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Indian Army holds major military exercise in Rajasthan

Lt Col Manish Ojha: The exercise aims to validate the battle readiness and operational effectiveness of the Pivot Formation and Rapid Division of the Army along with all its affiliated components

Jaipur: Indian Army is holding a major military training exercise 'Chakravyuh-II' to validate battle readiness and operational effectiveness of the Pivot Formation and Rapid Division, in Suratgarh.

The exercise also involves rapid mobilisation and execution of battle plans in conjunction with the Air Force.

"The exercise aims to validate the battle readiness and operational effectiveness of the Pivot Formation and Rapid Division of the Army along with all its affiliated components" Defence spokesperson Lt Col Manish Ojha said.

The exercise envisages mechanised manoeuvres in the entire spectra of new generation weapons, platforms and systems are employed in areas where rapid development and urbanisation along the border is predominant, he said.

"It has provided an opportunity to all commanders in planning and conduct of large scale operations an integrated theatre environment along with Air Force including fighter ground attack aircrafts, attack helicopters, unmanned aerial vehicles, remotely piloted vehicles and communication helicopters," Ojha said.

Consequently, troop insertion by air was also integrated into the exercise using the Special Forces and other Heliborne troops.

During the exercise, intelligence, surveillance, reconnaissance and communication systems were put to test in a network-centric battlefield environment supported by required operational logistics.

Improved mobility, inventory management techniques and extensive use of information technology to ensure logistics are in step with the fast paced operational environment was also validated during the exercise.

The Hindu
09 May, 2016

Army chief orders rightsizing study

The tooth-to-tail ratio, referred to as T3R in the Army, is the ratio of fighting arms, which wage the actual battle such as infantry and armoured wings, to support services, such as logistics, signals and ordnance.

In an attempt to make the world's third largest standing Army a leaner and meaner fighting force, the Chief of the Army Staff, General Dalbir Singh, has ordered a high-level study to determine and recommend measures to improve its tooth-to-tail ratio.

Informed sources said the issue was deliberated at length during the recent Army commanders' conference and based on those discussions, General Singh ordered the study last week.

The study will be undertaken by a committee headed by an Army Commander. The report is expected by August-end, after which recommendations will be considered for implementation.

To review Army logistics- “The study will comprehensively look at all arms and services, including logistics organisation and establishment to achieve right-sizing. Operational logistics will be reviewed, along with the philosophy and concepts to arrive at an optimal substance model both in peace and war,” a senior officer with knowledge of the matter told *The Hindu*. The other objective of the study is to achieve savings in manpower and cutting down on the burgeoning revenue expenditure to free up resources for military modernisation.

The tooth-to-tail ratio, referred to as T3R in the Army, is the ratio of fighting arms, which wage the actual battle such as infantry and armoured wings, to support services, such as logistics, signals and ordnance. Interestingly, the Army is in the process of raising a new mountain strike corps based in Panagarh, West Bengal, comprising 35,000 soldiers, to guard the China front.

Addressing the Combined Commanders Conference onboard the aircraft carrier *INS Vikramaditya* last December, Prime Minister Narendra Modi said the country had been slow in reforming structures within the armed forces to promote “jointness”, and called for efforts to “shorten the tooth-to-tail ratio”.

The study will look at the impact of equipment modernisation and automation levels improved communication and critical infrastructure development to review stock levels, inventory management models and logistics chain which add to the “tail”.

The Times of India
07 May, 2016

Create 141 colonel posts in 4 weeks, SC tells govt

By Dhananjay Mahapatra

Defence minister Manohar Parrikar's proactive step to correct the mistake in promotion of lieutenant colonels to colonels and subsequent judgment of the Supreme Court based on that assurance has not been honestly implemented, an Army officer alleged on Friday.

Some officers, through advocate Neela Gokhale, told a bench of Chief Justice T S Thakur and justices R Banumathi and U U Lalit that the court had on February 15 directed creation of 141 more colonel posts to improve promotional avenues for lieutenant colonels in the Army's support arm units -air defence, corps of engineers and corps of signals. But it was not implemented in letter and spirit, leaving deserving officers high and dry, Gokhale said.

The bench asked additional solicitor general Maninder Singh why the ministry had not implemented the judgment even after three months. Singh assured that the needful would be done in four weeks. The bench warned that if the judgment was not implemented in four weeks, the defence secretary would have to be present in court during the next hearing.

The Hindustan Times
09 May, 2016

Take politics out of defence deals

Make the process as transparent as possible and far less susceptible to external pressure

Defence equipment for the Indian military serves an all-important cause — the security of the nation. Yet, as the present parliamentary debate over the Agusta-Westland helicopter purchase indicates and the fading shadow of the Bofors howitzer case remind us, defence purchases seem to be inevitably caught up in fiscal and political chicanery of the worst kind. This is harmful to national security and undermines the credibility of the country's institutions, political or otherwise.

Corruption, or at least a sense of corruption, follows inevitably because buying weapons is both complicated and, by necessity, partly opaque. But the Indian system makes it worse with defence

procurement structures that are among the longest and most complicated in the world. The process is started by defence ministry and military officials whose expertise in cutting-edge weapons technology is often limited. It then jumps through an endless set of hoops, each one of them vulnerable to external pressure and lobbying — whether rival defence contractors, a bevy of government agencies including in the military, the media or politicians. That defence purchases are expected to serve multiple and often contradictory purposes does not help matters. A zero-corruption purchasing system would be possible if India bought only through government-to-government channels. But this would wreck the offset policy, designed to promote indigenised production and the transfer of technology. Neither of them necessarily aligns with larger strategic considerations of the country, some of which are impossible to convert into contractual language. The response by many actors makes the mess only worse. Foreign and even Indian defence manufacturers use local agents to help navigate through these treacherous paths, but often with little ability to control the actions of the agents. The political system reacts to any corruption charge through overreaction, dumping weapon systems or ripping up contracts at enormous cost to both the country's security and exchequer. The HDW submarine deal and even the Bofors cases were perfect examples of scandals that should have been handled by arrests and fines, but not by tossing out sound weapons and technologies.

India desperately needs to make buying arms far less treacherous, making it as transparent as possible and far less susceptible to external pressure. The government could start with working out more open statements on the country's defence policies and strategies as this would help explain why certain purchases are important — and make them less vulnerable to politicking.

The Tribune
09 May, 2016

A first: CRPF to deploy women in Red zones

Breaking yet another proverbial glass ceiling, country's largest paramilitary force CRPF is set to deploy over 560 women commandos for undertaking anti-Naxal operations in select Left Wing Extremism-affected states.

The ambitious plan to deploy such a large number of women personnel in most challenging combat theatres in the country's internal security domain got moving with a batch of 567 women passing out from the force's training centre in Rajasthan's Ajmer last week.

CRPF Director-General K Durga Prasad said the full batch will now be deployed in phases in LWE areas in the 'company formation' style, which means about 100 personnel at one time.

"These women who passed out on May 6 from Ajmer have been trained keeping in mind the LWE tasks rendered by us. We thought to give them the toughest assignment in the initial years of their service itself. Initially these women personnel will be deployed in one company at a time and after some time their deployment and work utility will be scaled up," Prasad said.

The DG added the force has already created living infrastructure and barracks for these women at certain locations while more such facilities will be created in due course of time. The CRPF, officials said, has been working on the concept that if Maoists can have women in their ranks, why not the security forces.

The CRPF had initiated a plan in this regard last year when two small teams of these women personnel were sent for familiarisation exercises and based in CRPF camps in the worst-affected Bastar region of Chhattisgarh and some sensitive LWE hit areas of Jharkhand. Officials said they can easily interact with the local women folk which will not only help gather good intelligence but also help bring the force closer to the locals.

Trained in jungle warfare, unarmed combat

- The latest batch of CRPF women personnel have been trained for 44 weeks in jungle warfare, unarmed combat, smart weapons firing and other drills after which they got commissioned in the 232nd battalion of the force
- This is the fourth ‘mahila’ battalion of CRPF. A CRPF battalion has about 1,000 personnel
- The women personnel, once deployed, will be operating from active CRPF bases and will carry arms and undertake patrols like their male counterparts
- Recently, border-guarding force ITBP had declared that it will post its women personnel in full combat role in its units along the Sino-Indian border

The Pioneer
09 May, 2016

IAF Asks Defence Min to Find Way Out

The Indian Air Force has asked the Defence Ministry to find a way out in the wake of a recent amendment in the Customs Act removing blanket duty exemption for defence goods, a move that may delay modernisation and maintenance programmes of fighter planes like Mirage and Jaguar.

Under the new rules, which came into effect from April 1, customs duty exemption has been given to specific projects, all of which are in production in the country.

However, components and spare parts for Mirage, Jaguar and MiGs combat aircraft have been left out of the list of exempted goods.

The IAF came to know about the new changes only in the first week of April, defence sources said, adding that various imported spare parts and components, worth several millions of euros, are now lying at various ports.

“This is not something which affects IAF alone. It affects other two Services also,” an official said, adding that since it is a new rule, clarifications have been sought.

Defence experts said if the matter is not resolved soon, at least 20 per cent of the Mirage fleet, which is being modernised under a multi-million euro deal with France, will be grounded.

Sources said the “thinking” behind the move to give duty exemption in project-specific cases was to ensure that the domestic industry thrives.

Deccan Herald
07 May, 2016

Most IAF bases lack modern navigation equipment

By Kalyan Ray

Only 6 bases received new air management system

New Delhi: Five years after the Indian Air Force (IAF) signed an agreement with the Tata group to modernise its 30 airfields, work on only 6 has been completed.

In March 2011, the IAF had signed a Rs 1,220-crore agreement with Tata Power to modernise 30 of its air bases within 42 months. But till December 2015, work was completed only in 6 places including Bhatinda, where the pilot project was conducted. Other bases that received new air traffic management, navigation and communication systems are Adampur, Jorhat, Kalaikunda, Bareilly and Pune, sources said.

According to the project, the first 30 airfields were to be completed by the end of 2014 following which another 37 airfields of the Army, Navy, Coast Guard and Home Ministry agencies were to be

done. With the first phase of the project way behind schedule, it would be several years before all IAF airfields have these aides.

The first 3 years of the MAFI (modernisation of airfield infrastructure) programme was a waste as the pilot project in Bhatinda began only in March 2014. All these instrumental aids are meant for improving the operational efficiency of the IAF's fighter fleet.

"Such delays should not become a regular and acceptable feature of the process and callousness in approach should be shed," a panel of lawmakers told the defence ministry.

While equipping all IAF airfields with modern navigation instruments would take years, 9 airfields still don't have permanent night landing facilities. In those 9 bases, only limited night operations are carried out using portable lighting system.

The IAF has 53 airfields, out of which, permanent lighting system is available in only 42 places.

"Night landing facilities should be part of all the airfields as in the present era of technological advancement, this is not a far stretched requirement," the standing committee on defence says in its report tabled in the Parliament.

Despite experiencing limitations in improving the existing fields, IAF now plans to operationalise another 24 abandoned air fields. These 24 airfields are among the 39 disused airstrips that are with the IAF.

The plan is to make them operational for deployment of long-range missiles, radars, weapon storage areas as also for emergency recovery strips for helicopters and fixed wing aircraft.

Also, there is barely any progress in upgrading the Nyoma and Kargil air station in Jammu and Kashmir for fighter operations, which was planned more than 5 years ago.

*One India
09 May, 2016*

3 Indian naval ships in Dubai to bolster ties

Bengaluru: Three ships of Indian Navy - INS Delhi, INS Tarkash and INS Deepak -- under the Command of Flag Officer Commanding Western Fleet, Rear Admiral Ravneet Singh arrived at Dubai on a four day visit. Naval officials said that the trip is demonstration of India's commitment to maritime relations with countries in the Gulf.

The current visit also seeks to bolster the strong bonds of friendship between India and UAE and contribute to security and stability in the Indian Ocean Region. During the visit, the crew would undertake professional interactions with the UAE Navy, towards enhancing co-operation between the two forces. The ships are also likely to conduct exercises with the UAE Navy.

Indian ships visited UAE last year too

INS Delhi is commanded by Capt Sandeep Singh Sandhu, INS Tarkash by Capt Pradeep Singh and INS Deepak by Capt Sujit Kumar Chhetri. Indian naval ships had last visited UAE in September 2015, including INS Delhi, INS Deepak, INS Trishul and INS Tabar.

Navy says bilateral relations between India and UAE are characterised by strong bonds of friendship based on cultural and economic ties dating back to nearly 3000 BC. "These have been further strengthened in recent times by a vibrant economic relationship and growing convergence on security issues. UAE is India's second largest trading partner and Indians are the largest expatriate community in the UAE," says a Navy spokesperson.

Modi visit opened up new avenues

Prime Minister Narendra Modi's visit to the UAE in August 2015 opened up new avenues of a strategic partnership between the two countries. Both nations had then agreed to cooperate in maritime security and strengthen defence relations. Modi along with Defence Minister Manohar Parrikar is scheduled to visit UAE from May 18. Maritime cooperation between the two countries has increased steadily since the inaugural Navy-to-Navy staff talks in January 2007.

Navy says reciprocal port visits, high-level delegations and training exchanges have further bolstered naval cooperation between the two countries. India and UAE are also members of Indian Ocean Naval Symposium (IONS), a voluntary and co-operative initiative between 30 countries of the Indian Ocean Region, which has served as an ideal forum for sharing of information and cooperation on maritime issues.

The Hindu
09 May, 2016

Navy to bid adieu to Sea Harriers on Wednesday

INAS 300 to induct the MiG 29K/Kub fighter planes

The Indian Naval Air Squadron 300 (INAS 300), 'White Tigers,' are set to phase out the Sea Harriers fighter aircrafts and make way for new generation of fighters in lieu on Wednesday.

The INAS 300 will thereafter induct the MiG 29K/Kub fighters.

The Sea Harriers are planned to be given a hero's send off during a ceremony presided over by Admiral R.K. Dhowan, Chief of Naval Staff, at INS Hansa, Dabolim in south Goa on Wednesday.

Traditional Change of Command ceremonies will be held where Commander Shikhu Raj, a Sea Harrier pilot, hands over the command of the squadron to Captain KHV Singh, a MiG 29K pilot. The ceremony will also include an air display by Sea Harriers and MiG 29Ks which will mark the last flight of the Sea Harriers in the Indian Navy. A large number of serving and retired Sea Harrier pilots are expected to attend the function.

Inducted in the year 1983 the Sea Harriers have dominated the sky protecting the fleet from prying eyes of foreign Long Range Maritime Patrol aircraft. The first three Sea Harriers, landed at Dabolim on December 16, 1983. This was followed by the first deck landing on the carrier, *INS Vikrant*, on December 20, 1983 and the arrival of the first Sea Harrier T Mk 60 trainer, on Mar 29, 1984.

Designed and manufactured by the British Aerospace, Sea Harrier is a naval Short/Vertical Take-Off and Landing (VSTOL) jet fighter, reconnaissance and strike aircraft. It first entered service with the Royal Navy in April 1980. Its ability of vertical takeoff and landing is the most unique feature of this fighter. The fighters were capable of Air to Air refuelling to operate at extended ranges.

Air defence

The principal role of the subsonic Sea Harrier was to provide air defence to naval fleet by operating from their aircraft carriers.

The Sea Harrier is equipped with four wing and one fuselage pylons for carrying weapons and external fuel tanks in addition to two removable 30 mm Aden Gunpods on the fuselage. The Sea Harrier was fitted with anti-ship Sea Eagle missile providing the best stand-off range anti ship capability to the fleet.

Falklands War success

The aircraft were operated by Indian Navy and Royal Navy. The squadron was deployed during the Operation Vijay and embarked on the carrier during Operation Parakram providing the essential offensive posture to the country and ensuring readiness to react to any escalation by the enemy.

As part of the Royal Navy, Sea Harriers have served in the Falklands War, both of the Gulf Wars, and the Balkans conflicts. Its usage in the Falklands War (1982) was its most high profile and important success, where it was the only fixed-wing fighter available to protect the British Task Force over 8,000 miles from homeland.

The fighters were de-inducted from the Royal Navy in the year 2006 and operated for the last time from *INS Viraat* on March 6, 2016.

Business Standard
08 May, 2016

India's maritime dilemma

To develop credible maritime assets and capabilities, India should structure itself essentially as an Indian Ocean Region player, rather than seek a broader Asia-Pacific profile

The last two decades have seen a remarkable shift in India's security dialogue. From almost nowhere, issues in the maritime sector have begun to acquire increasing focus. Terms such as Sagar Mala (development of ports), Mausam (promoting interconnectivity with littorals in the waters around us) and Blue Economy have entered the discourse even as efforts to build a stronger Navy and Coast Guard to safeguard the nation's interests at sea and to act as a Net Security Provider have come to the forefront. At every strategic discussion maritime security gets mentioned at the very start of the debate. This relatively recent development merits discussion.

Countries have either been or are continental powers or sought predominance at sea. Great Britain, the United States and Japan fall in the latter category while others like Russia, Germany and France, have tried but not been able to transform themselves from being essentially land focused entities to maritime profiles. This is because that requires certain geographic pre-requisites of which easy and unhindered access to open seas is an important one; equally, there is need for governments which understand what maritime power is all about and they then go about creating and exploiting it to further the nation's interests. These attributes are not easily found. Yet, as history has shown, no nation can really become a great power unless it is a power at sea.

Despite its two-coast configuration, dozens of ports on both sides and access to open seas, India has always been a continental country. There were kingdoms which did take our culture to distant lands across the seas but not our power. All invaders, those who came and went and those who stayed to rule, came from across the land borders in the north. The Europeans did come in their ships but had to fight no great battles at sea; they only required a few limited skirmishes on land as kingdoms, big and small, were added one by one to the fold that ultimately became India. In independent India, power at sea was never seriously in the consciousness of our political leadership till as late as the war of 1971 when Prime Minister Indira Gandhi first saw its potential. Rajiv Gandhi gave it further meaning in the mid 1980s. From a paltry 4.7 per cent of the Defence Budget in the mid-1960s, the figure reached 13 per cent two decades later and close to 18 per cent by the turn of the century. This is positive movement but we are far from having become a maritime nation.

China is in worse straits. A one-coast country, its access to open seas can be seriously constrained by any determined adversary of which the USA and Japan are two; this situation is unlikely to change anytime soon. Equally important, the narrow channels of South East Asia seriously inhibit its ability to deploy seagoing forces in the Indian Ocean Region (IOR), on which it depends for much of its energy and trade. These are critical to attaining the maritime stature that it now seeks for itself coupled with the One-Belt-One-Road initiative. It may be able to obtain facilities here and there such as at Gwadar in Pakistan, but so can others elsewhere as has Japan. In any event, these, by themselves, cannot ensure credible operations. So, assessments that China can soon become a power of consequence at sea are somewhat optimistic.

India faces another major decision point in its search for a maritime face. America has consistently advocated an Indo-Pacific role for us with joint naval patrols in the South China Sea, most recently during the visit of US Secretary of Defence Ashton Carter. We ourselves have begun to adopt a profile which is veering to 'Act East' from 'Look East'. For example, Indian warships now routinely deploy in the South and East China Seas and visit ports in those regions, exercising with littoral navies. Yet, for the US, the Indo-Pacific only seems to start from our eastern seaboard extending into waters of the western Pacific; it does not see major roles for our country westwards.

So, Indian participation in affairs relevant to Afghanistan is downplayed as also its interests in South West Asia; here, Pakistan is the 'prima donna'. Some Indian strategists, therefore, advocate that India should structure itself essentially as an IOR player. Yet others, being more ambitious, want the field to be expanded to Asia-Pacific. In terms of maritime influence and responsibilities, this means abilities that extend from the Suez Canal on one side to waters of the Western Pacific on the other. So, which of these postures fits in with our interests and are doable within our present and likely capabilities, is the dilemma.

Even though half of our overseas trade now transits the South China Sea and tranquility in those waters is important, confrontation with China will not ensure it. Similarly, sovereignty issues in those waters between littorals are neither relevant to us nor impinge upon our interests. We must protest any actions in those waters which could jeopardise safety of commerce and freedom of navigation but actions such as joint patrols with others should not be part of the menu. An Asia-Pacific profile will also not have credibility, at least in the foreseeable future; it can await better days. On the other hand, an IOR role is both credible and commensurate with our valid interests that stretch across the Indian Ocean. In this space, India's interests and responsibilities must be those of the major littoral power able to reach places of its choosing and operate credibly for as long as it needs to. We are also better placed than the Chinese to deal with issues in the IOR than in waters farther away and can dominate its entries and exits. This will need maritime forces significantly more than are presently there but not a level that we cannot reach if we plan for it systematically. Interestingly, given clear political direction, these goals are achievable with a less than 20 per cent share of the Defence Budget and predominantly through the 'Make in India' route. This approach will also contribute to development of maritime infrastructure in the country, a necessity now recognised at the highest levels.

In short, India's maritime posture needs to be refined. Without compromising on our long-term interests we must clearly identify our core area and that must be the IOR. This expands our operating space sufficiently without compromising any vital concerns. Such a posture will, in the next two decades or so, result in maritime assets and capabilities which will be credible and commensurate with what we will need. Will this make India a maritime power? On this, the jury could well be out for some time.

Business Standard
07 May, 2016

Guns, thieves & ghosts

By Shekhar Gupta

We get tangled up in our own crooked web on purchases, and the murky arms bazaar knows it

We Indians are beyond boring old grandma's wisdom, like don't throw the baby out with the bath water. We just throw away the baby and keep the bath water. Take our military acquisitions, for example. Most new acquisitions become scandals. Many are then terminated, leaving our forces with a fraction of the needed inventory, and short of spares and ammunition. Nobody is caught and punished.

Some examples from our times:

1. Bofors is the most storied of our scandals. The Army is left with just the guns bought in the first order. Indigenous production was stalled. Even existing guns are short of spares and ammunition. The Army made distress import of ammunition during the fighting in Kargil which, note, was 17 years ago. India has acquired no fresh artillery in the 30 years after Bofors. Most importantly, nobody was ever punished for the bribery, no money recovered. a classic case of throwing the baby out but keeping the dirty bath water.

2. German HDW submarines, called Type 209, are a scandal of the same vintage. These were to be the Navy's first SSKs (submarine-to-submarine killers). The programme was scuttled. Only two vessels were bought and two assembled in India, 10 years late. Technology transfer, expansion never happened.

3. This isn't a military acquisition, but I choose the Indian Airlines purchase of its first Airbus A-320s because it became a scandal at exactly the same time as Bofors and Type 209. Just as the rumours of kickbacks emerged, a new A-320 crashed in Bangalore. It was used to damn the aircraft and the entire lot just purchased, was grounded. The A-320 survived fortuitously. When Saddam Hussein invaded Kuwait, India need to airlift tens of thousands of its citizens out of Kuwait and Akshay Kumar was not available in real life to carry out the airlift. The spare Air India and IAF strength was inadequate. Then Prime Minister V P Singh was left with no choice but to de-mothball the A-320s. And once they resumed flying, there was no going back. Indian Airlines never recovered from the financial loss of grounding that fleet. Again, nothing was proven, nobody was caught or punished.

The setback and humiliation of Bofors led to our most vicious political blood feud. The Congress found its opportunity with the Tehelka sting. The NDA cried entrapment, but Bangaru Laxman and George Fernandes lost their jobs (the latter only temporarily). None except Laxman, who actually had nothing to do with any real defence deal, was punished by law.

The Gandhi family saw bitter revenge in Tehelka because it damaged not just the BJP but also Mr Fernandes, the noisiest Rajiv-baiter on Bofors. But, since Mr Vajpayee's credibility and popularity, and dumping of expendable Laxman helped Mr Fernandes recover, the revenge remained incomplete. A fresh bid was launched towards the later years of the NDA with what was called the "coffin scam" though nothing was eventually proven. As a consequence, however, no major acquisitions took place in Mr Vajpayee's six years, in spite of a limited conflict (Kargil) and a near all-out war, Op Parakram. Not one significant non-Russian system was introduced as the government was petrified. Even the Israeli Barak missile system for protecting our naval assets from enemy aircraft and missiles was rendered ineffective as its maker was banned, leaving the Navy's finest ships unprotected. Something similar has happened now with the latest submarine Scorpene entering the seas without torpedoes. The company that makes these, WASS, is a subsidiary of Agusta and covered under the A K Antony ban.

When Congress unexpectedly returned to power in 2004, it was desperate to find something on NDA's defence "scandals". But nothing was found and the first UPA Defence Minister Pranab Mukherjee was much too wise to launch a witch-hunt. He knew the consequences of perpetuating this feud at the cost of the armed forces. His inability to "discover" any scandals annoyed 10 Janpath. It probably led to his being moved out of defence, making way for loyalist A K Antony.

Mr Antony also did not launch a witch-hunt. He saw keeping his own back and hands clean as his most important KRA. His typical response to the first rumours of a scam, even anonymous complaints, was to call in the CBI and ban the supplier. In the process, he became not just India's longest-serving defence minister but also one who banned so many suppliers that it was no longer possible to find one completely chaste, particularly in this fast-moving environment of mergers and

acquisitions (M&As) in the multi-national defence industry. When he banned Germany's Rheinmetall in 2012 for example, it also excluded nearly a hundred other western armament companies that the conglomerate now owned. He banned companies from Europe, Singapore, even Israel. The joke in South Block used to be that soon he would ban the Pakistani army and end the problem altogether.

As armed forces got frustrated, I described his approach to defence modernisation as "strapped-in-Latex" and also once called him Indian politics' answer to cricketer Bapu Nadkarni who was known neither to concede runs nor get many batsmen out and holds the world record for the largest number of consecutive maiden overs (21) that will probably never be broken.

The greatest irony of the AgustaWestland bribery is, it took place in spite of Mr Antony. He had to admit that bribes had been taken, cancel the deal, invoke penalty clauses and order inquiries. It is an indisputable fact that he acted only after Italian authorities had detected wrongdoing and one Indian newspaper and its reporter had broken and pursued the story relentlessly. He continues to do so even today and set the pace for the rest, some of whom then claim retrospective "news-breaks."

Since it is a incontrovertible fact that bribes have been paid by Agusta, the case must be speedily investigated and the guilty punished. The test, however is, can we have the sagacity to distinguish this scam from the larger issue of modernisation?

We can talk about Make in India. But most "Indian" systems will also depend on large foreign imports for engines, avionics, sensors, weapons, guidance systems and so on. These include the most visible ongoing developments like Tejas, ALH, stealth frigates, even the MBT Arjun, nearly 30 years behind schedule.

India has to opt for one of three possibilities now. The first is, to concede that tender-based, vendor purchases are no longer possible in the murky arms bazaar. All future purchases would therefore be purely on government-to-government basis or what the Americans call FMS (Foreign Military Sales). This is how UPA had ordered the IAF and the Navy's new C-130s, C-17s and P-8Is. A cruel aside: this forced Mr Antony to do what he detested ideologically, to buy from the US, which became our biggest arms supplier under his watch, for the first time in 65 years. The BJP is now buying two squadrons of the French Rafale through the same route and exploring American artillery. This narrows the buyers' options and negotiating space but get the commission agents out. The second is to bring in a fool-proof system of purchases which is an impossibility given how broken our politics is. The third is to accept the limitations inherent in our system on timely acquisitions (the need for a so-called VVIP helicopter was first approved in 1999 and we still don't have it). You then mould your diplomacy and strategic posture accordingly. That, nobody would want. So we will likely keep muddling along, battered by scandals yet shortages, not catching any guilty but getting our soldiers frustrated. In short, keep flushing away the baby and frolicking in the soiled bath water.

The Asian Age
08 May, 2016

Dealing with defence-less security system

Defence preparedness, in simple terms, means readiness to meet an attack from an adversary or to attack the adversary and win a war. This is a function of strength and intention of the adversary, own strength in manpower and quality of equipment, doctrines and training and, national will. The strength of own Armed Forces also depends upon by the quality of their leadership, levels of training, ability to absorb and high technology weapon systems and use them effectively, domestic defence technology base, funds available to meet revenue and capital expenditure of the defence forces in a sustained manner and, clarity of political and military objectives. Winning a war requires synergy not only among the three services but full support of the government and the people. This

brief note focuses on the state of military hardware and the concerns about technological lag and obsolescence of the equipment held by Indian Armed Forces. There is enough literature available on the subject to indicate that wide gaps remain between the requirement and the present holding of equipment by the three Services. HQs Integrated Defence Staff of the Ministry of Defence issued a Technological Perspective and Capability Roadmap in April 2013 which lays down the technological perspective and capability roadmap. But this still remains a wish list rather than a clear road map.

DRDO has worked on some of the systems and provided some systems to the Armed Forces. However, we are still far from being self-reliant. The number of combat squadrons in the Indian Air Force remains well below the projected requirement; the Army has not inducted field artillery guns and air defence hardware for decades and deficiencies of its surveillance equipment and support and close combat weapons for infantry are far from being made up; and, the Navy is desperately short of modern submarines and some other equipment. India still relies heavily upon imports for weapon systems and allegation of corruption in defence purchases has further complicated the acquisition process.

There have been many instances of the capital component of defence budget not being fully utilised resulting in surrender of the part of the allotted capital budget. Perhaps, an assessment that war is not imminent has made us complacent in not putting efforts to shorten the acquisition cycle and procuring the required equipment. It, however, needs to be realised that the shortfalls in critical equipment is piling up and obsolete equipment is not being replaced in time thereby affecting the defence preparedness of the Armed Forces.

India needs to take urgent measures to make up the deficiencies in weapon systems and equipment for the three services lest it should reach a stage wherein a sudden military threat compels it to resort to emergency procurement at higher costs to meet the basic necessities of its Armed Forces as it happened during the Kargil conflict in 1999.

The Asian Age
08 May, 2016

Defence Scams: Is there a way out?

The Defence Procurement Procedure (DPP) has been routinely revised. An 'integrity clause' for capital acquisitions costing more than 100 crores was introduced to ensure fair play. An Integrity Pact Bank Guarantee was also put in place. The bidders signed the clause as a matter of ritual without any intent to abide by it. This clause has never been evoked and scams in defence purchases continue unabated.

The surfacing of defence scandals, the connected leaks from 'reliable sources' and the media hype that goes with it, are all timed to suit political conveniences and die a natural death after the instant news has served its purpose. Fiery statements are made by politicians while the role of bureaucrats is seldom questioned.

The Central Bureau of Investigation (CBI), which hardly has any credibility, is commissioned to carry out investigations without any time frame or intent to nail the culprit. Thereafter, nobody knows as to where the case stands as in the case of coal or the spectrums scams. At the end of the day, no one gets punished. The Bofors and the HDW scandals are classic examples. Obviously, the crook protection mechanism is much more effective than the scam prevention methods in place. The man hours and money spent in such mock investigations is colossal.

In an age when countries like US, China and Russia are in the final stages of developing Hypersonic Glide Vehicles which have the capability to pierce missile defences and an ability to hit any place in the world with conventional warheads in less than an hour, the Indian Army is struggling to get a

basic support weapon, the artillery gun to replace the existing Bofors gun, a weapon system which has survived beyond its age of entry to a museum.

If there is a war tomorrow, our leaders will be guilty of fielding our troops as cannon fodder without even the basic minimum fire support. Most of the essential equipment in our defence inventory like the helicopters and the air defence systems, just to name a few, are obsolete. The two divisions and the mountain corps under rising are yet to be equipped. How does one expect them to be trained for war?

Now with the AgustaWestland scam re-surfacing and the prospects of fresh investigations to unearth the scams in other deals such as Pilatus trainer aircraft looming large, the procurement processes of defence equipment is expected to be further delayed impacting national security. Should the delay factor put a stop to investigations even in cases where evidences of misdemeanor are visible? That will only incentivise the crooks. The bureaucracy, some say will be scared of taking decisions for being implicated in a scam. The soldier on the other hand going into battle without the fire support is expected not to get frightened of losing his life. If scared of taking decisions, one should just quit and not be a national liability.

Why is it that despite frequent updating of DPP and measures in place to prevent corruption, these scams are continuing? The reality is while the procedures have been fine-tuned, the role of the parties to the scams namely the bureaucrats, the politicians and the military have deliberately remained unchanged. The question is why should bureaucrats, who are meant to be the staff officers to implement political decisions, handle defence procurement including price negotiations? Why not constitute an independent body of experts to handle procurement within a stipulated timeframe? Experts from various fields as and when required could be called in for consultations. The final decision and payment could be left to the government.

The Indian Express
06 May, 2016

A recurring scandal

In the first round of tendering, the EH-101 helicopter (later renamed AW-101) offered by AgustaWestland did not make the cut as it was certified to fly only upto an altitude of 4,572 metres against the requirement of 6,000 metres specified in the Request for Proposal (RFP).

The scandal surrounding the procurement of 12 AW-101 VVIP helicopters from AgustaWestland is the latest in a long list of scandals in defence deals. There is no question that the guilty must be punished. But it is equally important to ponder why these scandals keep breaking out in spite of a seemingly strong preventive mechanism being in place.

The Defence Procurement Procedure (DPP), which regulates defence procurements, requires every vendor to sign a pre-contract integrity pact (PCIP), designed to prevent the vendors from adopting unethical practices to win contracts and remain on course after winning them.

Those who violate the pact can be slapped with sanctions ranging from the immediate calling off of the negotiations, if the transgression is detected before the award of contract, to the recovery of the bribe money, forfeiture of bank guarantees, and even blacklisting. Every defence contract also contains a clause that requires the vendor to declare that no agent had been employed and no agency commission paid to secure the contract. Breach of the clause invites punitive action.

The presumption underlying all these measures is that corruption in defence deals is almost entirely because of the shenanigans of middlemen and agents. In the event, all these measures are designed to deal with the symptoms rather than the root cause of the malady.

The history of past transgressions shows that at least three stages in the acquisition cycle are potentially vulnerable to undue influence and manipulation by unscrupulous elements: Formulation of the services qualitative requirements (SQRs), field evaluation and contract negotiation.

The manner in which the SQRs — the specifications that the equipment to be procured must meet — are drawn up could make or mar a vendor's chances of winning a contract. Non-compliance with even one of the several SQR parameters could result in rejection of a vendor's technical offer but, conversely, a minor tweaking of even one parameter could make the same vendor a frontrunner.

In the first round of tendering, the EH-101 helicopter (later renamed AW-101) offered by AgustaWestland did not make the cut as it was certified to fly only up to an altitude of 4,572 metres against the requirement of 6,000 metres specified in the Request for Proposal (RFP). The tender was later cancelled because of lack of competition. In the revised RFP issued in 2006, the altitude requirement was reduced to 4,500 metres with a view to widening the vendor base and the cabin height of 1.8 metres was added to the specifications. Such is the magic of SQRs that riding on the revised specifications, AgustaWestland not only made the cut but eventually went on to win the contract.

Field trials are the second vulnerable stage in the acquisition process. According to a Comptroller & Auditor General (CAG) report, instead of the AW-101 helicopter which was offered for sale by AgustaWestland in response to the revised RFP, the field (flight) trials were conducted on two other platforms as the AW-101 happened to be at the developmental stage at that point of time.

The contract negotiation is the third most vulnerable stage. The contract negotiation committee (CNC) also negotiates the price with reference to a benchmark price arrived at just before the opening of the commercial offers. Determination of the benchmark, as indeed the entire process of costing, is a weak link in the chain.

The CAG report on the VVIP helicopter deal points out that the benchmark adopted by the CNC was unreasonably high compared with the offered cost of the AW-101 VVIP helicopters as a result of which it cannot be said with certainty that the deal was struck at a reasonable price. This observation does not appear to be too far-fetched.

The kickback in this deal allegedly involves 10 per cent of the contracted price. AgustaWestland was obviously able to include this margin in the offered price and get away with it only because the offer must have appeared reasonable to the CNC with reference to the benchmark price. Obviously, something had gone wrong while fixing the benchmark because of which even the inflated price with a built-in margin for graft appeared reasonable.

It would be absolutely wrong to think that transgressions are rampant or to entertain any doubt about the integrity of the procurement officials. But it would be naive to deny the possibility of middlemen exerting influence at these, and possibly at some other vulnerable stages, in the procurement process. This is what needs to be fixed.

It is not that no efforts have been made in the past. A policy on regulating the role of agents and authorised representatives was laid down by the ministry of defence in 1989 and revised in 2001 but apparently it never got implemented.

It was an impractical policy as it sought to micro-manage the role of agents and authorised representatives by going to the extent of saying that the amount of commission to be paid to them will have to be as per the ministry's guidelines and recorded in the contract. The guidelines also stipulated that the principals will be liable for any transgression by their agents. The policy remained inoperative as the guidelines for regulating payment of commissions never got issued.

The problem is compounded by the lack of transparency and difficulty the vendors face in obtaining even legitimate information from the ministry. No wonder then that the middlemen thrive as they

are able to get not just the legitimate information but much more than that for their principals. Information is power that comes at a cost which the vendors are prepared to pay. Accessibility of officials and smooth flow of information to vendors will break this stranglehold.

At a conclave held in New Delhi in December 2014, the defence minister had said that the government was working on a policy for regulating the activities of the defence agents and probably also blacklisting of vendors. Hopefully, the much-awaited unreleased portion of DPP 2016 will deliver on this promise.

The Tribune
09 May, 2016

Glimpse of Pak's N-vault available online

The details of another Pakistani airbase, believed to be the storage point for air deliverable nuclear weapons, are now available online. A series of pictures reveal the construction of special underground vaults at Masroor airbase, west of Karachi, which were completed earlier this year.

An open source satellite image of March 2016 shows a hardened aircraft shelter adjacent to a taxi track, similar to that seen on airbases. A close examination of this image and comparison with earlier imagery of the same site reveals a "well designed" underground vault system and weapon storage bunkers interconnected with each other, according to a post by an expert in imagery interpretation.



Overhead images from February and April 2015 give a glimpse of the underground vault, believed to have been constructed with foreign assistance. The structure, according to experts, is on the lines of the western Weapons Storage and Security System that includes electronic controls and vaults built into the floors of aircraft shelters for safe storage of special weapons. These are present on many American and NATO military airbases.

Masroor is Pakistan's largest airbase that houses its 32 Tactical Attack Wing comprising four squadrons. It lies to the west of the port city and is about 15 km away from the Pakistan Navy's Mehran naval air station that had witnessed a devastating terror attack in May 2011.

The vault, experts said, enables Pakistan to have nuclear weapons and the required aircraft at operational readiness at all times. Greater secrecy can be maintained since it would not require any significant additional movement of manpower and vehicles, which can be detected. It also ensures survivability of nuclear weapons in case of any first strike.

Vault's dimensions

- It can be used to store at least four nuclear weapons that can be delivered from aircraft like the F-16 or the JF-17 through air launched cruise missiles like the Ra'ad, which has a range of 350 km and can carry a 10-35 kiloton nuclear warhead

US Congress seeks to block aid to Pak

Move To Hold Back \$450M Comes After Islamabad Failed To Take Action Against Haqqani Network

Days after US conveyed to Pakistan that it will have to foot the full \$700 million bill for the eight F-16s it wants to purchase, it now transpires that the US Congress has initiated a move to block \$450 million in aid to Islamabad for failing to “demonstrate its commitment“ and taking action against the Haqqani terror network.

The provision in the National Defence Authorisation Act (NDAA) for the fiscal year 2017, if passed by the Congress, would not allow US government to waive this condition in “national interest.“ The money is part of the Obama administration has \$742.2 million in American aid that the Obama administration has earmarked for Pakistan for fiscal year 2017, in itself a steep drop from the more than \$1.5bn annual aid Washington plied Islamabad with.

According to NDAA 2017 as passed by the House Armed Services Committee last week, of the total amount of reimbursement and support authorised for Pakistan during the period beginning on October 1, 2016, and ending on December 31, 2017, \$450 million would not be eligible for a national security waiver unless the secretary of defence certifies that Pakistan continues to conduct military operations against the Haqqani Network in North Waziristan.

The defence secretary also needs to certify that Pakistan is demonstrating commitment to prevent the Haqqani Network from using North Waziristan as a safe haven and is actively coordinating with Afghanistan to restrict the movement of militants, including the Haqqani Network, along the Pakistan-Afghanistan border.

There is similar certification requirement in the current fiscal 2016 ending on September 31, 2016, but the amount is \$300 million.

Defence secretary has not been able to give necessary certification for the release of such a fund to Pakistan so far.

The House Armed Services Committee says that it will continue to review the reimbursements made to Pakistan and how it comports with the future of US policy , including key counterterrorism and security objectives, in the region. It also asked the secretary of defence to notify the congressional defence committees prior to making any reimbursement to Pakistan for any logistical, military or other support.

It further extends the requirement for the secretary of defence to certify , prior to making any reimbursement to Pakistan, that Pakistan is maintaining security along the Ground Lines of Communications, taking demonstrable steps to support counterterrorism operations, disrupting cross border attacks and countering the threat of improvised explosive devices.

The Statesman
07 May, 2016

US-China Naval Exercise

Shanghai: China will take part in a regular US-led naval exercise starting next month, a top US commander said today, despite tensions over Beijing's territorial claims in the South China Sea.

The United States will host multi-national naval drills called the Rim of the Pacific Exercise (RIMPAC) -- billed as the world's largest -- off Hawaii in June and July. Although the Chinese navy has previously joined the exercises, held every two years, the latest drill comes as the country more

aggressively asserts its maritime claims in Asia, prompting the US to say in March that it was “reassessing” Beijing's participation.

The Pioneer
09 May, 2016

N Korean Leader Says Will Only Use Nuclear Weapons If Attacked

North Korean leader Kim Jong-Un told a rare ruling party congress that his country was a “responsible” nuclear weapons state, with a no first-use policy and a commitment to non-proliferation, State media reported on Sunday.

Speaking to thousands of delegates gathered for the first Workers’ Party congress in more than 35 years, Kim also announced a new five-year plan to boost the impoverished country’s moribund economy and “revitalise” people’s lifestyles.

His remarks yesterday, the second day of the congress, came amid growing concerns that the North might be on the verge of conducting a fifth nuclear test.

Kim had opened the congress with a defiant defence of the nuclear weapons programme, praising the “magnificent... And thrilling” test of what Pyongyang claimed was a powerful hydrogen bomb on January 6.

But his report to the conclave yesterday stressed that North Korea was also a “responsible nuclear weapons state” with an arsenal built for deterrence.

“Our republic will not use a nuclear weapon unless its sovereignty is encroached upon by any aggressive hostile forces with nukes,” he said, according to an English translation of his speech by the North’s official KCNA news agency.

That formula would appear to allow for the use of nuclear weapons against a conventional attack by a nuclear power, but the Korean-language version made it clear that the scenario involved an actual nuclear attack.

Kim also vowed that Pyongyang would “faithfully fulfil” its non-proliferation obligations and push for global denuclearisation.

North Korea withdrew from the global Non-proliferation Treaty (NPT) in 2003 - the first signatory country to ever do so.

Pyongyang’s nuclear weapons doctrine has always been a complex mix of self-defence, deterrence and threat.

Business Standard
08 May, 2016

NASA looks at asteroids to mine for metals

Senior researcher Rupak Biswas says agency now interested in exploiting space resources over traditional stations

Space stations are old hacks for Nasa; now, the agency is looking at exploring asteroids and exploiting their metal deposits.

Rupak Biswas, a Kolkata native and current director of exploration technology at the National Aeronautics and Space Administration's (Nasa) Ames Research Centre, made this revelation during his keynote address at TiEcon 2016. Asteroids are small rocky bodies, some no larger than a stone and others almost as big as a small planet, are found between the orbits of Mars and Jupiter.

According to experts, exploring them makes good business sense as they are depositories of metals, such as iron and copper, whose extraction on Earth will drastically deplete the supply within the next 100 years.

Executives from billion-dollar companies, along with investors, are looking at space as a new frontier for business.

Google co-founder and current chief executive officer (CEO) of Alphabet, Larry Page, started Planetary Resources in 2010. It was then called Arkyd Astronautics. Other founders included Ram Shriram, one of the earliest investors in Google, former Google CEO and current Alphabet chairman Eric Schmidt, and Richard Branson, the founder of the Virgin Group, among others. The most famous is Space X, started by PayPal and Tesla Motors co-founder Elon Musk.

A legal framework has also been created for space explorations. According to the Space Act, 2015, US citizens are allowed to engage in the commercial exploration and exploitation of "space resources", including water and minerals. But biological forms, that is alien beings, if found cannot be exploited.

Deccan Herald
09 May, 2016

Scattered across the universe

Landmark find a rare merger of two massive black holes has unleashed a burst of gravitational wave energy. C Sivaram explains the phenomenon behind it

The ubiquitous presence of several more super massive black holes in different parts of the universe is being uncovered. A recent landmark discovery was made by the Laser Interferometer Gravitational-Wave Observatory's (LIGO) gravitational wave detector was a rare merger of two massive black holes a crore light years away. With their masses several tens that of a solar mass, their merger at light speeds unleashed a stupendous burst of gravitational wave energy.

Just over 15 years ago, evidence was accumulated for the presence of a supermassive black hole that was weighing several 10 lakh solar masses in the centre of the Milky Way galaxy. Stars in the vicinity of the galactic centre were moving at several thousand kilometres per second when approaching this large invisible central mass concentration, whose mass was then deduced.

It turns out that many large galaxies have such supermassive black holes lurking in their core. The velocities of stars, molecular clouds and other objects in their vicinity reach speeds of 20,000 to 30,000 km/s. For instance, the supergiant elliptical galaxy, M87 in the Virgo cluster, has a black hole of at least 10 crore solar masses.

Binary systems

A few crore years ago, we had large numbers of spectacularly luminous objects like quasars, which emit energy several thousand times that of a typical galaxy, from a region hardly the size of our solar system. A typical quasar like 3C 273 has a luminosity that is about 4 lakh crore times that of the Sun. As a result, it emits luminosity in a second the Sun would emit in 10 crore years. These energetic objects are believed to be powered by matter (such as gas and stars) falling on to the supermassive black holes that have a mass that is 100 crore times or more than the solar mass.

The huge gravitational potential energy (associated with these compact objects) that is converted to kinetic energy heats up the gas several 10 lakh degrees making them glow into X-rays and other energetic radiation. Once they have consumed all or most of the surrounding matter, they can become dormant. The supermassive black hole in our galaxy's centre is right now in this dormant state. However, occasionally, a passing star or planet could be tidally split by the black hole giving rise to energetic flares.

Several binary systems of supermassive black holes are also known to exist. One such is the OJ 287, a binary system of two supermassive black holes, where one weighs 18 crore solar masses and the other, 10 crore solar masses. They orbit each other with just a 12-year period, implying that they could merge in less than 1,00,000 years. Such a merger would unleash energy that is several lakh times more intense than the present LIGO event, in gravitational waves.

However, the much lower frequencies would make this easily detectable only in future space borne gravitational wave detectors, like the Laser Interferometer Space Antenna (LISA), which consists of three spacecrafts in an equilateral triangle, separated by more than 50 lakh km. While this may be the case, we can also witness the merger of many galaxies through large telescopes. And when they merge, their respective supermassive black hole could also merge. The Milky Way and our near large neighbouring galaxy, the Andromeda is expected to merge in 3 to 4 crore years.

The recent discovery of a supermassive black hole with an estimated mass of 1,700 crore solar masses in a smaller galaxy like NGC 1600 was somewhat of a surprise as such black holes were expected to mainly lurk in huge star rich galaxies or gigantic galaxy clusters.

Tracing the origins

Sometime back, a supermassive black hole weighing 1,200 crore solar masses was discovered in the much earlier epoch of the universe, hardly 100 crore years since the Big Bang expansion. This implies that this gigantic black hole is almost 1,300 crore years old, almost the age of the universe. Many such black holes have been found at such large distances.

How could such supermassive black holes form so soon after the universe originated? Possibly, a generation of several thousand massive stars formed in a cluster evolved to become individual black holes in a few lakh years, all of which then merged together. Two or more body interactions or encounters in a dense cluster of objects such as stars can make them all collapse gravitationally together to form a supermassive black hole. However, there is no universally accepted model for the origin of these supermassive black holes.

It would be true to say that much less is known about their origins. Interestingly, in 1916, Karl Schwarzschild gave the first exact solution to the Einstein field equations for general relativity. Known as the Schwarzschild solution, this solution first indicated the possibility of black holes. When the radius of the collapsing massive star reaches the Schwarzschild radius (for a solar mass this is just 3 km), a trapped surface forms and all matter and radiation is confined for ever inside this surface (also called one-way membrane). The term 'black hole' to objects with gravitational collapse was coined by John Wheeler in 1968.

Detailed study

Unlike white dwarfs and neutron stars, which have upper mass limits of 1.5 and a little over 2 solar masses respectively, there is no upper limit for the mass of a black hole. Several hundred crore solar mass heavyweights are being discovered all over the universe. The Sun would only end up as a white dwarf. Only stars that begin the life with 30 or more solar masses could end up as black holes. In our own galaxy, several dozens of such mass black holes are known, and which are strong periodic x-ray sources like Cygnus X-1. Several interesting properties of black holes are being studied in detail.

They are indeed the biggest powerhouses on the universe. The supermassive ones powering the quasars generate several lakh crore more power than the Sun and in many cases, matter is ejected in jets of 10 lakh light years long. The origins of these, some of which have recently been shown to be present 1,300 crore years ago, continue to be a mystery, and challenge our understanding. And with the use of large telescopes, we would know more about black holes and uncover the mysteries behind them as well.

‘Black hole 660 mn times bigger than Sun’

Precise Measurement Arrived At Using High-Resolution Data

The mass of a supermassive black hole at the centre of a nearby giant elliptical galaxy is 660 million times greater than that of the Sun, astronomers have found.

Researchers from the University of California, Irvine (UCI) and colleagues derived a highly precise measurement of the mass of the black hole using high-resolution data from the Atacama Large Millimetre/submillimetre Array (ALMA) in Chile.

They were able to determine the speed of a disk of cold molecular gas and dust orbiting the supermassive black hole at the heart of galaxy NGC 1332. The researchers calculated the black hole's mass to be 660 million times greater than that of the Sun.

This is among the most precise measurements for the mass of a galaxy's central black hole, scientists said.

“This is the first time that ALMA has probed the orbital motion of cold molecular gas well inside the gravitational sphere of influence of a supermassive black hole,” said Aaron Barth from UCI. “We are directly viewing the region where the cold gas is responding to the black hole's gravitational pull,” said Barth.

To calculate the mass of a black hole in a galaxy's centre, astronomers must be able to measure the speed of something orbiting around it, he said. “For a precise measurement, we need to zoom in to the very centre of a galaxy where the black hole's gravitational pull is the dominant force. ALMA is a fantastic new tool for carrying out these observations,” said Barth.

Dense, cold clouds of interstellar gas and dust do not emit visible light, but glow brightly at wavelengths that ALMA can observe. Researchers trained ALMA's observational powers on NGC 1332, a giant elliptical galaxy in the southern sky 73 million light-years from Earth. Elliptical galaxies are known to contain massive central black holes.

Atomic oxygen detected in Martian atmosphere

Scientists have detected atomic oxygen in the atmosphere of Mars for the first time since the last observation 40 years ago.

These atoms were found in the upper layers of the Martian atmosphere known as the mesosphere.

Atomic oxygen affects how other gases escape Mars and therefore has a significant impact on the planet's atmosphere.

An instrument onboard the Stratospheric Observatory for Infrared Astronomy (SOFIA) detected only about half the amount of oxygen expected, which may be due to variations in the Martian atmosphere.

Scientists will continue to use SOFIA to study these variations to help better understand the atmosphere of the Red Planet.

“Atomic oxygen in the Martian atmosphere is notoriously difficult to measure,” said Pamela Marcum, SOFIA project scientist.

“To observe the far-infrared wavelengths needed to detect atomic oxygen, researchers must be above the majority of Earth’s atmosphere and use highly sensitive instruments, in this case a spectrometer. SOFIA provides both capabilities,” Marcum said.

The Viking and Mariner missions of the 1970s made the last measurements of atomic oxygen in the Martian atmosphere.

These more recent observations were possible due to SOFIA’s airborne location, flying between 37,000-45,000 feet, above most of the infrared-blocking moisture in Earth’s atmosphere.

The advanced detectors on one of the observatory’s instruments, the German Receiver for Astronomy at Terahertz Frequencies (GREAT), enabled astronomers to distinguish the oxygen in the Martian atmosphere from oxygen in Earth’s atmosphere.

SOFIA is a Boeing 747SP jetliner modified to carry a 100-inch diameter telescope. It is a joint project of NASA and the German Aerospace Centre.

The research was published in the journal *Astronomy and Astrophysics*.

Deccan Herald
09 May, 2016

Students mix art with science on simulated Mars mission

Grand Forks: Three University of North Dakota graduate students, including an Indian, emerged from their simulated space mission to Mars tired, happy and longing for spicy food.

"Smells like fresh air," Carolyn Newton said, after following Brittany Zimmerman and Poonam Josan out the door of the school's inflatable lunar mars habitat. They spent 10 days performing several experiments relating primarily to how the isolation of space missions affects cohesion of the crew.

They also managed to add some entertainment to the science. They shot two music videos, to "Hands to Myself" by Selena Gomez, and "Space Oddity" by David Bowie.

They made tacos to celebrate Cinco de Mayo. They baked a cake that included in frosting the names of family members and friends who had birthdays while they were on Mars. "And we danced a lot," Zimmerman said.

It was the third mission aboard the school's inflatable habitat and the first with an all-woman crew. The inaugural study in 2014 also lasted 10 days. That was followed in 2015 by an experiment that went for 30 days.

Zimmerman, 26, Newton, 25, and Josan, 23, say they could have made 30 days without any major issues. Although two of them were already good friends, they had a successful trial run during one week together at a meeting in Alabama. "So we knew we wouldn't kill each other," Newton said, laughing.

In both of the previous studies, the students left the habitat on occasion to test an electrical rover and space suits. The three women didn't see sunlight. They did interact with Sophie Orr, the mission controller, and participated in Skype sessions with elementary school students whose favorite question was whether the trio believed in aliens.

Each of them had unique roles on the mission. Newton, from Weeki Wachee, Florida, studied how personality and humor affect stress in confinement.

Moore's law runs out of room; hunt for successor

By John Markoff

For decades, the computer industry has been guided by a faith that engineers would always find a way to make the components on computer chips smaller, faster and cheaper.

But a decision by a global alliance of chipmakers to back away from reliance on Moore's Law, a principle that has guided tech companies from the giant mainframes of the 1960s to today's smartphones, shows that the industry may need to rethink the central tenet of Silicon Valley's innovation ethos.

Chip scientists are nearly at the point where they are manipulating material as small as atoms. When they hit that mark within the next five years or so, they may bump into the boundaries of how tiny semiconductors can become. After that, they may have to look for alternatives to silicon, which is used to make computer chips, or new design ideas in order to make computers more powerful.

It is hard to overstate the importance of Moore's Law to the entire world. Despite its official sound, it is not actually a scientific rule like Newton's laws of motion. Instead, it describes the pace of change in a manufacturing process that has made computers exponentially more affordable.

In 1965, Intel co-founder Gordon Moore first observed that the number of components that could be etched onto the surface of a silicon wafer was doubling at regular intervals and would do so for the foreseeable future.

When Moore made his observation, the densest memory chips stored only about 1,000 bits of information. Today's densest memory chips have roughly 20 billion transistors. Without those remarkable improvements, today's computer industry wouldn't exist. The vast cloud-computing data centres run by companies like Google and Amazon would be impossibly expensive to build. There would be no smartphones with apps that allow you to order a ride home or get dinner delivered. And scientific breakthroughs like decoding the human genome or teaching machines to listen would not have happened.

Signalling their belief that the best way to forecast the future of computing needs to be changed, the Semiconductor Industry Associations of the United States, Europe, Japan, South Korea and Taiwan will make one final report based on a chip technology forecasting system called the International Technology Roadmap for Semiconductors.

Nearly every big chipmaker, including Intel, IBM and Samsung, belongs to the organization, though Intel says it is not participating in the last report.

To replace what the semiconductor industry has done for nearly 25 years, a professional organization called the Institute of Electrical and Electronics Engineers announced Wednesday that it will create a new forecasting system, called the International Roadmap for Devices and Systems, that is intended to track a wider range of computer technologies.

One technology could be so-called quantum computing, a cutting-edge reimagining of how computers work that taps quantum physics - a branch of physics that explains how matter and energy interact. Another could be graphene, a form of carbon and an alternative to silicon that could produce smaller and faster transistors that use less power.

"The end of Moore's Law is what led to this," said Thomas M. Conte, a Georgia Institute of Technology computer scientist and co-chairman of the effort to draw up a new set of benchmarks to replace the semiconductor reports. "Just relying on the semiconductor industry is no longer enough. We have to shift and punch through some walls and break through some barriers."

Telescopes, projectors set for kids to watch mercury transit

New Delhi: School students in the national capital are gearing up to observe a rare transit of mercury across the face of the sun. Schools are making arrangements for telescopes with filters, projection methods and other equipment in playgrounds to watch the celestial event.

The transit will take place on Monday afternoon when mercury, the planet closest to the sun, will be seen as a small black dot.

Schools in the Capital have made special arrangements for the event which will take place between 4.15pm and 6.30pm.

At Tagore International School, Vasant Vihar, a telescope has been installed in the playground and students have been asked to come wearing their uniform to observe the transit. The school has connected the telescope with a projector so that students can see it in the auditorium too.

“We will be conducting an observation session for the transit of mercury on May 9 in collaboration with SPACE. Students can come with their families to witness the event from 4.15pm to 6.30pm... Using the projector we will show it to students who want to sit inside,” said Madhulika Sen, principal of the school.

Some students are also planning to observe the event at home with friends. “I am excited for it. I have always been excited over all kinds of space events, even if it is a lunar eclipse. I will be calling some of my friends over, and observe the transit through a telescope at my home and project it on the screen,” said Manan Bhatia, a student of Class 10.

SPACE, an organisation working for the development of science and astronomy in the country, is conducting mercury transit observations for schools and the public. Various branches of GD Goenka Public School, including Model Town and Sarita Vihar, will make arrangements for the observation. Other schools such as Indraprastha International School, Dwarka, The Indian Heights School, Dwarka and Bal Bharati Public School, Pitampura are also organising viewing of the phenomenon.

The last three transits occurred in 1999, 2003 and 2006. The phenomenon is usually seen in May or November. The next transit will happen on November 11 in 2019. The one in 2019 won't, however, be visible from India. Only in 2031, will the transit be seen from the country.

Deccan Herald
09 May, 2016

From Silicon Valley of tech to recycling

By Matt Richtel

As the world's population grows, people are consuming more, creating more trash. Countries are looking for ways to deal with it in a way that puts less stress on the environment

Robert Reed, who is enjoying a surprising career turn as a busy tour guide at the latest hot spot here, stood smiling one recent sunny morning before 10 foreign dignitaries and journalists. They included the mayor of Genoa, Italy, and the general consuls from Italy, Canada and Switzerland.

Each visitor wore a sport coat and tie, and a yellow safety vest to ensure they wouldn't be run down by garbage trucks.

"It's always nice to meet new friends from around the world," Reed said in his introduction, beaming. "In fact, we've had visitors from 58 countries." Behind him stood a warehouse filled with

a 630-tonne mountain of refuse being pecked by sea gulls. "Come on," Reed continued, "I'll show you the bottles, cans and paper."

You won't find San Francisco's Pier 96 in any travel guidebook but it has become a must-see destination for visitors from Afghanistan to Vietnam. They've come to explore Recology - Reed is a spokesman - one of the world's most advanced recycling plants, a deafening, Rube Goldberg system of conveyor belts and sorters that, with the help of human hands, untangles a 30-foot hill of debris collected by trucks every day from across the city.

"It's like a modern art installation," marveled Mauro Battocchi, the Italian consul general here. "So fabulous - the people and machines and objects of our lives all working together."

Foreign officials and others come here to pick up tips on how to handle their own mushrooming piles of garbage back home. As the world's population grows, people are consuming more, creating more trash, and countries are looking for ways to deal with it in a way that puts less stress on the environment.

Many are part of a growing movement sometimes called Zero Waste or the Circular Economy. It entails trying to eliminate tough-to-recycle items like flimsy plastic bags and also pioneering new ways to recycle or compost everything else. Often, cities around the world have led the way, including Portland, Oregon; Seattle; and Milan, as well as the Basque region in Spain. That has given rise to a trash tourism circuit.

Recycling sites "don't have to market themselves," said Jessica Morrison, an environmental policy analyst for the Fraser Valley Regional District in British Columbia, who helped organise a tour in 2014 for a dozen officials to visit a recycling plant in Montgomery, Alabama. "People like us are knocking down the doors."

And the interest remains despite strained recycling economics caused by falling oil prices. That has driven down the cost of new commodities, like plastic, and, in turn, the price of recycled materials sorted and sold by companies like Recology.

More broadly, sceptics contend that the energy and other resource costs required to recycle some items are not worth the investment. But the visitors to Recology tend to be among the converted, who believe that incineration and landfilling carry their own devastating, long-term ecological costs.

Recology, a private company, gets most of its operating budget from the monthly fee of \$35.18 it charges each household for residential trash, recycling and compost.

Reed says the Recology operation is cost effective, at least by one measure: San Franciscans pay the same amount or less than residents of other Bay Area big cities do for curbside pickup, but they compost or recycle a greater percentage of their garbage.

This success is partly why San Francisco's plant has achieved something approaching celebrity status, with numerous write-ups, including a big spread in France's *Le Monde* newspaper; visits from some 50 film crews, mostly for television; and roles in 2 major movies: the 2012 documentary "Trashed," featuring British actor Jeremy Irons, and the popular new French documentary "Demain," about solutions to global problems.

San Francisco has become a recycling model for some cities, including Paris. The city's deputy mayor, Mao Peninou, visited in October 2014 and said Recology's composting now serves as a proof-of-concept for new Parisian efforts along the same lines.

Recology continues to draw visitors even though it is "not state of the art," said Jack Macy, the Zero Waste coordinator for San Francisco. He acknowledged that other places have pulled ahead with

newer technology, and noted that San Francisco itself originally drew inspiration from Germany, which was recycling and beginning to compost in the 1980s.

Today, San Francisco diverts around 80% of waste away from landfills, putting it among the elite recycling cities.

San Francisco also has a world-class reputation for its composting processes, which turns food waste into fine, coffee-like grounds that is sent to farms as fertiliser.

Tourist site

The Recology tour starts at Pier 96, an industrial hub at the city's southern edge, inside the doors of a cavernous, 200,000-square-foot warehouse. The first step is the separation of all recyclable garbage, with tractors scooping up piles and pouring them onto 5 conveyor belts. It travels up to the first culling level, where human "classifiers" wearing masks, gloves and aprons pull out the biggest pieces of cardboard and drop them down shoots where they are baled.

A few feet later, everything else bustles up a fast-moving ladder that carries the lighter paper to the top, while heavier cans and bottles fall back down. The bottles and cans are then divided with magnets that pull the cans off the conveyor belt.

Farther along, an optical sorter uses a beam of light to determine which plastic bottles are clear and which ones are coloured. The clear ones are flipped off the belt by puffs of air.

Reed likes to explain that Recology is a private, employee-owned company that has created around 210 jobs, most of them drawn from Bayview-Hunters Point, one of the city's poorest neighbourhoods, where the plant is.

"It's the Silicon Valley of recycling," said Christian Forthomme, chief executive of RealChange, a Bay Area-based consulting firm that brings foreign executives and officials to visit Silicon Valley, including 4 delegations to Recology in the past 6 years.

One group included Bruno Hug de Larauze, president of the Chamber of Commerce in Brittany, France, who likens Recology to an Uber or Airbnb for waste that shows how technology and capitalism can change the world.

"It was the wow effect. It was incredible," he said of his first visit, and added with a laugh, "It smelled, let me be frank."

After the tour with Genoa's mayor and the consuls general, Reed organised a lunch of salad with French and Italian cheeses. As they sat down to eat, Reed raised the possibility of another destination for the group.

"I hope you'll get a chance to visit our composting facility," he told the dignitaries. "But we probably don't want to talk about that while you're eating."

Deccan Herald
07 May, 2016

Largest particle smasher set for big run

Geneva: The world's most powerful proton smasher is preparing for its biggest run yet which scientists hope will uncover new particles that could dramatically change our understanding of the Universe.

"We are exploring truly fundamental issues, and that's why this run is so exciting," physicist Paris Sphicas told AFP at Europe's physics lab, CERN, last week.

Late last year, before CERN shut down its Large Hadron Collider (LHC) for a technical break, two separate teams of scientists said they had discovered anomalies that could possibly hint at the existence of a mysterious new particle.

The discovery of a new particle could prove the existence of extra space-time dimensions, or explain the enigma of dark matter, scientists say.

The LHC, housed in a 27-kilometre (17-mile) tunnel straddling the French-Swiss border, has shaken up physics before.

In 2012 it was used to prove the existence of the Higgs Boson -- the long-sought maker of mass -- by crashing high-energy proton beams at velocities near the speed of light.

A year later, two of the scientists who had in 1964 theorised the existence of the Higgs, also known as the God particle, earned the Nobel physics prize for the discovery.

The Higgs fits in with the so-called Standard Model -- the mainstream theory of all the fundamental particles that make up matter and the forces that govern them.

But the anomalies, or "bumps", seen in the data last December could indicate something completely new.

Going beyond the Standard Model would "mean that there is yet another unbelievable idea out there. Something that is totally unthinkable," Sphicas said.

The LHC, he said, could unveil whole new dimensions, help explain dark matter and dark energy, of which we have no understanding but which together make up 95 percent of the universe.

The giant lab might also prove the exotic theory of supersymmetry, SUSY for short, which suggests the existence of a heavier "sibling" for every particle in the universe.

The unexpected excess pair of photons spotted last year could be a larger cousin of the Higgs, according to one theory.

"Who knows, maybe there's a whole Higgs family out there," Sphicas said.

But to determine whether the observed data "bump" is merely a statistical fluctuation or could actually be the first cracks in the Standard Model, much more data is needed.

Scientists had been gearing up to resume experiments at the LHC this week, but the plans were delayed after a weasel wandered onto a high-voltage electrical transformer last Friday, causing a short-circuit.

CERN told AFP that experiments were now expected to get underway next week.

When the massive machine comes back online, it is expected to quickly pile up astounding amounts of data for scientists to pick through for clues.

"If we have nature on our side, I think we will discover new particles and open a new road for physics beyond the Standard Model," said Frederick Bordry, CERN director for accelerators and technology.

The Indian Express
08 May, 2016

Atomic Force Microscopes get a technology boost

Developing a method to replace the needle in Atomic Force Microscopes, used to observe nano-sized particles, without changing the spring in the structure.

As more uses are found for nano-sized particles, there is an increasing need to 'see' and 'feel' them in order to understand their properties and behaviour better. For decades, electron microscopes have

been used to observe atomic-sized particles. These days, however, Atomic Force Microscopes (AFM) are gaining popularity as they have certain advantages over the electron microscope.

Unlike electron microscopes that send electron beams to ‘illuminate’ the object under observation, and thus ‘see’ it, AFMs use a very sharp needle, with dimensions of the order of a few nanometres, to ‘feel’ the object and develop its geometry. AFM takes a blind man’s approach to sense the shape of an object, touching and feeling it with fingers (needle) to understand what it looks like. Only, it does it with a lot more precision. Human fingers would be unable to get around all the curves and crevices of every object, but the AFM’s needle can. By sensing the variations in the mechanical forces during its interaction with the object, and subsequently controlling the force, it is able to very accurately ‘see’ how the small particles look like and what exactly their structure is.

AFMs have another big advantage over electron microscopes. They do not necessarily require vacuum conditions to operate. AFMs can work in air as well as in liquid medium.

But AFMs have a problem in their needles. Their tip is very sharp and it gets blunted or broken very frequently, and needs to be changed. The way AFMs are currently built, replacement of the tip is not a very smooth process. The tip is attached to a spring-like structure that has integrated sensors to measure the mechanical forces. Right now, replacing the tip means replacement of the needle as well as the spring. It is done manually and one needs to wait for about half-an-hour after the replacement, to resume operation. In industrial set-ups, this is a big hassle.

New instruments have emerged in the market that allow automatic replacement of needles. But for industries that have been using older AFMs, buying entirely new instruments can be a costly affair.

It is in this area that our work can have some significance. We have developed a method to replace the needle without changing the spring. More importantly, existing AFMs can be retrofitted with this technology, so buying new instruments won’t be necessary. This alone can potentially bring down the cost of automatic replacement by a factor of 100.

What we have done is to introduce a micro-gripper between the spring and the needle. This micro-gripper is actually a tiny liquid droplet. It is about a few picolitres (10⁻¹² litres) in volume. It acts like an adhesive to which the needles can get attached. A liquid droplet might not seem to be an ideal adhesive to hold anything firmly in place, but the relative magnitudes of forces operating at the micro-scale are very different from what we experience. At that scale, the surface tension of the liquid is very strong and good enough to hold the needle.

We have also developed a mechanism for detaching the needle from the micro-gripper without disturbing any other part of the instrument. This ability to attach and detach the needle to and from the micro-gripper presents an effective way of replacing the needle without needing to change the spring.

We are not the first ones to attempt replacement of needles in the AFM without disturbing its other parts. But we are the only ones to have shown that it can be done in ambient conditions — others have been able to achieve this only in vacuum — and can also be retrofitted to older instruments. The replacement process is still manual and we are currently working on its automation.

Business Standard
08 May, 2016

Artificial vision device might help nearly blind people

The OrCam artificial vision device uses a camera attached to any pair of glasses to recognise objects and then communicate that to the wearer through an earpiece

People with very poor vision may benefit from using a device that recognises faces, money and text, a small study suggests.

The OrCam artificial vision device uses a camera attached to any pair of glasses to recognise objects and then communicate that to the wearer through an earpiece, according to a report in JAMA Ophthalmology.

"If patients have advanced eye disease which is beyond medical and surgical therapy and they have lost their ability to read, I think the OrCam is at least one instrument they may wish to use to be more independent," said senior researcher Mark Mannis, of the University of California Davis Eye Center in Sacramento.

About two per cent of people in the US have low vision, which is usually caused by eye diseases like age-related macular degeneration and glaucoma, according to the National Eye Institute (NEI). The condition may also be caused by injuries and birth defects. The OrCam device is "really a remarkable innovation", Mannis told Reuters.

For example, he said, a person can "look" at a person entering a room, and the OrCam device will tell the wearer who it is. It can also read the text on a page, or tell people the value of paper money.

For the study, Mannis and his colleague Elad Moisseiev recruited 12 legally blind people between July and September 2015. The average age was 62.

Participants completed a 10-item functionality test, which included - among other daily life activities - reading an email on an electronic screen, recognising money, reading a newspaper, recognising different brands and reading distant signs.

They completed the functionality test once without vision aids, once with any vision aids they had available and then with the OrCam. Each participant received a 90- to 120-minute training session on the OrCam.

The average functionality score without vision aids was 2.5 out of a possible 10. That score jumped to 9.5 once the participants put on the OrCam devices.

After a week of using the OrCam devices, the participants returned to the lab to complete the functionality test again. Their score increased to an average of 9.8.

"Pretty much across the board there was tremendous improvement in their ability to perform," said Mannis.

At the end of the study, the devices were returned to OrCam's manufacturer, which did not fund the research. But Mannis said several of the participants have acquired the device and are using it daily. The device costs between \$2,500 to \$3,500.

Mannis said there are other types of character converters, but they weren't able to test those devices. The OrCam, however, is innocuous and inconspicuous compared to other bulky devices, he said. "It provides a patient with severe disability with an incredible amount of independence," he said.

The Times of India
07 May, 2016

‘Starving’ cancer cells key to new treatment, says study

“Starving“ cancer cells of a vital supply route that they use to obtain nutrients could lead to new safer treatments to stop the growth of tumours, a new study has found. Scientists blocked gateways through which the cancer cells were obtaining the amino acid glutamine and found the cells almost completely stopped growing.

“This is likely to work in a wide range of cancers, because it is a very common mechanism in cancer cells,“ said Stefan Broer from the Australian National University (ANU). “Better still, this should lead to chemotherapy with much less serious side-effects, as normal cells do not use

glutamine as a building material," said Broer. "Crucial white blood cells, which current treatments damage, could be spared, and it could cut out the hair loss that chemotherapy causes," he said.

There are 917 different types of cancer currently identified, and many cures work only for a single type of the disease or become ineffective as cancers develop resistance to chemotherapy. However, researchers said the new approach would be less prone to resistance because blocking the glutamine transport mechanism is an external process that would be hard for cancer cells to get around. They first attempted a glutamine blockade by genetically altering cancer cells to disable their main glutamine transporter. However, it was not very effective, Broer said.

The Times of India
08 May, 2016

Scientists warn of global sleep crisis

Middle-aged men get less shut-eye, reveals data from app

Social pressures are forcing people to cut back on their sleep, contributing to a 'global sleep crisis', according to a new study based on research collected through a smartphone app.

It enabled scientists from the University of Michigan to track sleep patterns around the world - gathering data about how age, gender and the amount of natural light to which people are exposed affect sleep patterns in 100 countries -and better understand how cultural pressures can override biological rhythms. "The effects of society on sleep remain largely unquantified," says the study published Friday in the journal *Science Advances*. "We find that social pressures weaken and/or conceal biological drives in the evening, leading individuals to delay their bedtime and shorten their sleep."

Lack of sleep is mostly affected by the time people go to bed, the study found. Middle-aged men get the least amount of sleep, less than the recommended seven to eight hours. Women sleep 30 minutes longer than men on average by going to bed earlier and rising later, and that people exposed longer to natural light every day often go to bed earlier.

It also found that age was the main factor determining amount of sleep.

The research is based on data collected through the free smartphone app *Entrain*. Scientists asked some 6,000 people, 15 years and older to send anonymous data about sleep, wake-up and lighting environment, enabling the scientists to obtain a large amount of data about sleep patterns worldwide.

The app also asks users to provide information about their age, gender, country and time zone. The study found that the average amount of sleep in the world varies from a minimum of seven hours 24 minutes in Singapore and Japan, to a maximum of eight hours 12 minutes in the Netherlands.

Although a difference of 48 minutes may seem inconsequential, a lack of sleep for half an hour can have significant effects on cognitive function and health, the researchers said.

Chronic lack of sleep increases the risk of obesity, diabetes, hypertension and cardiovascular disease, according to the CDC.

Sleep, snoring linked to breast cancer survival

Women diagnosed with breast cancer who sleep less than the recommended seven hours per night, and snore frequently are more likely to die from the disease, a new study has found. Breast cancer patients who reported sleeping six hours or less per night and snoring five or more nights per week before their diagnosis were two times more likely to die from breast cancer than patients who reported sleeping seven to eight hours per night and rarely snored.

Web browsers' future belongs to tech firms

Changes made to browser standards will make it harder for new companies to disrupt the status quo and cement the power of Google and Apple, writes Cory Doctorow

Ten years ago, there were two web browsers that anyone cared about: Netscape and Internet Explorer.

Each browser vied for favour with web publishers, begging them to optimise their pages for one browser or the other. The browser with the most pages would, the browser companies thought, win the most users and thus the web, and so the first browser wars were fought to win over publishers.

But that fight came at the expense of users, because the one thing publishers of web 1.0 really wanted was pop-up ads - and the more obnoxious the better. Remember ads that showed up one pixel square and ran away from your mouse-pointer if you tried to close them, while auto-playing sound adverts? And those weren't even the worst! Browsers didn't have pop-up blocking - they had pop-up "enhancing". Any company that blocked pop-ups would be de-optimised by the big publishers and doomed to obscurity.

Then came Mozilla - a not-for-profit, openly developed web browser that didn't care about publishers. It cared about users. It blocked pop-ups by default, understanding that users wanted to see the publishers' sites but not their pop-ups, and if Mozilla had enough users, it wouldn't matter if publishers hated them.

Skip to 2016 and the web is a very different place. The World Wide Web Consortium, the not-for-profit organisation that creates the web's open technology standards, made a brave effort to tame the web's lunatic proprietary HTML extensions that paid off, making those 'Best viewed with' badges on websites a relic of the past. All the browsers have changed, too: Netscape vanished, Mozilla begat Firefox, Internet Explorer morphed into Edge, and Apple's Safari and Google's Chrome grew from obscure side projects to two of the dominant forces on the web.

Ten years is an eternity in web years, and in a decade, everything can change.

However, that change might be coming to an end thanks to the existing web browser vendors and the World Wide Web Consortium. Since 2013 they've been working with Netflix, the cable industry, and the MPAA to create a standard to limit which browsers can display W3C-standardised data. It could mean goodbye to 'just works' and hello again to 'best viewed with'.

The W3C's project is called EME, for encrypted media extensions. This is a way of restricting the playback of video in browsers, and for a given EME version to work, it has to have the blessing of the entertainment giants. EME is designed to allow publishers to invoke global copyright rules. Thus, companies that try to receive EME-locked videos without permission face legal shutdown.

It's exactly the opposite of all the other W3C standards, which spelled out how to build a browser that could display any of the standards-defined information that web publishers emitted. By contrast, EME describes how to tune in video streams - only if you can convince media companies to give you permission to be a browser.

If other W3C standards worked like EME, there would have been no Mozilla. Now that EME is a standard, we may never get another Mozilla-like eruption of new browsers - browsers that cater to users, not corporations. New browsers make a niche for themselves by taking the side of users over publishers. With EME, publishers get to decide which browsers can and can't display their wares, ending this cycle of renewal.

The World Wide Web Consortium spent more than two decades making open standards that let anyone make a web browser and compete for users' loyalty. Why would it suddenly change sides and design a standard that will require all future browsers to get permission from a small group of entertainment companies in order to play back video streamed according to W3C standards?

It's because they think the web is cooked.

When you ask the W3C to defend their decision to standardise DRM - digital rights management or digital restrictions management, the technical term for EME-style tools - they tell you that the web giants are going to make DRM with or without W3C help. By agreeing to give them a standardisation forum where they can conspire without the risk of antitrust action, the W3C gets to beg them to make the DRM a little more user-friendly.

That makes sense, if you think that Chrome, Safari, Google and Edge are the last browsers we'll ever see. If you think that the winner-takes-all era of the web has arrived - when giants can no longer be overturned by upstarts. It's a self-fulfilling prophecy. Make it easy for today's crop of web giants to sue any new entrants into oblivion and you can be pretty certain there won't be any new entrants.

It marks a turning point in the history of those companies. Where once web giants were incubators for the next generation of entrepreneurs who struck out and started competitors that eclipsed their former employers, now those employees are setting the stage for a future where they can stay where they are, or slide sideways to another giant. Forget overturning the current order, though. Maybe they, too, think the web is cooked.

The world has entered the age of giants: giant media companies, giant banks, giant tech companies. Where giants tread, mere mortals tremble, and hope for a day when they will be cut down to size. With the W3C acting like they're a permanent fact of life, that day may never come.

Deccan Herald
08 May, 2016

Agents of change

Ever imagined life without a cell phone or the Internet? Or, even paper and the electric kitchen blender? Well, some inventions have changed the very fibre of our lives, for all time. Lakshmi Palecanda takes a look at some inventions that have helped shape the modern world

Recently, a man who'd just recovered his misplaced cell phone told me, "Madam, it doesn't matter if you lose your wife or kids. But if you lose your cell phone, you're finished." I knew just how he felt.

However, a phone wouldn't have been that important to someone, 30 years ago, would it? For that matter, the thought of a camera or a music player in a telephone would have made us scoff (remember our clunky rotary dial phones?). Not possible, we'd have said.

Well, inventions have made these possible. And there are more inventions, both useful and useless, coming out each day, as people feel compelled to act on strange and funny ideas that they have for making life easier and more fun. In fact, some inventions happen in crazy ways.

In the 1870s, Constantin Fahlberg, a Russian chemist, was working on the reactivity of coal-tar derivatives at Johns Hopkins University in the USA. One night, he returned home and was eating dinner rolls, when he realised that they tasted very sweet. Rolls normally taste bland, and the recipe hadn't been changed; it was something on his hands that had made everything sweet. He ran back to the lab and tasted all the vials, beakers and dishes that he had used for his experiments, and found the source, an overboiled beaker. The substance was the artificial sweetener, saccharin.

While saccharin may not be the most important invention in the world, think of this mad scientist who did everything wrong, like leaving the lab without washing his hands properly, and then

(horrors) actually tasting various strange compounds! This is when we see that inventing is a strange beast, and inventors are not really 'normal people'. When most of us ask "Why?", they ask "Why not?" And while the majority accepts the status quo, they ask "How?" and "What if...?" They are not afraid to step into the dark, vast and mysterious world of possibilities.

Let us first examine the idea of inventions themselves. There are very few inventions in this world which have been the sole work of one person. For example, who invented the television? John Logie Baird holds the patent for the apparatus for transmitting views or images to a distance (1929) and the first colour television (1933), but it is really Philo T Farnsworth who patented the video camera tube, the heart of today's television. However, the story of the invention actually began with the introduction of the facsimile machine in 1846. After that came a number of discoveries and inventions that helped Baird and Farnsworth come up with their own inventions. So, while we can name the actual inventor in some cases, we can only point out the patent holder on others. (By the way, producer Darryl Zanuck of 20th Century Fox predicted in 1946 that "Television won't last because people will soon get tired of staring at a plywood box every night.")

Now, let's turn our minds to some inventions that are extremely significant to us. Mind you, we're not going to talk of the most important inventions, period, but those that are most important to the common man today. And yes, this is where controversies erupt. Yes, the cell phone and the Internet are wonderful inventions, but we can live without them; however, without an LPG cylinder for cooking, we can't cook food, therefore we can't eat. Does this mean that we should rate the LPG cylinder above the Internet?

Getting down to basics

Well, one way to reduce the confusion is to categorise inventions according to their fields. For example, in the category of communication, the greatest inventions have to be the Internet and the World Wide Web, right? The initial idea of the Internet is credited to Leonard Kleinrock, while Tim Berners-Lee is honoured as the inventor of the World Wide Web. But the cell phone is much more indispensable to us, isn't it? Well, the first handheld mobile phone was invented by Martin Cooper who made the first call on April 3, 1973, using a device which weighed 1.1 kg and measured 23 cm long, 13 cm deep and 4.45 cm wide. Today, the device has come a long way, with some cell phones being less than 5 mm thick.

Here's a thought - the Internet would have been of no use if writing itself had not been invented. Language developed around 35,000 BCE, but written language was invented in Sumer, Mesopotamia between 3500 and 3000 BCE. The alphabet was created in Egypt and Crete and disseminated by Phoenicians (the people who lived in modern-day Lebanon, Israel and Syria). The first written document recovered is The Epic of Gilgamesh (1300-1000 BCE). Mahabharata is estimated to have been written around 400 BCE.

Writing leads us to paper which was first invented by the Chinese. Before this, people used clay, papyrus, wood, slate and prepared animal skin or parchment. T'sai Lun invented the paper-making process in around 105 AD. A German named Johannes Gutenberg invented the first printing press in Mainz, Germany, in 1440. This led to rapid diffusion of knowledge through books, pamphlets and other similar methods. Following this, the first printed weekly newspaper called Relation was published in Antwerp by Johann Carolus in 1605. And in case you were wondering, in 1938, Jewish-Hungarian journalist Laszlo Biro invented the ballpoint pen for writing.

Some inventions have changed the very fibre of our lives while some have become obsolete. Electricity generation, invented by Nikola Tesla, along with Edison's light bulb, has changed almost every facet of everyday life, including the very basic daily waking/sleeping patterns of human beings and even some animals, for all time. However, the rotary dial telephone, indispensable though it was, during its time, patented by Almon Brown Strowger in 1891, has gone obsolete.

Meanwhile, some inventions have been particularly beneficial, while others have been extremely bad for us. The object a lot of us rely on, the spectacles, invented by an unknown person in about 1286, has done so much good, while gunpowder, also an ancient invention from China in the 9th century, has done its best to turn man back into a savage.

Some inventions are so ubiquitous that they hide in plain sight, like cement and asphalt. Forms of cement that include lime have been known from ancient Greece, but the most commonly used kind, portland cement, was patented by Issac Charles Johnson at the turn of the 20th century. As for asphalt or tar, the method of using it to pave our roads is from ancient Middle East, but the first road to be paved with it was in front of the Newark, NJ City Hall in 1870.

We've come a long way

Speaking of the roads and travel, the first motorised 2-wheeler was the Daimler Reitwagen, invented and built by Germans - Gottlieb Daimler and Wilhelm Maybach - in 1885. The first modern car was the Benz Patent-Motorwagen built in 1886 by Karl Benz. And, on a parallel track, speaking of two, the first 2-piece swimsuit or the bikini was revealed on July 5, 1946 by French designer Louis Reard. It was named after the Bikini Atoll in the Pacific Ocean where the US had recently conducted an atomic test.

It is interesting to note that inventions like the bikini preceded more useful ones like wheels on suitcases - US patent no. 3,653,474 - invented by Bernard Sandow in 1972. And appropriately, the first remote for controlling television with an attached wire was called 'Lazy Bones', and developed by the Zenith Radio Corporation in 1950. The first wireless remote control was developed in 1955 by Eugene Polley in the US.

In the field of health, inventions like penicillin and vaccination stand out. However, not to be ignored are the inventions of anaesthesia and the pill. On October 16, 1846, William T G Morgan, a young Boston dentist, used his invention, general anesthesia, as Dr John Collins Warren removed a tumour from the neck of a 17-year-old boy at Massachusetts General Hospital, Boston, and forever relieved mankind of its greatest fear, the pain of surgery.

Abraham Lincoln freed black slaves with his Emancipation Proclamation; the young Mexican scientist, Dr Carl Djerassi, freed women from repeat unwanted and unplanned pregnancies by making the first progesterone pill that prevented ovulation. And then, endocrinologist Dr Gregory Pincus, along with activist Margaret Sanger and financier Katherine McCormick, developed the birth control pill, which was first approved for contraceptive use by the FDA in 1960.

As for the Indian woman, she used to be tied down in the kitchen with stones - the stone and mud chulha, the crushing stone and the grinding stone. Now, three wonderful inventions have removed her crushing burden - the LPG cylinder-gas stove, the mixie and the grinder, in that order.

We have LPG gas in cylinders to help in cooking, thanks to Dr Walter O Snelling who invented ways to liquefy LPG during the refining of natural gasoline in 1910. As for the electric kitchen blender or 'Mixie', as we affectionately call it, it was invented by Stephen Poplawski of Racine, Wisconsin, in 1922. It was invented to help make bar drinks, but has been used in so many other ways, too. It was even used by Dr Jonas Salk in the making of his famous polio vaccine.

Finally, the idli-dosa batter maker that saves time and drudgery, and guarantees a healthy breakfast - the wet grinder. It is said that this is the invention of P Sabhapathy of Coimbatore in 1955.

Newer inventions are coming up everyday. Driverless cars and Artificial Intelligence - these ideas are so radical that they have the potential to completely transform our lives. These will not be the end, either. Man is innately a curious animal: he constantly tries to understand and improve upon whatever exists at the present time. This is simultaneously one of his best and his worst qualities since, as Joel Mokyr, professor of economics and history, Northwestern University pointed out,

"Every time we solve one problem, a new one comes up. Each invention relies on subsequent inventions to clean up the mess it has made."

And so it goes on...

The Statesman
07 May, 2016

Beneficial CO₂

Carbon dioxide as an atmospheric gas usually has a bad name in the lexicon of environmental activists and watchdogs. Perhaps this reputation may change now. A recent study by the US National Aeronautics and Space Administration (NASA) shows that carbon dioxide ~ much maligned in the climate change debate ~ is making the earth greener. The study was conducted by an international team of experts comprising 32 authors from 24 institutions in eight countries using satellite data from NASA's Moderate Resolution Imaging Spectrometer and the National Oceanic and Atmospheric Administration's "advanced very high resolution radiometer instruments". The instrument was used to determine the "leaf area index", that is the extent of leaf cover over the planet's vegetated regions. The study showed that presence of increased levels of carbon dioxide in a region contributed towards extending leaf cover. This greening represents the increase of leaves on plants and vegetation in areas on earth twice as large as the continental United States. The enhanced level of carbon dioxide increases the process of photosynthesis that actuates plant growth.

Although carbon dioxide may be causing greening of the earth in the short-term, the longterm effect of CO₂ in the atmosphere will lead to an increase in the earth's temperature. Climate sceptics may see the new research as a boost to their case, but there can be no doubt that the earth's temperatures are rising due to the increase in levels of carbon dioxide in the atmosphere. The chief reason for such increase in CO₂ levels is industrialisation, which uses fossil fuels to satiate energy demands. The process of industrialisation on a large-scale has been on since the 19th century and primarily in the West. In recent times, developing societies such as India, China, Brazil, Russia, South Africa and the East Asian countries have joined the industrial bandwagon. Either these nations have achieved advanced industrialisation, like the East Asian economies have, or are on the cusp of industrialisation, as the BRICS grouping is, thus increasing their share of pollutants in the atmosphere. But the weight of historical responsibility lies on the shoulders of the Western bloc, which has uninhibitedly contributed towards anthropocentric climate change. The new study may have absolved carbon dioxide of its lethal status for some time but its increased level in the atmosphere ought to be an important environmental concern. Droughts and extreme temperatures have a direct bearing on human, plant and animal life on earth. While the study shows that rising CO₂ levels in the atmosphere may be favourable for plants, its increased levels will trap heat in the atmosphere, thus increasing the earth's temperature. The West has the primary responsibility to tackle climate change, and act it must.

The Hindu
09 May, 2016

'Noise net' could save birds and aircraft

Introducing a noise net around airfields that emit sound levels equivalent to those of a conversation in a busy restaurant could prevent collisions between birds and aircraft, saving lives and billions in damages, new research has found.

Filling a controlled area with acoustic noise around an airfield, where the majority of collisions tend to take place, can reduce the number of birds in the area by 80 per cent, the findings showed.

"We are using a different kind of deterrent — trying to stop birds from hearing one another by playing a noise that is at the same pitch as the alarm calls or predator noises they are listening out

for,” said lead researcher John Swaddle, professor of biology at College of William and Mary in Williamsburg, U.S.

“By playing a noise at the same pitch, we mask those sounds, making the area much riskier for the birds to occupy. The birds don’t like it and leave the area around the airfields,” Mr. Swaddle noted.

The researchers set up speakers and amplifiers in three areas of an airfield in Virginia and observed bird abundance over eight weeks, the first four weeks without noise and the second four with the noise turned on. Results showed a large decrease in the number of birds in the ‘sonic net’ and areas just outside and found that it was particularly effective at deterring a number of species that were at high risk of bird strike such as starlings.

Prior research

“We conducted prior research in an aviary but this is the first study done out in the field to show the efficacy of sonic net,” Mr. Swaddle, who is also a visiting research associate at University of Exeter in Britain, said.

The Times of India
07 May, 2016

In China, a ‘student bot’ to sit for entrance test

A Chinese robot is set to compete with grade 12 students during the country's national college entrance examination next year and get a score qualifying it to enter first-class universities. The robot will appear in three exams -math, Chinese and a comprehensive test of liberal arts, including history , politics and geography, said Lin Hui, CEO of an artificial intelligence company in Chengdu.

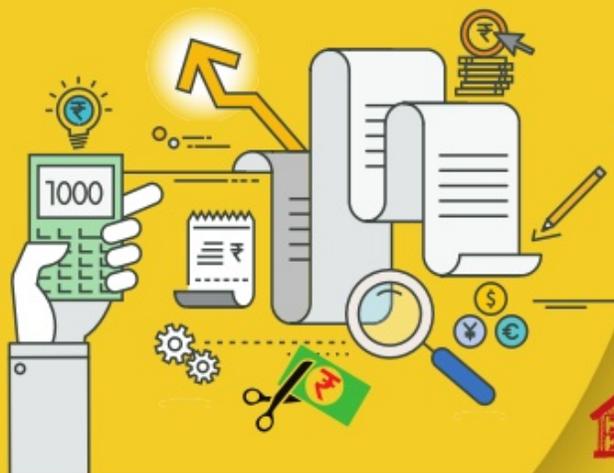
The robot will have to finish the exams during designated periods like the other examinees. It will take its exams in a closed room with just proctors and a notary present.

The robot will be linked to a printer before every exam, and the electronic examination paper will be loaded to the robot's program when the examination begins, Lin said.

It will be totally disconnected from the internet and can solve the problems with its artificial intelligence program, `China Daily' reported. It is believed that Chinese and a comprehensive test of liberal arts, rather than maths, will pose challenges to the robot, since questions in maths are objective with specific answers, while in the other test subjects, there are some subjective questions, such as the reading comprehension and essay writing. According to Lin, the robot writing technique nowadays has been increasingly mature.

3 CHANGES IN THE WAY YOU DECLARE INVESTMENTS

Income tax department has released a new form—12BB—that must be used for declaring investments to your employer starting financial year 2016-17. This won't affect the way you file tax returns later this year (for 2015-16) but only the way you will declare a few expenses and investment to your employer during the current financial year for filing returns next year



Number of forms and annexures

Earlier: Multiple forms and annexure for HRA, LTA, investments under Section 80 and house loan interest payment

Now: One form, 12BB, to declare all these expenses and investments

For claiming deduction for housing loan interest payment

Earlier: Loan certificate reflecting outstanding balance and interest paid for the year

Completion certificate of the property

Now: Along with the certificates, name, address and PAN of the lender

Nature of home loan lender

Earlier: Was not required

Now: Lenders have been classified into three categories: financial institutions, employer and 'other'

KEEP IN MIND

- Form 12BB is required only when employees are claiming deduction via employer.
- Apart from LTA, the other tax breaks can always be claimed directly while filing the income tax return and making these declarations in the returns form.
- Since income tax return is annexure-less, one just needs to enter the total amount of invested under Section 80 or the HRA deduction amount.
- There is no need to attach the proofs with ITR. However, proofs must be maintained by taxpayers, should the assessing officer ask for them later.

What remains the same



Claiming HRA



Claiming LTA



Deductions under Section 80