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Pakistan, EU Explore Cooperation in Electric Vehicle Skills Development

Advisor to the Prime Minister for Industries and Production Haroon Akhtar Khan has directed the Engineering Development Board (EDB) to engage with the European Union (EU) and identify practical areas of cooperation in electric vehicle (EV) skills development, technical training and capacity building. He said Pakistan was keen to benefit from European expertise to develop the skilled workforce and

technical capabilities needed by the rapidly evolving automotive industry.

Haroon Akhtar Khan met the EU delegation to discuss ways to strengthen cooperation in preparing Pakistan's workforce for the transition towards electric mobility. He said developing EV-related skills alongside the promotion of electric vehicles was an important part of Prime Minister Muhammad Shehbaz Sharif's vision for a modern, competitive and sustainable industrial economy.

"Pakistan has set a target

of increasing the share of electric vehicles to 30 percent by 2030. Achieving this transition requires more than

porting industrial ecosystem," the Advisor said.

He noted that several companies had entered Pak-

in emerging automotive technologies. He stressed that investment in technical training and skills development was essential to prepare young Pakistanis for new employment opportunities and strengthen the country's ability to adopt and manufacture advanced technologies.

"Pakistan missed important opportunities during earlier phases of the global automobile revolution, but we cannot afford to miss the electric vehicle revolution. Our objective is to build local capabilities, develop technical expertise and

ensure that this transition creates jobs and industrial opportunities for Pakistan," he said.

The Advisor said the government's forthcoming Auto Policy, expected to be introduced in the coming weeks, would give particular attention to electric vehicles and the development of the automotive sector. Work was also underway on a Battery Energy Storage System (BESS) Policy, which would support the wider shift towards cleaner energy technologies and help create favourable conditions for emerging industries.

Highlighting the economic and environmental benefits of electric mobility,



introducing new vehicles; it demands a skilled workforce, technical expertise and the development of a sup-

porting industrial ecosystem," the Advisor said. He noted that several companies had entered Pakistan's EV market, increasing demand for trained technicians, engineers and other professionals with expertise

Contd on page 12

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ECNEC Approves 11 Development Projects in Energy, Infrastructure, Healthcare, Technology

The Executive Committee of the National Economic Council (ECNEC), chaired by Deputy Prime Minister and Foreign Minister Senator Mohammad Ishaq Dar, has approved 11 development projects across Pakistan covering energy generation, electricity transmission, roads, water supply, irrigation, healthcare, urban land management and forensic science.

The approved projects are intended to improve electricity availability, strengthen transport links, expand access to water and healthcare, modernize land administration and enhance the country's forensic investigation capabilities.

Energy and Power Infrastructure

Koto Hydropower Project — Lower Dir, Khyber Pakhtunkhwa

The committee approved construction of the 40.8-megawatt Koto Hydropower Project. The project aims to increase domestic electricity generation through hydropower, a renewable energy source, and contribute to meeting electricity demand.

100 MW Distributed Solar Photovoltaic Plants — Gilgit-Baltistan

The approved project will develop distributed solar photovoltaic plants with a combined capacity of 100 MW. Its objective is to expand renewable electricity generation and diversify the region's energy supply. The distributed approach could also support electricity access in areas where conventional grid infrastructure is challenging.

Reactive Power Compensation Devices — National Grid Company Network

ECNEC approved the installation of reactive power compensation devices in the National Grid Company (NGC) network. Such equipment helps manage voltage levels and improve power-system performance, supporting grid stability and more efficient electricity transmission.

Water Supply and Irrigation

Rehabilitation and Remodelling of Lasbela Canal — Balochistan



The project will rehabilitate and remodel the existing canal system to improve irrigation and water management. Its intended benefits include more reliable water distribution for agricultural users and improved use of available water resources.

Water Supply Scheme for Gwadar from Mirani Dam — Balochistan

The project aims to provide Gwadar with a water supply from Mirani Dam, addressing the city's need for a more reliable source of water. Its implementation is expected to support households, urban services and the city's continuing development.

Roads and Regional Connectivity

Buleda-Proom Road — Balochistan

The road project is intended to improve connectivity between Buleda and Proom, facilitating local travel, access to services and the movement of agricultural and commercial goods.

Proom-Chedgai Road — Balochistan

The project aims to improve road access between Proom and Chedgai, helping connect communities and supporting regional economic activity.

Dirgi-Shahbozai-Taunsa Sharif Road

The construction and upgradation of this road is intended to improve interregional connectivity, reduce travel difficulties and facilitate the movement of people and goods between the connected

areas. Urban Development and Land Administration



Punjab Urban Land Systems Enhancement Project (PULSE)

The PULSE project aims to improve land administration and urban land-management systems in Punjab. Its broader objectives include modernizing land information, improving access to reliable land records and strengthening the use of digital and geospatial information for planning and land-related services.

Healthcare Infrastructure

King Salman bin Abdulaziz Al Saud Hospital — Tarlai, Islamabad

The proposed hospital will expand healthcare infrastructure in the federal capital. Its objective is to improve access to medical services and strengthen the capacity of the public healthcare system to serve Islamabad's growing population.

Forensic Science and Criminal Investigation Purpose-Built Laboratory for the National Forensic Agency

ECNEC also approved a dedicated laboratory for the National Forensic Agency. The facility is intended to strengthen forensic testing and scientific examination of evidence, supporting criminal investigations and the justice system through improved technical capabilities.

ECNEC Calls for Timely Completion and Financial Discipline

During the meeting, Dar stressed that development projects must be

completed within their approved schedules and without cost overruns. He



directed the relevant authorities to maintain financial discipline, remove procedural bottle-

necks and ensure that public investment delivers tangible benefits.



The meeting was attended by the Federal Minister for Planning, Development and Special

Initiatives, Punjab's Senior Minister, Balochistan's Minister for Planning and Development, Special Assistant to the Prime Minister Tariq Bajwa, the secretaries of Cabinet, Planning and Economic Affairs, the Chairman of the Capital Development Authority, and senior officials from provincial governments and relevant federal ministries and divisions.

The approvals cover a range of infrastructure and public-service priorities. Their eventual impact will depend on timely funding, procurement, implementation and effective monitoring. ECNEC approval represents an important administrative milestone, but does not itself mean that construction has begun or that the intended benefits have already been achieved. — ER Report

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Through its first-ever Management Development Programme, run in partnership with NDU, PEC is strengthening its institution through management training.

This four-week programme is an investment in the engineers who run PEC. PEC employees are now on their way to becoming NDU alumni.

An institution is built when it is strengthened, and that is where PEC is starting.

“
It is crucial for PEC in the 21st century that it prioritizes top service delivery and dismantle old patterns and bureaucratic approach.

~ ENGR. WASEEM NAZIR,
CHAIRMAN PEC

THE CORE MILESTONES

- 1 Management Development of PEC officers at NDU
- 2 21st-Century Capability
- 3 Measurable Institutional Impact
- 4 Enduring Governance Framework
- 5 Capacity Over Bureaucracy

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- ▶ **Institutional Strengthening:** Upgrading administrative capacity into modern executive leadership.
- ▶ **Strategic Pedagogy:** Advanced governance and public administration training powered by NDU.
- ▶ **21st-Century Readiness:** Transitioning from procedural bottlenecks to transparent, agile, digital service delivery.
- ▶ **Sustainable Impact:** Transforming mindsets to ensure PEC stands resilient for the next 50 years.

THE CHAIRMAN'S VISION: A MODERN PEC

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- 2 One Institution
Collaborative, not fragmented
- 3 Stakeholder - Centred
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- 4 Digital & Future-Ready
Data-Driven systems & workflows
- 5 A Continuous Learning Institution

FLASHBACK

THE DOOR THAT STAYED OPEN

1987

PEC made registration easier for its members.

In 1987, every registered engineer in Pakistan had to come back to PEC's door once a year.

The door was 'registration renewal'. Under the PEC Act, renewal was mandatory every year. Each year the Council sent reminders to its 28,000 members, and each year every engineer had to arrange a demand draft and apply within the deadline. Anyone who was late paid a surcharge.

For engineers in far-flung areas of the country and those working abroad, that yearly knock meant a long journey of paperwork.

So the members asked PEC to keep the door open longer.

The Executive Committee agreed. Registration could now be renewed for three years at a time. The yearly option stayed for young engineers who might find a three-year fee hard to pay.

Engineers abroad asked for more: to pay once and never knock again. Members raised it again at the Annual General Meeting, and the Executive Committee said yes. For Rs 1,000, paid once, a member's registration was covered for life, with renewal issued every three years, automatically.

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That same year, PEC stepped out through its own door.

Its Chairman, Engr Illahi Bukhsh Soomro, would visit engineers in their own cities "to know their problems and their difficulties." The visits began in Karachi, at the Steel Mills, and in Hyderabad, and Quetta sent an invitation next.

CARRYING THE PRINCIPLE FORWARD

1987

A door left open for members

2026

A modern, stakeholder centered PEC

QTECH Signs Strategic Agreement with China's Great Power for Battery Energy Storage Solutions

Quantum Data Technologies Limited (QTECH) has signed a strategic cooperation and market development framework agreement with China's Guangzhou Great Power Energy & Technology Co. Ltd to explore opportunities in battery energy storage and advanced lithium-based battery technologies in Pakistan.

Under the agreement, QTECH plans to introduce and progressively undertake local assembly of advanced battery energy storage systems, covering residential and commercial battery packs, industrial and utility-scale storage solutions, and specialized systems for data centers, artificial intelligence (AI) infrastructure, electric vehicle (EV) charging infrastructure and other energy-intensive applications.

Guangzhou Great Power Energy

& Technology is a Chinese energy technology company specializing in lithium batteries and energy storage solutions. The company is listed on the Shenzhen Stock Exchange under stock code 300438 and had an approximate market capitalization of US\$4 billion as of October 13, 2026, according to the information provided by QTECH.

as a data- and AI-driven technology company, considers reliable energy supplies and energy security essential to Pakistan's technological development. The company views the agreement as part of its broader strategy to establish innovative technology ventures and create long-term value for shareholders.

The planned expansion into bat-

ttery energy storage comes as demand for dependable power solutions grows across sectors increasingly reliant on digital systems, data centers, AI applications and electric mobility.

While the agreement establishes a framework

for strategic cooperation and market development, the scale, timing and implementation of local assembly will depend on the partners' subsequent plans and arrangements.

The collaboration could provide a pathway for QTECH to expand into energy storage technologies while strengthening its role in Pakistan's emerging technology and energy ecosystem. – ER News Desk



The proposed collaboration aims to support the development of Pakistan's energy storage market while creating opportunities to build local assembly capabilities and expand access to advanced battery technologies. Such systems can help businesses and institutions manage electricity demand, improve energy reliability and support the growing power requirements of digital infrastructure.

QTECH, which describes itself

Pakistan, CVF-V20 Secretariat Discuss Climate Finance and \$2 Billion Lifeline Fund

Federal Minister for Finance and Revenue Senator Muhammad Aurangzeb, accompanied by the Governor of the State Bank of Pakistan (SBP), met Sara Jane Ahmed, Managing Director of the CVF-V20 Secre-

aims to be ready by April 2027, with an initial mobilisation target of US\$500 million and plans to expand beyond US\$2 billion over time.

He sought clarification on the Fund's proposed contributions, governance structure, access arrangements, returns and withdrawal mechanisms, noting that these details were still under development.

The discussions also



tariat, on the sidelines of the World Bank Group-IMF Annual Meetings 2026 in Bangkok, Thailand, to discuss climate finance and Pakistan's Climate Prosperity Plan.

The Finance Minister welcomed efforts to expand concessional financing and attract sovereign investment in projects related to water, health and education. He also appreciated the proposed Lifeline Fund, which

covered the proposed country platform, investor book, BRIDGE initiative, and potential cooperation with Chinese institutions and development partners.

The Finance Minister emphasized the importance of ownership by relevant line ministries, integration with the national budget, and coordination with the United Nations Development Program (UNDP) and other development partners to avoid duplication of efforts. – ER News Desk

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Pakistan Plans Joint Global Technology Facility to Strengthen Disaster Preparedness

Deputy Prime Minister and Foreign Minister Senator Mohammad Ishaq Dar has called for the effective use of artificial intelligence (AI) and digital technologies to strengthen Pakistan's disaster preparedness, improve early-warning systems and shift the country's approach from reactive emergency response to proactive risk management.

Dar chaired a high-level meeting at the National Emergencies Operation Centre (NEOC), operated by the National Disaster Management Authority (NDMA), to discuss the establishment of a Joint Pak Global Tech Facility. The proposed initiative is intended to support technology-driven disaster management and international cooperation in building resilience against natural hazards.

NDMA Chairman Lieutenant General Inam Haider Malik briefed the meeting on NEOC's role in disaster monitoring, early warning,

preparedness and coordinated emergency response. He also outlined NDMA's Next Generation Technology (NGT) project and plans to establish a Global

Resilience Hub (GRH) to facilitate international cooperation in proactive disaster management. Dar stressed that Pak-



istan's vulnerability to climate change and recurring natural disasters makes it essential to strengthen national preparedness and improve the use of modern

technology. He also called for the coordinated and effective implementation of the plans discussed at the meeting.

The meeting was attended by Federal Minister for Climate Change and Environmental Coordination Dr Musadik Malik, NDMA Chairman Lieutenant Gener-

meteorological and hydrological analysis, and data-driven risk assessment.

NDMA's Next Generation Technology project aims to advance this

not specified in the official announcement.

International Cooperation and Climate Resilience Pakistan faces a range of climate-related hazards, including floods, droughts, extreme rainfall and risks associated with glacial melt. Strengthening forecasting capabilities and ensuring that warnings reach exposed communities in time are important components of reducing the human and economic costs of disasters.

The broader initiative also follows Pakistan's efforts to position NEOC as a centre for international disaster-management cooperation. On October 6, 2026, United Nations Secretary-General António Guterres visited NDMA headquarters and received a briefing on NEOC, the Next Generation Technology project and the proposed Global Resilience Hub. NDMA also demonstrated its National and Global Disaster Lens 2026-27, a disaster-risk intelligence and visualisation capability designed to integrate information on hazards, vulnerabilities and evolving risks.

For Pakistan's engineering and technology sectors, the proposed facility highlights potential areas for collaboration in AI systems, satellite-based monitoring, climate modelling, sensor networks, telecommunications and resilient infrastructure. Its ultimate value, however, will depend on how effectively these capabilities are integrated into operational warning systems, provincial and district-level emergency planning, and public communication.

The key challenge will be to translate institutional plans and technological capabilities into timely, reliable and actionable warnings that enable communities and emergency services to prepare before disasters strike. — ER News Desk

al Inam Haider Malik, Special Assistant to the Prime Minister Tariq Bajwa, the Secretary of the Economic Affairs Division and senior officials from the ministries of Planning and Development, Finance and Foreign Affairs, along with NDMA representatives.

AI and Data Analytics at the Centre of Disaster Management

The proposed facility comes as Pakistan seeks to strengthen its technology-based disaster management infrastructure. NEOC serves as a central platform for monitoring hazards, assessing risks and coordinating information for emergency preparedness. According to NDMA, its capabilities include satellite feeds, geographic information systems (GIS), remote sensing,

approach by integrating AI, machine learning, the Internet of Things (IoT) and advanced data systems to automate the development of more precise disaster early warnings. These technologies could help authorities

identify emerging threats, assess vulnerable areas and provide timely information to decision-makers and communities.

The proposed Global Resilience Hub is expected to provide a platform for international knowledge exchange and cooperation in disaster risk reduction. However, details about the Joint Pak Global Tech Facility's financing, international partners, technical architecture, implementation schedule and operational arrangements were

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This project enhances centralized monitoring, precise environmental control, operational efficiency and supports safe, reliable and compliant operations in a critical pharmaceutical manufacturing environment.

Prof. Dr. Muhammad Aamir assumes Charge as Vice Chancellor of SSUET

Sir Syed University of Engineering &

Technology (SSUET) has appointed Prof. Dr. Muhammad Aamir, the current Dean of the Faculty of Electrical & Computer Engineering, as the new Vice Chancellor. This decision comes as the previous Vice Chancellor, Prof. Dr. Afzal Haque, is recovering from brain surgery. Prof. Dr. Aamir will serve in this role until further

notice.

Prof. Dr. Muhammad Aamir is an accomplished academic, researcher, and

ing, conducting part of his research at the University of Malaga, Spain, through an Erasmus Mundus Scholarship. He has published approximately 50 research papers and book chapters and has contributed to national curriculum development through HEC's National Curriculum Revision Committees.

In addition, he is an HEC-approved PhD supervisor, a professional member of IEEE, and also serves as the

engineering educationist with extensive experience in higher education. He earned his PhD in Electronic Engineer-

Editor-in-Chief of the Sir Syed University Research Journal of Engineering & Technology. ■



Horses for Courses The ESL Philosophy of Intelligent Power

By: Muhammad Tariq Haq

As a great fan of cricket, if I recall correctly, it was perhaps first time in England that different cricket teams were selected for T20s, ODIs and Test matches.

They called it horses for courses strategy. Likewise, different teams were selected for home series and away from home series. Again for green turfs, selection used to be different than for the dry strips. One outfit, never fitted all.

Similarly, in the world of mission-critical power solutions, one size never fits all.

Different industries demand different strengths. Different customers pursue different priorities. Some seek uncompromising uptime. Others require aggressive commercial competitiveness without sacrificing reliability.

At Energy Solutions (Pvt.) Limited, we do not force customers into a single-brand ecosystem simply because it suits the supplier.

We engineer solutions around the customer.

That philosophy is called Horses for Courses.

Like a master horse rider

selecting the perfect thoroughbred for each terrain, ESL carefully aligns every project with the engine platform best suited for its operational, commercial and strategic realities.

Every application presents a different set of challenges. Load requirements, operating conditions, project timelines and commercial priorities all influence the choice of power generation equipment. Understanding these variables is fundamental to selecting the right platform for each customer. The objective is not simply to supply a generator, but to deliver a solution aligned with the demands of the application.

For high-end, mission-critical installations — where failure is not an option — ESL deploys globally respected Cummins engines coupled with Stamford alternators, delivering elite-grade reliability for critical infrastructure, healthcare and industrial applications.

For large-scale banking and telecommunications deployments involving hundreds of generating units, ESL frequently recommends Perkins powered solutions —

proven platforms renowned worldwide for fleet uniformity, durability and operational consistency.

For customers who are highly price conscious yet refuse to compromise on engineering quality, ESL strategically deploys Mit-



subishi engines — delivering disciplined economics with uncompromising performance integrity.

For housing and infrastructure developments, ESL often integrates Baudouin powered systems — robust, dependable and exceptionally suited for demanding environmental conditions and long operational cycles.

For hyperscale data centers, ESL has also suc-

cessfully deployed solutions based on Volvo Penta alongside Cummins platforms.

And where customers require very large quantities, rapid-fire deliveries and highly competitive commercials without compromising quality, ESL deploys



eslPOWER products — backed by almost lifetime warranty support.

These systems are sourced from modern Aksa manufacturing facilities across Turkey, China, Spain and beyond — enabling ESL to deliver global engineering excellence with speed, flexibility and confidence.

This is where ESL fundamentally differs from many others in the market.

Others often say: “You can buy any brand... as long as it is ours.” ESL says:

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1. Multiple world-class choices
2. Optimized technical fit
3. Faster deployment capability
4. Better lifecycle economics
5. Greater customer empowerment

The right power solution is not determined by the brand name alone. It is determined by how effectively the equipment meets the demands of the application, the realities of the operating environment and the customer's long-term objectives. This is the distinction between simply supplying power equipment and engineering a solution around the customer.

This is not merely product supply.

This is strategic power architecture.

This is the ESL Horses for Courses strategy.

ESL strategy is in stark contrast with a very famous car manufacturer. Its chairman used to say, “We can supply you a car in any color as long as it is black.”

We at ESL believe that customer can have what he wants. He can buy engine of any make, model, manufacturer as long as it fits the quality, price, reliability, longevity, CAPEX, OPEX requirements. Yet we don't sacrifice on efficiency and performance and easily offer multiple years warranties to our customers. In some cases, we have offered a lifetime warranty also. We know our products are built in poka-yoke factories with foolproof, failsafe, defect free, tried and tested battle-hardened processes. This is why; our warranty failure rate is almost ZERO. We administer our own warranties from the platform of Aksa without ever (yes, ever) involving engine distributors for warranty administration. This has been our policy since inception and will stay till eternity IN SHA ALLAH. ■

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From Students to Solution-Makers: Rethinking Engineering Education for Pakistan

By Prof. Dr. Abdul Waheed Bhutto

For generations, engineering education has followed a familiar path i.e. attend lectures, complete laboratory experiments, pass examinations, undertake a final-year project and graduate in search of employment. This model has produced millions of engineers around the world.

Yet the world in which today's engineers will work is changing faster than the traditional curriculum can accommodate.

Artificial intelligence, automation, climate change, digitalization, advanced manufacturing, resource scarcity and the transition towards sustainable production are redefining engineering practice. The question is no longer simply whether an engineering graduate has mastered a body of knowledge. The more important question is whether the graduate can identify a real problem, design a solution, build and test it, work with others and create value for society. This is why engineering education around the world is gradually moving from the

traditional model of "learn first, work later" towards "learn by doing."

The United States, Germany, Canada, the United Kingdom and Singapore have developed different approaches, but a common philosophy is emerging. Engineering students are increasingly expected to acquire not only technical knowledge but also design capability, professional skills, industry experience, digital competence, communication, teamwork and problem-solving ability.

Germany's dual-study model, for example, combines university education with structured learning in companies. In Canada, institutions such as the University of Waterloo integrate alternating academic and industrial work terms into engineering education. In the United States, engineering accreditation places strong emphasis on solving complex problems, engineering design, teamwork, communi-

cation, ethics and the application of knowledge.

Another influential international approach is the — Conceive, Design, Implement and Operate (CDIO)

Accreditation frameworks emphasize learning outcomes, quality improvement and industry linkages. Universities have laboratories, incubation centres, industrial placements and final-year

expensive imported one? These questions transform students from experiment performers into engineers.

Chemical engineering provides an excellent example. Its traditional founda-

tions — material and energy balances, thermodynamics, fluid mechanics, heat and mass transfer, reaction engineering, separation processes, process control and process design — remain essential. They should not be weakened. But the chemical engineer of the



automated systems. Consequently, communication, ethics, creativity, leadership and understanding human needs will become just as important as technical competence.

Pakistan could therefore rethink engineering education around four interconnected stages. Learn, Build, Test and Create. Students must first learn the fundamentals. They must then build something with that knowledge. They should test their ideas in laboratories, industries or com-



framework. Its underlying philosophy is particularly relevant to Pakistan. Engineers do not simply study systems. They conceive them, design them, implement them, operate them and improve them. This represents a fundamental change in educational thinking.

Our engineering universities already possess many of the necessary foundations. Engineering curricula contain strong mathematics, science and technical subjects.

projects. The challenge is to connect these components into a coherent educational experience.

future must also understand renewable energy, biomass and waste valorization, carbon capture and utilization,

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The laboratory, for example, should not merely be a place where students reproduce experiments from a manual. It should become a place where students ask questions. Can this process consume less energy? Can this material be produced more cheaply? Can agricultural waste be converted into a useful product? Can the water-treatment system be redesigned? Can artificial intelligence improve process control? Can a locally available material replace an

sustainable fuels, water treatment, circular economy, process intensification, artificial intelligence, digitalization and industrial decarbonization. The future engineer must combine strong engineering fundamentals with digital, sustainable, resilient, human-centered and entrepreneurial capabilities.

Industry 5.0 also reminds us that technology alone is not enough. The engineer of the future will increasingly work alongside artificial intelligence, robotics and

munities. Finally, they should learn how engineering can create economic, environmental or social value. This approach could begin from the first year rather than waiting for the final year project.

Universities could also establish real-world problem banks. Industries could contribute to engineering problems. Farmers could identify agricultural challenges. Hospitals could identify techno-

Contd on page 10

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From Students to Solution-Makers: Rethinking Engineering Education for Pakistan

Contd from page 9
logical needs. Municipal authorities could provide water, waste and infrastructure problems. Energy companies could identify efficiency challenges. Small and medium enterprises could provide manufacturing problems.

Students would then learn that engineering is not simply about answering questions given by teachers. It is about discovering the questions that matter.

This would also require us to rethink assessment. If examinations remain the principal measure of achievement, students will naturally optimize their learning for examinations. If we want creativity, innovation and problem-solving, these capabilities must also be assessed.

An engineering portfolio could therefore include a stu-

dent's designs, prototypes, simulations, field tests, economic assessments, sustainability analysis, teamwork

has a distinct industrial structure, with major sectors including textiles, agro-based industries, food processing,

emerging digital economy.

These industries face challenges related to energy costs and reliability, limited

should not simply copy engineering-education models from Germany, Canada or the United States.

Instead, we should learn from their core principles—experiential learning, industry engagement, design-build-test education, interdisciplinary skills and professional competence—and adapt them to Pakistan's own industrial and societal needs. Our engineering universities should prepare graduates not only to enter existing industries, but also to improve productivity, develop new technologies, solve local problems, create enterprises and generate economic, environmental and social value.

We should learn from international principles rather than import foreign systems wholesale. Our objective should be to develop a Pakistani model of engineering education that combines strong fundamentals with practical experience, digital capability, sustainability, entrepreneurship and social responsibility.

Pakistan does not simply need only engineering graduates. It needs engineers capable of addressing its energy, water, climate, industrial productivity, manufacturing, agricultural and environmental challenges.

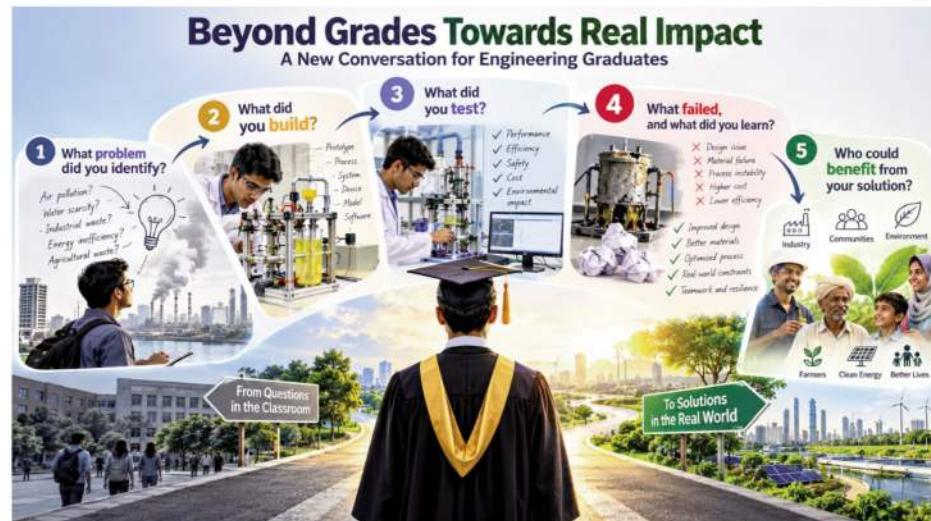
An engineer who reduces energy consumption in a factory creates value. An engineer who converts

agricultural waste into useful products creates value. An engineer who develops a low-cost water-treatment system creates value. An engineer who applies artificial intelligence to improve industrial productivity creates value.

This is the deeper meaning of moving from classroom to creation. The future of engineering education is not a choice between theory and practice. We need both. Fundamental knowledge provides the foundation; practical experience provides context; design provides application; industry provides real problems; technology provides new tools; and entrepreneurship provides a pathway to value creation.

The classroom, therefore, should not disappear. It should open its doors to the real world. Pakistan's engineering universities have an opportunity to move from an education system centered primarily on courses and examinations towards one centered on competence, creativity, creation and impact.

The engineer of the future should not graduate merely asking, "Where will I find a job?" The more powerful question should be: "What problem can I solve, what can I create, and who can benefit from my engineering?" That is the journey from classroom to creation. ■



and reflections on failure and improvement.

This does not mean copying Germany, Canada or the United States. Pakistan

chemicals, fertilizers, cement, automobiles, pharmaceuticals, mining, engineering and a large network of SMEs, alongside an

technological upgrading, low productivity, export concentration, infrastructure and weak university-industry linkages. Therefore, Pakistan

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Aftab Husain Appointed Interim Chairman of Pakistan Refinery Limited

Pakistan Refinery Limited (PRL) has appointed Mr Aftab Husain as Chairman of its Board of Directors on an interim basis, with

specify the duration of the appointment or provide further details about the circumstances leading to the decision.

Pakistan Refinery Limited is a petroleum refining company based in Karachi and is listed on the Pakistan Stock Exchange. Its



immediate effect.

According to a company notice, the Board of Directors approved the appointment through a circular resolution dated October 14, 2026.

Mr Husain will serve as chairman during the interim period. The company's announcement did not

operations include the processing of crude oil into petroleum products for the domestic market.

The appointment marks an interim change in the leadership of the company's board as it continues its refining operations in Pakistan's evolving energy sector. ■

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Agriculture Review



Pakistan Explores Rice Planters to Boost Yields by 15 pc, Cut Production Costs

The federal government is considering introducing mechanical rice planters in Pakistan's major rice-growing regions, particularly Punjab and Sindh, in a move aimed at increasing yields, reducing production costs and improving the competitiveness of the country's rice exports.

Federal Minister for Economic Affairs and Establishment Division Senator Ahad Cheema was informed at a meeting that the use of mechanical rice planters could increase rice yields by up to 15 percent while lowering production costs per kilogram.

The meeting reviewed the potential for introducing the technology across suitable rice-growing areas. Cheema directed the Secretary of Food to prepare a comprehensive feasibility study in consultation with provincial governments to assess the initiative's economic viability, potential cost savings and likely impact on rice exports.

The minister said the federal government would invest in the initiative in partnership with provincial governments if the study established a viable case. He also called for a cost-sharing mechanism involving the feder-

al government, provincial governments and farmers.

Cheema directed the Secretary of Food to consult provincial authorities on identifying suitable farmers and ensuring the equitable distribution of planters across relevant rice-growing areas. He also called for consultations with the Rice Exporters Association of Pakistan (REAP), the Engineering Development Board (EDB), provincial stakeholders and private companies already using the machinery.

Emphasizing the importance of technical expertise, the minister said the initiative should include a technology-transfer program covering farmer training, after-sales services and technical support to ensure the effective operation and maintenance of the machinery.

Coordinator to the Prime Minister on Food Ahmad Umair, Secretary of Food Amer Ali Ahmad, the Secretary of Industries and senior officials attended the meeting.

International Experience Offers Encouraging Results

Evidence from rice-producing countries suggests that mechanical transplanting can improve productivity and reduce labor requirements, although the results depend on farming conditions and the quality of implementation.

A 2026 systematic review published in the ASEAN Journal on Science and Technology for Development, examining

studies from Bangladesh, India, Nepal and the Philippines, found that mechanical rice transplanting reduced labor requirements by 30–94 percent

tonnes per hectare using manual methods—an increase of approximately 4.4 percent. Total production costs were around 20 percent lower with mechani-



cal transplanting, while the benefit–cost ratio improved from 2.42 to 3.44. Pakistan also has evidence supporting the potential of the

compared with manual transplanting. The review also identified additional yield benefits, while highlighting high machinery costs and the need for specialized seedling nurseries as barriers to wider adoption. A study published in Discover Agriculture in October 2025, based on irrigated rice production in Nepal, reported yields of 8.26 tonnes per hectare with mechanical transplanting, compared with 7.91

technology. A field survey conducted in the Gujranwala rice–wheat zone during the 2020 growing season found that mechanically transplanted rice achieved an estimated 11–13 percent higher yield and generated 16–20% greater net returns than conventional manual transplanting. The study noted that transplanting operations could cost more under the mechanical method, underscoring the importance of evaluating overall farm profitability rather than machinery costs alone.

These findings indicate that mechanical transplanting can deliver significant benefits, but there is no single, universally applicable success rate for rice planters. Outcomes depend on the availability of suitable seedlings, correct planting density, timely field operations, soil and water conditions, operator training and access to maintenance services.

Feasibility and Technology Transfer Will Be Critical

For Pakistan, the proposed feasibility study will need to establish whether the expected productivity gains and cost savings can justify the initial investment and ongoing operating expenses. It should also

assess the suitability of different planter models for local rice varieties, field sizes and farming practices.

A practical implementation strategy could include pilot projects in selected districts of Punjab and Sindh, followed by independent assessments of yield, labor savings, cost per kilogram, machine utilization and farmers' net returns. Shared machinery services or custom-hiring centers could also help small farmers access the equipment without having to purchase it individually.

The proposed training and technology-transfer program will be equally important. International experience shows that the availability of machinery alone does not guarantee successful adoption. Farmers need access to appropriate seedling nurseries, trained operators, spare parts and reliable after-sales services.

If supported by a sound feasibility study and an effective implementation framework, mechanical rice transplanting could help modernize Pakistan's rice sector, improve farm-level profitability and strengthen the competitiveness of its rice exports. – ER

Pakistan Calls for Stronger Global Scientific Cooperation to Tackle Climate Challenges

Pakistan has called for stronger international scientific cooperation and greater use of research in policy-making to address pressing global challenges, including climate change, water scarcity, biodiversity loss and food insecurity.

Federal Secretary for Science and Technology Shahid Iqbal Baloch made the call while addressing the inaugural session of the ANSO-COMSATS-TWAS International Conference, titled "A Sustainable Future for All Living Species on Planet Earth," in Islamabad.

He said scientific innovation and collective action were essential to protecting the planet and ensuring a sustainable future for coming generations.

The conference brought together scientists, researchers and international experts to strengthen collaboration and advance the objectives of UNESCO's International

Decade of Sciences for Sustainable Development.

Among those attending were Ambassador Dr Mohammad Nafees Zakaria, Executive Director of COMSATS; Dr Liu Weidong, Executive Director of ANSO; and Professor Quarraisha Abdool Karim, President of TWAS. Professor Federico Rosei of the University of Trieste, Italy, joined the event online.

Baloch stressed that scientific progress must translate into practical solutions. He called for greater investment in science education, stronger support for young researchers and closer links between research institutions and the wider community.

He also highlighted the need for an integrated approach to managing water, energy, food systems and ecosystems. For Pakistan, he said, stronger early-warning systems, wider adoption of renewable energy and climate-resilient agriculture were particularly important in responding to growing environmental pressures.

The federal secretary emphasized that government policies and development

plans should be guided by scientific evidence rather than assumptions. He urged policymakers, universities, research institutions and industry to work more closely to ensure that scientific discoveries lead to tangible benefits for society.

Reaffirming Pakistan's commitment to international scientific partnerships, Baloch pointed to ongoing cooperation with China, Iran, Türkiye and the Republic of Korea in areas including biotechnology and renewable energy.

He commended COMSATS, ANSO and TWAS for organizing the conference and expressed hope that the discussions would produce practical recommendations and strengthen international partnerships for sustainable development.

The conference underscored the importance of bringing science, policy and industry closer together at a time when countries are under growing pressure to manage natural resources responsibly, protect ecosystems and build resilience against climate-related risks. – ER/PID

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Pakistan, EU Explore Cooperation in Electric Vehicle Skills Development

Contd from page 1
Haroon Akhtar Khan said the transition could help reduce Pakistan's oil import bill, improve energy sustainability and create opportunities

for local value addition. He emphasised that the shift to EVs must be supported by stronger technical skills, domestic supply chains and greater industrial capacity.

He directed the EDB to work closely with the EU delegation to identify practical opportunities for collaboration in EV training, technical education and capacity

building. He said European experience could help Pakistan develop the skilled workforce and technical expertise needed to support the changing automotive

landscape.

Secretary of Industries and Production Ihsan Ali Mangi stressed the need to align skills development programs with the emerging requirements of the automotive industry. He said coordination among government institutions, industry and international partners would help identify skills gaps, strengthen training programs and prepare workers for new technologies.

He added that cooperation with the EU could facilitate the exchange of technical knowledge, improve training standards and equip Pakistani workers and technicians with skills relevant to the evolving electric vehicle ecosystem.

Prime Minister's Coordinator Rana Ihsan Afzal also highlighted the importance of preparing young people for emerging technologies and future employment opportunities. He said the transition to electric mobility should be seen not only as a technological change but also as an opportunity to develop human resources, encourage innovation and

broaden economic participation.

Rana Ihsan Afzal said international cooperation could help link training initiatives with industry's practical needs, enabling young Pakistanis to acquire competencies relevant to the automotive and clean-energy sectors.

The EU delegation expressed interest in exploring cooperation with Pakistan in EV skills development. Discussions also covered the importance of institutional coordination and engagement with industry in identifying areas where joint initiatives could be developed.

The meeting was attended by Secretary of Industries and Production Ihsan Ali Mangi, Prime Minister's Coordinator Rana Ihsan Afzal, the Chief Executive Officer of the Engineering Development Board, senior officials of the Ministry of Industries and Production, including additional and joint secretaries, and representatives of the European Union delegation.- ER Report/PID

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- George Fisher

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Pakistan, Malaysia Seek Stronger Trade and Investment Ties

Pakistan and Malaysia have reaffirmed their commitment to strengthening economic cooperation, expanding bilateral trade and encouraging investment partnerships at the Malaysia-Pakistan Business Engagement 2026, held at the High Commission of Malaysia

cantly, with an ambition to increase its value from approximately US\$1.5 billion to US\$5 billion through greater business engagement and private-sector participation.

The High Commissioner identified artificial intelligence, education, manufacturing, goods and services as promising areas for cooperation. He also highlighted Pakistan's strategic location as a gateway to Central Asian markets and its young population as important advantages for future economic engagement.

nology and called for closer cooperation to translate bilateral goodwill into tangible economic benefits.

The minister highlighted Pakistan's population of approximately 250 million, its young workforce and its strategic location as significant advantages for investors. He pointed to Karachi and Gwadar ports as important gateways for regional commerce and highlighted opportunities to strengthen connectivity with Central Asian countries, including those linked to the Central Asia

tions.

Highlighting opportunities in Special Economic Zones (SEZs), Sheikh referred to the industrial potential of the Bin Qasim area in Karachi, where approximately 6,000 acres of land offer opportunities for industrial development. He encouraged Malaysian companies to consider establishing manufacturing operations and export-oriented businesses, including through partnerships with Pakistani firms.

He also outlined govern-

Dr Tauha Hussain Ali Reappointed MUET Vice Chancellor for Second Term

Professor Dr Tauha Hussain Ali has been reappointed Vice Chancellor of Mehran University of Engineering and Technology (MUET), Jamshoro, for a second consecutive four-year term, extending his tenure until February 2031.

According to a notification issued by the Sindh government's Universities and Boards Department, the new term will take effect in February 2027,

allowing Dr Tauha to continue leading one of the province's major engineering and technology institutions.

The decision has been welcomed by university teachers, officers and employees, who have congratulated the vice chancellor and expressed hope that his continued leadership will contribute to the institution's development and academic progress.

Dr Tauha has served MUET in several administrative roles, including reg-

istrar and pro-vice chancellor, before assuming the university's top position. He holds a PhD from Australia, completed in 2006, and received the Higher Education Commission's Best Teacher Award in 2016.

During his leadership, MUET has pursued initiatives aimed at strengthening research, promoting innovation and expanding links with industry and other

institutions. The university has also worked to develop collaborations that provide students with greater exposure to professional practices and emerging technologies.

His second term will provide continuity in the university's leadership as higher education institutions face the challenge of improving academic standards, strengthening research capacity and ensuring that engineering graduates are equipped to meet the changing needs of industry.

The extension places responsibility on the university's leadership to build on existing initiatives and further advance teaching, research and institutional development over the next four years. - ER



in Islamabad.

Federal Minister for Board of Investment Qaiser Ahmed Sheikh attended the event as Guest of Honour, which brought together public- and private-sector representatives, business leaders, investors and other economic stakeholders to explore opportunities for trade, investment and business-to-business collaboration.

Welcoming the minister, Malaysian High Commissioner Dato' Mohammad Azhar Mazlan highlighted the longstanding friendship between the two countries and stressed the need to translate their close relations into stronger commercial partnerships. He expressed confidence that bilateral trade could grow signifi-

He encouraged Pakistani businesses to explore opportunities in Malaysia, particularly in edible oil and halal products, citing Pakistani investment in halal gelatin production as an example of the potential for successful cross-border ventures. He emphasized that mutually beneficial partnerships should remain central to bilateral trade and investment.

Addressing the gathering, Qaiser Ahmed Sheikh thanked the Malaysian High Commission for organising the engagement and reaffirmed Pakistan's commitment to its longstanding relationship with Malaysia. He praised Malaysia's progress in economic development and tech-

Regional Economic Cooperation (CAREC) region.

He identified information technology, artificial intelligence, advanced manufacturing, mining and minerals, agriculture, food processing, halal products and value-added industries as sectors offering considerable potential for joint ventures and investment.

The minister said Pakistan welcomed Malaysian investment that could support industrial development, technology transfer, employment generation and export growth. He invited Malaysian companies to explore commercially viable opportunities in Pakistan and assured them that the Board of Investment would facilitate investors and coordinate with relevant government institu-

ment efforts to improve the business environment through regulatory reforms, streamlined procedures and better coordination among institutions. Emphasizing the importance of long-term investor relations, he said the Board of Investment was committed not only to attracting new investors but also to supporting existing businesses and facilitating their expansion.

The engagement provided a platform for both countries to explore practical avenues for deeper commercial cooperation and build partnerships aimed at expanding trade, attracting investment and supporting shared economic growth. - ER News Desk/PID



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Strategic Mapping Frameworks for Green Technology Development

Engr. Dr. Muhammad Nawaz Iqbal

Strategic mapping frameworks for the development of green technologies offer a set of tools that organizations and policymakers can use to identify, assess, and prioritize new technologies that can help achieve environmental sustainability.

In contrast to traditional approaches to technology planning, these frameworks combine ecological considerations, economic viability, technology readiness, public acceptance, and regulatory requirements into a single planning process. Mapping the relationships between technologies, resources, markets, infrastructure, and environmental objectives enables organizations to identify technologies with the greatest potential while reducing investments in those that may be redundant or environmentally harmful.

Technology roadmaps can be incorporated into an innovative strategic mapping approach to provide a continuously evolving view of the green technology landscape through the use of dynamic sustainability indicators. Such an approach differs from the traditional research-to-commercialization pathway for technological development because it acknowledges that technological pathways can

change rapidly due to technological breakthroughs, policy changes, supply chain disruptions, and shifts in consumer behavior. Indicators such as carbon intensity, resource efficiency, lifecycle emissions, scalability, and investment trends can be incorporated into strategic maps and updated as market and environmental conditions evolve, enabling informed strategic decisions.

Another useful approach is ecosystem-based mapping, in which green technologies are evaluated according to their relationships with other technologies, industries, institutions, and the natural environment. For instance, the development of renewable energy can be mapped in conjunction with energy storage, smart grids, electric mobility, green hydrogen, and industrial electrification rather than being considered in isolation. This holistic view reveals

technological synergies, key constraints, and opportunities for cross-sectoral innovation. It can also help foster a circular economy by turning waste from one sector into a useful resource for another, thereby improving environmental outcomes and economic sustainability.

Geographic intelligence can also inform strategic mapping by identifying areas where green technologies can deliver significant environ-

mental and socioeconomic benefits. Spatial analysis can integrate information on renewable resource availability, energy demand, infrastructure quality, industrial concentration, water availability, environmental vulnerability, and community characteristics. This mapping can help policymakers and investment decision-makers determine which technologies are techni-



cally viable and which are most suitable for specific geographic regions. It can also promote decentralized innovation by identifying local opportunities for solar energy, sustainable agriculture, waste-to-energy systems, green buildings, and low-carbon transportation.

Another innovative approach is scenario-based strategic mapping, which helps planners prepare for possible future developments

in technology and the environment. Rather than following a single technological pathway, scenarios can be developed based on different assumptions about carbon prices, climate policies, resource scarcity, technological progress, and consumer preferences. Technologies can then be evaluated in terms of their performance under various scenarios. This enables decision-makers to

develop flexible solutions that remain beneficial under changing conditions while monitoring technologies whose future benefits remain uncertain.

Social and institutional aspects can also be explicitly incorporated into the framework to make green technology mapping more effective and efficient. A technically superior technology may not be adopted if communities consider it unaffordable, dis-

ruptive, unsafe, or incompatible with local practices. Innovative approaches can therefore complement technical indicators by identifying stakeholders, assessing public acceptance, determining skills requirements, exploring funding options, identifying regulatory barriers, and highlighting gaps in existing knowledge. This produces a more comprehensive picture of

innovation readiness and can inform technology strategies that are environmentally sustainable, socially inclusive, and institutionally viable.

Another transformative approach is the integration of artificial intelligence (AI) and data analytics, which can provide valuable insights into consumer behavior and preferences. Machine-learning models can process vast amounts of patent information, scientific publications, investment

trends, market data, environmental data, and industrial performance data to identify emerging technological clusters and potential breakthrough areas. Predictive mapping can reveal relationships that may not be readily apparent through traditional expert analysis, including combinations of technologies that can accelerate decarbonization and resource efficiency. These analytical capabilities can be combined with



expert knowledge to transform strategic mapping into an intelligent system for anticipating technological opportunities.

A strategic mapping tool for green technology development should be a dynamic decision-making instrument rather than a static planning blueprint. It should link technological innovation to measurable sustainability outcomes, investment priorities, policy instruments, infrastructure development, and social needs. Regular updates can ensure that the framework adapts to new scientific and environmental findings, as well as changes in laws, regulations, and markets. By integrating technological, environmental, economic, spatial, and social considerations, strategic mapping can facilitate the development of a portfolio of technologies that supports long-term decarbonisation, resource efficiency, resilience, and sustainable economic growth. ■

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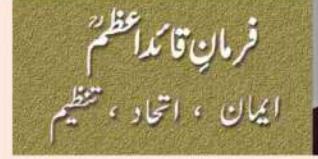
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Pakistan, World Bank Group Agree to Accelerate Reforms and Investment-Led Growth

Federal Minister for Economic Affairs Ahad Khan Cheema met World Bank Group (WBG) President Ajay Banga on the sidelines of the 2026 WBG-IMF Annual Meetings in Bangkok to discuss the next phase of cooperation aimed at accelerating Pakistan's economic growth, attracting investment and creating productive jobs.

The meeting focused on translating macroeconomic stabilization into sustainable, investment-led growth, stronger employment opportunities and improved living standards. It built on President Banga's visit to Pakistan in February 2026.

Cheema acknowledged the WBG president's efforts to improve the institution's operational efficiency, particularly reducing average project preparation time from 19 months to nine months. He also welcomed the WBG's record US\$112 billion in private capital mobilization in fiscal year 2026.

The minister highlighted Pakistan's ongoing government-wide reform initiative, led by the Prime Minister's Steering Committee on Implementation Reforms, which aims to address institutional bottlenecks, streamline procedures and speed up project execution.

Both sides agreed on the need to further improve operational efficiency, simplify processes and accelerate the delivery of development projects.

Cheema stressed that the WBG's Country Partnership Framework (CPF) and policy reforms should be aligned with large-scale investments capable of expanding productive capacity, encouraging private-sector investment and generating employment.



Priority areas include digital transformation and artificial intelligence (AI), minerals and value addition, primary healthcare, skills development, agricultural value chains, energy and transport infrastructure.

He also emphasized the importance of continued WBG financing for strategic initiatives, including the Main Line-1 (ML-1) railway project and the National Artificial Intelligence and Economic Development Program. These initiatives, he said,

could improve connectivity, strengthen competitiveness and support sustainable economic growth.

The minister called for measurable development outcomes, effective monitoring and a stronger focus on tangible improvements in the lives of ordinary Pakistanis.

Highlighting the role of private enterprise, Cheema said the government was committed to making the private sector a key driver of investment, innovation and job creation. This includes a target to double financing for small and medium-sized enterprises (SMEs) by 2028.

President Banga reaffirmed the WBG's support for Pakistan's efforts to expand private-sector activity and mobilize investment. He underlined the importance of selecting capable financial institutions and private-sector partners that can deliver sustainable benefits to businesses and communities.

The two sides also discussed the potential role of a sovereign wealth fund in mobilizing investment while ensuring that privatisation does not compromise strategic national interests.

Both reaffirmed their commitment to a forward-looking partnership that combines Pakistan's development priorities with the WBG's expertise and capacity to mobilize public and private capital. The shared objective is to turn reforms and strategic investments into sustained economic growth, productive employment and a better quality of life for Pakistanis. — ER/PID

Pakistan Seeks Stronger CIMMYT Partnership to Boost Wheat Yields and Build Exportable Surplus

Federal Minister for National Food Security and Research Rana Tanveer Hussain has called for stronger collaboration with the International Maize and Wheat Improvement Center (CIMMYT) to raise Pakistan's wheat productivity through improved genetics, advanced research facilities and modern farming technologies.

The minister stressed that Pakistan must move beyond wheat self-sufficiency and develop a sustainable surplus that could supply international markets and food-deficit countries.

He expressed these views during a meeting with Dr Flavio Brescghello, Director of CIMMYT's Global Wheat Program, and Dr Sajid Ali, Senior Scientist and Country Representative for Pakistan, at the Ministry of National Food Security and Research.

Rana Tanveer Hussain said wheat production needed to increase substantially to meet the food requirements of Pakistan's population of around 260 million. Referring to the country's recent need for wheat imports, he emphasized that closing the productivity gap required better seed varieties, stronger research and wider adoption of modern agricultural technologies.

He highlighted a target yield of 3.5 tonnes per hectare and called for greater engagement with private-sector partners to strengthen national food security.

The minister described the forthcoming five-year National Wheat Policy as an important framework for raising production and providing appropriate incentives to farmers. He said research partnerships and practical innovations would be essential to achieving

these goals amid rising input costs and mounting climate pressures.

Acknowledging six decades of cooperation between CIMMYT and Pakistan, he recognized the organization's contribution to agricultural development, including the role of MAXIPAK wheat varieties during the Green Revolution. He urged both sides to focus future cooperation on advanced technologies and innovations that could deliver further productivity gains.

The minister sought CIMMYT's support in improved and diversified germplasm,



genomic research, hybrid wheat, gene-editing technologies and advanced breeding methods. He stressed that modern research facilities and skilled scientists were vital to developing climate-resilient, nutrient-enriched wheat varieties and translating scientific advances into practical benefits for farmers.

He also welcomed CIMMYT's support for upgrading laboratories, providing research equipment and supplying farm machinery to national agricultural research institutions.

Briefing the minister on activities undertaken in 2026 to mark six decades of partnership, Dr Sajid Ali said laboratory facilities had been upgraded at five key wheat research institutions, including the National

Agricultural Research Centre in Islamabad. Research farm machinery had also been provided to 11 national research partners across the country.

He said 15 scientists had received training in Kenya, Nepal, Ethiopia and Mexico during 2026, alongside training programs conducted in Pakistan. In addition, 21 seed banks had been established in 20 districts across Punjab, Sindh, Balochistan and Khyber Pakhtunkhwa, including the merged districts, to support resource-poor and vulnerable farming communities.

Climate-smart zero-tillage seed-cum-fertilizer drills had also been distributed to five partner organizations, including the Green Pakistan Initiative and the National Rural Support Program.

Dr Brescghello highlighted the contribution of genetic improvement to sustained wheat yield growth and said CIMMYT's support was aimed at strengthening breeding programs, improving seed processing and field research, and developing varieties suited to changing climatic conditions and nutritional requirements. Both sides also discussed hybrid wheat and opportunities for deeper collaboration with Pakistani research institutions.

The minister assured the delegation of the government's continued support and facilitation. The proposed Host Country Agreement was also discussed, with the meeting informed that the document had been finalized and was ready for signing.

Rana Tanveer Hussain reaffirmed the government's commitment to agricultural research, innovation and climate resilience, expressing confidence that stronger cooperation with CIMMYT would help narrow Pakistan's wheat productivity gap and improve long-term food security. — ER

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پاکستان میں سیٹلائٹ انٹرنیٹ فریم ورک کو جلد حتمی شکل دی جائے گی: وفاقی وزیر آئی ٹی

وفاقی وزیر انفارمیشن ٹیکنالوجی شہرہ فاطمہ نے کہا ہے کہ پاکستان میں سیٹلائٹ انٹرنیٹ کے ریگولیٹری فریم ورک کی تیاری آخری مراحل میں ہے، بہت جلد اسے حتمی شکل دی جائے گی۔

اسلام آباد میں ایٹیاپیسفک ٹیلی کمیونٹی کے سپوزیم سے خطاب کرتے ہوئے انہوں نے کہا کہ سیٹلائٹ انٹرنیٹ کمپنیوں کو سازگار کاروباری ماحول فراہم کریں گے۔ شہرہ فاطمہ نے کہا ہے کہ گلوبل سسٹم فار موبائل کمیونیکیشن ایسوسی ایشن (GSMA) کے مطابق پاکستان نے صفائی ڈیجیٹل فریق کم کرنے میں تیز ترین پیشرفت کی ہے۔ وفاقی وزیر نے کہا ہے کہ پاکستان میں ڈھائی سال کے دوران 3 نئی سب میرین انٹرنیٹ کنکلیو لینڈ کی گئیں ہیں اور ملک میں سے محروم ہے۔

بین الاقوامی انٹرنیٹ کنکلیو کمیونٹی کے لیے نئی کیبل روٹس پر بھی کام جاری ہے۔ ان کا کہنا ہے کہ یونیورسل سروس فنڈ کے تحت 17 ہزار گلوبل سروس سے زائد آپٹیکل فائبر بجھائی جا چکی ہے اور اب پاکستان میں فائبر براڈ بینڈ ہوم پاسز کی تعداد 50 لاکھ سے تجاوز کر گئی ہے۔

وفاقی وزیر آئی ٹی نے مزید کہا ہے کہ مارچ 2026ء میں 480 میگا ہرٹز آپٹیکل سسٹم کی بنیادی سے پاکستان میں فائبر کی مینوفیکچرنگ کرائی گئی، فائبر سروسز کے لیے موبائل ٹاورز کو آپٹیکل فائبر سے منسلک کرنا ضروری ہے۔ وفاقی وزیر آئی ٹی نے یہ بھی کہا ہے کہ دنیا بھر میں 2 ارب 20 کروڑ افراد اب بھی انٹرنیٹ سے محروم ہیں جبکہ صرف ایشیا پیسیفک میں تقریباً 48 فیصد آبادی انٹرنیٹ سے محروم ہے۔

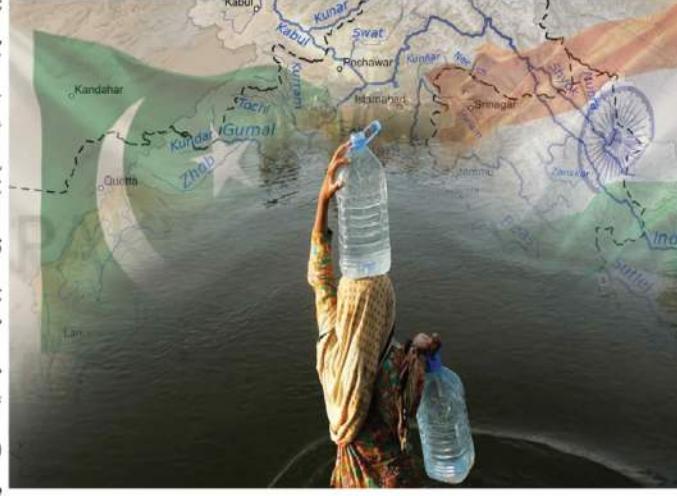
پاکستان کے مغربی دریاؤں پر بھارت نے 3120 میگا واٹ کا ہائیڈرو پاور نیٹ ورک بنالیا

پاکستان کے مغربی دریاؤں پر بھارت نے 3120 میگا واٹ کا ہائیڈرو پاور نیٹ ورک بنالیا، مزید 7250 میگا واٹ کے منصوبوں کی تیاریاں جاری ہیں۔ یہ منصوبے پاکستان کے پانی اور غذائی تحفظ کیلئے سنگین خطرہ ہیں۔

تفصیلات کے مطابق بھارت نے سندھ طاس معاہدے کے تحت پاکستان کو مختص کیے گئے مغربی دریاؤں پر پہلے ہی 3120 میگا واٹ کا ہائیڈرو پاور (پن بجلی) نیٹ ورک تعمیر کر لیا ہے، اور وہ صرف پنجاب میں سن مزید 7250 میگا واٹ کے منصوبوں کو تیز رفتار سے آگے بڑھا رہا ہے۔ پاکستانی ماہرین نے کہا کہ بھارت نے اس پیش رفت سے پاکستان میں پانی کے بہاؤ کے وقت کو کنٹرول کرنے کی نئی دہلی کی صلاحیت میں نمایاں اضافہ ہو جائے گا جس سے ملک کے پانی اور غذائی تحفظ کے حوالے سے خدشات مزید گہرے ہو جائیں گے۔

سرکاری منصوبہ بندی کی دستاویزات اور شعبہ جاتی ماہرین کے اشارے کرتے ہیں کہ بھارت نے مغربی دریاؤں پر مجموعی طور پر تقریباً 20000 میگا واٹ کی صلاحیت کے حامل ہائیڈرو پاور اقدامات کر رہا ہے۔

معاہدے کو معطل کرنے کے بھارتی فیصلے کے اہم ترین ترویجی نتائج میں سے ایک بالائی علاقوں میں بنیادی ڈھانچے کی تعمیر میں تیزی لانا ہے۔ اس معاہدے نے چھ دریاؤں سے زائد عرصے تک دونوں ایسی قوت سے لیس پڑوسیوں کے درمیان سندھ طاس کے پانیوں کی تقسیم کے نظام کو سنبھالا ہوا تھا۔ بھارت کے فعال ہائیڈرو پاور (پن بجلی) منصوبوں میں پنجاب پر ”سلا“، ”دہستی“ اور ”بگھیہار“ منصوبوں کے ذریعے تقریباً 1980 میگا واٹ، جہلم میں پراڑی-1، ”اڑی-II“ اور ”دکشن گرگا“ کے ذریعے لگ بھگ 1050 میگا واٹ، اور لدان میں مرکزی دریائے سندھ پر ”نیو پازگو“ اور ”چنگ“ منصوبوں کے ذریعے مزید 89 میگا واٹ بجلی شامل ہے، جس سے مغربی دریاؤں پر نصب شدہ مجموعی صلاحیت تقریباً 3120 میگا واٹ تک پہنچ جاتی ہے۔



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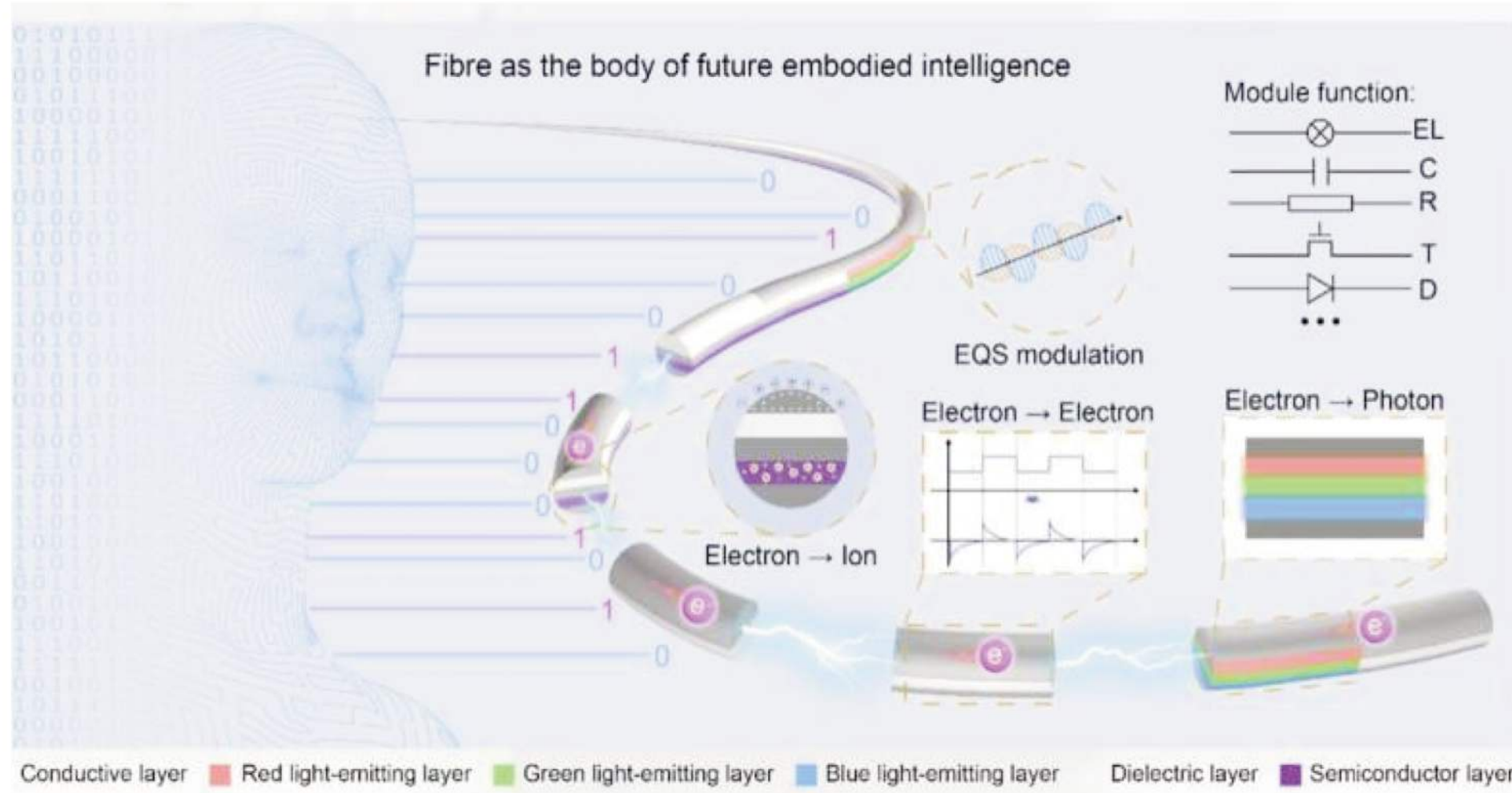
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New spinning method builds electronic circuits directly inside soft, washable fibers



Electronic devices are no longer limited to conventional systems with a screen, keyboard and processing components. Over the past decades, some electronics engineers have been developing thin electronic fibers that could be used to create wearable devices or flexible sensors for robots.

Despite their potential, electronic fibers can be difficult to assemble reliably into components or devices for specific applications. In a paper published in *Nature Electronics*, researchers at Donghua University in China introduced a new manufacturing method to build customizable circuits directly inside electronic fibers.

"This work grew out of a simple question: Can a soft fiber be more than a carrier for electronics and instead become the circuit itself?" Hengda Sun, co-author of the paper, told Tech Xplore. "For embodied intelligence, electronic systems need to conform to

complex, moving robot bodies while combining sensing, information processing and interaction."

A new approach to manufacturing electronic textile fabrics

Some conventional approaches for creating electronic textiles entail attaching rigid chips or individual electronic components to soft substrates. These strategies can create a mechanical mismatch and yield weak interconnections between components.

"Existing fiber-integration methods can also be constrained by materials and processing conditions," said Sun. "Our objective was to develop a manufacturing route in which material arrangement, device architecture and electrical interconnection are created together during fiber formation."

"We wanted to translate a circuit layout into a programmable spinning process so that the fiber is formed at the same time as the circuit is built inside it. In that sense, the broader idea is to move from 'circuit-on-fiber' toward 'fiber-as-circuit.'"

The manufacturing method introduced by the

researchers works by carefully controlling streams of different materials to build circuits inside electronic fibers as they are spun. The team uses a small device with five tiny channels to combine liquid mixtures of functional materials with elastic thermoplastic polyurethane (TPU), a stretchy plastic that holds them together, at room temperature.

"Using a five-channel microfluidic chip under mild, ambient liquid-phase conditions, a TPU matrix carries conductive, dielectric, luminescent or semiconducting formulations," explained Sun.

"Across the fiber cross-section, materials are layered to construct devices radially; along the fiber length, dynamically switching and tuning the flows encodes where devices start, stop and connect axially. This allows material placement, device fabrication and circuit wiring to occur simultaneously within a single continuous spinning step."

To demonstrate their manufacturing strategy, the researchers used it to produce fibers that emit light, process electrical signals,

carry out simple logic operations and detect nearby objects without touching them. They also combined different fiber-based modules into working circuits, including adjustable filters that select parts of an electrical signal and inverters, electrical circuits that switch a logical input of 0 to 1 or 1 to 0.

"To evaluate the platform, we examined their layered microstructures with microscopy, verified their optical and electrical performance, and confirmed their textile-grade durability under repeated bending, stretching and standard machine washing," said Sun.

"Finally, by interfacing touchless sensing fibers with control systems, we demonstrated spatial gesture control of drones and robotic arms, as well as automatic target tracking."

Toward flexible and washable electronic fabrics

In their paper, Sun and his colleagues did more than introduce different types of electronic fibers. They also established a new manufacturing method for effectively integrating electronic components within individual fibers to

build circuits for specific applications.

"Different electronic functions can be treated as modules built with shared fluidic-encoding rules, creating a modular library that can be combined according to the required circuit function," explained Sun. "This effectively circumvents the long-standing bottleneck of fragile, discrete solder joints and unstable interconnects in wearable systems."

The team's manufacturing approach could contribute to the development of reliable components and devices based on electronic fibers. In initial tests, it proved effective for integrating components with different electronic functions into circuits within a single fiber.

"We showed that different components can work together inside a single fiber, while the fibers remain soft and can be woven or sewn into textiles," said Sun. "This opens a route toward textiles and flexible structures that do more than sense: they can also process information and interact with their surroundings."

In the future, the team's

manufacturing strategy could be used to create various fiber-based electronics, including wearable devices, flexible human-machine interfaces, soft robots and embodied AI systems. Sun and his colleagues will now try to scale their approach to shift from the development of individual circuit fibers to complex, interconnected textile systems that distribute sensing, computation and interaction across entire garments.

"Important engineering challenges include establishing reliable fiber-to-fiber interconnections, suppressing signal crosstalk during dense module addressing, and integrating on-fiber power delivery and storage," added Sun.

"On the manufacturing side, we also want to improve formulation design and fluidic control and develop microfluidic chips with more channels and smaller feature sizes. These advances should increase module density, spatial precision and manufacturability, and help move fiber circuits toward larger-scale intelligent textiles and flexible robotic interfaces." - TX

Coordinated software tools could cut AI training energy use by up to 50 pc

Around half of the energy used to train AI can be saved without affecting speed or performance, using software developed at the University of Michigan Engineering. Now, U-M researchers are working with NVIDIA to integrate their new approach into Megatron-LM, NVIDIA's open-source platform for training AI.

Companies can use Megatron-LM directly or as a foundation to build private, customized training platforms. Megatron-LM is used to train NVIDIA's flagship Nemotron models, which users can download onto their own hardware.

By improving training efficiency, the U-M research team hopes to enable AI to do more useful work for less energy and cost. The savings come from finding the most efficient way to coordinate AI training across hundreds to thousands of computer processors, as well as how and when different jobs are performed.

"AI is becoming power-constrained as models become larger and more people want to train models, but we can achieve the same training speed and performance using less energy," said Ruofan Wu, a doctoral student in computer science and engineering at U-M who spent her summer integrating the U-M software into Megatron-LM.

"There are a lot of opportunities to optimize AI energy use at the software and hardware level, and one of the most rewarding parts of the internship was the opportunity to bring ideas from my research into

production systems," she added.

Co-optimizing processor speed and training task scheduling

The U-M system operates in two parts. Perseus, which slows down processors running unnecessarily fast, reduces training energy use by up to 30%, according to a 2024 study.

for large-scale AI models.

Together, both tools address inefficiencies in parallel processing, a computing technique often used to quickly train massive AI models. The method divides the model and training data across hundreds to thousands of computer processors, called GPUs, that work simultaneously. Plat-

called a core. The cores complete their tasks in sequence or concurrently by running programs, called kernels, in a schedule optimized for the GPU's maximum processing speed.

Normally, the GPUs rush to complete their assignments as quickly as possible. This wastes energy because one GPU must process more data than the rest, leaving the other GPUs to idle until the last GPU finishes. Instead, Perseus slows the other cores down so that they all finish simultaneously. These cores save energy by jogging rather than sprinting, without increasing the overall training time.

However, changing the processing speed can introduce memory and data bandwidth issues or create new, unexploited opportunities to run kernels simultaneously. Kareus corrects such inefficiencies by coordinating the cores inside each GPU and implementing the ideal kernel schedule. For example, it may adjust the number of cores allocated for communication tasks or the timing of those tasks.

"The processor speed changes what code should have been generated in the first place," said Mosharaf Chowdhury, an associate professor of computer science and engineering at U-M. "It is like picking a route by distance alone, without knowing the speed limits along the way. You get to your destination, but you burn more fuel than you need to."

"The principles of training are the same, regardless of whether you are using Megatron or a different framework, so our approach could be applied to other training platforms too," he said. — TX



Wu led the development of Kareus, which reduced the energy needed to train two leading open-source large language models by another 10%–30% in a study presented at the USENIX Symposium on Operating Systems Design and Implementation in July. The researchers say the total energy savings could approach 40%–50%

forms like Megatron-LM find the best way to divide the work and ensure the resulting output is combined correctly.

Each GPU completes its assignment by dividing the job into smaller subtasks, which can include data processing and chip-to-chip communication. Each subtask is handled by a processor within the GPU,

AI drone outpaces former world champions using one camera and no GPS

What does it take for an autonomous robot to be faster around a course than human drone pilots? At these dizzying speeds, humans need lightning-fast reflexes. Researchers at Delft University of Technology (the Netherlands) have developed an AI system that enables a racing drone to navigate demanding courses at extreme speed using only a single camera. It outperformed even former world champion human drone pilots in a race.

Now published in Science Robotics, the scientific work behind this accomplishment shows how compact, efficient neural-network-based control can achieve high-performance autonomous flight under real-world conditions. The underlying principles could help advance a much broader class of autonomous robots, from vehicles to mobile and humanoid systems.

Less is more

The TU Delft team set out to investigate how far artificial intelligence can push a drone with very limited sensors, onboard computing power and energy. This is a challenging problem: at high speed, even a small delay in sensing or control can mean missing a gate, colliding with an obstacle or losing control and crashing.

The result is MonoRace, an autonomous flight system developed at the MAVLab of TU Delft's Faculty of Aerospace Engineering. Unlike previous leading autonomous racing systems, MonoRace uses just one forward-facing camera and an inertial measurement unit (IMU) for perception, navigation and control.

Seeing the track with one camera

At high speed, the drone has very little time to interpret what it sees. A neural network identifies the racing gates in the camera

images, while the onboard IMU and a model of the drone estimate its position and motion. The system does all this without GPS or external motion tracking.

"Flying at very high speed with only one camera is challenging because the images are blurry, deformed and the AI system has very little time to precisely determine where the drone is," says Stavros Bahnam, main author of the study. "We developed a robust way of combining what the camera sees with the

commands for the drone's motors.

The network runs on board a tiny computing chip, the "flight controller," giving control commands 500 times per second. It was trained using reinforcement learning, allowing it to learn how to control the drone while taking its physical limitations into account.

"Instead of first planning a desired flight path and conventional commands, our neural network learns to directly control the motors,"

regularly rigorous challenge. The drone and racing environment were designed and operated by the competition organizers rather than by the Delft researchers. The system therefore had to operate successfully on both hardware and a track that the research team did not control. Despite these constraints, the TU Delft drone reached speeds of up to 100 km/h (62 miles per hour), defeating all other autonomous teams as well as three former world champion human pilots.

"Instead of giving the robot increasingly powerful sensors and computers, we wanted to find out how much intelligence we could extract from very limited resources," says Christophe De Wagter. "Drone racing provided an extreme environment in which to test these ideas outside the laboratory. It pushed us to develop AI that was not only fast but also robust and able to adapt when external reference measurements were unavailable."

Bringing AI to the real world

For Guido de Croon, professor at Delft University of Technology, the value of drone racing goes beyond making drones fly faster. "Autonomous racing is a way of pushing robotic AI to its limits. In the current study, we made an AI efficient enough to control a drone traveling at 100 kilometers per hour (62 miles per hour) using a single camera and a small onboard processor.

"The developed AI could be applied to many more, different real-world robotic systems.

Here, we optimized for speed, but the same approach could be

used to prioritize efficiency or safety. For example, it could perform smooth, energy-optimal control on systems ranging from small vacuum-cleaning robots to huge ship-to-shore cranes."

The researchers believe that the same principles could help a wide range of autonomous robots make fast, reliable decisions with limited onboard resources, from vehicles and mobile robots to future aerial and humanoid systems. — TX



drone's own motion information, allowing it to navigate the track at high speed without GPS." The system also had to cope with imperfections that occur in real flight, including camera interference and sensor saturation.

Neural network takes direct control

The researchers also redesigned how the drone is controlled. Rather than using a conventional control system with several layers of intermediate controllers, MonoRace uses a small neural network that directly generates

says Robin Ferde, author of the study. "This allows the controller to react extremely quickly and exploit the capabilities of the drone while remaining small enough to run on board."

Tested under extreme conditions:

To validate the system under realistic conditions, the researchers put it to the test in a demanding international competition environment. The 2025 Abu Dhabi Autonomous Drone Racing Competition provided a partic-