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GS 2 : INTERNATIONAL RELATION

THE HINDU PAGE : 1

Iran says blockade a threat to ceasefire; warns it will shut down Red Sea traffic

Agence France-Press

TEHRAN

Iran's military threatened on Wednesday to shut down Red Sea trade unless the U.S. lifted its naval blockade on Tehran's ports, saying the ceasefire was at risk.

The head of Iran's military central command centre said a U.S. failure to lift the blockade would constitute "a prelude" to violating the two-week ceasefire. Unless the U.S. relents, Iran's armed forces "will not allow any exports or imports to continue in the Persian Gulf, the Sea of Oman, and the Red Sea," Iranian General Ali Abdollahi said.

The warning came after U.S. President Donald Trump indicated peace negotiations could resume this week, while Iran confirmed the sides had kept talking via Pakistan after a first round of negotiations fell flat. Iran on Wednesday welcomed a Pakistani delegation led by its Army chief Asim Munir.

Islamabad "has held discussions with the Ameri-



Pakistan's Army chief Asim Munir receives a warm welcome from Iranian Foreign Minister Abbas Araghchi in Tehran on Wednesday. AFP

cans and has also heard our stances. During this visit the views of both sides are to be discussed in detail," Iranian Foreign Ministry spokesperson Esmail Baghaei said.

Washington has sought to turn the screws on Tehran with the blockade, with U.S. Central Command saying that American forces "have completely halted economic trade going into and out of Iran by sea".

The picture based on recent maritime tracking data in the Strait of Hormuz was less clear-cut, and Iran's Tasnim news agency reported on Wednesday that shipping had conti-

nued from southern Iran.

Speaking to the *New York Post* on Tuesday, Mr. Trump said a new round of talks with Iran could take place in Pakistan "over the next two days", while telling Fox Business the war was "very close to being over".

Reports said the U.S. had sought a 20-year suspension of Iran's uranium enrichment programme during the Islamabad talks, and that Iran, in turn, proposed suspending its nuclear activity for five years -- an offer U.S. officials rejected.

LEADERS FLOCK TO CHINA

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GS 3 : SCIENCE AND TECHNOLOGY

THE HINDU PAGE : 7

New brain-inspired 'memristors' promise to reduce AI energy use

Scientists at Cambridge University have found that hafnium-based films can reliably behave like synapses and with a low energy demand; hafnium oxide is already widely used in advanced CMOS transistors, which means chip manufacturers know how to deposit and integrate it at scale

(Shantanu Haque Mondal)

Researchers from the University of Cambridge have reported a new kind of brain-inspired nanodevice, a hafnium oxide memristor, that could dramatically cut artificial intelligence's (AI) energy bill by bringing memory and computation into the same component.

The findings were published in *Science Advances* on March 20.

Most of today's computers have the von Neumann architecture: the memory, e.g. its DRAM, is located in one place and its processors – which are usually GPUs when the workload is to run AI models – are in another location. So for every calculation, data needs to be transported between the DRAM and the GPUs.

In modern computing setups that handle large AI models, this movement of data, rather than the calculations themselves, can dominate total energy use, especially when information must travel on and off chips or across multiple servers. Loading a single byte of data from off-chip memory can cost much more energy than adding two numbers the moment they arrive, in the same location.

The human brain takes a different approach. Every synapse – the junctions where neurons communicate – both stores and processes information locally, which means memory and processing are fused inside the same biological hardware. This is one reason the human brain can run roughly 10^8 synaptic operations per second on about 20 W of power (less than a dim household light bulb), but an AI model running in a data centre will need at least hundreds to thousands of times more power for the same number of operations.

The field of neuromorphic computing aims to recreate this architecture by building electronic devices that act more like synapses and neurons than like traditional transistors and RAM chips.

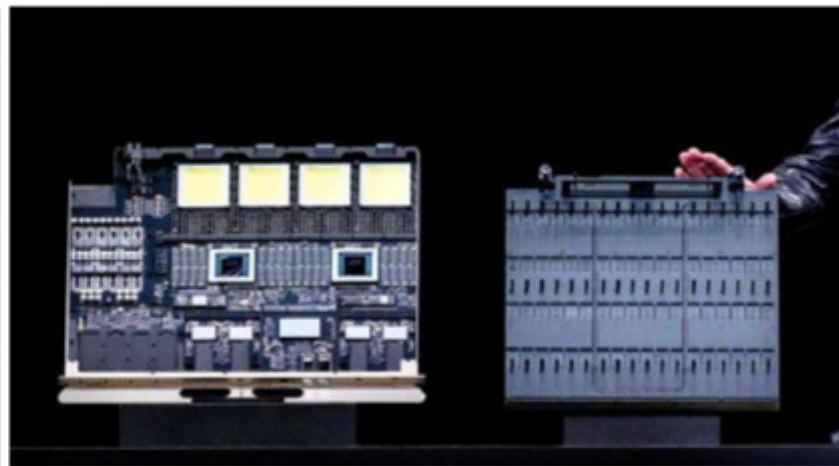
Resistor with memory

The Cambridge team, which has also been working on neuromorphic computing, reported that its new memristor can also store and process data in the same place. By avoiding having to transport data, the chip cut energy use by more than 70%, the researchers estimated. The term 'memristor' is a combination of 'memory' and 'resistor'. A resistor is a small device that applies a fixed amount of resistance to a current passed through it. (If you took science in high school, you must have seen one in your lab: a small, bean-shaped piece with bands of colours and two pins at the ends.) Unlike a resistor, a memristor has variable resistance – but it's also capable of something unusual. When a current is passed through it, the memristor offers some resistance. When the current is removed, the memristor 'remembers' the resistance it offered and maintains it.

In a neuromorphic chip, each memristor can serve as an artificial synapse, with its resistance level representing the strength of the connection between two neurons.

Memristors are mason-made and don't take up much space. Their energy demand is also very small.

They are usually made of a thin layer of hafnium oxide (TiO₂) sandwiched between two metal electrodes. Most oxide-based memristors on the market or in prototypes rely on a small conductive



In conventional computers that run AI models, the memory is located in one place and the GPUs (shown here) are in another location, so for every calculation, data needs to be transported between them. If the AI model is large, this movement of data can dominate total energy use. AP

filament that forms and breaks inside a thin layer of metal oxide. This filamentary mechanism lets the device switch between different resistance states but tends to be fickle: filaments grow unpredictably or need relatively high voltages to form, which can increase the energy demand.

A better memristor

The researchers, led by Robuk Isik, a professor in the Department of Materials Science and Metallurgy at Cambridge, created a p-n junction at the interface between a hafnium-based oxide film and an underlying titanium oxide layer.

A p-n junction is an interface that works like a gate: electrons can cross from one side to the other if the energy barrier between them is low enough. If the barrier is low, more electrons will flow and the resistance will be smaller.

The junction thus works like an adjustable electronic gate in the device. The researchers raised or lowered the barrier by gently pushing ions in the film with low-voltage electrical pulses. This changed the device's resistance smoothly instead of turning a filament on or off. The memristor's behaviour was also more predictable from one cycle and one device to the next than previous designs.

The field of neuromorphic computing aims at recreating the human brain's architecture by building electronic devices that act more like synapses and neurons than like traditional transistors and RAM chips.

A memristor switches when it changes from one resistance state to another (like high to low). Conventional oxide memristors need a certain minimum current to trigger this. In laboratory tests, on the other hand, the hafnium-based memristor required a million times less current to switch. This, the researchers estimated, could significantly reduce AI energy consumption by up to 70% if widely adopted. The various resistances can also be used to represent a range of values and be used to perform calculations directly where the data is stored, instead of moving it to a separate processor.

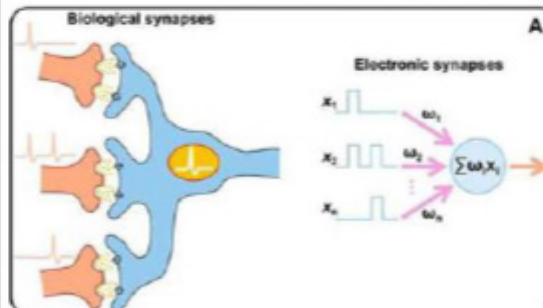
The team's experiments also revealed changes in the device's resistance that mimicked the working of synapses in the brain. Small changes in input produced small changes in output while big changes in input yielded big changes in output – a

relationship called linearity. The devices also exhibited an analogue of spike-timing dependent plasticity. Here, if one neuron fires just before another, the connection between two neurons strengthens; if the order is reversed, it weakens. The memristors could also encode tens of thousands of switching cycles and retained their programmed states for about a day, suiting for many on-chip learning tasks.

Hafnium oxide is already widely used in advanced CMOS transistors, which means chip manufacturers know how to deposit and integrate it at scale. By showing that hafnium-based films can reliably behave like synapses and with a low energy demand, the Cambridge team has narrowed the gap between cutting-edge neuromorphic research and the use of semiconductor in industry.

However, there is a catch: the multicomponent films used in the study currently require fabrication temperatures around 700 °C, which is far higher than the temperature used to make commercial semiconductors, and the process also takes longer. The researchers wrote in their paper that they are currently working to ensure future production of this neuromorphic chip aligns with conventional technologies.

Neuromorphic engineering is the branch of engineering that seeks to create applications that emulate the brain's structure using three-dimensional arrays of neuron-like and synapse-like components that interact in complex ways. The underlying technologies promise to require less energy than regular GPUs. The Cambridge memristor could be a part of these brain-inspired devices. That said, even if today's neuromorphic circuits can replicate the behaviour of millions of neurons, they are still a long way from being as complicated as the human brain. The Cambridge team's work has improved synaptic components and has made it easier to build larger, even more energy-efficient neuromorphic systems. (Shantanu Haque Mondal is a researcher in the Physics Division, State Forensic Science Laboratory, Kolkata. shantanumondal709@gmail.com)



The human brain takes a different approach to traditional computers. Every synapse – the junctions where neurons communicate – both stores and processes information locally, which means memory and processing are fused inside the same biological hardware. AP

GS 2: INDIAN POLITY

INDIAN EXPRESS PAGE : 1

STARTING TODAY, THREE-DAY SITTING OF PARLIAMENT ON CONSTITUTION AMENDMENT BILLS

Govt plan: Keep south share unchanged in LS, list each state's new count in 'schedule'

Delimitation exercise to demarcate constituencies based on 2011 Census, LS seats for all states to go up 50%

Vikas Pathak & Jatin Anand
New Delhi, April 15

THE GOVERNMENT will most likely bring on Thursday a 'schedule' in Parliament to clearly specify the number of Lok Sabha seats for each state, and this will show that the percentage share of each state in the Lok Sabha's total strength is the same as it is now, top sources said.

A 'schedule' is an additional section to a legislation that provides detailed information supporting its text.

Stating that the three Bills cleared by the Cabinet to facilitate women's reservation and

»CONTINUED ON PAGE 2

E. EXPLAINED

Centre's move, challenge to Opp

Opposition parties have primarily criticised the government's move to link women's reservation to the increase in the Lok Sabha strength and the delimitation exercise. With the government keen to maintain a pro-rata distribution of the increased seats in the Lok Sabha, the Opposition, including states in the midst of Assembly polls, will find it challenging to push its case.

Opp chorus: We back women's quota, but delimitation a devious agenda, tool of BJP



Congress president Mallikarjun Kharge and LoP Rahul Gandhi with MP Kapil Sibal, NCP-SP's Supriya Sule, TMC's Sagarika Ghose, Shiv Sena (UBT)'s Sanjay Raut and other INDIA bloc leaders in New Delhi. ANI

Asad Rehman
New Delhi, April 15

SETTING THE stage for a turbulent three-day session of Parliament which will meet Thursday, Opposition parties said Wednesday that they will vote against the Constitution amendment Bill provisions on delimitation, some among them calling the delimitation plan "a devious agenda" and "a tool to win a majority for the ruling party".

The Opposition parties underlined that they are not against reservation of seats for women in Parliament and state Assemblies, but are opposed to the manner in which the related Bill is being brought.

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GS 3: SCIENCE AND TECHNOLOGY (IPR)

INDIAN EXPRESS PAGE : 1

EXPRESS investigation | IN ASSOCIATION WITH ICIJ

7 Indian firms in race, experts eye cheaper Keytruda version in 2 yrs

Anonna Dutt
New Delhi, April 15

WITH AT least seven Indian manufacturers in the race to develop generic versions of Merck & Co's best-selling cancer immunotherapy drug Keytruda, doctors and researchers say a far cheaper alternative could be available within two years when the drug's patent expires in June 2028 — offering hope at a time when each mandated 200mg

dose costs more than Rs 3 lakh.

“We have seen this with other immunotherapies.

The entry of biosimilars leads to a significant drop in prices, sometimes by as much as

70%. This is the simplest way to make cancer drugs more affordable and accessible. In the long run, however, India needs



PART-IV

to invest in developing its own therapies,” said Dr Tarun Durga, associate director of medical oncology, Medanta-Noida.

The lack of access to Keytruda is one of the key

findings of an investigation by *The Indian Express* in association with the International

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GS 2: INDIAN POLITY

INDIAN EXPRESS PAGE : 2

Govt strategy

delimitation of Lok Sabha constituencies could not have mentioned a pro-rata increase in the number of Lok Sabha seats for states, the sources said, it would be done in the 'schedule'. "There will be no confusion... everything will be legally done," said a source, who did not wish to be named.

For example, if Tamil Nadu has 39 seats in the present Lok Sabha and its share in the total is 7.2%, it will remain 7.2% in the Lok Sabha with up to 850 seats. It is estimated that the strength of each state will increase by 50%. So, in Tamil Nadu's case, it is likely to have 57 or 58 seats.

The sources said this is what Union Home Minister Amit Shah has said in public so far, and it will deflate the Opposition's criticism that southern states will have a lesser voice in the Lok Sabha. Tamil Nadu's Chief Minister MK Stalin has been leading protests, saying states in north India such as Uttar Pradesh and Bihar have seen a sharp rise in population, and a delimitation on the basis of 2011 Census would result in their share rising sharply.

In the Constitution (One Hundred and Thirty-First Amendment) Bill, 2026, Article 81 has been amended to facilitate an increase in the maximum number of Lok Sabha seats to 850 from 550 now (815 for states, and 35 for Union territories). Article 82 effectively delinks the delimitation exercise with Census 2026 and future

Censuses too.

The sources said inter-state redistribution just means distribution of the increased number of seats, not on the basis of population, but on a pro-rata basis to maintain federal balance. "One-third of the seats will be reserved for women.... The delimitation exercise will take care of the boundary change of constituencies within the states, based on the 2011 Census," the source said. Till now, this intra-state adjustment of constituencies is based on the 2001 census.

The three Bills — Constitution (One Hundred and Thirty-First Amendment) Bill, 2026, the Delimitation Bill, 2026, and the Union Territories Laws (Amendment) Bill, 2026 — cleared last week are likely to be introduced during the extended session of Parliament beginning Thursday.

The Constitution Amendment Bill did not mention a pro-rata increase of 50% Lok Sabha seats for all states — something that sources in the government had been saying for weeks. The Delimitation Bill talks about delimitation on the basis of the latest census figures available, which is the 2011 Census.

This, opposition MPs felt, would change the proportionate share of the states, as there was differential growth of population in different states by 2011. The absence of equal increase in the allocation of seats to states in the three Bills made many in the

opposition question the intent of the government, with Stalin and Telangana Chief Minister Revanth Reddy openly criticising the move.

This delimitation exercise to redraw Lok Sabha constituencies will be the first one after the 1971 census, as delimitation was frozen for 25 years each in 1976 and 2001 so that southern states, whose population had begun to stabilise while the population growth of some other states had picked up pace, did not feel they would lose their share. It was said that the freeze would incentivise family planning measures and lead to population control.

The main challenge during the session will be the passage of the Constitutional Amendment Bill, as it would require a special majority in both the Houses — two thirds of the members present and voting, which should not be less than one half of the strength of the House. Both houses must separately pass the Bill.

BJP sources acknowledged that the party was engaging with floor leaders "across the board" for ensuring that the requisite numbers required for the three proposed Bills are met. During its outreach, party leaders had sought to emphasise that "all the issues pointed out by them had been assessed and addressed" in the proposed amendment to the Bill which was passed in September, 2023.

"The discussion is likely to be led by Prime Minister Narendra Modi and Union Home Minister Amit Shah; both leaders, especially the PM, are more than

ready to address specific issues, such as delimitation and its impact on South Indian states, being raised by the opposition," a senior leader said.

Any Constitutional amendment will require 360 votes in the Lok Sabha, if all present members turn up. The BJP, at 240, has the highest number of seats. The NDA's total seat tally is 293, excluding seven independent MPs. The non-NDA, of which the Congress with its 98 members is the largest party, has 241 members.

The present strength of the ruling NDA in the Rajya Sabha is as follows — BJP 106, TDP 2, JD (U) 4, Shiv Sena 2, RLD 1, JD (S) 1, AGP 1, NCP 4, AIADMK 5, RPI (Athawale) 1, Rashtriya Lok Morcha (Upendra Kushwaha's party) 1, United People's Party (Liberal) 2, apart from 7 nominated members who haven't yet joined the BJP, independent Rajya Sabha MP Kartikeya Sharma, and one each from the MNF, NPP and PMK. This adds up to 145. Five nominated members who joined the BJP have already been counted in the BJP's tally of 106.

In the case of parties that can take a line against the BJP, the Congress has gone up from 27 to 29 members, the TMC has 13, the AAP 10, the BJD 6, the Samajwadi Party 4, the NC 3, the BRS 3, the DMK 8, the Shiv Sena (UBT) 1, the NSP (SP) 1, the CPI (M) 3, the RJD 3, the JMM 2, the IUML 2, the CPI 2, the MDMK 1, the Kerala Congress (M) 1, the BSP 1, and the DMDK 1.

The present strength of Rajya Sabha is 245, and the two-thirds mark at full strength is 163.

GS 2: INDIAN POLITY

INDIAN EXPRESS PAGE : 2

SC: You cannot hollow out religion in name of social welfare, reform

Express News Service
New Delhi, April 15

THE SUPREME Court said on Wednesday that religion should not be hollowed out in the name of social reform, as it continued to examine constitutional questions arising out of its September 2018 judgment striking down age restrictions on the entry of women into the Sabarimala hill shrine.

"In the name of social welfare and reform, you cannot hollow out the religion," Justice BV Nagarathna, who is part of a nine-judge bench hearing the matter, said. The bench presided by Chief Justice of India Surya Kant also comprises Justices M M Sundresh, Ahsanuddin Amanullah, Aravind Kumar, Augustine George Masih, Prasanna B Varale, R Mahadevan and Joymalya Bagchi.

The remarks came as Senior Advocate Abhishek Singhvi, appearing for the Travancore Devaswom Board which administers the temple, was making his submissions on the relation between "the rights of persons under Article 25 of the Constitution and the rights of religious denominations under Article 26".

Article 26(b) gives religious denominations, and any section thereof, right to manage their own affairs in matters of religion

while Article 25 (1) guarantees every person freedom of conscience and the right freely to profess, practise and propagate religion subject to public order, morality and health. Article 25 clause (2) sub-clause (a) empowers the state to make laws for regulating or restricting any economic, financial, political or other secular activity, which may be associated with religious practice, while clause (b) allows the state to make laws for social welfare and reform or the throwing open of Hindu religious institutions of a public character to all classes and sections of the faith.

Singhvi urged that "Article 25(2)(b) may not and should not be interpreted so as to decimate or extinguish the primary right under 25(1)" as doing so "would mean the decimation of the main religious right under 25(1) on the alleged basis of social reform..."

Meanwhile, responding to submissions on the question of maintainability of a Public Interest Litigation in matters of faith, the CJI said, "The most difficult task for a court might be how to give a declaration that the belief of millions of people is wrong or erroneous."

The hearing will continue Thursday.

FULL REPORT ON
WWW.INDIANEXPRESS.COM