to Russia's continuous progress in the field of science and technology, he said, "On AI, Russian President Mr Vladimir Putin had said 'Whoever becomes the leader in this sphere will become the ruler of the world'." "Although India believes in the principle of 'Vasudhaiva Kutumbakam' (the whole world is one family) and has no intention to rule the world, we must develop the capability of our AI technology so that no country can even think of ruling us," he added. India has started incorporating AI applications in remote piloted,

unmanned aerial vehicles, etc, he mentioned. There is a need to move further in this direction so that India can develop autonomous weapon systems, he noted.

"Timely infusion of technologies like AI and Big Data in the defence sector is of utmost importance, so that we are not left behind the technological curve and are able to take maximum advantage of technology for our services," he mentioned. Singh launched 75 defence products powered by artificial intelligence at the event. Some are already being used by the armed forces while the rest are in the process of deployment. These 75 products are in the domains of robotics systems, cyber security, human behaviour analysis, intelligent monitoring system, supply chain management, voice analysis and C4ISR (command, control, communication, computer and intelligence, surveillance and reconnaissance) and operational data analytics.

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THE NEW INDIAN EXPRESS

Tue, 12 Jul 2022

Deploying Robots as Sentries, Deciphering Mandarin into English: Artificial Intelligence to Strengthen Indian Defence Forces

India's focus on the new age disruptive technology Artificial Intelligence (AI) will lead the forces soon to have not just robots doing sentry duty but also the soldiers in mine laden fields will have robots marking and warning about the mines. Even those soldiers operating along the Northern Border will have an AI device to decipher Mandarin into English for them. These three and 72 more such devices and products as Defence Minister Rajnath Singh launched 75 newly-developed Artificial Intelligence (AI) products/technologies during the first-ever 'AI in Defence' (AIDef) symposium and exhibition, organised by the Ministry of Defence in New Delhi on Monday.

These included AI Platform Automation; Autonomous/Unmanned/Robotics systems; lockChain-based Automation; Command, Control, Communication, Computer & Intelligence, Surveillance & Reconnaissance; Cyber Security; Human Behavioural Analysis; Intelligent Monitoring Systems; Lethal Autonomous Weapon Systems; Logistics and Supply Chain Management, perational Data Analytics; Manufacturing and Maintenance; Simulators/Test Equipment and speech/voice analysis using Natural Language Processing. A startup CogKnit run by Anuroop Iyengar is preparing the voice recognition and Mandarin Translator "The device is offline and can recognize voices at a distance of 5ft. It will be helpful during the Border personnel Meetings and also in times of any standoffs for better communication." The work is on to bring the present weight of device to 200 gms from 600 gms and to increase the effective range to 15 ft and more, said

Coming to the autonomous robot which will be functioning as sentry, Major Paras Kanwar said that it can be put on a metal rail and with its AI application it will be able to recognize a person

from far. “The device will challenge a person as it is enabled to differentiate between a friend and a foe.”. It will keep storing the data for future use and can be operated from a distance of more than five kilometers with wireless signals. Major Kanwar also is part of an AI based offensive weapon project where a device will Locate, detect and fire on an enemy. These products have been promoted by the Army Design Bureau and will soon have their mass production.

Three AI products developed by the DPSUs having dual-use applications and good market potential, namely AI-enabled Voice Transcription/Analysis software developed by Bharat Electronics Limited; Driver Fatigue Monitoring System developed by Bharat Earth Movers Limited and AI-enabled evaluation of Welding defects in X-rays of Non-destructive Testing developed by Garden Reach Shipbuilders & Engineers were screened during the event. These products are expected to open up new business avenues for the Defence PSUs. Speaking at the event Rajnath Singh pointed out that AI has built inroads in almost every sector, including defence, health & medicine, agriculture, trade & commerce and transport. He called upon all the defence stakeholders to enhance the jointness of human consciousness and the ability of AI to bring a radical change in the sector.

“When there has been full human participation in wars, new autonomous weapons/systems have been developed with the help of AI applications. They can destroy enemy establishments without human control. AI-enabled military devices are capable of handling large amounts of data efficiently. It is also proving to be very helpful in training the soldiers. In the coming times, Augmented and Virtual Reality technologies will also be used effectively,” he said.

https://www.newindianexpress.com/nation/2022/jul/12/deploying-robots-as-sentries-deciphering-mandarin-into-english-artificial-intelligence-to-strength-2475459.amp

ThePrint

Mon, 11 Jul 2022

Army to Conduct Trials of AI Enabled Unmanned All-Terrain Vehicles in Ladakh Next Month

The Indian Army will soon conduct trials of indigenously developed artificial intelligence (AI)-enabled, unmanned all-terrain vehicles in Ladakh for surveillance and logistics operations, ThePrint has learnt. Trials will also be held in deserts in Rajasthan before the Army selects a final product and goes for large scale acquisition. One of the vehicles under consideration has been developed by the Kalyani Group that runs on both batteries and motors. The vehicle was one of the 75 products that were on display at the defence ministry’s first AI symposium in Delhi Monday. The vehicle can operate on battery for about six hours and on motor for 14 hours. It has an operational range of three kilometres and can carry a load of up to 500 kg. Additionally, day and night cameras, having a range of two kilometres, are mounted on the vehicle. This means one can see up to five kilometers from a command centre.

Sources in the defence and security establishment said the vehicle has already undergone two trials with the infantry and the armoured units. The infantry used the vehicle to carry logistics such as weapons and ammunition, while the armoured units used it as a reconnaissance vehicle

to track enemy positions. The wheeled variants, both 4×4 and 6×6, are fully designed and developed indigenously while a tracked version is being built along with a European company. The vehicle has multiple sensors for mapping, path planning and obstacle detection, and can operate in temperatures ranging from -20 degree to +50 Degrees. It was also part of the Indo-Japan military exercise held in February this year. The unmanned vehicle will also be deployed for explosive detection and neutralisation of improvised explosive devices (IED). Sources said this vehicle will go for high altitude trials in Ladakh next month and take part in desert trials later.

More vehicles under consideration

The sources also said there were more such vehicles under consideration, including one built by Torus Robotics. It has a payload capacity of 750 kg and has been developed with state-run BEML Limited. Sources explained that the Army is looking at incorporating AI and unmanned systems extensively. Trishul, an AI-enabled and remotely-operated weapon station that can detect human movement, direct weapons and fire automatically, is also under consideration. It is capable of engaging targets at 300 metres with 100 per cent probability of first round hits.

https://theprint.in/defence/army-to-conduct-trials-of-ai-enabled-unmanned-all-terrain-vehicles-in-ladakh-next-month/1034256/

FINANCIAL EXPRESS
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Mon, 11 Jul 2022

Indigenous Fire Power for Indian Navy! IAC Vikrant to be Commissioned Next Month

On Sunday, the Indian Navy's first indigenous aircraft carrier (IAC-1) completed its 4th phase of sea trials successfully. The trials which concluded on July 10, 2022, were focused on equipment and systems which are onboard and this includes some of the Aviation Facilities Complex equipment too. According to an official statement the plan is to deliver the IAC-1 by the end of this month. And the commissioning is scheduled to take place in August to commemorate 75 years of India's independence.

More about the IAC-1

The ship is indigenous and has been designed and constructed by the Indian navy and Cochin Shipyard Ltd (CSL). Under "Make in India'' initiative the ship has almost 76 percent indigenous content including the steel that has been used. With this construction at the CSL, employment opportunities were generated for over 2000 personnel of the yard as well as more than 12000 employees in ancillary industries. This has also enabled the world to showcase the tremendous growth in the indigenous design and construction capabilities of building such a large and wide aircraft carrier. As has been reported in Financial Express Online last year, the maiden trials of IAC were completed successfully in August and this was followed by the second and the third phases of Sea Trials in last October and earlier this year in January. And the three Sea Trials

tested endurance of propulsion machinery; ship's Navigation and Communication systems; electrical & electronic suites; life saving appliances; and deck machinery.

Deck based fighters for the IAC-1

Once the trials are over and the IAC-1 is commissioned in the Indian Navy next month, the process of evaluating the fighters to go onboard will start soon. Last week, the Vice Chief of Indian Navy Vice Admiral SN Ghormade had told the media persons that the evaluation report of the recent demonstrations of the two different deck based fighter jets for the aircraft carriers is expected soon. "Once the initial report is received then staff evaluation will take place followed by other procedures before any decision is made." According to senior Indian Navy officers, the decision to procure the fighter jets for the IAC is still a long way to go. Which are the two aerospace companies in the race for deck based fighters? As has been reported earlier, Dassault Aviations' Rafale Marine of France and twin seater F/A-18E/F Block III Super Hornets of US aerospace Boeing Company. The Indian Navy will initially procure 26 fighters for its two aircraft carriers. What is the procedure followed for procurement of critical platforms? Explaining the process to Financial Express Online, Cdr KP Sanjeev Kumar (Retd), former naval aviator and Experimental Test Pilot, says, "Procedure starts with formulation of staff requirements after extensive Request for Information (RfIs) and internal confabulations." According to him, "Then next step is the issuance of a Request for Proposal (RfP). Followed by technical evaluation of responses; field evaluation trials (FET); staff evaluation; and finally, opening of tenders to determine L1. Once the tenders are opened up to identify the L1, this is then followed by cost & contract negotiations."

Why deck based fighter aircraft?

"As long as we operate aircraft carriers, deck based fighters would be required. Indian Navy's prospective plans include one carrier on each seaboard plus one under refit. These would require many more DBFs than we have today (Two Squadrons of MiG-29k)," explains Cdr KP Sanjeev Kumar (Retd), Experimental Test Pilot.

What are the challenges?

"Deck based operations always involve a huge challenge on design due to the limited space & landing/takeoff run available onboard. This impinges on payload that may require two engines to meet specific payload and performance requirements. These are again based on staff requirements and carrier size. Not all Deck Based Fighters (DBFs) are twin-engine, neither are all carriers the same," he adds.

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FINANCIAL EXPRESS
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Mon, 11 Jul 2022

IAF Centre of Excellence for Artificial Intelligence to Redefine Air Combat

The Indian Air Force became the first among the services to establish a dedicated center of excellence for the artificial intelligence. In the context of military modernization, such digital tools are radically redefining the technological elements and such gaps are widely discussed. Artificial intelligence is rapidly changing supply logistics, intelligence gathering, sensors, and military robots through the application as commonly knows as the Internet of Battlefield Things(IoBT). The IAF Centre of Excellence for Artificial Intelligence under the aegis of UDAAN (Unit for Digitisation, Automation, Artificial Intelligence and Application Networking) was inaugurated by Air Marshal Sandeep Singh, Vice Chief of the Air Staff (VCAS), on 09 July 2022 at Air Force Station Rajokri, New Delhi.

A Big Data Analytics and Al Platform has been commissioned in the IAF's Al Centre, for handling all aspects of Analytics, Machine Learning, Natural Language Processing, Neural Networks and Deep Learning algorithms. The high-end compute requirements would be undertaken by the latest Graphical Processing Unit powered servers. Addressing the gathering, VCAS said that IAF has taken proactive steps to embed Industry 4.0 and Al based technologies in its war fighting processes. He reiterated that the AI COE with high end compute and big data storage capabilities, coupled with full spectrum Al software suites, would substantially enhance operational capability of IAF. According to the officials, the Al based applications are being developed with inhouse expertise in coordination with various PSUs, MSMEs and leading academia in the field of Artificial intelligence.

Artificial Intelligence(AI) in Air Combat

The next generation combat jets is largely based on the software-centric for its combat operations. The elements of engagement are based on the data for the target detection, tracking and combat operations. In the case of only operational fifth generation fighter jet–F-22 and F-35– the target engagement activities are heavily software-generated, covering upto 95% the entire combat activities. The cockpit is so filled with sensors and computer processors that Algorithms are already flying planes. The data received from the multi sensors-sub-systems forms the basis of such engagement. But that is also the biggest challenge for a pilot to read through and process the high-speed data in a complex air combat environment. Also the Multi-platform Multi-Sensor Data Fusion (MPMSDF) creates real time awareness.

This is the core of AI based Decision Support Systems(DSS) which can fundamentally address such complex environment and analyze the sensory data through processors. While the algorithm is already flying planes, AI is now more about how to fight its own, and how to get pilots to trust the AI. It zeroes in on the OODA loop—the decision cycle of orient, observe, decide, and act. What are the fundamental basis for AI and OODA loop? In a well chronicled dogfights where American fighter aircraft F-86 won against the Russian MiG-15, the victories were based on the fact that American pilots had a much shorter OODA loop in the observing and acting phase of

combat operation. The F-86 had the much wider field of vision and easier hydraulic controls that allowed them to outrun the OODA loops of Russian pilots. So, the role of AI is about processing such information which is difficult to achieve in shorter time-frame. AI can drastically reduce the OODA loop. This is one of such applications.

Further, AI is also being deliberated across the C4I (Command, Control, Communication, Computers and Intelligence) management system. The research in this area is taking place at a staggering speed to achieve a MIL Grade standard and using AI in a SaaS (Software as a Service) model.

AI for Autonomous Vehicle

AI is the reason behind the explosive growth in innovative applications of Unmanned Aerial Vehicles (UAVs) and its military applications. AI applications in UAVs are spreading across an impressive variety of domains, including ISR (intelligence, surveillance and reconnaissance) and Targeting. Worldwide, military is heavily spending on the computer vision capability of artificial intelligence for activities like detect and hunt down submarines, detect an enemy intrusion, or decode messages using machine learning abilities.

AI application is also playing crucial role in developing anti-combat drone solutions. In a recent development, a US Start-up Epirus has developed Leonidas, a technology that can disable a hostile drone while leaving a friendly drone a few feet distant unharmed. Using super-dense Gallium Nitride power amplifiers and based on the AI algorithms, Leonidas uses direct energy to precise frequencies which can take out both large fixed-wing drones and small quadcopters. Besides, IAF has been pioneering AI is area of aircraft maintenance. IAF has substantially digitised its fleets onto the electronic maintenance management systems. IAF has also digitized the entire inventory management system which works on on AI-based formulation to come out with predictive maintenance or predictive threat scenarios or red flags.

Challenges for AI

While AI is being developed some of the challenges are critical especially in its military applications. Here is the need to address some questions to this effect- whether algorithms can be trained to effectively execute mission planning behaviors in unpredictable scenarios; can machines be taught combat strategies; could sufficiently generalized representations be built to capture the richness of the planning problem itself across the threat matrix. “The answer to these questions will help us firm up our requirement specifications that will essentially be a starting document vis-à-vis the expected outcomes. If we tend to utilise AI heavily in combat aviation, we may need to redefine or even abandon certain traditional principles,” said former IAF Chief RKS Bhadauria.

AI is not just a tactical advantage but it is become a necessity. Nations such as China, US and Russia, and many others are already investing heavily in AI. The need for the big data to train and test combat systems will be required for IAF. The data collection, assimilation, and analysis together will drive the AI for the next generation. Integrating AI in military strategies will the cornerstone of the defence sector. AI is the only way to navigate through this new paradigm of warfare.

https://www.financialexpress.com/defence/iaf-centre-of-excellence-for-artificial-intelligence-to-redefine-air-combat/2589934/lite/

FINANCIAL EXPRESS
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Mon, 11 Jul 2022

Boeing Super Hornet, Rafale Marine or a Surprise! Race to Identify Deck-Based Fighter for IAC -1 Vikrant to Heat Up

With the commissioning of the IAC-1 Vikrant scheduled for next month, the focus will soon shift to deck based fighter aircraft needed to be onboard the aircraft carriers. The Indian Navy will buy 26 deck based fighters which will be through Intergovernmental Agreement (IGA) (Government-to-government). Two different aircraft — American and European made — were in India to demonstrate their deck based capabilities. It is now going to be a choice between F/A-18 Block III Super Hornet from the US based Boeing Company and Rafale Marine (M) from Dassault Aviation of France.

The aircraft that will finally go onboard has to be based on the operational requirement of the Indian Navy and the specifications including the weight as well as the need for twin engine Vs single engine. “It is always better to have twin engines in a deck based fighter as it provides redundancy in a seaborne environment and hence greater chances of survivability. And, as regarding the weight, that is very crucial. Since the runway with a ski jump on a carrier is limited the all up weight (AUW) of the aircraft gets restricted. Hence greater the weight of the aircraft lesser its capacity to take the payload of ordnance which directly impinges in its combat efficiency and capability, Commodore Arun Kumar (Retd), author and former Indian Naval officer says.

Need for Deck Based Fighter

Commodore Arun Kumar (Retd), author and former Indian Naval officer tells Financial Express Online, “Once a navy operates an aircraft carrier, the need for a deck based fighter is self explanatory. Further, a deck based fighter can react to a developing situation at sea far more quickly and effectively as compared to a fighter requisitioned from a shore base. In many scenarios, the ashore based fighter may not have the required radius of operation to meet the Carrier Battle Group’s mission profile. Secondly, flying fighters over sea is a specialised capability not available with pilots operating from ashore. It has to deal with orientation while flying over the sea. Thirdly, in addition to giving standoff strike capability to the carrier battle group in an offensive mission, the deck-based fighter also provides defence from hostile aircrafts.”

Says Philippines based South Asian Defence Industry analyst, Miguel Miranda, “The Indian Navy has one of the longest operational experience with carriers in Asia (after Japan) and have used these in combat operations. This is unlikely to ever change although the ships and their aircraft will keep improving. As things stand, however, there are issues with the MiG-29Ks ordered from Russia and without these fighters the navy’s air arm becomes an empty shelf.” “So let me make this clear, the need for a “deck-based fighter” is very urgent regardless of the familiar inertia of Indian military procurement programmes,” he stresses.

F/A-18 Vs Rafale Marine (M)

Comparing the two, as a former naval officer Commodore Kumar, says, “Rafale M is a heavier aircraft compared to F/A-18 though rated higher in combat capability. However, in case of IAC-Vikrant, Rafael M has a difficulty that its wing span does not fit in the hangar lift on the ship. Therefore, its wings would require modification which is not a mean task.” “The pros of Rafale M are that the basic aircraft is already in service in the Indian Air Force (IAF) and hence the technology, maintenance support, repairs etc will be standardised ensuring greater effectiveness in the economic sphere. French aircraft carrier Charles Degaulle carries the Rafale M, so has proven maritime capability,” the Navy Veteran says while explaining the pros and cons of each aircraft.

According to him, “F18 is also a proven versatile deck based aircraft which also meets the QRs of the Indian Navy. It has foldable wings so accommodation on the hangar lift is not an issue. As understood the Americans are offering manufacturing facilities of the aircraft in India. This will fit in well with Make in India policy. It further cements Indo-US strategic partnership. In terms of combat capabilities both are comparable with the Rafale M having a slight edge.” Simply put, “the F/A-18 means the Indian Navy ties its future to a US-centric alliance network in the “Indo-Pacific.” The carrier-based Rafale M made in France is just as formidable. Now if you want to split hairs on the advantages/disadvantages of single seat and double seat fighters it’s usually down to their roles as electronic warfare and intelligence gathering platforms besides being able to fly combat sorties. If the Indian Navy anticipates future operations to involve long-range strikes coordinated with other branches (the air force) against “peer adversaries” with advanced air defenses then a twin-seater does make sense,” Miguel Miranda opines.

He further adds, “Now, when it comes to the number of engines on a contemporary fighter it’s really a matter of payload and role. Let me expand on this in the most simplistic terms. If the country’s air force envisions territorial defense against potentially hostile neighbours single engine fighters are a practical choice. However, when the air force and other aerial warfare branches have to deal with an entire wartime theater that covers air, land, and sea and a variety of missions are needed, twin engine fighters are prioritized. This is evident with the Indian Air Force and its mix of single engine and twin engine fighters.”

India’s Naval Aviation

According to Miguel Miranda, “A specific problem one faces when trying to envision what India’s naval aviation aspires to become in the next 10-15 years is everything else that’s going on in naval technology at the moment. I have no idea why there isn’t an aggressive push to ideate and test a new generation of indigenous UAVs for carrier operations. Or even serious discussions on overseas bases the navy can operate in the near future and how to maintain and defend these. There are other pressing matters regarding on board anti-missile defenses, fleet logistics, and myriad other problems. The bigger question is not what aircraft is better for the navy but how the navy’s role will evolve in the coming years.”

What about the Naval Version of Indigenous Light Combat Aircraft (LCA)?

Philippines-based Miguel Miranda, says, “The single engine LCA Tejas has successfully flight tested as a carrier-based fighter on a “ski jump” runway. Hindustan Aeronautics Limited (HAL) also announced its timeline for the “deck-based fighter” (TEDBF). So the Indian Navy is

guaranteed an indigenous platform it can retool and redesign to its exact wishes and, if there's enough institutional pressure, the ideal fighter will be ready before 2030."

https://www.financialexpress.com/defence/boeing-super-hornet-rafale-marine-or-a-surprise-race-to-identify-deck-based-fighter-for-iac-1-vikrant-to-heat-up/2590495/lite/

Mon, 11 Jul 2022

Space Emerges as India's Next National Security Frontier

By Vaibhav Agrawal

Recently, the Indian Ministry of Defence (MoD) green-lit a programme for developing satellite communication (SATCOM) terminals housed on naval planes, submarines and warships. The Indian Navy's sea-going platforms are connected with the naval satellite, GSAT-7 (Rukmini), by the SATCOM terminals. The naval satellite is connected to ground stations and relays real-time data and information. The field units have reported problems with the slow pace of data transfer, and product support as most of these SATCOMs are over a decade old. The navy is focusing on SATCOM terminals with Ku-band and C-band compatibility with greater speeds of communication and data. The MoD has granted the principle approval to develop these indigenously under the 'Make-II' category of the Defence Acquisition Procedure. 'Make-II' implies the industry will fuel the acceleration of the project, including a prototype for which no government funding will be provided.

The Navy would examine the product after clearance to check if it withstands the vagaries and humidity of the sea. It would be followed by material testing, including checking downlink and uplink speeds. On the other hand, giving a boost to self-reliance in safeguarding India's space assets, the country has developed the Indian Space Research Organisation (ISRO) System for Safe and Sustainable Space Operation and Management (IS4OM). ISRO says that the IS40M system is conceived with a holistic approach towards ensuring sustainability and safety of the space environment while reaping the benefits of sustainable utilisation of outer space for national development.

Utilisation of Space Before the 21st Century

During the Cold War, access to space was majorly limited to the Soviet Union and the United States. However, the scenario has now changed as the counties in space have expanded beyond the big two. Nations including France, North Korea, Japan, India, Iran and Israel have also developed massively in this domain. Each of these nations possesses unique abilities and characteristics. For instance, Japan's post-World War II space activities stood limited until a recent constitution change, while India heavily invested in space capabilities and infrastructure. North Korea has been working on jamming radio frequency signals sent to or from a satellite, France on laser beams fired from the ground, which could dazzle a spy satellite, thereby preventing it from capturing photographs of classified targets, and Iran on cyberattacks that

could interfere with a satellite's systems. Meanwhile, according to the Secure World Foundation (SWF) report, the big three (Russia, China and US) already possess the above approaches.

The report further states that the big three have also mastered "rendezvous and proximity operations" that involve using satellites as weapons or surveillance devices. A country's satellite could manoeuvre within miles of an adversary's device, capture pictures of the equipment and transmit the photographs to Earth. Or, if a satellite tries to creep up to another, it can effectively spray the adversary's lenses or cover its solar panels to cut off power and turn it useless. As per experts, Russia might have advanced with this technology as it has already launched a series of small satellites, which the Russian Ministry of Defense calls "inspector satellites".

First Developments From The Cold War

During the Cold War, the United States and the Soviet Union spent vast amounts of their GDP developing defence technologies. The plan of placing objects in space stimulated space research and triggered the Space Race. The USSR launched the first artificial satellite, Sputnik 1, in 1957. Both nations regularly deployed satellites by the end of the 1960s. The defence forces used reconnaissance satellites to click accurate photographs of their adversary's military installations. With time, the accuracy and resolution of orbital reconnaissance raised alarms for both the giants. Soon, the Soviet Union and the US began to develop anti-satellite weapons to destroy or blind the opponent's satellites.

Kamikaze-style satellites, directed-energy weapons and orbital nuclear explosives were also researched with different levels of success. Spy satellites were used to monitor the dismantling of military assets per the treaties signed between the two. Using spy satellites in this manner is often referred to as "national technical means of verification" in the treaties. With the implosion of the Soviet Union, the Cold War ended, and so did the space race between the countries. The US was now left as the only superpower globally with a considerable concentration of technological advancement and the world's wealth. Despite the new status gained by the US, countries such as Japan, China and India have commenced their space programmes, as mentioned earlier, while the European Union works collectively to develop satellite systems to contest those of the US.

Space-Warfare in A Nutshell

In layman's terms, any combat in outer space, i.e. outside the Earth's atmosphere, is Space warfare. Technically, this refers to battles where the targets are present in space. Therefore, such a battle involves ground-to-space warfare, such as attacking satellites from Earth, and space-to-space warfare, where satellites attack their adversary. Only some incidents of space warfare have occurred in the past, though all were training missions; for example, in the mid-1980s, a United States Air Force pilot in an F-15 shot down the P78-1 communications satellite. However, in 2007, China used a missile system to eliminate one of its obsolete satellites, and in 2008, the US destroyed its malfunctioning satellite USA 193 similarly. Following the two countries, India destroyed a live satellite in 2019, and in 2021, the Russian military destroyed the Kosmos 1408, an old Soviet satellite, using a ground-based missile.

Space, Defence and Security Analyst Omkar Nikam opines that space is currently a strategic point of dominance instead of a conflict zone. There are conflicts between several nations, such as the two different human spaceflight programs to Moon – Artemis, which we initiated, and the International Lunar Research Station (ILRS) undertaken by China and Russia. Such programs

are segmenting and dividing the nations, but a lot more commercial innovation is pumped out at the same time. And in the near future, we might observe that commercial space might bridge the gap and potentially help develop healthy international cooperation between several nations.

Potential Risks of Space-Warfare

Open sources suggest that the top players in space have advanced their space military capabilities, including technologies that merely disrupt spacecraft by blocking data collection and transmission and such anti-satellite weapons. According to experts, if these advanced technologies are deployed, they could ratchet up an arms race or even trigger a war in space. Destroying a single satellite would scatter debris throughout the atmosphere, and such an explosion could severely affect projectiles in the pathway of other spacecraft that would threaten the accessibility of space for all. There could be collateral damage to the several everyday satellites that already circle the Low-Earth orbit. About half are from the United States and provide services like long-distance communications, internet access, GPS signals, and weather information. When a missile hits a satellite, its debris could take out another spacecraft and create more debris.

In 2007, when China conducted an anti-satellite missile test, a massive cloud of space junk drew international condemnation. On the other hand, India tried to limit the debris by conducting their test at a low altitude to enable the Earth's gravity to pull the pieces down where they would burn up on the descent. China's space approach can be described as RAPID, ACTIONABLE, and STRATEGIC. Looking back at history, China has single-handedly developed complex space capabilities, and within a decade (China privatised its space industry in 2015), the country has rapidly expanded the reach of its commercial space technologies. Though there are still several hurdles to cross, China has established a strong presence in the space domain by launching its navigation system, BeiDou. The Chinese space industry is evolving rapidly as compared to others, and in the coming years, we might observe China's Belt Road Initiative (BRI) member nations also joining or contributing to the Chinese space sector, says Omkar

Policies for Space Militaries?

So far, no international policies or norms exist to educate the militaries on what's allowed in modern-day space and what's not. The SWF report argues that a misunderstanding or an incident could raise tensions if it's perceived as an armed attack. Other media reports state that smaller space powers have few satellites and less to lose, unlike the United States. A tense regional relationship could stand unpredictable. For instance, in a standoff between the US and South Korea, North Korea might decide to fire and detonate a nuclear weapon in space that would propel radiation, disabling most satellites. The only international law that exists offers some guidance regarding modern weapons in space. While they prohibit weapons of mass destruction in space, they don't limit the use of other kinds of space weapons, military space forces or weapon tests. These laws include the UN's Outer Space Treaty, passed in 1967 and the Partial Nuclear Test Ban Treaty, passed in 1963.

As A Next-Gen Battlefield

Omkar Nikam explains that it will potentially become more of a strategic point of dominance as opposed to a conflict zone. Moreover, as an industry expert, I believe we should neutralise threats without creating a destabilised zone. Therefore, it is imperative to understand that creating or looking toward space as a battlefield will only cast a wide net of regulations across

the commercial sector, which will ultimately degrade international cooperation and create more harm to the scientific and educational community in the process. Because space is not only a resource for commercial and defence purposes, it is a much more valuable resource for scientific communities. Astrophysics, Astrobiology, Cosmochemistry, Radio Astrophysics, etc., are some of the crucial branches of space sciences that not only contribute toward technology innovation but also help advance our planet's chemical and biological knowledge base.

What Is The Present Utilisation Of Space By India?

Air Vice-Marshal M Ranade, Assistant Chief of Air Staff-Space, Indian Air Force, noted in the June issue of Indian Aerospace & Defence magazine that "The role of the IAF is closely linked to the space domain. Activities through the medium of air and space can never be separated and conducted in isolation. It has always aligned its operational priorities keeping the space domain in focus, with due attention to the rapid advancements in that field. Currently, IAF is utilising the space domain for Satellite Communications (SATCOM), Position Navigation Timing (PNT) and Intelligence Surveillance and Reconnaissance (ISR)."

SATCOM: The official said the Indian Air Force had set up SATCOM networks in the 2000s as a backup to its Optical Fiber Communication (OFC) networks. The satellites' hired bandwidth is used for these networks' operations. However, for Beyond Line of Sight (BLoS) operations, airborne sensors like Airborne Early Warning and Control (AEW&C) and Airborne Warning And Control System (AWACS) have also been exploiting space during the past decade. A dedicated IAF satellite, GSAT-7A, became operational in 2019, considering the growing bandwidth demand and the need to transfer information by airborne sensors with forces on the ground. The AoN for another satellite enabling BLoS communication with airborne elements was accorded by the Government the previous year.

The IAF also uses GLONASS and GPS-based PNT services for ground and air operations. The AVM opined that "Satellite-based images for planning air operations by IAF and to enhance situational awareness has been in vogue for a while. Operational requirements for space-based intelligence are being conveyed to the coordinating agency." Here Omkar is of the view that the world is looking toward the Indian space program because there is a strategic approach to developing space resources. As opposed to investing heavily in diverse fields, India has taken a bottom-to-top approach, where we first saw the launch segment strengthening the country's global position. With the recent developments in the privatisation of the Indian space sector, there will be more rapid developments in civil, commercial, and defence programs. Though everything is progressing very well, in the coming years, India needs to strengthen its position in space applications for defence, as it is one of the verticals that require more attention from a strategic point of view.

https://www.financialexpress.com/defence/space-emerges-as-indias-next-national-security-frontier/2590242/lite/

ThePrint

Mon, 11 Jul 2022

Defence Minister Rajnath Singh Briefs MPs on 'Agnipath' Scheme, Some Seek Rollback

New Delhi, Jul 11 (PTI) Ahead of the Monsoon Session of Parliament, Defence Minister Rajnath Singh gave a presentation to the Parliamentary Consultative Committee on Defence members on the "Agnipath" scheme for military recruitment on Monday, with some opposition MPs demanding its immediate withdrawal. After the nearly-two-hour meeting addressed by the defence minister and the three chiefs of the armed forces, opposition MPs, including those from the Congress, the Nationalist Congress Party (NCP) and the Trinamool Congress (TMC), raised objections to the new recruitment scheme and said it should be rolled back. Sources said Congress MP Shaktisinh Gohil cited the criticism of the scheme by experts and decorated soldiers and said it should be withdrawn as it would affect the morale of the forces and create confusion.

He said the scheme should first be launched as a pilot project and those trained be recruited in the armed forces. It should only be introduced after working out various modalities, Gohil added. The Congress leader was supported by NCP MP Supriya Sule and TMC MP Saugata Roy. They also gave a written document to the defence minister, seeking the withdrawal of the scheme, but Congress MP Manish Tewari did not sign it. Tewari has publicly lauded the Agnipath scheme, saying it is a much-needed reform as the armed forces of various other countries have introduced such a scheme. The presentation was aimed at addressing the concerns of the opposition leaders ahead of the Monsoon Session of Parliament, starting July 18. After briefing the MPs in the committee, the defence minister, the three service chiefs and the defence secretary answered several queries raised by them. After the unveiling of the scheme on June 14, violent protests against it were reported from several states for nearly a week and various opposition parties had demanded its rollback. The Indian Air Force (IAF) recently said it has received around 7.5 lakh applications under the scheme. The registration process began on June 24.

https://theprint.in/india/defence-minister-rajnath-singh-briefs-mps-on-agnipath-scheme-some-seek-rollback/1034368/

REPUBLICWORLD.COM

Mon, 11 Jul 2022

Israel's Iron Dome would be Ineffective Against Russian Missiles: Ukraine Defence Minister

In a sharp response to comments previously made by Kyiv's ambassador to Israel, Ukrainian Defence Minister Oleksii Reznikov on Sunday explained why the Israeli Iron Dome will be ineffective against Russian missiles. Speaking at a televised address, General Reznikov highlighted that the Iron Dome is manufactured to intercept mostly low-impact, slow-moving

missiles, and as Ukraine is facing Russian cruise and ballistic missiles, it will mostly be unable to "deliver 100% protection." Reznikov went on and added that with Russia continuing its brutal rampage, Ukraine will need "another air defence system" being developed in Israel and is available in the Czech Republic and the US. Reznikov, however, refused to divulge details on whether Kyiv was mulling purchasing such missile defence systems to intercept surface-to-air attacks.

"We need to develop our air defence/anti-missile defence system or to obtain one, including from our partners," the Ukrainian Defence Minister said. His contradictory remarks came after the Ukrainian envoy to Israel, Yevgen Korniychuk, in June, pushed Kyiv to purchase the surface-to-air missile defence system from Tel Aviv. Zelenskyy says 'will reshuffle cabinet ' to enhance post-war planning Meanwhile, Ukrainian President Volodymyr Zelenskyy is eyeing the reconstruction of the ex-Soviet nation as the conflict continues unabated. On Sunday, the embattled President told local media that he will reshuffle his cabinet to secure global confidence, tackle corruption and instances of collusion as well as plan post-war recovery. His announcement came after Zelenskyy citing "usual diplomatic practice" dismissed Ukrainian ambassadors to the Czech Republic, Germany, Hungary, Norway, and India last Saturday. He directed the other diplomats to step up efforts to secure foreign ties as the country was gearing up to refurbish the tattered economy.

https://www.republicworld.com/amp/world-news/russia-ukraine-crisis/israels-iron-dome-would-be-ineffective-against-russian-missiles-ukraine-defence-minister-articleshow.html

BBC

Mon, 11 Jul 2022

Ukraine Aims to Amass 'Million-Strong Army' to Fight Russia, Says Defence Minister

Ukraine has touted plans to amass a "million-strong army" equipped with NATO weapons to fight Russian forces. However, the comments by Defence minister Oleksii Reznikov are being seen as more of a rallying cry than a concrete plan for a counter offensive. They come as Russia makes gains in the eastern Donbas region, and continues to pound areas across Ukraine. Mr Reznikov also said that retaking the country's southern Black Sea coast was vital to the country's economy. In his interview with The Times newspaper, the minister said weapons deliveries needed to be sped up. He praised the UK for being "key" in the transition from providing Ukraine with Soviet-era weapons to the more effective Nato-standard air defence systems and ammunition. "We need more, quickly, to save the lives of our soldiers. Each day we're waiting for howitzers, we can lose a hundred soldiers," he said.

The defence minister added: "We have approximately 700,000 in the armed forces and when you add the national guard, police, border guard, we are around a million-strong." However, analysts have cautioned against taking the figure of one million at face value. "It's not a million-strong force that will be conducting a counter-attack," Dr Jack Watling, senior research fellow at the Royal United Services Institute, told the BBC. "Normally you would want operational surprise when you launch a counter-attack, so announcing it publicly is partly about forcing the Russians

to have to commit resources more widely to guard against this threat." Meanwhile, Russia's offensive continues relentlessly, especially in the Donetsk region. In one bloody incident on Sunday, a night-time rocket strike on a block of flats killed 30 people, local Ukrainian officials said. Nine people were rescued from the rubble in Chasiv Yar, near the city of Kramatorsk. Rescuers are still looking for survivors.

On Monday, six people were killed and 31 wounded when residential areas in the northeastern city of Kharkiv were struck by Russian shells, the regional governor said. There's always a danger when politicians directly intervene in military campaigns. Oleksii Reznikov said an offensive to recapture some of the territory taken by Russia was "politically very necessary". It's also economically important, not least to try to resume exports of Ukrainian grain via Black Sea ports. Ukraine may believe that while Russia focuses its military effort in the east, now is a good time to try to take back parts of the south. But the truth is that much of Ukraine's military effort and resources are already being consumed by fierce fighting in the Donbas. We have spoken to a number of units that have already lost more than half their troops and need reinforcements. Ukraine's confidence has been boosted by the supply of more advanced long-range artillery systems - but still not in the number Ukraine says it need.

The question is whether Ukraine is really yet ready to conduct a major offensive in the south, while its forces try to halt Russia's advances in the east? I've been told that Western politicians have already made clear to senior Ukrainian politicians and military commanders that now is not the time to try to launch a major counter-offensive. It may be good for morale, but it could easily stall. So far Ukraine's counter-offensive operations around Kharkiv and Kherson have had limited success. They still need time to rebuild their army. Russia's own initial invasion of Ukraine highlights the dangers of fighting on multiple fronts. It failed to achieve most of its objectives. It's only seen some success in the east by concentrating its forces.

https://www.bbc.com/news/world-europe-62118953

Science & Technology News

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Connecting the Dots between Virus Infection and Progress of Brain Cancer

Scientists have found that cancer-causing virus Epstein Barr Virus (EBV) can infect the neuronal cells and drive various changes in biomolecules such as fatty acids, carbohydrates, and protein

components, leading to diseases of the central nervous system as well as brain cancer. EBV virus has been found to be widely present in the human population. It usually does not cause any harm, but the virus gets reactivated inside the body in some unusual conditions like immunological stress or immunocompetence. This may further lead to various complications like a type of blood cancer called Burkitt's lymphoma, stomach cancer, multiple sclerosis, and so on. Earlier studies provided links of EBV involvement in various neurodegenerative diseases. However, how this virus can affect the cells of brain and manipulate them is still unexplored.

A research team from IIT Indore utilized the Raman microspectroscopy technique, supported by the Department of Science and Technology (DST) under FIST scheme to explore the possible impacts of a cancer-causing virus on brain cells. The technique based on Raman Effect is a simple, cost-effective tool to find sensitive chemical changes in biological samples. The study, published in the journal ACS Chemical Neuroscience, showed that there could be timely and gradual changes in various biomolecules in the neuronal cells under viral influence. Additionally, these changes were distinct when compared to the changes observed in other supportive brain cells (that is, astrocyte and microglia).

The team consists of a group leader from Infection Bioengineering group at IIT Indore, Dr. Hem Chandra Jha, along with his students Omkar Indari, Shweta Jakhmola, and Meenakshi Kandpal in collaboration with the group leader of Material and Device Laboratory (Department of Physics), Professor Rajesh Kumar and team including Dr. Devesh K. Pathak and Ms. Manushree Tanwar found that some common biomolecular changes were observed at times in these cells. They observed that the lipid, cholesterol, proline, and glucose molecules increased in the cells under viral influence. These biomolecular entities could ultimately play pivotal roles in the viral usurpation of cells. Further, the study also provided insights into whether these biomolecular changes can be correlated to virus-associated impacts and linked to neurological complications.

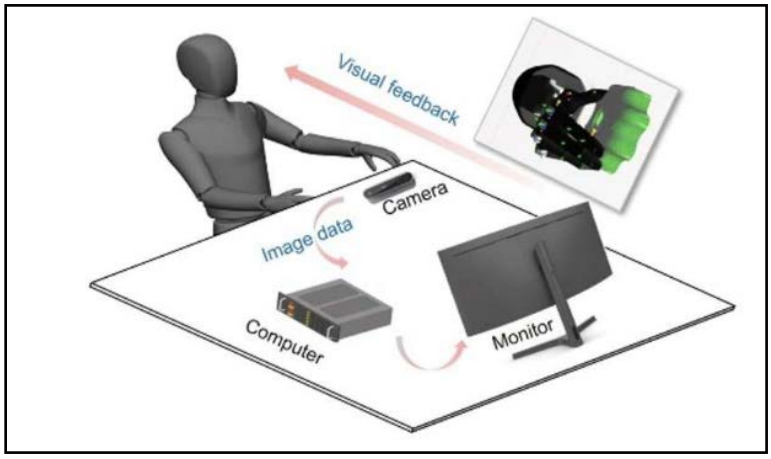
"The research work aids in the understanding of EBV-mediated biomolecular changes in the various compartments of the central nervous system leading to better understanding of nervous system diseases," said Dr. Hem Chandra Jha. Professor Rajesh Kumar pointed out that the study is also helpful in establishing the advantages of Raman microspectroscopy, a cost-effective and non-invasive technique, in carrying out studies on virus-associated cellular complications in clinical settings. It could provide an upper hand in analysing clinical samples in comparison to other techniques, which require advanced setups for studying the virus-associated changes in cells, tissues, and organs.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1840747

Mon, 11 Jul 2022

A New Approach to Enhance Multi-Fingered Robot Hand Manipulation

In recent years, roboticists have developed increasingly advanced robotic systems, many of which have artificial hands or robot hands with multiple fingers. To complete everyday tasks in both homes and public settings, robots should be able to use their "hands" to efficiently grasp and manipulate objects. Enabling dexterous manipulation involving multiple fingers in robots, however, has so far proved challenging. This is primarily because it is an advanced skill that entails an adaptation to the shape, weight, and configuration of objects. Researchers at Universität Hamburg have recently introduced a new approach to teach robots to grasp and manipulate objects using a multi-fingered robotic hand. This approach, introduced in IEEE Transactions on Neural Networks and Learning Systems, allows a robotic hand to learn from humans through teleoperation and adapt its manipulation strategies based on human hand postures and the data gathered when interacting with the environment.



"The original idea behind this research was to develop a teleoperation system that can transfer human hand manipulation skills to a multifigured robot hand, so that a human user can teach a robot hand to perform tasks online," Dr. Chao Zeng, one of the researchers who carried out the study, told TechXplore. "There are two basic objectives of our work. Firstly, unlike other state-of-the-art methods, we do not want to wear a glove with optical markers on it." Zeng and his colleagues wanted their robot to acquire dexterous manipulation skills by watching human demonstrations. However, instead of forcing human users who are training the robot to wear gloves with optical markers, as done in other previous studies, they wanted the user to be able to move his/her fingers freely, without any physical restrictions.

Instead, they used cameras to capture images of the human user's hand postures. This proved to be quite challenging, yet they were ultimately able to attain promising results. "Our second objective was to use the robotic hand to achieve compliant behaviors, like we humans do, so that

it would be able to deal with physical contact-rich interaction tasks with expected dexterity," Zeng explained. In their previous works, the researchers found that controlling the force with which a robot grasps or holds objects can help to attain more compliant manipulation skills. These are skills that are particularly important during tasks that entail a physical interaction with objects, such as cutting, sawing or inserting objects inside something.

"In this research, we also wanted to adopt force control on the robot hand," Zeng said. "However, directly training a deep neural network (DNN) to generate the desired force control commands for the robot at run time is challenging. To address this problem, we take a two-step approach." The first step of the approach devised by Zeng and his colleagues entailed capturing the posture of human users and mapping this onto the robot's joint angles using a DNN. Their model was trained on data they collected during simulations. After its training, it could effectively analyze images of a human user's hands and produce matching joint angles for the robot's hands. "As a second step, we designed a force control strategy that can predict the desired force commands at each time step given the current reference angles," Zeng said. "Our approach's two components can be seamlessly integrated into the teleoperation system, to improve the compliance of the robotic hand, as we had set out to do." The researchers evaluated their approach in a series of tests, both in simulations and in real-world settings using the Shadow hand, a robotic system that resembles a human's hand in both size and shape. Their results were highly promising, as their models significantly outperformed a widely used approach for compliant robot manipulation, producing more effective manipulation strategies.

"The system we proposed can be used for robot hand teleoperation only relying on vision data, and it can work in both simulation and real-world tasks," Zeng said. "Our work is an interesting attempt to integrate high-level learning and low-level control for robot manipulation. Although this integration looks somehow straightforward, it can indeed improve the robot's compliant manipulation ability." In the future, the new approach introduced by this team of researchers could help to improve the manipulation skills of both existing and newly developed humanoid robots. In addition, it could prove to be a promising strategy to close the gap between deep learning and control-based approaches, merging the advantages of both to improve the capabilities of robots. "Our current teleoperation system is not perfect, and several aspects could be improved," Zeng added. "For example, it lacks immersion during teleoperation and VR/AR might be used to improve the human user experience. In our next studies, we plan to explore these possibilities and train a better NN model that can generalize over different human hands of different sizes. We are also considering the possibility of tracking the robot's arm to realize robot arm-hand teleoperation for compliant manipulation."

https://techxplore.com/news/2022-07-approach-multi-fingered-robot.html

The Indian EXPRESS

Mon, 11 Jul 2022

Biden and NASA Share First Image of Universe taken from James Webb Space Telescope

By Dennis Overbye, Kenneth Chang and Jim Tankersley

The image, taken by the James Webb Space Telescope — the largest space telescope ever built — showed a distant patch of sky in which fledgling galaxies were burning their way into visibility just 600 million years after the Big Bang In a brief event at the White House on Monday evening, President Joe Biden unveiled an image that NASA and astronomers hailed as the deepest view yet into our universe's past. The image, taken by the James Webb Space Telescope — the largest space telescope ever built — showed a distant patch of sky in which fledgling galaxies were burning their way into visibility just 600 million years after the Big Bang. "This is the oldest documented light in the history of the universe from 13 billion — let me say that again, 13 billion — years ago," Biden said. The president, who apologized for beginning the event tardily, praised NASA for its work that enabled the telescope and the imagery it will produce.

"We can see possibilities no one has ever seen before," Biden said. "We can go places no one has ever gone before." Biden's announcement served as a teaser for the telescope's big cosmic slideshow coming Tuesday morning, when scientists reveal what the Webb has been looking at for the past six months. For Biden, the reveal of the images was also a chance to engage directly with an event that will almost certainly stir wonder and pride among Americans — at a time when his approval ratings have plummeted as voters recoil at high food and gasoline prices and Democrats question his ability to fight for gun control and abortion rights.

In a setting in the White House's South Auditorium that evoked scenes from the bridge of a starship on "Star Trek," Biden and Vice President Kamala Harris were joined by Alondra Nelson, the acting director of the White House Office of Science and Technology Policy; Bill Nelson, the former Florida senator appointed NASA administrator by Biden; and Jane Rigby, an operations project scientist for the Webb telescope. Each sat at small, widely spaced desks in front of a large screen where other NASA officials appeared. The screen gave way to the cosmic image, which was speckled with tiny dots of galaxies and drew applause from the far end of the room.

Nelson, the NASA chief, touted the telescope's scientific potential at the White House event. "We are going to be able to answer questions that we don't even know what the questions are yet," he said. When he added that the technology could determine whether other planets were habitable, Biden responded with a "Whoa." As the ceremony ended and the reporting pool was escorted from the room, Biden was heard to say, "I wonder what the press are like in those other places." One of the most ambitious of the Webb telescope's missions is to study some of the first stars and galaxies that lit up the universe soon after the Big Bang 14 billion years ago. Although Monday's snapshot might not have reached that far, it proved the principle of the technique and

hinted at what more is to come from the telescope's scientific instruments, which astronomers have waited decades to bring online.

As the telescope "gathers more data in the coming years, we will see out to the edge of the Universe like never before," said Priyamvada Natarajan, of Yale University, an expert on black holes and primeval galaxies, in an email from India. She added, "It is beyond my wildest imagination to be alive when we get to see out to the edge of black holes, and the edge of the universe."

What image NASA and Biden showed?

On Friday, NASA released a list of five subjects that Webb had recorded with its instruments. But Biden showed off one of them at the White House on Monday.The image goes by the name of SMACS 0723. It is a patch of sky visible from the Southern Hemisphere on Earth and often visited by Hubble and other telescopes in search of the deep past. It includes a massive cluster of galaxies about 4 billion light-years away that astronomers use as a kind of cosmic telescope. The cluster's enormous gravitation field acts as a lens, warping and magnifying the light from galaxies behind it that would otherwise be too faint and far away to see. Thomas Zurbuchen, NASA's associate administrator for space science, described this image as the deepest view yet into the past of our cosmos.

Marcia Rieke of the University of Arizona, who led the building of NIRCam, one of the cameras on the Webb telescope that took the picture, said, "This image will not hold the 'deepest' record for long but clearly shows the power of this telescope."

What about the rest of the images?

NASA will show other pictures at 10:30 a.m. ET Tuesday in a live video stream you can watch on NASA TV or YouTube. They will be shown off at the Goddard Space Flight Center in Greenbelt, Maryland. The pictures constitute a sightseeing tour of the universe painted in colors no human eye has seen — the invisible rays of infrared, or heat radiation. A small team of astronomers and science outreach experts selected the images to show off the capability of the new telescope and to knock the socks off the public. There is the Southern Ring Nebula, a shell of gas ejected from a dying star about 2,000 light-years from here, and the Carina Nebula, a huge swirling expanse of gas and stars including some of the most massive and potentially explosive star systems in the Milky Way.

Yet another familiar astronomical scene is Stephan's Quintet, a tight cluster of galaxies about 290 million light-years from here in the constellation Pegasus. The team will also release a detailed spectrum of an exoplanet known as WASP-96b, a gas giant half the mass of Jupiter that circles a star 1,150 light-years from here every 3.4 days. Such a spectrum is the sort of detail that could reveal what is in that world's atmosphere.

Why has it taken so long to share Webb's first images?

Getting to space on Christmas Day last year was just the first step for the James Webb Space Telescope. The spacecraft has been orbiting the second Lagrange point, or L2, about 1 million miles from Earth since Jan. 24. At L2, the gravitational pulls of the sun and the Earth keep Webb's motion around the sun in synchronization with Earth's. Before it got there, pieces of the telescope had to be carefully unfolded: the sun shield that keeps the instruments cold so it can precisely capture faint infrared light, the 18 gold-plated hexagonal pieces of the mirror. For the

astronomers, engineers and officials watching on Earth, the deployment was a tense time. There were 344 single-point failures, meaning if any of the actions had not worked, the telescope would have ended as useless space junk. They all worked.

The telescope's four scientific instruments also had to be turned on. In the months following the telescope's arrival at L2, its operators painstakingly aligned the 18 mirrors. In April, the Mid-Infrared Instrument, or MIRI, which requires the coldest temperatures, was cooled to minus 447 degrees Fahrenheit, and scientists could begin a final series of checks on it. Once these and other steps were done, the science could begin.

How does the Webb compare with the Hubble telescope?

The Webb telescope's primary mirror is 6.5 meters (about 21 feet) in diameter, compared with Hubble's, which is 2.4 meters, giving Webb about seven times as much light-gathering capability and thus the ability to see further out in space and so deeper into the past. Another crucial difference is that Webb is equipped with cameras and other instruments sensitive to infrared, or "heat," radiation. The expansion of the universe causes the light that would normally be in wavelengths that are visible to be shifted to longer infrared wavelengths that are normally invisible to human eyes.

https://indianexpress.com/article/technology/science/nasa-biden-share-first-image-of-universe-taken-from-james-webb-space-telescope-8023682/lite/

the pioneer

Tue, 12 Jul 2022

Harnessing Atomic Power for the Good

Horizons of violence and war are fast expanding. The Russian invasion of Ukraine lingers on with no signs of victory or defeat, no possibility of a reconciliation or meditation by other nations. It is inflicting inhuman sufferings not only on the people of Ukraine and Russia but on practically every country, one way or another. At this juncture in history, war anywhere would no longer remain confined to two nations, but would drastically impact the planet as a whole. Is it not really intriguing that a world devastated by the pandemic for over two years finds itself in the midst of another global crisis which could cause immeasurable loss to life and property, coupled with devastating wastage of natural resources?

There are significant indications that more war zones could open up any day. These could involve Russia and NATO, or the China-Taiwan-US. There is practically no visible effort at the international level to attempt a truce. On the contrary, the Nato nations, sitting on the fence, are supplying arms and ammunition to Ukraine and publicising it as a great act of "help". Obviously, it is a clear act of inspiring Ukraine to continue the war. What destiny have human beings created for themselves, the one that includes their own destruction; nations competing among themselves in the race to produce more and more lethal weapons? Enormous sums are consumed in this race to produce lethal weapons. This race thus becomes one of one-upmanship, resulting in widely spread vested business interests requiring promotion, use and sale to generate rich dividends. And that would increase insecurity, apprehensions, distrust, violence and wars.

Wars are often referred to as parts of history, which is factually correct. However, it must be remembered that when nations, regions, principalities and even village clusters were independent of each other, victory and defeat had a specific meaning. Not now, when everyone is dependent on everyone else. Nato may impose sanctions against Russia, but its dependence on Russian natural gas has another story to tell. One of the most revered global figures — except by China — His Holiness the Dalai Lama articulates it succinctly: "However, we are so interdependent that the concept of war has become outdated. When we face problems or disagreements today, we have to arrive at a solution through dialogue. Dialogue is the only appropriate method. One-sided victory is no longer relevant. We must work to resolve conflicts in a spirit of reconciliation and always keep in mind the interests of others. We cannot destroy our neighbours. We cannot ignore their interests. Doing so would ultimately cause us to suffer."

We all know that everyone is a neighbour of everyone else. They are neighbours, but not necessarily neighbourly! Unfortunately, an analytical perusal of the developments of the last seven decades generates little hope in international organisations like the UN, UNSC and other bodies that were expected to minimise — if not completely abolish — violence, wars, exploitation and production of lethal nuclear weapons. Is it not a sad commentary that the nuclear race stands escalated as against the great expectations that it would be totally banned? The views of Einstein, published in the New York Times on August 16, 1948, say it all: "We scientists, whose tragic destiny it has been to help make the methods of annihilation ever more gruesome and more effective, must consider it our solemn and transcendent duty to do all in our power to prevent these weapons from being used for the brutal purpose for which they were invented. What task could possibly be more important to us? What social aim could be closer to our hearts?"

Human beings are blessed with unfathomable power of ideas and imagination. It is the curiosity that ignites the mind to explore, discover, innovate and utilise. Creativity kindles acquisition of skills, ever open to refinement, and replaced by newly discovered ones. It is these human traits that lead to the advancement of civilisations and exploration of the secrets of nature, leading to new inventions and discoveries in the realm of science and technology or, in the current context, information and communication technology. One of the most significant human achievements in science and technology was the first atomic explosion, some 210 miles south of Los Alamos, New Mexico, on July 16, 1945.

The generation of enormous amounts of energy was now within man's reach and control. Obviously, scientists were exploring how it could help improve human lives, and how all concerns regarding energy availability could indeed be resolved in the years ahead. In the Indian tradition, any acquisition of knowledge is of relevance only if it can be used to better the lives of all humanity, with all its diversity accepted and respected: 'Sarva bhut hite ratah'. One often comes across references to Robert Oppenheimer referring to the famous shloka of Gita: 'Brighter than a thousand suns'! But that was that; powers that be were thinking about the destructive possibilities of the new tool that scientists had placed at their disposal, and they had no ethical qualms that could prevent disastrous applications of atomic weapons in Hiroshima and Nagasaki. To prevent the recurrence, there has to be sustained dependence on dialogue, discussion and deliberations. Any laxity would mean devastation, destruction and disasters of unfathomable measure.

https://www.dailypioneer.com/2022/columnists/harnessing-atomic-power-for-the-good.html