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समाचार पत्रों से चयित अंश

Newspapers Clippings

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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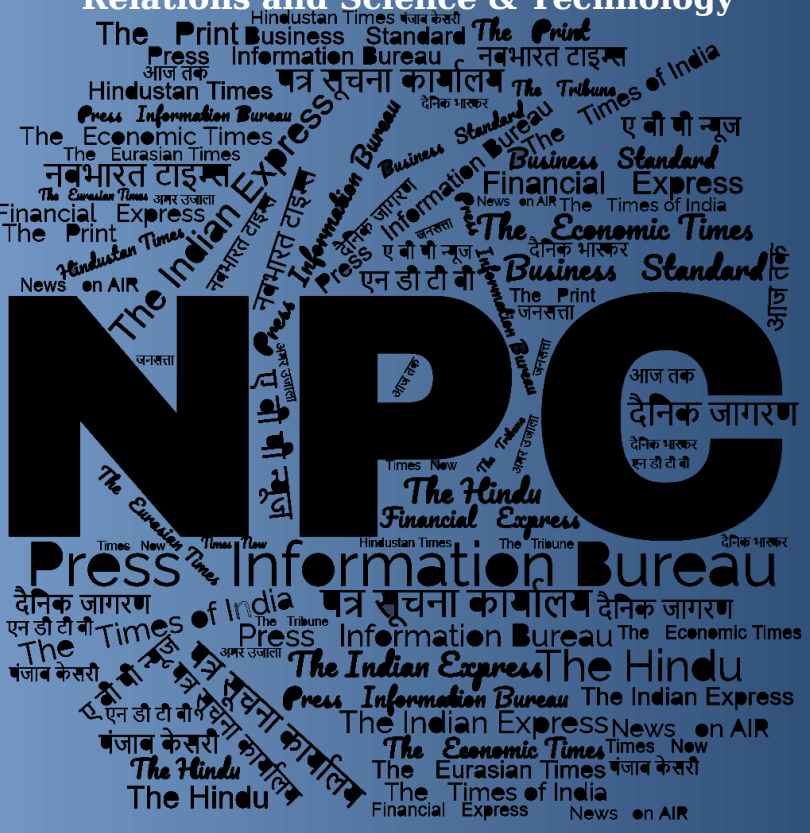

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Tue, 25 Apr 2023

DRDO Organises International Conference on 'Optimising Human Capital of Armed Forces: Psychological Perspective'

A four-day International Conference on 'Optimising Human Capital of Armed Forces: Psychological Perspective' organised by Defence Institute of Psychological Research (DIPR), a Delhi-based laboratory of Defence Research and Development Organisation (DRDO) was inaugurated in Delhi on April 25, 2023. The conference aims to deliberate recent advances, emerging trends and challenges of psychology with respect to human capital of the Armed Forces upon world over. The conference has participation from the three Services, DRDO labs and academia.

Major themes of the conference include emerging trends in personality assessment, leadership, psychological testing and neuro-cognitive assessment, psychological warfare & psychological functions under hi-tech and extreme environments. It has keynote addresses, panel discussions and sessions from luminaries of psychology from Indian and international academia and research institutions which includes speakers from USA, UK and Australia.

During the inaugural function, Chief Guest, Member NITI Aayog Dr VK Saraswat appreciated the contributions of DIPR and said that the technology continues to evolve rapidly and needs to be integrated effectively. He stated that cognitive warfare and cognitive domain operations are emerging as one of the significant new dimensions and will play a decisive role in future warfare. He emphasised that in the current era of techno-centric warfare, psychology will play a vital role in creating optimum man-machine interface.

Secretary Department of Defence R&D and Chairman DRDO and Chief Patron of the conference Dr Samir V Kamat, through his message, emphasised on the importance of research in the relevant domains and conveyed his best wishes to the delegates and organisers for fruitful deliberations on diverse areas, exchange of new ideas and perspectives for strengthening research efforts at DIPR for the Indian Armed Forces.

Adjutant General, Indian Army Lt Gen CB Ponnappa hoped that the wide areas being deliberated during the conference will be helpful for the Armed Forces.

Director General Life Sciences, DRDO Dr UK Singh highlighted the collaborative approaches among Psychological Sciences, Artificial Intelligence (AI), Machine learning, data mining and big data analysis using psychological system approach for addressing very complex problems when it comes to the military psychology and advanced warfare techniques.

Director, DIPR Dr K Ramachandran stated that the international conference will be a great enabler to bring to the fore various trends and emerging challenges in military psychology.

https://www.pib.gov.in/PressReleasePage.aspx?PRID=1919578

DRDO on Twitter

Defence News

Defence Strategic : National/International

THE TIMES OF INDIA

Wed, 26 Apr 2023

Ready to Punish Adversaries: Army, IAF Chiefs

India has the capability, and more importantly the will, to respond to an adversary at a level that it deems appropriate and to impose its own escalation matrix, IAF chief Air Chief Marshal V R Chaudhari said on Tuesday.

Army chief General Manoj Pande, in turn, said the armed forces will also continue to be operationally prepared to fight a two-front war if required, though India's attempt would be to avoid such a situation.

Speaking at an event here, ACM Chaudhari said, "Air power has the capability to deter, defend and if required punish an adversary in a conflict. Even at the lower end of the spectrum, during 'no war, no peace' and peacetime situations, IAF has been and will continue to contribute effectively in the pursuit of our national objectives."

Asked about the possibility of a two-front war with China and Pakistan, Gen Pande said, "While the attempt will be across all domains to avoid a two-front situation, I believe we still need to be prepared…how to utilise the resources."`

"We have plans in place, depending on which of the two will be the primary front and which one secondary. In terms of our preparedness levels, we will continue to be prepared to fight a two-front war," he said.

India has taken "significant strides" in border infrastructure development over the last 8-10 years to reduce the asymmetry with China, be it in terms of improving roads and surface connectivity, building more advanced landing grounds and helipads, boosting communication and power connectivity. "But yes, more needs to be done…As far as infrastructure development goes, we are on the right track," Gen Pande said.

Both the chiefs stressed the need for self-reliance in defence production and technologies, which has been reinforced by the ongoing Russia-Ukraine war. They said the armed forces are moving in the right direction as far as development of capabilities across the full spectrum of conflict as well as induction of modern and niche disruptive technologies is concerned.

https://timesofindia.indiatimes.com/india/ready-to-punish-adversaries-army-iaf-chiefs/articleshow/99769421.cms

REPUBLICWORLD.COM

Tue, 25 Apr 2023

IAF Chief VR Chaudhari Discusses Past & Future of Indian Defence Forces | Full Statement

All three chiefs of the Indian Army, Air Force and the Navy attended the Republic Summit 2023 where they shared their insights into the present and the future of India's defence forces and capabilities. While Chief of the Naval Staff, Admiral R. Hari Kumar reflected on the growth of the Navy, Chief of Army Staff General Manoj Pande spoke on the prospects of the Army's transformation. Air Chief Marshal Vivek Ram Chaudhari of the IAF, on the other hand, set the goal of India gaining superiority not only in air but also in space. Below is VR Chaudhari's full statement.

Air Chief Marshal VR Chaudhari's full statement:

A "TIME OF TRANSFORMATION". In the words of the Hon'ble PM- "We have less time, but immense capabilities. We have difficult targets, but great courage. We have the goal to climb the mountains, but we will transcend even the skies."

Good Afternoon, Ladies and Gentlemen. It is indeed a pleasure for me to be here to deliver the Summit Key Note Address and talk about India's growth trajectory and where we see India and the Indian Air Force in the year 2047, almost twenty five years from now.

Let me first take you all 25 years back in time to 1998. I was a senior Sqn Ldr flying Mig 29s in Adampur. India carried out nuclear tests in Pokhran, and many nations imposed sanctions on us. Mobile phones were a distant dream and we were still using conventional dial-up phones. India's GDP was 421 Billion US Dollars. The internet was just about coming into India and was quite a luxury. Data storage on floppy disks was a big technological leap. If I remember correctly, inland letters and postcards were still being used by a majority of Indians and e-mails were yet to take off. This flashback to 1998 will allow us to better comprehend the kind of leap that technological advances will take in the next 25 years within the rubric of Moore's law of course. Not to forget, we are all 25 years older and yet have adapted to modern technology seamlessly. From our grandparents to grandchildren, we are all on the same Whatsapp group and communicate freely and efficiently.

The fact that technology grows exponentially, and not linearly, will mean that the next 25 years would witness an even greater growth, the contours of which may be difficult to predict very accurately at this stage. However, it is certain by 2047, when our nation completes 100 years of independence, we would be looking at a very different India, possibly one of the largest economies in the world, possibly a world leader in many fields and definitely a power to reckon with.

So, I asked myself what does it take for a country to be reckoned with and what are the attributes required. One such attribute could be reaching a dominant position characterized by ability to exert influence or project power on a global scale. This is done through the combined means of economic, military, technological, political and cultural strength as well as diplomatic and soft

power influence. We are the fifth largest economy in the world and by estimated growth rates we are well on the way to becoming the third largest economy in the next decade.

We are already the most populous country in the world. Interestingly, the window of demographic dividend opportunity available from 2005-06 to 2055-56 is longer than any other country in the world. This bulge in the working age population is a window that we must exploit. Our economic progress, political stability and diplomatic deftness has put us at the centre stage and announced to the world that India has arrived. Added to this is the combined military might of the armed forces of India. We have the second largest Army, the eighth largest Navy and the fourth largest Air Force in the world. Let me now focus on the Indian Air Force. IAF completed 90 years last October, and I will speak about where we stand and what we need to do to transform into a modern Air and Space Force when we celebrate our centenary.

The Indian Air Force, as a highly technological and capital intensive force, will mirror the trajectory of our nation's progress. No other field has seen such a rapid transformation in technology as aerospace power has seen in the last 120 years of its existence. Evolution from a small biplane to a proliferation of space based systems, is just a mere glimpse of things we can expect in the future. The challenge is going to be indigenous 3 design, development and production of future capability. Development of the next generation of aircraft, weapon systems and equipment will call for an 'all of nation' approach because no single entity will have the resources or the knowledge base to develop future battle-ready technology.

We therefore need to focus more on Research and Development with an aim to manufacture on our own rather than relying on minor indigenisation of foreign products. The government has been very supportive to this cause and has taken giant steps in supporting Indian companies and academia with necessary policy formulation and by providing a conducive environment. I have no doubt in my mind that our industry partners, MSMEs and academia will give full impetus in realizing India's aspiration of achieving strategic autonomy or Atmanirbharta in defence production.

Besides, futuristic technology, we will also need innovative means to sustain, maintain and upgrade our existing platforms and equipment. While a few of our legacy fleets would have been phased out by 2047, the majority of our current fleets will still be in service. Developments in technology and the success of our Indian defence manufacturers will play a major role in shaping the inventory and capability of the IAF of 2047. When we look at India@100 years, we are not only looking at preventing our adversaries from gaining technological asymmetry over us but also at developing the asymmetry in our favour across all domains.

Earlier, technological advances resulted in incremental up-gradation of existing platforms in terms of range, weapon delivery accuracy and sophistication. Today, path breaking technologies, Artificial Intelligence, Robotics and Autonomous Systems, Battlefield of Things (BoTs) and Internet of Things (IoTs) are knocking at the doors of defence production. The application of these technologies in the aerospace industry has the potential to entirely transform the way wars will 4 be prosecuted. While it is heartening to see the growth in our indigenous defence production capability, we need to incorporate and infuse these technologies in our future projects. This will enable us to produce cutting edge platforms, weapons, sensors, and networks essential to fight and win a future war.

Future warfare would be hybrid in nature and the spectrum of conflict will be spread across all domains spanning from conventional to sub-conventional, kinetic to non-kinetic and lethal to

non-lethal. Development of capabilities across the full spectrum of conflict with a special focus on multi-domain operations is the need of the hour. Glimpses of things on the anvil can be seen in the ongoing Russia-Ukraine conflict. We need to accept the fact that tomorrow's wars cannot be fought with yesterday's mind-set.

What we need to understand is that airpower has the capability to deter, defend and if required punish the adversary in a conflict. Even at the lower end of the spectrum, during NWNP and peacetime situations, IAF has been and will continue to contribute effectively in the pursuit of our national objectives. IAF's response during various calamities like floods, earthquakes and the COVID pandemic both within our borders and in the region, contributed towards India's growing eminence in the world order.

IAF has the unique capability of undertaking independent strategic operations as well as operations coordinated with other services and arms of the national security apparatus. We understand the imperative nature of joint planning and execution in future wars and are keen on integrating the efforts of the three services. We have recently updated and revised the Doctrine of IAF to keep it relevant for the next decade. The next step would be to use our doctrines and well trained manpower to evolve employment philosophies and Concepts of Operations. This would require joint planning 5 and joint execution of plans. No single service can win wars on its own and this holds good even for the future.

In the fog of war, there is a need to get as clear a picture as possible of the battle space and intentions of the adversary. This would give a high degree of flexibility to the commander at the operational level to make dynamic changes and shape the battlespace. This ability will rely on highly secure and efficient networks that integrate sensors, decision makers and the shooters. Our network centric capability seamlessly fuses all elements of war-fighting to create a very high level of shared battle space awareness. The key components of this capability are all interconnected in the loop. Sensors such as Radars, Surveillance platforms, AWACS, and Satellites; the shooters, both manned & unmanned and the decision makers who control the air battle at all levels have to remain fully networked. We are actively pursuing development of niche technologies in the field of space-based capabilities, Data Linking and AI based Decision Support Systems to shorten the sensor to shooter loop and for making the targeting cycle highly responsive.

Conflicts in the last few decades have clearly established without doubt, the pre-eminence of Aerospace Power as the Instrument of Choice for almost all operational contingencies. The tactical advantage that 'high ground' offers is a must-achieve criteria even today. In this aspect, aerospace power provides that high ground and the ability to bypass fielded forces to hit targets in great depths with speed and precision. In more recent time, Space has been increasingly exploited as it provides the ultimate high ground where the nation's forces can operate with near impunity. The accrued ability to see and comprehend the enemy's disposition and design provides a commander with an ability to decide and act quickly.

Easy accessibility of high end technology is also posing new challenges to the conventional forces. Harassment through the use of drones in the Middle East, use of drones alongside fighter aircraft in Azerbaijan-Armenia conflict and extensive use of armed drones in the ongoing Russia-Ukraine conflict are all indicative of things to come in the future. We have also doctrinally included drone usage in our scheme of operations to benefit from some of the exclusive attributes of these platforms. At the same time, we are pursuing unmanned combat

systems and their integration with manned fighter platforms in what is known as manned-unmanned teaming.

We have laid out a roadmap to add new capabilities and harness modern technology, making technological innovation an integral part of our security apparatus. This thought has initiated a process of reequipping, retraining and remodelling of our security infrastructure. A potent Air Force of the future will be characterized by aspects of persistent presence, multi role capability, rapid deployment, spectrum dominance, centricity of information management, precision targeting and rapid innovation for creating asymmetry. The unique combination of developing capabilities, operational concepts and technological opportunities has created a situation where air power will play a very crucial role to overcome rapid changes in the character and conduct of war.

Last, but definitely not the least, is the importance of the man and woman behind the machine. Multiskilling our personnel has become the need of the hour to enable them to take decisions spanning the vast spectrum of operations that we are likely to undertake. A lean and mean force equipped to handle more than its own core competency is the need of the hour in tomorrow's technologically intensive battlespace.

India has the capability and more importantly, the will, to respond at a level that we deem appropriate and to impose our own escalation matrix. We the men and women in uniform are the cutting edge of that response. Therefore, it is imperative that we keep that edge as sharp and lethal as possible.

When you think of the Air Force, I am sure you visualize fast jets, huge transport aircraft or nimble helicopters. I do foresee the AF equipped with indigenous platforms like variants of the LCA, the AMCA, the LCH & the IMRH. But what lies beyond these assets are the enablers and enhancers of our capability. We are looking at secure communications through Operational Data Links powered by 5th and 6th generation SDRs and redundant networks. We are looking at post-Quantum cryptography compatible equipment, along with miniaturised EW systems. We are seeking multiple satellite based and airborne networks along with significant capability in ISR through space based assets.

All this can only be made possible if we the users work in synergy with the researchers and developers, manufacturers- both Government and private and the aerospace industry. And when I say "WE", I don't mean the Indian Air Force alone. A joint and integrated plan of action with the Indian Army and the Indian Navy with a synergistically orchestrated procurement plan is the way forward to leverage the optimum potential of our armed forces.

Ladies & Gentlemen, Transformation is an ongoing process that appears to be ordinary, when, in fact, something extraordinary is actually taking place. On that note, I would like to wish all participants of this "TIME OF TRANSFORMATION" summit the very best. I am sure the discussions and brainstorming that takes place here will produce ideas and concepts that will take India where it deserves and needs to be in 2047. Thank You and Jai Hind!

https://www.republicworld.com/republic-summit/republic-summit-2023/iaf-chief-vr-chaudhari-discusses-past-and-future-of-indian-defence-forces-full-statement-articleshow.html

The Tribune

Tue, 25 Apr 2023

Army Western Command Chief Bats for Indigenous Production of Defence Equipment

A senior Army officer on Tuesday laid emphasis on indigenous manufacturing of defence equipment and the role of micro, small and medium enterprises (MSMEs) in it, saying it is essential to go local to capitalise on the capabilities.

General Officer Commanding-in-Chief of the Army's Western Command Lt Gen Nav K Khanduri said the armed forces, MSMEs and the academia need to come together to enhance the role of MSMEs in defence manufacturing.

"It is essential to go local and indigenous to capitalize on the capabilities...," he said at an event.

He was here to take part in a conference on "opportunities for MSMEs in the defence manufacturing ecosystem in north India", organised by the Confederation of Indian Industry (CII), Northern Region and the Army's Western Command headquarters.

Later, replying to questions of reporters, Lt Gen Khanduri said, "As far as we (Western Command) are concerned, right from the very beginning we have been saying that we need to have our own indigenous production.""...we are a country which is on the move, is rising. India is poised to be a great power. And I would state that no country can aspire to be a great country on borrowed technology. Hence the importance of indigenous technology," Khanduri told reporters. According to a CII release, Khanduri highlighted four critical challenges faced by the defence sector.

Firstly, the need for adequate funding and capital infusion into research and development (R&D). The Indian Army has already initiated allocations for R&D.

Among others, he said, there is a need for a mechanism for continuous maintenance and sustenance of the equipment. Lastly, quality assurance for establishing a connection with MSMEs or manufacturers and ensuring that the quality meets the requirements.

Speaking to reporters, he said, "...we do have legacy equipment...which needs to be maintained. But the replacement to the same has got to be indigenous. That is why the participation between the armed forces, industry, MSMEs, the acamedia, all put together, through synergy, I think we can achieve the vision that we have laid for ourselves." Asked about repeated drone intrusions from across the border in Punjab, Khanduri said, "...as far as counter measures are concerned, we do have our indigenous equipment that is being validated and fielded.

"So, if you look at recent reports in Punjab, in last about four months, about 22-23 drones and quadcopters have been brought down. And that is utilising indigenous capacity or the equipment that is manufactured within India. So, there is adequate amount of preparation that is being done and requisite action being taken at all levels," he said.

https://www.tribuneindia.com/news/chandigarh/army-western-command-chief-bats-for-indigenous-production-of-defence-equipment-500858

INDIA TODAY

Tue, 25 Apr 2023

India Fourth Biggest Military Spender, but China Way Ahead at No. 2

A belligerent China and the ongoing Russia-Ukraine conflict have pushed total global defence expenditure to record levels in 2022, jumping by 3.7 per cent to reach an unprecedented high of $ 2,240 billion, the Stockholm International Peace Research Institute said in a new report.

With an arms budget of $81.4 billion, India retains its place as one of the world's top five military spenders. The United States leads the pack with an expenditure of $877 billion, and China a distant second place with $292 billion.

Russia is in third place with a defence budget of $86.4 billion – less than a tenth of arch rival the United States. Riyadh rounds out the top five with $75 billion in spending.

Incidentally, the three largest spenders in 2022— the US, China and Russia — accounted for 56 per cent of the world's military spending. Moreover, at a time of heightened tensions at the Himalayan border, Beijing's expenditure was three and half times higher than that of New Delhi's. "India raised its defence spending by 6 per cent from 2021 and 47 per cent from 2013 consequent to the border tensions with China and Pakistan. Its expenditure on capital outlays that funds equipment upgrades for the armed forces and to the military infrastructure along its disputed border with China, amounted to 23 per cent of total military spending in 2022," the report stated. On the other hand, China has boosted its military expenditure for 28 consecutive years. The one-party nation's defence budget has surged 63 per cent since 2013 and the outlay in 2022 being 4.2 per cent more than in 2021.

WHY IS INDIA'S DEFENCE SPENDING ON THE RISE?

India has been raising its military spending year-on-year as it focuses on three objectives – modernising the tri-services, bolstering troops deployed along the borders with Pakistan and China, and shoring up domestic defence manufacturing.

This year, Finance Minister Nirmala Sitharaman allocated Rs 1.63 trillion for defence capital outlays – an expenditure that would include new weapons, aircraft, warships and other military hardware, as she unveiled nearly $550 billion of total federal spending in the annual budget for 2023-24 starting in April.

With the government's 'atmanirbhar' push, defence production has also started picking up in the country. India now has an impressive stockpile of indigenously made, lethal ballistic missiles that act as deterrence.

PRALAY MISSILE

A core component of India's "rocket force", Pralay is the country's first tactical quasi-ballistic missile with a range of 150-500 kilometres. It can carry conventional warheads weighing 500-1,000 kg.

AGNI-V MISSILE

Agni-V is an ingeniously built advanced surface-to-surface ICBM that can strike targets half a world away with a very high degree of accuracy. It is capable of delivering a 1.5 tonne nuclear warhead.

BARAK-8

Used in naval point and area defence, Barak-8 is all weather missile system which can engage sea skimming to high altitude targets up to a distance of 150 km. It can intercept aircraft, low-flying anti-ship and cruise missiles, and stealthy targets.

BRAHMOS CRUISE MISSILE

An Indo-Russian venture, the Brahmos cruise missile packs a supersonic punch. With a proven range of up to 280 km, which was further enhanced to 450 km during recent tests, BrahMos missiles can reach speeds of up to Mach 3 and take out deep underground bunkers of the enemy.

VL-SRSAM

Developed by the DRDO, the VL-SRSAM is a surface to air missile that can be used to target an enemy ship or missile flying at low altitude in a range of 25-30 km. It flies at Mach 4 speeds, twice that of the Barak-8 missile.

PINAKA ROCKET LAUNCHER

Named after the bow of Lord Shiva, the Pinaka rocket system fires 12 projectiles in 44 seconds. Its range is 7 to 90 kilometres. High Explosive Fragmentation (HMX), cluster bombs, anti-personnel, anti-tank and landmine weapons can be installed on top of the Pinaka rocket.

INDIA'S AEGIS

A double-tiered anti-ballistic missile system consisting of two land and sea-based interceptor missiles, namely the Prithvi Air Defence (PAD) missile for high altitude interception, and the Advanced Air Defence (AAD) Missile for lower altitude interception. The two-tiered shield should be able to intercept any incoming missile launched 5,000 kilometres away.

https://www.indiatoday.in/india/story/global-defence-expenditure-skyrockets-india-in-top-5-biggest-spenders-2364439-2023-04-25

FINANCIAL EXPRESS
Read to Lead

Tue, 25 Apr 2023

Russian Military Supply Issues to India Raise Fresh Concerns for the Indian Military

As reported, it is about $ 2 billion of payments from India to Russia got stuck over the last year. The reason is: Russia simply does not want the surplus of Rupees stacked in its reserve. While India is unable to settle payments in US dollars due to the fear of sanctions, Russia has turned down India's request to make payments in rupees.

The idea of rupee trade flourished as India looked at buying cheap oil from Moscow to contain a rising import bill amid high commodity prices. India also began to build up a similar mechanism with other nations such as Mauritius and Sri Lanka.

Initially, the oil import surged on the back of the Rubble-Rupee mechanism, and the overall bilateral trade largely remained in favour of Russia. What is adding to this is the defence transactions as Russia has decided to stop supplying credit for about $10 billion worth of spare parts as well as two S-400 missile defence system batteries that are yet to be delivered.

Despite the agreement on the smooth transaction under the alternative currencies mechanism which avoids the international Society for Worldwide Interbank Financial Telecom (SWIFT) protocol under the existing dominant regime, Russia is not willing to accept Rupees for such defence contracts.

Both sides are struggling to resolve the issue as External Affairs Minister S Jaishankar recently admitted that there are discussions going on between India and Russia on the payments issues and they need to be worked through.

Rupee-Rouble exchange –All that is not simple

The talk over alternative currencies exploded with immense possibilities that Russia and China looked at amid harsh economic sanctions imposed by the US government. The idea of bypassing the dollar was too lucrative to ignore amid the constant threat of economic sanctions which revolve around the dominant reserve currency of the world.

Indian authorities have also tried to propose the idea that Russia balances the payments from India by adjusting them with the purchase of Indian goods. However, the idea had to be dropped given that Russia has a trade surplus of $37 billion (according to last year's figures) with India.

Russia has played down India's offer to invest in Indian debt and capital markets to avoid stockpiling.

On top of that, Russia is unwilling to accept payments in rupees due to fluctuating exchange rates. India is also being cautious on its part, especially in procuring defence-related payments in US dollars due to fears of being slapped with secondary sanctions by the US.

While India's procurement accounts for 20% of Russia's defence exports, most of the items are related to the serviceability and maintenance of military equipment of Russian origin. The Indian armed forces maintain roughly seventy percent of the arsenal of Russian origin. Around 70% of the equipment of the India Air Force (IAF) is of Russian origin. The mainstay of the IAF–Sukhoi Su-30 MKI– fighter jet constitutes the bulk of 14 squadrons. In addition to that, there are also MiG-29UPG and MiG-21 combat helicopters, IL-78 tankers, two IL-76 aircraft, seven Kilo-class submarines and more than 1,200 T-90 tanks – all of which are expected to be in use for another decade and would require spare parts and technical assistance from Russian defence firms.

"The difference is between the urgent economic needs versus the military purchase," comments a senior international trade analyst.

India has also offered to consider paying in euros and dirhams – which India generally uses for imports of discounted Russian crude oil. However, India could also be at a loss due to unfavourable exchange rates, according to foreign trade experts.

"That raises some concerns," says a former vice chief of IAF.

What is the way out?

"While this itself presents a great opportunity for India to scale up indigenous production and push alternative supply issue, it cannot be resolved overnight," he laments.

Russia has emerged as India's fifth-biggest trading partner, from 25th rank during FY22. Amid the ongoing Ukraine war, trade between India and Russia has reached a record high of $39.8 billion in 2022-23. However, India has a huge trade deficit with Russia which is now reached $34.79 billion, from April through January 2022-23 (FY23). The trade deficit is mostly on account of oil imports from Russia.

https://www.financialexpress.com/business/defence-russian-military-supply-issues-to-india-raises-fresh-concerns-for-the-indian-military-nbsp-3062479/

FINANCIAL EXPRESS
Read to Lead

Tue, 25 Apr 2023

SCO Meeting in New Delhi: Russian, Chinese Defence Ministers to Hold Bilateral Talks with Rajnath Singh

Later this week defence ministers of China Li Shangfu and Russian defence minister Sergei Shoigu are likely to hold bilateral meetings with their Indian counterpart Rajnath Singh on the sidelines of the two days Shanghai Cooperation Organisation (SCO) meeting in New Delhi.

The two ministers along with their counterparts from Iran and Belarus and other member states have confirmed their presence for the SCO meeting scheduled to take place from April 27-28. There is no update on the presence of the defence minister of Pakistan Khawaja Asif. India had sent an official invite for the forthcoming visit.

The defence ministers of the SCO grouping are meeting ahead of the Foreign Ministers meeting next month in Goa where the Pakistan Foreign Minister's presence has already been confirmed by Islamabad last week. These meetings are taking place under the presidency of India which will culminate in the SCO Summit later in July this year. India and Pakistan had officially joined the grouping in 2017 which included other countries — China, Russia, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan. Iran and Belarus are the newest members of the grouping and they will be attending various meetings of the SCO for the first time.

Chinese Defence Minister

Li's visit to New Delhi for the SCO defence ministers' meeting comes at a time when the two countries had an inconclusive 18th round of Corps Commander Talks on Sunday (April 23, 2023). In the official statement issued late Monday evening (April 25, 2023) there was, however, no indication of any forward movement in resolution of the friction points along the Line of Actual Control (LAC). And the troops of both countries continue to be in a three year standoff and the friction points at Depsang in Daulet Beg Oldi sector and Charding Nullah Junction (CNJ) in Demchok sector remain on the negotiating table. Next month the border issue

between the two countries which was triggered in May 2020 in eastern Ladakh will enter its fourth year.

14 Corps Commander Lt Gen Rashim Bali led the India side at the talks and Shilpak Ambule, Joint Secretary (East Asia), Ministry of External Affairs was also present. According to the MEA statement, India and China had an in-depth and a frank discussion related to the resolution of the relevant issues along the LAC in the western sector to restore peace and tranquility in the border areas, which will enable progress in bilateral relations.

The two countries have several rounds of talks at different levels to find solutions, however, though there have been four rounds of disengagement from Gogra (PP-17A), Hot Springs (PP-15), Galwan Valley, Pangong Tso, the armies of India and China still have more than 50,000 troops and heavy equipment deployed in the Ladakh theatre.

The visit of the Chinese defence minister after the June 2020 violent Galwan Clash in which the Indian Army had lost 20 personnel near Patrolling Point 14 in Galwan Valley has derailed the ties between the two countries. It has been reported that the Indian assessment is that the Chinese side had casualties twice as many.

Sources have indicated that in subsequent meetings legacy issues along the LAC such as Depsang Plains and Demchok will be discussed. And discussions at various levels are focused on confidence-building measures and to avoid confrontation at the borders in the coming months. There will be regular interactions between the brigade and battalion commanders level too.

Russian Defence Minister

It will be the first visit of MinisterShoigu after the Russia-Ukraine war erupted last year. He will meet with Defence Minister Rajnath Singh on the sidelines and, according to sources, the impact of the ongoing Russia-Ukraine war on the weapons and equipment the Indian Armed Forces are using; lack of spares; the payment for various equipment as well as dealing with new emerging threats in the region.

His visit comes amid a series of high-level engagements between India and Russia in recent months. The Russian Deputy Prime Minister Denis Manturov was in New Delhi recently for the 24th India-Russia Inter-governmental Commission on Trade, Economic, Scientific, Technological and Cultural Cooperation (IRIGC-TEC).

The defence cooperation between India and Russia has now advanced from buyer-seller relationship to a more comprehensive collaboration. The two sides are now doing joint research and development, production, and also marketing of advanced defence technologies and systems.

Agenda of the SCO Defence Ministers' Meeting

The meeting will be chaired by Minister Rajnath Singh, as India is holding the presidency of the SCO. And the member states are expected to focus on the situation in Afghanistan, regional security, cross border terrorism, radicalization, situation in Ukraine, and narco trafficking.

Uncertainty about Pak Defence Minister

There is no confirmation about the presence – physical or virtual – of the Pakistan Defence Minister. According to sources the recent terror attack in Poonch district of Jammu and Kashmir could cast a shadow on the visit. Even the visit of the foreign minister of Pakistan is uncertain now, especially if the investigations point to the involvement of Pakistan-based terror groups.

Iran Minister for SCO Meeting

Defence Minister Mohammad Reza Gharaei Ashtiani of Iran too is confirmed to be present here in New Delhi to attend the SCO Defence Ministers meeting. His presence was confirmed by the Iranian ambassador to India Iraj Elahi who at a recent event talked about the importance of the growing defence relations between the two countries.

Speaking at the Iran Army Day Celebrations, he mentioned that the defence relations are going through a growing process under the framework of the Comprehensive Relations between the two sides.

The Iranian defence minister Ashtiani is scheduled to have bilateral meetings with his Indian, Belarus, Tajik and Chinese counterparts here.

https://www.financialexpress.com/business/defence-sco-meeting-in-new-delhi-russian-chinese-defence-ministers-to-hold-bilateral-talks-with-rajnath-singh-3062133/

INDIA TODAY

Tue, 25 Apr 2023

India, China Agree to 'Speed Up' Ladakh Standoff Resolution, Says Chinese Defence Ministry

Top military officials of India and China, during their latest round of talks, have agreed to "speed up" the settlement of "relevant issues" related to the prolonged standoff in eastern Ladakh, the Chinese defence ministry said on Tuesday.

The two sides will also safeguard peace in the border areas, it said.

India and China held the 18th round of the Corps Commander Level Meeting at the Chushul-Moldo border meeting point on the Chinese side on April 23.

The talks were held ahead of Chinese Defence Minister Li Shangfu's planned visit to India to attend a meeting of the Shanghai Cooperation Organisation (SCO) on April 27 and 28.

“The two sides had a friendly and candid exchange of views on relevant issues,” said the People's Liberation Army (PLA) statement.

“Under the guidance of the leaders of the two countries and based on the achievements of the meeting between the two foreign ministers, both sides agreed to maintain close contact and dialogue through military and diplomatic channels, speed up the settlement of relevant issues on the western section of the China-India boundary, and continue to safeguard the peace and tranquillity in the border areas," it said.

Chinese foreign ministry spokesperson Mao Ning told the media in Beijing on Monday that the two sides held an in-depth exchange of views on expediting the resolution of relevant issues.

"According to the important common understanding of the leaders of both countries, the two sides held an in-depth exchange of views on expediting the resolution of relevant issues. I refer you to the competent authorities for more details," Ning said.

In a statement on Monday, the Ministry of External Affairs (MEA) said the two sides had a "frank and in-depth" discussion on the resolution of the "relevant" issues along the Line of Actual Control (LAC) in the Western sector.

"The two sides agreed to stay in close contact and maintain dialogue through military and diplomatic channels and work out a mutually acceptable resolution of the remaining issues at the earliest," the MEA said.

The two sides had a frank and in-depth discussion on the resolution of the relevant issues along the LAC in the Western sector so as to restore peace and tranquillity in the border areas, which will enable progress in bilateral relations, it said.

"In line with the guidance provided by the state leaders and further to the meeting between the two foreign ministers in March 2023, they had an exchange of views in an open and candid manner," it said.

"In the interim, the two sides agreed to maintain the security and stability on the ground in the Western Sector," it said.

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"In the interim, the two sides agreed to maintain the security and stability on the ground in the Western Sector," it said.

The ties between the two countries nosedived significantly following a fierce clash in the Galwan Valley in June 2020 that marked the most serious military conflict between the two sides in decades.

As a result of a series of military and diplomatic talks, the two sides have completed the disengagement process on the north and south banks of the Pangong Lake and in the Gogra area.

https://www.indiatoday.in/india/story/india-china-ladakh-standoff-resolution-chinese-defence-ministry-statement-lac-clash-2364327-2023-04-25

FINANCIAL EXPRESS
Read to Lead

Tue, 25 Apr 2023

Indians now See China as their Greatest Military Threat: Congressman Ro Khanna

Influential Indian-American Congressman Ro Khanna has said that Indians now see China as their greatest military threat and not Pakistan, and emphasised the need to have constructive re-balancing with Beijing. Relations between China and India have virtually frozen ever since the eastern Ladakh military standoff between the two countries in May 2020.

The two countries have held 17 rounds of high-level military commanders' talks to resolve the standoff. India has been maintaining that its ties with China cannot be normal unless there is peace in the border areas.

"Today, we need a constructive re-balancing with China. This requires us to be clear-eyed about the threats we and our allies in Asia face, but are hopeful that our diplomacy and statesmanship can make the 21st century less bloody than the 20th century," Khanna said in a foreign policy speech at the prestigious Stanford's Hoover Institution on Monday. "There are four guiding principles for a constructive re-balancing with China: First, an economic reset to reduce trade deficits and tensions; second, open lines of communication; third, effective military deterrence; and fourth, respect for our Asian partners and robust economic engagement with the world," he said.

"China creeps towards hegemony in Asia, threatens India's borders, and treats other countries as junior partners. The people of India now see China as their greatest military threat, not Pakistan," he said. Khanna, 46, represents Silicon Valley in the US House of Representatives.

"We have the technology to bring about an American production renaissance as Andy Grove, the famous Intel CEO, called for back in 2010. We have an Asian American diaspora that understands the need for open lines of communication and exchanges with Asia," he said.

The Valley is pioneering the leading technology in AI, cyber, space, long-range missiles, and unmanned vehicles that will be essential for effective deterrence in the Taiwan Strait, he said.It has a business community that understands that engagement — not isolation — is how they make friends around the world, especially in the Global South, and stand up for American values, he said.

Khanna pointed out that the US needs to build its alliances with India and other Asian partners, recognising that they will not be satellite states. "Given the history of colonialism, and the

cultural pride of many Asian nations, the US cannot expect to have as smooth, lockstep, and cohesive an alignment as an Asian NATO," Khanna explained.

"What we need is multipolarity in Asia and the denial of China as a hegemony. India will be a key partner in that effort. As the new co-chair of the Congressional India Caucus, I've called for strengthening our economic and defence ties between the oldest and largest democracies. The new US-India initiative on Critical and Emerging Technology, will deepen our technology partnership," Khanna elaborated.

The US, India and several other world powers have been talking about the need to ensure a free, open and thriving Indo-Pacific in the backdrop of China's rising military manoeuvring in the resource-rich and strategically important region.In 2017, the US, Australia, India and Japan gave shape to the long-pending proposal of setting up the Quad to develop a new strategy to keep the critical sea routes in the Indo-Pacific region free of any influence.

"India's participation in the Quad, along with Japan and Australia, is critical for ensuring our partners work together to keep China from becoming a hegemony in Asia. In the 1950s, China and India shared a common aspiration to see Asia emerge after Western colonialism. But Nehru's vision of collaboration with China has soured," Khanna said.

"We've also seen Japan, a nation hesitant to build up its defence after World War II, take historic steps to build out its national security apparatus," he added.

China is engaged in hotly contested territorial disputes in both the South China Sea and the East China Sea.China claims sovereignty over all of the South China Sea.Vietnam, Malaysia, the Philippines, Brunei and Taiwan have counterclaims.

Beijing has also built up and militarised many of the islands and reefs it controls in the region. Both areas are stated to be rich in minerals, oil and other natural resources and are also vital to global trade.

https://www.financialexpress.com/business/defence-indians-now-see-china-as-their-greatest-military-threat-congressman-ro-khanna-3061259/

FINANCIAL EXPRESS
Read to Lead

Tue, 25 Apr 2023

China Tests DF-27 IRMB! Know More About it

Earlier this year, China's People's Liberation Army (PLA) had successfully tested DF-27 hypersonic glide intermediate-range ballistic missile (IRBM), which flew for 12 minutes with a range of 2,100 kilometers (1,300 miles), was "very likely" to penetrate the US ballistic missile defense system. This is according to the recently leaked US intelligence documents.

The US government officials said last year that the DF-27 ballistic missile could be an intermediate or intercontinental ballistic missile with a range of 5,000-8,000 kilometers. With DF 27, Chinese PLA will have greater precision strike options with conventional and nuclear warheads.

The DF-27 is a mobile, solid-fueled ballistic missile developed by China. It is an intermediate-range ballistic missile (IRBM) that is capable of carrying both conventional and nuclear warheads.

The DF-27 missile system consists of a transporter-erector-launcher (TEL), which can move the missile to different locations, a command and control vehicle, and support vehicles such as fuel and maintenance trucks.

The missile's guidance system is composed of an inertial navigation system (INS) and a global positioning system (GPS), which allows for high accuracy in targeting. The missile is also equipped with a terminal guidance system that enables it to make course corrections during its final phase of flight to increase accuracy and avoid countermeasures.

The missile is launched vertically from the TEL, and its solid rocket motor accelerates it to hypersonic speeds. Once it reaches a certain altitude, the missile's warhead separates from the rocket motor and begins its descent towards the target. The missile's high speed and maneuverability make it difficult to intercept by enemy missile defense systems.

The DF-27 has a reported range of around 3,000-4,000 km, which allows it to strike targets in the Western Pacific, including US military bases in Guam and other locations in the region.

https://www.financialexpress.com/business/defence-china-tests-df-27-irmb-know-more-about-it-3062367/

Tue, 25 Apr 2023

Pakistan Army Chief Visits China to Boost Defence Ties

Pakistan Army Chief General Asim Munir on Tuesday (April 25) arrived in China for a four-day official visit. The visit is aimed at boosting bilateral defence ties between the two countries. This is General Munir's fourth overseas visit since he took command of the Pakistan army in November last year. In January, he visited Saudi Arabia and United Arab Emirates (UAE) on his first official visit abroad since his appointment.

A month later, he visited the United Kingdom on a highly important visit on Britain's Ministry of Defence invitation to discuss security-related strategic issues.

After his UK visit, Gen Munir again visited the UAE.

"COAS is on a four-day official visit to China for enhancing bilateral military relations," the army's media wing said in a statement on Monday without providing any further details about the trip.

It is common for the new army chief in Pakistan to undertake a visit to China within weeks of his appointment. The delay this time is attributed to the internal situation in Pakistan.

The visit comes amidst mounting pressure from the International Monetary Fund (IMF) on cash-strapped Pakistan to arrange at least USD 6 billion to bridge the external payment financial gap.

So far, Saudi Arabia and the UAE have committed to providing USD 3 billion to Pakistan but the international lender has demanded assurance for the remaining amount.

Prime Minister Shahbaz Sharif last week acknowledged the army chief's efforts towards securing financial commitments from Pakistan's friendly countries.

Though nothing has been said officially about the financial purpose of the visit, China is the only country, apart from Saudi Arabia and the UAE, which is believed to provide critical support to Pakistan.

https://www.wionews.com/south-asia/pakistan-army-chief-visits-china-to-boost-defence-ties-586112

JANES

Tue, 25 Apr 2023

China's Norinco Delivers SH-15 Howitzers to Pakistan

China North Industries Group Corporation Limited (Norinco) delivered the second batch of SH-15 155 mm/52 calibre wheeled self-propelled howitzer (SPH) based on a Shaanxi 6×6 truck to the Pakistan Army.

According to images posted on Chinese social media Weibo, Norinco is seen delivering the second batch of 56 SH-15 howitzers to Pakistan in a ceremony. The SH-15 is an export designation of the PCL-181 155 mm wheeled SPH produced by Norinco.

In 2019, Pakistan signed a contract with Norinco to deliver 236 SH-15s. The first batch was delivered in January 2022. The number of howitzers received in the first batch is not known.

On 23 March 2022, the Pakistan Army unveiled its SH-15 howitzer during the Pakistan Day parade held at the Shakarparian Parade Ground in Islamabad, the country's capital.

According to *Janes Land Warfare Platforms: Artillery & Air Defence,* the SH-15 weighs 22 tonnes and can attain a maximum speed of 90 km/h on road.

The SPH is armed with a 155 mm L52 howitzer provided with a digital fire-control system (FCS). In addition, the SH-15 features a semi-automatic loader.

According to Norinco, the SH-15 is capable of being deployed in a quick-reaction role in the high-plateau region. Norinco said the SH-15 can fire 4–6 rds/min and has a range of 53 km.

https://www.janes.com/defence-news/defence/latest/chinas-norinco-delivers-sh-15-howitzers-to-pakistan

Tue, 25 Apr 2023

Game on: USAF Wargames Strengthening Indo-Pacific Alliances

The debut deployment of US Air Force (USAF) Rockwell B-1B Lancer strategic bombers in India for a combat exercise focuses attention once again on Washington's attempts to bolster allied military capabilities across the region.

According to the US Pacific Air Forces (PACAF), two B-1Bs from the US 34th Expeditionary Bomb Squadron deployed to southern India on 13 April from Ellsworth Air Force Base in the United States to support 'Cope India 23', an exercise involving other USAF aircraft and major units from the Indian Air Force (IAF). Also present were members of the Japan Air Self-Defense Force (JASDF) as observers.

USAF B-1s had earlier landed in India for participation in the Aero India 2023 show in Bangalore. However, such aircraft had not previously participated in a military exercise with the IAF.

"The B-1 will integrate with other USAF and IAF fighter and transport aircraft to promote interoperability between the two air forces," a PACAF spokesperson told *Janes*. "The intent is to strengthen our co-operation and learn from each other's best practices."

Based on public disclosures by various regional governments and the USAF, *Janes*

https://www.janes.com/defence-news/defence/latest/game-on-usaf-wargames-strengthening-indo-pacific-alliances

Tue, 25 Apr 2023

Australia's Defence Review Highlights Requirement for Disruptive Technologies

Australia's new Defence Strategic Review (DSR) highlights the need to advance disruptive military technologies to enhance the Australian Defence Force's (ADF's) capabilities across five domains comprising maritime, land, air, space, and cyber.

An unclassified version of the DSR, released on 24 April, urges the government to intensify efforts towards the development of disruptive technologies related to command, control, communications, and computers (C4); and intelligence, surveillance, and reconnaissance (ISR)

to improve the ADF's capability to conduct conventional and asymmetric warfare, against a backdrop of rising competition in the Asia-Pacific and increasing risks of "military escalation or miscalculation".

The DSR said the Australian Department of Defence's (DoD's) C4 networks and architectures must collect and integrate a diverse range of information to enhance the ADF's situational awareness, as well as facilitate resilient sensor-to-effector networks that cannot be compromised by hackers.

The DoD needs to adopt an open architecture approach in both hardware and software to reduce integration complexity and costs, and reduce barriers for local industry participation in development projects, the DSR added.

The DSR also added the need to step up the development of different military platforms related to C4ISR.

For example, according to the DSR, the Australian government should prioritise collaboration with the US for the development of MQ-28A Ghost Bat unmanned aerial vehicles (UAVs) for the Royal Australian Air Force (RAAF). The Australian government said it concurs with this recommendation.

https://www.janes.com/defence-news/defence/latest/australias-defence-review-highlights-requirement-for-disruptive-technologies

Science & Technology News

The Indian EXPRESS

Wed, 26 Apr 2023

A New Mission for Quantum Computers, and What it Means for India

"Nature isn't classical, dammit, and if you want to make a simulation of nature, you'd better make it quantum mechanical, and by golly it's a wonderful problem because it doesn't look so easy," remarked Richard Feynman, a Nobel Prize-winning physicist with a cult status, at a lecture at the MIT Computer Science and Artificial Intelligence Laboratory in 1982. This lecture — later published as a paper under the title 'Simulating Physics with Computers' — in which Feynman proposed the development of different, more powerful computers by utilising the quantum mechanical properties of matter, is often considered the original idea behind quantum computers.

Four decades later, quantum computers have become a reality, though they are yet to do anything meaningful. Getting quantum computers to realise their full potential and perform tasks impossible or impractical for the conventional computers is one of the hottest areas of research. Last week, India decided to join in this global effort in a big way, by setting up a Rs 6,000 crore

National Mission on Quantum Technologies and Applications. Development of homegrown quantum computers is one of the major objectives of the mission.

Not just another fast computer

Quantum computers are not just the next generation of faster and more efficient computers. Conventional computers, when they are more powerful and have much higher capabilities, become supercomputers. But these perform their tasks in the same way as the normal home computers or mobile phones do. Quantum computers are fundamentally different in the way they handle and process information. They are meant to be useful in some very specific situations where the traditional ways of computing are inadequate. For more mundane uses, like playing a video or browsing the internet, quantum computers would not offer any significant advantage over conventional computers.

If conventional computing is compared to the task of climbing up the stairs of a tall building, a more powerful computer would mean getting a fitter or healthier person to climb. The fitter person can probably go faster and a few storeys higher, but would eventually get exhausted. Using the elevator is a fundamentally different way of accomplishing the task. There is a significant gain in speed, but the main advantage is the ability to access floors that would be out of reach, or extremely inefficient to climb, for any person. At the same time, in certain situations, like when only the first couple of floors are to be reached, the elevator might not offer any great advantage.

Quantum properties

While elevators rely on machines and electricity to perform a task too difficult for human beings, quantum computers exploit the very special properties of matter in the sub-atomic world for calculations beyond the capabilities of ordinary computers.

Small particles, the size of atoms or its constituents like protons or electrons, exhibit a number of strange properties that go entirely against our everyday experiences. For example, these particles can exist at multiple locations at the same time, a phenomenon called superposition, but only till no one is looking. The moment they are observed at one place, they cease to exist at all other places. Then there is the property of entanglement, the ability of a particle to instantaneously influence the behaviour of another with whom it had an earlier ‘interaction’, even when they are separated by arbitrarily great distances. Research on entangled particles won the Physics Nobel last year.

Conventional computers store and process information in bits. A bit is the smallest unit of data that computers can handle. It can take just two values — 0 or 1 — but only one of these at a time. A zero would result in a certain set of instructions to be carried out, while a one would lead to a different set of instructions. All data in computers, including text, pictures and videos, are broken down into a sequence of zeros and ones for purposes of storage and processing, and can be reconstructed from these.

A two-bit system in a conventional computer can have four states — (0,0), (0,1), (1,0) and (1,1) — but again only one at a time. To go through each of these four states, the computer has to take four steps. A more powerful computer can speed up the process, but it would still have to go through the four steps.

This is where the quantum computer starts to do things differently. Superposition makes it possible for the quantum bit, or a qubit as it is called, to exist in both 0 and 1 state

simultaneously. Counter-intuitive as it may appear, it can be 60 per cent 0 and 40 per cent 1 at the same time, or any other combination. Similarly, the two-qubit system can be in all four states at the same time — some part (0,0), some part (0,1), some part (1,0) and remaining (1,1). What it means is that a quantum computer can go through these four states in one step, unlike the conventional computer that requires four steps.

Not yet perfect

As more qubits are added, the processing capability of the quantum computer increases exponentially. With just a few qubits, say 50, quantum computers can outpace traditional computers that perform a couple of billion operations per second. Tasks that conventional computers would take millions of years to finish can become a matter of seconds with a quantum computer. Such tasks are found in a variety of domains, like internet and data security, and health research. And this is where the main use cases of quantum computers lie.

However, it is not all straightforward. Apart from the challenges in building a quantum computer — requirements of very cold temperatures and extreme isolation — there is a significant risk of errors. The parallel processing happening in superposition states all lead to different results, only one of which is correct or desirable. In other situations, when the superposition breaks down, the final outcome is randomly selected from the range of possibilities. But this would make quantum computer totally useless. Error correction, and the ability to guide the computer to produce the correct result as the most favoured option, is one of the ongoing areas of active research.

The mission in India

The excitement in the scientific community about the Quantum Mission is because it allows India to join a global technology development race when it is still in the nascent stages. “We are in the game. We have rarely been in the game (with regard to other technologies). Work on quantum technologies has been going on in India for the past 10 years, more vigorously in the last four-five years, whereas groups in some other countries have been working for close to three decades. We have some catching up to do, but this mission will help us do that. We have a fairly large pool of people with the right skills,” said Rajamani Vijayaraghavan of Tata Institute of Fundamental Research (TIFR) who will play an important role in the computing node of the mission.

Several scientific groups in the country are already working on quantum computers and related technologies. A collaborative effort of Tata Institute of Fundamental Research (TIFR), Defence Research and Development Organisation (DRDO) and Tata Consultancy Services (TCS) is developing a 7-qubit quantum computer. Much more powerful quantum computers, having a few hundred qubits, have been developed in some other countries, though none of these have yet performed calculations beyond the capabilities of regular computers. One objective of the mission is to build a 1,000-qubit computer in the next eight years.

https://indianexpress.com/article/explained/explained-sci-tech/quantum-computers-and-india-8575969/

नवभारत टाइम्स

Wed, 26 Apr 2023

क्वांटम तकनीक के लिए तैयार भारत

- **19वीं सदी** में जन्म हुआ क्वांटम फिजिक्स का और दुनिया के सामने आई क्वांटम थियरी।
- **दार्शनिक रूप** से यह थियरी जैन धर्म के स्यादवाद (अनेकांतवाद) और चीन के यिन और यांग दर्शन के काफी नजदीक मानी जाती है।
- **यह तकनीक** सबएटॉमिक लेवल पर ऊर्जा और पदार्थ की व्याख्या करती है।
- **क्वांटम कंप्यूटिंग**, क्वांटम क्रिप्टोग्राफी और क्वांटम सेंसिंग में है इसका इस्तेमाल।
- **क्वांटम कंप्यूटर**, क्वांटम बिट्स या क्यूबिट्स यूज करता है। एक क्यूबिट इलेक्ट्रॉन या फोटॉन से बना होता है। उनका घूमना क्वांटम की स्थिति के बारे में बताता है।
- **इस तकनीक** में 0 और 1 साथ हो सकते हैं। मसलन हम सिक्का उछालें तो चित और पट दोनों आ जाए।

नई व्याख्याएं

क्वांटम तकनीक ने कई चीजों की नई व्याख्याएं की हैं

- एक ऑब्जेक्ट की दो अलग-अलग अवस्थाएं समान समय पर मौजूद हो सकती हैं।

यह व्याख्या...
चिकित्सा, कंप्यूटर साइंस और अन्य क्षेत्रों में उपयोगी।

- प्रकाश एनर्जी फोटान के बहुत ही सूक्ष्म और न बांटी जाने वाली यूनिट्स या क्वांटा से बनता है।

- इसकी सहायता से कुछ ऐसे नए उत्पादों को बनाया जा सकता है जो क्लासिकल टेक्नॉलजी से नहीं बनाए जा सकते हैं।

क्वांटम कंप्यूटिंग में कई समानांतर गणनाओं का हल एक साथ दिया जा सकता है।

इनको फायदा

- एयरो-स्पेस इंजीनियरिंग
- मौसम पूर्वानुमान
- फाइनेंशल ट्रांजैक्शन
- कम्युनिकेशन प्रणाली
- साइबर सिक्यॉरिटी
- शिक्षा और स्वास्थ्य
- रक्षा और कृषि
- डेटा सुरक्षा और ऊर्जा
- नेविगेशन सुपरकंडक्टर्स
- नए सेमीकंडक्टर

THE TIMES OF INDIA

Wed, 26 Apr 2023

Designing Engines that Withstand 1,800 Degree Celsius Temperature, to Predicting Faults

General Electric (GE) recently gave TOI a tour of their John F Welch Technology Centre (JFWTC) in Bengaluru. The company has over the past 23 years invested over $200 million in setting up and running the state-of-theart centre. The centre's 1,000 engineers have contributed more than 4,000 patents to GE, with innovations focusing across a range of industries from aviation, energy, to the healthcare sector. We thought we'd give a glimpse into the kind of engineering work being done for the aviation sector at the Indian unit of the company started by Thomas Edison over 130 years ago.

Technologies for today

There are few things more infuriating than your flight getting delayed. It could be due to a variety of factors, including trouble with the engines. The engineers at JFWTC are acutely aware of this and spend a considerable amount of time and energy into building systems, processes, and tools to predict aircraft maintenance requirements to cut down on down time.

They call it 'analytics-based maintenance' and it involves creating a virtual twin of the engines in order to simulate different environments and conditions. Sundar Krishnaswami, consulting engineer at GE Aerospace, says the engines that GE designs are fitted on planes that travel all over the globe, meaning the plane could be subjected to harsh desert sand in the middle east at one moment and thunderstorms in the middle of the Pacific Ocean a few hours afterwards.

Those swings in environmental conditions can be simulated, and the optimum engine maintenance schedule calculated. All of this involves a lot of data science, statistics, and physics to accomplish, says Krishnaswami.

GE's data analytics team also created a tool that could physically be inserted into the engines of a plane to take images (similar to an endoscopy). These images are then fed through an AI model to automatically detect defects. In order for the model to work though, the engineers first had to individually label differentengine defects on images and teach the AI manually – a painstakingly laborious process when you consider the number of potential defects a complicated engine could have. It was worth the man hours though. The AI model can sort through tens of thousands of images from a thousand planes in a fraction of the time it would take human beings to physically inspect the same engines.

Technologies for tomorrow

Aero engines have extreme operating conditions in terms of stress, temperature, and environmental damage. Which is why unique metallic materials are used that can retain very high strength up to 90% of their melting point. But there's a problem, says Sanjay Sondhi, senior principal scientist of metallurgy at GE Aerospace Research Centre, Bengaluru. The hot gases around these components can reach temperatures of around 1,800C, which is 300-500 degrees celsius hotter than the melting point of these alloys. Which means parts of the engine would melt mid-flight. The solution? Use thermal barrier coatings (TBC) to bridge that temperate gap. "TBCs provide extreme insulation; it's a very thin coating that reduces the temperature of metals by 300-600 degrees celsius," Sondhi says.

GE's metallurgical specialists generate new chemistry to develop viable TBCs. "We first conceptualise them in our thought process or in a simulation, and then make a new chemistry, and then process it in a way that it has the right structure and properties, and then test whether the TBC has the properties we want, both in terms of mechanical durability, as well as in terms of its chemical performance," Sondhi says.

The chemical powder that is developed is then made into a slurry and applied as an even coating on engine parts. The process requires high levels of metallurgical expertise to create and then serious engineering capabilities to test and execute at scale.

"You have to concurrently think like a scientist and an engineer," Sondhi says.

Technologies for 10 years later

Sanjeev Jha is an advance technology leader for GE Aerospace. It's his job to look 10 years down the line and start the long process of developing the technologies of the future. One of the projects his team is working on is called RISE – Revolutionary Innovation for Sustainable Engines (RISE). The objective is to design an engine that uses 20% less fuel and produces 20% fewer CO2 emissions than the most efficient jet engines built today. That translates to two generations worth of fuel efficiency in one programme. "There is a very detailed and rigorous process of showing that that technology actually works before it even gets in the programme," Jha says.

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