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DRDO's robot system can handle mines, IEDs from afar

Armed forces and security agencies, including paramilitary forces and police, often face situations where suspicious objects need to be identified, handled and transported to some distance.

Research and Development Establishment (R&DE), a laboratory of the Defence Research and Development Organisation (DRDO) based in Pune, has developed an intelligent and rugged robotic system that can handle mines and IEDs and can be controlled from very far distances while operating in hostile conflict conditions.

Armed forces and security agencies, including paramilitary forces and police, often face situations where suspicious objects need to be identified, handled and transported to some distance. The Electro-Mechanical Systems Group, from the R&DE, which is based in Dighi in Pune, has recently developed a Mobile Autonomous Robot System (MARS), a rugged vehicle which in its basic form looks like golf cart with green armour, but is actually a very useful tool in conflict scenario.

Speaking to Newsline, R&DE scientist MK Roy who is part of the team that has worked on the development on MARS, said, "The word 'autonomous' in its name is there for a reason. The machine can operate on its own and has an in-built programme that guides the mechanical system. MARS can see, identify and then pick up the suspicious object which can then be transported to a designated location. With some add-ons, this system can even be used to dig the ground for the object and defuse the Improvised Explosive Device by various methods. MARS actually creates a 3-dimensional image of the object before it handles it."

Scientists say that with basic mechanical additions, it can take several roles and can adapt for any terrain to operate in.

MARS was displayed at the Multinational Field Exercise that concluded in Pune recently and had Humanitarian Mine Action (MHA) as one of its focus areas and will also be displayed in the Defence Expo to be held in Goa.

Several countries in the South East Asia have the problem of Explosive Remnants of War (ERW) and in such scenarios MARS can be very useful.

In India, several insurgency and terrorism affected areas and regions affected by Left Wing Extremism, face the problem of IEDs. MARS can be a useful tool for paramilitary forces, central police agencies and local police in these regions.

MARS can be operated from very long distances once a telecommunications system is fitted on it.

Along with Roy, the core team comprises of group leader VV Parlikar and MM Kuber. Roy says that everything that MARS uses, right from the algorithm and programme which runs it to the body and arms, have been developed in-house, thus giving the laboratory the liberty to make changes as per specific requirements of the security agencies.

The R&DE will transfer the technology of MARS to the industry for manufacturing in the future, scientists from the laboratory said.

Trial near Turtle Rookery Criticised

Kendrapara: The Monday's trial of nuclear capable Agni-I missile from Abdul Kalam Island, near the world's largest rookery of Olive Ridley sea turtles at Gahiramatha in Kendrapara district during the mass-nesting time of marine species, has been criticised by environmentalists, turtle researchers and forest officials.

"Two years back, the forest officials had urged the officials of DRDO not to test any missile from the island from November 1 to May 31 but the DRDO authorities ignored the request," said Dr SS Srivastava, Principal Chief Conservator of Forests (PCCF) on Monday.

Test of missiles from the island has put a question mark on the turnout of Olive Ridelys to Gahiramatha and the future of mass nesting, said Sudhanshu Parida, an environmentalist and secretary of district unit of People for Animals. Bright lights and sound will distract the movement of turtles in the sea as artificial lightning at the missile taste range disorients hatchlings and adult females in ways that can be deadly, added Parida.

The Pioneer
16 Mar, 2016

Navy Requires a Long Arm for Indo-Pacific

Since the late 1980s, the arming of Indian Navy to fulfil its legitimate role in the Indian Ocean Region has remained largely notional. The US is keen for India to partner in multilateral joint exercises

Dressed in his flying suit and accompanied by half a dozen personal staff, Admiral Harry B Harris Jr, Commander United States Pacific Command, the largest military command on earth, marched into Taj Palace hotel before turning up in Naval uniform to deliver his keynote address at the recent Raisina Dialogue — focussed on Asian connectivity and integration which is partly predicated on India's vital role in the Indian Ocean region.

Invoking the Obama-Modi Joint Strategic Vision Statement of 2015 which identified Asia Pacific (including South China Sea and IOR) as key lifelines requiring freedom of navigation and open skies, Admiral Harris called the region as "Indo-Asia-Pacific" and said referring to India, "we are ready for you...we need you, your leadership" and added: "Let's be ambitious together". He raised two key issues: Initiating a quadrilateral strategic dialogue between US, India, Japan and Australia; and "joint patrolling...anywhere in the Indian Ocean, the Pacific, even South China Sea...wherever our leaders decide...in the not too distant future". Both these ideas set the cat among the pigeons.

The JSVS had reflected a sharp strategic congruence and was interpreted in Delhi as India's tilt towards the US and readiness to even balancecontain China. The synergisation of India's Act East policy and US re-balancing to Asia is to ensure that China conformed to the existing rule-based order especially in its adherence to a code of conduct in SCS and IOR. China's development of seven new artificial islands and deployment of missile batteries to reinforce its historical claims to Spratly and Paracel chain of islands is the strategic game-changer reflecting Beijing's determination to be calling the shots in South and East China Seas in pursuance of its two oceans strategy buttressed by its looking beyond the first and second island chains. For China's economic outreach, a blue water Navy and power projection are essential. And this has begun to worry the US.

China's strategic message to India to lay off SCS was first delivered in 2011 when it targeted New Delhi's five billion dollar investment in oil blocks in Vietnam as "fishing in troubled waters". This

was followed the same year by ragging of INS *Airavat*, an amphibious ship in SCS. Chief of Naval Staff, Admiral DK Joshi's advocacy of defending national interest in SCS was watered down by National Security Advisor Shivshankar Menon, then in Beijing. The JSVS drew typical Chinese comments like "India's entrapment by the US". Beijing's strong reaction to any attempt by New Delhi to balance or contain China, coupled with the ground realities of the significant military capability gap that will require decades to make up, has put some realism into the ambitious JSVS. Conventional wisdom suggests caution at a time when China-Pakistan relations are at an all-time high and Uncle Sam gifting F-16s to Islamabad.

Admiral Harris's joint patrol balloon has been discussed quietly earlier at appropriate forums. Reports in the US media that the idea was being actively considered by New Delhi were leaked just before the Admiral's invitation to joint patrolling was promptly shot down by the Ministry of External Affairs. The Chinese media and strategic commentators equated joint patrolling to India joining US pivot to Asia: Betraying its hostility to China and needing to develop more friends than enemies. Minister for Defence Manohar Parrikar ruled out any joint maritime patrolling in the Asia Pacific region. He said India will participate in joint military exercises but no joint patrolling "at this stage". This leaves the door open to the US and India being ambitious together. This year's naval Malabar exercise between India, US and Japan will be off the coast of Japan likely in the north Philippine Sea, close to SCS.

The Admiral's pitch for a quadrilateral security dialogue is a repackaged idea relating to freedom of navigation in international waters. It had upset Beijing in 2007 when the Malabar series traditionally between India and the US was expanded to include Japan, Australia and Singapore. This became a one-time exercise and was dropped due to China's objections. Prime Minister Narendra Modi is believed to have endorsed the revival of the Quad even as China's Foreign Ministry spokesperson Hong Lei said: "we have no objection to relevant countries' normal cooperation but we believe that cooperation should not be targeted against a third party". The Quad like joint patrolling will remain mothballed for now.

Strategic innovations need not be discussed through the medium of media, but with discreet diplomacy. It was the NDA Government which, in its first full-term, supported US ballistic missile defence, provided logistic support to the US naval ships at Indian ports engaged in Afghanistan and Iraq and even escorted US vessels through Malacca Straits. Modi, on his visit to China, tried to alter the contours of talks between Special Representatives after their 17 rounds produced no framework for a border settlement by boldly but vainly re-seeking a clarification of Line of Actual Control which was abandoned in 2003. Resolution of the border which is India's Achilles heel is being dictated by China.

India's penchant for sitting on the fence is becoming counter-productive. Washington has been wooing New Delhi for a decade now to sign certain bilateral foundational military agreements which are being regularly postponed in national interest — a euphemism for undermining its strategic autonomy. The US is now the biggest supplier of military platforms, something that was simply unthinkable a decade ago. US Defence Secretary Ashton Carter will be in New Delhi next month when India must decide one way or the other on critical foundational agreements. The history of distrust lingers on as does the unease over undue political and strategic proximity to the US.

Since the late 1980s, the arming of the Navy to fulfil its legitimate role in the IOR has remained largely notional. While the Navy has excelled in showcasing military diplomacy with 'bridges of friendship and united through oceans' it is still recovering from a few bad years of accidents, shortage of funds and delays in its modernisation with big holes in the inventory of fighting

platforms especially submarines and helicopters. The strategic programs equally are moving too slowly for comfort.

Just as Beijing says Indian Ocean is not India's, New Delhi should emphasise SCS is not China's. To be ambitious, New Delhi has to get off the fence sooner than later. And to do that, it requires a strong military, especially a Navy with a long arm covering the Indo-Pacific. The strategic centre of gravity is shifting from land to sea. But the defence budget with its incapacity to modernise is oblivious to the sea change.

The Pioneer
16 Mar, 2016

Reliance Defence, Thales Sign Deal for Sonars, Counter-Mining

Anil Ambani-led Reliance Defence has signed an exclusive accord with the global aerospace, defence and transportation major Thales for making in India sonars for surface ships and submarines, as also mine warfare and mine counter-measure equipment, sources said.

In all, the agreement is eyeing immediate deals worth around Rs 10,000 crore.

The sources said this 51:49 equity pact between Reliance Defence and Thales will create critical capabilities in the country and provide modern systems for the Indian Navy. Thales is said to have discussed a possible tie-up with the Tatas, Mahindras and Larsen and Toubro as well.

Sources said the Indian Navy's immediate requirements include towed array sonars and torpedo decoy systems, which are used for detecting torpedoes and submarines. In mine warfare, the focus is expected to be on high frequency sonars and various methods to destroy mines.

The Indian Navy also needs similar equipment for its choppers.

Reliance Defence, a subsidiary of Reliance Infra, had earlier acquired Pipavav Offshore and Engineering and renamed it Reliance Defence and Engineering to execute all the naval warship and systems programme.

The Hindu
16 Mar, 2016

LCH set for firing trials soon

The Light Combat Helicopter looks set for its combat-qualifying weapons trials in April or May after its first armed version gave positive results in firing 70-mm rockets, according to its developer Hindustan Aeronautics Ltd.

The third prototype, TD-3, entered the weapon trials phase in late February when it released rockets in a satisfactory performance during tests held in Jaisalmer, HAL said.

HAL confident

"These trials give us confidence for carrying out certification firing trials planned during April-May," said HAL Chairman & Managing Director T. Suvarna Raju. The aircraft would be further readied for tests with other rockets, 20-mm turret guns and air-to-air missiles.

The LCH will participate in the IAF's Iron Fist 2016 exercise which starts on March 18.

Ahead of the weapons test, TD-3 was fitted with the electro-optical system, solid state digital video recording system and the 70-mm rocket system along with updated glass cockpit software. Last year, it completed cold weather, hot weather tests and hot and high-altitude tests.

The 5.5-tonne LCH is derived from the indigenous multipurpose Advanced Light Helicopter and is being developed for lethal combat operations. The first prototype had its first flight in March 2010, the second in June 2011 and the third in June 2014. TD-4 flew for the first time in December 2015.

The Hindu
16 Mar, 2016

Kakrapar leak a ‘Level-1’ nuclear mishap, says AERB

Experts surprised at low rating for incident

India’s atomic energy regulatory body has classified Friday’s nuclear reactor leak at the Kakrapar atomic power station (KAPS) as a Level-1, or the lowest in a seven-rung classification scheme internationally used to rate the severity of nuclear mishaps.

Akin to the Richter scale, used to quantify the severity of an earthquake, the International Nuclear and Radiological Event (INES) scale, developed by the International Atomic Energy Authority, rates a Level 1 as only akin to ‘an anomaly in the plant.’ Levels 1-3 are termed ‘incidents’ and 4-7 as ‘accident.’ By comparison, the nuclear accidents in Fukushima, Japan in 2011 and Chernobyl, Russia in 1986 were Level 7 incidents, according to the Atomic Energy Regulatory Board (AERB) update.

On Friday, one of the pipes carrying heavy water ruptured and led to leakage on the floor of the reactor building. Though plant operators have identified the location of the leak, it will take a while for it to be plugged.

Moreover, the leak occurred in a subsystem that had been refurbished with better quality material in 2011, as part of a planned upgrade.

“The present situation at KAPS Unit 1 is stable and the reactor is in cold shutdown state. The reactor is being continuously cooled and at present there are no major safety concerns. There has been no radioactivity release exceeding the specified daily limits for normal operation, between March 11, 2016, till date. There has also not been any case of workers receiving abnormal radiation exposures,” says the update by AERB, the safety assessor of India’s nuclear plants.

S. Harikumar of AERB said that though heavy water, a key component used to facilitate a nuclear reaction, was still leaking at the plant he didn’t expect anything untoward going ahead, as there was no surge in radiation. However, independent experts said it was “surprising” that the incident was classified only as a Level-1 incident. “Right now we have contradictory reports on the quantum of the leak. A Level-1 classification may be underestimating the seriousness of the incident,” said A. Gopalakrishnan, former Chairman, AERB and vocal critic of the India’s nuclear establishment.

Parrikar set for maiden visit to China on Apr 18

Defence minister Manohar Parrikar is set to make his maiden visit to China next month as part of India's overall policy to “constructively engage“ with its neighbour despite continuing “troop transgressions“ along the 4,057-km Line of Actual Control (LAC) as well as the growing presence of People's Liberation Army (PLA) soldiers in Pakistanoccupied-Kashmir.

Defence ministry sources said Parrikar is likely to leave on April 18 for a three-day trip to China, during which he is slated to hold extensive talks with his Chinese counterpart and top PLA brass, as well as visit some defence establishments.

The two sides will discuss the effective implementation of the bilateral border defence cooperation agreement (BDCA) inked in October 2013, which was geared towards ensuring troop faceoffs were effectively defused at the local level itself, as well as the proposed hotline between their top military commanders, like the DGMO-level one between India and Pakistan, said sources.

India and China have slowly but steadily enhanced their bilateral military exchanges and other CBMs like additional border personnel meeting (BPM) points along the LAC over the last few years. A top-level Chinese military delegation led by General Fan Changlong, vice-chairman of the all-powerful Central Military Commission, for instance, had visited India in November.

Similarly , the two militaries are now going to have an additional BPM point in the Uttarakhand sector, which will add to the five already existing at Daulat Beg Oldi and Chushul (Ladakh), Nathu La (Sikkim), Bum La and Kibithu (Arunachal).

While all this has led to a decline in transgressions across the LAC, with the number coming down to 387 in 2015 from 555 in 2014, there is still “a persisting trust deficit“ between the two militaries. Rival troops still resort to aggressive patrolling to lay claims to disputed areas along the LAC, and also continue to tail each other's patrols, which was specifically prohibited by the BDCA.

Eastern Ladakh, in particular, remains a major flashpoint, with yet another troop confrontation in the Pangong Tsu area on March 8.

Moreover, the growing presence of PLA troops along the Line of Control in PoK to ostensibly guard the Chinese infrastructure projects in the region -China Gezhouba Group Company , for instance, is building the Jhelum-Neelum hydropower project -has become a big worry for the Indian security establishment.

Of equal concern is the expanding footprint of the Chinese navy in the Indian Ocean Region, with its nuclear and conventional submarines now making regular forays in what India considers its own strategic backyard.

Parrikar's visit comes at a time when China is undertaking a major restructuring of its 2.3 million-strong PLA to make it more combat-ready and mobile, which will see all armed forces come under a joint operational military command and regrouping of the existing seven military regions into four strategic zones, as reported by TOI earlier.

Troops warned against 3 ‘spying’ apps

The Army has issued an advisory to all its officers and soldiers to not download three applications available on Google playstore -WeChat, Smesh and Line -to guard against online espionage attempts by foreign intelligence agencies, especially from China and Pakistan. Sources said the advisory, issued last month, had warned that there was “credible information that inimical agents

were using such mobile apps to break into smart phones and steal all data“. Such advisories are regularly issued by the armed forces to ensure cyber security of classified information in light of mounting espionage attempts through malicious software to tap into smartphones. Sources said some of the security instructions issued from time to time deal with monitoring of photocopying machines, caller ID spoofing.

Deccan Herald
16 Mar, 2016

Parrikar to discuss 'hotline' with China during April trip

Defence Minister Manohar Parrikar will travel to China in April to take forward the bilateral agenda on military cooperation between the two neighbours that fought a bitter war in 1962.

One of the important items on the agenda is to finalise the modalities for setting up a dedicated telephone link between the two armies for quick resolution of border flash points - a move that was agreed upon by both nations. A similar hotline exists between the Director Generals of Military Operations of Indian and Pakistani Army. Parrikar's tour is likely to begin on April 18.

In January, Army Chief Gen Dalbir Singh stated a hotline between the DGMOs in Indian Army and People's Liberation Army is likely to come up within months as surveys were carried out to establish the link. Parrikar would also discuss transgressions and flare-ups along the disputed Sino-Indian border and explore the possibilities of opening up more border personnel meeting points.

Parrikar's China trip will take place in the wake of his recent talks with US Defence Secretary Ashton Carter, who discussed the USA's re-balancing strategies in the Asia-Pacific to counter China with his Indian counterpart. The USA has been nudging India for a greater role in the Indian Ocean where Americans are keen to undertake joint patrolling with Indian Navy. Parrikar, however, ruled out any such move for the time being.

Deccan Herald
16 Mar, 2016

Checkmating China via Andamans

By Ellen Barry

Andaman and Nicobar Islands have seen the alliance of India and Japan to upgrade civilian infrastructure

India and Japan are in talks to collaborate on upgrading civilian infrastructure in the Andaman and Nicobar Islands, an Indian archipelago seen as a critical asset to counter China's efforts to expand its maritime reach into the Indian Ocean. The first project being discussed is a modest one - a 15-megawatt diesel power plant on South Andaman Island, as described in a proposal submitted late last month to the Japanese Ministry of Foreign Affairs.

But the collaboration signals a significant policy shift for India, which has not previously accepted offers of foreign investment on the archipelago. The Andaman and Nicobar Islands are northwest of the Strait of Malacca, offering control of a so-called choke point that is one of China's greatest marine vulnerabilities.

It is also testimony to the unfolding relationship between India and Japan, which is also funding a \$744 million road building project in the northeastern Indian border regions of Mizoram, Assam and Meghalaya. Like the Andaman and Nicobar chain, the northeastern region is a strategic area that has remained relatively undeveloped because of its separation from the mainland.

Japan's marshalling of official development assistance in the region has drawn less attention than the effort that China calls "One Belt, One Road," a network of roads, railways and ports intended to link China to the rest of Asia and to Europe. But it fits logically into the web of strategic projects taking shape as Prime Minister Narendra Modi enters into closer relationships with Japan, Australia and the United States, as well as regional powers like Vietnam, to counter China's growing influence.

A senior Indian official, who spoke on the condition of anonymity to discuss internal deliberations, said that China's project would be answered by "a more decentralised, local but organic response." The official described proposed infrastructure projects in the Andamans as "not of a big scale, and not of a big value," but added that New Delhi is intent on developing its "frontier" regions. "The idea that the frontier should be left undeveloped, I think people have rejected that approach," the official said. "There is a realisation that it doesn't help to leave part of any part of India undeveloped."

Japan's vision for contributions in the island chain goes far beyond the proposed power plant. The plan was submitted in Tokyo more than a year after Japan's ambassador made a visit to Port Blair on South Andaman Island and, in a meeting with the territory's top official, offered financing for "bridges and ports." Akio Isomata, minister for economic affairs in the Japanese Embassy, said the country's aid agency, Japan International Cooperation Agency, could only respond to "formal requests" from the Indian government.

He added that Japan would consider "any other request" on the Andaman and Nicobar chain or elsewhere and was eager to use official development assistance to enhance India's "connectivity" with countries that are members of the Association of Southeast Asian Nations or the South Asian Association for Regional Cooperation. "We usually start with small projects and go bigger," he said. He said construction of the power station could start in the next fiscal year, which begins in April.

The Andaman and Nicobar chain is made up of 572 islands, all but 34 of them uninhabited, stretching around 470 miles north to south. Used as a penal colony by the British Raj, the island chain was occupied by Japan for three years during WW II, a period that older island-ers recall with dread. Then prime minister Jaw-aharlal Nehru secured the archipelago in the hurried distribution of property that accompanied the British withdrawal from the subcontinent, beating out bids by Australia and Pakistan.

The islands' importance has increased along with China's naval expansion. The chain's location makes it an ideal base for tracking naval movements in the Strait of Malacca, a long, narrow funnel between Malaysia and Indonesia. The strait provides passage for China's fuel imports from Africa and West Asia, around 80% of its total fuel imports.

Nevertheless, change has come slowly to the islands, where almost all the undeveloped land is set aside for indigenous tribes and wildlife. A plan to lay undersea optical fibre cable from Chennai on India's east coast, so that residents can finally have high-speed Internet access, has been under discussion for more than a decade. Until last year, no flights landed after dark because there were no runway lights at the Port Blair airport. Defence analysts from the West regard the island chain with envy and a degree of confusion.

"Almost every year, I see some senior Indian military official say we have major, major plans in store for the Andamans, and you're going to see them soon," said Jeff M Smith, author of "Cold Peace," a book on the Chinese-Indian rivalry. "Everybody waits for the big story to hit on the Andamans, year after year, and it doesn't happen." A decision to accept Japanese investment there, he said, "would be a sign that the Modi government is getting out of this feedback loop and moving on some of these aspirations."

"Serious note"

India has taken "serious note" of the presence of Chinese submarines in the Indian Ocean in recent years, Adm Robin K Dhowan, the chief of India's navy staff, told a news channel in 2014. In January, India announced that it would deploy Israeli-made aerial "Searcher" drones and two Boeing P-8I maritime surveillance aircraft, developed for anti-submarine warfare, to the Andaman and Nicobar chain.

Airstrips at the northern and southern tips of the archipelago are being lengthened to accommodate the long-range surveillance planes. Japan is hardly the only country interested in taking a role in developing the island chain. India and the United States are said to be close to concluding a maritime logistics agreement, meaning that US ships might be allowed to make port calls in the Andaman and Nicobar Islands in the future, defence analysts say.

The chain's location provides a "perfect geographic position" for maritime aerial surveillance, said Rory Medcalf, head of the National Security College at Australian National University. "If India were more open to allowing friendly foreign countries access and awareness in the Andamans, it would find them more forthcoming as well," he said. In Port Blair, there is the feeling that the outside world, once distant, is drawing nearer.

The front page of the Andaman Express, a daily newspaper, is typically devoted to small-town news about motorcycle accidents and stove explosions. But a recent report on the presence of a Chinese naval submarine in Andaman waters mentioned, almost as an aside, that the archipelago "would become the primary target of the People's Liberation Army if China and India go to war."

Talk like that has brought an edge of apprehension to the quiet life on the island, said RVR Murthy, a professor of history at Mahatma Gandhi Government College. Murthy lives on a hilltop, and in January, when officials in New Delhi announced the positioning of aerial drones at Port Blair's airport, he could peer down from his house and spot them. "In the old days," he said, a little wistfully, "this was the safest place in the world."

'India rivalry drives China, Pak ties'

LALIT K. JHA
WASHINGTON, MARCH 15

The strategic alliance between China and Pakistan is primarily driven by their rivalry with India, eminent US experts have said, with one of them expressing concern over Sino-India border tensions.

"China's close ties with Pakistan also raise tension in the subcontinent. The China-Pakistan relationship has always been strategic in nature driven by their mutual rivalry with India," Katherine C. Tobin, commissioner of the US China Economic and Security Review Commission, said during a

hearing on China in South Asia.

Lisa Curtis of the Heritage Foundation — a top American think-tank — said that the current policy of the US is "hands-off approach" when it comes to tensions between India and China.

"I think the US has taken a very hands-off approach, but there may be some room for contingency planning back here in the US if the Sino-India border disputes were to ratchet up," Ms Curtis said.

"And certainly we have seen on two occasions in the last two years or three years rather, once in the spring of 2013, once in the

autumn of 2014, that tensions ratcheted up in terms of unusual troop movements by the Chinese PLA forces in the Ladakh region," she said.

"So, it's certainly something that I think we need to pay attention to. I am not saying the US needs to get involved per se, but we should at least have an idea of how the US might react if the tensions were to escalate quickly along the border," Ms Curtis said.

China, she argued, seeks to build strategic and military ties with Pakistan in order to contain Indian power and to prevent India from extending its influence outward and essen-

tially prevent it from focusing its attention and military resources towards China. China's relations with India are marked by mutual suspicion, said James F Moriarty, senior adviser for South Asia at Bower Group Asia. "China's relations with Pakistan evolved into an extremely close economic and security partnership. And China's relations with the remaining countries of South Asia remained cordial, but largely lacked substance," he said.

An increasingly close US-India relationship will be key to the US success in the Indo-Pacific region, Mr Moriarty said. — PTI

The Times of India
16 Mar, 2016

Pakistan trying to get more F-16s: Report

Pakistan is trying to get more F-16s from the US as well as looking towards countries like Russia and France for new aircraft to replace old ones to match India's defence purchases, according to a report.

Jane's Defence Weekly reported this week that Pakistan would seek to purchase 10 F-16 additional planes from the US if the current deal for eight of these fighter jets is successfully concluded. A "decision in principle has been made to buy 10 more F-16s," a senior Pakistani government official told Jane's. The official said that the strong resistance it faced in the US Congress for buying a small batch of eight planes was "discouraging".

"That's why we are looking at other options too, such as buying them from Russia or France.

North Korea's Kim Jong warns of impending nuke, rocket tests

North Korean leader Kim Jong Un has warned of impending tests of a nuclear warhead explosion and ballistic missiles capable of carrying atomic warheads, state media reported on Tuesday, in an escalation of threats against Seoul and Washington.

The warning came as North Korea said it had made a breakthrough in its pursuit of a long-range missile capable of striking the US mainland. South Korea says the North has yet to develop a functioning inter-continental ballistic missile.

Kim issued the order for the tests "in a short time," according to the Korean Central News Agency. The KCNA report did not say if Kim gave specific dates for the tests.

It is not clear if the tests would happen soon, given that any tests would likely invite harsher international sanctions after the country was hit by the toughest UN Security Council sanctions in two decades in early March for a nuclear test and long-range rocket launch conducted earlier this year.

Some of the North's recent rhetoric was seen intended for a domestic audience to display government strength ahead of a major meeting of the ruling party in May. In the past, North Korea has typically conducted nuclear tests and rocket launches every three to four years.

Even if the tests happen, analysts in Seoul said the nuclear warhead explosion that Kim referred to will likely be just a test of a warhead containing only a trigger device but lacking plutonium or uranium. They said the North could also launch shorter-range missiles, but not one with an intercontinental range.

Pyongyang, known for its trademark fiery rhetoric in times of tension with the outside world, has been stepping up its threats after Washington and Seoul last week began annual military drills that the North views as an invasion rehearsal.

The drills, set to run until late April, are the largest ever. Last Wednesday, North Korea's main newspaper printed photos of what appeared to be a mock-up of nuclear warhead.

Do Iran's missile tests violate its historic nuclear deal with the western powers?

Iran has infuriated American critics over the past few weeks with missile tests that skeptics say violate a United Nations Security Council resolution and call into question Iran's commitment to the landmark nuclear agreement that took effect in January.

The critics, including members of Congress from both parties and the Republican presidential candidates, say the Obama administration was naïve in asserting that the nuclear deal would lead to a more amicable atmosphere with Iran after more than three decades of enmity.

Q. Is Iran honoring the agreement?

A. Yes, according to the International Atomic Energy Agency, the nuclear-monitoring arm of the United Nations. The agency reported on Feb. 26, in its first assessment since the deal took effect, that Iran is complying with the terms that are meant to block pathways to a nuclear weapon.

Q. How do we know Iran is not cheating?

A. The agency has a detailed accounting of Iran's sharply reduced supply of nuclear fuel, working centrifuges and other equipment, and is empowered to monitor them. "The agency's job is to make sure there is no backsliding," said Daryl G. Kimball, the executive director of the Arms Control Association, a nonproliferation advocacy group based in Washington.

Q. Are the missile tests prohibited under the nuclear agreement?

A. No. Such launchings are considered a separate issue.

Q. Are critics correct that Iran has violated provisions of a Security Council resolution banning missile launchings?

A. That depends on your interpretation of the resolution, 2231, adopted in July, that put the nuclear agreement into effect. That measure terminated all other resolutions that had penalized Iran for its nuclear program, but it called on the country to refrain from engaging in ballistic missile activity "designed to be capable of delivering nuclear weapons." Iran contends that the wording does not prohibit launchings and that since it has no nuclear weapons, there is no violation.

Q. What is the Obama administration doing, if anything, about the missile tests?

A. American officials contend that Iran may be in violation of Resolution 2231 and that they may bring a formal complaint to the Security Council, which could lead to new sanctions. Other critics have called Iran's behavior an ominous sign. "If Iran sees it can violate U.N. missile sanctions with no consequence, it will violate this nuclear deal too," said Representative Ed Royce, a California Republican who is chairman of the House Foreign Affairs Committee and is a leading skeptic of Iran's promises.

Q. Iran's parliamentary elections last month were supposed to have strengthened moderate supporters of President Hassan Rouhani, the architect of the nuclear deal. So why is Iran provoking its critics by testing missiles?

A. The tests have been carried out by the powerful Islamic Revolutionary Guards Corps, which endorsed the nuclear agreement but rejected any constraints on missile tests. If nothing else, the launchings demonstrate the Revolutionary Guards are not under Mr. Rouhani's control.

Q. Regardless of who is carrying them out, how does Iran justify the missile tests?

A. While the United States and its Middle East allies accuse Iran of meddling and being threatening, and of sowing regional instability, Iran says it is a peaceful nation surrounded by hostile powers. The United States Navy's Fifth Fleet patrols the Persian Gulf. American forces are deployed in Iraq to the west, Afghanistan to the east and in other regional neighbors including Turkey, Bahrain and Qatar. Iran has especially poor relations with Saudi Arabia, its biggest regional rival. And Iran regards Israel, which possesses nuclear weapons, as its most intractable enemy.

Q. When should the United States expect to see tangible benefits from the nuclear deal?

A. Proponents argue the most important benefit — an Iran with no nuclear weapons — is already obvious. Iran remains off limits to most American businesses because many other non-nuclear sanctions still apply. The nuclear agreement did permit a resumption of some types of commerce, most notably sales of civilian aircraft.

Q. What if the next president of the United States wants to abandon or renegotiate the nuclear deal with Iran?

A. The next president theoretically will be free to renounce the deal, but experts in nonproliferation and multinational agreements say the consequences could be onerous for the United States and damaging to its credibility. The nuclear deal also was negotiated by other big powers and has the force of international law because it was approved by the Security Council. Many countries in Europe have since resumed commercial activities with Iran, including purchases of Iranian oil. Any unilateral attempt by the United States to reimpose sanctions on Iran would likely fail because of resistance from American trading partners.

The Pioneer
16 Mar, 2016

Iran Missile Tests Don't Breach Nuclear Deal: EU

Iran's recent ballistic missile tests are not in violation of its nuclear deal and the European Union is not considering sanctions at this stage, EU foreign policy chief Federica Mogherini said on Tuesday.

Mogherini warned that last week's missile tests, which Tehran insists are not aimed at developing nuclear weapons capability, could raise tensions in an already volatile region.

"This is indeed also in our view not a violation of the (nuclear deal) as such," Mogherini said after meeting the foreign ministers of the 28 EU nations in Brussels.

"If there is a violation of UNSC resolutions, this should be discussed in the appropriate UN bodies," Mogherini said.

The Hindu
16 Mar, 2016

Russian warplanes leave Syria

Putin's move raises UN hopes for peace talks in war-torn nation

Russian warplanes began leaving Syria on Tuesday as Moscow started to draw down forces that have tipped the war President Bashar al-Assad's way, and the UN envoy said he hoped the move would have a positive impact on peace talks under way in Geneva.

As the first aircraft touched down in Russia, UN envoy Staffan de Mistura called it a "significant development" and said he hoped President Vladimir Putin's move would advance progress towards a solution and a peaceful political transition in Syria.

Putin's announcement of the withdrawal of the "main part" of Russian armed forces in Syria has led Assad's opponents to speculate Moscow may be trying to press him towards a political settlement, though Damascus has dismissed any talk of differences with its ally and says the move was coordinated. It was unclear what the withdrawal would mean for the outcome of the war or for the future of Assad. — Reuters

Quietly, symbolically, U.S. control of the Internet through ICANN just ended

At a luxury hideaway in Morocco, two years of talks on Ican's running of the Internet finished with a deal to put multiple global stakeholders in charge. Inside, the people who run the Internet's naming and numbering systems have been meeting with some of the governments who would rather be doing the job themselves. Eventually, they cut a deal, and then negotiators from countries mostly in the northern hemisphere staggered blinking into the sunlight and splayed like lizards around the azure swimming pools, almost too tired to drink. Almost.

What they have agreed is a plan for Ican, the Internet Corporation for Assigned Names and Numbers, to end direct U.S. government oversight control of administering the Internet and commit permanently to a slightly mysterious model of global "multi-stakeholderism".

Like any settlement of a long-running conflict, the trick is to spread the unhappiness evenly and not celebrate too much, lest anyone think they've lost more than they'd reckoned. Though the French government was still seething over a spat about "dot champagne", it rallied the naysayers the weekend before the official meeting started. Yet the real worry was the United States.

Larry Strickling, assistant secretary at the U.S. Department of Commerce, is a man who defines jovial calm, but I pity any rug salesman who tries to get one over on him at the medina. He has steadily navigated the U.S. government towards fulfilling its original commitment to Ican's independence almost 20 years ago, but he has a tough crowd back home. To avoid spooking Republican congressmen or presidential candidates, Ican won't big up last week's historic achievement. Make no mistake, though, Thursday 10 March 2016 was a bright shining day on the Internet. Internet Independence Day, no less. But why did we even need a carefully brokered deal to make managing the Internet the world's business, and not America's prerogative? When Ican was founded in 1998, the plan was to keep its anchoring contract with the U.S. National Telecommunications and Information Administration (NTIA) for a year or two, and for Ican to become independent in 2000. But in the meantime, the Internet became just too important for the U.S. to let go of the reins.

Shielded by the U.S., Ican resisted attempts by the United Nations' International Telecommunication Union to take over its job. Iana (the Internet Assigned Names Authority, the part of Ican that deals with country codes, Internet numbers and protocols) went on being part of Ican, even as other countries felt sure the U.S. must be abusing its power behind the scenes. And Ican's "multi-stakeholder model" evolved; a hodge-podge of different interests, meeting by conference call, email list and in different cities around the world to manage the domain name system.

But as the millions of dollars of business transacted over the Internet became trillions, and the first, second and then third billion people came online, it started to look a bit odd that one government had *de jure* control of a chunk of the Internet. And that this oversight was done via a procurement contract.

The Internet is run by an unaccountable private company. This is a problem. Even as Ican staff travelled the world saying "we're just a technical coordination organisation," having a California not-for-profit organisation run part of the global infrastructure no longer passed the sniff test.

Under pressure from the EU and others, Icann and the U.S. government took small steps, spelling out their relationship in a deceptively simple document, the Affirmation of Commitments, in 2009. Icann and the U.S. would probably have muddled along together for another decade, with the occasional hand-wave towards global accountability. And then Snowden happened.

In September 2013, just months after the first Snowden revelations confirmed long-suspected global Internet surveillance by the U.S., the Internet's elders rebelled. Technical organisations around the world issued the "Montevideo Statement". No one was more surprised than themselves when the sleeping giants of technical organisations woke up and growled that the "recent revelations of pervasive monitoring and surveillance" had undermined the trust of Internet users around the world. It was time, they said, to hurry up and "globalise the Iana".

In a prescient flash of political brilliance, Icann's CEO, Fadi Chehade, made a pact with Brazil's President Dilma Rousseff. Still smarting over the NSA tapping her smartphone, Rousseff, announced a global meeting to decide the future of the Internet. — © *Guardian Newspapers Limited*

Deccan Herald
16 Mar, 2016

Privacy and national security

Genuine national interest may dictate that laws on digital privacy and cyber security be enacted and linked with Aadhaar Bill.

At present, there is no law on privacy, but in *Rajagopal Vs State of Tamil Nadu* (1994), the Supreme Court opined that privacy is inherent in an individual's right to personal liberty. Also, Section 8(1)(j) of the RTI Act 2005, protects the private individual against unwarranted invasion of his/her privacy, proof enough that privacy is a right even if it is not a fundamental right.

On whether privacy is a fundamental right, the Government of India succeeded in convincing a 3-judge Supreme Court bench hearing a bunch of petitions challenging Aadhaar on multifarious grounds, that privacy is important enough an issue to warrant consideration by a Constitution bench.

There is little doubt that mass surveillance for suspicionless, untargeted snooping into people's private spaces to identify a possible threat to security, is questionable. The privacy issue was brought to international attention in 2013, with the USA admitting that its National Security Agency had been clandestinely collecting billions of pieces of information worldwide including personal data and emails from computer networks and telephones. India was one of USA's many surveillance targets.

Today, the technical capability of shadowy agencies for mass surveillance to collect, sort and process enormous quantities of data or meta-data has multiplied enormously. Hacking into databases for data is not very difficult for a person with the necessary motivation, skills and time, and it is quipped that systems are hack-proof only until the first hack. Cyber security concerns in the face of clandestine, untargeted surveillance are not only about national security but also citizens' right to privacy.

The Aadhaar system: Whether or not it succeeds in its declared primary aim of targeted welfare services for the poor, Aadhaar enables surveillance and tracking. Aadhaar promoters claim that access to its data base will not be permitted to any agency, and will be secure from intelligence agencies that spy on citizens.

This claim is questionable since, according to its website, the Unique Identification Authority of India (UIDAI) is contracted to receive technical support for biometric capture devices from L-1 Identity Solutions, Inc (now MorphoTrust USA), a US-based intelligence and surveillance

corporation. According to the corporation's website, its top executives are acknowledged experts in the US intelligence community.

Other companies awarded contracts for key aspects of the Aadhaar project are Accenture Services Pvt Ltd (implementing biometric solution for UIDAI) which works with the US Homeland Security, and Ernst & Young (setting up of Central Identities Data Repository (CIDR) and Selection of Managed Service Provider (MSP)).

It is difficult to have confidence in the security of sensitive national information when the technical provider which creates, holds or manages the database is a business corporation with strong connections to foreign intelligence organisations. Furthermore, the US corporations are mandated by the US law to reveal to the US government, information obtained during their legitimate operations, when called upon to do so.

The extent to which India's cyber security has already been invaded by surveillance is not even known, and when the security of the Aadhaar system is not water-tight, compromise of the Aadhaar system's security will tantamount to compromise of national security.

When the cyber systems of high-security organisations like USA's NASA or India's DRDO have been repeatedly hacked, UIDAI's self-certification of its database security rings hollow. As far as institutional cyber security in India is concerned, barring one database protected by an indigenously developed network security system, official databases in India, including Aadhaar's Central ID Repository (CIDR), are protected by purchased commercial network security and cryptographic products.

Database vulnerability

There is little need to emphasise the vulnerability of the Aadhaar database to access by unauthorised persons/ agencies for data destruction, corruption or simply copying by surveillance or hacking. The effect on individual privacy is unquestionably adverse.

Intelligence agencies operate by conducting general surveillance on citizens in public places and linking this with personal information available in various databases maintained by banks, income tax offices, ration cards, electoral rolls, airline and railway ticketing, internet and telecom service providers etc.

Since the Aadhaar number is "seeded" in these various data bases, Aadhaar itself will inevitably be at the core of a system to enable profiling and tracking of any and every private individual. Therefore, Aadhaar is a prize target for intelligence agencies to hack or surveil to acquire data to invade individual privacy and compromise national security.

The Aadhaar (Targeted Delivery of Financial and Other Subsidies, Benefits and Services) Bill, 2016, has two aspects: the Opposition objects to its being tabled as a "money bill" to avoid its being placed before the Rajya Sabha, and that there have been a host of objections - especially including those of privacy and security - to the Aadhaar scheme since its inception, with several petitions still pending before the Supreme Court.

The Aadhaar Bill fails to address the serious systemic issues of national security and individual privacy and indeed, the word "privacy" is absent from its text. However, concerning the security and confidentiality of information, the value of individual privacy is indirectly acknowledged in Section 33(2), by specifying that an individual's Aadhaar number, and biometric and demographic information may be revealed in the interest of national security, only by a specially authorised officer not below the rank of Joint Secretary of the Government of India.

Genuine national interest may dictate that laws on data/ digital privacy protection and cyber security be urgently enacted and linked with the Aadhaar Bill, before it becomes law.

The Statesman
16 Mar, 2016

Chromosomal Functions

Explains the Unique Features of Meiosis

The evolutionary establishment of the complex chromosomes of higher organisms has been accompanied by new patterns of chromosomal behaviour called Meiosis. The processes of synapsis, segregation and crossing over, are evolutionary innovations associated with and probably, arising out of, the molecular architecture of these chromosomes — neither are they displayed by genes as such nor by the relatively simple chromosomes of viruses and bacteria.

Let's address the phenomenon of synapsis first. There is no known mechanism whereby double DNA helices can be brought into homologous alignment with each other. This can only be accomplished at the molecular level with single polynucleotide strands, as demonstrated through annealing experiments to give DNADNA or DNA-RNA hybrid structures.

When viewed in meiotic cells at the highest resolution of the light microscope, synapsis appears to be a most exact process, dependent upon sequential homologies but the exactness of homologous recognition at this level of resolution is a chromosomal event. The chromosomes prior to synapsis are visible in the light microscope and hence partially condensed, and since synapsis follows replication and the formation of chromatids, the units of homologous recognition are at least two DNA helices thick. It may be that further understanding of the "synaptonemal complex" as described by experts, will shed new light on this problem, but at the moment synapsis has not been explained by known physical forces or chemical attractions. It is, therefore, a property of complex chromosomes functioning as organelles and at a supragenetic level of behaviour.

The products of replication of viral and bacterial chromosomes are separated into their respective particles or cells by mechanisms different from, but as effective as, the process of segregation taking place in higher cells. Like synapsis, segregation is a property of complex chromosomes which has its origin in the fact that a portion of each chromosome (whole in some species) is differentiated into a unit of movement called the centromere. This structure acts in conjunction with another organelle peculiar to higher cells — the spindle. These two organelles make biological sense only when both are present and functioning.

It is possible to imagine equipping each 10⁵ or 10⁶ genes with independent centromeres capable of making connections with an equal number of spindle fibres, but in terms of biological economy the argument is not particularly defensible. Segregation must, therefore, be viewed as behaviour acquired through differentiation of both chromosome and cell, and only after genes were assembled into linear arrays.

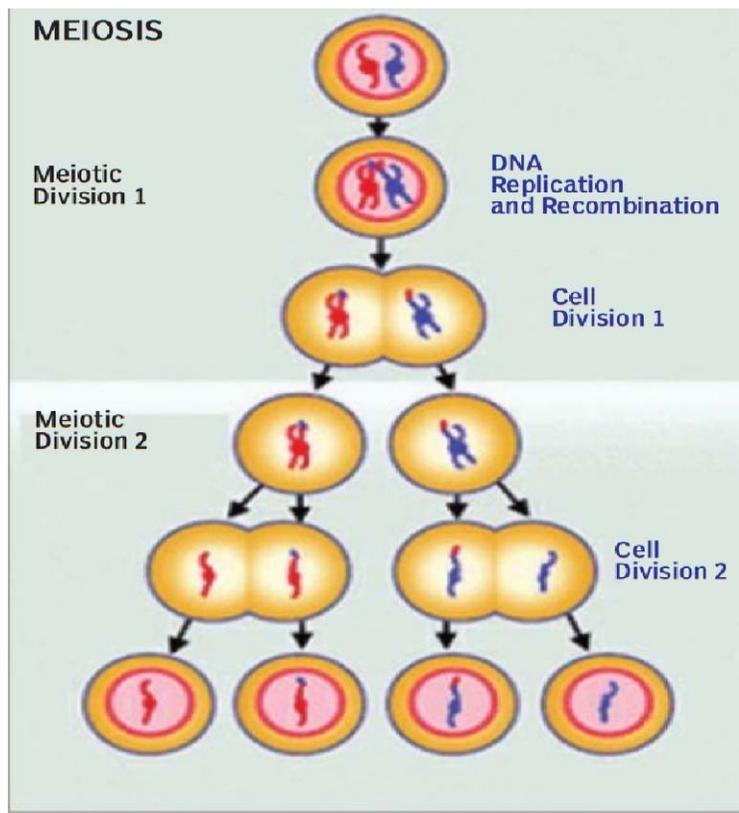
The same may be said of crossing over as it is an acquired property of complex chromosomes. A parallel phenomenon is displayed by viral and bacterial chromosomes but that is mainly in the recombination of genes, not necessarily in terms of how it is attained. A number of schemes for recombination in viruses and bacteria have been proposed with the exchange of genes generally considered to take place between single polynucleotide strands. In higher forms of organisms, all genetic evidence points to recombination taking place between chromatids.

Yet an open mind as to the mechanism must be maintained if only for the reason that while an exchange may occur at a seemingly structural level, it is minutely exact at the molecular level —

gains or losses of nucleotides do not normally occur as the result of crossing over. Of more immediate interest is the fact that, regardless of the mechanism of recombination or perhaps, more likely. Because of it, the rates of recombination per physical unit of DNA vary widely in different organisms. When examining the data in the picture, it needs to be kept in mind that a map unit in microbial systems (those above the dividing line) is not determined with the same degree of ease as a map unit in higher organisms. The property of high negative interference, characteristic of these systems, means that the reliable construction of a genetic map can be based only on very small intervals. Making use of computer techniques, however, they have shown that phage T4 has a map distance of about 2,500 units and that there is a good correspondence between map distance and physical length of the chromosome.

When a comparison is made between the genetic maps of higher organisms the correspondence with physical distance measured in number of nucleotide pairs is not a clear one. The genetic maps of mice, maize, and humans are approximately the same as that of *E. coli* and T4 yet contain more than 1,000 times more DNA than the former and 10,000 times more than the latter.

In general, therefore, chromosomes that are structurally simple recombine much more freely than those that are complexed with RNA and proteins, a factor that suggests that linkage in higher forms has cytogenetic meaning that transcends the mechanics of segregation.



During Meiosis, diploid cells undergo two cell divisions that result in haploid cells. In meiosis I, homologous chromosomes pair up along the cell equator and are divided into separate cells. In meiosis II, sister chromatids are divided into separate cells, making a total of four haploid cells that are genetically unique.

The Pioneer
16 Mar, 2016

Disabled Employees Likely To Get Motorised Wheelchairs, Other Aid

Disabled employees working with the Central Government may soon get motorised wheelchairs and other helping devices. The Department of Personnel and Training (DoPT) has started a scheme for providing facilities to the employees with disabilities. However, the scheme is initially being started for those working in the DoPT.

As per the scheme from next month persons with disabilities will get wheelchairs (motorised), special furniture, hearing aids with battery, low vision aids, smart cane and special software or computer. Besides, there will be braille signage near lift area, toilets and canteens, and provision of beep sound in biometric attendance system.

The objective of the scheme is to enable and empower persons with disabilities of the department by providing certain additional facilities to help them discharge their duties more conveniently and effectively, an order issued by the DoPT said.

Employees with disability would be given option to apply for the assisting aids through proper channel, which will be examined on case to case basis and decided with the approval of competent authority, the DoPT said. "After successful implementation of the scheme in DoPT, other Government departments will also be asked to follow it," a senior official said.

Deccan Herald
16 Mar, 2016

Nanomotors may help make self-healing electronics a reality

Los Angeles, PTI: Scientists have developed self-propelled nanomotors inspired by our body's immune system that can seek out and repair tiny scratches or electronic components and could lead to self-healing gadgets.

"Electronic circuits are very sophisticated these days. But a crack, even an extremely small one, can interrupt the flow of current and eventually lead to the failure of a device," said Jinxing Li, a PhD candidate at the University of California at San Diego (UC San Diego).

"Traditional electronics can be fixed with soldering, but repairing advanced electronics on a nanoscale requires innovation," Li said.

Gadgets will soon be more ubiquitous than ever, appearing in our clothes, implants and accessories, said Li. But finding ways to fix nanocircuits, battery electrodes or other electronic components when they break remains a challenge. Replacing whole devices or even parts can be tricky or expensive, particularly if they are integrated in clothes or located in remote places, researchers said.

Creating devices that can fix themselves would be ideal, according to Joseph Wang from UC San Diego.

"If you cut your finger, for example, platelets will automatically localise at the wound location and help start the healing process," Li said.

"So what we wanted to do is create and use extremely small robots to perform the same function, except in an electronic system," he said.

To accomplish this, researchers designed and built nanoparticles out of gold and platinum that are powered by hydrogen peroxide. The platinum spurs the fuel to break down into water and oxygen,

which propels the particles. Testing showed that the nanomotors zoomed over the surface of a broken electronic circuit connected to a light-emitting diode, or LED.

The nanomotors would be ideal for hard-to-repair electronic components such as the conductive layer of solar cells, which are subject to harsh environmental conditions and prone to scratching.

The Times of India
16 Mar, 2016

Meet Tega, a robot tutor for children

Scientists have developed a furry, brightly coloured robot that serves as peer learner to encourage students in a classroom and can create a personalised motivational strategy by interpreting emotional responses of a child.

Researchers from Massachusetts Institute of Technology in US and Tel Aviv University in Israel developed the socially assistive robot called Tega that is designed to serve as a one-on-one peer learner in or outside of the classroom.

Testing the setup in a preschool classroom, the researchers showed that the system can learn and improve itself in response to the unique characteristics of the students it worked with. Tega uses an Android device to process movement, perception and thinking and can respond appropriately to children's behaviours. It is equipped with a second Android phone containing custom software that can interpret the emotional content of facial expressions, a method known as “affective computing“.

The Asian Age
16 Mar, 2016

Why science needs journalism

Sage Narada from Hindu mythology may be considered the father of journalism. Always on the move, he took special pleasure in conveying to Person A what he considered relevant news for him or her. Like his modern counterparts, he would derive special pleasure if the event reported by him caused the maximum turmoil. It's not hard to imagine the following dialogue between him and Lord Vishnu, the one of the Trinity whose job it is to ensure that the world created by Lord Brahma (the first of the Trinity) continues to function without any major problem.

Lord Vishnu asks Narada if everything is going well. Narada says, “Sir, barring one factor, everything is fine, thanks to your careful attention. The disturbing aspect is that my successors are failing in their duty of informing people of what is going on.”

This reply surprises Vishnu who points out how different TV channels are all the time putting out “Breaking News”. But Narada shakes his head and says, “Breaking nonsense, Sir! While running after such items which are often hyped out of proportion, they miss the real solid chunk of information which is so crucial to human existence and well-being. They stay away from any news of scientific or technological nature.”

Vishnu laughs and says, “Because they are conditioned to think that these are difficult subjects that are hard to understand.”

Narada says, “Ironically, science and technology (S&T) are the major forces today on which human society functions. Today's journalists and media people in general owe it to the society to alert them to anything significant taking place in the field of science and technology.”

Leaving these two to sort it out, let's turn to the crucial issue — that S&T are an important part of today's human existence. Nobody will deny this. That they lead to the creation of new concepts that

lead to improvements in human standard of living, too, nobody will deny. Important also are ways, sometimes obvious and sometimes subtle, in which these changes occur.

But understanding and identifying these ways is only a part of the story. More importantly, we need to control them. Alvin Toffler, in his book *Future Shock*, highlighted the uncontrolled expansion of S&T. So can we compare the present situation with that of a diner eating in a restaurant whose menu is unlimited and the diner is invited to eat what he likes for a stipulated fixed price? With a lot of dishes stacked on the buffet table, the diner may be tempted to try as many as possible. The situation is worsened by the circumstance that new dishes keep appearing on the table! Obviously a diner not observing self-control may find himself having to cope with an upset stomach the following day.

Narada's worry may be understood in this context. Unless we exercise self-control in using the "gifts" brought by S&T, we may find plenty to regret the following day. And to do so we need to understand, if not all, then at least the important implications of these gifts. If an invention is seen as advantageous in one sector, can it create an unpleasant reaction in another? Are production methods of an apparently advantageous product likely to create unacceptable pollution? Or, will excessive use of the product exhaust some vital natural resource?

There may be smug satisfaction today that we have created an ultimate weapon that will hold our enemy in check. But tomorrow's situation may find us facing that weapon from the wrong end.

This list can go on and on, but what has been stated here is sufficient to alert the society to the dangers to its very existence. This is where one needs the help of science journalism. The media no doubt has the material resources to collect and distribute information on topics relating to S&T. At present there is shortage of those who can spot and identify such issues in S&T and who will do their own homework to assess their relevance to public interest. In short, we need persons familiar with science, who after spotting an issue can have a go at getting to know its relevance to the present-day society and, last but not the least, who can follow up the details through various information sources, including, of course, consultations with scientists themselves. In short, an independent mediaperson in science has to evolve in many directions.

This picture takes into consideration friendships between science journalists and scientists, which no doubt helps in the process of information collection and assessment.

All too often a typical ivory tower scientist prefers isolation, arguing that interaction will be a waste of time which is better spent thinking about research, or that the layman, that is the mediaperson, will not gain anything since this work is complicated, or the scientist does not feel competent enough to explain the technical aspects of his work to a layman.

This is a major hurdle to the satisfactory growth of science journalism. A change in the mindset of a typical productive scientist has to be brought about. How? There are several ways. Local and national awards for popularisation of science will certainly help in raising its popularity. Most scientists work in government or private labs and are periodically promoted. Amongst the various criteria for evaluation, there may be one of science popularisation. Workshops and schools with occasional national and international conferences can help generate interest amongst laymen to undertake popularisation of science.

Indeed, aren't each of these programmes being tried? The answer to this question is, "Yes, but not forcefully enough and not often enough." The National Science Day does provide a stimulus but the dialogue between scientists and the lay person should not be limited to Science Day. It should be regular and deeper.