

अक्टूबर
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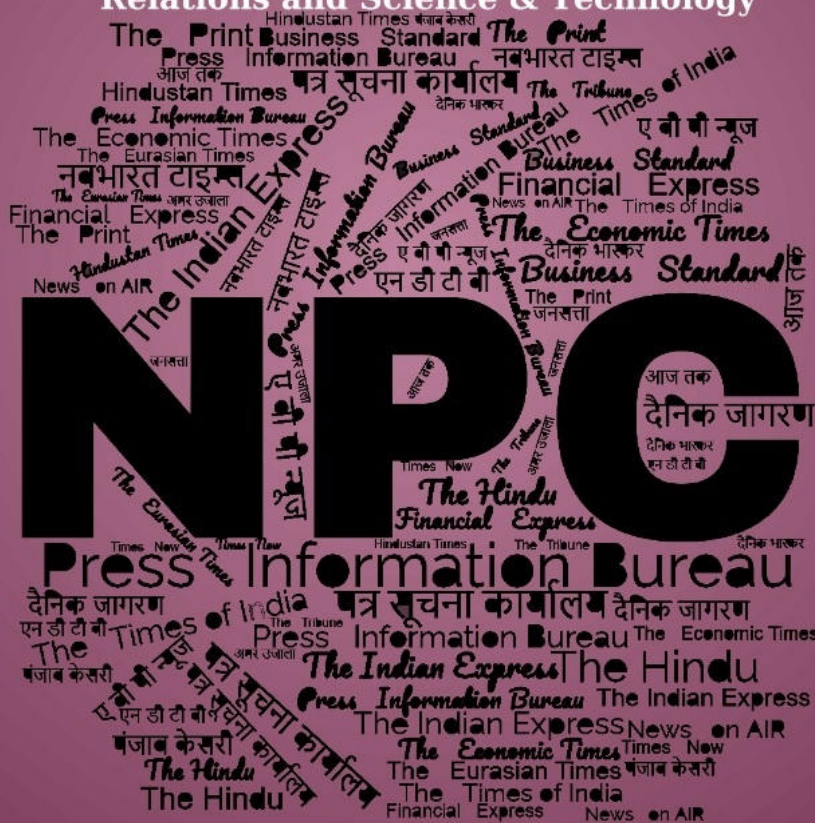
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डीआरडीओ समुदाय को डीआरडीओ प्रौद्योगिकियों, रक्षा प्रौद्योगिकियों, रक्षा नीतियों, अंतर्राष्ट्रीय संबंधों और विज्ञान एवं प्रौद्योगिकी की नूतन जानकारी से अवगत कराने हेतु दैनिक सेवा

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DRDO News

DRDO releases the Indian Radio Software Architecture standard 1.0 to enable interoperability in Military Communication

Source: Press Information Bureau, Dt. 07 Oct 2025

Defence Research and Development Organisation (DRDO), in collaboration with the Integrated Defence Staff (IDS) and the Tri-Services, formally released Indian Radio Software Architecture (IRSA) standard 1.0 to enable interoperability in Military Communication, during the National workshop organised on Oct 06, 2025 at DRDO Bhawan, New Delhi. IRSA is a comprehensive software specification for Software Defined Radios (SDR), defining standardized interfaces, APIs, execution environments, and waveform portability mechanisms. IRSA is designed to ensure waveform portability, SDR Interoperability, Certification and Conformance.



The launch of IRSA represents a defining step in India's journey toward self-reliance in defence communication technologies, embodying the vision of building indigenous, inter-operable, and future-ready SDR solutions — designed in India, for India and ready for the world. The specification is designed to evolve with operational requirements. It also lays the foundation for integrating future technologies.

The workshop covered the journey of IRSA, its technical overview, ecosystem roles and future directions. It also provided a platform for industry, academia and the tri-services to discuss collaboration opportunities, pilot projects and adoption pathways.

The event brought together representatives from the Indian Armed Forces, Department of Defence Production (DDP), Defence Public Sector Undertakings (DPSUs), industry, academia and research institutions, highlighting a comprehensive and collaborative approach towards developing indigenous communication technologies. Dr Samir V Kamat, Secretary DD R&D and Chairman DRDO was the Chief Guest of the event. Air Marshal Ashutosh Dixit, Chief of Integrated Defence Staff, and Dr Rajat Moona, Director IIT Gandhinagar were the Guests of Honour. The National workshop was organised under the guidance of Dr. BK Das, DG (ECS).

About IRSA:

The IRSA initiative traces its origin to 2021, when the critical role of SDRs in modern military communication was highlighted and the need for a national software standard was felt. A core technical team led by DRDO initiated work in 2022, engaging with the Integrated Defence Staff (IDS) and the Services to capture operational and user requirements. After extensive reviews and consultations with stakeholders, IRSA Version 1.0 was approved by the High-Level Advisory Committee (HLAC) in 2025, becoming India's first national specification defining a standardised software architecture for Software Defined Radios. The vision is to position IRSA not just as a national standard, but as a global benchmark — enabling India to shape the future of SDR technology and export IRSA-compliant solutions to friendly nations.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2175879>

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DRDO celebrates Swachhotsav 2025 at DRDO Bhawan

Source: Press Information Bureau, Dt. 07 Oct 2025

In line with the Government's Swachh Bharat Abhiyan, a special cleanliness drive was conducted at DRDO Bhawan on Oct 07, 2025. The event focussed on responsible disposal of waste for a healthier and cleaner environment. The Swachhata-Hi- Seva, 2025 fortnight was marked by various activities namely Identification of CTU Work & Geotagging, Cleaning Drive at Circle, Lecture & Quiz on "Community Responsibility for Cleanliness", Cleaning of CTUs, Shramdaan & Cleaning drive at nearby Temple Area, organising Safai Mitra Suraksha Shivir by INMAS Team, Selfie Point Installation, Open Competitions for Poster making, poem and essay writing etc., inspiring participants to go beyond ordinary efforts.

At the end of the event, Director General, DRDO felicitated the safai mitras for their efforts round the year and stated that Swachhotsav is not just one-day event but a movement to transform habits and build a cleaner & healthier future. The event culminated with a pledge, binding all to continue the mission of cleanliness at work and at home.

<https://www.pib.gov.in/PressReleasePage.aspx?PRID=2175856>

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Stalin sets target of securing 75K crore investment in aerospace and defence manufacturing

Source: The Statesman, Dt. 08 Oct 2025

Expressing the desire that Tamil Nadu should become a centre of defence manufacturing and propelling growth, Chief Minister MK Stalin on Tuesday said the state has set a target of securing Rs 75,000 crore investments in this sector by the year 2032. Inaugurating the three-day **AeroDefCon'25 (Aerospace and Defence Conference cum exhibition)** in Chennai, he said "I wish Tamil Nadu to become a centre for manufacturing in this sector with the Defence Industrial Corridor set to play a key role in the future."



The state government would always stand by the armed forces personnel, scientists, entrepreneurs and investors, he added. The global conference organised by the state government in association with BCI Aerospace of France, is being attended by 300 plus enterprises, over 1000 delegates and more than 8000 B2B meetings. Top Original Equipment Manufacturing industries from 19 countries participating in the three-day event included Boeing, Airbus, Lockheed Martin and Dassault as well as ISRO, **DRDO**, HAL and Tata Group. Many firms have set up their stalls at this expo.

Stating that the Defence Industrial Corridor has become a turning point for this sector bringing together aerospace, defence and shipbuilding, he said "since its inception it has attracted Rs 23,000 crore investments and is progressing towards achieving the target of Rs 75,000 crore for the next seven years.

Already projects worth Rs 5000 crore had been implemented. In order to make Tamil Nadu a maritime economy hub, MoUs had been signed with Cochin Ship Yard and Mazagon Dock last month for an investment of Rs 15,000 crore, generating 60,000 jobs, including 10,000 direct employment." Stalin announced that this AeroDefCon would be made an annual event bigger than the present one. Defence, Testing and Coordination Centres would be established through the TN Industrial Development Corporation (TIDCO) and integrated into the global supply chains to make the State aerospace, defence innovation hub.

<https://www.thestatesman.com/india/stalin-sets-target-of-securing-75k-crore-investment-in-aerospace-and-defence-manufacturing-1503496193.html>

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Defence News

रक्षा क्षेत्र में आत्मनिर्भरता की ओर देश: राजनाथ सिंह

Source: Punjab Kesari, Dt. 08 Oct 2025

● 2024-25 में 1.20 लाख करोड़ के घरेलू सैन्य उपकरण खरीद दिए गए

नई दिल्ली, (पंजाब केसरी): रक्षा मंत्री राजनाथ सिंह ने मंगलवार को कहा कि भारत वित्तीय वर्ष 2024-25 में 1.20 लाख करोड़ रुपये मूल्य के घरेलू सैन्य उपकरण और हथियार खरीद रहा है।

उन्होंने कहा कि देश सुरक्षा चुनौतियों का सामना करने के लिए तेजी से आत्मनिर्भरता की तरफ ध्यान लगा रहा है। एक कार्यक्रम को संबोधित करते हुए रक्षा मंत्री राजनाथ सिंह ने कहा कि सरकार, युद्ध क्षेत्र के बदलते स्वरूप, खासकर ड्रोन आदि के इस्तेमाल की अहमियत से पूरी तरह वाकिफ है और उसके अनुसार ही अपनी सैन्य तैयारी कर रही है। राजनाथ सिंह ने बताया कि '2021-22 में,



रक्षामंत्री राजनाथ सिंह विज्ञान भवन में प्रतिरक्षा निर्माण में भारत की संभावनाओं को लेकर एक प्रदर्शनी में हथियारों का निरीक्षण करते हुए।

घरेलू स्रोतों से हमने करीब 74 हजार करोड़ रुपये के घरेलू सैन्य उपकरण खरीदे, लेकिन 2024-25 के अंत तक, घरेलू स्रोतों से सैन्य खरीद बढ़कर करीब 1.20 लाख करोड़ रुपये हो गई है। यह बदलाव

केवल आंकड़ों का नहीं, बल्कि मानसिकता का भी है।' रक्षा मंत्री ने कहा कि 'मोदी सरकार ने पिछले 10 वर्षों में देश में रक्षा उपकरणों के स्वदेशी डिजाइन, विकास और निर्माण को प्रोत्साहित करने के लिए

कई नीतिगत पहल की हैं और इन पहलों के तहत, अब सैन्य उपकरणों की खरीद में घरेलू स्रोतों को प्राथमिकता दी जा रही है।' ड्रोन आदि गैर संपर्क तकनीक की अहमियत बढ़ीरक्षा मंत्री ने कहा, 'भारत सरकार युद्ध के बदलते स्वरूप से पूरी तरह वाकिफ है। आज का युद्ध पूरी तरह से तकनीक आधारित हो गया है।

हमने ऑपरेशन सिंदूर में भी इसका प्रदर्शन देखा। इसमें हमने पाया कि ड्रोन, ड्रोन-रोधी युद्ध और वायु-रक्षा प्रणालियों जैसे गैर-संपर्क युद्धों का महत्व काफी बढ़ गया है।' राजनाथ सिंह ने कहा कि 2047 तक भारत को एक विकसित देश बनाने में रक्षा क्षेत्र की भूमिका अहम है। रक्षा मंत्री ने कहा, 'हमें महत्वपूर्ण रक्षा क्षमताओं में आत्मनिर्भरता हासिल करनी होगी। साथ ही हमें रक्षा क्षेत्र में एक प्रमुख वैश्विक निर्यातक बनना होगा।

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रक्षा क्षेत्र को मजबूत करना सभी भारतीयों का साझा संकल्प है: राजनाथ सिंह

Source: Jansatta, Dt. 08 Oct 2025

जनसत्ता ब्यूरो
नई दिल्ली, 7 अक्टूबर।

रक्षा मंत्री राजनाथ सिंह ने मंगलवार को कहा कि रक्षा और सुरक्षा पूरे देश की सामूहिक जिम्मेदारी है और रक्षा क्षेत्र को मजबूत करना केवल एक संस्था या सरकार का कर्तव्य नहीं, बल्कि सभी भारतीयों का साझा संकल्प है।

'देश में रक्षा विनिर्माण के अवसर' विषय पर आयोजित इस सम्मेलन में रक्षा मंत्री ने राज्यों और केंद्रशासित प्रदेशों से एक मजबूत, विश्व स्तर पर प्रतिस्पर्धी रक्षा विनिर्माण पारिस्थितिकी तंत्र के निर्माण में सक्रिय भागीदार बनने का आह्वान किया। साथ ही उन्होंने कहा कि भारत का रक्षा उत्पादन जो 2014 में 46,000 करोड़ रुपये से अधिक था। अब 2025 में 1.5 लाख करोड़ रुपये से ज्यादा



हो गया है।

सिंह ने कहा कि रक्षा में आत्मनिर्भरता हमारे लिए केवल उत्पादन या अर्थव्यवस्था का मामला नहीं है, बल्कि यह सबसे पहले और सबसे महत्वपूर्ण रणनीतिक स्वायत्तता का मामला है और सीधे संप्रभुता से जुड़ा है। उन्होंने इस बात पर प्रकाश डाला कि आपरेशन सिंदूर के दौरान, जब देश को एक 'छद्म

अभ्यास' की आवश्यकता थी, सभी राज्य सरकारों और उनकी एजेंसियों ने सक्रिय रूप से भाग लिया। उन्होंने आगे कहा कि यह सब इस बात का प्रमाण है कि जब हम सभी एक लक्ष्य की ओर मिलकर काम करते हैं, तो कोई भी चुनौती बड़ी नहीं होती।

रक्षा मंत्री ने कहा कि भारत राष्ट्रीय सुरक्षा चुनौतियों का सामना करने के लिए आत्मनिर्भरता को मजबूत करने पर लगातार ध्यान केंद्रित कर रहा है। उन्होंने कहा कि सरकार युद्ध के बदलते स्वरूप खासतौर पर ड्रोन जैसे 'नान-कान्टैक्ट वारफेयर' (दूरस्थ युद्ध तकनीक) के महत्व को समझती है और उसके अनुसार तैयारी कर रही है। इस संदर्भ में उन्होंने विभिन्न सुरक्षा चुनौतियों का सामना करने के लिए भारत के अपने रक्षा उद्योगों को बढ़ाने के महत्व को रेखांकित किया।

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Self-reliance in defence linked to strategic autonomy, says Rajnath Singh

Source: Hindustan Times, Dt. 08 Oct 2025

NEW DELHI: Self-reliance in defence is not just about boosting production or economy but directly linked to the country's strategic autonomy and sovereignty, defence minister Rajnath Singh said on Tuesday, adding that India aims to grow the country's defence production to ₹3 lakh crore and exports to ₹50,000 crore by 2029.

"Defence and security are the collective responsibility of the entire nation and strengthening the defence sector is not just the duty of one institution or government but the shared resolve of all Indians," the defence minister said at a national conference on opportunities in the country's defence manufacturing sector, urging states and union territories to step forward and become active partners in building a robust and globally competitive defence manufacturing ecosystem.

Singh said all state governments and their agencies actively participated in the run up to Operation Sindoor — India's direct military response to the April 22 Pahalgam terror strike — when the country carried out mock drills. "All this is proof that when we all work together towards a goal, no challenge is too great."

In his address, Singh underlined how the defence manufacturing sector had grown over the last decade. India's defence production, which was around ₹46,000 crore in 2014, has now crossed the ₹1.5 lakh crore mark with the private sector accounting for over ₹33,000 crore, a clear indication that industry has become an equal stakeholder in the Atmanirbharta (self-reliance) mission, he said.

Singh also spoke at length on harnessing the power of technology and innovation.

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AI, algorithms to decide future wars, says Rajnath

Source: The Tribune, Dt. 08 Oct 2025

The battlefield has changed and wars of tomorrow will be fought with algorithms, autonomous systems and artificial intelligence, a demonstration of it was seen in Operation Sindoor, said Defence Minister Rajnath Singh.

Drones, anti-drone systems, quantum computing and directed-energy weapons will define the future, he said today while speaking at the 'Raksha Navachar Samvaad', an interaction between the Ministry of Defence and startups and innovators.

The minister urged innovators to think beyond existing solutions and develop technologies that redefine warfare. "We must not remain imitators or followers in technology we must become the creators and standard-setters for the world," he added. Today, more than 650 innovators have emerged and prototypes are being sourced worth Rs 3,000 crore, he said.

Singh encouraged startups to set higher benchmarks, underlining that India has more than 100 unicorns today, but none in the defence sector, calling upon them to change that.

"Let the first defence unicorn of India emerge from among you. It will be a matter of pride not only for you but for the entire nation," he added.

The minister lauded the collective effort of innovators for contributing to record-breaking achievements in defence production worth Rs 1.5 lakh crore and exports exceeding Rs 23,000 crore in the last financial year.

"You are the architects of a new India that believes in designing, developing and producing for itself. The energy and innovation you bring are key to realising the Prime Minister's vision of a technologically self-reliant India," he highlighted.

<https://www.tribuneindia.com/news/india/ai-algorithms-to-decide-future-wars-says-rajnath>

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Military hardware worth Rs. 1.20 lakh crore procured from domestic sources

Source: The Indian Express, Dt. 08 Oct 2025

PRESS TRUST OF INDIA
NEW DELHI, OCTOBER 7

INDIA PROCURED military hardware and weapons worth ₹1,20,000 crore from domestic sources by end of 2024-25 as it is increasingly focusing on boosting self-reliance to confront national security challenges, Defence Minister Rajnath Singh said Tuesday.

Addressing an event, Singh said the government is fully aware of the changing dynamics of the battlefield, especially the importance of non-contact warfare such as use of drones, and preparing for it accordingly.

In this context, he underlined the importance of enhancing India's own defence industries to meet myriad security challenges.

"In 2021-22, our capital acquisition from domestic sources was around ₹74,000 crore, but by the end of 2024-25, the capital acquisition from domestic sources has increased to approximately ₹1,20,000 crore," he said, adding, "This change is not just about data, but also about mindset."

Singh said that the Modi government has taken several policy initiatives in the last 10 years to encourage indigenous design, development, and manufacturing of defence equipment in the country.

Under these initiatives, the highest priority is now being given to domestic sourcing in procurement of military hardware, he noted. "Today's warfare has



Defence Minister Rajnath Singh speaks at Vigyan Bhawan, New Delhi, Tuesday as CDS Anil Chauhan looks on. PTI

become completely technology-oriented. We have seen a demonstration of this in Operation Sindoor as well," he said.

"In this, we observed that the importance of non-contact warfare, such as drones, anti-drone warfare, and air-defence systems, has significantly increased," he said.

Singh also listed goals in the defence sector to realise India's overall aim to become a developed country by 2047.

"First is that we must achieve a high degree of self-reliance in the critical defence capabilities. Second, we must become a prominent global exporter in the defence sector," he said.

"Third, to take India forward in cutting-edge technology sectors, we must achieve advancements in some new niche technologies," he said.

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Operation Sindoor 'shining example' of cohesion among armed forces: IAF Chief

Source: *The Indian Express*, Dt. 08 Oct 2025

OPERATION SINDOOR was a "shining example" of clear directions, India's indigenous capabilities and effective cohesion among the armed forces, Chief of Air Staff Air Chief Marshal A P Singh said on Tuesday.

Singh made the remarks in his message a day ahead of the 93rd Air Force Day.

"The Indian Air Force will continue to defend our nation's skies by enhancing its capabilities, embracing innovation and upholding the highest standards of professionalism," he said.

In response to the April 22 Pahalgam attack, India launched Operation Sindoor on May 7, targeting terror infrastructure in territories controlled by

Pakistan. The strikes triggered four days of intense clashes that ended with an understanding on stopping the military actions on May 10. In his remarks, the IAF chief said the highest priority of his force is to always protect India's integrity and sovereignty.

"Going beyond the combat role, the IAF always stood by the people, rescuing lives during floods, disasters and evacuating citizens from conflict zones as demonstrated during Operation Sindhu and Operation Brahma," he said.

"The Indian Air Force has been and will continue to be the first responder to the nation's call," he said. The IAF will celebrate the Air Force Day on Wednesday at the Hindon airbase.

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Pakistan likely to receive advanced air-to-air missiles from US

Source: *Hindustan Times*, Dt. 08 Oct 2025

Pakistan is likely to receive AIM-120 Advanced Medium-Range Air-to-Air Missiles (AMRAAM) from the United States, as ties between the two countries appear to be on an uptick. An arms contract recently notified by the US Department of War (DoW), formerly known as the Department of Defence, listed Pakistan among the 35 buyers for the missiles.

The DoW document, as seen by HT.com, said that the contract for Advanced Medium-Range Air-to-Air Missiles C8 and D3 variants was awarded to the Raytheon company, Tucson, Arizona. The total value of the contract stands at \$2,512,389,558.

"This contract involves foreign military sales to United Kingdom, Poland, Pakistan, Germany, Finland, Australia, Romania, Qatar, Oman, Korea, Greece, Switzerland, Portugal, Singapore, Netherlands, Czech Republic, Japan, Slovakia, Denmark, Canada, Belgium, Bahrain, Saudi Arabia, Italy, Norway, Spain, Kuwait, Finland, Sweden, Taiwan, Lithuania, Israel, Bulgaria, Hungary, and Turkey," the contract stated.

It further said the work order is likely to be completed by May 30, 2030. However, it remains unclear how many AMRAAM missiles Pakistan will receive.



The AIM-120C8 is the export variant of the AIM-120D, the current AMRAAM variant used by the US

This comes just days after President Donald Trump's meetings with Pakistan's PM Shehbaz Sharif and army chief Asim Munir, at which Trump again claimed to have a role in ending the most recent military conflict between Islamabad and Delhi.

Upgrade for Pakistan's F-16 jets?

It has sparked speculation about potential upgrades to the Pakistani Air Force's F-16 fleet. The AMRAAM is only compatible with the F-16 fighter jet in the Pakistan Air Force service, the Express Tribune reported. It was reportedly used in the conflict with India in February 2019.

The development also follows the Pakistan's air force chief Zaheer Ahmed Babar's visit to the US State Department in July this year.

What's the capability of the missiles?

The AIM-120C8 is the export variant of the AIM-120D, the current AMRAAM variant used by the US. According to Raytheon, the AMRAAM missile is integrated into the F-15A/B/C/D/E Eagle/Strike Eagle, F-16 Fighting Falcon, F/A-18 Super Hornet, F-22 Raptor, Eurofighter Typhoon, JAS-39 Gripen, Tornado and Harrier.

The newest version of AMRAAM is also operational on all F-35 Joint Strike Fighter variants. In its air-to-air role, the missile quickly finds targets in challenging environments, while in the surface-launch role, it is the baseline weapon on NASAMS, which allows countries to use AMRAAM in either role. NASAMS is a short to medium-range ground-based air defense system developed by Raytheon (now RTX).

<https://www.hindustantimes.com/world-news/pakistan-likely-to-receive-advanced-air-to-medium-range-air-missiles-from-us-trump-shariff-asim-munir-meet-101759855571069.html>

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IAF at 93 : Balancing power, technology & reform

Source: *The Tribune*, Dt. 08 Oct 2025



AIR MARSHAL AMIT TIWARI (RETD)
FORMER AOC-IN-C,
CENTRAL AIR COMMAND

AS part of the 93rd Air Force Day celebrations, the Chief of the Air Staff, Air Chief Marshal Amar Preet Singh, addressed a press conference in Delhi on October 3. The event was significant, marking both the completion of his first year in office and his first major media interaction since Operation Sindoor. During the briefing, the Chief covered a wide range of topics, including the Indian Air Force's role in Operation Sindoor, future strategic plans, operational readiness, the-aterisation, indigenisation and training requirements.

The conference could, on one hand, be seen as a victory lap following Operation Sindoor's success; on the other, it was a signal of deterrence to adversaries and a message to policymakers about the steps needed to maintain the IAF as a credible offensive instrument for advancing national interests. While the Chief addressed a broad spectrum of issues, I would like to high-

light a few key aspects.

Given the geopolitical environment in the subcontinent and the fact that India, a nuclear power, has territorial disputes with both China and Pakistan, who are also nuclear powers, no form of contestation can be ruled out. These could range from full-scale wars on one or two fronts to limited border clashes, *salami*-slicing tactics and coercive probing by China as well as persistent low-intensity infiltration and proxy warfare from Pakistan.

Any future conflict is likely to span multiple domains simultaneously, such as land, sea, air, subsea, space, electronic and information warfare and cyberspace. India must, therefore, be prepared to meet any challenge to its national security. The IAF is the only service that, by virtue of its inherent qualities, can operate seamlessly across all these domains.

Recent operations such as the Balakot airstrikes in 2019 and Operation Sindoor in 2025 have demonstrated that the air force has emerged as the offensive weapon of choice. This raises a relevant question: why has the IAF been consistently chosen for such tasks? The selection is based on its inherent operational attributes of mobility, flexibility, reach and speed, which enable timely, precise and effective response. Moreover, as the Chief

brought out, with limited exposure, the IAF retains the advantage of striking and disengaging with minimal risk of escalation.

In addition to kinetic capabilities, the IAF also provides air dominance, intelligence, surveillance and reconnaissance (ISR) as well as offensive and defensive electronic warfare support. These are not limited to aiding air power alone; they also assist other services in achieving their objectives, thereby supporting broader national security interests.

In this context, discussions around theaterisation should move beyond the allocation of aircraft and systems

While self-reliance is vital, it must not come at the cost of technological relevance.

operational agility and responsiveness. It is, therefore, important to assess whether such structural changes will support or hinder the IAF's ability to meet national objectives.

The next issue pertains to indigenisation. The Chief of the Air Staff noted that the Advanced Medium Combat Aircraft (AMCA) is expected to make its maiden flight in 2028 and may enter production by 2035.

These timelines are based on estimates provided by Hindustan Aeronautics Limited (HAL), which has historically experienced significant delays, often exceeding a decade in new aircraft development. Consequently, India may acquire a fifth-generation fighter by 2035, while its adversaries are likely to have progressed to sixth-generation platforms or beyond, the development of which is already underway.

This raises concerns about technological relevance. Fifth-generation fighters are network-centric and rely heavily on secure data connectivity for operational effectiveness. China has reportedly studied these vulnerabilities extensively and has developed capabilities to disrupt Link 16, a key data-sharing network used by the US and allied forces.

This forms a critical element of China's anti-access/area-denial (A2/AD)

across various commands. A more fundamental question for proponents of theatre commands should be whether theaterisation would actually help the IAF achieve national objectives.

According to open-source reports, the IAF deployed 72 aircraft for the initial strike in Operation Sindoor. Coordinating such a large-scale, time-sensitive operation likely required drawing resources from across its 30 squadrons, ensuring aircraft readiness, armament and pilot preparedness.

Introducing an additional layer of decision-making through theatre commands may have implications for

strategy, aimed at isolating combat aircraft from their networks and intercepting them.

In response to such challenges, the US is developing sixth-generation fighters designed to operate independently of external networks, supported by autonomous Collaborative Combat Aircraft (CCA).

In this context, the strategic utility of fifth-generation platforms warrants careful evaluation. Policymakers may need to consider whether collaborative development efforts could enable India to leapfrog directly to sixth-generation capabilities using contemporary technologies.

While self-reliance in defence manufacturing is a desirable objective, it must be balanced against operational requirements and national security imperatives. In conflict scenarios, technological parity or superiority can be decisive; delays or mismatches in capability may carry significant strategic costs.

As the IAF celebrates its 93rd anniversary, policymakers must reflect on the fundamental rationale for maintaining an air force and consider whether the decisions made today would take us towards that basic aim.

Meanwhile, I am sure the IAF will continue to do what it does best, which is to protect our country.

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Fintech, trade & defence on table as Starmer begins two-day visit today

Source: *The Indian Express*, Dt. 08 Oct 2025

British Prime Minister Keir Starmer will arrive in India for a two-day visit on Wednesday and is scheduled to hold bilateral talks with Prime Minister Narendra Modi on Thursday. Fintech, trade and defence are expected to dominate the agenda between the two leaders. This will be Starmer's first visit to India as PM. Calling it a "trade mission", sources say Starmer will lead a delegation of about 100 British business leaders to India in a bid to strengthen economic, tech and defence ties.

Starmer and Modi are expected to address the Global Fintech Summit in Mumbai. Sources say after the signing of the long-awaited Free-Trade Agreement, the two sides are also looking at enhancing cooperation on connectivity and transport, critical and emerging technologies and pharmaceuticals. Following three years of intense negotiations, Starmer finalised the trade deal with Modi in July 2025, saying it would bring "huge benefits to both of our countries" by boosting wages, raising living standards and bringing down prices for consumers. It's also the first such trip by a British PM since Theresa May visited in the immediate aftermath of her country's vote to leave the European Union nine years ago.

India and the UK are the world's fourth and sixth largest economies and they signed the FTA on July 24, 2025 during Modi's UK visit. The pact has some important benefits for India, which includes unprecedented market access as it ensures duty-free access to the UK market for approximately 99% of Indian exports by value. It is also expected to give a thrust to labour-intensive sectors such as textiles, marine products, leather, footwear, sports goods, toys, gems and jewellery, which are crucial for employment generation and may attain enhanced competitiveness in the UK market.

The agreement paves the way for enhanced trade in the services sector, – including IT/ITeS, financial services, professional services, education and other business services – creating new opportunities for Indian professionals and businesses. Also, it serves as a fillip to mobility for skilled Indian professionals, including contractual service suppliers, business visitors, investors, intra-corporate transferees and independent professionals like yoga instructors, musicians and chefs.

The agreement establishes mechanisms to address non-tariff barriers, ensuring smoother flow of goods and services and preventing unwarranted restrictions on Indian exports. New Delhi expects that riding on the success of the FTA, the two leaders are expected to exchange notes on how they can expand the areas of cooperation.

While financial technologies will be a major part of discussions, sources said that defence technologies, especially cooperation on jet engines, is an important element in the agenda. Sources said the India-UK ties have transformed into a robust, multi-faceted, mutually beneficial relationship and during India-UK Summit on May 4, 2021, the relationship was elevated to a new and transformational 'Comprehensive Strategic Partnership', with an ambitious India-UK Roadmap 2030 unveiled to steer cooperation for the next ten years.

<https://indianexpress.com/article/india/fintech-trade-defence-on-table-as-starmer-begins-two-day-visit-today-10294018/>

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Science & Technology News

तीन अमेरिकी वैज्ञानिकों को मिला भौतिकी का नोबेल

Source: Jansatta, Dt. 08 Oct 2025

जनसत्ता ब्यूरो

नई दिल्ली, 7 अक्टूबर।

अमेरिका के जान क्लार्क, माइकल एच डेवोरेट और जान एम मार्टिनिस को डिजिटल प्रौद्योगिकी को आगे बढ़ाने वाली 'क्वांटम टनलिंग' पर शोध के लिए भौतिकी का नोबेल पुरस्कार दिए जाने की मंगलवार को घोषणा की गई। क्लार्क (83) ने अपना शोध कैलिफोर्निया विश्वविद्यालय, बर्कले में किया। वहीं, मार्टिनिस ने कैलिफोर्निया विश्वविद्यालय, सांता बारबरा में तथा डेवोरेट ने येल में और कैलिफोर्निया विश्वविद्यालय, सांता बारबरा में भी अपना शोध किया। तीनों को 10 दिसंबर को आयोजित समारोह में यह पुरस्कार प्रदान किया जाएगा।

स्टाकहोम में नोबेल समिति ने कहा कि 1980 के दशक में पुरस्कार विजेताओं का काम



जान क्लार्क



जान एम मार्टिनिस



माइकल एच डेवोरेट

तीनों को 10 दिसंबर को आयोजित समारोह में यह पुरस्कार प्रदान किया जाएगा।

'क्वांटम क्रिप्टोग्राफी, क्वांटम कंप्यूटर और क्वांटम सेंसर सहित क्वांटम प्रौद्योगिकी की

अगली पीढ़ी' के विकास के अवसर प्रदान करता रहा है।

क्लार्क ने नोबेल पुरस्कार से सम्मानित किए जाने की घोषणा के बाद फोन पर पत्रकारों से कहा कि सीधे शब्दों में कहें तो यह मेरे जीवन का सबसे बड़ा आश्चर्य है। उन्होंने अन्य दो पुरस्कार विजेताओं के प्रति सम्मान प्रकट करते हुए कहा कि उनका योगदान शानदार है। क्लार्क ने कहा कि हमारी खोज कुछ मायनों में क्वांटम कंप्यूटिंग का आधार है। इस समय, यह कहाँ फिट बैठता है, यह मेरे लिए पूरी तरह स्पष्ट नहीं है। हालांकि, अपने मोबाइल फोन से बात करते हुए, क्लार्क ने कहा कि मोबाइल फोन के काम करने का एक मूल कारण यह सारा काम है।

नोबेल समिति ने कहा कि 1980 के दशक में पुरस्कार विजेताओं का काम 'क्वांटम क्रिप्टोग्राफी, क्वांटम कंप्यूटर और क्वांटम सेंसर

सहित क्वांटम प्रौद्योगिकी की अगली पीढ़ी' के विकास के अवसर प्रदान करता रहा है। भौतिकी के लिए नोबेल समिति के अध्यक्ष ओले एरिकसन ने कहा कि सदियों पुरानी क्वांटम यांत्रिकी ने जिस तरह से लगातार नए आश्चर्य प्रस्तुत किए हैं, उसका जश्न मनाना शानदार है। यह बेहद उपयोगी भी है, क्योंकि क्वांटम यांत्रिकी सभी डिजिटल प्रौद्योगिकी का आधार है।

क्वांटम यांत्रिकी का यह 100 साल पुराना क्षेत्र, असंभव प्रतीत होने वाले उप-परमाणु जगत से संबंधित है, जहाँ स्विच एक ही समय पर चालू और बंद हो सकते हैं और परमाणुओं के कुछ हिस्से अभेद्य प्रतीत होने वाली बाधाओं को भेदकर सुरंग बना सकते हैं। पुरस्कार विजेता तिकड़ी के काम ने इसे विश्व फलक पर व्यापक रूप से ले जाने में मदद की है, जहाँ इसमें कंप्यूटिंग और संचार को गति देने की क्षमता है।

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Three scientists win Physics Nobel for work that paved way for cellphones

Source: The Times of India, Dt. 08 Oct 2025

US-based scientists John Clarke, Michel Devoret and John Martinis won the 2025 Nobel Prize in Physics for "experiments that revealed quantum physics in action", paving the way for the development of the next generation of digital technologies.

"There is no advanced technology today that does not rely on quantum mechanics," Olle Eriksson, chair of the Nobel Committee for Physics, said during the announcement of the award. The laureates' discoveries, he added, paved the way for technologies such as the cellphone, cameras and fiber optic cables.



US scientists John Clarke, Michel Devoret and John Martinis

It also helped lay the groundwork for current attempts to build a quantum computer, a device that could compute and process information at speeds that would not be possible with classical computers. The three scientists were recognised for a series of experiments conducted in 1984 and 1985. They proved the existence of two quantum phenomena on a system visible to the human eye.

The principles of quantum mechanics describe the strange properties and behaviours of single or small collections of elementary particles. In one such behaviour, called quantum tunnelling, a particle can move through a barrier even if it does not have enough energy to do so.

Another property of subatomic particles is that they can emit and absorb energy only in fixed, discrete amounts. This is known as the quantization of energy. With a large number of particles, however, these tiny quantum effects generally become insignificant.

The laureates of this year's physics prize showed, for the first time, that quantum tunneling is observable in a system they called macroscopic because it was "big enough to get one's grubby fingers on," according to their paper describing the discovery. They also showed that the energy of this system was quantised, or existed at fixed levels.

They made these discoveries by studying a chip with a circuit that was superconducting, meaning it was capable of conducting current with no electrical resistance. As a result, the current was "trapped" in a state of flow without any voltage, because it did not have enough energy to escape, according to a summary posted by the Nobel committee, as if behind a barrier that it is unable to cross. The researchers observed the current go from a state of zero voltage to one of non-zero voltage, an observation of quantum tunneling. They also observed that the system only absorbed light of certain frequencies, suggesting that its energy was 'quantised'. The three laureates will share a prize of 11 million Swedish kroner (Rs 10.4 crore).

British-born Clarke is a professor at the University of California, Berkeley. Devoret, who was born in France, is a professor at Yale University and the University of California, Santa Barbara, also in the US, where Martinis is also a professor.

TRIO REVEALED QUANTUM PHYSICS IN ACTION



John Clarke

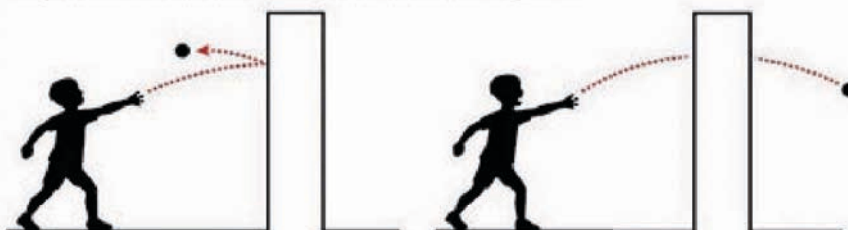


Michel H Devoret



John Martinis

John Clarke, Michel H Devoret and John M Martinis were recognised for a series of experiments they conducted in 1984 and 1985 on electrical circuits, which revealed that a process called 'tunnelling' – a quantum mechanical phenomenon in which particles move directly through a barrier – could occur on a larger scale than had previously been believed possible. The researchers' work showed that this tunnelling process and quantised energy levels could occur in a system 'big enough to be held in the hand'. It paved the way for the development of the next generation of digital technologies



When you throw a ball at a wall, you can be sure it will bounce back at you

You would be extremely surprised if the ball suddenly appeared on the other side of the wall. In quantum mechanics, this type of phenomenon is called 'tunnelling', and is exactly the type of phenomenon that has given it a reputation for being bizarre and unintuitive



1 In a normal conductor, the electrons jostle with each other and with the material



2 When a material becomes a superconductor, the electrons join up as pairs, Cooper pairs, and form a current where there is no resistance. The gap in the illustration marks the Josephson junction



3 Cooper pairs can behave as if they were all a single particle that fills the entire electrical circuit. Quantum mechanics describes this collective state using a shared wave function. The properties of this wave function play the leading role in the laureates' experiment

©Johan Jarnestad/The Royal Swedish Academy of Sciences

Two of the three have links with Google. Martinis headed Google's Quantum Artificial Intelligence Lab until 2020. Devoret, besides his professorship, is also the chief scientist of Google Quantum AI. It is the second straight year that a Nobel has been won by scientists with Google ties. The 2024 chemistry prize was awarded to Demis Hassabis and John Jumper at Google DeepMind while Geoffrey Hinton, who worked for Google for over a decade, won for physics the same year.

<https://timesofindia.indiatimes.com/world/us/three-scientists-win-physics-nobel-for-work-that-paved-way-for-cellphones/articleshow/124375320.cms>

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Barrier-defying phenomenon in quantum realm

Source: Hindustan Times, Dt. 08 Oct 2025

Kabir Firaque

letters@hindustantimes.com

NEW DELHI: Even people without a background in science are familiar with Schrödinger's cat because of the sheer audacity of the idea: the cat in a box is both alive and dead at the same time until you actually observe it, at which time it is definitely dead. Although he was one of the pioneers of quantum physics, Erwin Schrödinger's thought experiment showed that the ideas of quantum mechanics cannot easily be understood in terms of real-world objects.

Harnessing the strange properties of the quantum world for real-world use is the key to the future. Quantum computers work at speeds several orders of magnitude higher than that of classical computers, but building them for mass use remains a challenge. The key area being explored — superconducting electrical circuits — was, however, shown as far back as 1984-85, by physicists John Clarke (currently with University of California, Berkeley), Michel H Devoret (Yale University) and John M Martinis (UC Santa Barbara). Their work won them the Nobel Prize for Physics on Tuesday.

To understand the gap they helped bridge, consider a quantum particle, said to exist in multiple possible states simultaneously until an observation causes it to collapse into one definite state. Compare that with Schrödinger's

cat: how can it be dead and alive at the same time? The three laureates demonstrated quantum properties on a scale somewhere in between that of a particle and a cat — a system large enough to be held in the hand. They carried out an experiment in UC Berkeley with a superconducting electrical system that "tunnelled" from one state into another, with measurements matching the predictions of quantum mechanics.

A cat, of course, is too large to enable scientists to demonstrate its quantum properties in the laboratory. Nevertheless, physicists such as Anthony Leggett (Nobel winner in 2003) have compared the work of Clarke, Devoret and Martinis with Schrödinger's thought experiment. Leggett has argued that the three scientists' experiments showed that vast numbers of particles together can indeed behave just as quantum mechanics predicts.



PICK OF THE DAY

Micro vs macro

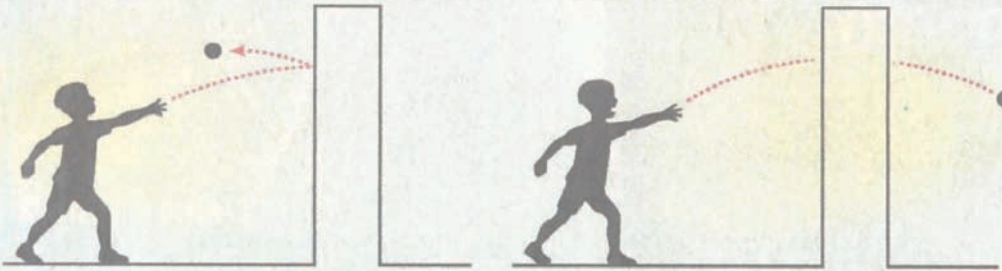
Imagine you are hitting a ball against a wall, a standard example of the scale at which quantum properties are not observable. The ball will bounce back every time.

A single particle, on the other hand, can sometimes pass through an equivalent barrier in its microscopic world, and appear on the other side in a different state.

"What bothered everyone was that a cricket ball follows the laws of classical physics but it is made

Quantum activity on a macro scale

A BALL CANNOT PASS THROUGH A WALL...



We know a ball will bounce back every time it is thrown at a wall, and would be surprised if it passed through and appeared on the other side, like a single particle might sometimes pass through an equivalent barrier in its microscopic world.

... BUT A LARGISH SYSTEM CAN BREAK A BARRIER



When current is passed through a superconductor, the electrons form a series of pairs, and all these pairs together behave as a single mechanical system. The Nobel laureates exploited this phenomenon with an experiment in which electrons behaving as a large particle passed through a barrier.

ILLUSTRATION: JOHAN JARNESTAD, ROYAL SWEDISH ACADEMY OF SCIENCES

up of atoms which obey quantum physics. So why does that happen?" said R Vijayaraghavan, who has worked separately with all three Nobel laureates and is currently a quantum physicist at the Tata Institute of Fundamental Research, Mumbai.

Vijayaraghavan was Devoret's first PhD student at Yale. "I have also shared publications with the other two laureates. I was a postdoc at UC Berkeley and collabo-

rated with Clarke and his PhD student on a joint project. I also collaborated with Martinis on ultra-low noise parametric amplifiers," he told HT.

To return to the comparison between the ball and a particle, the phenomenon of the particle crossing a barrier and emerging in a different state is called tunnelling. To recreate this at a macroscopic level, the goal was to create a setup composed of multiple particles

rather than a single one, and look for quantum mechanical effects there, Vijayaraghavan said.

The answer lay in superconducting material, through which current passes with zero resistance. In such systems, the electrons synchronise themselves into pairs, called Cooper pairs (after the physicist Leon Cooper, Nobel winner in 1972) that behave as a single system. And if two superconductors are joined together with a thin

insulating barrier between them, it creates a Josephson junction (after Brian Josephson, Nobel in 1973).

The laureates exploited this existing knowledge.

A tour de force

At UC Berkeley, Clarke was leading a research group that included Devoret as a postdoc, and Martinis as a doctoral student. After precisely creating and refining the experimental setup, they fed a weak current into the Josephson junction and measured the voltage (initially zero) and the time it took for the system to tunnel out of this state, causing a voltage. Measurements showed that the energy levels matched the predictions of quantum mechanics.

"This experiment showed that when you isolate a macroscopic collective degree of freedom composed of many particles by careful engineering, you can see quantum mechanical effects like tunnelling and quantised energy levels. This is possible to do in many different types of systems but the difficulty of engineering can vary from one to the other. The experiment was a tour de force in achieving the right conditions for observing quantum mechanical effects in an electrical circuit," Vijayaraghavan said.

It was a big step towards harnessing quantum mechanics for real-world applications. "This set the stage for making quantum bits using superconducting electrical circuits, which is now one of the leading platforms for building practical quantum computers," Vijayaraghavan said.

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Radical tunnel: On the Physics Nobel 2025

Source: *The Hindu*, Dt. 08 Oct 2025

John Clarke, Michel Devoret and John Martinis's experiments in the 1980s proved that the strange laws of quantum mechanics could govern not just subatomic particles but entire circuits visible to the eye. Their discovery of macroscopic quantum tunnelling and energy quantisation in an electric circuit won them the 2025 Physics Nobel Prize. This marks a significant interval since quantum mechanics last directly featured in a Physics Nobel, noticeable given the field's enduring vitality, and at a time when the world anticipates profound revolutions in computing and communications. Their experiments at the University of California, demonstrated quantum behaviour in a circuit comprising two superconductors separated by an ultrathin insulating barrier, also known as a Josephson junction. In classical physics, a current flowing through this system would be trapped in a zero-voltage state unless it had enough energy to cross the barrier. But at temperatures near absolute zero, they found that the current could escape by 'tunnelling' through the barrier, a uniquely quantum phenomenon. The system also behaved as if it were a single large particle, with

discrete energy levels instead of a continuous range. To ensure these effects were not artefacts of noise in the circuits, the team took elaborate pains to isolate them from stray microwave radiation. Their results confirmed that a superconducting phase difference, a collective property of the trillions of pairs of electrons that sustained superconductivity, behaved as a single quantum variable.

Josephson junctions are the foundation of superconducting qubits, which animate many of today's leading quantum computers; superconducting circuits also underpin ultrasensitive magnetometers, quantum voltage standards and single-photon detectors used in astronomy and biomedical imaging. By confirming that quantum laws apply to objects "big enough to hold in your hand", the laureates opened a new domain of applied quantum engineering. Today, the challenge is not to prove that macroscopic quantum behaviour exists but to preserve it long enough to be useful. Quantum states are exquisitely sensitive to their surroundings; research thus focuses on materials with lower loss, better filtering and cryogenic control and hybrid architectures that combine superconducting circuits with mechanical, photonic or spin-based systems. The 2025 prize also exemplifies the value of inquiry driven solely by curiosity about nature's limits. When the laureates set out to test whether quantum mechanics could govern a macroscopic electrical circuit, no one foresaw its consequences. Their pursuit of a fundamental question produced the principles underpinning the pursuit of engineers today, including in India, of new technologies — and prestige for their host countries.

<https://www.thehindu.com/opinion/editorial/radical-tunnel-on-the-physics-nobel-2025/article70135800.ece>

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The Tribune
The Statesman
ਪੰਜਾਬ ਕੇਸਰੀ ਜਨਸਤਾ
The Hindu
The Economic Times
Press Information Bureau
The Indian Express
The Times of India
Hindustan Times
नवभारत टाइम्स
दैनिक जागरण
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