

# समाचार पत्रों से चयित अंश Newspapers Clippings

दैनिक सामयिक अभिज्ञता सेवा

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## India not leveraging R&D benefits

By Apurva Venkat

*Advantages are not being leveraged fully mainly because of lack of funds, say experts*

India enjoys a huge advantage of a great talent pool that comes at a low cost. However, experts from Samsung, IBM and Cisco say the advantages are not being leveraged fully mainly because of lack of funds and no collaborative work.

Vinod Kumar, general manager, GE Global Research, says one of things that are different in India as compared to other countries is the time duration and pace at which things happen, and the amount of money that goes into the activities. "In a US scenario where GE has worked, there are programmes, worth \$5 million and \$10 million, where companies collaborate with government labs and universities and these will run in a way that the project is completed in five years," said Kumar at a R&D summit earlier this week.

However, Kumar feels, India lacks such a pace or scale of getting things done. "Short term does not mean that it does not have any innovation or R&D. But one should look at innovation in a phased manner. Try to get things to the market, even if it is a pilot or a test, and tweak your solution and move it to the next one. It should incrementally add value to the customer or market."

Similarly Monica Agarwal, vice-president, India Systems Development Lab, IBM, said there was a lack of fora and platforms for people to collaborate and key strategy areas needed to be defined. "Say we have smarter cities; the questions are who do we need to bring on the table, what are the things needed for the project, and what needs to be done in the next three years to come up with application products. Running it as a project and bringing it to definitive closure in a set period of time will make it a lot more of successful than now."

Countries such as South Korea and Israel spend more than four per cent of the GDP on research and development (R&D) of new products and technologies. In contrast, the figure in India is less than one per cent. Of this the private sector's contribution is only a third. There is an increased government focus to bring investment to India. Thus, now is seen as the ideal time to boost private sector participation in R&D.

Despite Bengaluru being a city where most MNCs have set up research centres and India projected to be the third largest hub for R&D by 2020, the percentage remains much lower than many nations that spend at least four to six per cent.

Experts also feel that the benefits of R&D is understood well by software companies, but not by manufacturing companies despite a greater potential for the latter. Alok Nath De, CTO of Samsung, says the percentage spent by manufacturing companies on R&D is almost in decimals.

"The basic thing is intent, the understanding and belief that if you spend a percentage of your profits in R&D, it will bring in more development. Execution of this understanding is the key problem here," said De. Samsung has 8,000 members working on R&D in India and it is the highest patent filer in the country.

Combined with the problem of unavailability of collaboration is the fact that smaller Indian companies find the cost of capital very high. The cost of borrowing in India is eight to nine per cent.

"Taking the example of Cisco, for every 100 patents that it files it is able to monetise six. The average investment in the patent is for three years, another three years is invested before that and borrowing is done two years in advance. Availability of cash is not a big issue for MNCs, but for a smaller company it is a big inhibitor. Very often smaller businesses do not want to take this risk," said Angshik Chaudhuri, a global managing director at Cisco Systems Inc.

While most agree that India needs to increase the percentage spends on R&D to at least four per cent, they also believe that the structure followed in developed nations needs to be adopted in India. Sriganesh Gandham,

executive director and head of R&D at Hindustan Petroleum, says that in developed countries every small thing — be it in the development or testing phase — is counted as R&D whereas in India such a structure is lacking. At the same time IP-enabled services is not counted in R&D although they have such a component.

“If we count it right, the percentage will grow to two or even three per cent. As the market opens up, there will be more competition. Indian companies will start understanding that India is not their only market, the R&D investments will increase,” added Gandham.

## MAIL TODAY

Sun, 09 Apr, 2017

### Lady fighter pilots learn combat tricks

The first three lady officers commissioned to fly fighter aircraft in the Indian Air Force have now entered their second phase of training where they are learning the tricks of aerial combat at the Kalaikunda airbase in West Bengal. “The three lady officers have now entered their second phase of training and they are learning air to air combat and air-to-ground combat tricks on the Hawk advanced jet trainer aircraft at the air base,” IAF officials said. The trio of flying officers Avani Chaturvedi, Bhawana Kanth and Mohana Singh was commissioned into the air force last year after they had successfully completed their initial basic training at the air force academy in Telangana. IAF officials said the lady officers will be trained to fire armament from their planes during the third stage of training which will again be held on the Hawk trainer aircraft.

The three lady officers are part of an experiment to include women officers as fighter pilots by the government and the future of women as combatants would depend on the success of these ladies in the coming times. The decision was taken by the Defence Ministry to allow women in the air force as a five year experiment in October 2015. The Navy and the Army are yet to allow women in combat as they are dealing with a lot of operational, social and logistics issues in opening avenues in war fighting for them. After the completion of their third stage training at the same air base, the three officers would be deployed in operational frontline squadrons of planes such as the Su-30 and the Mirage 2000 where they would be involved in daily operations.

The three lady officers will have to fly close to 150 hours on the Hawk trainers before they are allowed to graduate on the actual fighter planes. In the batch after the three ladies opted for fighter flying, none of the lady cadets in the next batch have opted for fighter stream. A few lady cadets have opted for helicopters while one or two have chosen the transport aircraft.

The defence ministry is in the process of making a comprehensive policy for the induction of women in combat and opening more avenues for them in the forces and trying to look for answers for some of the legal and social issues it may face in the future regarding them. The issues being discussed include the reaction of authorities in case of an affair between a lady officer and a jawan along with the family support system for the lady officers in case of a long deployment away from the place of posting. Defence forces are of the view that the avenues for lady officers in Army and Navy should be opened only after these issues are sorted out and the services are given the answers on how to react in a particular situation.

## दैनिक जागरण

Sat, 08 Apr, 2017

### भारत-इजरायल के बीच 13 हजार करोड़ का सैन्य खरीद समझौता

यरुशलम, प्रेट्र। भारत और इजरायल के बीच रक्षा संबंधों ने नई ऊंचाई को छू लिया है। दोनों देशों ने दो अरब डॉलर (करीब 13 हजार करोड़ रुपये) का सैन्य खरीद समझौता किया है। इसे इजरायल के रक्षा उद्योग का सबसे बड़ा खरीद समझौता माना जा रहा है। इसके तहत इजरायल भारत को उन्नत मिसाइल रक्षा प्रणाली की

आपूर्ति करेगा। इजरायल की सरकारी कंपनी इजरायल एयरोस्पेस इंस्ट्रुमेंट्रीज (आइएआइ) भारतीय सेना को सतह से हवा में मार करने वाली मध्यम दूरी की उन्नत मिसाइल रक्षा प्रणाली (एमआरएसएम) देगी। आइएआइ ने बताया कि भारत के पहले स्वदेश निर्मित विमान वाहक पोत के लिए लंबी दूरी की मिसाइल रक्षा प्रणाली (एलआरएसएम) की आपूर्ति भी की जाएगी। आइएआइ के साथ 1.6 अरब डॉलर (करीब 10,290 करोड़ रुपये) का सौदा हुआ है। शेष समझौता अन्य सरकारी कंपनी राफेल के साथ किया गया है। राफेल इस प्रणाली के अन्य अवयव मुहैया कराएगी।

आइएआइ के सीईओ जोसेफ वीस ने कहा, 'ये करार आइएआइ की क्षमता और उन्नत तकनीक पर भारत सरकार का भरोसा दिखाते हैं। इन तकनीक को भारत सरकार की मेक इन इंडिया पहल के तहत हमारे स्थानीय सहयोगियों के साथ मिलकर विकसित किया जा रहा है।'

इजरायल के राष्ट्रपति रूवेन रिब्लिन ने वीस को इस ऐतिहासिक समझौते के लिए बधाई दी। अपने भारत दौरे पर रिब्लिन ने भारतीय नेताओं से इस समझौते पर चर्चा की थी। मेक इन इंडिया पहल का समर्थन करते हुए तकनीक साझा करने और भारतीय कंपनियों के साथ संयुक्त उद्यम बनाने की इजरायल की इच्छा को भारत सरकार ने सकारात्मक तरीके से स्वीकारा है।

बताया जा रहा है कि एमआरएसएम की तकनीक का विकास आइएआइ ने भारत के रक्षा अनुसंधान एवं विकास संगठन (डीआरडीओ) के साथ मिलकर किया है। इसमें राफेल और आइएआइ की ईएलटीए ने सहयोग किया। भारतीय कंपनियां बीईएल और एल एंड टी भी परियोजना का हिस्सा थीं।



Sat, 08 Apr, 2017

## Missile deal between India, Israel to boost defence setup

New Delhi: The Indian military's capability to take down hostile aircraft and missiles has received a significant boost, with India and Israel signing deals worth \$2 billion for advanced surface-to-air missile systems.

Israel Aerospace Industries (IAI) will provide the Indian Army with advanced mediumrange surface-to-air missile (MRSAM) systems as part of the deal.

Israel Aerospace Industries (IAI) said it was the single largest contract in Israel's defence industry history. The deal was approved by the cabinet in February and comes ahead of a possible visit of Prime Minister Narendra Modi to Israel in July.

The IAI describes the MRSAM as an advanced ground breaking air and missile defence system that provides the "ultimate protection against a variety of aerial threats". The MRSAM is operational with the air force, navy and Israel Defense Forces.

It is the army version of the long-range surface-to-air missile (LR-SAM) deployed on Indian warships. LR-SAM has been co-developed by India and Israel under a 2,606-crore programme.

According to the deal, IAI will also supply surface-to-air missiles to be fitted on indigenous aircraft carrier Vikrant being built in Kochi. The new deals will strengthen the position of Israel in the Indian defence market.

Israel currently is the fourthlargest arms supplier to India after the US, Russia and France.

## Sheikh Hasina arrives on four-day visit: Civil nuclear cooperation, defence on talks agenda

*During Hasina's visit, the two sides will be signing at least 25 pacts in various key sectors, including civil nuclear cooperation and defence.*

Prime Minister Narendra Modi received his Bangladesh counterpart Sheikh Hasina on Friday when she arrived at the Palam technical airforce base for a four-day visit to India.

This is the third time Modi has broken protocol to receive visiting leaders. Earlier, he did so to welcome US President Barack Obama and Crown Prince of Abu Dhabi Sheikh Mohamed bin Zayed Al Nahyan, both of them chief guests for the Republic Day celebrations. Usually, a minister of state or a senior official of the External Affairs Ministry receive foreign dignitaries on their visit to India.

Shortly after she landed, External Affairs Minister Sushma Swaraj met the Bangladesh Prime Minister, and they are understood to have discussed bilateral issues of importance.

During Hasina's visit, the two sides will be signing at least 25 pacts in various key sectors, including civil nuclear cooperation and defence. However, any agreement on the Teesta water sharing issue is unlikely to be inked. Officials here said, "It will be a visit without water," indicating that a pact on Teesta river waters is not on the cards. This is Hasina's third visit to India in the past three years.

She had earlier come to attend the funeral of President Pranab Mukherjee's wife Suvra Mukherjee and then for the BIMSTEC summit in Goa last year.

Modi and Hasina will hold bilateral talks on Saturday, where India is set to announce a line of credit of \$500 million to Bangladesh for military supplies. Hasina will visit Ajmer on Sunday and meet Indian business leaders the next day.

The two sides are looking at the inking of a framework agreement on civil nuclear energy which will provide for extensive cooperation in the sector, including setting up of nuclear reactors in Bangladesh by India.

In a bid to strengthen trade, the two sides are likely to announce setting up of another set of trade facilitation huts along the borders in the Northeast.

West Bengal Chief Minister Mamata Banerjee has accepted an invitation by the central government to attend the launch of some projects between the two countries and a lunch to be hosted by Modi in the Bangladesh Prime Minister's honour.

## दैनिक जागरण

### भारत-बांग्लादेश के बीच और गहरी हुई दोस्ती, 22 समझौतों पर हस्ताक्षर

नई दिल्ली, जागरण ब्यूरो। शनिवार को दिन भर पीएम नरेंद्र मोदी व बांग्लादेश के पीएम शेख हसीना के बीच द्विपक्षीय बैठक और मंत्रिस्तरीय बैठकों का सार एक पंक्ति में यह है कि इन दोनों देशों के रिश्तों के बेहतरीन दिनों की अभी शुरुआत भर हुई है। शनिवार को दोनों प्रधानमंत्रियों के सामने रक्षा से लेकर परमाणु ऊर्जा तक और सूचना प्रौद्योगिकी से लेकर न्यायायिक प्रक्रिया तक के क्षेत्र में 22 समझौतों पर हस्ताक्षर किये गये। पड़ोसी देशों के साथ रिश्तों को पीएम मोदी ने यह कह कर नया आयाम दे डाला कि वे, "भारत के साथ ही बांग्लादेश के विकास के भी सपने देखते हैं।"

वैसे शेख हसीना सरकार की बहुत चाहत के बावजूद तीस्ता जल बंटवारे पर समझौता नहीं हो सका लेकिन पीएम मोदी ने यह वादा जरूर किया कि इस मुद्दे पर जल्द से जल्द वह सहमति बनाने की कोशिश करेंगे। शेख हसीना हर हालत में चाहेंगी कि इस पर मोदी पश्चिम बंगाल की मुख्यमंत्री ममता बनर्जी को तैयार कर ले क्योंकि बांग्लादेश में अगले वर्ष चुनाव है और यह मुद्दा वहां राजनीतिक रंग ले सकता है। लेकिन हसीना के लिए अपने यहां बताने के लिए यह जरूर होगा कि भारत से उन्हें एकमुश्त 5 अरब डॉलर की वित्तीय मदद मिला है।

इसमें से 4.5 अरब डॉलर भारत बांग्लादेश में विभिन्न परियोजनाओं को पूरा करने में देगा। जबकि 50 करोड़ डॉलर की मदद भारत से जरूरी रक्षा उपकरणों की खरीद के लिए दी जाएगी। इससे पिछले तीन वर्षों में नई दिल्ली की तरफ से ढाका को दिए जाने वाले आर्थिक मदद का आकार आठ अरब डॉलर का हो जाएगा। लेकिन यह सुनिश्चित करेगा कि ढाका नई दिल्ली का एक अहम रक्षा सहयोगी व बाजार बने।

भारत व बांग्लादेश के बीच 22 समझौतों में से तीन समझौते परमाणु क्षेत्र से जुड़े हुए हैं जो बताता है कि दोनों देश किस तरह से रिश्तों को नई राह दे रहे हैं। इससे आने वाले दिनों में भारत बांग्लादेश में परमाणु ऊर्जा संयंत्र लगाने में भी मदद करेगा। यह पहली बार है कि भारत परमाणु तकनीकी का निर्यात करने की कोशिश कर रहा है। पीएम हसीना ने अपनी तरफ से भारत को पूरा आश्वासन दिया है कि उनके देश का इस्तेमाल अब भारत विरोधी के लिए नहीं होगा।

उन्होंने कहा भी कि, आतंकवाद पर उनकी सरकार की जीरो-टोलरेंस की नीति जारी रहेगी। भारत-बांग्लादेश सीमा पर शांति व सुरक्षा बनाये रखने के लिए वह हर मुमकिन कोशिश करेंगी। मोदी ने भी हसीना सरकार की तरफ से आतंकवाद के खिलाफ की जा रही कार्रवाइयों को हर किसी के लिए प्रेरणा का कारण बताया। दोनों देशों के बीच आतंकवाद के खिलाफ एक दूसरे की मदद करने को लेकर भी एक समझौता हुआ है।

**MAIL TODAY**

*Sat, 08 Apr, 2017*

## **India, US N-deal becoming a dud**

Donald Trump's ascension to power in the US has cast a shadow over the nuclear deal with Iran clinched by his predecessor, Barack Obama. But another landmark nuclear deal — signed by Obama's predecessor, George W Bush, with India — is also under pressure. Indeed, there is a distinct possibility that the deal could turn out to be a dud on the energy front.

### **Bankruptcy**

The Toshiba-owned Westinghouse's bankruptcy has derailed US-Indian plans to finalise the first contract under the deal. India has earmarked at least one nuclear park each for Westinghouse, GE-Hitachi and France's state-owned Areva. Each of these firms was to build a cluster of reactors at their assigned park. Westinghouse's massive losses have left Toshiba tottering on the brink of collapse. Toshiba has already decided to exit from overseas nuclear power construction business. The paradox is that the promise of the India-US nuclear deal contributed to Toshiba's overpriced \$5.4 billion acquisition of Westinghouse in 2006, yet that purchase turned out to be a huge blunder. India's plan to import over \$100 billion worth of reactors had promised to revive the decrepit US nuclear power industry. Today, Toshiba is on the verge of disintegration as it stares at a staggering \$9 billion net loss in the financial year ending March 31, thanks to Westinghouse. Westinghouse's imprudent purchase of a heavily indebted US nuclear constructions service company in late 2015 proved the proverbial last straw for Toshiba. Meanwhile, the US-India deal's prospects have been further dimmed by the financial troubles of the other two leading reactor vendors, Areva and GE-Hitachi. Like Toshiba, Areva's very survival is at stake today. It needs at least a €5 billion bailout from the

French government to stay afloat. Such a rescue package has to await the outcome of the French presidential election. Areva is likely to be split, with its reactor unit being sold to EDF, which is also stateowned. As for GE-Hitachi, it has already trimmed down its nuclear operations by recognising their economic risks. Meanwhile, Japanese Prime Minister Shinzo Abe's political travails over a school scandal have injected uncertainty over whether Japan's Parliament will ratify the country's separate nuclear deal with India. The 2016 agreement was six years in the making largely because it was controversial in Japan, representing the first such accord with a country that is not party to the NPT.

### **Ratification**

Due to Japan's global role as nuclearequipment supplier, its ratification of the agreement with New Delhi is essential to opening the path to the India-US deal's implementation. Japan is the world's leading supplier of heavy nuclear forgings, with just one Japanese company — Japan Steel Works — controlling 80 per cent of the global market for large forged components for light-water reactors (LWRs), the type India is seeking to import. Nearly 12 years after it was unveiled with great fanfare, the India-US deal holds little promise to deliver any tangible energy benefits to India, although the larger strategic framework in which the agreement was embedded has helped make the US the largest seller of arms to New Delhi. Rarely before has America acquired a major arms client of India's size so rapidly. The nuclear deal has also fostered growing strategic cooperation between the two countries. Against this background, it is apparent that the deal raised false hopes at a time when nuclear power was already in decline globally. Indeed, India, in announcing plans for a huge expansion of its installed nuclear power generating capacity, fell victim to its own hype over the deal.

### **Interests**

Two successive Indian governments went out of their way to accommodate US commercial interests in order to operationalise the deal. For example, Indian law allowing suppliers to be held liable in case of a nuclear accident was reinterpreted through executive action by the Modi government to effectively transfer reactor vendors' accident liability risks to Indian taxpayers. It also reinterpreted another provision so that victims of a potential accident would be barred from suing for damages in another country. These actions were controversial, given India's bitter experience over the 1984 gas leak from an American-owned chemical plant in Bhopal that killed as many people as Japan's 2011 Fukushima disaster. India refused to heed the lesson from Japan's liability laws that indemnify nuclear suppliers and make plant operators exclusively liable. GE built or designed all the three Fukushima reactors that suffered core meltdowns, yet the US firm went scot-free, despite a fundamental design deficiency in the reactors. The dire financial state of the foreign companies that were planning to build reactors in India should be seen by Indian taxpayers as a blessing in disguise. Given the exorbitant price sought by them for selling reactors, India would have had to heavily subsidise the electricity from such plants. The four Westinghouse nuclear plants under construction in the US and Areva's project in Finland are years behind schedule and billions of dollars over budget. Had Indian plans gone ahead, India would have been saddled with multiple Enrons in the nuclear-energy sector.



*Sat, 08 Apr, 2017*

## **3 Soldiers Killed in J&K Avalanche**

*Total Count: At least 20 Army men, including a major killed in snow avalanches this year*

Nine people, including three army men were killed as avalanches hit the higher reaches of Kashmir and Ladakh and extreme downpour caused minor floods in some parts of Jammu and Kashmir.

Three army men were killed in Batalik sector in J&K's Ladakh region, as multiple avalanches hit the army post on Thursday afternoon due to extreme weather conditions. Two army men rescued from the spot have received injuries and have been shifted to hospital. "Spl teams toiled inhospitable weather & 15feet snow overnight; body of 3rd soldier retrieved. Soldiers martyred guarding icy heights," Army's Northern Command tweeted on Friday morning.

This year, at least 20 Army personnel, including a major were killed in snow avalanches in separate incidents in Gurez, Sonamarg and Kupwara areas of north Kashmir. Heavy rainfall and abnormal snowfall in April, triggered panic in Kashmir as water level crossed danger mark in river Jehlum and all other tributaries and rivulets on Thursday.

Six people were killed due to bad weather conditions and consequential flooding and avalanches. According to government officials, the father-son duo of Kargil was buried in avalanche, a minor girl in Kupwara was drowned and a woman in Rajouri was struck by lightning. Meanwhile, two men drowned in Kokernag area when their vehicle plunged into the river.

Even though the water level in river Jehlum and other tributaries has been receding on Friday, many people living on banks of the rivers and tributaries have shifted to safer areas and also moved their belongings to third storeys of their houses. At least 20 Army personnel, including a major were killed in snow avalanches. Spoke to J&K CM Mehbooba Mufti on the flood situation in the state. Offered all possible support from Centre in dealing with the situation, the Prime Minister tweeted.

The weatherman has also predicted significant improvement in weather from Friday afternoon and has maintained that people should be cautious.

## THE ASIAN AGE

Sun, 09 Apr, 2017

### Navy aircraft turns into museum after retirement

*TU-142M recently de-inducted after 29 years.*

Visakhapatnam: One of the TU-142M long-range maritime patrol aircraft of the Indian Navy, which was recently de-inducted after 29 years of service, arrived here on Saturday, to be converted into a museum by the Andhra Pradesh government.

Chief minister N. Chandrababu Naidu welcomed the anti-submarine warfare aircraft, which landed at INS Dega for the last time on Saturday morning.

Civil aviation minister P. Ashok Gajapathi Raju, Flag Officer Commanding-in-Chief, Eastern Naval Command Vice Admiral H.C.S. Bisht and others were present on the occasion.

The aircraft was given an impressive welcome by a flypast of three Chetak helicopters, two Kamov helicopters, two Dorniers and one P-8I aircraft.

Mr Naidu said on the request made by the Andhra Pradesh government, the defence ministry allotted the aircraft to the state for converting it into a museum.

The aircraft would be dismantled and transported by road on trailers and re-assembled on the beach road.

“A Task Force with the officials of the state government and Indian Navy would be constituted to coordinate the activities to convert the aircraft into museum on the beach road near INS Kursura Submarine museum,” Mr Naidu said.

According to him, the aircraft would promote the knowledge to the citizens on the activities of the Indian Navy and its service to the nation.

The chief minister said that the TU142M has been the fastest turboprop aircraft in the world and has rendered yeoman service to the nation “with pride and elan” during 1988-2017.

He interacted with the crew members of the aircraft.

The aircraft was decommissioned by Chief of Naval Staff Admiral Sunil Lanba on March 29 at a ceremony at INS Rajali, India’s premier naval air station in Tamil Nadu’s Arakkonam.

A total of eight Tupolev-142Ms were inducted into the Navy. The Soviet-era aircraft was widely known as one of the most formidable reconnaissance platforms.

## US punishes Assad for chemical attack, fires missiles at Syrian airbase

*Trump ordered US to directly targetting Assad's military with air strikes*

The United States fired cruise missiles on Friday at a Syrian airbase from which it said a deadly chemical weapons attack had been launched this week, the first direct US assault on the government of Bashar al-Assad in six years of civil war.

US President Donald Trump ordered the step his predecessor Barack Obama never took: directly targetting Assad's military with air strikes in punishment for the chemical weapons attack, which killed at least 70 people, many of them children.

That catapulted the United States into a confrontation with Russia, which has military advisers on the ground assisting its close ally Assad.

"Years of previous attempts at changing Assad's behaviour have all failed and failed very dramatically," Trump said as he announced the attack from his Florida resort, Mar-a-Lago, where he was meeting Chinese President Xi Jinping.

"Even beautiful babies were cruelly murdered in this very barbaric attack," he said of Tuesday's chemical weapons strike, which Western countries blame on Assad's forces. "No child of God should ever suffer such horror." The swift action is likely to be interpreted as a signal to Russia, and also to other countries such as North Korea, China and Iran where Trump has faced foreign policy tests early in his presidency.

The Syrian army said the US attack killed six people at its air base near the city of Homs. It called the attack "blatant aggression" and said it made the United States a "partner" of "terrorist groups" including Islamic State. Homs Governor Talal Barazi told Reuters the death toll was seven.

A spokesman for Russian President Vladimir Putin said the strike had seriously damaged ties between Washington and Moscow.

Putin, a staunch ally of Assad, regarded the US action as "aggression against a sovereign nation" on a "made-up pretext", spokesman Dmitry Peskov said. Russian television showed craters and rubble at the site of the airbase and said nine aircraft had been destroyed.

US officials said they had taken pains to ensure Russian troops were not killed, warning Russian forces in advance and avoiding striking parts of the base where Russians were present.

Western allies of the United States spoke out in support of the decision to launch the strikes. Several countries said they were notified in advance, but none had been asked to take part.

US officials and allies described the attack as a one-off that would not lead to further escalation. It signalled Trump's determination to take "decisive action", US officials said.

For years, Washington has backed rebel groups fighting against Assad in a complex multi-sided civil war under way since 2011 that has killed more than 400,000 people. The war has driven half of Syrians from their homes, creating the world's worst refugee crisis.

The US has been conducting air strikes against Islamic State militants who control territory in eastern and northern Syria, and a small number of US troops are on the ground assisting anti-Islamic State militias.

But until now, Washington has avoided direct confrontation with Assad. Russia, meanwhile, joined the war on Assad's behalf in 2015, action that decisively turned the momentum of the conflict in the Syrian government's favour. His decision to strike Syrian government forces is a particularly notable shift for Trump, who in the

past had repeatedly said he wanted better relations with Moscow, including to cooperate with Russia to fight Islamic State.

However, Trump had also criticised Obama for setting a "red line" threatening force against Assad if he used chemical weapons, only to pull back from ordering air strikes in 2013 when Assad agreed to give up his chemical arsenal.

Trump said this week's chemical attack "crosses many, many lines", an allusion to Obama's threat that was not carried out. Russian media long portrayed Trump as a figure who would promote closer relations with Moscow. At home, Trump's opponents have accused him of being too supportive of Putin.

US spy agencies say Moscow intervened with computer hacking to help Trump beat Hillary Clinton in last year's election, and the FBI is investigating whether Trump campaign figures colluded with Moscow, which the White House denies.

Trump ordered the strikes a day after he blamed Assad for this week's chemical attack in the Syrian town of Khan Sheikhoun.

The Syrian government and Moscow have denied that Syrian forces were behind the attack, but Western countries have dismissed their explanation — that chemicals were released in an air strike on a rebel weapons depot, as beyond credibility.

Video of the aftermath of Tuesday's chemical attack was shown around the world this week, depicting the limp bodies of small children choking while rescue workers hosed them down to try to wash off the poison gas. In Russia, state television blamed rebels and did not show footage of victims.

Tomahawk missiles were launched from the USS Porter and USS Ross around 0040 GMT on Friday, striking multiple targets - including the airstrip, aircraft and fuel stations - on the Shayrat Air Base, which the Pentagon says was used to store chemical weapons.

The attack was a "one-off," a U.S. defence official told Reuters, meaning it was expected to be a single strike with no current plans for escalation.

U.S. Secretary of State Rex Tillerson said the strike did not mean the wider U.S. policy on Syria had changed.

"This clearly indicates the president is willing to take decisive action when called for," he told reporters. "I would not in any way attempt to extrapolate that to a change in our policy or our posture relative to our military activities in Syria today. There has been no change in that status."

Iran, which backs Assad, denounced the US strike, saying it was "dangerous, destructive and violation of international laws" to use chemical weapons as an excuse to for unilateral action.

Israel, where right-wing Prime Minister Benjamin Netanyahu is a supporter of Trump, welcomed it: "In both word and action, President Trump sent a strong and clear message today that the use and spread of chemical weapons will not be tolerated," Netanyahu's office said in a statement.

Over the previous few months, many Western countries had been quietly backing away from long-standing demands that Assad leave power, accepting that rebels no longer had the power to remove him by force. But after the chemical weapons attack on Tuesday, several European countries said Assad must go.

"President Assad alone is responsible for this development," the German government said in a statement after the French and German leaders spoke by phone on Friday morning.

The attacks spurred a flight to safety in global financial markets, sending yields on safe-haven U.S. Treasury securities to their lowest since November. Stocks weakened in Asia and U.S.

equity index futures slid, indicating Wall Street would open lower on Friday. Prices for oil and gold both rose, and the dollar slipped against the Japanese yen.

# Why the Tomahawk is US's missile of choice

US Navy launched 59 Tomahawk missiles early on Friday at a military airfield in Syria in response to a chemical-weapons attack this week on civilians. Here's what makes this advanced weapon system such a handy option for the world's most powerful military...

## AN ALL-ROUNDER

- > One of the biggest advantages of using the Tomahawk is that it **does not require a pilot** to be anywhere near the target
- > Tomahawk is the mainstay weapon when US wants to attack from a safe distance
- > Missile can be launched from navy destroyers. It has a **range of 1,250-2,500 km**
- > It has been a critical part of US warfare since the Gulf War in 1991 and commonly carries a 1,000-pound warhead
- > Tomahawks have less explosive yield than larger bombs carried by US aircraft
- > But it's good enough to target Syrian planes on the ground, like on Friday

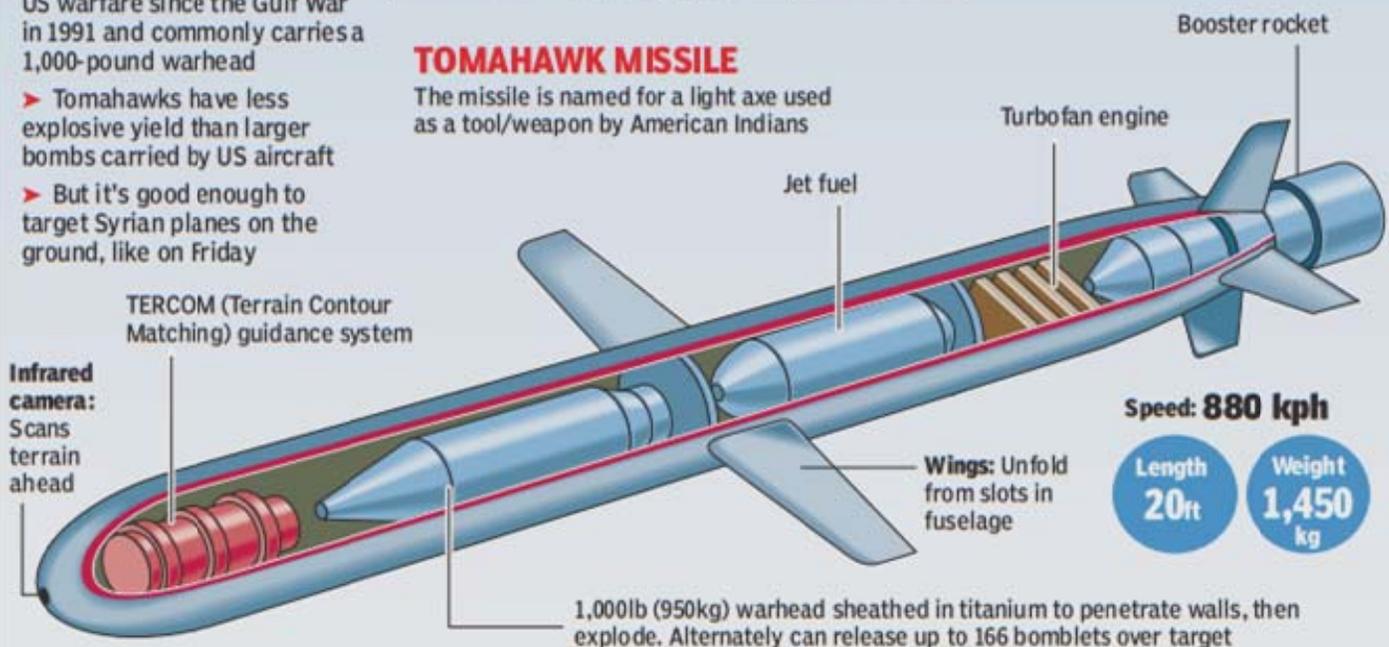


## WHAT HAPPENED ON APRIL 7

- > Missiles were launched about **4:40am local time** from USS Ross and USS Porter, navy destroyers in the eastern Mediterranean Sea
- > The strikes **targeted al-Shayrat air base in Homs province**, from which the Syrian military allegedly launched the chemical weapons attack on Tuesday that **killed at least 80 civilians**

## TOMAHAWK MISSILE

The missile is named for a light axe used as a tool/weapon by American Indians





Russia denied that Syria had any such weapons or that it was behind the attack in Id lib Province on Tuesday that left more than 80 people dead.

“The Syrian Army has no chemical weapons at its disposal,” said Dmitri Peskov, a spokesman for Putin. Russia called on the United Nations Security Council to convene an emergency meeting and Peskov said Putin considered the missile strike a breach of international law.

Syria on Friday condemned the strike as “a disgraceful act,” news agencies reported. A statement from Assad's office said the cruise missile strike was the result of “a false propaganda campaign.”

The American cruise missile strikes hit Al Shayrat airfield. American officials said the chemical weapon attack was conducted from that air base. The Syrian Army said six people were killed.

The strike was carried out by two American destroyers, the Porter and the Ross, that were already in position in the eastern Mediterranean.

Iran, Russia's main ally in the region in buttressing Assad, also condemned the American attack as “dangerous, destructive and a violation of international law.” Bahram Ghasemi, a spokesman for the Iranian foreign ministry, said that his government condemned the missile strikes.

Peskov said that the American attack would do nothing to advance the fight against international terrorism.

“Most important, from Putin's point of view, this move doesn't bring us closer to the end goal in a fight against international terrorism,” Peskov said. “On the contrary, this creates a serious obstacle for the building of an international coalition to fight it and to effectively resist this universal evil.”



Sat, 08 Apr, 2017

## Crimes against Humanity

By Nayan Chanda

*In Syria and North Korea, Trump bumps up against realities of geopolitics*

President Donald Trump, product of the television era, prefaced his first summit meeting with America's Asian rival China with a televised display of shock and awe. Hours before Chinese President Xi Jinping landed in Florida, all of the world's news channels replayed endless loops of American Tomahawk cruise missiles roaring into the night sky to hit a Syrian airbase. The unmistakable message was unlike his cautious predecessor Barack Obama this president would not hesitate to use American power if its national security interest was threatened. In light of Trump's multiple warnings about using all options to punish North Korea if China failed to dissuade its ally, this display of American might had additional weight. However, the geopolitical reality will prove much harder than bringing life to a TV script.

The result of Trump's talk with Xi at Mar-a-Lago club is not known as we go to press but Trump will soon learn that bringing North Korea to heel with bluster and threats is more difficult than ordering a missile strike against Syria. As if to underline the point, just two days before Xi's arrival North Korea taunted Trump by test firing yet another missile. White House believes that if unchecked, within four years North Korea will be able to hit the US with a nuclear-armed missile. There is thus an urgency to halt North Korea. Trump has repeatedly called for crippling Chinese sanctions against North Korea.

In an interview with Financial Times the week before the summit Trump warned “Well if China is not going to solve North Korea, we will.” Trump's advisers have made it clear that Chinese willingness to restrain North Korea is “a test of the relationship”. Attacking Syria just on the eve of the summit makes the test even more severe. If Washington forewarned Xi, as press reports suggest, his public reaction could be muted giving the first score to Trump. But Trump would find it hard to get Xi to pressure North Korea to the point of bringing about a collapse and thus remove a valuable buffer. And unless he is willing to risk decimating Seoul, a city of 10 million people living within North Korean artillery range, he could not contemplate a Syria strike against

North Korean missile launch site or nuclear weapon storage facilities. Even if it did not trigger a nuclear war, the radiation and environmental impact that a strike against North Korea would bring would be catastrophic.

Hopefully Xi will be able to persuade Trump that China wants as much as the US does to take these weapons of mass destruction from the hands of Kim Jong-un, but the best course would be to engage in direct talks and denuclearise the Korean Peninsula in exchange of recognition of North Korea. A thoughtful Congressional leader like Democratic Senator Edward J Markey has written to Trump, urging him to launch a joint Sino-American approach to initiate direct talks with North Korea with Chinese promise of increased pressure if Pyongyang refuses to play. The path of diplomatic solution is no silver bullet as decades of futile efforts including Chinese-led Six Party Talks show. But given the options prolonged jaw-jaw at conference halls or devastating conflict involving millions of deaths joining China in a diplomatic effort is far preferable. But then it would inevitably involve accepting North Korea as a de facto nuclear state, just as Obama had to do with Iran in order to freeze its nuclear programme. Having repeatedly denounced Obama's Iranian deal as "disastrous" Trump would find talking with North Korea an utterly distasteful option.

After swearing that he was not a globalist and that he would always put America first, Trump found himself taking the first military action to punish a crime against humanity . He might find talking with Kim Jong-un was preferable to undertaking an emotionally satisfying military strike that would make him responsible for a bigger crime against humanity.



*Sat, 08 Apr, 2017*

## **Will drones replace conventional war?**

Globalisation of terrorism has brought to all of us "drones", the worst kept secret of future warfare. Drones have unleashed and added a new pattern of horror to the already devastating cruelties of battles fought among nations, and between nations and non-state actors. It was no other than the US, which first started the extensive use of drones for targeted killings. The continued support of power, status and money for long have emboldened America to introduce the drones as one of the most sophisticated weapons of "firepower" in the arsenals of the 20th and 21st centuries. No wonder, America still enjoys the status of superpower, though Russia and an emerging China always hint for an alternative mode of power centres. The emergence of drones in the warfare can well be regarded as no other than a paradigm shift. And this paradigm shift is discovered in the very absence of the warrior from the battlefield. And truly, the warrior's absence will result in new psychological stimuli for both the warrior and the policymaker, who is just planning for his next move. Combined with precision weapons mounted on drones, the drone technology can be used to control territories and human beings. As for now this capability is not turning out to be a fact, but there are chances that this will soon be so. So drones will not simply remain as simple robot-controlled killing machines from a safe distance, this will be a big game changer in the battlefield.

Hence, it is worth looking at the drones — what is it and how can it change the futuristic wars? And, of course, how could drones be regarded as an all new threat to civilians?

Post-Taliban, Afghanistan was the birthplace of the armed drones wherein America had to orchestrate a completely new war strategy to target both the dreaded al-Qaeda terrorists and to retain its superiority in the warring greater West Asian region. Basically, America had to find a new killing machine to wipe out Osama bin Laden, who was then taking shelter in Afghanistan's Kandahar province. But then Washington was completely uneasy about ordering an assassination that may result in civilian casualties. However, the historic 9/11 terror attack at the heart of the US, such doubts disappeared. The American administration and its security agencies took the help of drones to eliminate Islamic terrorists not only in Afghanistan but also in many other parts of the world. Therefore, it was the need of the accurate, purely up-to-date information about the target that led to the development of drones. Before that, drones were used in the Balkans for surveillance,

but this time the range and reliability factors were brought under serious consideration while arming them. The initial thinking was that lessening the time gap between target identification and strike would certainly enhance the probability of a precise strike, with minimum collateral damage. This is how one of the most controversial weapon systems of the modern warfare has come into existence. In fact, killing Osama was possible through drones, but he had invited the same by targeting America in September 2001. Afterwards, the US responded heavily, by targeting both the al-Qaeda and its protector, the Taliban regime in Afghanistan. In fact, America's armed drone strike came that autumn to kill the reclusive Taliban leader Mullah Mohammed Omar. However, this time, there was no cry for legality of using such lethal weapons, but it was simply killing a combatant in the battlefield.

Since then, America has been using drones in Iraq, Yemen, Syria, Somalia and in Pakistan to kill terrorists belonging to al-Qaeda, the ISIS and what it calls as "associated forces". Thus, Michale Hayden, the former director of the CIA, said using drones have become a "part of the American way of war".

So far, drones have sparked an international debates and dialogues across the civilian space, power corridors and, of course, among the war strategists. First of all, what transpired from the political left is that drone strikes are simple signs of America's war mongering spree going amok. It is nothing but a planned attempt to reassert its hegemonic role around the globe. Scholars like Mathew Burrow are concerned not only of the legal ramifications of domestic drone used by Government organisations, but the broad spectrum variations Americans could experience (2013). To him Unmanned Aerial Vehicles (UAVs) flying high in the sky can have a chilling effect on democracy that most Americans would consider intolerable. These are standard idealistic concerns raised by many scholars like him. Today, with an all powerful globalisation, all aspects of our daily lives are seriously disturbed, interrupted and rather our privacy aspect has been compromised to a great extent. It is "no drone era" that can particularly rob the freedom from the American natives, but it is the greatness and super accessibility of the information and communication technologies that are indeed giving us enough liberty on one side and taking away much more on the other hand. However, many of the common criticisms against drones do not hold good or rather failed to offer any serious scrutiny, while offering a comparison between already available war weapons and the UAVs for military purposes. The most common anti-drone argument says that "drones kill more innocent civilians than enemies". It is a fact and the international community has witnessed the devastating impact of these UAVs over innocent people across Pakistan, Afghanistan, Libya, Yemen, etc. But then all types of wars are finally fought to defeat the enemies and mostly it results in grave tragedies. There are some means and methods like the drones which cause more unintended damages than the others or which were used before in any wars and conflicts.

Arguably, drone strikes don't exactly kill innocent people or enemies, but people kill people in the warfare. If we draw a comparison between deaths occurred because of drone attacks and other weapons of war, then it can clearly be concluded that the rate of casualties of the former is not higher than the later. To be fair, the common means of warfare cause more deaths than drones.

If we look at the other side of drones, it is bringing us an entirely a noble experience. Unlike other existing advanced technological war weapons, drones provide greater precision while targeting an enemy. Using UAVs is a strong force multiplier for sure. For instance, an army helicopter needs at least two officials: one to fly the vehicle and the other to manage the entire system. However, drones, which require less intervention to accomplish both, enhance the capabilities of a single officer and at the same time spare resources for other crucial tasks. Also, UAVs carry highly accurate ordnance which normally causes lesser damage than other munitions. Another advantage of drones is that as it is comparatively fuel efficient, it can concentrate more on targets than any manned aircraft. Therefore, drones actually don "persistent surveillance". It makes them easier to spend hours, days and possibly months while monitoring a potential target. It just not only swoops, but also fires missiles and goes off faster than manned vehicles. Finally, they are "equipped with imaging technologies that enable operators who may be thousands of miles away to see details as fine as individual faces". Besides, modern drone technologies allow their operators to distinguish between civilians and combatants far more effectively than most other weapons systems. But if it is the case, why are the US drones killing innocent people in many countries, particularly in Afghanistan? For commoners, such incidents could well be regarded

as either sheer carelessness or may be an intentional game plan to cause a fear psychosis. But, in any case, either of them will bring home a complete negative perspective of America's long-term foreign and defence policies in the affected areas.

As we witness more and more sophisticated technologies entering into the war kitty, the debates are fast coming up about the extensive use and abuse of the UAVs by the US. Across the US, at least 36 States had already passed legislations in regard to drones by 2014. "While much of the legislations introduced seeks to solve perceived privacy issues, some of the legislations seeks to require a warrant before drones are used, even in public places where privacy expectations are diminished" (American Civil Liberties Union, November 7, 2013). Although there are serious concerns about the privacy implications, and targeting of persons by armed domestic drones, but such concerns are largely unfounded so far. The protection systems are already in place in regard to these issues which are clearly explained in the American Constitution. It is then fine when the US uses drones at home as its citizens have the respective laws in hand to fight the Government in case any misuse happens. Again what is the guarantee that the law enforcement agencies of the US would not violate such provisions in the garb of protecting national interests?

As such drones do not pose that much threat to humanity. It is not going to overturn the very strategy of war. Finally, the drones are not presenting a whole lot of challenges to the Governments, civilians and to the combatants in the warring nations. But the way America is using these weapons, it is pointing at grave consequences and their strategic efficacy. Besides, as of today the major target of the US drones are no other than the greater parts of the West Asia wherein the country has been in command for long, though there used to be challenges at times. Indeed, this is sending a wrong message to some of the country's leadership and their civilians as they are now at the centre of America's global war on terrorism. What worries many is that the so-called legal narratives which are being employed to justify the use of US drone attacks risk seriously the core tenets of international law itself.

At last, what we all could gather is that advanced technologies are potentially helping the constitutional authorities to overstep more and more into the lives of private citizens. Drones are no exception to this. But then, with the coming of drones, are the all-powerful Governments trying to overcome their regular constraints by employing such ultra-modern technologies? Therefore, the UAVs in the form of drones must be treated very carefully and with skepticism by the Americans, their lawmakers and the world at large. Any nation would be encouraged to engage in more and more wars if they use drones which will cost them lesser human resource. There has been a great deal of debate concerning the current use of drones by the US as a part of its global war on terrorism. The legality, past, present and future of using drones are being debated across the world. But the only concern is that will the use of drones minimise or so to say eliminate global jihad entirely from the world? It is highly unlikely and drones are just another stage of technological advancement of weapons that will simply be acquired by rich nations such as America to terrorise the world. Beyond the drones, America should evolve its war strategies so as to minimise the loss of the lives of common people while targeting the terrorists and other combatants. *(The writer is an expert on international affairs)*



Sun, 09 Apr, 2017

## Large asteroid to buzz past Earth on April 19: NASA

**It is a close pass for an object this size**

A relatively large near-Earth asteroid will fly safely past our planet on April 19 at a distance of about 1.8 million kilometres — over four times the distance from Earth to the Moon, NASA said today.

Although there is no possibility for the asteroid to collide with Earth, this will be a very close approach for an asteroid of this size.

The asteroid, known as 2014 JO25, was discovered in May 2014 by astronomers at the Catalina Sky Survey in Arizona, US. Contemporary measurements by NASA's NEOWISE mission indicate that the asteroid is roughly 650 meters in size, and that its surface is about twice as reflective as that of the Moon.

At this time very little else is known about the object's physical properties, even though its trajectory is well known. The asteroid will approach Earth from the direction of the Sun and will become visible in the night sky after April 19.

It is predicted to brighten to about magnitude 11, when it could be visible in small optical telescopes for one or two nights before it fades as the distance from Earth rapidly increases, NASA said.

Small asteroids pass within this distance of Earth several times each week, but the upcoming close approach is the closest by any known asteroid of this size, or larger, since asteroid Toutatis, a five-kilometre asteroid, which approached within about four lunar distances in 2004.

The next known encounter of an asteroid of comparable size will occur in 2027 when the 800-metre-wide asteroid 1999 AN10 will fly by at one lunar distance, about 380,000 kilometres.

The April 19 encounter provides an outstanding opportunity to study this asteroid, and astronomers plan to observe it with telescopes around the world to learn as much about it as possible.

The encounter on April 19 is the closest this asteroid has come to Earth for at least the last 400 years and will be its closest approach for at least the next 500 years. Also on April 19, the comet PanSTARRS (C/2015 ER61) will make its closest approach to Earth, at a very safe distance of 175 million kilometres, NASA said.

A faint fuzzball in the sky was discovered in 2015 by the Pan-STARRS NEO survey team using a telescope on the summit of Haleakala, Hawaii. The comet has since brightened considerably due to a recent outburst and is now visible in the dawn sky with binoculars or a small telescope.



Sun, 09 Apr, 2017

## IISc designs a novel graphene electrical conductor

By R. Prasad

**The new way of making graphene with a perfect edge structure was the key to success**

Researchers from the Indian Institute of Science (IISc), Bengaluru have been able to experimentally produce a new type of electrical conductor that was theoretically predicted nearly 20 years ago.

A team led by Arindam Ghosh from the Department of Physics, IISc successfully produced graphene that is single- or a few-layers thick to conduct current along one particular edge — the zigzag edge. The zigzag edge of graphene layer has a unique property: It allows flow of charge without any resistance at room temperature and above.

“This is the first we found the perfect edge structure in graphene and demonstrated electrical conductance along the edge,” says Prof. Ghosh. The results of the study were published in the journal *Nature Nanotechnology*.

A few-layers-thick graphene that conducts current along one edge does not experience any resistance and so can lead to realising power-efficient electronics and quantum information transfer, even at room temperature.

### Getting an edge

Many groups over the world have been trying to access these edges since the emergence of graphene in 2004, but have been largely unsuccessful because when current flows through graphene, it flows through both the edge as well as the bulk. “We succeeded in this endeavour by creating the bulk part of graphene extremely narrow (less than 10 nanometre thick), and hence highly resistive, thus forcing the current to flow through the edge alone,” he says.

“While the bulk is totally insulating, the edge alone has the ability to conduct because of the unique quantum mechanics of the edge. Because of the zigzag orientation of carbon atoms [resulting from the hexagonal lattice], the electron wave on each carbon atom overlaps and forms a continuous train of wave along the edge. This makes the edge conducting,” explains Prof. Ghosh. The edge will remain conductive even if it is very long but has to be chemically and structurally pristine.

In the past, others researchers had tried making narrow graphene through chemical methods. But the use of chemicals destroys the edges. So the IISc team resorted to mechanical exfoliation to make graphene that are single- and few-layers thick. They used a small metal robot to peel the graphene from pyrolytic graphite. “If you take a metal tip and crash it on graphite and take it back, a part of the graphite will stick to the tip. The peeling was done slowly and gradually (in steps of 0.1 Å),” says Amogh Kinikar from the Department of Physics at IISc and the first author of the paper.

### **Effect of chemicals**

The exfoliation was carried out at room temperature but under vacuum and the electrical conductance was measured at the time of exfoliation before the pristine nature of the edge was affected. The unsatisfied bonds of the carbon atoms make them highly reactive and they tend to react with hydrogen present in the air. “The edges conduct without any resistance as long as the edges don’t come in contact with any chemicals,” says Prof. Ghosh. “It is very easy to passivate [make the surface unreactive by coating the surface with a thin inert layer] the edges to prevent contamination [when narrow graphene is used for commercial purposes].”

As the carbon atoms have a hexagonal structure, exfoliation is by default at 30 degree angle and one of the edges has a zigzag property. “The steplike changes observed for small values of conductance when other variables were changed were surprising. Through theoretical work we were able to link this to edge modes in graphene,” says Prof. H.R.Krishnamurthy from the Department of Physics, IISc and one of the authors of the paper.

There are currently several chemical methods to produce very narrow graphene nanoribbons. But these chemicals tend to destroy the edges. “So the challenge is to produce graphene nanoribbons using chemicals that do not destroy the edges,” Prof. Ghosh says. “We believe that this successful demonstration of the dissipation-less edge conduction will act as great incentive to develop new chemical methods to make high-quality graphene nano-ribbons or nano-strips with clean edges.”

## **Business Standard**

*Sun, 09 Apr, 2017*

### **China tech investment flying under the radar: Pentagon**

China is investing in Silicon Valley start-ups with military applications at such a rapid rate that the United States government needs tougher controls to stem the transfer of some of America’s most promising technologies, a Pentagon report says.

There are few restrictions on investing in American start-ups that focus on artificial intelligence, self-driving vehicles and robotics, the report contends, and China has taken advantage. Beijing, the report says, is encouraging its companies to invest for the purpose of pushing the country ahead in its strategic competition with the United States.

In some instances, Chinese companies have made under-the-radar investments intended to dodge the oversight of a government agency, the Committee on Foreign Investment in the United States, known as Cfius. “If we allow China access to these same technologies concurrently, then not only may we lose our technological superiority, but we may even be facilitating China’s technological superiority,” the report says.

Such concerns show that China is looming in America’s rearview mirror after a decades-long campaign by Beijing to close the technological gap between the two countries. Though the race is often cast in an economic light, the Pentagon report underlines the national security threat.

In recent years, China has combined domestic subsidies with aggressive investment overseas to build its own technological know-how. A government plan, “Made in China 2025,” that proposes lavishing state funds on 10 important industries has raised concerns from American and European business groups. Meanwhile, the global semiconductor industry has been shaken by Beijing-backed investment aimed at acquiring new microchip knowledge.

The report found that increasingly sophisticated commercial technology had blurred the lines between what was available to military consumers and civilian ones. Often start-ups and leading internet companies like Facebook and Google are working on products as sophisticated as anything the military has at its disposal.

“For example, VR for gaming is at a similar level of sophistication as the VR used in simulators for our armed forces,” the report said, referring to virtual reality. “Facial recognition and image detection for social networking and online shopping has real application in tracking terrorists or other threats to national security,” the report continued, which added that much of the autonomous vehicle and drone technology of was developed using grants from the Pentagon.

In some cases, companies aided by those grants have since raised money from Chinese investors. Velodyne, for example, started developing light sensors for driverless cars after participating in a competition set up by the Defence Advanced Research Projects Agency, a unit of the Pentagon, in 2005. Since then, those sensors have been used on the United States Navy’s unmanned surface vehicles.

Last summer, the company received a \$150 million joint investment from Ford and the Chinese internet giant Baidu. Baidu declined to comment on the investment.

A Velodyne spokeswoman said the round represented its first outside investment.

“The company obtained all necessary government clearances relating to the investment as part of the funding process,” the spokeswoman wrote in an email. “Notably, the investments were designed to make advanced LiDAR sensors more accessible to the broader industry, resulting in the development of safer, less expensive autonomous vehicles.”

Ashton B Carter, the former secretary of defence, commissioned the report as an urgent review of what senior Pentagon officials have considered China’s alarming penetration of Silicon Valley, particularly in deals that finance nascent technology that has military applications. The report found that American private industry was mostly unaware of Beijing’s efforts — many of the deals involve relatively small amounts of money — and that Washington did not have a strong understanding of the scale of the issue.

Carter declined to comment on the final document issued to cabinet officials last month.