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AL-TAQADDUM AL-ILMI



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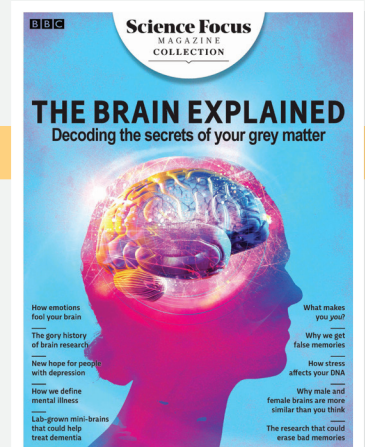
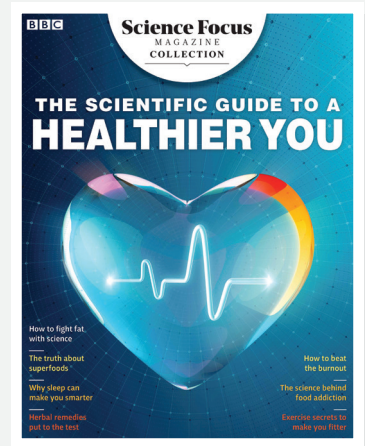
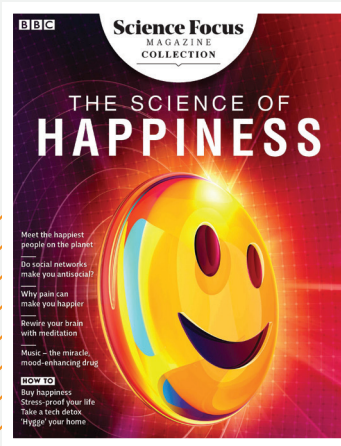
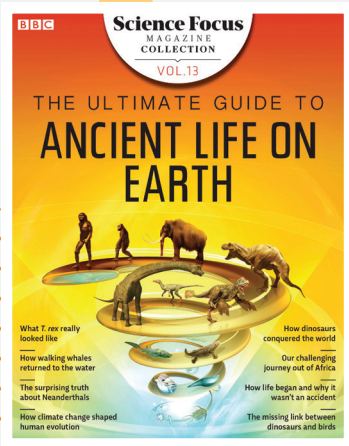
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Kuwait Foundation for the Advancement of Sciences

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التقدم العلمي للنشر





Digital Transformation

Digital Transformation is one of the main pillars of The Kuwait Foundation for the Advancement of Sciences' (KFAS) new strategy, it drives many of its activities. In this issue, we feature Dr. Abdullah Almutawa, who has made a career using his knowledge of artificial intelligence and machine learning in the medical field.

KFAS also organized a STEM trip sending a group of students to South Korea to visit prestigious South Korean and International organizations like the Korea Institute of Science and Technology Information (KISTI), and Dankook University. The programs focused on the cutting-edge fields of artificial intelligence and virtual reality implementations.

As for the college level, KFAS organized the Entrepreneurship Hackathon through Virtual Reality Technology (Metaverse) competition in cooperation with

the Gulf University of Science and Technology and leading Singaporean educational technology companies. The main aim of the hackathon was to develop and refine the digital skills of young people and enable them to find solutions to modern challenges.

In its efforts to advocate the conservation of nature and biodiversity and implement the Environmental Pillar, the Scientific Center Kuwait (TSCCK), one KFAS' centers, made a first-of-its-kind achievement with the successful breeding of the endangered Sand Tiger Shark. KFAS also funded exploring new ways to conserve turtles, harnessing the power of modern satellite trackers.

Funding research remains at KFAS' core. Inspired by the spirit of scientific innovation in Boston, Kuwaiti neuroscientist Shaikhah Alshuaib wanted to shape the future of neuroimaging. Funding from KFAS helped her do it. Now, she is working on a neuroimaging-based Ph.D. research project with significant implications for the future of medicine and our understanding of the human brain.

Executive Editor

Dr. Layla Al-Musawi

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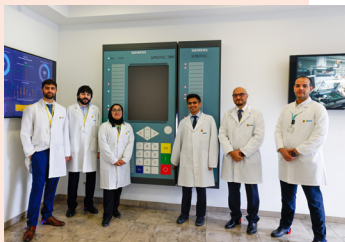
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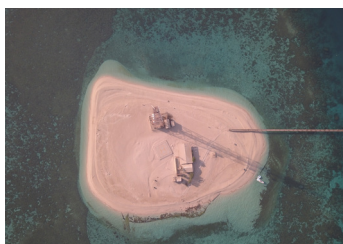
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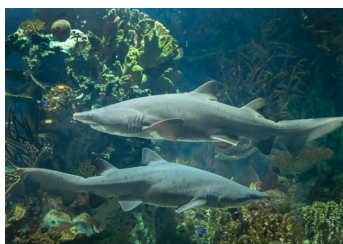
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لمراقبة السماء



BBC
Sky at Night
بالعربية

دليل السماء

نوفمبر 2022

استعدّ لرصد المريخ

عالياً فوق كوكبة الجبار المهيبة،
يزداد حجم المريخ وسطوعه مع
اقترابه كل يوم من موعد تقابله

حوادث عبور بالجملة لأقمار المشتري

هل يمكنك أن ترصد حوادث عبور أقمار
المشتري الغاليلية في هذا الشهر؟

تعرف على أكثر

ضوء الثريا الأمامي ونجمنا لهذا الشهر

PETE LAWRENCE

الضوء الأحمر لمفاهدة أفضل



للمحافظة على جودة رصدك
اليلي، يمكنك قراءة هذا الدليل
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سنشاهد أيضاً في هذا الشهر

* قنيسان القمر: رؤية البحر الشرقي

* أورانوس في موقع تقابله..
كيف ترصده؟

* هل تستطيع رصد أقمار المريخ
الخافتة؟

ستيفن تونكين

Stephen Tonkin

خبير مراقبة

بالنظار المزوَّج.

تابع جولته على أفضل

الناشر لكتا العيين على



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ومقدم حلقات برامج

The Sky at Night

شهرياً

على قناة BBC Four



مجلة الفلكيين!

حب الاستكشاف ليس له حدود!

إذا كنت تنظر ليلاً وأعجبك منظر السماء المليئة بالنجوم وأطوار القمر وحركة الكواكب النجمية
فإن مجلة **Sky at Night** ستأخذك من مجرد المشاهدة إلى متابعة علمية دقيقة لحركة
السماء وأجرامها واطلاع على تفاصيل الأحداث الفلكية من خلال **دليل السماء** الشهري.



KFAS Organizes an Entrepreneurship Hackathon in Cooperation with GUST to Sharpen Digital Skills of the Youth



The Kuwait Foundation for the Advancement of Sciences (KFAS) organized the Entrepreneurship Hackathon through Virtual Reality Technology (Metaverse) competition in cooperation with the Center for Teaching, Learning and Research from the Gulf University of Science and Technology (GUST) from July 4 - 6, 2022. The event was in line with KFAS objectives that focus on motivating students and graduates to join the fields of technology

and innovation and enhance their skills to enable them to take part in the Fourth Industrial Revolution. The main aim of the hackathon was to develop and refine the digital skills of young people and enable them to find solutions to the challenges posed by the competition. The content of the hackathon was the result of a cooperation between the top companies in educational technology and the development of digital educational content in the Republic of Singapore.

The hackathon was a challenging competition and an educational experience with that was applied using metaverse technology for the first time in Kuwait and the region. During the event, the participants explored digital tools, programs, and skills in order to prepare them to succeed in the business world.

KFAS invited young people between the ages of 20 -24 to register for the Hackathon through KFAS' website.

The three-day training camp was held from 10:00 a.m. to 6:00 p.m., and the top three winners received cash prizes. All participants were honored with a certificate of participation upon the completion of the program.

KFAS indicated that the goal of organizing the entrepreneurship hackathon was to invest in the human element and to introduce participants to the best digital programs and skills used in startups and technology companies around the world.

The Foundation strongly believes that these tools and techniques have helped participants engage in the appropriate training that would enable them to develop in the work environment.

New Internship Program Places Kuwaiti Graduates at Multinational Companies

Thanks to partnerships with Siemens and Emerson Electric, a new program from the Kuwait Foundation for the Advancement of Sciences (KFAS) helps top STEM graduates explore exciting new career paths



This year, a new internship program led by the Kuwait Foundation for the Advancement of Sciences (KFAS) placed Kuwaiti graduates in internships at multinational companies. The focus was to teach students the ins and outs of multinational companies and expose them to new career paths.

Mohammed Abdullah, a program manager at the Scientific Culture Directorate at KFAS, said the program was a great success. “The initial feedback from visiting [the companies] when the interns were there was positive,” he said. Students were placed at Siemens and Emerson Electric, and both companies “evaluated [the interns] very highly.”

The program kicked off with an announcement and a call for applicants on social media. The call for applicants targeted top graduates from engineering programs who had finished their bachelor’s or master’s degrees within the last year.

Abdullah said his team received dozens of applications. They interviewed shortlisted candidates and selected the top ten to move into internship positions at Siemens and Emerson Electric. The companies were “very welcoming,” said Abdullah.

Learning about multinational companies like Siemens and Emerson Electric through the internship program is meant to help recent graduates explore new career paths. Abdullah said that most Kuwaiti students who graduate with engineering degrees choose to register with the Civil Service Commission to pursue a career in the public sector or turn to oil and gas companies. “This third avenue of private sector entities that are linked to multinationals is not very well known, so it was important to highlight it,” he said.

After being selected, the interns spent a month shadowing employees in various positions, including engineers, solutions architects, and finance managers, to get a range of experience. “The whole idea is for these graduates, who have not yet had the experience of working in an organization, to get a feel for what an organization looks like and how an organization functions — not just the engineering side of it,” said Abdullah.

Another critical aspect of the program was learning about technology. “Because we are dealing with engineering students, [another part of the internship program] is learning the technology these companies are working with and the innovation they provide,” said Abdullah.

The program concluded with a trip to a Siemens campus in Berlin, Germany, in September. Abdullah said that the feedback from interns has also been positive, and he hopes to continue the program next year. He also wants to expand the program to all science, technology, engineering, and mathematics (STEM) graduates and pursue partnerships with more multinational companies in Kuwait. “We’re trying to promote STEM,” he said, “[and] show that exciting jobs are available.”

By Marianne Dhenin

Modern Tech Makes a Difference Conserving an Ancient Species



By Emma Stenhouse

PHOTO: ABDULLAH AL-ZAIDAN



Cultural artifacts from the Bronze Age show that sea turtles have been an intrinsic part of Kuwait's seas for at least 3,000 years. But these gentle creatures are now considered endangered and placed on the International Union for Conservation of Nature (IUCN) Red List.

As a result, the Kuwait Environment Public Authority (KEPA) – with the support of the Kuwait Foundation for the Advancement of Sciences (KFAS), Kuwait University, The Scientific Center Kuwait, Senyar Dive Team, Kuwait Environmental Lens, and The Kuwait Coast Guard – has been exploring new ways to conserve the turtles found within this region. Harnessing the power of modern satellite trackers — far more effective than radio trackers — can help scientists discover

more about the migratory pathways and foraging grounds that these turtles depend on.

“Sea turtles are exposed to a wide range of threats including marine pollution and climate change,” said Abdullah Al-Zaidan, Deputy Director General of Technical Affairs – KEPA. “As a governmental body, one of our responsibilities is to ensure the turtles and their environment are protected.”

One of the optimal ways to find out if the turtles in the Arabian Gulf leave or stay within the region, are satellite trackers, according to Amani Al-Zaidan, assistant professor in the department of biological sciences at Kuwait University. “Knowing the habitats they prefer, their favorite foraging grounds, and migration

routes will allow us to work regionally with other states to protect this population,” she said. The challenge was finding turtles to track.

“Until now, we didn’t have a turtle rehabilitation program in Kuwait,” Abdullah Al-Zaidan said. “But the opportunity arose to rescue three sea turtles that had been rehabilitated in tanks.”

It took around six months for the rescued turtles to recover. The next stage of the project involved the logistics of release and finding funding to purchase the trackers. Alan Rees, a marine turtle expert, acted as a consultant. Rees advised on the tracker technology and supported the rehabilitation efforts. Thanks to a grant from KFAS, the trackers were purchased and the release of the two healthiest turtles was achieved. The third turtle will be released shortly.

“A big thank you goes to KFAS for supporting the first national project of its kind to be carried out in Kuwait,” said Abdullah Al-Zaidan. “Our hope is that we can continue carrying out this project to conserve Kuwait’s sea turtles for many more years to come.”

Sea turtles are exposed to a wide range of threats including marine pollution and climate change. As a governmental body, one of our responsibilities is to ensure the turtles and their environment are protected.

Sand Tiger Shark Conservation Efforts

A new international achievement for The Scientific Center Kuwait



The Scientific Center Kuwait (TSCCK), one of the centers of the Kuwait Foundation for the Advancement of Sciences (KFAS), announced a major global scientific achievement with the successful breeding of the endangered Sand Tiger Shark.

A first-of-its-kind achievement for the center, this new milestone sets TSCCK apart as one of a few centers in the world to have successfully bred this endangered species. To celebrate the scientific feat, TSCCK held a press conference on July 5, 2022, in the presence of several representatives of major institutions,

entities, and key figures in the world of environmental sciences, preservation, biodiversity and sustainability. At the conference, the attendees were able to see the baby sharks for themselves, who have now become part of the group of Sand Tiger Sharks that the Center has cared for now for more than 20 years – becoming one of the most popular marine creatures at TSCCK.

The famed Sand Tiger Shark, Bibi, who is estimated to be more than 20 years old herself, gave birth to the new baby Sand Tiger Sharks, one male and one female, on January 24, 2022, at TSCCK

Aquarium. The baby sharks were named Bader and Badriya, a choice made by the public via a vote held on TSCCK's Instagram account.

Salam Al-Ablani, a biologist and a former member of the TSCCK Board of Directors, said that TSCCK was able to provide and maintain a suitable environment for Sand Tiger Sharks that enabled them to reproduce naturally and continuously without any artificial interference during those years. According to scientific studies, this type of shark is one of the rarest species that breeds in aquariums, due to various

stressors such as crowding, diet, and water temperature. The gestation period of females ranges from 12 to 14 months, and it is difficult to maintain her pregnancy for this length of time under all the factors inside an aquarium's environment. The birth of healthy youngsters also indicates that the nutritional value of the sharks' diet is very high, which is reflected very positively in the excellent breeding practices of the Marine and Wildlife Department staff and their expertise, not to mention the management of TSCK.

Once the birth took place safely, the Aquarium team, led by Global Consultant Andrew Clarke, rushed the youngsters out of the main tank in time, where they were transferred to the nursery ponds to ensure their safety – and where they were closely monitored for all aspects, especially their feeding. The team then put in place a strategy to take care of the newborns and ensure their proper growth, by providing the right amount of food they need at the right time.

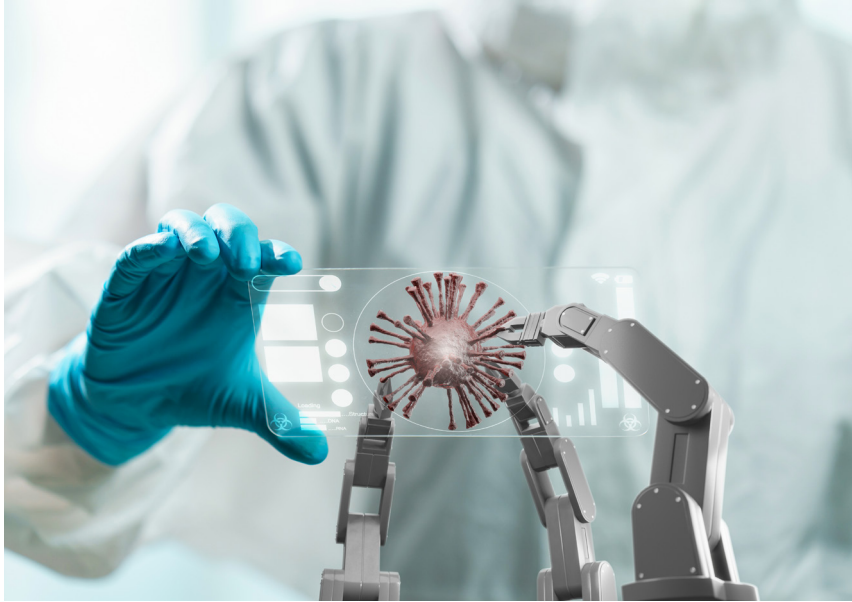
About Bader and Badriya's condition, Al-Ablani said: "The baby sharks are in excellent health. Each one of them weighed about 3.5 kg at birth and began to feed about five days after birth, which is the norm for this type of shark given that they are born with egg yolks and the remains of the fetuses they ate during the gestation period in their stomachs. At the age of four months, the youngsters weighed about 9.5 kg and reached a length of about 130 cm. Currently the Center's specialized staff carefully weighs the amount of food they are fed, to be able to track how much each of them



consumes, and we use this information to determine their growth rates. We also collect morphometric measurements (weight and height) monthly."

Al-Ablani continued: "These sharks have great ecological importance and value in maintaining the marine bio-balance, as well as scientific value in terms of what they mean for the field of scientific research. With this information, we will learn more about Sand Tiger Sharks, and will help other facilities

around the world that struggle to breed and nurture them. We can also use this information to better understand their natural history, and help provide vital information about some of the environmental threats to which these animal populations are exposed to in nature - such as poaching, by catch, and other threats, which are thankfully in decline. Our daily observations also give us insight into their natural and reactive behaviors."



Improving Patient Outcomes with Computer Science

Abdullah Almutawa, an expert in artificial intelligence and machine learning, is changing how disease are detected and treated

Abdullah Almutawa is one of Kuwait's foremost experts on artificial intelligence and machine learning, and he uses his skills to help people in the medical field. Almutawa earned a doctorate in Computer Artificial Intelligence from Syracuse University in Syracuse, New York, in 1999. Following graduation, he joined the Computer Engineering Department at Kuwait University, where he still serves as an associate professor. Almutawa is also a recognized expert in artificial intelligence and

ethics and recently served on an intergovernmental committee that drafted recommendations on the ethics of artificial intelligence adopted by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in November 2021.

"Artificial intelligence is a broad subject," Almutawa said. While it might sound complicated, artificial intelligence actually has a simple premise. "What we do is try to imitate the intelligent behavior of any species," he said.

"Humans are at the top of the pyramid."

While organic species, like humans, develop natural intelligence, machines can develop artificial intelligence. Almutawa is also a specialist in machine learning, a branch of artificial intelligence that uses data and algorithms to train machines.

Usually, humans learn from examples, and machine learning imitates this process. Specialists like Almutawa feed machines thousands of good and bad examples. At first, the researchers tell the machine which examples are good or bad. Eventually, it "learns" how to do that itself. As the machine sees more and more examples, its performance improves.

These methods can be applied in dozens of fields, from retail to agriculture. Almutawa has made a career using his knowledge of artificial intelligence and machine learning in the medical field.

A Career of Helping People

Working in medicine has allowed Almutawa to combine his skills and interests with his desire to help people, which he said has been a goal since the beginning of his career. One of the first papers he published early in his career involved using artificial intelligence and expert systems to help patients with hearing loss. One of Almutawa's more recent projects involved developing a system that used electroencephalograph (EEG) signals to help hospitalized patients on ventilators express themselves. "This [auto-emotion detection] will detect if they are bored, happy, sad, disgusted or frustrated," said



Abdullah Almutawa

Almutawa, “because it is reading the signals directly from their brain.”

Another of his projects uses machine learning to analyze eye scans in diabetic patients at risk for developing diabetic retinopathy, a complication of diabetes that can affect vision and cause blindness, which can be avoided if treated early. Preventing diabetic retinopathy requires regular monitoring with diagnostic imaging. Almutawa said his team has trained artificial neural networks to read these images better than humans. “Machines are very good at spotting things at the bit and byte level,” he said. “It’s very accurate when it comes to the images, and [the artificial neural networks] can discover any signs of [retinopathy] at the early stages.” This ensures that patients will receive needed treatment as soon as possible.

One of Almutawa’s latest projects involves using these computer engineering skills and technologies with the application to the medical field to analyze COVID-19 cases admitted to Kuwait hospitals. The study will help to identify and protect high-risk patients at the earliest stages of the disease.

Applying AI and Machine Learning to COVID-19

Beginning in 2020, Almutawa led a team of researchers who used machine learning methods to analyze COVID-19 patients’ genome sequences, medical histories, and outcomes. “From our observations, the same family could have one member hospitalized in the intensive care unit, and others are not,” said Almutawa, “We would like to benefit from this information.” By analyzing data from cases like these, the research team set out to determine why some patients have more severe cases of COVID-19 than others. The team received support from the Kuwait Foundation for the Advancement of Sciences (KFAS) to conduct their research.

They used two approaches: First, the team took sequenced data from COVID-19 patients held in an international repository and applied machine learning methods to re-analyze it. This approach produced some interesting findings regarding the origin of the coronavirus.

But Almutawa said the team’s most significant breakthroughs came from their second approach when they collected data from COVID-19 patients admitted to the intensive care unit at Jaber Hospital in Kuwait City. “We collected around four hundred patients that had been admitted to ICU unit and had their full medical history fed into our machine learning system,” he said.

The machine used information about these patients’ cases and medical histories to help the team develop categories. These categories could be

used to sort future patients based on whether they are likely to have a critical case of COVID-19. With these categories, Almutawa said, “We can [make] critical decisions about if a patient would be admitted or be released further on.”

Almutawa said that the information could be used to develop an app or a website that people could visit after testing positive with COVID-19. The app would ask targeted questions about risk factors and your medical history. Then it would use that information to gauge whether a patient should be admitted to the hospital for early treatment or if they are likely to have a minor case without further intervention. If the system recognizes that a person is at high risk for a critical case, they could receive treatment immediately rather than wait for their symptoms to worsen.

This technology could save lives and protect hospitals from becoming overloaded with patients that are unlikely to become critical. According to Almutawa, the research team hopes their findings can be “part of the global solution to the pandemic,” and inspire new paths for further research at the intersection of computer science and medicine.

According to Almutawa, artificial intelligence and machine learning provide an excellent merging of the engineering, technical, and medical fields to help numerous people.

By Marianne Dhenin



KFAS Takes Students on STEM-Themed Trip to Korea

A group of students took part in an educational trip to South Korea organized by the Kuwait Foundation for the Advancement of Sciences (KFAS). The STEM (science, technology, engineering, and mathematics) oriented trip included programs provided by prestigious South Korean and International organizations like the Korea Institute of Science and Technology Information (KISTI), Dankook University, and a few others. The programs focused on the cutting-

edge fields of artificial intelligence and virtual reality implementations.

In August 2022, fifteen high school students accompanied by organizers from KFAS embarked on a two-week journey across five South Korean cities. In line with its efforts to support and encourage Kuwaiti youth's interest in fields that would benefit the future of Kuwait and the region, KFAS hopes that this program prepares the students to envision future technological developments. Students

engaged in several comprehensive learning programs alternating between the metaverse world and artificial intelligence.

While at KISTI, a pioneering research organization in South Korea, the group learned about the multiple facets of artificial intelligence. Through a three-day program, they received an intensive course on machine learning, the basic principles and terminologies in AI, and the various real-life applications

of AI. The students were able to use what they learned to work together in creating a simple video game at the end of the course.

Later, the group made its way to a six-day program offered at Dankook University, a well-respected research institute located in Korea's Silicon Valley. The program was designed and prepared under the theme of The First Smart City in Kuwait, in reference to the South Saad Al-Abdullah city in Kuwait, modeled after Bundang in South Korea. In one of the courses, students learned about the requirements for building a metaverse world through the utilization of Minecraft Education Edition (MEE), which is an interactive STEM education tool that engages young students through an online gaming platform. The team at the university concluded the interactive program with a workshop about the five stages associated with design thinking.

In addition to the well-rounded educational content of the trip, the group had the chance to explore different local experiences with the K-Cultural Program. Its purpose was to help them understand Korean culture and experience aspects of daily Korean life. The program entailed traditional musical performances, workshops to learn the Korean language, hiking a few natural trails, and museum visits to learn about South Korean history.

"Surprisingly, the most interesting things I learned were about the culture" said Mohammed Al-Ali, one of the students on the trip. His mother added that her son's "visit to a new country with a completely different and booming



cultural character and seeing its distinctive buildings and picturesque natural landscapes certainly left a positive effect on him."

An experience like this has a great impact on realizing the potential of young and ambitious minds like Al-Ali's, who dreams of pursuing a path in computer science and coding. According to his mother, KFAS "plays an important and prominent role in realizing Mohammed's goal through

its continuous programs, courses, and lectures held throughout the year." She added that KFAS' efforts to connect students like her son with experts and specialists in the field of science and technology goes a long way toward nurturing and supporting young local talents.



By Lulwa Alaftan



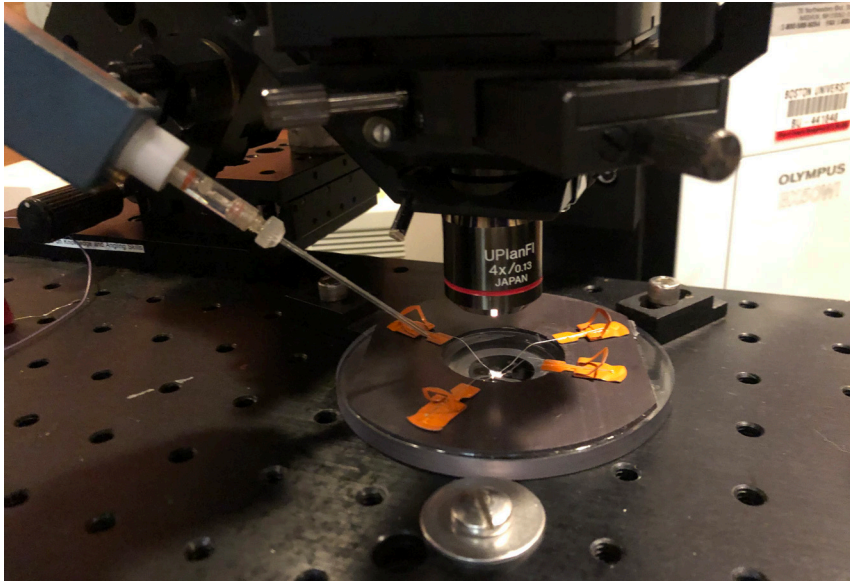
Shaikhah Alshuaib

Kuwaiti Scientist Pioneers Use of Ultrasound Waves in Neuroimaging

Inspired by the spirit of scientific innovation in Boston, Kuwaiti neuroscientist Shaikhah Alshuaib wanted to shape the future of neuroimaging. Funding from the Kuwait Foundation for the Advancement of Sciences helped her do it

By Marianne Dhenin

PHOTO: THOMAS TOWNSEND



Shaikhah Alshuaib moved to Boston when she was 17 to earn a bachelor's degree from Boston University. She had a scholarship from Kuwait's Ministry of Education and planned to pursue a pre-med track and then a career in dentistry. But she soon fell in love with research, working in a lab, and trying to understand the most complex inner workings of the human brain.

"I got really interested in learning more about the sciences," she said. With help from mentors and advisors, Alshuaib changed the focus of her undergraduate degree to neurobiology so that she could pursue a career in neuroscience research. "I loved neuroscience [and] I realized that I needed to do something that I was passionate about," she said.

Now, she is working on a neuroimaging-based Ph.D. research project with significant implications for the future of medicine and our understanding of the human brain.

Before moving to Boston, Alshuaib said she knew relatively

little about research-based careers and hadn't dreamed of earning a Ph.D. in neuroscience. "I think in Kuwait, sometimes, the social culture doesn't embrace scientists and embrace what we do," she said. That makes it difficult for young people in Kuwait to discover and explore career paths in the sciences. "That was the biggest obstacle for me," said Alshuaib. "If I had access to labs and research and scientists that I could relate to, I think I would have done this a lot earlier."

The New England city is a historical haven of scientific innovation, especially for neuroscience. "It was the city where neuroscience in the United States happened, it was where the first experiments were done," said Alshuaib.

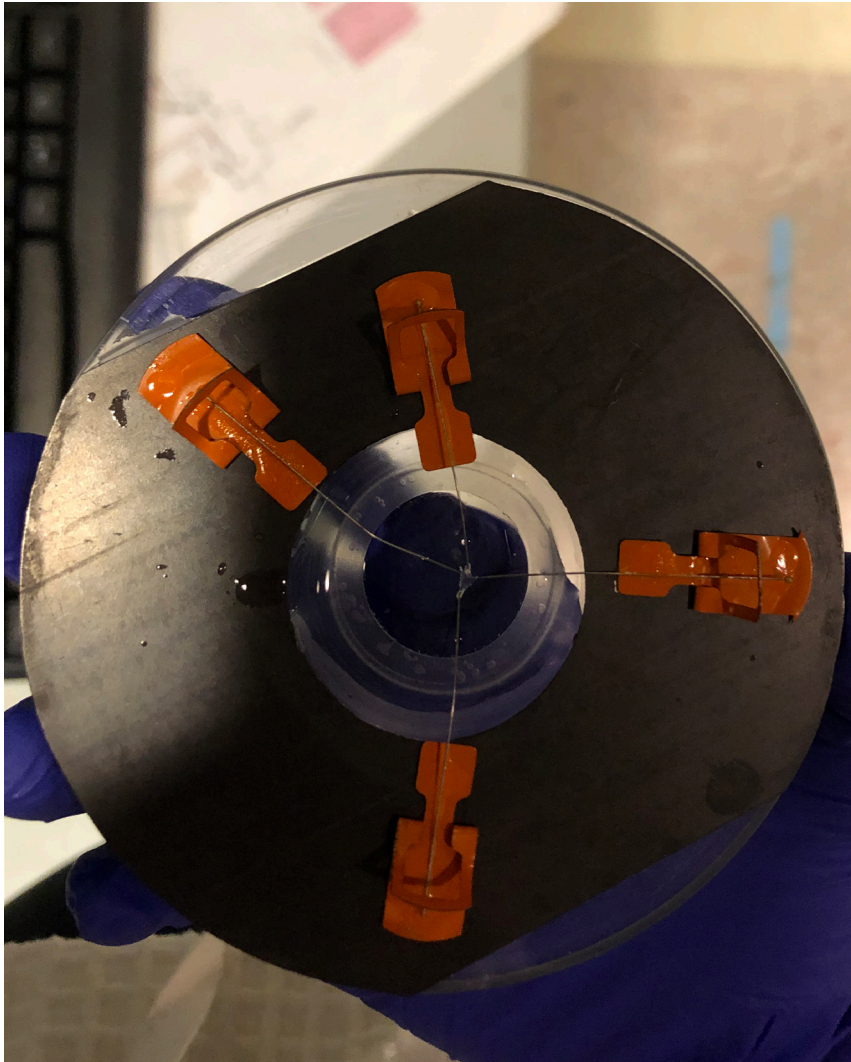
Many famous neuroscientists, including Stephen W. Kuffler, known as the "Father of Modern Neuroscience," once called Boston home and carried out cutting-edge experiments in labs at local universities like Harvard University and

Boston University. Their legacies have helped ensure the city remains a hub for neuroscience research today. Alshuaib said that made it "easy for me to see what neuroscience was from a theoretical perspective, and the lab was accessible, and the culture around it was welcoming."

This culture allowed her to undertake a series of internships in various environments while she studied for her B.A. in biology with a specialization in neurobiology and then an M.A. in neurobiology, which she completed in 2019. One of her first neuroscience internships was in a clinical research environment at the Vision and Cognition Lab at Boston University, working with patients with Parkinson's Disease, a progressive disorder that affects the nervous system.

But Alshuaib soon found that she enjoyed working in a wet lab more than working with patients in a clinical setting. A wet lab is a lab equipped with plumbing, ventilation, and equipment that allows for hands-on scientific research and experimentation, like the Membrane Biophysics Lab at Boston University, where Alshuaib now works. She said she prefers the wet lab environment because it allows for greater experimentation with fewer ethical considerations. Whereas in a clinical setting, she worked with living patients, Alshuaib now works with samples of various animal brains in the lab.

Her current Ph.D. project involves testing ultrasound technology on various animal models to understand how ultrasound affects neurons and the neural membrane and how neurons



communicate with one another. The project was made possible, in part, thanks to funding from the Kuwait Foundation for the Advancement of Sciences (KFAS).

When she decided she wanted to continue her research beyond the completion of her M.A., funding was a significant concern. She applied for funding from KFAS in Spring 2020 and was selected for a grant.

Alshuaib said she and her advisors, Dr. Jen-wei Lin at Boston University and Dr. Yoshio Okada at Harvard

Medical School, spent the interim period “troubleshooting and putting all the pieces together.” She learned a lot during this period. The world seemed to slow down due to COVID lockdowns, but Alshuaib still had access to the lab and unprecedented access to Lin and Okada, whose schedules were less busy than usual. “I learned things that I never thought I would,” she said.

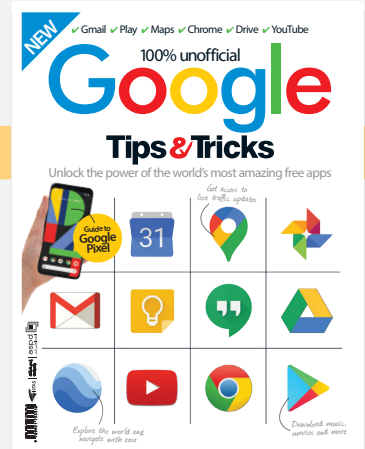
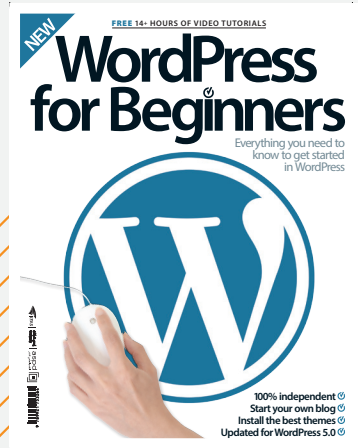
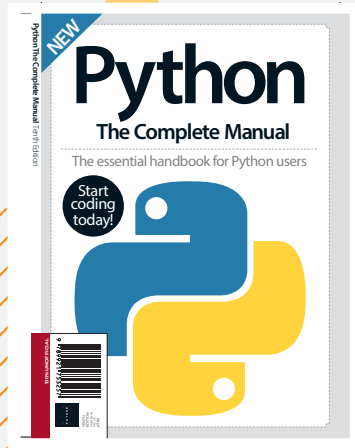
In September 2020, when the news came that KFAS would help fund their project, the team was ready to secure

the final materials and equipment they needed to carry out their experiments and start collecting data right away.

Since then, Alshuaib has run experiments on samples of three different animal brains: mice, crayfish, and fruit flies. Each has presented unique setbacks and helped the project progress. Ultimately, this research could reshape neurological diagnosis and treatment by providing new options for non-invasive neurosurgical interventions and real-time brain mapping, something other imaging technologies like CT and MRI scans cannot do. Immediately, too, the research will help us better understand how ultrasound waves affect neurons, especially synaptic transmission. “The implications [for advancing the field] are big,” said Alshuaib.

With the final round of experiments almost complete, Alshuaib is now looking ahead to writing and publishing her results over the next two years. She anticipates having a first publication released sometime next summer. As she begins to compile her results and reflects on the project, Alshuaib is thankful for the recognition and support provided by KFAS.

“The level of freedom that we had because we had the funds was amazing,” she said. “I learned so much in these past two years.”



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