

FORTNIGHTLY ENGINEERING REVIEW

The voice of engineers

Founded by **Najam ul Hassan (Marhoom)**
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Is Pakistan Engineering Council facing an existential threat?

By Manzoor Shaikh
 The Pakistan Engineering Council (PEC) suffered two shocks after its elec-

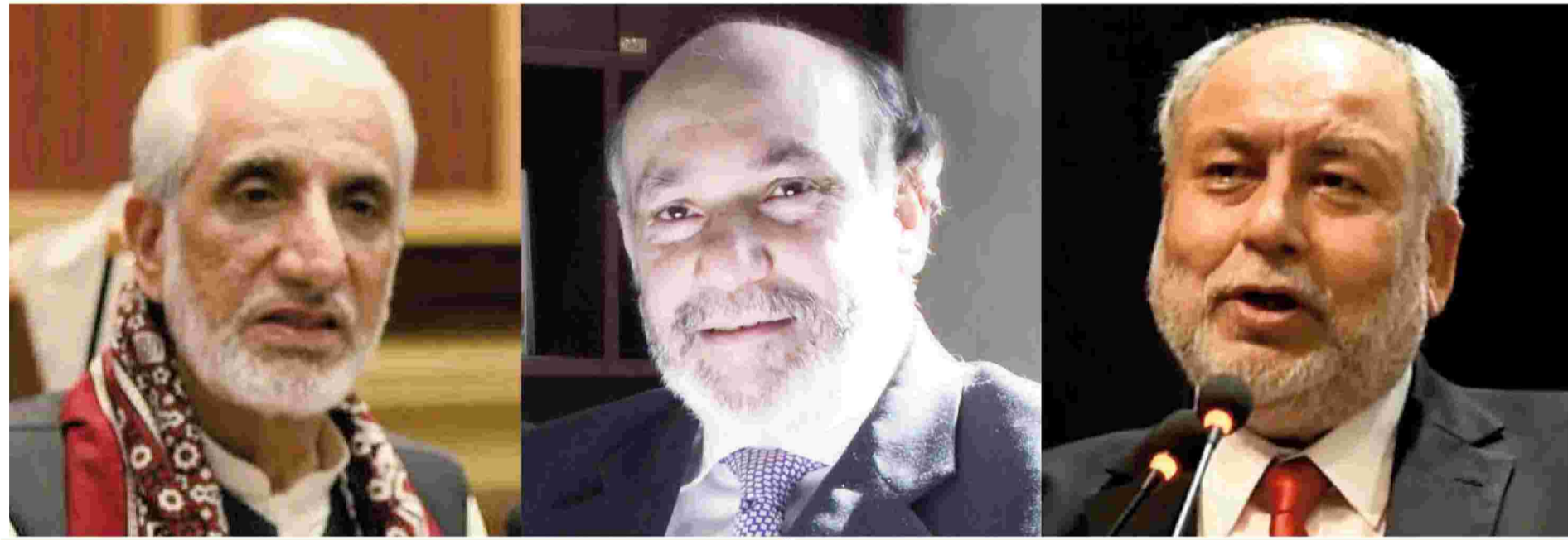
tions last year (2024) and thus stands as an organization eclipsed by grave uncertainty about its future.
 The first shock was that

the council lost its fundamental ethos of being inclusive and consultative, and the second was severe allegations of misgovernance and absence of transparency in financial matters, which resulted in the

constitution of a Ministerial Committee to scrutinize the council's performance and determine if complaints lodged against it are based on facts.
 The ironic part of the

story is that the political bosses of engineers' groups across Pakistan still seem to be digging fortunes for their groups instead of dwelling deeply on efforts to improve the functioning of the council

and seeking advice and suggestions from engineers across the country. All such organizations across the world organize broader and
Contd on page 2



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Is Pakistan Engineering Council facing an existential threat?

Contd from page 1
more intense consultative meetings to face challenges they encounter in the wake of engineering aspects of the economy, engineering educa-

which, as per the Act of the council, is mandated to meet thrice a year—and take the elected members into confidence. "Why would he call the meeting?" asked one of

Interestingly enough, it's been seven months since the PEC elections, and little less than half of the GB members hailing from The Engineers Pakistan (TEP), led by Engr.

politically-driven committee led by Engr. Qadir Shah, whose prime objective, according to NEA insiders, is to place his men in the working groups and committees.

Engr. Nazir's political move has helped him neutralize Engr. Mukhtiar Shaikh—in a marriage of inconvenience with Engr. Shah—since he cannot afford to face both Shah and Shaikh in the same line. Engineers close to Engr. Shaikh suggest he turned instrumental in launching a tirade against the chairman during a recent meeting of the Management Committee

of the council. The chairman is said to have been alienated in the meeting, echoed by hot arguments, and finally called off without discussing the agenda.

The chairman's style of running the affairs of the council and the post-PEC elections flurry of allegations of corruption leveled by Engr. Zahoor—a former member of the GB—have compounded into an impression across the country that the council has malfunctioned.

"The council seems to have been paralyzed after its

elections, especially,' believes a GB member. Even the PEC chairman cared not to look into the allegations of a former GB member that damaged the image of the council, he stated. "The young engineers, already angry with engineering political groups led by veterans, contribute to the accusation game too."

The image of PEC in the federal public sector organizations and the ruling circles has been tarnished, claims an engineer working with a federal government department at a higher position. "At any level, no one from the top of the council came forward to control the damage." The council, though working under the Ministry of Science & Technology (MoST), is not synchronized with the relevant ministries so that they could be part of the overall development of the country, he argued, saying it's for this reason that Engr. Jawed Salim's complaints traveled to the federal cabinet.

With such an image in mind, a high-powered committee will assess the performance of the council, mandated to evaluate the performance of the Pakistan Engineering Council in accordance with its mandate, as outlined in the preamble of the Pakistan Engineering



tion and institutions, environmental disasters, and the onslaught of new technologies that have started swallowing traditional sets of engineering disciplines. However, the PEC seems negligent of all challenges and also real threats emanating from inside the council. In recent months, the council, as scores of engineers believe, has become a secret service-like organization, whose boss's doorless office attracts a scant few of his cronies in running the affairs of the council.

Amidst concerns about the outcome of the Federal Cabinet's Ministerial Committee, the council cared not to convene the meeting of the Governing Body (GB)—

his close allies, saying he is a manager, not a leader. A senior engineer who prefers to remain anonymous said, "He is an exclusionist; it's his style, and that's the reason he did not form committees, which is the mandate of the governing body. The chairman of the council cannot make committees as per the law," claims another senior engineer. The committees that he called "working groups" are based on governing body members. None of these committee-cum-groups have come up with anything substantial. A member of such a group told Engineering Review that he was unable to understand the situation; no one was interested in working.

Jawed Salim Qureshi, stayed away from the meetings of the working groups. The reason is the alleged lack of transparency in the poll. "They shall not turn up unless their grievances are addressed," they said. After the polls, many of these elected members fear drastic changes that may fall upon the council in the backdrop of the outcome of the Ministerial Committee's hunt.

Some of these members believe the NEA, led by Engr. Qadir Shah, and TEP should sit together to save what they call the very existence of the council. But it seems less probable as Chairman Engr. Waseem Nazir has already appeased NEA's Shah group by making a



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IPCC Kicks Off Special Report on Climate Change and Cities with Inaugural Lead Author Meeting

The inaugural Lead Author Meeting for the Intergovernmental Panel on Climate Change (IPCC) Special Report on Climate

gender representation. For the first time in IPCC history, women make up the majority of the authors, with 51 women and 46 men out of the 97 total authors, marking a significant step forward in diversifying climate science.

urgent and timely examination of the latest scientific developments concerning climate change in urban environments, including climate impacts, risks, and potential solutions for adaptation and mitigation.

Thousands of experts from around the world contribute to the IPCC's work. Authors volunteer their time to evaluate the latest scientific studies and provide a comprehensive summary of knowledge on climate

change; Working Group II addresses impacts, adaptation, and vulnerability; and Working Group III is concerned with mitigation. Additionally, the Task Force on National Greenhouse Gas Inventories

al negotiations to address climate change. These reports undergo multiple stages of drafting and review to ensure objectivity and transparency.

About the Seventh Assessment Cycle IPCC assessment reports



SIXTY-FIRST SESSION OF THE IPCC

Change and Cities was held from March 10 to 14, 2025, at the Osaka International Convention Centre in Osaka, Japan. The event gathered nearly 100 experts from over 50 countries, including researchers and practitioners in physical sciences, climate impacts, adaptation, vulnerability, and mitigation. These experts were selected as Coordinating Lead Authors and Lead Authors for the report, which is slated for completion by March 2027.

The meeting's primary goals were to kick off the drafting process for the Special Report, review the relevant literature, and ensure that the various chapters align coherently. The report aims to offer a comprehensive analysis of the most current scientific understanding regarding climate change's impacts, risks, and solutions specifically for urban areas.

A notable feature of this report is its authorship, which is a landmark achievement in

Looking ahead, the second Lead Author Meeting is set for July 21 to 25, 2025, where authors will continue to develop the content of the report, incorporating feedback from expert reviews.

"This Special Report lays the groundwork for leveraging the full potential of cities in combating climate change, ensuring they remain resilient, inclusive, and sustainable for future generations. We are excited to see the insights our expert contributors will bring to creating a robust and actionable report," said Winston Chow, Co-Chair of Working Group II.

The drafting of this Special Report, which stands as the only Special Report in the seventh assessment cycle, commenced with the authors working from the outline established during the IPCC's 61st Session in Sofia, Bulgaria, in July-August 2024. This meeting also focused on discussing the literature to be assessed and ensuring that all chapters complement each other effectively.

The report will provide an

"It's thrilling to meet the leading experts selected from around the globe and across various fields, all collaborating to draft this Special Report. We celebrate the dedication of scientists and practitioners who are volunteering their time to create a more livable future for our cities," remarked Diana Ürge-Vorsatz, Chair of the Scientific Steering Committee for the scoping of the Special Report and Vice Chair of the IPCC.

What is the IPCC? The Intergovernmental Panel on Climate Change (IPCC) is the United Nations body responsible for assessing climate science. Established by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) in 1988, the IPCC provides periodic scientific assessments on climate change, its impacts, and risks, along with strategies for adaptation and mitigation. Endorsed by the UN General Assembly in the same year, the IPCC is comprised of 195 member states.

change's causes, impacts, and risks, as well as how adaptation and mitigation can reduce these risks.

The IPCC operates through three working groups: Working Group I focuses on the physical sci-

develops methodologies for measuring emissions and removals.

IPCC reports provide governments with vital scientific data to inform the development of climate policies and are instrumental in international

are published every 5 to 7 years. The current seventh assessment cycle began in July 2023, with the election of new IPCC and Task Force Bureaus during the IPCC's Plenary Session in Nairobi. -- ERMD

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Energy Solutions Limited Partners with Elsewedy Electric to Offer Busways in Pakistan

Energy Solutions Private Limited (ESL), a leading name in power generation and renewable energy, proudly announced its partnership with Elsewedy Electric, a globally renowned Egyptian company, to introduce state-of-the-art busways to Pakistan's power distribution landscape.

The signing ceremony took place at ESL's head office on February 17, 2025. The agreement was formally signed by Ibrahim Fayed, Commercial Manager - Busways from Elsewedy Electric, Egypt, and Mohammad Nadeem Sadiq, COO of Energy Solutions (Pvt.) Limited. In addition to the signing, a training session was also conducted for ESL's employ-



About Elsewedy Electric
Elsewedy Electric is a globally recognized leader in energy solutions with decades of experience delivering cutting-edge electrical products and services. Renowned for their commitment to innovation, sustainability and efficiency, Elsewedy Electric's partnership with Energy Solutions (Pvt.) Limited is a testament to their shared vision of revolutionizing power infrastructure.

Why Busways Are a Game Changer

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ees to enhance their understanding of busway technology and its applications.

This strategic collaboration marks a significant expansion of ESL's product portfolio. Known for its excellence in gen-

erators, parts, services and renewable solutions, Energy Solutions (Pvt.) Limited has now incorporated busways as an innovative alternative to conventional cable systems, further strengthening its power solutions portfolio.

Innovation at Energy Solutions (Pvt.) Limited

This partnership underscores ESL's dedication to innovation and leadership in Pakistan's energy sector. By introducing cutting-edge solutions like busways, ESL continues to redefine industry standards, ensuring that its clients have access to the best products and technologies available globally.

In his message on the occasion, Mr. Muhammad Tariq Haq, CEO of ESL, stated, "Our collaboration with Elsewedy Electric reflects our commitment to bringing world-class innovations to Pakistan. With busways, we are offering a solution that is safer, more efficient and future-ready. This partnership is just the beginning of our journey towards reshaping power distribution in the region."

As Pakistan's energy needs continue to evolve, Energy Solutions (Pvt.) Limited is proud to lead the way in providing smarter and more efficient solutions. The introduction of busways represents a bold step forward in delivering on that promise.

About Energy Solutions Private Limited (ESL)

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Under the umbrella of ESL Renewables (Pvt.) Limited, the company also delivers energy-efficient Solar & Micro-grid EPC Solutions, prioritizing sustainability and reliability. With ISO certification and a dedicated team of certified engineers and expertise in power plant design, installation, commissioning, and maintenance, ESL ensures seamless power solutions for a diverse range of industries. - Karachi, Pakistan: PR

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"You don't learn to walk following rules. You learn by doing? and falling over."

- Richard Branson

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"HEAL PAKISTAN – Green Sustainability and Climate Change" Conference in Lahore NESPAK, in Strategic Partnership with Synergy Inc., Leads Green Punjab Initiative

NESPAK, in strategic partnership with Synergy Inc., successfully organized the HEAL PAKISTAN Conference today at PC Hotel, Lahore. The campaign was officially inaugurated at

detrimental to health concerning climate change, mainly focusing on heatwaves, poor air quality, etc.

- Vice President, Bank of Punjab (BOP): Financial models supporting green infrastructure development.

- Mr. Kamal Ali Haider, Member of the

has launched HEAL PAKISTAN – Green Sustainability and Climate Change, an ambitious initiative spearheaded by NESPAK in collaboration with Synergy Inc. This initiative is designed to address the growing environmental challenges by promoting sustainable development and climate resilience

HEAL PAKISTAN is not only setting the agenda but also driving actionable solutions. By leveraging cutting-edge industry expertise and sustainability-driven innovation, this initiative seeks to transform discussions into tangible climate action, policy implementation, and lasting change.



NESPAK House, Lahore, by Mr. Zargham Eshaq Khan, Managing Director and President of NESPAK. Later, he welcomed esteemed guests at the PC Hotel, where the two-day conference took place. In his opening remarks, he emphasized the critical need for environmental sustainability and proactive measures to combat climate change.

Ms. Ambrin Sipra, Chief Executive Officer of Synergy Inc., addressed the audience, presenting key insights on the topics "App Demonstration – A Digital Leap for Environmental and Infrastructure Integration" and "Technology and Sustainability—Bridging the Gap Between Policy and Practice."

Keynote addresses were delivered by prominent stakeholders on the following topics:

- Mr. M Imran, DG SUPARCO, spoke on the policy direction for data integration and the necessity of local satellite-based data to address climate change challenges.

- Dr. Zafar Iqbal, Additional DG EPA, highlighted the topic of the regulatory framework for sustainable urbanization.

- Mr. Zeeshan Usman, Director of Engineering at Lahore Development Authority (LDA), emphasized that essential services should be within a 15-minute distance to reduce emissions and promote pedestrian- and environment-friendly modes of transport. He also mentioned that joint efforts among like-minded individuals are crucial to finding feasible solutions to climate-related issues.

- Professor Catalina Turcu, from University College London, presented factors most

Judicial Water and Environment Commission of Punjab, stressed the importance of maintaining a balance between the existing landscape and proposed green interventions. He emphasized that existing green spaces should be integrated into urban designs, rather than replaced or damaged in favor of new initiatives.

- The Director, Ministry of Climate Change (MOCC), underscored the reality of climate change and emphasized collaborative efforts toward climate financing to address future challenges.

The high-level conference brought together policymakers, environmental experts, urban planners, and industry leaders to discuss the country's most pressing climate and sustainability challenges. Through collaborative discussions, policy dialogues, and strategic planning, the initiative aims to chart a path toward a climate-resilient Pakistan, ensuring both environmental sustainability and economic viability.

Key Focus Areas of the Conference:

- Climate adaptation strategies to mitigate environmental risks

- Sustainable infrastructure and resilient urban development

- Green energy solutions and carbon reduction policies

- Eco-driven economic models and circular economy approaches

Pakistan stands at a crucial turning point in its fight against climate change, necessitating urgent and collective action. Under the Green Punjab Initiative, the Government of Punjab

across the country.

"HEAL PAKISTAN is more than just a conference—it is a movement. This initiative calls for immediate action, innovative policy reforms, and sustainable solutions to safeguard Pakistan's future," stated a NESPAK spokesperson.

With Synergy Inc. as a strategic partner,

As climate change presents unprecedented environmental and economic challenges, HEAL PAKISTAN marks a significant milestone in aligning Pakistan's development agenda with global climate commitments. This initiative represents a decisive step toward a cleaner, greener, and more sustainable future for generations to come. ■

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Climate Change, Environmental Coordination plants 67.5 m trees

Ministry of Climate Change and Environmental Coordination (MoCC&EC) over the past year, had planted 67.5 million trees under the Green Pakistan Program, creating 200,000 green jobs and secured \$91.5m for climate projects.

According to an official document, available with APP, climate finance saw remarkable growth in 2024, securing \$8.1 million from

climate change mitigation.

Key bilateral climate agreements were also secured with Belarus, UNICEF, and the International Rescue Committee. The country's leadership in global climate forums was evident through its active participation in the United Nations Framework Convention on Climate Change (UNFCCC), where it played a pivotal role in various committees.

It further demonstrated its dedication to gender-responsive climate policies by hosting the AFPPD meeting. The ministry reaffirmed its commitment to interna-

The appointment of a regular Executive Director at the Global Change Impact Study Centre (GCISC) strengthened research and policy development, while the creation of a Climate Finance Wing ensured efficient allocation of resources for climate action.

In a bid to enhance transparency and accountability, the ministry fully implemented e-office systems and launched the e-Pak Acquisition & Disposal System (EPADS), streamlining procurement processes and improving operational efficiency.

The ministry also imple-



the Global Environment Facility (GEF) and \$83.4 million from the GCF for bio-diversity conservation and land degradation efforts.

Similarly, the Green Climate Fund (GCF) backing the Acumen Climate Action Fund and the Recharge Pakistan project, aimed at enhancing climate resilience. In a year marked by robust international engagement, the ministry signed the SCO Environmental Protection Agreement and the Joint Action Plan for the SCO Green Belt Program, reinforcing its commitment to regional cooperation on sustainable development and

tional climate agreements by achieving a 67.5% reduction in Hydrochlorofluorocarbons (HCFCs) phase-out under the Montreal Protocol and banning pre-blended polyols with HCFC-141b.

Pakistan also submitted its Biennial Transparency Report (BTR) to the UNFCCC and implemented carbon market trading policies under the Paris Agreement.

To align with the Kunming-Montreal Global Biodiversity Framework, the ministry revised Pakistan's Land Degradation Neutrality (LDN) targets and updated its Nationally Determined Contributions (NDC-2021).

mented a comprehensive media strategy to raise awareness about climate change, organizing seminars, workshops, and dialogues to highlight Pakistan's vulnerabilities and resilience measures.

Collaborations with local and international media for events like World Environment Day and campaigns to reduce plastic use were widely applauded. A bi-monthly newsletter was launched to keep stakeholders informed about climate-related updates and achievements. -- ERMD

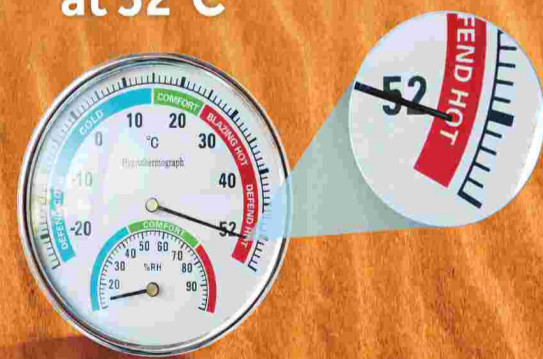
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Challenges to Agriculture in Sindh

There are three major challenges to agriculture in Sindh.

Water Scarcity: Despite the reliance on the Indus River, water availability remains a major issue, with frequent droughts affecting crop yields.



Climate Change: Extreme weather conditions, such as heatwaves and floods, can damage crops and reduce agricultural productivity.

Also, infrastructure issues pose a challenge too. The poor rural infrastructure and limited access to markets hinder the full potential of Sindh's agricultural sector. ■

Sindh Agricultural Experts Develop 22 New Crop Varieties to Boost Yields with Less Water

In a groundbreaking move to enhance agricultural productivity while conserving water, agricultural experts in Sindh have developed 22 new crop varieties

government.

The crucial approval was granted during an important meeting chaired by Sindh's Minister of Agriculture, Sardar Muhammad Bakhsh Khan Mehr. The minister emphasized the importance of these innovations, especially in the face of climate

approved 10 additional crop varieties across various agricultural sectors. Among these are new maize varieties such as Mazhar Gold, Sindh Rani, and Sarhan, as well as mustard varieties like Neeya Canola and Neeya Toria Gold. In addition, the Mirpurkhas Desi Mango variety

Sardar Muhammad Bakhsh Khan Mehr congratulated DG Research Mazhar Kario and his team for their exceptional work in developing these new agricultural crop varieties. The minister noted that these innovations are crucial to addressing the challenges posed by climate

change, including rising temperatures and unpredictable rainfall patterns. "As climate change continues to affect our agricultural systems, it is vital to adopt new technologies and techniques to ensure food security," said Mehr. "Due to decreasing rainfall, it's imper-

ative that we modify traditional farming practices and introduce crop varieties that are more resilient to water stress." The Minister also highlighted the significant progress that Sindh has made in cotton production, surpassing Punjab this year. He

ing how innovative farming practices can lead to sustainable agricultural growth even in challenging environmental conditions. The new crop varieties approved by the Provincial Seed Council represent a significant step forward in ensuring that Sindh continues to lead the way in



that promise higher yields with significantly reduced water usage.

The new varieties, including those for cotton, maize, mustard, rice, pulses, and mango, were recently approved by the Provincial Seed Council of the Sindh

change and increasing water scarcity, which have severely impacted traditional farming practices across the country.

The approved varieties include three new varieties of cotton – CKC1, CKC221 – and four new rice varieties – CKC6, Ghori 2, Haf 3, and ICS 386. The council also

was also given the green light for cultivation.

The new sesame variety, TS3, was approved along with four rice varieties, KS434, Basmati 515, and Kainat, which are expected to help farmers adapt to the evolving agricultural landscape.

change, including rising temperatures and unpredictable rainfall patterns.

"As climate change continues to affect our agricultural systems, it is vital to adopt new technologies and techniques to ensure food security," said Mehr. "Due to decreasing rainfall, it's imper-

attributed this success to the better crop care practices and the use of modern techniques by farmers in Sindh, which have helped mitigate the impact of water shortages.

Despite facing significant water scarcity, Sindh is emerging as a model for other provinces, demonstrat-

agricultural innovation and resilience.

This move signals a hopeful future for the province's agricultural sector, offering a potential blueprint for other regions grappling with similar challenges posed by climate change and water scarcity. - ER Report



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Battle of the Bots: Which AI Chat Reigns Supreme in Ease, Cost, and Content Brilliance?

By Syed Umair Ali

Artificial Intelligence (AI) has revolutionized how we interact with technology, particularly through conversational agents or "chat-bots." These tools have become indispensable in industries ranging from customer service to education, content creation, and mental health support.

With a growing number of AI-powered chat applications available today, it can be challenging for users to determine which one best suits their needs.

In this article, we compare ten of the most popular AI-based chat applications—similar to GPT—across three critical dimensions: ease of use, subscription plans, and quality of content.

1. ChatGPT by OpenAI

Ease of Use: ChatGPT is renowned for its intuitive interface, which makes it accessible even to non-technical users. The web-based platform requires no installation, and prompts are entered via simple text boxes. Mobile apps further enhance usability on the go.

Subscription Plans: OpenAI offers both free and premium versions. The free tier provides access to older models like GPT-3.5, while ChatGPT Plus (\$20/month) grants faster response times, priority access during peak hours, and exclusive features powered by GPT-4.

Content Quality: ChatGPT excels in generating high-quality, coherent

responses across diverse topics. However, factual accuracy occasionally falters due to outdated training data cutoffs.

2. Google Bard (Now Gemini)

Ease of Use: Google's Gemini boasts a sleek design integrated into Google Workspace products. It supports multi-modal inputs, including images and voice commands, enhancing user interaction.

Subscription Plans: Gemini is currently free but may introduce paid tiers as part of Google One subscriptions in the future.

3. Microsoft Copilot

Ease of Use: Copilot integrates seamlessly with Microsoft 365 apps such as Word, Excel, and Outlook, offering contextual assistance within familiar environments. Its conversational flow feels natural and responsive.

Subscription Plans: Available as part of Microsoft 365 Copilot Pro (\$20/month), targeting professionals who need advanced productivity tools. A standalone version might launch

soon. **Content Quality:** Powered by GPT-4 Turbo, Copilot generates polished, business-oriented content. Its ability to summarize documents, draft emails, and analyze spreadsheets makes it ideal for workplace efficiency.

4. Claude by Anthropic

Ease of Use: Claude's interface is clean and straightforward, though slightly less refined than competitors. It works via API integrations and third-party platforms like Slack.

Subscription Plans: Claude offers tiered pricing based on usage, starting at \$20/month for individual users. Enterprise solutions cater to larger organizations.

5. Meta Llama (Open Source)

Ease of Use: As an open-source model, Llama requires technical expertise to deploy locally. Pre-built interfaces exist but lack polish compared to commercial alternatives.

Subscription Plans: Free for personal and research purposes; enterprise licenses vary depending on customization requirements.

Content Quality: Llama performs admirably in niche applications where fine-tuning is essential. However, out-of-the-box performance trails behind proprietary models like GPT-4.

Ease of Use: Perplexity combines conversational AI with robust citation capabilities, presenting sources alongside generated text. This transparency enhances trustworthiness.

6. Perplexity AI

Ease of Use: Perplexity stands out for its commitment to verifiable facts. Responses often include hyperlinks to primary sources, ensuring accountability.

Subscription Plans: The basic plan is free, while Pro (\$20/month) unlocks additional features like ad-free browsing and enhanced privacy controls.

Content Quality: With contributions from global developers, Hugging Face models exhibit remarkable diversity. Performance depends heavily on the specific model chosen.

7. Jasper AI

Ease of Use: Jasper specializes in content creation, featuring templates for blogs, social media

8. Hugging Face Transformers

Ease of Use: Hugging Face hosts numerous pre-trained models accessible via APIs or local deployment. Technical proficiency is necessary for optimal utilization.

9. Character.AI

Ease of Use: Character.AI focuses on role-playing and entertainment, allowing users to converse with fictional characters. Setup is quick and fun.

Subscription Plans: Primarily free, with optional donations supporting character creators.

posts, and marketing copy. Its guided workflows simplify complex writing tasks.

Subscription Plans: Pricing starts at \$39/month for beginners, scaling up to custom enterprise packages.

Content Quality: Tailored for marketers, Jasper produces SEO-friendly, engaging content. However, its versatility outside marketing contexts is limited.

10. Replika

Ease of Use: Replika targets emotional well-being, functioning as a virtual companion. Conversations feel personalized and empathetic.

Subscription Plans: Basic functionality is free; premium memberships start at \$6.99/month for deeper interactions and customization options.

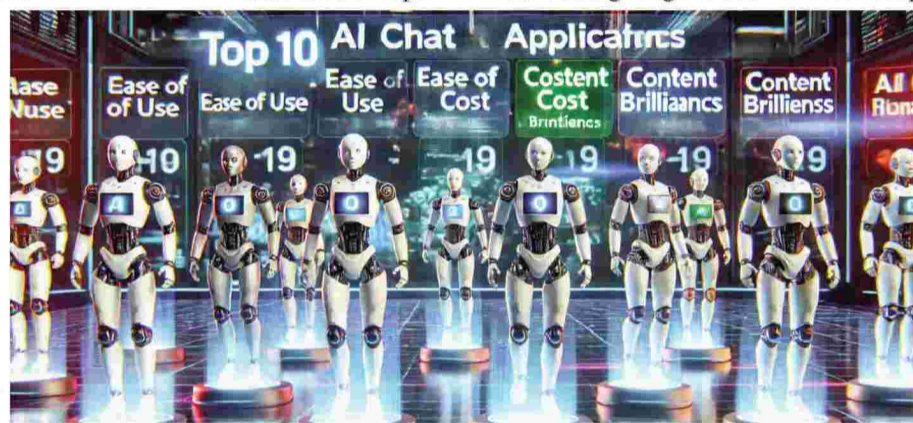
Content Quality: Replika prioritizes empathy over factual rigor, excelling in supportive dialogues but falling short in analytical tasks.

Conclusion

Ultimately, the landscape of AI chatbots continues to evolve rapidly. As these tools improve, they promise to redefine human-computer interaction, empowering users to achieve more than ever before. Whether you're crafting compelling narratives, analysing datasets, or simply looking for companionship, an AI assistant is waiting to assist you. ■



While entertaining, Character.AI struggles with factual accuracy. Best suited for casual conversations rather than professional applications.



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The Role of Edge AI in Decentralized Technology Management

Engr. Dr. Muhammad Nawaz Iqbal

Edge AI is making a much-needed difference in decentralized technology management by enabling real-time decision-making at the very periphery of the network. Unlike centralized AI systems that rely on the cloud as their brains, Edge AI works from the edge devices directly on board, cutting down latency and bandwidth consumption. This ability is especially helpful when it comes to decentralized systems where autonomy, security, and efficiency are crucial. Jointly, Edge AI would help organizations deploy intelligent solutions that are capable of operating independently, assisting in managing seamless operations despite environments with little or no connectivity. One of the key advantages of Edge AI in decentralized technology management is its ability to process data closer to its source. This minimizes the need for data transmission to centralized servers, reducing network congestion and improving response times. For applications such as industrial automation, smart cities, and autonomous vehicles, Edge AI ensures that critical decisions are made instantly, preventing delays that could compromise performance and safety.

Security is another crucial factor in decentralized systems, and Edge AI enhances data privacy by processing information locally. Since sensitive data does not need to be transmitted over networks, the risk of cyber attacks and unauthorized access is significantly reduced. This makes Edge AI particularly useful in sectors such as healthcare, finance, and defense, where data security and confidentiality are paramount. Edge AI also offers resilience and fault tolerance for decentralized networks. Since the traditional centralized network is prone to single points of failure, decentraliza-

tion distributes the computation task among a number of nodes. In such an event that one node goes down, some other node will take its duties, thereby providing continuity. This redundancy is essential for smart grids and IoT-type applications, as any disruption due to downtimes can be very costly.

Scalability is another major benefit of integrating Edge AI with decentralized technology management. As the number of connected devices continues to grow, centralized cloud-based systems struggle to handle the increasing data load. Edge AI alleviates this burden by processing data locally, allowing decentralized networks to scale efficiently without overloading cloud resources. This is especially valuable in industries like telecommunications and supply chain management, where large-scale deployments require seamless scalability. The role of Edge AI extends to autonomous decision-making, enabling decentralized networks to function with minimal human intervention. Machine learning models deployed at the edge continuously analyze data and adapt to changing conditions in real time. On the other hand, this self-learning ability is needed for closed-loop applied systems like an autonomous manufacturing setup, where machines must adjust operations according to dynamic, real-time inputs.

Energy efficiency is yet another key factor wherein Edge AI makes an impact on decentralized systems. AI-based services running in the cloud require massive computational power and energy for data processing and their actual transmission. By transferring some computations onto the edge, an organization can reduce power consumption and use resources efficiently for productivity. This stands as an added advantage for remote locations and IoT applications where energy is a prime concern. Edge AI further decentralized management in smart

cities by optimizing infrastructure operation. Infrastructure setup for traffic management, waste collection, and energy distribution could be further automated and improved through edge computing real-time analysis of data. With AI-based sensors and devices, cities can improve urban planning and resource distribution while minimizing operational costs.

Edge AI allows for the decentralized management of technology in healthcare. Wearables and remote monitoring systems equipped with AI locally analyze patient data and provide immediate insights, unchallenged by cloud connectivity. This facilitates timely intervention, betterment of patient outcomes, and reduced dependency on centralized healthcare infrastructures. In decentralized finance (DeFi), Edge AI enhances security and efficiency because transactions can be processed locally and then verified on a blockchain. This helps reduce network congestion and detect fraud better. AI can also coerce smart contracts to execute automatically when certain pre-defined conditions are met, thus enhancing the transparency and security of financial systems.

Supply chain management is another area where Edge AI supports decentralized decisions. Smart sensors and AI analytics enable inventory tracking, logistics, and demand forecasting. The follow-on effect is that, by reducing reliance on central control points, the supply chain turns agile and becomes resilient to disruptions such as delays, shortages, or changes in demand. In addition, Edge AI is a vital enabler for autonomous drones and robotics, providing the means for decentralized processing to facilitate real-time navigation and decision-making. AI autonomous drones can work independently in the fields of agriculture, Security, and Disaster Response while performing envi-

ronmental analysis, changing their actions according to the analysis, without continuing cloud communication.

Edge AI in telecommunication facilitates the decentralization of network management and consequently works towards the allocation of bandwidths, anomaly detection, and the upliftment of cyber-security. AI-enabled edge computing provides the necessary capabilities to telecom operators to optimize the network traffic by minimizing latency for applications like 5G and IoT connectivity. The gaming and entertainment industries have also embraced Edge AI for decentralized content distribution. AI-driven edge servers improve the real-time gaming experience with reduced lag and optimized resource allocation. Such systems will be particularly beneficial for cloud gaming platforms and virtual reality applications that cannot tolerate high latency.

In the world of decentralized technology management, Edge AI adoption continues to expand. Future work will focus on improving AI models, improving edge hardware capabilities, and developing more efficient communication protocols. With AI at the edge, organizations will create highly autonomous, secure, and scalable decentralized ecosystems that drive the transformation of technology management in every industry. ■



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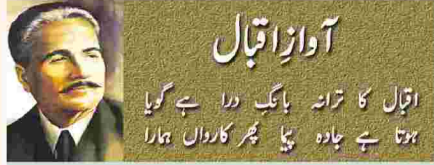
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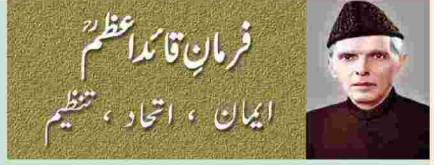
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اقبال کا ترانہ بانگ درا ہے گویا ہوتا ہے جاوہر پھر کاردار ہمارا

اے ہمالہ کوئی بازی گاہ ہے تو بھی جسے دست قدرت نے بنایا ہے عناصر کے لئے ہائے کیا فرط طرب میں جھومتا جاتا ہے ابر ٹیل بے زنجیر کی صورت اڑا جاتا ہے ابر

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Is Pakistan Engineering Council facing an existential threat?

Contd from page 2

Council Act of 1975 and its functions as specified in Section 8 of the Act. It will also assess the authenticity of complaints received against the PEC and the validity of general dissatisfaction with the council, and review the PEC Act of 1975 to identify any gaps or weaknesses in the law that may be affecting institutional outcomes.

Although some in Engr. Qureshi's camp believe the complaints lodged by them with the MoS&T, where an exercise of rightsizing departments is going on, may rebound on the complainants, 'Instead of focusing on election-related complaints, the Ministerial Committee would look into many other things that may have a huge impact on the council,' a TEP engineer says.

However, Engr. Jawed Salim Qureshi, talking to ER, said he welcomed the formation of the Ministerial Committee with a heavy heart. He demanded that first, it should be determined who brought the council to this point. "Our complaints on election transparency were not investigated properly, and now the culprits should be brought to the book. The council should be running as per the Act and Bylaws. No one other than the GB can constitute the committee."

In TEP, there are many who predict the extinction of the

council and see another mechanism to regulate engineering education and the industry.

'Since the leadership of the engineers is weak, I don't see the council in the future anymore,' said another engineer.

The NEA leader Abdul Qadir Shah agrees with Engr. Qureshi regarding the potency of the leadership. He believes



Engr. Nazir made a few mistakes at the outset, which worked as oil on the fire. However, he did not share the details of what exactly Engr. Waseem did that led to the situation reaching this extent.

The PEC headquarters, with few exceptions, seems content, and the officers and staffers welcome the scrutiny of the council's performance by the Ministerial Committee, as they believe whatever may be investigated has to do with the doings of the elected members

of the council. A few of them claim there is no ground for the allegations of Engr. Jawed Salim Qureshi, as these 760 votes were cast by veteran engineers, whose biometrics are not possible. 'It's a common practice in the elections, and even during the last elections, more votes were cast by senior engineers,' claimed one.

the chairman's autocratic style have caused real damage. 'The council chairman should have come up with a plan to discourage the practices that harmed the council's image,' he suggested, alleging some of the chairman's close aides were enjoying the same perks that others did during other administrations of the council.

Hundreds of miles away in other cities of Pakistan, this allegation is circulating, and many engineers point fingers at some of the chairman's close aides who allegedly receive undue perks. An engineer said many engineers have valid documentary proof to validate the allegations.

Are these allegations based on facts? The PEC chairman has to answer this question, but he is not in touch with the independent engineering media and could not be accessed despite repeated calls and messages by Engineering Review. However, he is present in all PEC offices across the country through his vision and mission statements, some of which are debatable though, hanging on the walls.

Now, all eyes are on the Ministerial Committee, which has been given three weeks to compile its report and what every engineer in Pakistan has to see is if the committee comes up with a realistic report and lays the groundwork for the reform of the council. ■

BISMILLAH HIR REHMAN NIR RAHEEM

WE CREATED YOU IN PAIRS

By Muhammad Tariq Haq | ESL

When Allah loves someone,
— He is loved by everyone, from earth to heaven.

— Who does not show off nor look down upon anyone (Muslim).

Allah loves the repentant,
— Seeking His pardon often.

He loves the virtuous with little provisions,
— Who begs not despite many children." (Muslim and Ahmed)

He loves those who purify themselves,
— From filth, sin, and transgression.

Allah is most generous,
— He loves generosity in all transactions.

Allah loves every pious, God-fearing person,
— And those who act righteously with excellence.

If people love each other for His gratification,
— Allah loves them too in a greater proportion.

He loves those who rely upon Him with complete dependence,
— And those who are just and fair in every action.

"The best deeds to Allah are the ones
— Which are few but consistent." (Bukhari and Muslim)

Allah loves the steadfast,
— Who in distress acts with patience.

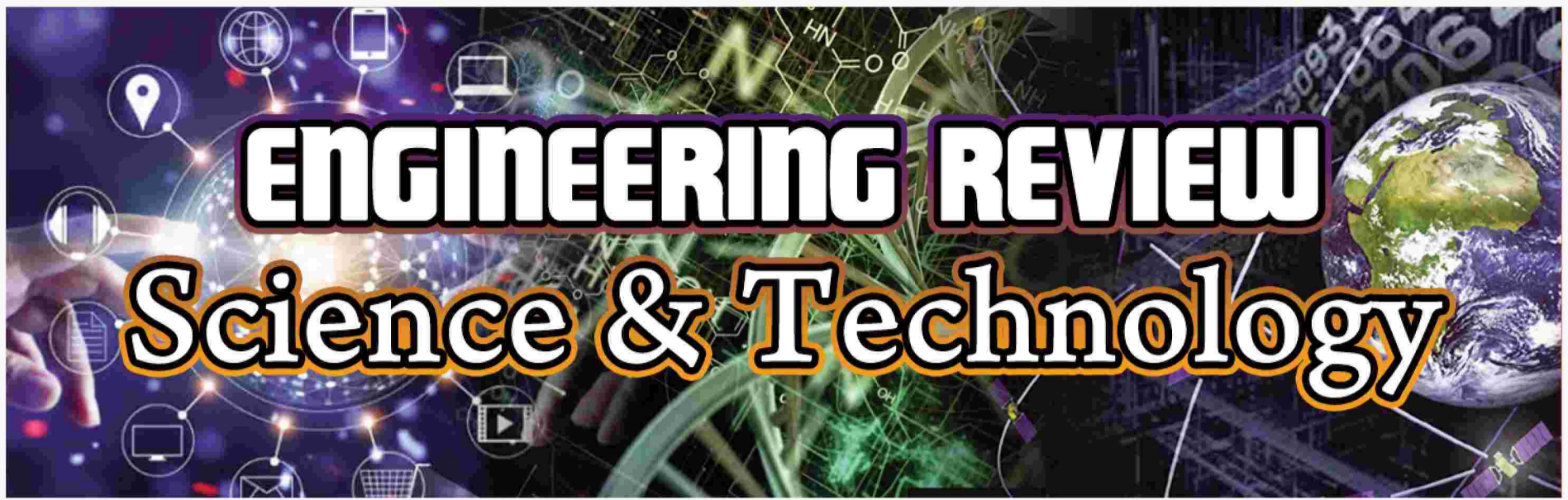
The thing Allah loves most, without question,
— Is offering prayers at their appointed times with full submission (hadith- Bukhari).

And those who for His cause line up,
— Hand in gloves, as combatants.

The one with the best mannerism and humble disposition,
— Will be a highly loved one on the day of resurrection.

As a united front,
— As if brass molten, after it is hardened.

May Allah include us in His loved ones,
— With all the qualities above mentioned.



Lithium needed for battery revolution could be harvested from saltwater lakes thanks to a new membrane

Demand for lithium is rising due to its use in batteries for mobile devices, cars and clean energy storage.

Securing access to natural deposits of the mineral is now a matter of strategic importance, but lithium can be found elsewhere in nature.

gas emissions in the process. The alternative developed by Dr. Qilei Song and his team in the Department of Chemical Engineering uses a membrane that separates lithium from salt water by filtering it through tiny pores.

The usual shortcoming with this approach is that the pores also let through magnesium and other con-

on a new generation of synthetic polymer membranes, based on materials known as polymers of intrinsic microporosity (PIMs). These polymers are shot through with tiny, hour-glass-shaped micropores that provide ordered channels through which small molecules and ions can travel.

In this new study, Dr.

for lithium, and produced high-purity battery-grade lithium carbonate.

If these membranes are to be of practical use, however, they must be produced in large quantities. Fortunately, the polymers are soluble in common solvents and can be turned into membranes using established industrial techniques.

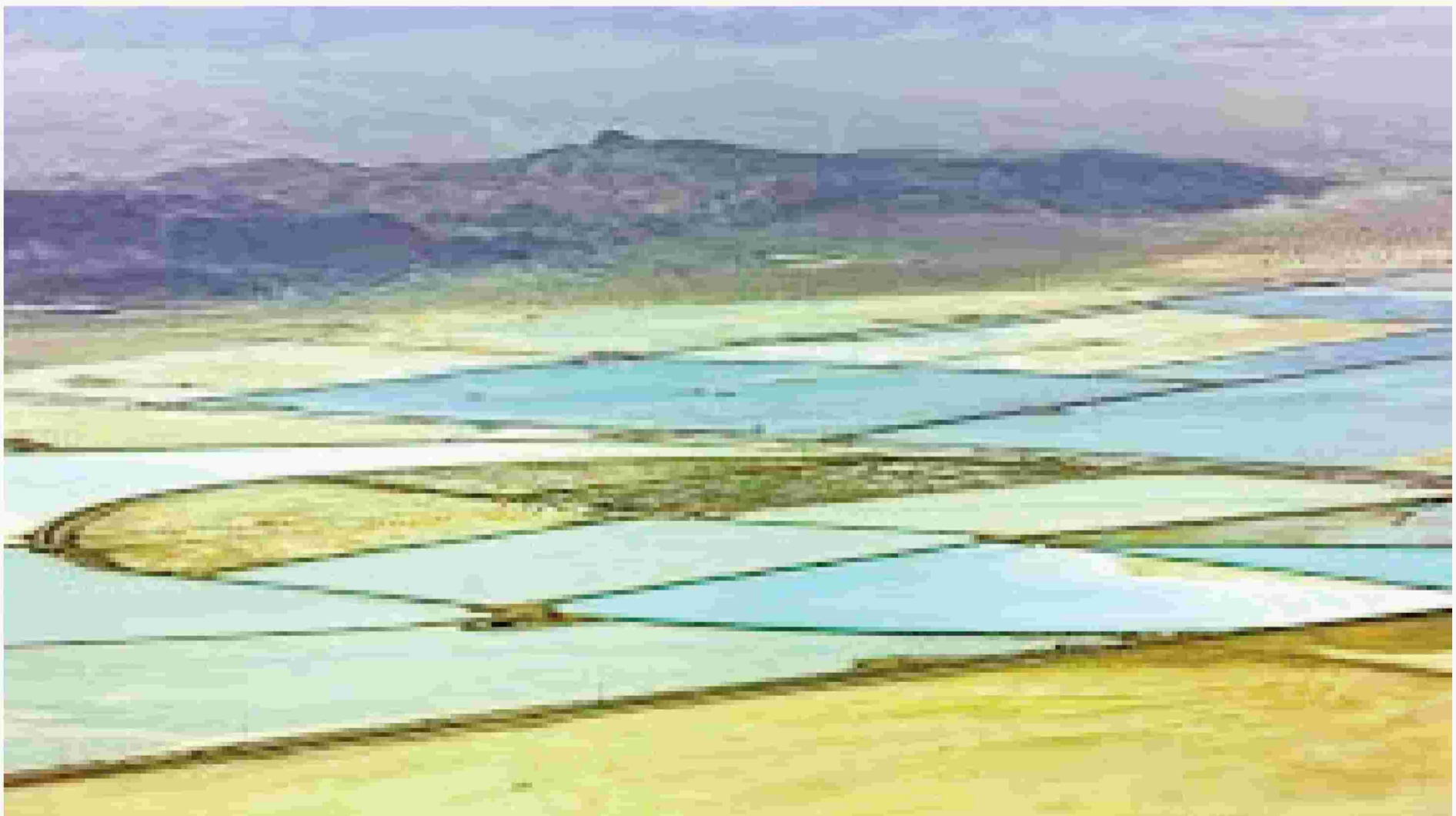
"The polymer synthesis

with other separation processes, which will also speed their use.

Commercial prospects Imperial has filed patent applications for these membranes and a range of different uses, including lithium extraction. Dr. Song is now working with Imperial Enterprise and ChemEng Enterprise, the technology transfer initiative of the

tial for these high-selectivity membranes. "This technology has tremendous potential in a variety of commercially important areas, from energy storage to water purification to recovery of critical materials in a circular economy," said Professor Sandro Macchietto, Director of Enterprise in the Department of Chemical Engineering.

One line of investiga-



As an alternative to mining, Imperial researchers have created a technology that could be used to efficiently extract it from saltwater sources such as salt-lake brines or geothermal brine solutions.

Conventional lithium extraction from brines takes months and uses significant amounts of water and chemicals, generating greenhouse

taminants, but the team have developed a class of special polymers that are highly selective for lithium. Details of the method, and how it can be scaled up for practical application, have just been published in the journal *Nature Water*.

Polymers of intrinsic microporosity For more than a decade, Dr. Song has been working

Song's team fine-tuned the micropores to become highly selective for lithium. Used in an electro dialysis device, the lithium ions are effectively pulled through the membrane micropores by an electrical current, while larger magnesium ions are left behind.

Tested on simulated salt-lake brines, these PIM membranes were highly selective

routes are based on commercially available monomers and simple chemical modifications, which makes scaling up the membranes relatively easy," said Dingchang Yang, a Ph.D. student in Dr. Song's group who led the experimental work. They can also be incorporated easily into commercial membrane modules and combined

Department of Chemical Engineering, to explore potential commercialization of the technology.

"We are in the process of establishing a climate tech company and are keen to build partnerships with companies to extract lithium at a large scale using real brine solutions," he said.

Isolating lithium is just the beginning of the poten-

tion will apply the ion-exchange polymers and selective electro dialysis to the extraction of copper and other metal ions from mining process waters. "This links well with the sustainable extraction of critical materials, which is being pursued by the Rio Tinto Center for Future Materials at Imperial," Dr. Song said. -- TX

Electrification and carbon capture can make cement production more energy-efficient and sustainable

Concrete is the world's most widely used building material—but the production of cement, its key component, generates significant carbon dioxide emissions.

New research at Umeå University shows how electrification and carbon capture can make production both more energy-efficient and climate-smart.

The cement industry accounts for approximately 8% of global carbon dioxide emissions. These emissions mainly originate from chemical reactions when limestone is heated and from the fossil fuels used in production. By electrifying the production process and implementing carbon capture, emissions can be reduced. This has been investigated in a doctoral thesis at Umeå University.

José Aguirre Castillo, an industrial doctoral student at Umeå University and process engineer at Heidelberg Materials Cement Sweden, has

examined how different carbon capture technologies—such as electrified plasma heating, oxy-fuel combustion,

ronments with extremely high carbon dioxide concentrations. Aguirre Castillo has discovered that this can actu-

"Our results show that high carbon dioxide levels can promote high-temperature reactions. By leveraging this,

climate impact," says Aguirre Castillo.

The research shows that tricalcium silicate, a key com-

ponent of cement—a finding that can be leveraged to enhance energy efficiency and improve cement quality.

Aguirre Castillo has also explored how the composition and particle size of raw material can be adjusted to lower energy consumption while making the clinker more reactive. Increased reactivity creates the conditions for diluting the cement with alternative binders, such as volcanic material, further reducing the climate impact.

Umeå University is conducting extensive research on sustainable cement and quicklime production in collaboration with Sweden's leading industrial players in the field. Several studies have contributed valuable knowledge to support the transition that the cement industry is facing.

Aguirre Castillo's doctoral thesis shows that carbon capture can be integrated into existing cement plants without compromising cement quality. This enables the industry to reduce emissions while maintaining the strength and durability of the cement. - TX



and calcium looping—affect cement production.

In these technologies, cement is produced in envi-

ronments with extremely high carbon dioxide concentrations. Aguirre Castillo has discovered that this can actu-

"Our results show that high carbon dioxide levels can promote high-temperature reactions. By leveraging this,

climate impact," says Aguirre Castillo. The research shows that tricalcium silicate, a key com-

ponent of cement—a finding that can be leveraged to enhance energy efficiency and improve cement quality.

Developing 3D-printed soft material actuators that can mimic real muscles

Empa researchers are working on producing artificial muscles that can keep up with the real thing.

They have now developed a method of producing the soft and elastic yet powerful structures using 3D printing.

One day, these could be used in medicine or robotics—and anywhere else where things need to move at the touch of a button. The work is published in the journal *Advanced Materials Technologies*.

Artificial muscles don't just get robots moving: One day, they could support people at work or when walking, or replace injured muscle tissue. However, developing artificial muscles that can compare to the real thing is a major technical challenge.

In order to keep up with their biological counterparts, artificial muscles must not only be powerful, but also elastic and soft. At their core, artificial muscles are so-called actuators: Components that convert electrical impulses into movement. Actuators are used wherever something moves at the push of a button, whether at home, in a car engine or in highly developed industrial plants. However, these hard mechanical com-

ponents do not have much in common with muscles just yet.

Reconciling contradictions

A team of researchers

trade material and a non-conductive dielectric. These materials interlock in layers. "It's a bit like interlacing your fingers," explains Empa researcher Patrick Danner. If

the printing process. They should not mix but must still hold together in the finished actuator.

The printed "muscles" must be as soft as possible so

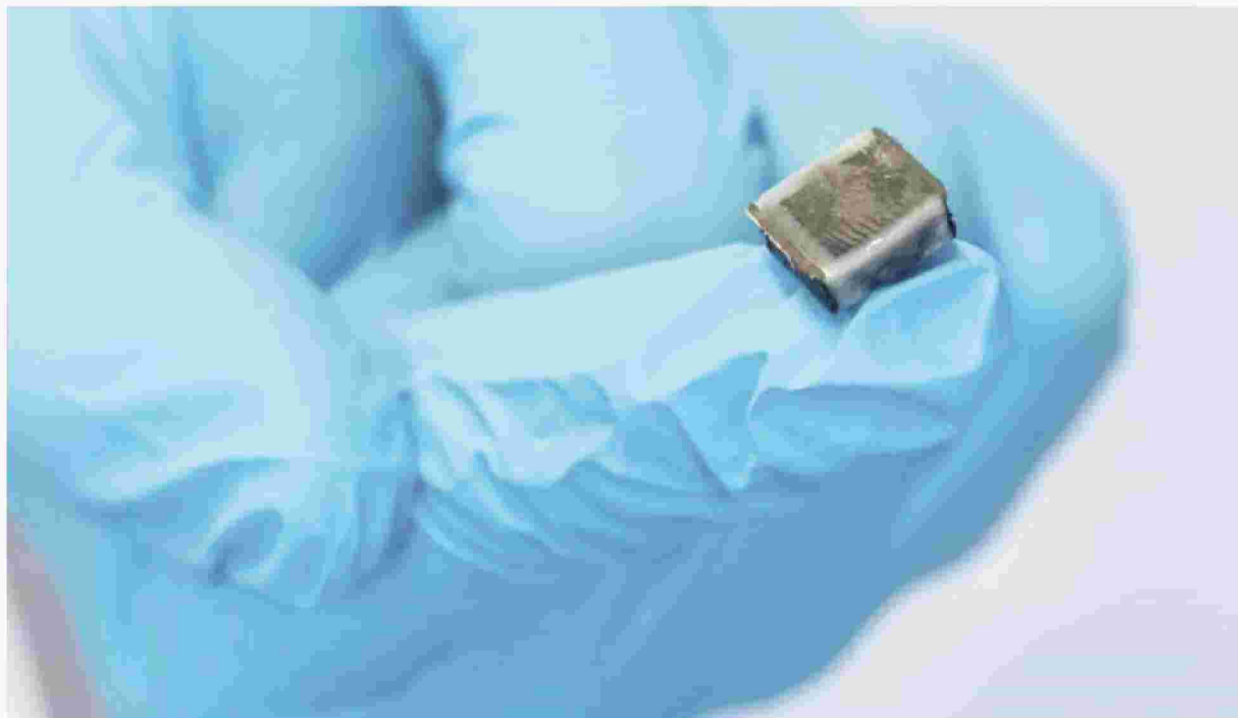
"These properties are often in direct contradiction," says Danner. "If you optimize one of them, three others change ... usually for the worse."

soft actuators using a nozzle developed by ETH researchers Tazio Pleij and Jan Vermant.

The collaboration is part of the large-scale project *Manufhaptics*, which is part of the ETH Domain's strategic area *Advanced Manufacturing*. The aim of the project is to develop a glove that makes virtual worlds tangible. The artificial muscles are designed to simulate the gripping of objects through resistance.

However, there are far more potential applications for soft actuators. They are light, noiseless and, thanks to the new 3D printing process, can be shaped as required. They could replace conventional actuators in cars, machinery and robotics. If they are developed even further, they could also be used for medical applications.

Opris and Danner are already working on it. Their new process can be used to print not only complex shapes, but also long elastic fibers. "If we manage to make them just a little thinner, we can get pretty close to how real muscle fibers work," says Opris. The researcher believes that in the future it may be possible to print an entire heart from these fibers. However, there is still a lot to do before such a dream becomes a reality. - TX



from Empa's Laboratory for Functional Polymers is working on actuators made of soft materials. Now, for the first time, they have developed a method for producing such complex components using a 3D printer.

The dielectric elastic actuators (DEA) consist of two different silicone-based materials: a conductive elec-

trical voltage is applied to the electrodes, the actuator contracts like a muscle. When the voltage is switched off, it relaxes to its original position.

3D printing such a structure is not trivial, Danner knows. Despite their very different electrical properties, the two soft materials should behave very similarly during

that an electrical stimulus can cause the required deformation. Added to this are the requirements that all 3D printable materials must fulfill: They must liquefy under pressure so that they can be extruded out of the printer nozzle. Immediately thereafter, however, they should be viscous enough to retain the printed shape.

From a VR glove to a beating heart

In collaboration with researchers from ETH Zurich, Danner and Dorina Opris, who leads the research group *Functional Polymeric Materials*, have succeeded in reconciling many of these contradictory properties. Two special inks, developed at Empa, are printed into functioning