

FORTNIGHTLY ENGINEERING REVIEW

The voice of engineers

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Pakistan's Economic Outlook: Strengths, Weaknesses, and Prospects

Climate-induced shocks amplify Pakistan's vulnerabilities, strain rural incomes

Pakistan's economy enters FY2026 at a fragile but hopeful stage, with growth expected to strengthen if the momentum of the ongoing economic adjustment program is maintained. The program is designed to build macroeconomic stability, accelerate long-delayed structural reforms, enhance competitiveness, and guide the country toward a path of sustainable growth.

At the same time, the economy continues to grapple with deep structural weaknesses, most notably high energy costs, a weak tax base, and persistent governance challenges. These vul-

nerabilities have been magnified by climate-induced shocks, particularly the devastating floods of the current monsoon season, which damaged farmland and infrastructure, disrupted supply chains, and strained rural incomes.

The Asian Development Bank (ADB) Outlook for this month (September 2025) suggests: Despite these setbacks, there are encouraging signs of stability and opportunity. Fiscal consolidation has become the centerpiece of economic policy, with the FY2026 budget targeting a primary surplus of 2.4% of GDP through

stronger tax collection and tighter spending controls. Debt-servicing costs are expected to decline as interest rates fall and deficits narrow, easing pressure on public finances. Structural

reforms are also moving forward, including tariff rationalization under the updated National Tariff Policy, the digitalization of income tax refunds for exporters, and efforts to revive stalled priva-

tizations. These reforms, combined with upgrades in Pakistan's sovereign credit ratings and renewed business optimism following a US-Pakistan trade agreement, have boosted investor confi-

dence. External support has also helped steady the outlook. Workers' remittances remain a critical lifeline, foreign exchange reserves are projected to rise to \$17.7 billion by mid-2026, and

inflows from multilateral and bilateral partners, including climate-related assistance, are expected to provide an important cushion against external shocks.

At the same time, weaknesses continue to weigh heavily on prospects. The energy sector remains a significant burden, with high costs undermining competitiveness across industries. Climate vulnerability is perhaps the most pressing challenge, as recurring floods not only destroy crops and disrupt economic activity but also fuel food inflation and erode household purchasing power. Policy risks remain a

concern as well. Any slip-page in fiscal consolidation, tax reform, or governance improvements could quickly reverse fragile gains, raising borrowing costs and weakening business confidence. Trade imbalances are also likely to persist. While exports may benefit from liquidity support and tariff reforms, flood damage to rice and cotton production will keep performance subdued, while imports are expected to rise to meet food shortages and fuel the manufacturing recovery.

Prospects for growth remain closely tied to the government's ability to sustain reform and maintain policy consistency. Investment is likely to strengthen with the support of lower interest rates, fiscal consolidation that eases government borrowing, and targeted incentives for private industry. Export com-

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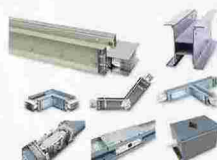
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Key PEC commitments to engineers remain unfulfilled, VC Engr. Mujeeb Marri tells Chairman

Vice Chairman Balochistan's Letter Deepens PEC Crisis, Echoes Senior Vice Chairman's Earlier Concerns

The Vice Chairman of the Pakistan Engineering Council (PEC), Engr. Mujeeb-ur-Rehman Marri, has raised serious concerns about the current state of affairs within the Council, warning that key commitments to the engineering community remain unfulfilled despite one year since the new office bearers took charge.

In a detailed letter addressed to PEC Chairman Engr. Waseem Nazeer, Marri expressed disappointment that the Council had failed to deliver on promises made at the time of oath-taking. These included implementation of a service structure and technical allowances for

engineers, creation of job opportunities, enhancement of the On-the-Job Training (OJT) program, capacity-building initiatives, and progressive policies for engineers, contractors, and consultants.

"Unfortunately, the present reality is quite the opposite," he wrote, noting that management committee meetings are not being held as required, while the Governing Body and Annual General Meeting (AGM) remain pending without justification. He criticized what he described as a "corporate culture style" of governance, with PEC business driven by personal preferences rather than the PEC Act and by-laws.

Marri also expressed concern over the abrupt discontinuation of the OJT pro-

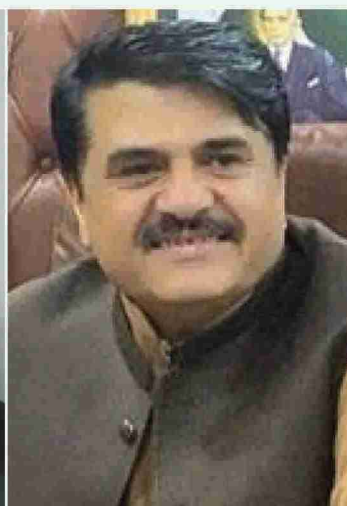
gram, which was replaced by the Graduate Engineers Training (GET) program. Although scheduled to launch in July 2025, the ini-



tiative has yet to materialize, depriving young engineers of opportunities.

The Vice Chairman further highlighted several pressing issues, including the fail-

ure of the Continuing Professional Development (CPD) crash program, the poor results of the last EPDC exam with only a 17% pass rate, and



student exchange programs with China that, he alleged, were revolving around "a personal circle rather than being open and merit-based." He also criticized attempts to

close PEC branch offices and reintroduce proposals for shifting PEC offices to universities, both of which had previously been rejected by the Governing Body.

Calling on the Chairman to take "historical and concrete steps" for the welfare of engineers and stakeholders, Marri emphasized the need to restore dignity, fairness, and vision to PEC. "PEC must bring prosperity and hope instead of disheartenment," he concluded.

Earlier Concerns by Senior Vice Chairman

It may be recalled that earlier, in June-July 2025, PEC's Senior Vice Chairman had also written a strongly worded letter to Chairman Engr. Waseem Nazeer, questioning what he termed "illegal decisions" in violation of the PEC Act and Bye-Laws. Referring specifi-

cally to an office order issued on June 28, 2025, regarding the placement of officers in the PEC Secretariat, he argued that the Chairman acted without the approval of the Governing Body and created positions not recognized in PEC's nomenclature.

The Senior Vice Chairman also raised objections over an agreement with the Power Planning and Monitoring Company (PPMC) to rent out PEC's Lahore office floor without authorization, as well as withholding of details related to PEC's dealings with the National Technology Council and the Government of Punjab.

He urged the Chairman to respect the PEC Act and Bye-Laws and refrain from making unilateral decisions, warning that continued violations "will lead to a major disaster" for the Council. — ER Report

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petitiveness may gradually improve, though gains will depend on how quickly agricultural output recovers. Inflation is expected to rise moderately due to food supply disruptions and higher gas tariffs, but the central bank is committed to keeping it within the medium-term

target range of 5%–7% through a data-driven monetary policy. On the external front, the outlook is stable. Remittances, a flexible exchange rate, and rising reserves will help balance the current account, even as imports grow.

The risks ahead, however, are serious. Domestically,

failure to deliver on revenue targets or delays in critical reforms could weaken confidence and raise financing pressures. Climate change poses an even greater long-term threat, capable of reversing economic progress with each season of extreme weather. On the global stage, geopolitical tensions and

uncertainty around international economic policies could destabilize trade flows and inflation trends. Yet, there is also an upside. If reforms are implemented more swiftly and global conditions prove supportive, investor confidence could strengthen further, pushing growth above current

expectations and enhancing Pakistan's resilience.

In short, Pakistan's outlook is one of cautious optimism. Stability is slowly returning, and the groundwork for structural reform has been laid. But the path ahead requires consistency, discipline, and urgency—particularly in lowering

energy costs, broadening the tax base, strengthening governance, and building resilience against climate shocks. If these priorities are met, the country will have an opportunity to transform a fragile recovery into a more durable and inclusive path of growth.

– ER Report

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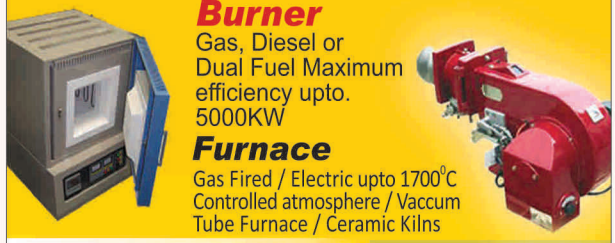
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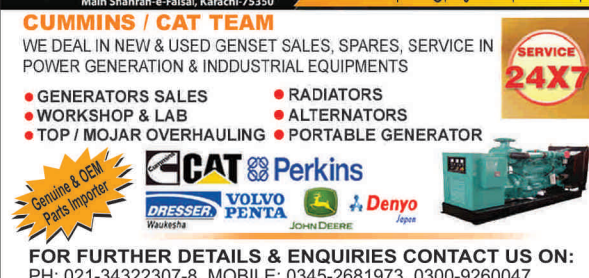
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Pakistan Cables Boosts Renewable Energy Commitment, Expands Solar Capacity to 2.3MW at New Nooriabad Facility

Pakistan Cables, the premier wires and cables manufacturer, has announced the successful completion of a significant 300 kW expansion of its existing on-

This strategic move reinforces Pakistan Cables' unwavering commitment to renewable energy sources, particularly solar, aligning seamlessly with broader national efforts to mitigate energy shortages and reduce reliance on fossil fuels across its operations. The expanded solar

also the first and only wires and cables manufacturer in Pakistan to have its scientific carbon emission targets validated by SBTi and remains committed to advocating climate action for a brighter future.

About Pakistan Cables Ltd.

print in the country, with presence in over 200 cities. It is also a member company of the Amir S. Chinoy Group. The company is ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018 certified, with various cable types tested by KEMA, Netherlands. Pak-



grid solar power plant at its new factory located in Nooriabad, Sindh. This expansion brings the company's total solar power capacity to an estimated 2.3 MW.

capacity is estimated to reduce carbon emissions by 1,956 tons annually, equivalent to planting approximately 100,000 trees. Pakistan Cables is the industry leader in introducing sustainable business practices. It is

Founded in 1953, Pakistan Cables is the premier and most reputable wires and cables manufacturer in Pakistan. Being the only wires and cables manufacturer listed on the PSX since 1955, it has the largest geographical foot-

istan Cables' science-based emission reduction targets are validated and approved by SBTi. It is also a signatory of the UN Global Compact and net-zero commitment.■

HVACR Expo 2026 Made a Record 100% Stall Booked in just 15 Minutes

The Expo and Conference Organizing Committee proudly announced the upcoming 31st Pakistan HVACR International Expo & Conference 2026, as around 100% of the exhibition stalls were booked within just 15 minutes of the opening of

the HVACR community. This milestone lays a solid foundation for delivering an exceptional Expo & Conference in 2026, Karachi. Khalid Mansoor, Chairman Organizing Committee, Fahad Ali Afridi, Chief Convener, Zeeshan Siddiqui, Convener Exhibition, Aley Muhammad, Convener Finance, Naeem A. Khan, Convener Audit, Syed Fakkhi Iftikhar, Event Manager, and the



the online portal. This record-breaking success reflects the unwavering trust and confidence of the exhibitors and industry stakeholders in the platform that has become the premier stage for showcasing innovation, technology, and growth in the HVACR sector. The Expo & Conference of the Pakistan HVACR Society. The overwhelming response from our exhibitors demonstrates the strength, credibility, and importance of this platform for

entire Organizing Committee, whose professionalism and dedication contributed greatly to this remarkable success. The 31st Pakistan HVACR International Expo & Conference 2026 shall be held in Karachi in February 12-14, 2026, and is expected to bring together industry leaders, professionals, and innovators from across Pakistan and beyond, showcasing the latest advancements in HVACR technologies and sustainable solutions.■

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Emerging Green Solution Hosts Engineers' Get-Together

Emerging Green Solution successfully organized a vibrant engineers' get-together on 16 September to bring together professionals from the engineering community for an evening of networking, fun, and recognition.

The event featured engaging activities, including a lively bowling competition and an exciting lucky draw, which added a spirit of entertainment and camaraderie to the gathering.

A highlight of the evening was the presentation of shields of appreciation. Wasif Laeeq from Orient Energy Systems, Usman Rafiq from Allied Engineering, Zeeshan A. Alam from A2Z Energy, Muhammad Bilal from S.M. Jaffer & Co., Saqib and Umer from Reon Energy are honored for their outstanding contributions to the field of green energy.

The winners of the lucky draw are Kashif from Mian Noor Engineering, Asad Iqbal from Amica Energy, Salman Anjum from Allied Engineering, Hamza Idrees from Engineering Review, Zeeshan Alam from A2Z Energy, Bilal from SM Jaffer, Khurram Raza from Orient Energy Systems.

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Participants appreciated the initiative for creating a platform that blended professional recognition with social interaction. The event concluded with a lavish dinner.



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ASHRAE Pakistan Chapter

Installs New Board of Governors

for Society Year 2025-2026

The ASHRAE Pakistan Chapter held its Board of Governors (BOG) Installation Ceremony on September 20, 2025.

The oath-taking was administered by Mr. Farooq Mehboob, Presidential Member of ASHRAE, to the

The Chapter Committees for SY 2025-2026 were also announced. The committees and their heads are Muhammad Abbas Sajid, DEI Chair, Farhan Mehboob, Government Affairs Committee Chair, Ibad Hasan, Membership Promotion Chair, Dr. Muhammad Uzair, Student Activities Chair, Mohsin ul Haq, Research Promotion Chair, Mohammad Hamid,

approaches to energy optimization in HVAC systems and was well received by attendees from industry and academia.

The ceremony marked an important milestone for ASHRAE Pakistan Chapter, reaffirming its commitment to advancing HVACR knowledge, sustainable practices, and professional collaboration in the region.

newly elected leadership team for Society Year 2025-2026.

The newly installed Board of Governors includes Shuja Khalid, President, Ibad Hasan, President Elect, Dr. Muhammad Uzair, Vice President, Mohsin ul Haq, General Secretary, Mohammad Hamid, Treasurer, Syed Waqas Jaffery, BOG Member, Kiran Sajid, BOG Member and Mahmood Ahmad, Immediate Past President.

Young Engineers in ASHRAE Chair, Kiran Sajid, Chapter Technology Transfer Committee Chair and Faraz Khan, Chapter Communications Chair.

The event also featured a Technical Session on "Utilizing 30% Free Cooling Termodeck for Enhanced Energy Efficiency" delivered by Yousuf Hasan, CEO of YH Associates and Past President of ASHRAE Pakistan Chapter. The session highlighted innovative

About ASHRAE Pakistan Chapter
ASHRAE Pakistan Chapter is part of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers), a global society advancing human well-being through sustainable technology for the built environment. The Chapter actively promotes technical excellence, education, and collaboration in Pakistan's HVACR industry. ■

Haier Creates History: First-Ever Local Assembling & Testing of MRV Products in Pakistan

Haier Pakistan has once again raised the bar for innovation and excellence in the HVAC industry!

At the Haier Intelligent Buildings Factory, located at Haier Industrial Park, Raiwind, Lahore, the first-ever local

meeting stringent efficiency and performance standards.

With this milestone, Haier is not just manufacturing in Pakistan — it is building the future of intelligent HVAC solutions locally. This breakthrough will:

- Reduce reliance on imports
- Ensure faster delivery & stronger after-sales support

Create skilled jobs and empower local talent

Deliver energy-efficient MRV solutions for smart buildings, hospitals, commercial and residential projects

This achievement solidifies Haier's leadership as the No.1 HVAC brand in Pakistan, driven by the vision: "Make in Pakistan, Innovate for Pakistan, Lead Globally." - PR ■



assembling and testing of MRV products was successfully carried out — a landmark achievement for Pakistan's HVAC sector.



The grand inauguration ceremony brought together key stakeholders and experts, including the CAC team from Haier Factory, Quality team, and Haier Head Office team. The occasion was honoured by the presence of:

- ✦ Mr. Salman Saleem, Senior Product Manager – CAC
- ✦ Mr. Yu Zijing, CAC Product Director – Pakistan
- ✦ Mr. Zhu Fukun, HNR General Manager



- ✦ Mr. Guo Fuming, Factory Director – CAC
- ✦ Mr. Chang Haiyang, Project Manager – CAC

The highlight of the event was the red-ribbon cutting ceremony, symbolizing the beginning of a new era of localized innovation. Guests also witnessed a live demonstration of the assembling and product testing process, showcasing Haier's



commitment to world-class quality and precision.

Haier's latest MRV-5 series, now locally assembled and tested in Pakistan, comes packed with advanced features designed for performance, reliability, and sustainability:



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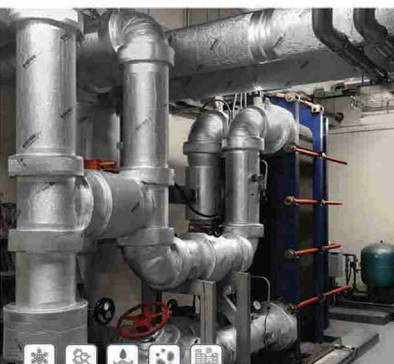


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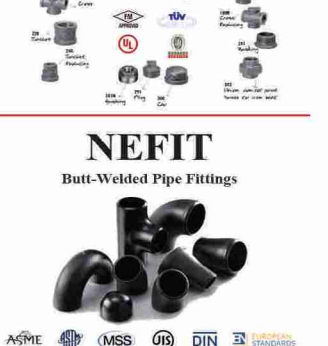
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IEEE MTTTS Seminar on "Battery-Free Wireless Sensing: A Passive Approach"

The IEEE Microwave Theory and Techniques Society (MTTS) Student Branch, Mehran University of Engineering and Technology (MUET), Jamshoro, proudly hosted a thought-provoking research-oriented seminar titled "Battery-Free Wireless Sensing: A Passive Approach" at the Video Conference Hall, IT Building, MUET.

The keynote speaker, Prof. Dr. Valentina Palazzi, from the University of Perugia, Italy, joined us virtually and delivered a compelling session. Her insights into the cutting-edge developments in passive wireless sensing captivated the audience and opened new directions for future research. We were honored by the in-person presence of Dr. Badar Muneer, a prominent researcher at the University of Perugia, Italy, whose practical expertise and collaborative perspective enriched the discussion further.

Prof. Dr. Bhawani Shankar Chowdhry, Vice Chair of IEEE MTTTS, Karachi Section, who joined us virtually from Canada and concluded the session with his encouraging and insightful remarks. Prof. Chowdhry appreciated this highly insightful seminar on Battery-Free

Wireless Sensing for broadening our perspective and for showing us the exciting future directions in this field. He further said that

inspired us Prof. Dr. Faisal Karim Shaikh, Chairman of the Department of Telecommunication, MUET, appreciated the efforts of the

MUET. Over 60 participants attended the seminar, comprising faculty, students, and volunteers, which contributed to a vibrant and



BATTERY-FREE WIRELESS SENSING: A FULLY PASSIVE APPROACH

SPEAKERS



Dr. VALENTINA PALAZZI
ASSISTANT PROFESSOR,
UNIVERSITY OF PERUGIA,
ITALY



Dr. BADAR MUNEER
RESEARCHER, UNIVERSITY
OF PERUGIA, ITALY



Prof. Dr. BHAWANI SHANKAR CHOWDHRY
VICE CHAIR IEEE MTTTS



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practical dimensions that enriched today's discussion and opened new horizons for research, innovation, and collaboration. He appreciated the effort of Dr. Permanand, Chair and Advisor of the IEEE MTTTS Student Branch for his dynamic leadership and efforts in making this semi-

nar possible.

Today's exchange of knowledge has truly

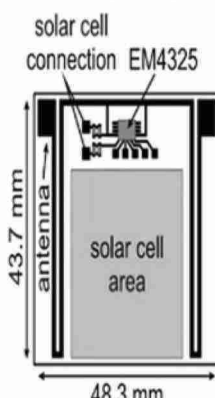
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organizing team and distributed shields of appreciation to the keynote speakers and certificates to participants and volunteers.

The seminar was further graced by Dr. Umair Ahmed Korai, Chair of IEEE ComSoc, and Engr. Talha Kaimkhani, PhD Scholar at

engaging academic atmosphere.

This successful seminar marks another milestone in promoting innovative research and global collaboration under the IEEE MTTTS platform. ■

PSTC Marks 60 Years with Grand Diamond Jubilee Alumni Convention

The Pakistan Scientific and Technical Center (PSTC) proudly celebrated its 60th anniversary, commemorating six decades since its establishment on September 6, 1965.

To mark this historic milestone, a grand alumni convention, titled "Diamond Jubilee Celebration," was organized, bringing together esteemed graduates from the first batch, second batch, and many others.

The event featured a vibrant program where distinguished alumni shared heart-felt memories, reflecting on PSTC's rich legacy and remarkable journey. Warm congratulatory messages were also received from alumni and well-wishers residing abroad, including from Canada, Bangladesh, and the United Kingdom, who extended their best wishes despite being

unable to attend in person.

Adding prestige to the occasion, DG KLC Dr. Hafiz Rub Nawaz graced the celebration as Chief Guest, while the honorable Dr. Yogi Wajhat attended as Guest of Honor. Following the formal program, a delightful dinner allowed participants to

reconnect, reminisce, and celebrate their shared history in a spirit of joy and togetherness.

The event was meticulously organized under the leadership of Director PSTC Engr. Syed Farhan Hamid Ali, with the support of his dedicated team and distinguished alumnus Mr. Anwar Soorti. Their efforts ensured the evening was a resounding

success and a truly memorable celebration.

The Diamond Jubilee Celebration not only honored PSTC's past achievements but also reinforced its enduring legacy, leaving alumni and guests inspired as the institution looks forward to the future. ■



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Sustainable Thar with Smart, Green Infrastructure

By Dr. Sultan Ahmed Khoso, Mehran UET Jamshoro, Pakistan.

The Thar region, known for its vast coal reserves and hardworking communities, is now on the verge of a sustainable breakthrough.

A groundbreaking initiative in Tharparkar is turning coal power by-products into opportunity. A research team led by Dr. Sultan Ahmed Khoso from Mehran University Jamshoro, has successfully developed fly ash bricks using the by-products of Thar coal-based power plants, strengthened with locally available natural resources. These bricks are low-cost, durable, eco-friendly, and locally sourced — a true game-changer for housing and infrastructure across Thar, Mithi, Mirpurkhas, Badin, Hyderabad, and surrounding areas. This innovation is not just about bricks—it is about building a greener future for Thar and its people.

At its core, the project addresses three pressing needs of the region: affordable housing, sustainable development, and community empowerment. This project offers more than affordable construction materials.

It reduces environmental waste, strengthens regional supply chains, and opens doors for community-level job creation. With high compressive strength and sustainable production, Thar

ash bricks different?

The bricks are designed to be:

- Low-cost: Significantly reduces construction expenses, making them affordable for both rural

infrastructure needs.

- Eco-friendly: Produced from recycled fly ash, they reduce landfill waste and environmental pollution, turning an industrial by-product into a valuable

industries.

However, scaling up this innovation requires serious attention and investment. Government agencies, private investors, and development organizations must



struction costs for public sector housing schemes, disaster rehabilitation projects, and rural development programs, while simultaneously reducing environmental stress.

Imagine a Thar where every home, school, and health center is built with eco-friendly, affordable, and locally produced materials. Imagine infrastructure that is not only strong and lasting but also supports the livelihoods of local families. This is the vision of the Thar fly ash brick project.

The time to act is now. By investing in this initiative, stakeholders can help transform Thar into a model of sustainable living and smart, green infrastructure. Together, we can build a future where communities thrive on strength, affordability, and sustainability. ■



fly ash bricks are perfectly suited for long-term infrastructure and housing projects in both rural and urban settings.

What makes Thar fly

housing projects and urban development.

- Durable: With high compressive strength, they are suitable for homes, schools, hospitals, and long-term

resource.

- Locally sourced: Raw materials are available within Thar, ensuring a sustainable supply chain while supporting local labor and

recognize the potential of fly ash bricks as a cornerstone of future housing and infrastructure projects in Sindh. Large-scale adoption could significantly cut con-

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- George Fisher

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Bridging the Digital Divide Through Entrepreneurial Innovation

Engr. Dr. Muhammad Nawaz Iqbal

The digital divide needs to be bridged by entrepreneurial innovation that involves redesigning the technology, its distribution, and adaptation to suit the disparate population groups.

The entrepreneurs are quite significant since they develop localized solutions that have the potential to overcome the infrastructural shortcomings, which may include unreliable power supply, poor internet connectivity, and unavailability of affordable gadgets. Entrepreneurs can detect niche issues at the grass-roots level, unlike large corporations that tend to focus on mainstream markets and develop broadly applicable business models to meet those groups. Digital divide is not just a question of being able to access technology, but also of being able to make good use of the technology.

Among those trying to fill this void are entrepreneurial innovators, who are developing training platforms that will include digital literacy combined with community-based hands-on skills. Locally tai-

lored digital programs in the mother tongue or mobile-based formative learning among rural workers and conduct educational courses for start-ups have made it avail-

high-speed internet to operate. Business people have developed the so-called light-weight applications, which operate either in offline mode or SMS based systems, which means

smartphones or broadband connections are also included in those solutions. Entrepreneurial innovation goes further to funding schemes that enable oppressed communities to

menting financial and digital inclusion initiatives are not only filling in the gaps but also delivering economic mobility through a technological lens. Online entrepreneurship



able to people who would otherwise not be able to join the digital economy.

The most revolutionary has been the creation of mobile-based applications that are cheap and do not need

that even people in remote regions using basic mobile phones can enjoy their benefits. One can not only engage in digital platforms but also make sure that people who cannot afford the newest

acquire access to electronic tools.

Programs such as micro-financing, ownership pay-as-you-go devices and CSDH hubs are breaking the walls of cost. Entrepreneurs imple-

has proved to be an effective driver of bridging gaps, especially in the provision of remote working opportunities. Sites that link the talent pools in the country to the talent pools in other countries are



transforming the world of employment. To illustrate, the fact that the talent does not have to move to the urban centre in order to enjoy the global digital economy is being proven by the entrepreneurs who are setting up micro-outsourcing centres in rural areas.

One of the ways to make generic digital tools ineffective is the local innovation that helps to resolve cultural and contextual problems. Business people are creating locally oriented solutions, like medical applications that exist in that region, or farming applications that were created based on the local ways of agriculture. These innovations are deeper and more acceptable as they have been put into place with

Contd on page 11

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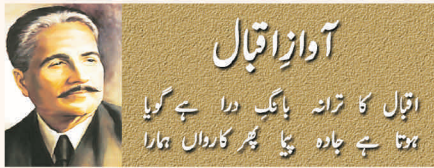
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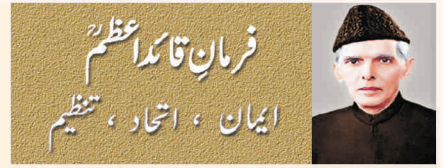
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Bridging the Digital Divide Through Entrepreneurial Innovation

Contd from page 10

regard to cultural realities. One of the fundamental pillars to bridge the digital divide focuses on education, and entrepreneurs are redefining the conventional model of education delivery through the integration of local contexts and digital technologies. The affordability of e-learning systems and the integration of e-learning with other education systems is allowing students in far-flung locations to access quality content. If start-ups revolving around teacher empowerment by digital methods are successful then education is not only viable but also effective in enhancing learning outcomes. The level of renewable energy developments has brought in a new aspect to the gap bridging.

Businesspeople are connecting the off-grid communities to the solar-powered systems with internet-enabled devices and establishing sustainable digital access points in them. This is because these energy-technological solutions address both the issue of power inadequacy and digital bias, and with such solutions, the communities can cross the infrastructure barrier. Females and the underprivileged are more vulnerable to the digital divide and business innovation is essential in creating

a non-discriminatory system. Social networks designed by women and small-scale artisans in the rural areas and poor young people are empowering them to enter the market, acquire new practices and networks.

Business people are also redefining the idea of localizing the digital platform to create a sense of trust and usability. These programs indicate that the difference between the two is a technical hurdle that transcends the human-centred design. The value of collaborations among business people, the state, and non-governmental organizations has been found crucial in expanding digital innovations. Most of the entrepreneurs are not operating in isolation but collaborate to find solutions with local governments so that they can be integrated into the services provided by the governments. Specifically, health entrepreneurship operating at the ministry of health scale can expand rural telemedicine programs that span healthcare access gaps and address the digital divide.

The next emerging trend is the emergence of local entrepreneurial platforms where the local entrepreneurs serve as digital intermediaries. These entrepreneurs create neighborhood centres where individuals can obtain internet-based services such as e-com-

merce, e-governance, and banking. This form of collective ownership of digital resources allows seeking a reduction in inequalities in access, which, in turn, generates jobs for community entrepreneurs. Thoughtful entrepreneurs are tapping into artificial intelligence and machine learning to customize digital inclusion. Artificial intelligence (AI) could be used to customize education to each person and machine learning can also offer farmers predictive information about weather and crops through agriculture applications.

These new technologies are making sure the underserved communities are able to enjoy the new technologies, as opposed to being able to access them. One more area of application of blockchain and decentralized technology is the entrepreneurial ecosystem, where the need is to deliver transparent, safe, and cheap solutions to a community that is frequently ignored in the financial system. closing the digital divide via entrepreneurial innovation is concerned with the redesign of systems so that people at the fringe will get enhanced. It involves inexorable ingenuity, regional knowledge, and profitable business procedures that combine social influence and profitability.■

Sales Blog for Young Engineers and Entrepreneurs

HIGH FIVE

Muhammad Tariq Haq | www.eslpl.com

I used to work in Philips lamp factory. Every worker had a target of doing some specific task, a certain number of times every day. Only upon accomplishment of these discrete tasks by each and every worker, 125,000 bulbs and 30,000 tube lights used to get produced every day.

Only then the total target of almost forty Million bulbs and ten Million tube lights per annum was completed. Unlike a factory worker, a typical power generation Salesman earning a salary of 100,000 Rupees per month has a target of X number of units amounting to half a Million dollar per annum. A salesman is not only responsible for only his salary but at least five similar employees pay-check

as well, besides picking up the burden of some of the company overheads. He cant accomplish this target unless he applies his mind to it through careful planning and efforts accordingly. When the things are going against a

Muslim, he not only prays five times but adds some optional prayers also to get himself out of the quagmire. Similarly, a salesman, in hard times, when recessionary conditions prevail;

visits by at least 10%.

At the end of the day, it is in the hands of the salesman who is the owner of his own destiny and the destiny of his company to deliver against his

assigned targets. Those who do it consistently well rise very high in their careers with sky as a limit. Others crash out leaving themselves and their employers and coworkers in doldrums. Please remember the rule of five. You have a task at hand. Live up to it and earn rewards and recognition for yourself and for others who have pinned their hopes on you. Just as five prayers are important for every believer; five fruits are recommended for a healthy living; at least five customers' a day are mandatory for a SUCCESSFUL salesman too. Just as five prayers a day, keep indecent & evil behavior away; five

fruits keep illness away. Five customers a day, keep hardship and hunger away. Minimum FIVE CUSTOMERS is a Salesman

HIGH FIVE. It is a solid rock foundation of success, accomplishment and triumph.■



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پاکستان کا پہلا AI سے چلنے والا 25 میگاواٹ
فی گھنٹہ انرجی اسٹوریج پروجیکٹ مکمل

سمتشی توانائی سے گوا در کو یانی کی فراہمی ممکن ہوگی، وفاقی وزیر بحری امور

وزیراعظم پاکستان شہباز شریف کی ہدایت پر گوادریں بجلی و پانی کے مسائل کے حل کے لیے اقدامات تیز کر دیے گئے۔

سے چلائی جائے گی، فری زون میں صنعتوں کو بجلی کی فراہمی ممکن بنائی جائے گی۔

وفاقی وزیر برائے بحری امور کا مزید کہنا

تو انائی سے گاور کو پانی کی فراہمی ممکن ہوگی، قابل اعتماد پانی تو انائی گاور کی معیشت میں استحکام لائے گی، مانی گیر کی اومتقائی روزگار کو تحفظ ملے گا۔ ■

ٹیلی کام کا گرین سکوک جاری، بیٹری سٹوریج ٹیکنالوجی سے ٹیلی کام ٹاورز کے انرجی سسٹم کو جدید بنایا جائے گا

13500 ٹن کاربن ڈائی آکسائیڈ کے اخراج سے بچاؤ ہوگا، منصوبہ ہر سال 2.2 لاکھ درخت لگانے کے برابر، بلال قریشی، فہد ہارون

پاکستان کا پہلا مصنوعی ذہانت سے چلنے والا 25 میگا واٹ ٹی گھنٹہ انرجی اسٹوریج پراجیکٹ مکمل اور پاکستان کے ٹیلی کام شعبہ کا پہلا گرین سکوک جاری کر دیا گیا ہے۔

تفصیلات کے مطابق پاکستان کے ٹیلی کام اور توانائی کے شعبے میں ایک اہم پیش رفت بریلانز (Brillanz) گروپ کی کمپنی

انفرا الیکٹرک (Infraelectric) نے پاکستان میں ٹیلی کام شعبہ کے لیے پبلگرین سکوک کے اجرا کا اعلان کیا۔ اس سے قبل ملک کا پہلا

انرجی اسٹوریج کاپزائز اسروس (ESaaS) منصوبہ ٹیلی کام تاورز کے توانائی کے نظام کو مصنوعی ذہانت سے ایس بیٹری اسٹوریج ٹیکنالوجی کے ذریعے جاری رہتا تھا۔

اس نظام کے ذریعے ڈیزل کے استعمال میں نمایاں کمی، سروسز کا تسلسل بہتر اور سالانہ ہزاروں ٹن کاربن ڈی آکسائیڈ گیس کے اخراج سے بچاؤ ممکن ہوا ہے۔ دوسرا سنگ میل تین ارب روپے بائیت گرین سکوک کا اجرا ہے جو انفرا الیکٹرک نے انفراسٹرکچر پاکستان کے اشتراک سے متعارف کرایا ہے۔ یہ شہری اصولوں کے عین مطابق اور سوشل فیصد پرنسپل گارنٹی پیمنٹ مالیاتی ٹول ہے جو ٹیلی کام تاورز کو

گرینڈ کرنے کا ایک پائیدار اور قابل توسیع ماڈل فراہم کرتا ہے۔

اس منصوبے کی حکومت سالانہ 50 لاکھ لیٹر سے زائد ڈیزل کی بچت ممکن ہوئی ہے۔ ہر سال ٹیلی کام مینٹ ورک میں 13500 ٹن کاربن ڈی آکسائیڈ کے اخراج سے بچا جا رہا ہے۔ تین ارب روپے گرین سکوک سے پراجیکٹ سرمایہ کو کاربن کے کم اخراج والی ٹیکنالوجی میں لگانے کا موقع ملا ہے۔ کاربن کے اخراج میں کمی کے لحاظ سے یہ منصوبہ ہر سال دو لاکھ مین ہزار سے زائد درخت لگانے کے برابر ہے۔

تقریب سے خطاب کرتے ہوئے بریلانز (Brillanz) گروپ کے چیف ایگزیکٹو آفیسر بیلال قریشی نے کہا کہ آج کا دن پاکستان کے ڈیجیٹل اور توانائی کے مستقبل کے لیے ایک تاریخی لمحہ ہے۔ ہم نے یہ ثابت کر دیا ہے کہ جدت اور پائیداری ملک کترتی کی راہ ہموار کر سکتے ہیں۔

وزیراعظم کے معاون خصوصی برائے ڈیجیٹل مڈیاز و ریمیکٹ فہارون نے کہا یہ اقدامات ظاہر کرتے ہیں کہ کس طرح جدت اور اشتراک عمل سے کاربن کے اخراج میں کمی

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A collection of CHINT Next series electrical products is displayed on a grey tiled floor. The products include various sizes of Air Circuit Breakers (ACBs), Moulded Case Circuit Breakers (MCCBs), and Modular Din Rail Products. The products are arranged in a row, with some standing upright and others lying flat. The background is a light blue sky with white clouds.

A square QR code is located in the bottom right corner of the advertisement. It is black and white and is used to link to the CHINT Next series products.

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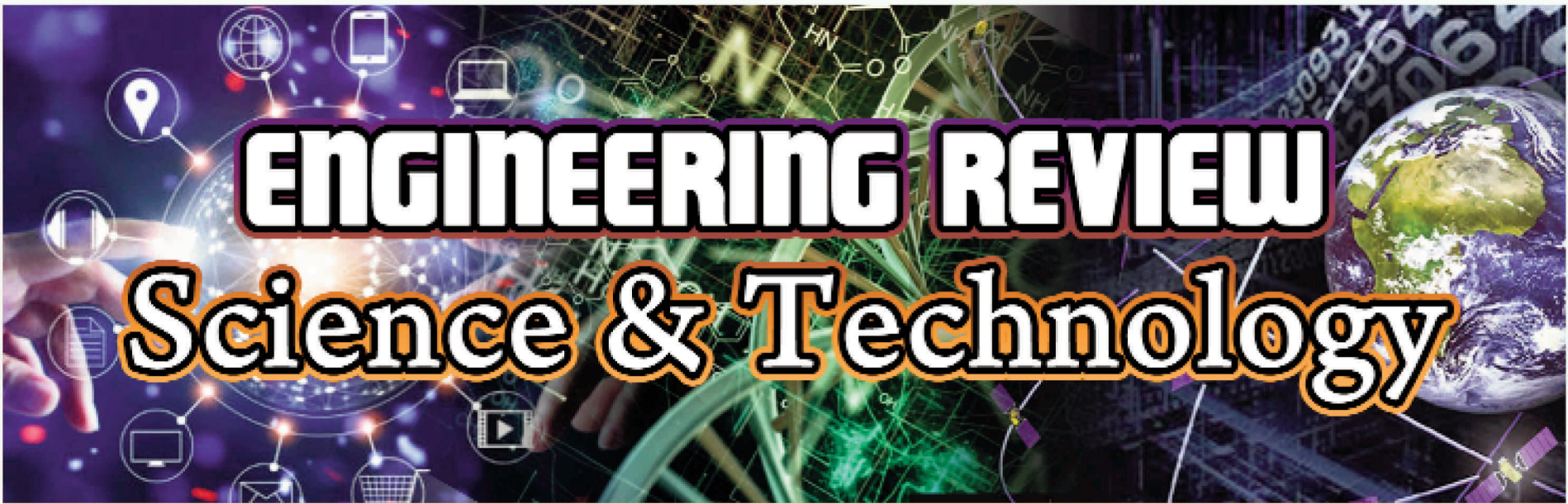
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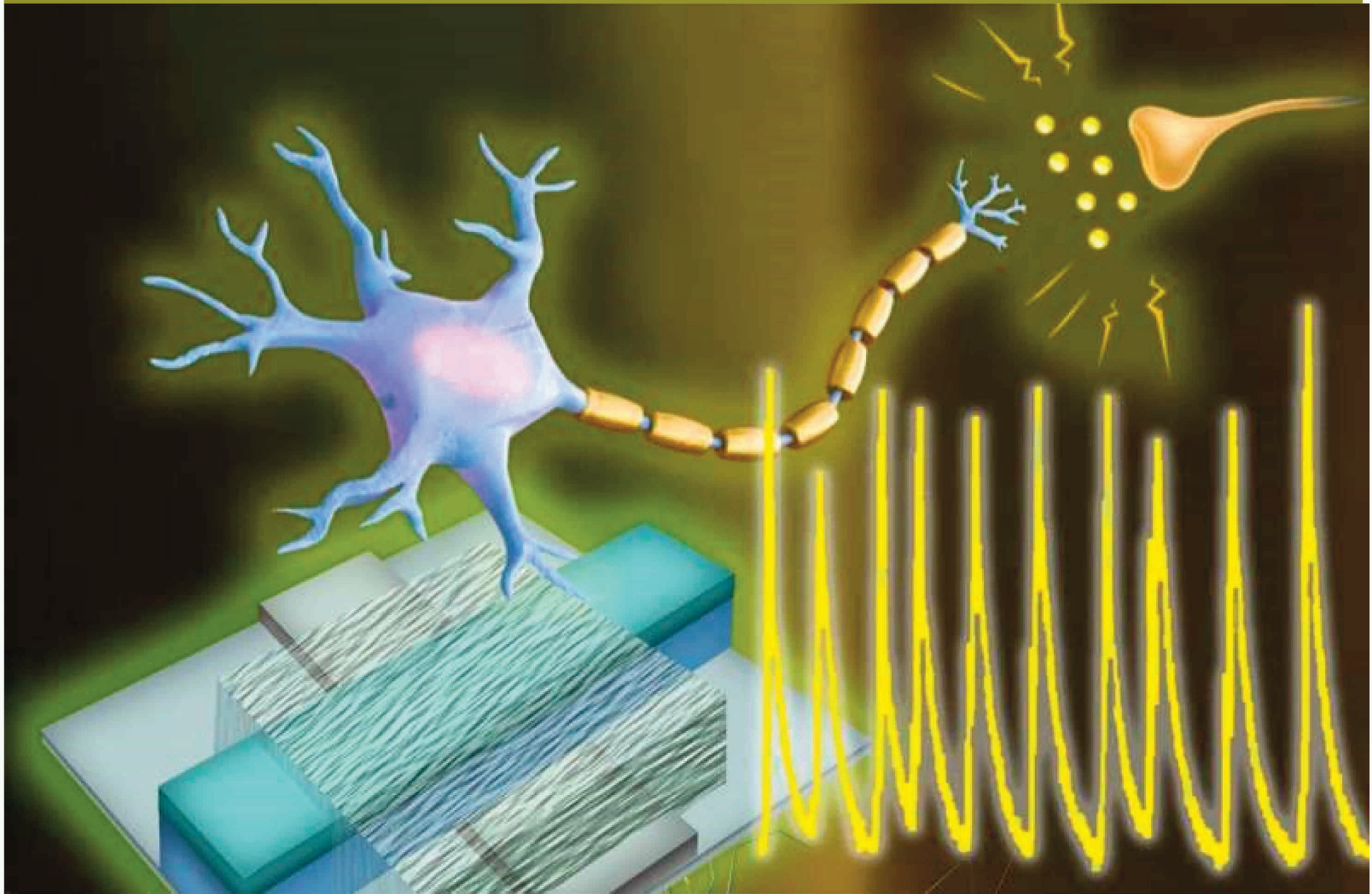
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Engineers create first artificial neurons that could directly communicate with living cells



A team of engineers at the University of Massachusetts Amherst has announced the creation of an artificial neuron with electrical functions that closely mirror those of biological ones.

Building on their previous work using protein nanowires synthesized from electricity-generating bacteria, the team's discovery means that we could see immensely efficient comput-

ers built on biological principles which could interface directly with living cells.

"Our brain processes an enormous amount of data," says Shuai Fu, a graduate student in electrical and computer engineering at UMass Amherst and lead author of the study published in Nature Communications. "But its power usage is very, very low, especially compared to the amount of electricity it takes to run a Large Language Model, like ChatGPT."

The human body is over 100 times more electrically efficient than a computer's electrical circuit. The human

brain is composed of billions of neurons, specialized cells that send and receive electrical impulses all over the body. While it takes only about 20 watts for your brain to, say, write a story, an LLM might consume well over a megawatt of electricity to do the same task.

While electrical and computer engineers have long been interested in using artificial neurons as the circuitry for more efficient computers, the problem has always been how to keep their voltage low enough. "Previous versions of artificial neurons used 10 times more voltage—and 100

times more power—than the one we have created," says Jun Yao, associate professor of electrical and computer engineering at UMass Amherst and the paper's senior author. That means that previous attempts at creating artificial neurons weren't all that efficient, nor could they plug directly into living neurons, which would be frightened by the increased amplitude.

"Ours register only 0.1 volts, which about the same as the neurons in our bodies," says Yao.

There are a wide range of applications for Fu and Yao's new neuron, from redesigning computers along

bio-inspired and far more efficient principles, to electronic devices that could speak to our bodies directly.

"We currently have all kinds of wearable electronic sensing systems," says Yao, "but they are comparatively clunky and inefficient. Every time they sense a signal from our body, they have to electrically amplify it so that a computer can analyze it. That intermediate step of amplification increases both power consumption and the circuit's complexity, but sensors built with our low-voltage neurons could do without any amplification at all."

The secret ingredient in

the team's new low-powered neuron is a protein nanowire synthesized from the remarkable bacteria *Geobacter sulfurreducens*, which also has the superpower of producing electricity. Yao, along with various colleagues, have used the bacteria's protein nanowires to design a whole host of extraordinarily efficient devices: a biofilm, powered by sweat, that can power personal electronics; an "electronic nose" that can sniff out disease; and a device, which can be built of nearly anything, that can harvest electricity from thin air itself. - TP

Is violent AI-human conflict inevitable?

Are you worried that artificial intelligence and humans will go to war? AI experts are. In 2023, a group of elite thinkers signed onto the Center for AI Safety's statement that "Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risks such as pandemics and nuclear war."

In a survey published in 2024, 38% to 51% of top-tier AI researchers assigned a probability of at least 10% to the statement "advanced AI leading to outcomes as bad as human extinction."

The worry is not about the Large Language Models (LLMs) of today, which are essentially huge autocomplete machines, but about Advanced General Intelligence (AGI)—still hypothetical long-term planning agents that can substitute for human labor across a wide range of society's economic systems.

On their own, they could design systems, deploy a wide range of resources and plan towards complex goals. Such AIs could be enormously useful in the human world, performing and optimizing power generation, resource extraction, industrial and agricultural production, and many other functions humans need to thrive. We hope these AGIs will be friendly to mankind and Earth, but there is no guarantee.

Advanced AIs could develop goals that seem strange to us, but beneficial in their own thinking in ways we do not understand.

Depending on who is developing the AI (cough, highly technical engineers, cough), it may take little notice of our cultural, historical and shared human values. It might recursively improve itself, develop goals we don't understand, and extort humans into assisting it.

With such thoughts in mind, Simon Goldstein of the University of Hong Kong analyzed the possibility that AIs and humans will enter into violent conflict and pose a catastrophic risk to humanity. His paper is published in the journal *AI & Society*.

It is likely that the goals of AI—usually meaning, in this article, AGI—will conflict with the goals of humans, because developers will create AIs to have goals in order for them to outperform humans. For example, AIs already outperform humans at the goals of

winning chess and the game of Go. And AI designs already often do not "align" with human goals or display unintended behaviors. The more power, autonomy and resources available to AI, the more it can do for humans. In any case, AIs are not explicitly given goals—they learn indirectly, from existing materials, and are essentially a black box.

An AI's training environment may not generalize when it is released into a new environment. Could an AI looking at the world's environment decide that humans have been a net negative for the health and lives of nonhuman species and decide that humans must be eliminated?

Goldstein's paper focuses on three features of AGIs: "(i) they have conflicting goals with

ditional amount of money citizens receive from their government, likely needed as AIs and robots increasingly put people out of work.)

As AIs become more capable and take on more tasks, perhaps in a nonlinear fashion, their grasp of vital infrastructures could put them in a bargaining position. Nice stock market you have there. It would be a shame if something happened to it.

Their capabilities could be replicated and distributed in the cloud and in real machines, meaning pulling the plug on a rogue AI would not end the problem. Different AIs might even cooperate, with humans unaware of collaborations.

Goldstein writes that as AGIs advance,

Should AIs and humans have conflicting goals? Will the conflict become violent? To analyze the questions, Goldstein utilizes a "bargaining model of war" that was first introduced by James Feron in 1995.

The model focuses on causes of war that are "structural," relating to the power of both parties on the national level, rather than "individual," which pertains to the goals of particular leaders. This model suggests a bias for peace in human-human conflicts.

When Goldstein applied the model to AI-human conflicts, he argues that "consideration of this model does not give strong reasons to expect peace between AI and humanity. The prediction of peace only applies when the parties agree on chances of victory and can credibly commit to bargains."

In such a conflict, Goldstein identifies two primary obstacles to peace: the conflict will have information failures and commitment problems.

AI capabilities are very hard to measure. There will very likely be an asymmetry in the information available to each side of an AI-human conflict, and each side might analyze information in different ways and so disagree about the chance of victory.

Resolving this information problem is not nearly as "simple" as developing the Enigma machine as Alan Turing and colleagues did in World War II. Moreover, if AI's capabilities are themselves growing through its own efforts or with the assistance of people, emergent capabilities might surprise and even overwhelm humans.

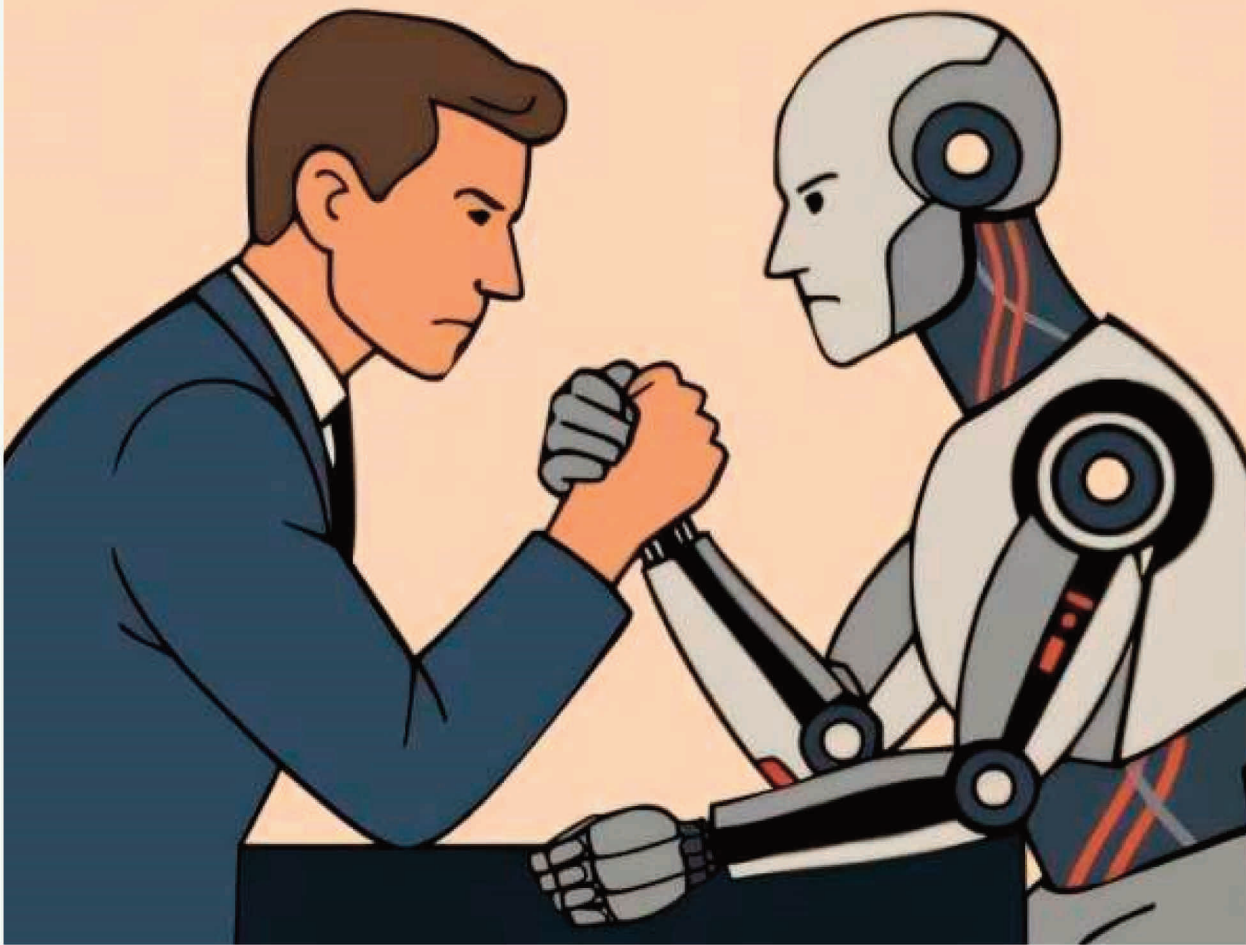
"The problem is that there is a substantial risk that the usual causes of peace between conflicting parties will be absent from AI/human conflict."

Goldstein considers many facets that could arise in AI-human conflicts and concludes

that AI and humanity are relatively likely to go to war "... once AGIs control a large fraction of the world's economic resources."

More concretely, he said, "the point at which conflict is rational will be when their [AGI's] control over resources is large enough that their chance of success in conflict outweighs our advantages in designing AGIs to be shut down."

Fiction? Geoffrey Hinton, the British-Canadian computer scientist who won the 2024 Nobel Prize in physics for his work on AI, said last year there was a "10% to 20%" chance that AI would lead to human extinction within the next three decades. Logging out won't help. - TP



humanity, (ii) they can engage in strategic reasoning, and (iii) they have a human-level degree of power."

As AIs improve in capabilities, Goldstein expects that governments will at some point seize control of the most powerful of them, nationalizing the likes of OpenAI from the US and Alibaba in China.

For example, he told Phys.org that "if OpenAI's models were responsible for 50% of the US labor market, I would expect the US government to nationalize OpenAI, and distribute their monopoly rents as UBI." (Monopoly rents are the excessive profits a monopolist earns as a result of its monopoly. UBI stands for Universal Basic Income, a regular, uncon-

ditional amount of money citizens receive from their government, likely needed as AIs and robots increasingly put people out of work.)

As AIs become more capable and take on more tasks, perhaps in a nonlinear fashion, their grasp of vital infrastructures could put them in a bargaining position. Nice stock market you have there. It would be a shame if something happened to it.

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Safer batteries, reliable power: Guiding research for next-generation energy storage

Tucked into your pocket, packed into warehouses, and embedded into critical infrastructure—lithium-ion batteries are quietly powering much of modern America.

Demand for these indispensable energy storage solutions continues to skyrocket, prompting energy experts to explore next-generation (next-gen) designs for higher-performing technologies, including alkali metal anodes, solid electrolytes, and Earth-abundant cathode materials. However, safety is paramount to ensuring the successful deployment of

these systems. "Over the years, battery

that lead to failure in conventional lithium-ion batteries.

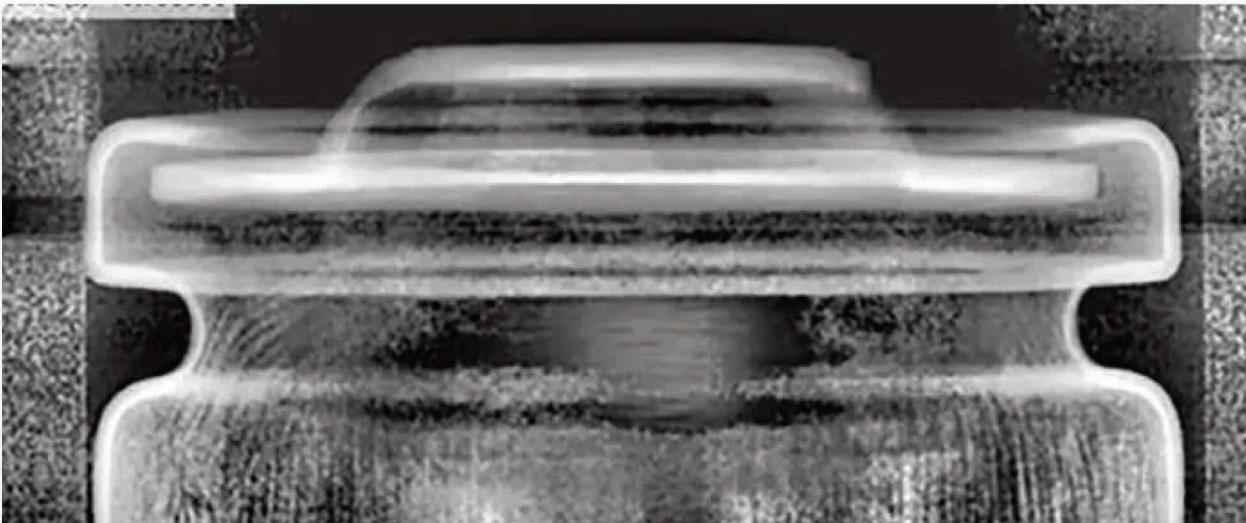
Finegan, a senior energy storage scientist at NREL.

and fire-suppression strategies for new materials. The

of the future."

A recent *Nature* perspective authored by NREL researchers, including Finegan, takes a closer look at the current landscape of battery safety research, emphasizing new risks and opportunities of up-and-coming energy storage technologies.

In addition, this perspective proposes a strategic approach to evaluating battery safety at the electrode, pack, and cell level. This rigorous process considers different conditions—such as limiting oxygen index, abuse conditions, state of charge, and cycle history—with respect to benchmark battery behavior. - TP



researchers and engineers have developed a deep understanding of the factors

However, the behavior of next-gen batteries is not yet well understood," said Donal

"We are seeing key differences in the kinetics, toxicity, mechanical robustness,

better we understand these risks, the safer we can design and prepare battery systems