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Homegrown EV or Assembled Reality?

Questions Surround Pakistan's 'Made in Pakistan' Electric Car

By **Manzoor Shaikh**

Pakistan's push toward electric mobility has received a new boost with the announcement that the country's first fully "homegrown" electric vehicle (EV) will hit the roads by mid-2026. The claim, made by the chief executive of the Engineering Development Board, has generated excitement in policy circles. Yet industry observers say the narrative of a fully indigenous EV may not entirely reflect the realities of Pakistan's automotive ecosystem.

Speaking at an Iftar gathering in Karachi, EDB CEO

Hamad Ali Mansoor said a locally manufactured mini EV would be launched by June or July at a price below Rs1 million. The vehicle, to be produced at a plant in Lahore, will reportedly offer a driving range of around 180 kilometres on a single charge and target two-wheeler users seeking an affordable transition to four-wheel transport.

The announcement also comes as the federal government prepares its next auto

budget. Officials believe the move could break the long-standing dominance of estab-

However, the bigger question is what exactly constitutes "localization."

In Pakistan, the term often refers to vehicles assembled locally with some components produced domestically. But internationally, localization carries a much stricter meaning. In countries with mature automotive industries, original equipment manufacturers (OEMs) are generally required to source components from independent local vendors. If parts are produced internally by the assembler itself, they are



policy and plans tax reductions for locally assembled vehicles in the FY2026-27

lished carmakers and attract new players to Pakistan's EV sector.

Contd on page 4

Focusing on
Universities: Adapting to
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2026 Part 2

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Contractors Demand Inquiry into Alleged Misappropriation of Development Funds Contractors Allege Misuse of Billions in Dev. Funds Sanctioned by Karachi Mayor

The Karachi Contractors Association (KCA) has issued a white paper against the Engineering Department of the Karachi Metropolitan Corporation, alleging widespread corruption, malpractices and irregularities in development projects across the city.

In a written communication addressed to Murtaza Wahab, the association accused certain officials of collecting heavy commissions from contractors in the name of project execution, which it said was adversely affecting the pace and quality of development works in Karachi.

According to the association, billions of rupees worth of development funds sanctioned by the mayor have allegedly been misused, while contracts for various projects are reportedly being awarded through direct arrangements instead of transparent bidding procedures. The contractors' body has demanded an immediate and impartial investigation into the alleged misap-

propriation of public funds.

The association specifically referred to the construction of Rahim Bakhsh Soomro Road in Karachi's East District, a project

significantly lower cost if open competitive bidding had been conducted.

The contractors' group noted that on January 22, 2026, the mayor ordered an inquiry

report has not been made public nor has any action been taken against officials allegedly involved in the matter.

The white paper also highlighted alleged irregularities in other development schemes, including projects related to Empress Market and Chadi Had Market, which the association claimed were awarded without following the prescribed procurement procedures.

According to the association, several contractors have complained about the alleged demand for heavy commissions by officials for the execution of works, warning that refusal to comply often leads to delays, blackmail, or other administrative hurdles. It maintained that such practices are causing significant losses to the public exchequer and undermining transparency in municipal development.

The complaints were submitted under the signature of KCA Chairman Naeem Kazmi, who assured the mayor of the association's full cooperation in ensuring transparent development in the city while urging authorities to take strict action against those responsible. - ER News Desk



costing more than Rs100 million, claiming that the scheme was undertaken without proper tendering or public advertisement. It said the project could have been completed at a

into the project and sought a report within three days after the matter was highlighted in the media. However, it said that despite the passage of more than 25 days, the inquiry

tion's full cooperation in ensuring transparent development in the city while urging authorities to take strict action against those responsible. - ER News Desk

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Homegrown EV or Assembled Reality?

Contd from page 1
often not counted as local-
ized.

This distinction is signifi-

cant. Pakistan's auto sector
has historically relied heavily
on imported components,
particularly for critical sys-
tems such as engines, power

electronics and batteries. In
the case of electric vehicles,
these dependencies may
become even more pro-
nounced.

Unlike conventional
internal combustion vehicles,
EVs are mechanically sim-
pler. The complex engine and
transmission system is large-

ly replaced by an electric
motor, battery pack and control
electronics. Industry analysts
say that in Pakistan's case, the
most expensive and technol-
ogically sophisticated parts—
namely the motor and lithium
battery—are likely to be
imported, most probably
from Chinese suppliers.

If that happens, crit-
ics argue, the vehicle
may technically be
assembled in Pakistan but
cannot fully qualify as
"homegrown" in the
strict industrial sense.

The government has
also signalled substantial
financial support for EV
adoption. Under the EV
policy framework for
2025-2030, subsidies of
up to Rs100 billion are
planned for electric
mobility. Officials indi-
cate that buyers of the
new mini EV could
receive a subsidy of
around Rs250,000 per
vehicle under the Prime
Minister's Electric Vehi-
cle initiative.

Yet experts say subsi-
dies alone will not build
a sustainable industry.
Real industrial develop-

ment requires mass produc-
tion, vendor development
and technology transfer. If
production remains limited
to imported kits assembled
locally, the broader ecosys-
tem—particularly Pakistan's
vendor industry—may see
little benefit.

The experience of other
markets offers cautionary
lessons. India's early experi-
ments with ultra-cheap cars,
including basic two-seater
models, struggled to gain
traction because consumers
demanded basic features
such as air conditioning and
acceptable comfort stan-
dards.

Ultimately, the success
of Pakistan's first low-cost
EV will depend not only on
price but also on quality,
reliability and scale of pro-
duction. For policymakers,
the real challenge lies in
ensuring that localization
goes beyond assembly—cre-
ating domestic supply
chains, generating jobs and
transferring technology.

Until then, the promise
of a fully "homegrown"
EV may remain more aspi-
rational than industrial
reality. ■

Bijli Ghar



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you find out it is a moving target."

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Focusing on Universities: Adapting to Changing Times

Special Supplement on Engineering S&T Universities & Institutions

Exploring Innovation with SZABIST Vice President Academics

2031 may mark start of AI divide similar to digital divide of yesteryears: Prof. Dr. M. Altaf Mukati

'The real question is what the future holds. Nations that uphold honesty, ethics, and integrity will benefit the most from AI.'

Where does SZABIST stand today?

First of all, thank you. People like you are working hard, travelling from place to place and conveying our message nationally and internationally.

I have seen many phases of computers in my life. I am 68 years old, and my first job was in 1974 at Muslim Commercial Bank. At that time, mainframe computers were used. They were almost twice the size of this room. IBM 370 was a very popular computer in those days.

Later, the era of smaller computers came, which were called mini-computers. Then in the early 1990s the era of Information Technology began, and the dynamics of the world changed dramatically. At that time, there was a serious concern that computers and IT would cause widespread joblessness. To some extent that concern was correct because the concept of the digital divide emerged. Those who did not upgrade themselves were left behind, while many new opportunities opened up for others.

Now the era of Artificial Intelligence (AI) has begun. I anticipate that by 2031 we will start hearing the term "AI divide", similar to the digital divide of the past.

Growth of SZABIST

Despite intense competition and declining admissions in

many universities, SZABIST has continued to grow. Alhamdulillah, our admissions are increasing.

When I joined SZABIST in 2013, there were about 2,900 students at the Karachi campus. Today that number has grown to more than 7,000, and other campuses have also expanded significantly.

SZABIST's vision is very clear: education must reach the masses. We do not focus on the commercialization of education. For example, we could have opened six or seven more centers in Karachi and earned more money, but we chose not to. Instead, we focused on smaller cities.

We have a campus in Larkana and a state-of-the-art center in Gharo, where education has been subsidized by 50 percent to make it accessible to local communities.

Across Pakistan we currently have five campuses. After Karachi, the largest campus is Islamabad, and we are also establishing a new center there. We also have campuses in Hyderabad and Larkana.

Before setting our fee structures, we studied the financial capacity of each region. Programs in Larkana and Hyderabad are subsidized accordingly. Overall, SZABIST has around 17,000 students enrolled across Pakistan.

What makes SZABIST different from other universities?



Contd on page 13



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Interview with Dr. Samreen Hussain: Leadership in Engineering Education

Four Years Are More Than Enough for a Vice Chancellor; Besides Infrastructure, I Focus on Changing Mindsets, Says VC, DUE&T Karachi

'Technology has been evolving rapidly. Even before AI became a major topic, many of its components already existed separately. Now these components have combined into a more powerful integrated system, which we call AI.'

AI Discussion and Reality

AI is not only influencing education but is also transforming the corporate environment and everyday life. It is no longer limited to a single aspect of life; it has started affecting our daily routines as well.

Regarding where Dawood University stands today, I would say that Alhamdulillah, whenever new advisories or directives arrive, we usually have already implemented them or are in the process of doing so.

One of the first initiatives I took after assuming office was to establish a separate Faculty of Information and Computing Sciences. Within this faculty we introduced four programs:

1. Artificial Intelligence, 2. Cyber Security, 3. Computer Science 3. Data Science

Later, we adopted Major Tufail Shaheed School from the local government and invested Rs. 660 million to transform it into a complete academic center.

We could have conducted this interview there, but during Ramadan we shifted many activities online. This is actually a smart solution because time becomes very limited in Ramadan and students often cannot reach home in time for Iftar.

Therefore, during this period we follow a 9-to-5 online schedule, focusing mainly on theoretical courses. When the university reopens physically, we complete the laboratory and practical components.

The point I am trying to make is that we adopt smart solutions ourselves. AI is not telling us to do these things; we are doing them through our own planning. This approach saves around 6 to 7 million rupees every month, because fuel consumption decreases and electricity usage is also reduced.

AI Initiatives at Dawood University

One of our most significant steps related to AI was the establishment of an Augmented Reality (AR) and Virtual Reality (VR) laboratory. The total cost of this facility, including equipment, was about Rs. 70 million.

While similar labs may exist in other universities, our equipment is among the most advanced. A complete

team of trainers came from the United States to train our faculty members on how to use the system.

Importantly, this lab is not restricted to AI students or computer science students. It supports a wide variety of applications. For example: Architectural scenario simulations, Chemical engineering processes, Mathematical modeling, Biomed-

I often say: "Let them play with the toys."

Today's students belong to Generation Z, and they often understand technology even faster than faculty members because they have grown up with it.

When I discussed the lab with our Deans, they initially felt the facility might be underutilized. However, once students became actively involved, they started developing impressive scenarios and applications.

Recently, during our AI Summit Week, we showcased many of these projects developed by students in collaboration with faculty members. The level of student

erational gap is smaller compared to many other institutions.

Technology has been evolving rapidly. Even before AI became a major topic, many of its components already existed separately. Now these components have combined into a more powerful integrated system, which we call AI.

However, in institutions where faculty members are not technologically updated, challenges certainly arise.

For example, the Chief Minister of Sindh issued a circular stating that all official work must move to an e-office system, eliminat-

Similarly, once senior faculty members understand the importance of this transformation, they adapt.

Experience remains extremely valuable. Senior academics possess strong fundamental knowledge. When someone has strong fundamentals, it becomes easier to learn new technologies and move toward advanced levels.

Ultimately, the key factor is intent and willingness to learn.

Regulators and AI Recently, the Higher Education Commission Pakistan issued a directive asking universities to include AI components in

Deans, and academic teams.

When decisions are taken collectively, everyone feels ownership and works toward successful implementation. Such transformations cannot be achieved through individual decisions alone.

At Dawood University we have worked to establish the importance of AI internally by involving our academic leadership and making them understand that it is an essential need for the future.

DUET Karachi and Its Future Growth

This is my last year as Vice Chancellor of this university, and I am not interested in seeking a second term.

The reason is simple: after a long period of continuity, institutional stagnation can occur.

During the past three years we have worked at a very rapid pace. Major initiatives include:

- Expansion of the Gulberg campus
- Expansion of the Sukkur campus
- Infrastructure development at the main campus

These major initiatives have already been completed or initiated. However, it is not always possible to maintain the same pace indefinitely.

The next leadership will have the opportunity to consolidate and further strengthen these developments.

I believe that within the available space and resources, we have accomplished everything that could realistically be done. Every institution has its limits and capacities.

Currently, only a few development projects are still in progress.

In my view, four years are more than enough for a Vice Chancellor if they truly want to make a difference.

During my tenure we focused not only on infrastructure but also on changing mindsets, ensuring that the university Act and policies were properly implemented, and improving financial management.

At one time the university was running at a financial deficit, but today we have completed projects worth Rs. 100 million using our own resources.

We are now a surplus university, and these achievements were made without relying on government grants or development funds.

My goal is to leave the university at a higher level of growth and stability so that its future leadership can take it even further. —

By Manzoor Shaikh



ical and healthcare applications

After establishing the lab, we made a university-level decision that every student batch must spend at least three hours in the facility.

We implemented this in 2024, even before official advisories arrived.

Our philosophy is simple: students should experience AI rather than just study it.

This is not a traditional lab where an instructor lectures and students listen.

Instead, we encourage students to explore and experiment freely.

interest was remarkable.

Currently, I have also asked them to develop a virtual tour of Dawood University using this technology.

Even industry representatives are now interested in visiting the lab facility.

Gap Between Generation Z and Earlier Generations

At Dawood University we face less difficulty regarding the gap between Generation Z and their predecessors. One reason is that we have a relatively young faculty.

Many of our newly recruited faculty members are also young, so the gen-

ing physical files. This represents a major administrative change.

Naturally, there will be resistance to change. Some people may not even be comfortable using computers.

However, if you want to remain relevant and stay within the system, you must learn. It is no longer simply a matter of willingness; it has become a necessity.

If the government requires all work to shift to e-office systems, then everyone must adapt, even if there are some initial technical issues.

every subject.

I was present in the commission meeting where this topic was discussed. Sometimes I find it surprising when a Vice Chancellor says, "HEC should design the framework for us."

The role of HEC is to provide broad policies and guidance. Implementation depends on the university leadership.

It is the responsibility of the Vice Chancellor to interpret that policy according to the institution's vision, resources, and academic priorities.

This requires consultation with faculty members,



AI

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Chief Executive Aptech on Technology, Innovation, and Education Aptech Made Accessible to Those Seeking Skills to Overcome Poverty: Iqbal Yousuf Shaikh

Today's students are smarter. They come knowing what they want. They are more informed and already possess pre-entry knowledge. Around 90 percent of students today are serious. This is a major difference.

AI in Perspective

I am an electrical engineer. When we were in our first year at university, there were only three major computers in Pakistan known as mainframes. One was at PIA, one at Mehran University, and I believe one at SUPARCO. We saw those computers ourselves.

FORTRAN IV was the programming language used at that time. The computer room was as large as an office. In the center, there was a deep-freezer-like machine, which was actually the CPU. Along the side walls were racks containing memory cards. We used to sit on the other side of a glass partition and work. There was no mouse — only a keyboard. It was called a terminal, and everything operated through keyboard commands.

In the second year, we heard that personal computers were arriving at Mehran University for individual use. At that time, we could not even imagine what that would look like. We were very curious when they arrived, so a few of us went to see them. They were PCs. There was no Win-

dows then. We used WordStar for writing our thesis.

Early Days of IT and Aptech

Fast forward to the early days of Aptech. At that time, there were only a few institutions offering small computer courses. IT training was perceived as learning MS Office. Bureaucrats considered computers merely as a modern replacement for typewriters. Even until 2015, I saw government job advertisements describing computer-related roles as "typist" positions. People had no real understanding of what computers were capable of. That was the beginning.

In those days, coming to Aptech to learn computers was mostly something for children of wealthy families. Middle and lower-middle-class families could not even think about it. Aptech developed a reputation as an institute for the elite, and students from other classes were very few.

In the early years, many students enrolled, but the dropout rate was high. Many came with the perception that IT was a modern, glamorous



field and that they would have great fun and an easy future. By that time, the internet had also arrived. Many students believed that if they joined an IT institute, their parents would buy them a computer. Poor students simply could not afford one.

Those who dropped out did so because Aptech was serious about quality and discipline. However, the graduates who completed their programs performed exceptionally well. Many are serving in reputable organizations today, and several have built international careers.

Now, the situation is dif-

ferent. Today's students are smarter. They come knowing what they want. They are more informed and already possess pre-entry knowledge. Around 90 percent of students today are serious. This is a major difference.

The earlier perception that Aptech was only for wealthy families has also disappeared. I worked hard to remove that stigma. Today, we have succeeded in making Aptech accessible to those who need skills to uplift themselves from poverty.

AI and Technological Challenges

People often say that

machines are doing everything now and that AI has taken over. How are we coping with this challenge?

This transition has not been a shock for us at all. Aptech's niche has always been updating its courses every one or two years. Over the past 15 years, the pace of technological change has accelerated dramatically — even before one technology fully matures, another arrives.

We continuously update our curriculum accordingly. For older students, we conduct workshops free of cost to keep them updated. Therefore, technological shifts do not come as a shock to our students. This is one of the reasons students choose Aptech. Our intake continues to grow because of our rapid updating process.

We are not slow like government institutions, nor are we hindered by bureaucratic obstacles. Aptech is a global organization, and we operate independently. Our philosophy is to remain aligned with cutting-edge technologies. If we had not followed this approach, we would have become obsolete like many old institutions.

Aptech Expansion

Initially, when we had 16 centers in Karachi, we planned to expand outside the city.

However, we observed that demand within Karachi itself was extremely high. Karachi is a mega city, and students travel long distances to attend classes, which increases their expenses. Therefore, we decided to open more centers in distant areas within the city.

Currently, we have 25 centers in Karachi. Last year, we opened one in Baldia. Next, we are opening one near Hub Chowki in Naval Colony.

Aptech's mission is to provide quality education at people's doorsteps. Every district and tehsil should have an institute like Aptech. Otherwise, particularly in rural Sindh, students are severely disadvantaged.

We opened centers in Sukkur, Larkana, Jamshoro, and Hyderabad. I also opened centers in Moro, Umerkot, and Mirpurkhas. However, one of our major challenges is the franchise model. We cannot directly operate every center ourselves. It is difficult to find visionary franchise partners. Many talk a lot but fail to deliver. They do not follow SOPs and fail to maintain quality standards. Due to this, the brand image was being affected, so we had to close several centers, retaining only Sukkur, Jamshoro, and Hyderabad outside Karachi. —

By Manzoor Shaikh



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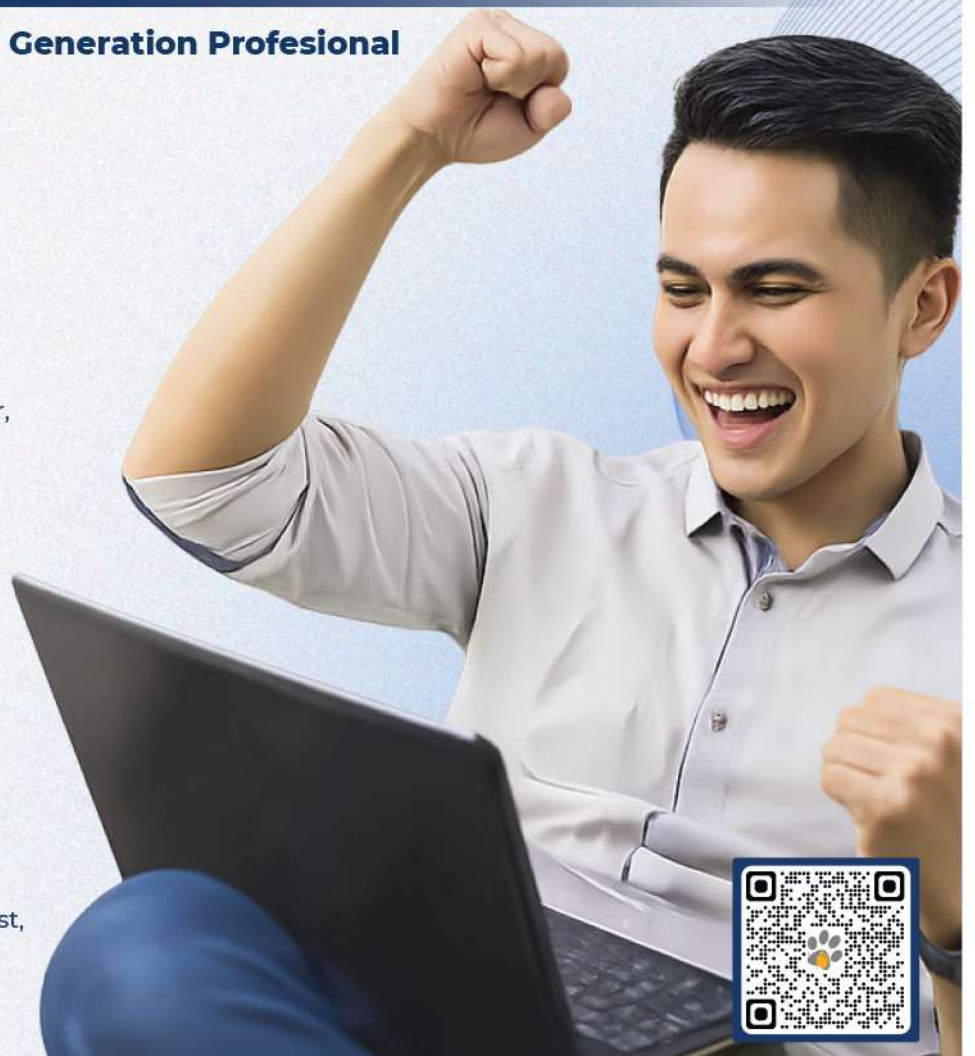
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JOB PROFILES:

Hadoop Developer, Business Intelligence Analyst, Data Analyst



Nasreen Iqbal on Building an AI-Driven Echo System for Recruitment and Employability.

With nearly three decades of experience spanning business operations, compliance, HR, and enterprise systems, Nasreen Iqbal has witnessed firsthand the structural inefficiencies embedded in traditional hiring models. Having served at largest bank in a large-scale operational environments and later founding ventures including JobGenie, Minerva Education and Innovador Solutions, she identified a persistent disconnect between talent and opportunity.

"Hiring inefficiency is not a small issue," she explains. "It directly impacts productivity, growth, and competitiveness. At the same

time, capable individuals remain underutilized

because the system does not accurately evaluate their readiness."

This insight led to the creation of JobGenie, an AI-powered recruitment and employability ecosystem designed to move beyond conventional job boards. Unlike traditional platforms that rely on keyword matching and manual screening, JobGenie leverages intelligent models to assess capability, skills alignment, and role readiness.

"The world does not need another job portal," Nasreen says. "It needs better hiring decisions. Our system evaluates not just what is written on a CV, but whether the individual truly matches the role's requirements and

potential."

JobGenie serves multiple stakeholders within a unified platform—candidates, employers, HR consultancies, and universities. For candidates, the emphasis is on job readiness through structured profiling and skill mapping. Employers benefit from automated shortlisting, ranking, interview scheduling, and analytics. Staffing firms operate through a dedicated Resource on Demand module that streamlines talent delivery.

A defining pillar of the platform is CampusConnect, designed specifically for universities. Nasreen highlights that many institutions lack real-time visibility into industry demand and measurable placement systems. CampusConnect digitizes career services by

organizing student and alumni data, enabling curated talent pools, and managing both virtual and physical job fairs.

"Placements should not be an annual activity," she notes. "They should be continuous, data-driven, and measurable. Universities need insight into employability trends and skill gaps. Employers need access to pre-assessed graduates."

As artificial intelligence becomes central to workforce transformation, concerns about job displacement frequently arise. Nasreen addresses this directly: "AI does not eliminate jobs; it eliminates inefficiency. It supports human judgment rather than replacing it. The real risk is not AI; it is failing to adapt."

Looking ahead, she envisions hiring

becoming increasingly skill-based, proactive, and intelligence-led. Organizations will build talent pipelines continuously, and universities will be evaluated not only on academic outcomes but on employability performance.

In an increasingly competitive global job market, platforms like JobGenie demonstrate

how technology can reshape hiring into a more structured and outcome-focused process. By aligning employer needs with verified talent readiness, the ecosystem reduces friction, saves time, and improves long-term workforce quality. Nasreen believes that sustainable employability requires collaboration between industry, academia, and technology, supported by intelligent systems that adapt as market demands evolve. Her work reflects a broader shift toward data-informed, inclusive, and future-ready recruitment practices.

For Nasreen, the driving force remains

impact. "When systems improve, lives improve. If we can create a structured bridge between education and opportunity, we are contributing to long-term economic and social progress."

Through JobGenie, she aims to position AI not as disruption but as an enabler of smarter, fairer, and more efficient recruitment ecosystems. ■



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Making A Sustainable Denim Garment

By Zahid Kamal

Making a sustainable denim garment involves a combination of Eco-friendly materials and energy-efficient processes.

Here are key steps to make denim garments in a sustainable way:

1. Selection of Fabric

• Organic Cotton:

Always go for organic cotton, which is grown without harmful pesticides or synthetic fertilizers, promoting healthier soil and less water consumption.

• Recycled Denim:

Use denim made from recycled cotton or post-consumer denim. This reduces waste and energy use compared to making new fabric.

• Tencel (Lyocell):

A sustainable alternative made from wood pulp, often produced in closed-loop processes that reuse water and chemicals.

• **Hemp:** A natural fiber that's low in water usage, doesn't need pesticides, and grows quickly, making it more sustainable than traditional cotton.

2. Eco-Friendly Dyeing and Finishing

• Natural Dyes:

Instead of synthetic dyes, natural dyes from plants,

fruits, or other sustainable sources can be used. However, these might have limited color options.

• Low-water Dyeing Methods:

Technologies like waterless dyeing (Nano bubble) can reduce the environmental impact of dyeing.

• Indigo Dyeing:

Traditional denim is often dyed with indigo, but eco-

ganate and stone Wash) are both harsh chemicals. Look for methods like enzyme

reduce the carbon footprint associated with shipping.

• Zero-Waste Pat-

processes. Solar, wind, or hydro energy can reduce the carbon footprint.

• **Water-efficient Techniques:** Denim production traditionally uses a lot of water, so look for methods like laser cutting or ozone technology, which uses less water in the finishing stages.

5. Recycling

• Recyclable or

Biodegradable: The garment should ideally be recyclable or biodegradable. Many

washing or PP alternative, which uses fewer chemicals and is gentler on the environment.

3. Sustainable Produc-

terms: Design the garments to minimize fabric waste.

Techniques like pattern grading or using fabric scraps to create new prod-



friendly indigo alternatives are now available, such as plant-based or low-impact synthetic dyes.

• **Avoid Toxic Chemicals:** Traditional denim finishing processes (e.g., potassium perman-

tion Method

• **Laser Cutting Machine:** Use laser for dry process instead of manual labor

• **Local Production:** Where possible, manufacture garments locally to

ucts can reduce textile waste.

4. Energy and Wter Conservation

• **Energy-efficient Manufacturing:** Use energy from renewable sources to power manufacturing

companies are now developing denim that can be fully recycled at the end of its life cycle.

• Upcycling:

Encourage consumers to upcycle their old denim into new products or donate



their jeans for recycling to avoid them going to landfills.

6. Packaging

• **Minimal or Sustainable Packaging:** Use recycled or biodegradable packaging, such as cardboard boxes, paper bags, or reusable cotton bags.

• **No Plastic:** Avoid using plastic tags, bags, or packaging materials.

8. Go for Certifications Look for certifications that guarantee the sustainability of your materials and processes, such as:

• **GOTS (Global Organic Textile Standard)** for organic cotton

• **OEKO-TEX** for ensuring no harmful chemicals are used

• **Cradle to Cradle** for eco-friendly production and recycling

(The author is Denim Expert - Fiberglass Institute - Textile Division) ■

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Agriculture Review



DIFC's Dubai FinTech Summit expands globally with Pakistan Digital Authority

DIFC Innovation Hub, the largest start-up and innovation hub in the world operating out of Dubai International Financial Centre (DIFC), in partnership with the Pakistan Digital Authority, is launching the Pakistan FinTech Summit from 18 and 19 August 2026, positioning Pakistan as a strategic growth market within the global FinTech landscape.

The Pakistan FinTech Summit (PFS) is the first international expansion of the Dubai FinTech Summit, one of the world's premier gatherings of Finance and FinTech leaders, organized by DIFC, the leading global financial center in the Middle East, Africa and South Asia (MEASA) region.

Bringing together the region's most influential poli-

cymakers, financial institutions, technology leaders, investors, and innovators, the Pakistan FinTech Summit aims to catalyze Pakistan's rapidly evolving digital economy and accelerate the country's position as a regional FinTech and digital financial



services hub.

His Excellency Arif Amiri, Chief Executive Officer, DIFC Authority, [Spokesperson], at DIFC, said: "We are pleased to expand the Dubai FinTech Summit to Pakistan, a rapidly emerging FinTech hub. The Pakistan FinTech Summit is a powerful reflection of DIFC's ambition to lead the global dialogue on financial

innovation and FinTech, underpinning Dubai's commitment to enabling growth and unlocking cross-border innovation opportunities between the UAE, Pakistan, and South Asia. By lending expertise and thought leadership to such impactful gatherings, we are charting the future of finance."

Shaza Fatima Khawaja, Federal Minister of IT and Telecommunications (MoITT) said, "A credible FinTech ecosystem is built on innovation, regulatory clarity, and institutional trust. Pakistan is advancing all three in a disciplined and forward-looking manner. The Pakistan FinTech Summit, organized in collaboration with DIFC, reflects a strategic partnership grounded in shared ambition and mutual confidence. DIFC's decision to convene its flagship FinTech platform under the Pakistan brand, beyond the UAE, is a strong signal of global trust in Pakistan's emerging digital financial ecosystem and its reform trajectory." - PR

After Reko Diq, Swedish Companies Explore Pakistan's Mining Potential

In a move to bolster bilateral economic cooperation, Federal Minister for Petroleum, Ali Pervaiz Malik, held a high-level meeting with Ambassador of Sweden to Pakistan, Alexandra Berg von Linde, to explore new avenues of partnership in the mining and energy sectors.

The discussions underscored a mutual commitment to leveraging Swedish expertise to unlock Pakistan's vast natural resource potential.

Ambassador Berg von Linde opened the dialogue by highlighting the deep-rooted and diversified nature of Sweden's engagement with Pakistan, which spans an impressive 77 years. She noted that collaboration extends across multiple sectors, including transport, telecommunications, packaging, and heavy industry. The Ambassador pointed to the robust Swedish commercial presence in the country as a testament to this enduring relationship, revealing that more than 40 companies are currently active members of the Swedish Business Council in Pakistan.

The Ambassador identified mining as a particularly promising frontier for future collaboration. She detailed Sweden's world-renowned expertise in the sector, specifically in areas such as digitalization, sustainability, advanced mining services,

and stringent environmental protection protocols.

"Swedish companies are already contributing to Pakistan's mining sector and see strong potential for further growth," Ambassador Berg von Linde stated. She specifically referenced the landmark Reko Diq Project, confirming that Swedish firms are actively involved by providing critical products and services, including connectivity solutions and explosives.

Federal Minister Ali Pervaiz Malik welcomed the

invitation to Swedish companies to explore further opportunities, particularly at the upcoming Pakistan Minerals Investment Forum 2026. He encouraged Swedish firms to look beyond their current involvement and consider investments in allied sectors and the country's largely untapped exploration sector.

"The Pakistan Minerals Investment Forum 2026 is expected to be larger and more impactful than the previous edition," Minister Malik stated. "We see immense potential for Swedish technology and investment in our exploration sector and invite you to be a part of this growth story."

Ambassador Berg von Linde recalled the success of the previous minerals forum, noting that Pakistan had organized an impressive event that drew strong international participation. She shared that Sweden had a notable presence at the last forum, with an official stall and five Swedish companies exhibiting independently. She expressed optimism for an even larger Swedish contingent this year, potentially including representatives from the Business Development Association.

Both sides concluded the meeting by reaffirming their commitment to strengthening Pakistan-Sweden cooperation. They agreed to maintain high-level engagement to promote further investment, facilitate technological exchange, and advance sustainable development practices in the mining and energy sectors. ER News Desk







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Exploring Innovation with SZABIST Vice President Academics

Contd from page 5

As Vice President Academics, my primary responsibility is to ensure quality education.

I have always said that maintaining quality is essential. There is always a relationship between quality and quantity. When student numbers increase, quality can suffer. However, we have worked hard to ensure that increasing enrollment does not compromise quality.

Evidence of this can be seen in the HEC quality index, where SZABIST has consistently maintained over 90 percent ratings for the past five years. This shows that we have successfully maintained quality while expanding our student base.

SZABIST's international presence and regulatory challenges

For a long time, I have been emphasizing that higher education in Pakistan needs reform. I regularly write to policymakers, but unfortunately, they often do not have the time to consider these suggestions.

Due to HEC policies, we are now forced to close our Dubai campus, and our last batch will graduate in December 2026. The reason is that HEC does not have a friendly offshore policy.

Our Dubai campus was established in 2003, and we were pioneers there. In fact, we were the first foreign university in Dubai Academic City.

For example, our Computer Science and BBA programs take four years in Pakistan, while in Dubai most universities offer similar programs in three years. Naturally, students prefer shorter programs.

Another challenge is the fee structure. We charge about 22,000 dirhams per year, which is already minimal. Meanwhile, universities like Curtin University of Australia charge about

28,000 dirhams, but students still prefer them because of the international brand.

In the UAE there are 17 Indian universities with large campuses. They are able to offer three-year programs because their governments have made government-to-government agreements to allow such flexibility.

Unfortunately, Pakistan has not taken similar steps. Opening an overseas campus is not only about classrooms; it also builds a national footprint and socio-economic impact. India has strategically expanded its presence in many countries such as the UAE and Malaysia.

We proposed a simple solution to HEC. In our four-year program there are 13 courses that are not domain-specific. If those were removed, the program could easily be reduced to three years, but unfortunately this proposal was not accepted.

AI Revolution and SZABIST

HEC recently sent a letter asking universities to include AI courses, but we had already done this earlier. Every program at SZABIST now includes an AI-related subject, because we understood early on that AI will affect every discipline.

Today AI has become a buzzword. AI is essentially an offshoot of Information Technology. With the growth of the internet and cloud computing, the amount of data in cyberspace has reached about 200 zettabytes. One zettabyte is equal to 1 followed by 21 zeros. By 2031, this data is expected to become four times larger, and AI will reach its peak with what some call super intelligence.

Can AI take over human intelligence?

In my opinion, it cannot. The reason is simple: the creator is always superior to the creation. Humans created AI,

so AI cannot replace human intelligence. Human intelligence will always remain superior.

However, AI will certainly improve efficiency and decision-making.

In the past, our forefathers used to perform calculations mentally. When calculators were introduced, people started using them even for simple calculations like 2+2. In the same way, if we become too dependent on AI, we may lose some of our natural abilities.

Therefore, my advice is use AI tools, but do not become dependent on them.

Ethical concerns in AI Any AI system goes through several stages:

data, algorithms, machine learning, and prediction.

At least three of these stages can be manipulated. If the data is biased, the results will also be biased.

The real question is what the future holds. Nations that uphold honesty, ethics, and integrity will benefit the most from AI.

Unfortunately, according to one survey, Japan ranks first in honesty, while Pakistan ranks 161st. When we even see adulteration in medicine, one naturally worries whether data can also be manipulated.

That is why ethics is extremely important in AI development.

At SZABIST, we allow students to use AI tools but with responsibility. For example, some students used AI improperly during entrance tests, and we had to disqualify them. Similarly, when theses are submitted, we can usually detect if they have been entirely generated by AI.

Therefore, we have proposed a dedicated course on ethics, because when AI is used with ethical responsibility, its benefits can be truly realized.

By Manzoor Shaikh

Bricsys Partner Conference 2026

Cadomation Pakistan Showcases Homegrown CAD Technology

Team Cadomation Pakistan represented the country at the Bricsys Partner Conference 2026, held in Ghent, Belgium, where it showcased its

forum that brings together technology partners, developers, and industry experts from across the world. The conference focuses on innovations in computer-aided design (CAD), engineering workflows, and digital technologies for the architecture, engineering, construc-

tailored to the needs of engineers, surveyors, and planners.

By showcasing SPCAD at an international platform, the team demonstrated Pakistan's growing capability in developing indigenous engineering software solutions and contributing to the glob-



locally developed CAD solution SPCAD alongside global technology innovators.

The Pakistani delegation included Engr. Imran Anees and Murad Ali Kasana, who represented Cadomation Pakistan at the prestigious international gathering of technology partners and engineering professionals.

The Bricsys Partner Conference, organized by Bricsys, a part of the global digital solutions company Hexagon, is an annual

tion, and manufacturing industries. It serves as an important platform for partners to present new solutions, exchange ideas, and explore collaboration opportunities.

At the conference, Cadomation Pakistan presented SPCAD, a homegrown CAD technology developed to support engineering design, surveying, and infrastructure development projects. The solution aims to improve efficiency in drafting and design workflows while offering tools

al digital engineering ecosystem.

Cadomation Pakistan works closely with Spatio, a Lahore-based surveying and geospatial services company known for providing high-precision surveying, mapping, and geospatial solutions. Spatio offers services including land surveying, GIS mapping, infrastructure surveys, and digital mapping technologies, supporting projects in construction, urban planning, utilities, and infrastructure development across Pakistan. – ER Report

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How Artificial Intelligence is Shaping Modern Technology Management Practices

Engr. Dr. Muhammad Nawaz Iqbal

With artificial intelligence, the principles of technology management are being redefined because it is changing the way organizations view and align technological assets.

The modern technology managers do not have to perform strategic technology planning through human judgments, nowadays, AI-based analytics can analyze extensive operational, market, and technical data, to identify trends that could not have been detected before. The ability enables organizations to predict trends in technology adoption, anticipate disruptions, and efficiently allocate resources in a way that brings a lot of predictability in decision-making.

The unique change in the current technology management is the appearance of predictive technology governance. The AI systems check the performance, security, and efficiency of the technological infrastructures at all times, providing the managers with the ability to predict the failure before it happens. Predictive maintenance algorithms installed on enterprise platforms use machine data and system logs to identify anomalies so that organizations could minimize downtime, enhance reliability, and plan upgrades in a strategic manner without interrupting a continuous operation cycle.

Innovation management is also being remodeled through artificial intelligence which brings about ideation processes which are algorithmic. In contrast to using brainstorming as a single source of information, AI solutions scan patent databases, scholarly resources, and trends in the world of innovations to suggest new ideas on the product or technology concept. This computer based creativity helps organizations to better increase their innovation pipeline and explore unorthodox opportunities that might not be identified using the conventional managerial methods.

The other modern trend is the AI-assisted technology portfolio management. More and more companies handle various technology resources, including cloud platforms, IoT infrastructures, and so on, using AI systems that can analyze performance metrics, cost frameworks, and a strategic fit. These smart systems can suggest what technologies to develop, to replace or to retire so that the portfolio of technologies can dynamically change as organizational goals and market requirements change.

Another area of AI technology change is risk management in technology ecosystems. Cybersecurity threats are becoming more sophisticated, and technology managers are now dependent on machine learning algorithms to analyze behaviors in the network constantly and detect the suspicious activities. Such AI-based security

systems make organizations more resilient to emerging threats because they can respond faster to these threats and therefore safeguard digital infrastructures and sensitive information.

AI based decision intelligence systems are increasingly becoming augmentative in decision-making processes in technology management. These systems combine predictive analytics and scenario, and machine learning models to consider a set of strategic options in concurrently. Technology leaders are thus able to explore the possible consequences of technology investment, digital innovation or system integration in an organization before applying it to the actual organizational setting.

The technological world is transforming project management through the use of artificial intelligence. Project management tools that use AI can process team productivity, project job bottlenecks and project schedules to provide suggestions on how to allocate tasks and schedule them in the most optimal manner. By revealing possible delays or inefficiencies in advance, such platforms can enable the managers keep the project moving and keep technological initiatives in line with organizational schedules.

Development of autonomous digital operations is another aspect of AI that is innovative in the field of technology management. Companies are becoming more

inclined to implement AI-based operational infrastructure that can autonomously handle most of the standard technological aspects of such systems including software updates, optimizing servers, and assigning resources. These self-managing systems lighten the administration of technology managers so that they can concentrate on strategic and innovative operations.

AI is also having an impact on how knowledge in technological environments is being handled by organizations. Rational intelligence knowledge management system is able to extract understanding out of technical documents, research output and organizational experiences and converts them into searchable and actionable knowledge bases. The relevant expertise is also readily available to technology managers through which the problem-solving and decision-making processes can be fast-tracked.

One of the most modern tendencies is the application of AI to the development of teamwork among multidisciplinary teams of technologies. NLP systems have the ability to analyze the communication patterns in teams, recognize instances of miscommunication and suggest the teams better communication patterns. AI helps to make the technology development and implementation processes more unanimous by enhancing collaboration between engineers, managers, and other stakeholders.

The management of vendors and technology partners is also being transformed by artificial intelligence. By assessing historic data and market indicators, AI platforms will be able to judge the performance of suppliers, risks of the contract, and the technological fit. Technology managers will be able to make better choices as to partners, so that alliances will play a positive role in long-term technological expansion and innovation.

Within the environment of digital transformation, AI empowers organizations to perform continuous technology audits. Smart monitoring systems assess how digital initiatives are generating the desired value and where technological investments could be performing poorly. This feedback enables the managers to real-time correct the digital strategies and to make sure that technological changes are not at variance with organizational objectives.

The management of technologies is also becoming ethical and responsible with the help of AI. The algorithmic monitoring devices evaluate the societal and organizational consequences of the technological choices, like data privacy, algorithmic bias, and environmental consequences. Technological managers are thus able to include ethical concerns in the technology governance models, so that innovation is done in a responsible manner.



One of the current trends, in particular, is the fusion of AI with technology sustainability management. Smart systems are able to monitor both the environmental footprint of technological systems, such as energy usage and carbon emissions. These insights can help technology managers revamp the systems in a more energy-efficient way which will help in achieving greater corporate sustainability.

Lastly, artificial intelligence is also reshaping the position of technology managers per se. Instead of fulfilling the role of mainly managers of technological assets, they are also becoming organizers of smart ecosystems in which humans and machines work together. They have been mandated to lead the governance of AI, oversee innovation culture, and ensure that the technological capabilities are incorporated in a strategic manner in all facets of organizational development. ■

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Pakistan, Netherlands Explore Expanded Energy Cooperation

Federal Minister for Petroleum Ali Pervaiz Malik

held a meeting with H.E. Robert Jan Siegert, Ambassador of the Netherlands to Pakistan, along with a delegation from Engro Vopak Terminal Limited (EVTL), to discuss prospects for strengthening cooperation in Pakistan's energy and industrial sectors.

Welcoming the Ambassador and the delegation, the Petroleum Minister expressed optimism about deepening bilateral engagement between Pakistan and the Netherlands, particularly in areas related to energy infrastructure and industrial development. He reaffirmed the government's commitment to facilitating foreign investment by ensuring a stable, transparent and business-friendly environment.

Ambassador Siegert noted that the Netherlands attaches great importance to its partnership with Pakistan and views it as a promising destination for investment and trade. Highlighting the role of Engro Vopak Terminal Limited, he described the company as a flagship example of Dutch part-

nership in Pakistan's energy sector. EVTL is a joint venture between Royal Vopak of the Netherlands and Engro Corporation Limited, operating modern storage and handling facilities for bulk liquid chemicals and liquefied petroleum gas (LPG).

The Ambassador said the Netherlands is keen to further



strengthen this collaboration and demonstrate that Pakistan remains open to international business partnerships. He added that the Dutch side is particularly interested in seeing the cooperation in terminal operations continue to grow and evolve in the coming years.

During the meeting, EVTL Chief Executive Officer Ammar Shah briefed the minister on the company's operations and its role in supporting Pakistan's industrial supply chains. He informed the participants that EVTL handles a substantial portion of the country's LPG

marine imports and plays a critical role in supplying feedstock to key manufacturing sectors.

According to Shah, the terminal's infrastructure helps ensure the efficient handling and storage of essential raw materials required by downstream industries, including those producing DAP fertilizer, PVC and PTA. He said EVTL's operations

vaiz Malik reiterated that the government is committed to providing a conducive environment for investors and ensuring fair and transparent opportunities for all stakeholders operating in the country's energy and industrial sectors.

The meeting also included a discussion on the broader energy supply chain situation in light of ongoing developments in the Middle East. The minister informed the delegation that the government is closely monitoring regional dynamics and taking necessary steps to ensure stability in Pakistan's energy supply.

He noted that the country currently maintains comfortable fuel stock levels but emphasized the importance of prudent consumption patterns and efficient supply management to safeguard long-term energy security.

The interaction underscored the importance of international partnerships in strengthening Pakistan's energy infrastructure and supporting industrial growth, while reaffirming the commitment of both countries to expand cooperation in mutually beneficial sectors. ■

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Laylat-ul-Qadr

By Muhammad Tariq Haq | www.eslpc.com

When the world lies quiet beneath the cloak of night,
When hearts whisper prayers the tongue cannot recite,
When the stars bow low in silent beauty
There descends the Eternal Lord's mercy.

"Indeed, We sent it down on the Night of Decree."
The Qur'an's light first brightened the darkened sea.
A message descended from the heavens afar,
Guiding lost hearts like a radiant star.

No scale of the world can measure it's treasure
For Laylat-ul-Qadr is better than a thousand months' prayer.
One tear in repentance, one whisper sincere,
May rewrite a destiny written for years.

The angels descend in silent array,
With Jibril leading their luminous way.
They descend with decrees from the Lord Most High,
For every soul living beneath His vast sky.

They pass through the earth with greetings of peace,
Where hearts bow in sajdah and tears release—
"Peace it is until the rise of dawn,"
And every pain seems to be gone.

From dusk till the break of the morning light,
Mercy embraces the faithful that night.
O seeker of mercy, awaken your soul—
Let remembrance and repentance be your goal.

Perhaps in this moment, unseen, unheard,
Your name is written among those preferred.
Raise trembling hands, let repentance flow,
For the One who forgives already knows.

So stand in the darkness, yet bathed in His light,
A servant humbled in Qadr's sacred night.
For destinies change where sincere hearts beseech
And a thousand hidden blessings are released.

When dawn finally breaks and the stars depart,
Leave that night written deep in your heart.
For whoever finds Qadr with faith and plea—
Finds the keys to eternity.

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Perhaps this very night your soul is cleansed within.

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سندھ کے تفریحی مقام گورکھ پل اسٹیشن کی ترقی کے لئے اربوں روپے خرچ ہونے کے باوجود گورکھ پل اسٹیشن کا منصوبہ تاحال مکمل نہیں ہو سکا۔ پی اے سی اجلاس میں گورکھ پل اسٹیشن پر ریزورٹ، روڈ اور دیگر ترقیاتی اسکیموں سمیت فرنیچر و دیگر اشیا کی خریداری میں کروڑوں روپے کی بے ضابطگیوں کا انکشاف۔ محکمہ ثقافت اینڈ ٹورزم گورکھ پل اسٹیشن کے متعلق سالانہ رپورٹ میں ہوا۔



مشرق وسطیٰ میں کشیدگی، پاکستان کو توانائی بحران کا خدشہ

آبنائے ہرمز بند ہونے سے توانائی پر انحصار کر نیوالے ممالک کو مشکلات کا سامنا
تھر کوئلے سمیت مقامی توانائی ذرائع کو تیزی سے ترقی دینا ہوگی، توانائی ماہرین

ماہرین کا کہنا ہے کہ صورتحال میں پاکستان کیلئے مقامی توانائی وسائل کی ترقی قومی ترجیح بن چکی ہے۔ تھر کوئلے کے ذخائر کو ملک کا سب سے اہم توانائی اثاثہ قرار دیا جا رہا ہے، جن کے اندازاً ذخائر 175 سے 186 ارب ٹن تک بتائے جاتے ہیں۔ مالی سال 2024-25 میں پاکستان کی مقامی کوئلہ پیداوار 19.1 ملین ٹن تک پہنچ گئی، جو 2 سال قبل تقریباً 12 ملین ٹن تھی۔ رپورٹس کے مطابق 2026 کے آغاز تک تھر کوئلے سے بجلی پیدا کرنے کی صلاحیت 3,300 میگا واٹ تک پہنچ چکی ہے۔ ماہرین کے مطابق عالمی بحران کے دوران فرانس آئل یا ایل این جی سے پیدا ہونے والی بجلی کی قیمت 50 روپے فی یونٹ تک پہنچ سکتی ہے، جبکہ تھر کوئلے سے بجلی تقریباً 5 سے 8 روپے فی یونٹ میں پیدا کی جاسکتی ہے۔ توانائی ماہرین کا کہنا ہے کہ پاکستان کاری کی سیٹھانیز ایل این جی پر بڑھتا انحصار ماضی میں

امریکا و اسرائیل کے ایران پر حملوں کے بعد عالمی توانائی کی ترسیل کے نظام کی کمزوری واضح ہو گئی ہے۔ اطلاعات کے مطابق قطر انرجی کی جانب سے اسپٹ کارگو کی ترسیل روکنے اور ایران کی طرف سے آبنائے ہرمز بند کرنے کی دھمکی کے باعث توانائی پر انحصار کر نیوالے ممالک کیلئے سنگین خطرات پیدا ہو گئے ہیں۔ آبنائے ہرمز دنیا کی اہم ترین بحری گزرگاہ ہے جہاں سے روزانہ تقریباً 2 کروڑ بیرل تیل گزرتا ہے، جو عالمی سمندری تجارت ہونیوالے تیل کا تقریباً 30 فیصد بنتا ہے۔ پاکستان کیلئے یہ صورتحال خاص طور پر تشویشناک ہے، کیونکہ اس کی تقریباً 2 تہائی ایل این جی سپلائی اسی راستے سے آتی ہے۔ ماہرین کے مطابق عالمی منڈی میں تیل کی قیمت میں ہر 10 ڈالر اضافے سے پاکستان کے کرنٹ اکاؤنٹ خسارے میں سالانہ ڈیڑھ سے 2 ارب ڈالر تک اضافہ ہو سکتا ہے۔

مینگے معاہدوں اور شرائط کی وجہ سے مسائل پیدا کرتا رہا ہے۔ موجودہ صورتحال میں سپلائی کی غیر یقینی صورتحال نے پالیسی کے خطرات کو مزید واضح کر دیا ہے، ماہرین تجویز دیتے ہیں کہ گیس پر چلنے والے پاور پلانٹس کو ثانوی حیثیت دی جائے اور محدود گیس کو برآمدی صنعتوں کیلئے مختص کیا جائے، تاکہ معیشت کو سہارا مل سکے۔ ماہرین کے مطابق حکومت کو توانائی کے شعبے میں اصلاحات کا عمل تیز کرنا ہوگا۔ اقتصادی تجزیہ کاروں کا کہنا ہے کہ اگر مشرق وسطیٰ کی کشیدگی طویل ہوگی تو بلند تیل قیمتیں پاکستان کیلئے مہنگائی، ٹیکس وصولیوں اور صنعتی پیداوار پر شدید باؤ ڈال سکتی ہیں، ایسے میں تھر کوئلے سمیت مقامی توانائی ذرائع کو تیزی سے ترقی دینا اور متبادل بندرگاہوں اور توانائی منصوبوں کو فعال کرنا اہم تقاضا بن چکا ہے۔

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Does adding 'please' and 'thank you' to your ChatGPT prompts really waste energy?

Cut the words "please" and "thank you" from your next ChatGPT query and, if you believe some of the talk online, you might think you are helping save the planet.

The idea sounds plausible because AI systems process text incrementally: longer prompts require slightly more computation and therefore use more energy. OpenAI's chief executive, Sam Altman, has acknowledged it all adds

appears. That instinct is worth taking seriously.

Artificial intelligence depends on large data centers built around high-density computing infrastructure. These facilities draw substantial electricity, require continuous cooling, and are embedded in wider systems of energy supply, water and land use.

As AI use expands, so does this underlying footprint. The environmental question, then, is not how individual prompts are phrased, but how frequently and intensively these systems

technical terms, each prompt triggers a fresh "inference"—a full computational pass through the model—and that energy cost is incurred every time.

This is why AI behaves less like conventional software and more like infrastructure. Use translates directly into energy demand.

The scale of that demand is no longer marginal. Research published in the journal *Science* estimates that data centers already account for a significant share of global electricity consumption, with demand rising rap-

AI's hidden environmental footprint

New Zealand offers a clear illustration. Its high share of renewable electricity makes it attractive to data center operators, but this does not make new demand impact-free.

Large data centers can place significant pressure on local grids and claims of renewable supply do not always correspond to new generation being added. Electricity used to run servers is electricity not available for other uses, particularly in dry years when

work focuses on land and infrastructure: managing flood risk, protecting water quality, maintaining reliable energy supply and designing resilient settlements.

Yet AI infrastructure is often planned and assessed separately, as if it were merely a digital service rather than a persistent physical presence with ongoing resource demands.

Why the myth matters From a systems perspective, new pressures do not simply accumulate. They can drive reorganization.

In some cases, that reor-

al issues.

The more consequential questions concern how AI infrastructure is integrated into energy planning, how its water use is managed, how its location interacts with land-use priorities, and how its demand competes with other social needs.

None of this implies that AI should be rejected. AI already delivers value across research, health, logistics and many other domains.

But, like any infrastructure, it carries costs as well as benefits. Treating AI as immaterial software obscures



to operating costs at the scale of billions of prompts.

At the same time, it is a stretch to suggest that treating ChatGPT politely comes at significant environmental cost. The effect of a few extra words is negligible compared with the energy required to operate the underlying data center infrastructure.

What is more important, perhaps, is the persistence of the idea. It suggests that many people already sense AI is not as immaterial as it

are used.

Why every AI query carries an energy cost

One structural difference between AI and most familiar digital services helps explain why this matters.

When a document is opened or a stored video is streamed, the main energy cost has already been incurred. The system is largely retrieving existing data.

By contrast, each time an AI model is queried, it must perform a fresh computation to generate a response. In

idly as AI workloads grow.

The International Energy Agency has warned that electricity demand from data centers could double by the end of the decade under current growth trajectories.

Electricity is only one part of the picture. Data centers also require large volumes of water for cooling, and their construction and operation involve land, materials and long-lived assets. These impacts are experienced locally, even when the services provided are global.

hydro generation is constrained.

Viewed through a systems lens, AI introduces a new metabolic load into regions already under strain from climate change, population growth and competing resource demands.

Energy, water, land and infrastructure are tightly coupled. Changes in one part of the system propagate through the rest.

This matters for climate adaptation and long-term planning. Much adaptation

organization produces more coherent and resilient arrangements; in others, it amplifies existing vulnerabilities. Which outcome prevails depends largely on whether the pressure is recognized early and incorporated into system design or allowed to build unchecked.

This is where discussion of AI's environmental footprint needs to mature. Focusing on small behavioral tweaks, such as how prompts are phrased, distracts from the real structur-

those costs. Treating it as part of the physical systems we already manage brings them into view.

The popularity of the "please" myth is therefore less a mistake than a signal. People sense AI has a footprint, even if the language to describe it is still emerging.

Taking that signal seriously opens the door to a more grounded conversation about how AI fits into landscapes, energy systems and societies already navigating the limits of adaptation. - TX

Sub-zero green freezer achieves zero emissions

Researchers at the School of Engineering of The Hong Kong University of Science and Technology (HKUST) have developed the world's first sub-zero Celsius elastocaloric freezing device, capable of reaching temperatures as low as -12°C . This represents a significant milestone in expanding green solid-state elastocaloric refrigeration technology into the global freezing industry, offering a promising solution to combat climate change and accelerate low-carbon transformation of the global freezing market.

The findings have recently been published in *Nature*, under the title "Sub-zero Celsius Elastocaloric Cooling via Low-transition-temperature Alloys."

As global warming intensifies, the demand for freezing has been growing rapidly and accounts for a significant portion of global electricity consumption. Mainstream freezing based on vapor compression cooling technology relies on refrigerants with high global warming potential (GWP).

As an eco-friendly alternative, solid-state cooling technology based on the elastocaloric effect of shape memory alloys (SMAs) has drawn substantial attention from both academia and industry due to its zero greenhouse gas emissions and high energy efficiency potential. The technology harnesses the latent heat from cyclic phase transition of shape memory alloys to provide cooling without greenhouse gas refrigerants, offering a promising path to decarbonize the freezing sector of the cooling industry and to mitigate global emissions and climate change.

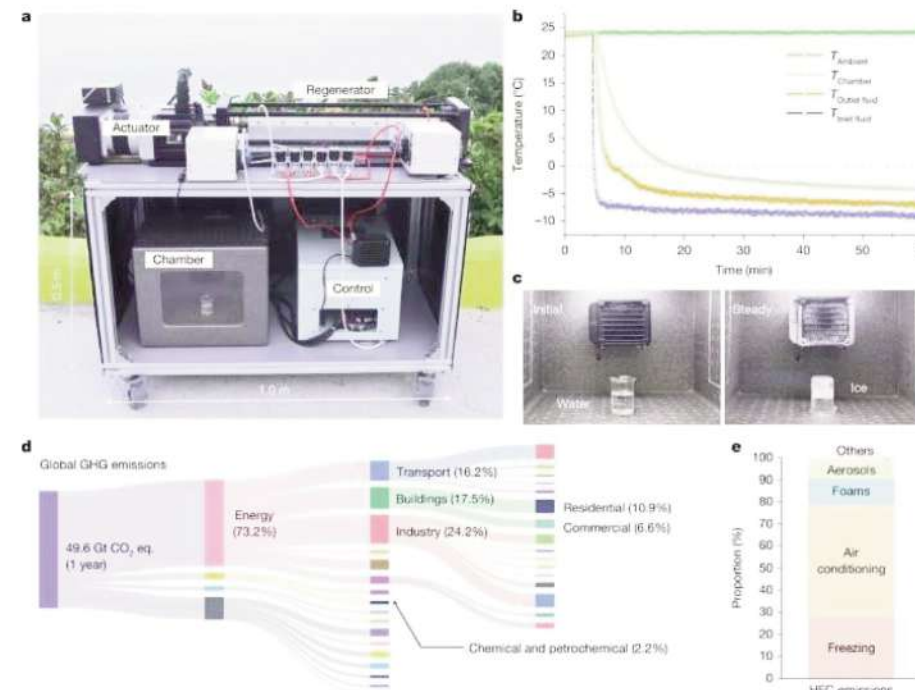
Challenges and recent breakthrough in elastocaloric cooling

However, the existing elastocaloric devices have been limited to air conditioning scenarios for room temperature applications. It is important to expand the technology into the freezing sector, which has the same market size as the air-conditioning sector.

A research team led by Prof. Sun Qingping, Chair Professor from the Department of Mechan-

ical and Aerospace Engineering at HKUST, has achieved a breakthrough in Sub-zero Celsius elastocaloric cooling. This advancement results from a synergistic combination of materials, heat transfer fluid and refrigeration structures. The features include:

1. Super-elastic alloy: employing a binary low-transition-temperature nickel-titanium (NiTi) alloy with a high nickel content (51.2 at %) and lowering its austenite finish temperature (A_f) to -20.8°C . This alloy maintains excellent super-elas-



ticity and a substantial latent heat even at -20°C , with a peak adiabatic temperature change of 16.3°C at 0°C and a functional temperature window of 48.5°C .

2. Freezing-resistant heat transfer fluid: using a 30wt% aqueous calcium chloride solution as the working fluid. Its low freezing point ensures that it remains fluid in sub-zero operation, while its good wettability on the NiTi surface enhances heat exchange efficiency.

3. Cascaded tubular architecture: the regenerator operates on a compression-based active Brayton cycle and consists of eight cascad-

ed units, each containing three thin-walled NiTi tubes. This design offers a high surface area-to-volume ratio (8.68 mm²/l) and withstands a compressive stress of 900MPa without buckling, as verified by X-ray computed tomography.

Operating at 1Hz, the desktop-scale device achieved a cold-source temperature of -12°C from a room-temperature heat sink (24°C), establishing a temperature lift of 36°C . This is the first reported sub-zero Celsius performance in elastocaloric cooling.

In a real-world demonstration, the system was integrated into a package measuring $1.0 \times 0.5 \times 0.5$ m³ and tested outdoors at temperatures between 20 and 25°C . It successfully cooled an insulated chamber down to a stable -4°C air temperature within 60 minutes and froze 20ml of distilled water into ice within 2 hours, validating its real-world freezing capability.

The device demonstrated a specific cooling power of up to 1.43W g⁻¹ under zero-temperature-lift conditions. In addition, the system's coefficient of performance can reach 3.4 under the ideal work-recovery assumption, highlighting its poten-

tial energy efficiency.

Potential impact on global emissions
The work has a significant impact on global decarbonization to battle climate change. According to published data, global Hydrofluorocarbon (HFC) emissions are projected to exceed 1.2 gigatons of CO₂ equivalent annually by 2025, with roughly 27% originating from sub-zero freezing applications. This translates to approximately 330 million tons of CO₂ equivalent each year.

The successful demonstration of sub-zero elastocaloric cooling provides a viable, emission-free alternative for these applications. Widespread adoption of this technology could, therefore, potentially mitigate around 330 million tons of CO₂ equivalent emissions annually, contributing substantially to global climate goals.

Future directions and expert perspectives

The research team leader, Prof. Sun Qingping stated, "This achievement demonstrates the potential for large-scale application of elastocaloric freezing technology. We are collaborating with industry to drive its commercialization. As global regulations on HFCs tighten, this zero-emission, energy-efficient freezing technology is poised to reshape the freezing sector of the refrigeration industry and provide a key technical solution for carbon neutrality."

"Looking ahead, we will focus on optimizing system efficiency, power density, and cost-effectiveness through advances in shape memory alloy materials, manufacturing, heat exchange design, and system integration and optimization to achieve larger cooling power and high energy efficiency."

Prof. Lu Mengqian, Director of the HKUST Otto Poon Center for Climate Resilience and Sustainability, where Prof. Sun and Prof. Zhou are affiliated members, said, "This groundbreaking advancement in elastocaloric freezing technology by our center's members represents a significant step forward in our fight against climate change. By offering a zero-emission alternative for sub-zero applications, we are addressing the urgent need for sustainable freezing solutions. This achievement has been phenomenal since the center's establishment in July 2025. The work accelerates the center's mission to deliver impactful strategies for climate resilience and sustainable development worldwide." - TX

Robot learns to lip sync by watching YouTube

Almost half of our attention during face-to-face conversation focuses on lip motion. Yet, robots still struggle to move their lips correctly. Even the most advanced humanoids make little more than puppet mouth gestures—if they have a face at all.

We humans attribute outsized importance to facial gestures in general, and to lip motion in particular. While we may forgive a funny walking gait or an awkward hand motion, we remain unforgiving of even the slightest facial malgesture. This high bar is known as the "Uncanny Valley." Robots oftentimes look lifeless, even creepy, because their lips don't move. But that is about to change.

A Columbia Engineering team announced today that they have created a robot that, for the first time, is able to learn facial lip motions for tasks such as speech and singing. In a new study published in *Science Robotics*, the researchers demonstrate how their robot used its abilities to articulate words in a variety of languages, and even sing a song out of its AI-generated debut album "hello world."

The robot acquired this ability through observational learning rather than via rules. It first learned how to use its 26 facial motors by watching its own reflection in the mirror before learning to imitate human lip motion by watching hours of YouTube videos.

"The more it interacts with humans, the better it will get," promised Hod Lipson, James and Sally Scapa Professor of Innovation in the Department of Mechanical Engineering and director of Columbia's Creative Machines Lab, where the work was done.

Robot watches itself talking

Achieving realistic robot lip motion is challenging for two reasons: First, it requires specialized hardware containing a flexible facial skin actuated by numerous tiny motors that can work quickly and silently in concert. Second, the specific pattern of lip dynamics is a complex function dictated by sequences of vocal sounds and phonemes.

Human faces are animated by dozens of muscles that lie just beneath a soft skin and sync naturally to vocal cords and lip motions. By contrast, humanoid faces are mostly rigid, operating with relatively few degrees of motion, and their lip movement is choreographed according to rigid, predefined rules. The resulting motion is stilted, unnatural, and uncanny.

In this study, the researchers overcame these hurdles by developing a richly actuated, flexible face and then allowing the

robot to learn how to use its face directly by observing humans. First, they placed a robotic face equipped with 26 motors in front of a mirror so that the robot could learn how its own face moves in response to muscle activity. Like a child making faces in a mirror for the first time, the robot made thousands of random face expressions and lip gestures. Over time, it learned how to move its motors to achieve particular facial appearances, an approach called a "vision-to-action" language model (VLA).

Then, the researchers placed the robot in front of recorded videos of humans talking and singing, giving AI that drives the robot an opportunity to learn how exactly humans' mouths moved in the context of various sounds they emitted. With these two models in hand, the robot's AI could now translate audio directly into lip motor action.

The researchers tested this ability using a variety of sounds, languages, and contexts, as well as some songs. Without any specific knowledge of the audio clips' meaning, the robot was then able to move its lips in sync.

The researchers acknowledge that the lip motion is far from perfect. "We had particular difficulties with hard sounds like 'B' and with sounds involving lip puckering, such as 'W.'" But these abilities will likely improve with time and practice," Lipson said. More importantly, however, is seeing lip sync as part of more holistic robot communication ability.

"When the lip sync ability is combined with conversational AI such as ChatGPT or Gemini, the effect adds a whole new depth to the connection the robot forms with the human," explained Yuhang Hu, who led the study for his Ph.D. "The more the robot watches humans conversing, the better it will get at imitating the nuanced facial gestures we can emotionally connect with."

"The longer the context window of the conversation, the more context-sensitive these gestures will become," he added.

The missing link of robotic ability

The researchers believe that facial affect is the 'missing link' of robotics.

"Much of humanoid robotics today is focused on leg and hand motion, for activities like walking and grasping," said Lipson. "But facial affect is equally important for any robotic application involving human interaction."

Lipson and Hu predict that warm, lifelike faces will become increasingly important as humanoid robots find applications in areas such as entertainment, education, medicine, and even elder care. Some economists predict that over a billion humanoids will be manufactured in the next decade.

"There is no future where all these humanoid robots don't



have a face. And when they finally have a face, they will need to move their eyes and lips properly, or they will forever remain uncanny," Lipson estimates.

"We humans are just wired that way, and we can't help it. We are close to crossing the uncanny valley," added Hu.

Risks and limits

This work is part of Lipson's decade-long quest to find ways to make robots connect more effectively with humans, through mastering facial gestures such as smiling, gazing, and speaking. He insists that these abilities must be acquired by learning, rather than being programmed using stiff rules.

"Something magical happens when a robot learns to smile or speak just by watching and listening to humans," he said. "I'm a jaded roboticist, but I can't help but smile back at a robot that spontaneously smiles at me."

Hu explained that human faces are the ultimate interface for communication, and we are beginning to unlock their secrets.

"Robots with this ability will clearly have a much better ability to connect with humans because such a significant portion of our communication involves facial body language, and that entire channel is still untapped," Hu said.

The researchers are aware of the risks and controversies surrounding granting robots greater ability to connect with humans.

"This will be a powerful technology. We have to go slowly and carefully, so we can reap the benefits while minimizing the risks," Lipson said. - TX