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April – June 2024

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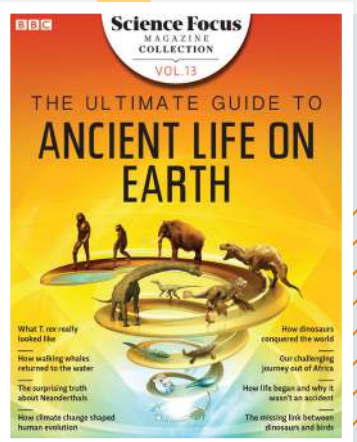

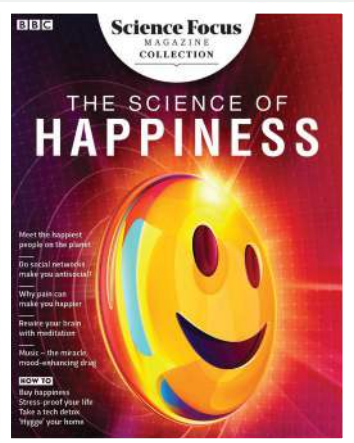

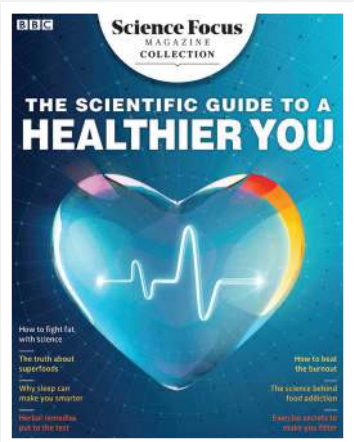

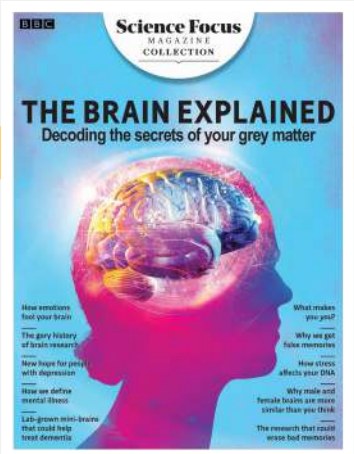

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التقدم العلمي
AL-TAQADDUM AL-ILMI

Issue 125
April – June 2024

A quarterly scientific cultural magazine published by the Kuwait Foundation for the Advancement of Sciences

KFAS إحدى شركات Company

aspd التقدم العلمي للنشر

Nurturing Kuwait's Scientific Journey Towards a Sustainable Future

As we reflect on the extraordinary journey in science, we are reminded of the pivotal role played by inspirational moments in sparking curiosity and driving innovation. From the eager undergraduate captivated by a CERN Exhibition to the collaborative efforts showcased in the recent 3rd Kuwait-imec Symposium, the trajectory of scientific advancement in Kuwait is marked by dedication, collaboration, and vision.

The symposium, which took place in October 2023, exemplified KFAS's dedication to digital transformation and sustainable energy transition, in alignment with the nation's 2035 vision for innovation and sustainability. By bringing together global experts in digital technologies and renewable energy, the event provided a platform for meaningful discussions on the strategic drivers and requirements for embracing digital transformation across various sectors.

A highlight of the symposium was the unveiling of the 10-year partnership between imec and Kuwait University, resulting in notable progress in photovoltaic solar cell technologies. This collaboration not only underscores Kuwait's dedication to fostering scientific research but also highlights the transformative power of international partnerships in driving innovation.

As Kuwait embarks on its journey towards a sustainable energy future, challenges and opportunities lie ahead. Young researchers like Yousef Al-Abdullah and Dhoha Al-Saleh embody the spirit of innovation, contributing invaluable insights and driving progress in crucial domains like energy systems and artificial intelligence.

KFAS continues to play a pivotal role in supporting research initiatives and fostering international collaboration. By investing in the upcoming generation of researchers and facilitating knowledge sharing, KFAS ensures that Kuwait remains at the forefront of scientific innovation.

The recent partnership between KFAS and the Korea Institute of Science and Technology Information (KISTI) marks a noteworthy advancement in enhancing the skill sets of the upcoming generation. Through educational summer programs and collaborative initiatives, this partnership aims to bolster digital capabilities and enhance STEM education in Kuwait.

These joint efforts not only promote research cooperation and technology exchange but also enhance digital competencies among students and young professionals, laying the foundation for a collaborative future.

Together, with strategic partnerships and unwavering commitment to scientific excellence, we can overcome challenges, drive progress, and create a brighter future for generations to follow.

Ameenah Farhan
Director General

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KISTI Agreement with Kuwait Foundation for the Advancement of Sciences

The Kuwait Foundation for the Advancement of Sciences (KFAS) has initiated a partnership with the Korea Institute of Science and Technology Information (KISTI) with the goal of enriching the skill sets of the next generation. This collaboration marks a significant stride towards nurturing a vibrant scientific culture, bolstering digital capabilities, and enhancing STEM education forward.

Initiated two years ago, this partnership began by organizing educational summer trips for high school students from Kuwait. In both years, KISTI trained the Kuwaiti students

in advanced artificial intelligence, metaverse, and machine learning applications. The students applied these new skills to develop innovative concepts for environmental solutions. Additionally, the students had the opportunity to tour supercomputing facilities, gaining valuable insights into cutting-edge technologies and their potential applications.

The memorandum, signed at the Kuwait Foundation for the Advancement of Sciences headquarters, was attended by esteemed figures including Dr. Ameenah Farhan, Director General of KFAS, Dr. Jaesoo Kim, President of KISTI, His Excellency the South Korean Ambassador to Kuwait, Chung Byung-ha, and officials from both entities.

At the heart of this collaborative endeavour is the development of initiatives aimed at fostering research collaboration and technology transfer, while also enriching digital competencies among students and young professionals across Kuwait. Specifically, the focus is on enhancing skills related to artificial intelligence, digital transformation, and the dissemination of digital educational resources.

Situated in the Daedeok Science Area in Daejeon, Korea, KISTI stands as a premier international research institute supported by the South Korean government. Renowned for its expertise in science and technology information, KISTI plays a pivotal role in advancing research infrastructure, cybersecurity, and data-driven analytics.

Dr. Ameenah Farhan, Director General of KFAS, remarked, “As the world moves forward into the era of digital transformation, spanning from big data sciences and supercomputing to quantum computing, KFAS and KISTI announce their partnership through this MOU, demonstrating collaboration between a prominent institute in science and technology information (KISTI) and a facilitating STI foundation (KFAS). This initiative will pave the way for a collaborative future for both Kuwait and South Korea, fostering increased cooperation in mutual activities and programs for the advancement of STI.”

Echoing this sentiment, Dr. Jaesoo Kim, President of KISTI, emphasized the significance of the memorandum in nurturing “digital capabilities in areas such as S&T Data, artificial intelligence, high-performance computing, and digital transformation and to nurture the future human resources in STEM. This MOU is expected to contribute to developing digital capabilities and research abilities with KFAS, as well as R&D cooperation and the spread of scientific and technological knowledge in artificial intelligence and digital transformation.”

The Beginning of an Extraordinary Journey

As a 10th grader, my visit to CERN's Large Hadron Collider Exhibition in Kuwait University was more than just a field trip; it marked the beginning of an extraordinary journey. My fascination with quantum technology and physics, a personal interest until then, took an unexpected turn last spring. This shift led me to a life-changing opportunity – applying for a summer internship at CERN, where I could contribute to experiments that redefine our understanding every day.

Upon landing at Geneva Airport, I felt a surge of excitement, knowing I was about to expand my horizons in computer science, physics, research, and personal development. Under Dr. Fawaz AlAzemi's guidance, my initial apprehensions about the tasks ahead were quickly replaced by a sense of eagerness. My first project involved developing tests for 4 Message Passing Interface (MPI) communication methods. This task went beyond mere coding; it was a deep dive into the intricacies of parallel computing. I learned the value of clear code and thorough documentation, especially crucial in a large scientific collaboration where my work could influence numerous researchers.

The transition into July signaled new opportunities, like the 13th PataTrack Hackathon. This event emphasized collaboration over competition. Here, I delved into employing kernels using Compute United Device Architecture (CUDA), aiming to make them more accessible by adapting these test cases to Alpaka. This effort showcased the importance of inclusive technology. The apex of my internship was the integration of these projects to test various methods of operating remote GPUs. The complexity and intensity of this task were counterbalanced by the immense satisfaction it brought, often leading me to work late into the night out of pure passion and love for the project.

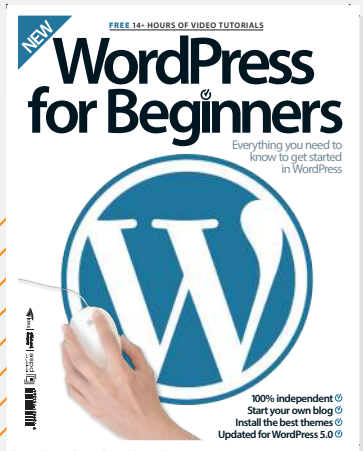
However, my experience at CERN transcended the technical realm. Joining the CERN soccer club was not just about playing a sport; it opened doors to forming relationships. The relationships on the field evolved into friendships and a supportive network in the professional sphere. Interacting with other interns, particularly those from the MENA region, enriched this experience, fostering a sense of community that went beyond mere project collaboration. These bonds were rooted in our shared passion for research and discovery.

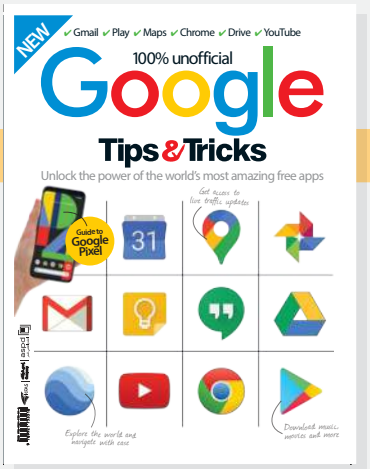
CERN's lectures and resources were a treasure that expanded my knowledge and inspiration. Engaging in discussions about the latest in particle physics and attending seminars on the latest technology enriched my understanding of the scientific world. This wealth of information, combined with the mentorship I received, profoundly shaped my approach to research and problem-solving.

Reflecting on my internship's conclusion, I recognized how each step, from my initial intrigue by the exhibition at Kuwait University to the hands-on experience at CERN, was pivotal in pursuing my dream. My summer at CERN was not just an internship; it was a voyage of discovery and personal growth. It solidified my passion for computer science and connected me with a global community dedicated to unraveling the universe's mysteries.

This summer taught me that science transcends theories and experiments; it's about the collective spirit and the people who bring these ideas to life, continually pushing us to explore the unknown. A special thanks to KFAS and CERN for making this journey possible.

By Majed Al Munefi





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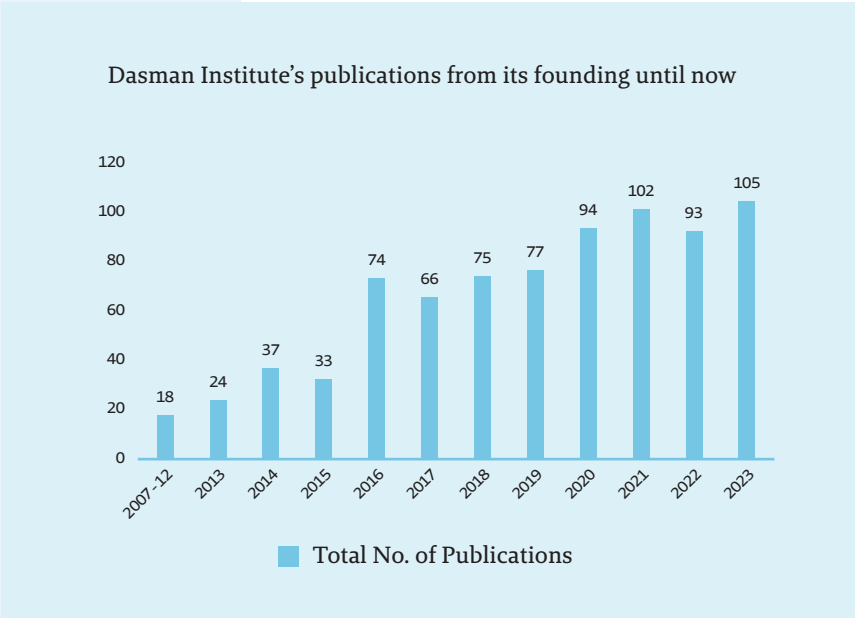
Dasman Diabetes Institute: Leadership in Diabetes Research and Care

Since its founding in 2006, the Dasman Diabetes Institute has positioned itself at the forefront of institutions advancing scientific knowledge and innovation in the field of metabolic disorders. Through its continuous pursuit of excellence, the Institute has achieved remarkable progress in the areas of scientific research, cooperation, and community outreach, affirming its position as a leader in diabetes research and care.

Excellence in research and innovation

Over the years, the Institute has published a total of 799 research articles, including 413 original research papers. A testament to our growing influence in



the field, 59% of these articles and 66% of original papers were published in the last five years, reflecting an upward trajectory in the quantity and quality of our research output.

In terms of research quality, the Dasman Institute has seen a significant 55% increase in the average impact factor of the journals in which we have published our research, from 3.263 in 2018 to 5.05 in 2023. This demonstrates not only the level of our research but also our commitment to providing valuable insights to the scientific community. Additionally, the significant 200% increase in publication in high-impact journals (IF ≥ 5) since 2018 represents the ability of our researchers to produce groundbreaking work.

Patents and global recognition

Our commitment to innovation is demonstrated by obtaining five scientific patents over the past five years. The Institute has also established more than 20 major international collaborations with prestigious institutions such as McGill University, Harvard University, the University of Oxford, and the University of Texas at San Antonio, highlighting our global reach and international recognition for our research efforts.

Community outreach and translational research

The Institute reflects a commitment to bridging the gap between scientific discoveries and their clinical applications. Since 2019, we have hosted more than 230 research presentations, reading clubs, and lectures by prominent figures from around the world, actively participating in scientific dialogues. Our researchers have presented more than 220 abstracts at 125 conferences and events, with nearly 80% at international conferences, highlighting our active participation in the global scientific community. The Dasman Diabetes Institute has achieved international recognition with 9 scientific abstracts accepted, for the first time, by the Diabetes Association American, including 3 oral offers. This proves the success and international recognition of our unique research path towards excellence.

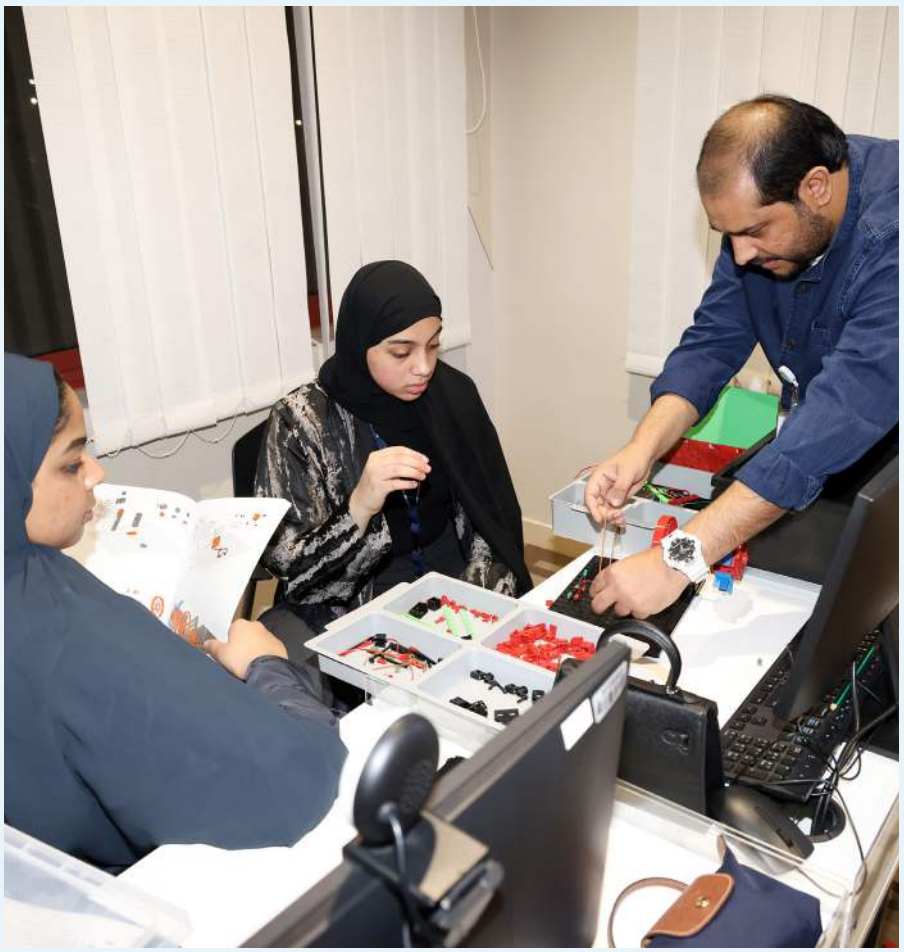
Our new research strategy prioritizes clinical research aimed at making a direct impact on Kuwaiti society. We launch groundbreaking studies in diabetes prevention and management, develop treatment regimens for type 1 diabetes, and provide innovative treatment options for insulin-dependent individuals. These initiatives reflect our commitment to improving public health and addressing the significant challenges posed by diabetes and obesity in Kuwait.

Dasman Diabetes Institute stands as a beacon of hope in the fight against diabetes. Through our advanced research, international collaborations, and commitment to community outreach, we are paving the way toward a healthier future. As we continue to make an important impact in diabetes research and care, the Dasman Diabetes Institute remains a major player on both the national and international stages, poised to make a profound impact on global health.

Sabah Al-Ahmad Center for Giftedness and Creativity Hosted the First Gulf Forum for Gifted Students

The activities of the First Gulf Forum for Gifted Students, which was held by the Sabah Al-Ahmad Center for Giftedness and Creativity, one of the centers of the Kuwait Foundation for the Advancement of Sciences, were completed with great success and brilliance, and it lasted from February 4 to 8, 2024.

This forum embodies the efforts of the State of Kuwait in supporting talent and developing the capabilities of youth in the Gulf region.



The forum aims to achieve scientific, cultural, and social goals, and to enhance communication and the exchange of experiences among the countries of the Gulf Cooperation Council. It is attended by 80 male and female students from ninth to twelfth grade, along with 20 supervisors from various countries and centers. These participants include male and female students from talent classes in the State of Kuwait. Representatives from the Ministry of Education in the Kingdom of Saudi Arabia, the King Abdulaziz and His Companions Foundation for Giftedness and Creativity in Saudi Arabia, the Ministry of Education in the Sultanate of Oman, the Ministry of Education and Higher Education in the State of Qatar, the Hamdan Bin Rashid Center for Giftedness and Innovation in the United Arab Emirates, the UAE Ministry of Education, and the Emirati Rubu' Qarn Foundation are also present.

The forum features a series of training programs for participating students, conducted in collaboration with key training organizations such as CODED, Dr. Bassam Al-Jazzaf, and Mr. Badr Al-Issa (Bu Nabil). Additionally, there are training workshops for supervisors offered in partnership with DAWRAT and DECUM, along with a variety of workshops provided by the center itself.

Badr Mishari Al-Humaidhi, Chairman of the Center's Board of Directors, stressed the importance of this forum in nurturing and developing young talents in the Gulf region, noting the successful achievement of its goals and reviewing the achievements of the participating students. He praised the efforts of the Kuwaiti leadership in supporting education and young talents.

For his part, the Center's Director General, Mr. Neda Al-Daihani, confirmed that this forum represents a promising beginning for developing such events in the future, and an affirmation of Kuwait's pioneering role in supporting young talents.

During the forum, several scientific and recreational trips were organized to explore Kuwait's prominent landmarks. Including the Ahmed Al-Jaber Oil and Gas Museum, the Houbara Club of the Kuwait Oil Company, the Sheikh Abdullah Al-Salem Cultural Center, and the Kuwait Towers.

Al-Daihani expressed his thanks and appreciation to the success partners in the forum, such as the Gulf University for Science and Technology (GUST), the Kuwait Telecommunications Company (STC), the Abdullah Al-Salem Cultural Center, the Kuwait Oil Company, the Ahmed Al-Jaber Museum, and the Vinco Company for Kuwait International Airport Advertising, stressing their vital role in the success of this important event.

Breaking Boundaries

Dhoha Al-Saleh's Journey Towards Seamless Integration of Diverse Fields to Create Leading research

In a world where innovation is celebrated and interdisciplinary approaches are valued, researchers like Dhoha Al-Saleh, Associate Professor - Business Administration, Marketing, at Gulf University for Science and Technology (GUST), are leading the charge in melding the worlds of art and science. With a rich academic background spanning computer science and marketing, Dhoha's journey exemplifies the seamless integration of diverse fields to create leading research.

With a bachelor's degree in computer science, from Kuwait University, complemented by a minor in Marketing, Dhoha's academic trajectory provided her with a blend of analytical prowess and creative thinking. "On one hand, the field of computer science helped me to foster my problem-solving and critical thinking skills. On the other hand, the field of marketing significantly increased my creativity level and helped me to better understand people's psychology," reflecting on her educational journey, Dhoha remarked, "I always enjoyed the inspiring aspects of combining art with science. The combination of computer science and marketing in my bachelor's degree allowed me to transition seamlessly between different roles and industries."

Furthering her academic pursuits, Dhoha pursued postgraduate studies in the United States, earning a master's degree in business administration from Southern Illinois University – Carbondale, followed by a PhD in Business Administration-Marketing from the same institution. Her thirst for knowledge didn't stop there; she also attended "Crisis Leadership in Higher Education Program" at Harvard University, and received a Summer Research Fellowship at the University of Missouri - St. Louis.

Dhoha's primary focus lies within artificial intelligence, specifically exploring its applications in Consumer Behavior, Innovation, and Technology. She finds great fulfillment in collaborating on research endeavors. Her particular interest in cross-cultural investigations in digital marketing and social media, earned her a notable achievement in 2020: she became the first Kuwaiti female member of The Arab-German Young Academy of Sciences and Humanities (AGYA) based in Berlin, Germany, which serves as a platform for fostering interdisciplinary and intercultural research collaborations between Germany and the Arab region.

Al-Saleh's recent work sheds light on the adoption of AI-powered technology from the customer's perspective, unraveling the intricacies of consumer behavior in the face of technological advancement.

In a conversation with Dhoha, she elaborates on the motivation behind her research, stating, "AI is everywhere right now. It is used in a wide range of applications, from our personal assistants like Alexa and Siri, to cars, factories, education, and healthcare." It's imperative to understand what drives individuals in their adoption of AI technology. Given the growth of AI-enabled technology in consumer devices, researchers and firms need to understand consumer behavior in accepting new technology. Firms that are considering implementing AI to provide services for their consumers may want to understand consumer behavior. It can help them determine whether consumers will choose to adopt the technology. "My current research questions the reason that makes consumers choose to adopt AI technology," she explained.

Dhoha's research employs a unique methodology, conducting comparative studies between Kuwait and the United States to gauge cultural influences on AI adoption. Utilizing structural equation modeling (SEM), her study delves into the intricacies of consumer behavior and sheds light on the factors influencing AI adoption.

Key findings from Dhoha's research highlight the positive correlation between motivation, perception, attitude, and intention in AI adoption. Moreover, the study underscores the significance of social and cultural factors, particularly in collectivist societies like Kuwait, where reference groups and family members wield considerable influence.

Research into the adoption of AI draws upon established models such as the Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA), and Unified Theory of Acceptance and Use of Technology (UTAUT). However, Dhoha's findings revealed limitations within the TAM, which only considers two factors influencing consumer behavior towards technology adoption. Neglecting factors like social and cultural influences undermines the model's predictive accuracy. "Our study suggests that integrating external cultural and social factors into models like TAM can enhance our understanding of consumer technology adoption", she said.

Al-Saleh's research project, funded by KFAS, delves into consumer behavior, and extends existing studies on technology acceptance, revealing the significant impact of social and cultural factors on consumer decisions. Highlighting specific findings, she discusses how the outcomes resonate with Hofstede's individualism/collectivism dimension, illustrating that individualistic cultures like the U.S. prioritize personal achievement, while collectivistic cultures such as Kuwait emphasize loyalty to the extended family and societal harmony. This dichotomy underscores how individualistic societies prioritize personal needs over group interests, whereas collectivistic societies prioritize the group's welfare, often requiring conformity and loyalty in exchange for social protection.

From a consumer perspective, Dhoha's research urges caution regarding the potential alienation and addiction stemming from AI adoption. While AI promises enhanced convenience and efficiency, it also poses ethical concerns and challenges related to misinformation and consumer addiction.

For firms, Dhoha's findings offer invaluable insights into consumer preferences and decision-making processes when incorporating AI services. By understanding the psychological and social factors driving AI adoption, firms can tailor their strategies to enhance the consumer experience and ensure responsible AI implementation.

Looking ahead, Dhoha emphasizes the imperative for further quantitative research to enhance our comprehension of AI adoption. By broadening studies to encompass diverse cultural settings and integrating additional variables, researchers can enhance the current knowledge base and facilitate responsible AI integration.

Continuing her journey, Dhoha remains dedicated to advancing scientific research in Kuwait and globally contributing to knowledge. Through collaborative efforts and innovative approaches, she envisions a future where technology acts as a driver for positive transformation, enriching lives and forging a sustainable path for future generations.

AI is everywhere right now. It is used in a wide range of applications, from our personal assistants like Alexa and Siri, to cars, factories, education, and healthcare.

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Shaping the Future Energy Landscape

As Kuwait progresses toward its sustainable energy goal, with energy a national priority, the Kuwait Foundation for the Advancement of Sciences (KFAS) renews its commitment to advancing scientific research in the energy sector by strategically funding energy efficiency, and energy policy research.

Among the young figures driving such research is Yousef Al-Abdullah, a Research Scientist in the Renewable Energy Program at the Kuwait Institute for Scientific Research (KISR). His research delves into energy and power systems, alongside energy statistics, overseeing a team of researchers and associates engaged in projects such as the Kuwait Energy Outlook (KEO), as well as other projects in the field of energy and power systems. His latest work offers valuable insights into Kuwait's energy landscape, emphasizing the indispensable role of scientific research in advancing this vital sector.

Kuwait ambitiously aims to achieve a sustainable energy future by fulfilling 15% of the projected electricity demand in 2030 through renewable sources. But this initiative goes beyond mere energy generation. Part of the plan is to develop energy efficiency policies as well. "We are identifying policies that fulfill the

energy needs of different services/sectors while also decreasing energy use," notes Al-Abdullah.

Yet, significant challenges confront the path forward. "Availability of data is a key obstacle. Data in Kuwait originates from various stakeholders, resulting in a fragmented landscape" says Al-Abdullah. "Establishing a centralized unit to manage energy-related data acquisition is essential." Tackling such hurdles is paramount to ensuring that research efforts remain informed and aligned with Kuwait's developmental plans.

The General Secretariat of the Supreme Council for Planning and Development (GSSCPD) is actively engaged in addressing these concerns, fostering research initiatives that harmonize with national strategies while bolstering Kuwait's energy future. Furthermore, it aids in crafting decision-making tools to comprehensively assess the nation's current energy landscape.

Despite Kuwait's commitment to sustainability, the current subsidies, while beneficial domestically, could potentially exacerbate global emissions burdens. Thus, Kuwait needs to demonstrate steadfast adherence to its sustainability pledges, navigating the intricate interplay between national priorities and international obligations.

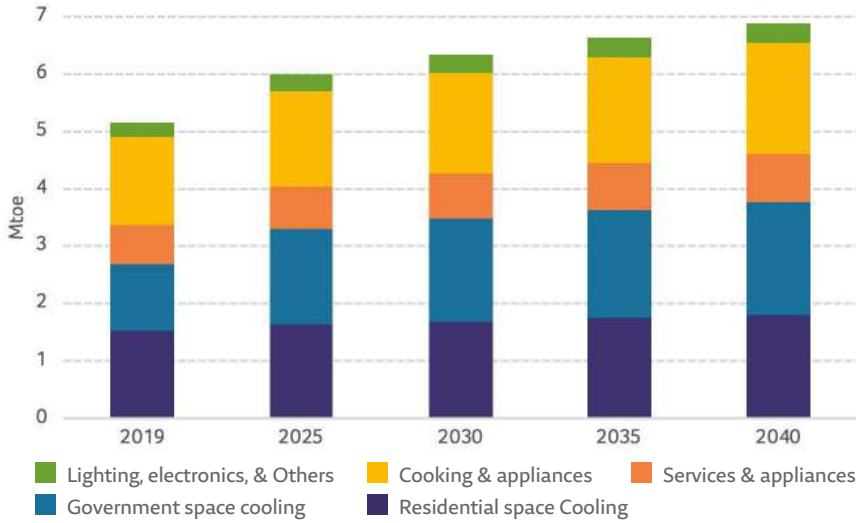
"In Kuwait, clear aims, targets, and supportive policies will shape the future energy landscape," says Al-Abdullah. "At KISR, we contribute to addressing these challenges by conducting research that informs decision-makers and the public about sustainable energy practices at large."

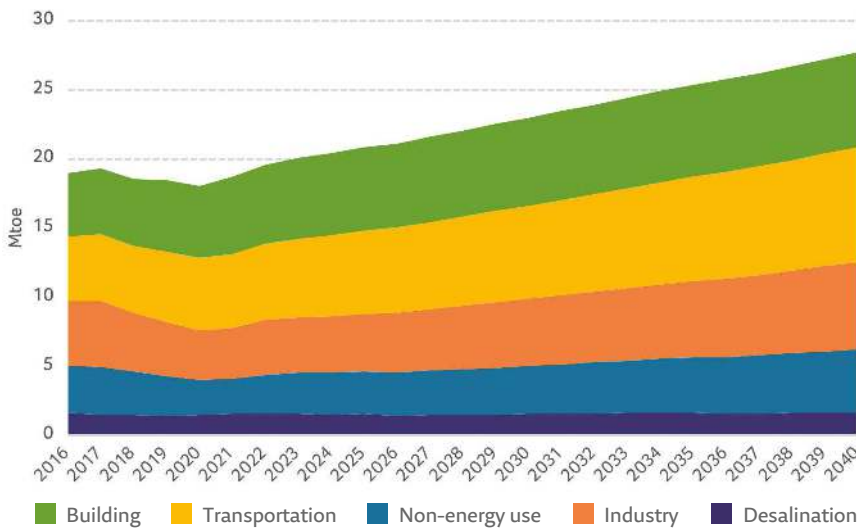
In a region where energy dynamics shape geopolitical landscapes, Kuwait stands as a pioneer. "None of the other Gulf Cooperation Council (GCC) countries have undertaken a similar endeavor," notes Al-Abdullah. "We are the first to develop a comprehensive national energy outlook in the region, empowering our nationals with the skills needed to navigate the intricacies of energy forecasting."

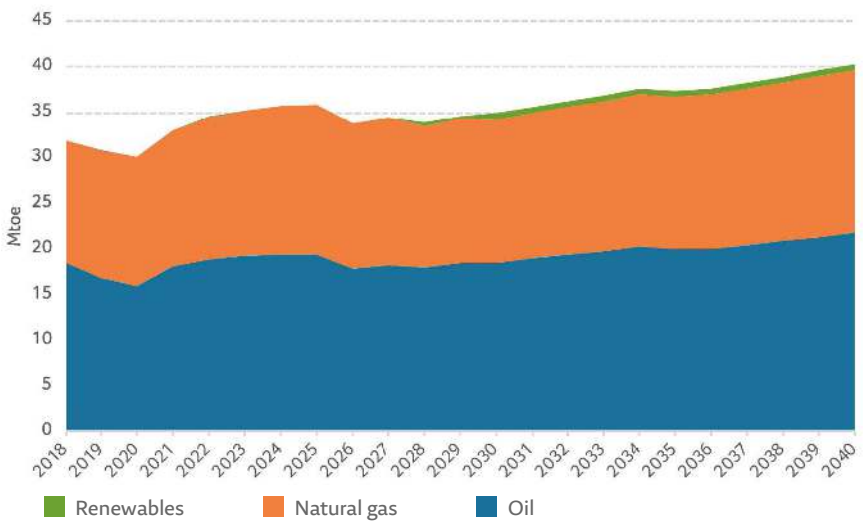
Al-Abdullah emphasized KISR's dedication to fostering global scientific engagement, driving progress and innovation in energy research. Noteworthy among these partnerships is the collaboration with the Oxford Institute for Energy Studies, where the expertise of Manal Shehabi, an applied economist specializing in energy, economics, climate, and sustainability, has played a central role in the development of the KEO. In addition, collaborations with Charlie Heaps, the Energy Modeling Program Director at the Stockholm Environment Institute, renowned for his work on Low Emissions Analysis Platform (LEAP), as well as the International Energy Agency (IEA), have further enriched the KEO with invaluable insights. These collaborations underscore KISR's commitment to international scientific cooperation and its pursuit of cutting-edge research in the energy sector.

The KEO uncovered significant opportunities and challenges in sustainable energy development. One of the key prospects lies in the realm of renewable energy, where Kuwait has vast potential. Studies indicate that Kuwait's power system could readily accommodate up to 60% renewables at present, with even greater capacity anticipated in the future. This trajectory is bolstered by emerging technologies like smart grid systems and advanced control mechanisms, which promise to further enhance renewable integration.

Moreover, energy efficiency emerges as a critical avenue for reducing overall energy demand. Initiatives such as the White Paper on District Cooling, spearheaded by KFAS, offer practical solutions for curbing electricity consumption. However, it's important to recognize that energy demand







encompasses more than just electricity; it extends to oil-based products, particularly in transportation. To address this, the KEO recommends prioritizing efficiency measures in sectors like transportation, where mass transit solutions present the most promising pathway. "Revisiting options such as a metro network and street-level tram systems," says Al-Abdullah, "could significantly mitigate energy demand from transportation, aligning Kuwait with sustainable energy goals."

"The KEO team is actively engaged in enhancing public outreach by organizing events and seminars to disseminate the outcomes. They acknowledge the need for further improvement in this area and plan to host more events in the future.

Al-Abdullah underscores the importance of KFAS's backing for endeavors such as the Kuwait Energy Outlook 2023, underscoring the pivotal role of research in shaping this direction. This publication provides crucial perspectives on the country's energy path. These undertakings establish the foundation for well-informed decision-making and strategic foresight. By sponsoring national researchers and hosting international expertise, KFAS provides Kuwait with an invaluable service, enabling the discovery of solutions to complex problems facing the nation.

In the energy sector, Kuwait stands at a crossroads—a juncture where scientific inquiry intersects with national aspirations. With enthusiastic researchers like Yousef Al-Abdullah leading the change, Kuwait is poised to navigate this landscape with confidence and determination.

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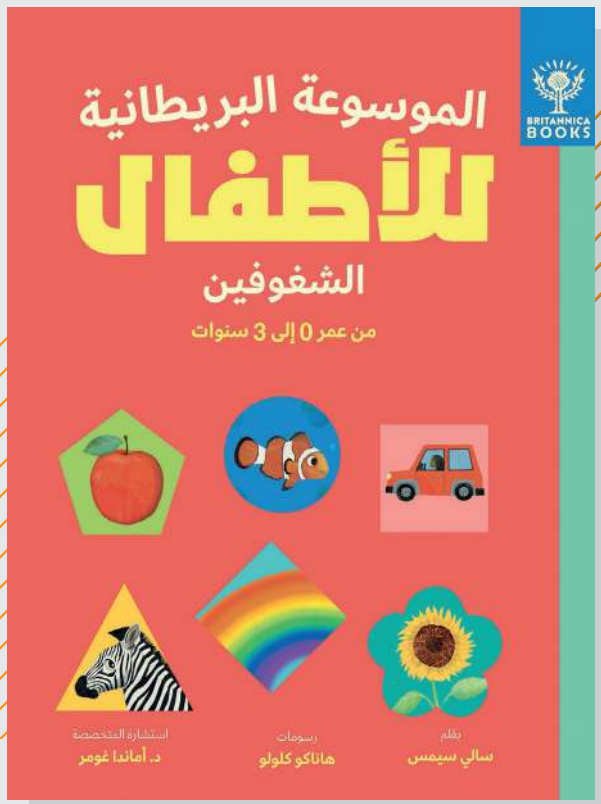

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Digital transformation is at the forefront of Kuwait's 2035 vision, aiming to propel the nation towards a more innovative and sustainable future. In line with this vision, the Kuwait Foundation for the Advancement of Sciences (KFAS) organized the 3rd Kuwait-imec Symposium: Advancing Our Societies with Digital and Energy Transitions was held in October 2023, in collaboration with the Belgian Interuniversity Microelectronics Centre (imec) and EnergyVille, a collaboration between Belgian research partners in the fields of sustainable energy and intelligent energy systems.

Featuring 12 global experts in digital technologies, artificial intelligence, and photovoltaic solar cells, the symposium brought together international and regional experts to delve into the profound transformations occurring in societies due to advancements in digital technologies and the transition towards sustainable energy systems. It explored the strategic drivers and digital transformation necessary for diverse AI applications. These applications have the potential to accelerate the pace of scientific discovery especially in areas such as medicine, climate science, and green technology. The convergence of AI holds the promise of a golden age of discovery that will reshape our world. The sessions and discussion were designed to be beneficial to policymakers, industry leaders, researchers, and all stakeholders interested in harnessing the power of data for economic prosperity.

The symposium, spanning two days, served as a collaborative platform to explore strategic drivers and requirements for digital transition in various sectors such as healthcare, smart cities, sustainable food, and energy. Key sessions addressed topics including data sensing, Internet of Things (IoT), renewable energy generation, preventive healthcare, sustainable food production, and AI applications. The discussion also covered topics related to developing microelectronics technology in the energy field, and exploring investment opportunities for the private sector.

About 300 participants, including researchers, academics, businessmen, and stakeholders from various government entities such as the Kuwait Institute for Scientific Research (KISR), Kuwait University (KU), the Ministry of Electricity Water and Renewable Energy (MOEWRE), the Kuwait Public Authority for Environment (KEPA), as well as representatives from the oil, banking, and diplomatic sectors from several Gulf and European countries, attended this prominent event.

The 3rd Kuwait-imec Symposium kicked off with a vibrant discussion on AI's far-reaching impact. The first day's lectures focused on the strategic motives for digital transformation and its requirements in various areas such as healthcare, smart cities, food security, water, and sustainable energy. The presentations also touched on data sensing, information extraction, IoT, and the use of artificial intelligence in widely deployed small computing devices. Moreover, discussions revolved around integrating data and information from these sources, analyzing them, and integrating digital transformation technologies such as IoT and transitioning towards sustainable energy systems.

The focus of the second day centered on the outcomes arising from the 10-year collaboration supported by KFAS between imec and KU to support research photovoltaic projects. The collaboration has led to the establishment of a research program called "Advanced Crystalline Silicon PV Research Program" which is part of a larger international research consortium aimed at developing advanced,

highly efficient photovoltaic solar cell technologies at lower manufacturing costs. KFAS has funded 3 phases of the program: Phase I aimed at producing high efficiency solar cell technologies at lower manufacturing costs; Phase 2 focused on the development of new hybrid perovskite based solar cells, this technology has shown strong progress with an increasing efficiency to more than 23%; Phase 3, aimed at assessing and predicting the performance of under Kuwait conditions in collaboration with KISR.

KU has invested KFAS grant in building up new technical infrastructure to have in-house processing capabilities for perovskite solar cells, accelerating the technology knowledge build-up and transfer from imec towards Kuwait University.

This facility concentrates on pushing the boundaries of perovskite solar cell technology, capitalizing on its improved performance and stability for both terrestrial and potential space applications. Innovative hybrid tandem approaches, such as combining perovskite with substrates like silicon or copper indium gallium selenide (CIGS), have yielded device efficiencies surpassing 25%. KU's advanced facilities for fabricating high-performance perovskite devices underscore its keen interest in space applications.

Research endeavors at the Perovskite lab encompass the design and fabrication of devices tailored for space conditions, utilizing stable P-I-N device structures and specific material compositions like PTAA:Al_2O_3/ C_{60}:BCP for efficient charge transport. The lab conducts comprehensive studies on the optical and electrical properties of these devices under simulated space conditions, shedding light on performance and degradation mechanisms. Detailed insights into materials, processing methods, and device structures are provided to further advancements in the field.

This, 3rd Kuwait-imec Symposium, showcased the dedication of strategic partnership between KFAS, imec and EnergyVille in advancing science, technology, and innovation. The expertise accumulated by KU during that period serves as a solid foundation for the next phase, which involves establishing a Renewable Energy Research Center. The primary objective of the center is to promote the adoption of innovative technologies within the Research Community, raise awareness of these technologies within Kuwait society, and inspire Stakeholders to invest and establish new spin off companies to cater to the local market with innovative products and services related to renewable energy. This is crucial for successful Energy Transition.