
Qatar University Research Magazine

Issue no 6 - November 2015



CUTTING-EDGE ROBOTICS TECH FOR IMPROVED HEALTH AND WELLNESS

Dr. Eiman Mustafawi: We strive to exceed the standards to ensure that our students get the best education.

Research & Innovation: Connected Vehicles – Cars for the future



جامعة قطر
QATAR UNIVERSITY

Innovation in Materials Science and Technology



Message from the VP

Originality and Continuity



Dr. Darwish Al-Emadi

Acting Vice President for Research
Qatar University

Qatar University aspires to lead the region as a national academic institution of highest standing committed to providing a comprehensive and creative learning environment for students that is backed by outstanding research expertise and infrastructure dedicated to innovation, discovery and entrepreneurship.

At the Research Office, we seek to embrace innovation and build knowledge. Thus our vision is focused on finding solutions and addressing the challenges facing our community through interdisciplinary and innovative research characterized by quality and breadth. In this context, our faculty members, researchers and students have achieved great accomplishments this year, garnering a number of awards at local and international levels.

These achievements are a proof of the university's continuous commitment to the national mission and its leading role in the field of research and innovation at the regional level. They contribute to the achievement of the objectives of the Qatar National Vision 2030 as they constitute a base for the different elements of a knowledge-based economy.

Moreover, the Research Office has issued a "White Paper on Enhancing Research and Advancing Curiosity-driven Learning" in Qatar University. It will be the guiding principle for organizing, facilitating and promoting the research enterprise within the university in relation to its various constituents. It seeks to position research high in the University's mission and vision. This strategic document will serve as a foundation and guideline for the 2014-2019 Research Roadmap which was recently launched as a guide for all the university's staff.

In this issue of Qatar University Research Magazine, you will find an exclusive range of topics and articles about the work of our researchers and students.

The feature story highlights a research project on the use of robotics in the field of health care in the region. It focuses on the use of robots for the treatment of autism, surgeries, rehabilitation and others.

This issue also features a new section titled "Celebrating Excellence" dedicated for those who won the Research Excellence Award during Qatar University Annual Research Forum 2015. There is also a section on "Research and Innovation" with a report on the Connected Vehicles project being run by Dr. Hamid Menouar, Product Manager and R&D expert in Qatar Mobility Innovations Center (QMIC).

The "Student in the Limelight" section showcases the work of QU students who were recognized at the 7th Qatar National Research Fund (QNRF) Undergraduate Research Experience Program (UREP) awards this year for their promising work in the field of electrical transformers.

This issue also includes sections on News, Research Success Story and Research Issues as well as others which we will let you discover by yourself.

Finally, we wish you an enjoyable and informative reading.



LAW AND MEDICINE CONFERENCE

February 28-29, 2016

Qatar University - College of Law

INTERNATIONAL DAY OF DISABLED PERSONS

December 7, 2015

Qatar University, College of Education



INNOVATION FORUM ON COMPUTING WITHOUT SEEING

February 2, 2016

Qatar University



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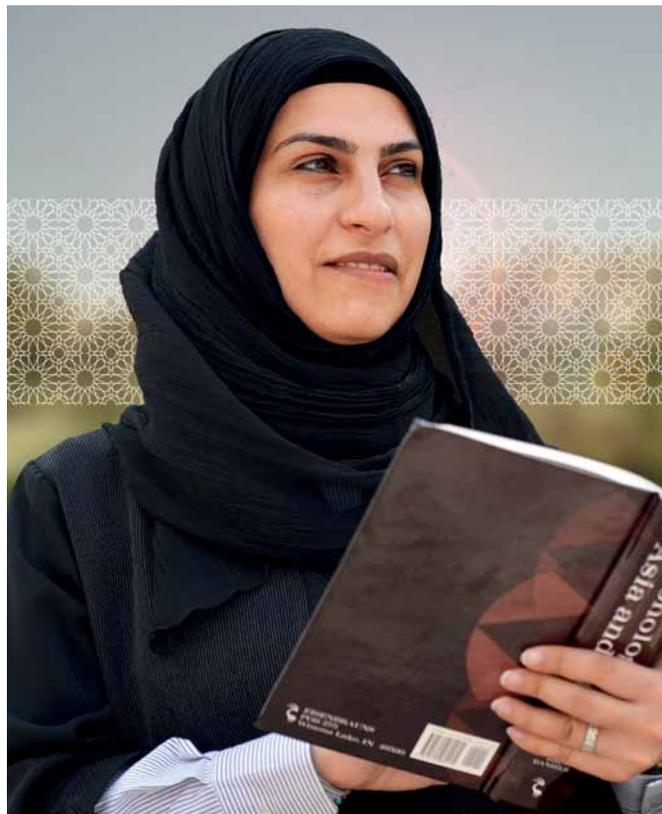
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Editor in Chief: **Symaa Abdullah**

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Our Exclusive

ESC investigates biodiversity of historic oyster beds of Qatar



ESC researchers

The “Pearl Oyster” *Pinctada radiata* has long been associated with the nation of Qatar. Historically pearl oysters were harvested in huge quantities in the Arabian Gulf with Qatari pearls making up a large percentage of the fishery. The oyster represented the key economic income to the Qatari people prior to the discovery of oil in the 1930s.

However, following this and combined with the emergence of Japanese cultured pearls onto the market, the Qatari pearl fishing industry diminished considerably. The explosion of economic growth and the subsequent development of coastal and

offshore infrastructure added to the further disinterest in the oyster beds of Qatar and their valuable associated ecosystem services. It was therefore important that the demise in interest of this once iconic mollusk, which is such a rich part of Qatar’s culture and heritage, be addressed.

It was the lack of information into the current status of the oyster beds and their associated biodiversity that prompted the research program that is presently underway at the Environmental Science Center (ESC) at Qatar University. The project is being undertaken by the scientific team at the Qatar University Environmental

Science Centre comprising of Dr Ibrahim Al-Maslamani, Dr Ebrahim Al-Ansari, Dr David Smyth, Dr Oguz Yigiterhan, Dr Y. Sinan Husrevoglu, Dr Bruno Giraldes and Mr Mark Chatting.

The research will be one of the most thorough experimental investigations undertaken into the oyster beds of Qatar and will be focusing on the following aspects:

- The current ecosystem health, biodiversity, population structure and demographics of the “Pearl Oyster” *Pinctada radiata* within the Qatari



Janan going to sea for sampling

Exclusive Economic Zone.

- The current status of the standing stock of *Pinctada radiata*.
- The potential for oyster reef restoration using applied stock enhancement strategies and habitat expansion.
- The establishment of long-term monitoring protocols to determine the level of potential environmental stressors such as; the effects of climate change and pollutants on the “Pearl Oyster” beds and the associated marine flora and fauna.

The research started with a two day biogeochemical and biological cruise onboard the R/V Janan when ten offshore oyster sites were visited. Dredge sampling was carried out on at the oyster bed and on the periphery of site. This sampling technique will allow the researchers to compare the biodiversity indices between the oyster assemblages and areas of substrate where no oysters are found. Sediment, phytoplankton/zooplankton and

water samples were also taken at each site. These samples are currently being processed in the ESC biological laboratory and the diversity and number of species is quite astounding, in fact it would appear that many have not been described before in the waters of the Arabian Gulf. These biological investigations are being carried out in conjunction with a comprehensive hydrographic and biogeochemical study of the Oyster Bed region to understand the effects of various physical and biogeochemical dynamics and their seasonal variability on biodiversity and population dynamics.

Five transects are navigated by RV JANAN, collecting continuous current data and sampling stations are distributed along the transects to collect physical and biogeochemical data throughout the water column. Resulting datasets from three research cruises will shed light on spatial and temporal variability of circulation dynamics, water column structure, and dissolved material fluxes in the region encompassing the oyster bed sampling sites.

Initial Findings

Preliminary research on the biodiversity of the oyster beds has revealed a high biodiversity in Qatari oyster beds. Many species were recovered from these offshore sites, after just a single visit by the ESC team on the Janan. There is huge potential for Qatar’s oyster beds to provide new research for Qatar University and propel it to the forefront of marine science. One example of this is the new occurrence of a species in Qatar, *Branchiostoma arabiae*.

Previous reports recorded the species in the Arabian Gulf; however, no reports existed of its presence in Qatar. The distribution of *B. arabiae* is still not well understood and this discovery will help to document the current geographic range of the species within the Arabian Gulf. *B. arabiae* are Amphioxiformes, which are an important taxonomic group in the study of phylogeny and evolutionary biology. Morphologically they share similarities with vertebrates and are considered important in the research of vertebrate evolution. They are small “worm like” invertebrates that inhabit soft, coarse



sediment. They submerge their body in the sediment only having their head sticking out to filter feed from the surrounding water.

It has also been reported that *Branchiostoma* intake water through the mouth whilst breathing and expelling it out the atriopore thereby possibly increasing the oxygenation of the surrounding sediment. The genus has also been shown to be sensitive to changes in sediment characteristics especially within areas exposed to long term dredging and eutrophication.

It has been identified within the European Water Framework Directive as a bio indicator of sediment degradation an application which could assist environmental researchers in Qatar when monitoring the effects of coastal development and land reclamation projects.

Although there has been extensive work on *B. lanceolatum* in European waters there is still a lack of research on the biology and ecology of the species in the Arabian Gulf. This presents an excellent research

opportunity for the ESC to become a leading authority in the species.

The discovery of *Branchiostoma arabiae* in Qatari waters and the description of its ecology is just one of the examples of the initial findings of the ESC's research into offshore oyster beds.

Based on the number of samples yet to be taxonomically processed it is envisaged that many more new species will be described and documented.

The work represents the first step in describing this unique oyster bed ecosystem and as the research progresses it will provide a valuable insight and understanding into unique marine biodiversity associated with Qatar and the Arabian Gulf.

In 2015, the Environmental Science Center at Qatar University entered a new phase where its mission has been re-defined, and a new staff structure implemented to define its research activities into several clusters, namely: the Marine Science Cluster that encompasses physical and chemical

oceanography, as well as marine biology; Atmospheric Science Cluster; and Earth & Terrestrial Science Cluster. Each cluster is led by a Science Leader, with supporting research coordinators and laboratory assistants. The new research strategy of the ESC is aligned to the Qatar National Vision 2030 with respect to: "The management of the environment such that there is harmony between economic growth, social development and environmental protection".

The ESC has a long history of fundamental and applied research, consultancy and national capacity building since its inception. It was first established in 1980 by a special Amiri Decree as the Scientific and Applied Research Center (SARC). In 2005, Qatar University restructured the SARC, renaming it as the Environmental Studies Center (ESC) with a mission to conduct research and commissioned studies for the environmentally sustainable development of the country. In 2015, the name of the center was changed to the Environmental Science Center to better reflect our research-driven objectives.

Research Issues

Qatar's Intangible Heritage Revisited



Dr. Daniel Martin Varisco

Research Professor and
Coordinator of Social Science
Research,

Center for Humanities and Social
Sciences,

College of Arts and Sciences

President of American Institute of
Yemeni Studies

Editor of Contemporary Islam

With a skyline at times rivaling Manhattan, an abundance of malls and large sports stadiums, the Doha of today is far removed from the pearling, fishing and trading customs of only two generations ago. In 1988 I arrived in Qatar as a Fulbright scholar for work at the Arab Gulf States Folklore Centre on the traditional almanac lore and seasonal knowledge of Arabia, with a focus on Qatar.

This was before any of the current tall abraj, when the area around the Sheraton Hotel was bare, except for the Post Office. Doha was poised for development, but it was still possible to find individuals who had been active as pearl divers, boat captains or fishermen.

During my year-long stay in Qatar I was able to piece together local knowledge about the seasons, folk astronomy, fishing, sailing and date palm production. I remember at the time that several of the men I talked with in a majlis lamented that their sons and daughters were no longer interested in the old ways.

This made the research at the Arab Gulf States Folklore Centre all the more urgent, as scholars there carried out folkloric and ethnographic research, documented traditions in film and photographs, and published the important journal *al-Ma'thurat al-Sha'biya*.

One of the highlights of my research in Qatar at that time was the opportunity to interview Shaykh Abdullah Ibrahim al-Ansari, the well-known author of the Qatari Almanac, before his passing. The Qatari Almanac was known and appreciated throughout the Gulf region and Najd for its prayer times, astronomical information and traditional knowledge about the seasons and weather.

Following his father, Shaykh al-Ansari had published his almanac since 1377/1957-58, before Qatar became an independent state. The almanac included information derived from earlier Arabic sources and almanacs. One of these was the almanac (taqvim) compiled in 1324/1906 by Shaykh 'Abd al-'Aziz ibn 'Abdullah al-'Uyuni of Hasa. With the patronage of the emir, al-Ansari published this earlier almanac in 1960.

The Qatari Almanac was unique in that it combined formal astronomical knowledge with local reckoning systems. The charts included details on the zodiacal months (buruj), the lunar stations (manazil al-qamr or tawali'), planets, lunar hijri calendar, shadow lengths for prayer times throughout the year, Christian solar calendar, navigational suhayl (Canopus) reckoning and the local seasonal sequence. It also provided distances in kilometers between Doha and other towns in Qatar.

Beyond the charts there is poetry, saying and traditional knowledge about events and environmental changes in each season. Before the age of Google and the Internet, this almanac provided practical information for the full range of citizens in the region.

The hijri calendar was loosely coordinated with the twelve zodiacal constellations. In the year 1406/1985-86, for example, the sun entered the constellation of Libra (Mizan) on 10 Muharram, which was equivalent that year to September (Aylul) 24. This was the first zodiacal group of stars in the season of autumn (kharif), during which the vernal equinox occurred.

At that time the noon shadow (zill al-zawal) length was four feet (aqdam), lengthening each day to six feet by the first day of the next zodiacal month.

Before the common occurrence of modern clocks, mosques in the Middle East often measured the prayer times at noon and midday ('asr) by the shadow lengths, which varied according to a set pattern throughout the year depending on the location and declination of the sun. Many older mosques still have a gnomon used for this purpose, although individuals would at times use the height of their own shadow as a rough indicator.

For each zodiacal month Shaykh al-Ansari discussed the seasonal information for the rising stars of the 28 lunar stations. This draws on an ancient tradition of star lore stemming back to the pre-Islamic era in the Arabian Peninsula and documented in a genre known as the *anwa'*.

One of the most famous of these texts was the *Kitab al-Anwa'* of Ibn Qutayba, who died in 276 AH/885 CE. Ibn Qutayba's text described the origin of Arabic star names, traditional knowledge about the stars and weather, and detailed descriptions of each season.

Although not the only source in this genre, his text was often quoted in later sources. Of special value was his documentation of rhymed sayings (*saj'*) for each of the lunar stations. The 28 lunar stations along the zodiacal belt were linked to this lore on the *anwa'* stars in the formal astronomical system that developed. These 28 asterisms constitute a lunar zodiac, indicating the relative location of the moon in the sky each night of its rotation or lunation around the earth in 27 1/2 days.

For the year 1406/1985-86 the asterism of *sarfa* (a bright star in Leonis or Asad) rose on 18 Muharram or October 1. Shaykh al-Ansari notes that this star was called *sarfa* in Arabic because of the *insiraf* (departure) of the heat at its dawn rising and of the cold at its setting six months later.

It was considered the first of the rising stars for rain, especially the famous *wasmi* rain period, so-called by the pastoral Arabs because the ground is marked (*yasimu*) by its falling. This rain results in the growth of the truffle (*kama't*) as well as a variety of pasturage and flowering plants. From the standpoint of preventive humoral medicine, one

should avoid eating food that is defined as cold and dry as well as beef and eggplant during the period of this star.

The classic four-season model that is now universal differs from the seasonal sequence historically used on the Arabian Peninsula. The primary distinction of the seasons was according to the weather, especially rain, wind and heat or cold. Shaykh al-Ansari noted an ancient Arab system of dividing the year into six main seasons, mainly according to the major rain or temperature in each period.

The first season, starting with the autumn rain was the *wasmi*, followed by *shita'* (usually in reference to winter), *rabi'* (usually in reference to spring), *sayf* (in reference to both late spring and summer), *hamim* (a term signifying heat) and *kharif* (usually for autumn but also for late summer).

For the Gulf, however, a different set of terms has been used, starting with the summer rising of Canopus or *suhayl* in Arabic. This is a bright red star that can be found near the horizon in the south, as one examines the sky in the Gulf region. In navigation its point of rising defines SSE and its setting is for SSW. This is one of the most famous stars on the Arabian Peninsula, with common references in poetry and proverbs.

Ibn Qutayba recorded the following saying about the annual dawn rising in late summer: "When *suhayl* rises, the nights cool and the flood is feared, the mother of the young camel is in anguish."

At this time the intense heat of summer abates and the autumn rains begin. This was the start of the pastoral cycle, leaving water sources and venturing out to find pasture from the new rain. It is also the time that Bedouin would begin to wean baby camels, much to the anguish of their mothers.

One of the unique aspects of *suhayl's* rising is that it disappears almost immediately beneath the rising sun. Al-Ansari noted that the disappearance (*faraq*) occurred about seven days before it could be seen rising again, around August 24, although the time would vary according to location.

Several of the men I interviewed in the 1980s noted that they used an approximate calendar based on the number of days after the rising of *suhayl*, because that rising was so visible. The basic measure was each ten days, which were often linked to the rising of one of the lunar stations or other stars. This led to several forty-day periods defining local seasons.

The reckoning by the number of days passed from the rising of *suhayl* is similar to a navigational calendar used in the past based on the number of days after the *nayruz* or Persian new year. The major navigational texts of Ibn Majid and Sulayman al-Mahri discuss the use of this calendar for determining the sailing times even as far away as China.

While the *suhayl* calendar was useful for the autumn and spring, it was rarely used in practice throughout the entire year.

The rising of *suhayl* signaled the start of the autumn season called *sfiri*, which lasted for forty days until the rising of the star Alpha Virginis (*simak*) in early October. This term is clearly taken from the ancient lunar month of *Safar*, which was in autumn before the adoption of the *hijri* calendar.

This season is followed by the major period known across the peninsula as the *wasmi* in early November and was associated with the dawn setting of the Pleiades (*thurayya*), one of the most important marker stars of the Arabs in the past. Following the *wasmi* rain is the *mirba'aniya* or forty days of winter. This is a time of intense winds that make sailing in the Gulf hazardous. The cold of winter is known by several terms.

One of these is *'aqarib* (scorpions) and another is *shubt*, taken from the solar month name *Shubat* for February. The end of winter is known as *bard al-'ajuz* (the cold of the old woman), seven days of bitter cold at the end of February and start of March. It is said by some that this refers to an old woman who was afraid to shear her sheep because there might be more cold weather.

In late spring the strong winds known as *barawih* blow, the first known as *barih al-nuffakh* or *barih al-mishmish* in Qatar,



If you have a Facebook page, why not post something about the cultural traditions people in your family still remember. Preserving the best that the past has to offer is one of the best ways to foster cultural sustainability. As the billboard says, “Qatar deserves the best.”

followed by *barih al-huffar* and *barih al-'ud*. The summer heat occurs during the time called *qayz* at the rising of the Pleiades, signaling the traditional start of the pearling seasons and the need to gather pastoral animals near water sources. With the appearance of watches, mobile phones and printed calendars, it is no longer necessary to look at the stars or one's shadow to tell time. While modern technology clearly makes life easier, at the same time it robs us of much of the creative thinking and practices of earlier generations.

The stars that shone bright for generations of Qataris have not changed, even if the bright lights of the night skyline in Doha obscure all but the very brightest stars. But the reliance on machines, especially now in the digital age, threatens the ability of young people to adapt to the rhythm of nature, perhaps even to think for themselves without an iPhone, iPad or laptop handy.

It can be argued that customs which are no longer needed are only relevant in museums. Yet it is also the case that even the best museum is still a mausoleum of the cultural past. Culture, however, lives even as it changes.

Specific customs will be replaced as the environment we live in moves on, especially with technological innovation. The point is not that we should go back to earlier customs, but simply that we need to appreciate the achievements of earlier generations.

The rapid social and economic change in Qatar during the past two decades has led to recognition of the need for sustainable development. The environment, fragile on both land and sea, can easily be polluted, aquifers overdrawn, local plants and animals endangered and the sheer beauty of the natural landscape spoiled.

The cultural traditions that have flourished in Qatar for hundreds of years are as much a part of the environment as the fish, the mangrove and the date palms.

The material culture, primarily architecture but also crafts, has changed considerably despite the best attempts to incorporate old designs with the new. Less visible but just as important is the

intangible heritage: the poetry, proverbs, stories that families told, religious rituals, dance and music, and local dialects.

Scholars can do their part in documenting this diverse pool of traditional knowledge before it disappears, but so can students and ordinary citizens.

What can you do as a student? Talk to your grandparents or individuals of that generation and find out how they lived their lives. Listen to their stories and record them for your children. Hold on to old photographs and letters in the family. You do not need to be an anthropologist or sociologist to write down what you hear, although these are valuable fields for preserving the heritage of the past.

If you have a Facebook page, why not post something about the cultural traditions people in your family still remember. Preserving the best that the past has to offer is one of the best ways to foster cultural sustainability.

As the billboard says, “Qatar deserves the best”, so we should all do our best to ensure that the intangible heritage lives beyond museums and library shelves.

For further Reading:

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News

Lab safety training gets priority attention



As part of Qatar University (QU's) commitment to continuous improvement of safety best practices in its laboratories, 35 lab staff, technicians and teaching assistants from the Environmental Science Center (ESC), Biomedical Research Center (BRC), Center for Advanced Materials (CAM), Gas Processing Center (GPC) and Laboratory Animal Research Center (LARC) benefitted from a "Lab Health and Safety" orientation session.

The one-day training, part of a series of training mapped out for staff was initiated by the Qatar University Research Office to also demonstrate the University's dedication to the realization of the objectives of the Human Development Pillar of Qatar National Vision 2030.

It was led by QU Campus Facilities of the Business Operations Department (BOD) under the Office of AVP for Facilities and Information Technology. It included lab safety drills and instruction anchored by BOD safety engineer Mr Ronald Carlos Macaspac, fire technician Mr Gilbert Calisay,

and environmental health officer Mrs Laura Vallenius from the AVP's office.

The staff were drilled on fire safety awareness measures, laboratory safety management, and handling of hazardous materials, and were oriented on the philosophy, policies, and procedures of laboratory health and safety and how to deal with emergencies and handle emergency equipment. The training stressed the cooperative aspect of safety which requires teamwork to ensure prevention of accidents at all levels within the campus environment.

Mr Calisay explained the hazardous nature of the lab environment and the necessity for workers to have basic knowledge of handling and operating fire equipment, to provide immediate assistance in the case of an incident before emergency services arrive.

ESC lab coordinator Mr Hamoud Alsaadi, welcomed the idea of the orientation session and said it enlightened lab staff about workplace hazards and controls,

participation in decisions about their personal health and safety, emergency procedures, and health and safety standards. LARC research assistant Mrs Kavitha Varadarajan highlighted the knowledge she gained on the proper arrangement of chemicals in the lab, and disposal of chemicals and biological waste.

QU Acting Vice President for Research Dr Darwish Al-Emadi hailed the training as an opportunity to align QU's laboratory staff with the very important principle of embracing and ensuring international best practices in all its activities. He said that the institution gives prominence to the safety and wellbeing of its staff and facilities and ensures that all the requisite practices are adapted in its labs. "We are working to ensure that our researchers have peace of mind with the understanding that nothing should go wrong when they are in the labs and that if, at any point in time there is an emergency, safety lifelines will be in place", Dr Al-Emadi said.

Our Exclusive

Biomedical science master students' projects target national priority health issues



Dr. Ahmed Malki

The Health Sciences department at Qatar University hosted the presentations of second year biomedical science students to evaluate their progress towards fulfilling the requirements that would enable them earn their master degree in Biomedical Science.

Dr Ahmed Malki, associate professor and coordinator of the Biomedical Science program, anchored the event. Based on the recommendations of Dr Asmaa Al-Thani, head of Health Science department and director of Biomedical Research Center, the strategic intent of the program was to prepare future scientists who would be able to solve critical health issues in Qatar such as diabetes, cancer, cardiovascular diseases and infectious diseases.



Dr. Mahmoud Naasea

The students' research activities were done in partnership with the Hamad Medical Corporation (HMC), Cornell Medical College (WCMC) and National Center for Cancer Care & Research (NCCCR).

The first topic was 'Discovery of Novel Pyridine Derivatives as Anticancer Agents' which was presented by Mona Omar Mohsen, MS candidate at QU and research associate at QF, under the supervision of Dr. Malki, in collaboration with Prof. Khaled Machacha, professor of physiology and biophysics and Associate Dean for Research at Weill Cornell Medical College – Qatar.

In Qatar, cancer accounts for 10% of all deaths. This figure is expected to double by 2030. Given the need to develop a novel anti-cancer agent with an improved safety profile, this study evaluated 20 novel pyridine

derivatives for their anti-cancer effect on different cell lines, breast, ovarian and colorectum cancers cell lines, to determine if the effect is cell specific, tumor type specific or a generic compound. Among the studied synthesized derivates, one derivative showed the highest cytotoxicity against MCF-7 breast cancer cells as it significantly reduced cell viability by 40% at a concentration of 10 μ M. Collectively, the data of current study suggested that the four novel derivatives trigger apoptosis in human MCF-7 breast cancer cells by targeting p53.

The current studies will identify novel pyridine derivatives as potential treatment for breast cancer patients.

The second research presented by Noura

B. Younes, under supervision of Dr. Naser Risk, was on the 'Effect of hypoxia (chronic and intermittent) on metabolic markers and gene expression in adipose tissue'. Obesity results from awkwardness between energy admission and energy use. Abdominal obesity and fat tissue dysfunction are real hazard components for incessant illnesses, for example, insulin resistance, type 2 diabetes, and cardiovascular diseases.

Adipose tissue is progressively distinguished as an imperative part of entire body homeostasis. No longer viewed singularly as vitality stockpiling cells, adipocytes emit countless components (adipokines) which are included in an assorted reach of organic capacities, counting vitality equalization, lipid digestion system, insulin affectability, angiogenesis, and haemostasis. Obesity is portrayed by an overgrowth of adipose tissue that prompts the shaping of hypoxic ranges inside this tissue.

Present data demonstrates that hyperoxia appears to generate an inflammatory reaction because of the arrival of ROS and the upregulation of ace incendiary adipokines, for example, IL-6 and MCP-1. Then again, hyperoxia might have a backhanded impact on insulin affectability because of the upregulation of PPAR- γ motioning and additionally a conceivable tweak of both glucose and lipid metabolic markers.

Hypoxia-inducible element 1 (HIF-1) is a translation consider that is actuated because of cell hypoxia. HIF-1 is made of α and β subunits. HIF-1 α is corrupted by the ubiquitin framework under normoxic conditions, while it is balanced out under hypoxic conditions. If hypoxia appears to generate a chronic inflammatory reaction and effect insulin signaling, then hypoxia due to obesity could be one of major factor for insulin resistance, type 2 diabetes, and cardiovascular diseases.

Rebecca Lynn Bearden under the supervision of Dr. Mahmoud Naasea also presented her work on research about 'Method for the Early Detection of Preeclampsia in Pregnancy'.

Preeclampsia is one of the most common medical complications associated with pregnancy affecting 3-7% of pregnant women worldwide. Preeclampsia is a condition characterized by hypertension, proteinuria, and end organ dysfunction

caused by abnormal placentation.

The abnormal attachment of the placenta induces endothelial dysfunction and vascular damage that lead to these complications.

Diagnosis of preeclampsia can only be made starting from 20 weeks gestation after the clinical symptoms have already been manifested. At this stage there is nothing that can be done to stop or prevent further damage and in severe cases can even prove to be fatal. The only cure for this condition is delivery of the placenta and in most cases results in preterm delivery and a premature infant. This created the need for the development of a test that can detect the disease at early stages of pregnancy before serious complications would occur.

The aim of the research was to develop a method for the early detection of preeclampsia by distinguishing between the protein content in the urine of affected pregnancies compared to normal pregnancies. The methods under investigation have the potential to detect the disease in a fast, safe, accurate, and cost effective way that can be utilized in the clinic for prenatal screening.

Research on 'Association between insulin resistance and nitric oxide in retinal vascular endothelial cells in vitro' was presented by Sumbul Bushra, with Dr. Nasser Rizk as the instructor. Obesity and type 2 diabetes are characterized by insulin resistance which has been reported as the major risk factor associated with the development of the endothelial dysfunction and vascular complications such as atherosclerosis.

Induction of the vascular dysfunction is obviously a proved metabolic consequence of insulin resistance. Nitric oxide (NO) is well known to play a significant role in the cardiovascular systems functions.

NO has broad biological properties in the maintenance of vascular homeostasis. It performs a crucial role in normal endothelial function, modulation of vascular tone and blood flow, regulation of local cell growth, and protection of the vessel from platelet aggregation, leukocyte adherence, and smooth muscle proliferation.

A key pathogenic step in the initiation and

progression of endothelial dysfunction has been accounted as a manifestation of reduced bioavailability of endothelial cell derived from nitric oxide (NO) production. Therefore, this could be accounted to be the ultimate future deleterious consequences of endothelial dysfunction initiated due to insulin resistance.

Several components in signaling pathways have been proposed to be determinant in the nitric oxide bioavailability and vasodilation. The endothelial nitric oxide synthase (eNOS) is the key signaling molecule in the production of NO for the vascular homeostasis. eNOS expression is regulated by factors such as insulin and stress.

However, eNOS stimulated NO production regulation is complex and requires various intermediary components. Insulin leads to the increased production of NO through the activation of phosphatidylinositol 3-kinase (PI3K) followed by activation of protein kinase B (PKB/Akt).

This leads to the phosphorylation of eNOS on the substrate L-arginine utilizing a critical cofactor tetrahydrobiopterin (BH4) for the production of NO within the vascular endothelium. Several factors were postulated to be associated with the reduced production of NO of the vascular endothelium in insulin-resistant states such as impairment of eNOS production, and PI3K activation.

Another factor associated with the diminished production of NO is the reactive oxygen species (ROS) such as superoxide that leads to the production of peroxynitrite. This, in turn yields deleterious phenotypic changes to the endothelial cell through protein nitrosylation.

Diabetes leads to altered retinal microvascular function and ultimately diabetic retinopathy. Insulin signaling may play a role in this process, and animal studies indicated a role of the insulin in the pathogenesis of retinal neovascularization through its effect on endothelial cells. Diabetes induces dysregulation of metabolites, hormones, inflammatory, oxidative stress and adhesion markers and other factors to activate these retinal cells and induce damage.

Endothelial dysfunction impairs ocular

hemodynamics by reducing the bioavailability of NO and increasing the production of reactive oxygen species (ROS) and may be responsible for the pathogenesis of vascular dysfunction in retinopathy.

Insulin resistance would impair the production of NO in retinal vascular endothelial cells.

Until now, the pathophysiology of retinal vascular dysfunction due to high glucose load and insulin resistance in association with NO bioavailability in these cells remains unclear.

Ayeshah Madani's work was on 'Investigating Molecular Pathways of ROS-induced Pro-inflammatory Senescence in Preadipocytes'. Incidences of obesity and diabetes in Qatar rank among the highest in the world and the morbidity of these metabolic disorders creates major public health problems.

It has been associated with chronic low-grade inflammation, which is considered to be a major cause for insulin resistance and Type 2 Diabetes (T2D). The therapeutic interventions for T2D are inaccessible due to the unclear understanding of the molecular mechanisms of obesity-driven T2D. The ultimate focus is to investigate and reveal the molecular mechanisms of this association to discover novel therapeutic targets for obese

individuals living with diabetes. The adipose tissue in the obese state is characterized by the accumulation of reactive oxygen species (ROS), which will lead to DNA damage and the cell undergoes senescence, when the DNA is severely damaged and unable to be repaired. It has been reported in vitro and in vivo studies, that cellular senescence will result in secretory phenotypic changes by senescent cells characterized by significant increased secretion of pro-inflammatory cytokines known as senescence associated secretory phenotype (SASP).

The knowledge about SASP components and the determination of pro-inflammatory phenotype is lacking especially in obesity and T2D. The main goal of this study is to investigate the role of the novel transcription factors DDIT3, CEBP-Delta and STAT1 in pro-inflammatory senescence.

This will result in understanding the molecular details that will help in the development of effective therapeutic interventions.

Dr. Marawan Abumadi and Dr. Anand Deshmukh supervised Ola A. Alsharabasi's research on 'Application of MALDI-TOF Mass Spectrometry as a tool for biotyping of Brucella'. Brucellosis is an endemic zoonotic disease in many parts of the world with high incidence in Mediterranean and Middle Eastern countries. The genus Brucella, the causative agent of Brucellosis, contains highly infectious species out of which B. melitensis is the species most frequently reported as a cause of human disease and the most virulent one. Each Brucella species contains several biotypes.

Biotyping is important for epidemiological purpose and developing strategy for vaccination. Conventional biotyping techniques involve combination of conventional metabolic, biochemical, serological, dye and phage testing. Routinely, it's not done in most clinical laboratories as these assays are time consuming and hazardous to laboratory workers. Molecular techniques such as PCR and MLVA has been standardized for identification, classification and typing of Brucella spp.

However these techniques are expensive and require molecular setup. MALDI-TOF, a proteomic based assay, on the other hand, has been recently standardized for identification of microorganisms and has been studied for epidemiological typing of different bacteria. The advantage of this technique over other conventional identification methods is that it is fast, cost effective, accurate and does not require high skilled personnel.

One more advantage especially when talk about the utilization of MALDI for Brucella typing is the safety issue. The procedure includes an inactivation step by which the risk of laboratory acquired infection and need for bio-safety level 3 laboratory are eliminated. There are few studies published on potential use of MALDI-TOF technique for biotyping and it's not clear if Maldi-typing will be as successful as Maldi-identification.

"We hypothesize that with the help of biotyping software available in MALDI-TOF (Brucker Daltonics), along with standardized typing procedure, we will be able to generate mass spectra with a type specific peak with reasonable signal intensities for all Brucella isolates.

To our knowledge this is the first study that attempt to use MALDI-TOF MS for identification and subtyping of Brucella isolates in Qatar", Ola and her supervisors said. 'Gold Nanoparticles-based Assays for Direct and Cost Effective Detection of C. difficile in Qatar', was presented by Tahani Masood Saleh T Al-Saadi. Clostridium difficile Infection (CDI) is a major health problem worldwide. Prevention techniques require fast and precise detection of Clostridium difficile (CDF) with high sensitivity. Conventional diagnostic methods are time-consuming, costly and inappropriate for clinical field settings.

Therefore, the aim of the study was to develop Gold Nanoparticles-based assay (AuNPs) for direct qualitative and quantitative detection of nucleic acid of CDF. The proposed assay is expected to be highly sensitive, rapid, simple, and cost effective. A total of fifty-eight leftover CDF isolates were collected from Al-Khor hospital in Qatar.

Clinical data showed that the majority developed diarrhea during hospitalization after administration of broad spectrum of antibiotics. AuNPs based assay was optimized using different concentration of salt, primer and different annealing temperature. Samples were tested using the optimized AuNPs assay for the presence of CDF DNA, which is indicated by changing in AuNPs color from red to blue color.

Fifty-eight positive CDF samples were tested using AuNPs based-assay. The color of the solution changed from red to blue in 51 samples within one min, which is considered as positive. On the other hand, the seven samples showed no color change and were considered negative. As preliminary findings, the study showed a sensitivity of 87.9% that requires further testing and future studies for CDF toxins detection using AuNPs. Furthermore, measuring assay performance including Specificity, Negative Predictive Value and Positive Predictive value is also required.

Our Exclusive

How secure are online transactions? Dr. Wang offers insight

The secure nature of online services such as online banking, online investing, e-commerce etc., which we now use regularly in daily transactions depends on protocols such as Secure Socket Layer (SSL) and Virtual Private Network (VPN).

Why are they secure and how secure are they? From a technical viewpoint, SSL/VPN is secure because the server computers could generate unpredictable random bits, says Dr. Yongge Wang, associate professor for cybersecurity at Qatar University's KINDI Lab. Dr. Wang has designed a statistical distance based LIL-testing prototype and carried out experimental results on commonly used pseudorandom generators in cyber infrastructure.

"If an attacker who is eavesdropping on our communication could predict in some way the random bits generated by the server, then the adversary could easily break into the system and decrypt all of our communications," he said.

"This can also be understood in the following way: if a gambler could predict or control the outcome of dice rolls, then he can make a fortune by bidding on the correct outcome. In other words, our secure server computers need the same kind of randomness that a casino needs."

Based on this scenario, according to him, if the random generators of the web servers were not strong enough, a hacker could easily break into these connections to eavesdrop on these "secured" connections, impersonate the e-commerce web service transactions, and steal client credentials.

Following his study, Dr. Wang says surprisingly, a large number of many web servers in the world have weak pseudo random generators and could be attacked and be controlled by the adversary using the weakness in the web services pseudorandom generators. A recent survey/study shows that at least 1.53% web servers could be attacked and controlled due to the fact that they



Dr. Yongge Wang

use weak pseudorandom generators to generate their master SSL/TLS private keys.

Then why are the vulnerabilities not fixed before deployment? The answer is that no existing technique could effectively detect the weakness of these pseudorandom generators. Dr. Wang's project is working towards designing an effective technique to check and take care of the noticeable vulnerabilities.

Although there are state-of-the-art pseudorandom testing techniques such as US government NIST SP800-22 standard, Dr. Wang, working from QU's KINDI Lab for Computing Research, has carried out extensive experiments (based on over 200TB of random bits generated) which show that NIST SP800-22 techniques could not detect the weakness in the pseudorandom generators that are widely deployed for e-commerce web services.

The experiments show the advantage of the proposed techniques by Dr. Wang over existing techniques such as NIST SP800-22 testing suite. For example, the prototype testing tool could easily identify the weakness in the widely deployed pseudorandom generators though NIST SP800-22 suite could not.

Dr. Wang's results first appeared in the European Symposium on Research in Computer Security (ESORICS) 2014. After reading Dr. Wang's results, a cryptographic mathematician at the National Institute for Standards and Technology (NIST) in the US commented that "It raises an important concern about the NIST SP 800-22 statistical tests and provides a substantiated recommendation for adding another test to the suite". Currently, Dr. Wang is collaborating with the NIST mathematician for potential wide adoption of Dr. Wang's techniques for web security testing.

Feature Story



Cutting-edge robotics tech for improved health and wellness



We design child-specific interactions with the robot that would help children maintain eye contact and participate in conversations,”

Hifza Javed

Qatar University is on the verge of establishing a firm stronghold and leadership in the field of healthcare robotics in the region. Under the leadership of Dr. John-John Cabibihan, Associate Professor of Mechanical Engineering in the College of Engineering, a young team of researchers is working hard to develop cutting edge healthcare technology, focusing on robots for autism therapy, surgery, and rehabilitation. The unifying theme of this team’s research is the invention of enabling technologies that can benefit those in need.



Dr. John-John Cabibihan

In line with the objectives of Qatar National Vision 2030 and the relevant theme of Qatar University's research road map, Dr. Cabibihan's work focuses on health and wellness of the population. Healthcare is also one of the research pillars identified by the Qatar National Research Fund. "More specifically we are dealing with robotics for autism therapy, for robotic surgery, and for rehabilitation robotics, specifically in prosthetics," he says.

The work of Hifza Javed, a research engineer in the team, focuses on robots for autism therapy. On how healthcare robotics can help Qatar, she says, "It is not uncommon to find people with 'different abilities' being prevented from living fulfilling lives or from making much impact on society. In many cases, there is a social stigma associated with their condition".

She explains that healthcare robotics is specifically aimed at improving the standard of their lives by allowing assistive

technologies to help them overcome their limitations.

Social Robots for Autism Therapy

In the light of Qatar's initiative at the United Nations to spearhead a campaign to raise awareness about autism spectrum disorder (ASD), this work is definitely aligned with the national goals. With Qatar's pioneering role in the designation of April 2 as the annual World Autism Awareness Day, the team at Qatar University is following in the state's footsteps with the aim of enabling individuals with autism to lead fulfilling lives and opening doors to new opportunities.

According to Dr. Cabibihan, looking at the number of children with autism worldwide, it has become imperative for people with expertise to step forward to provide assistive technologies for these children. Available statistics indicate that in the UK, 700,000 children may have this condition, which is about one child out of

100 children. In the USA, it is one out of 68 children. In Qatar, the numbers are not yet available, but a 2012 study by the College of Pharmacy in Qatar University indicates that children with autism largely stay indoors, spending about 17 hours a day with most of their time spent on watching TV and sleeping.

"This is an open call for us to help. Beyond research, we have been working tirelessly to develop assistive tools for them," Dr. Cabibihan says. "Essentially we are looking at it not as research any more but as a humanitarian social service to help the parents, the children, and the therapists." He said the affected children, parents and therapists are the major stakeholders in this area of research.

Autism Spectrum Disorder (ASD), he says, includes difficulties in social communication and interaction, where simple movements like nodding, eyebrow movement, and shaking of the head are very difficult for

the children to understand. “But if there is a robot in the middle, we can teach basic skills to a child and ensure a three-way interaction with the therapist.”

He enthuses that robots are beneficial as they help children with autism to practice the art of imagination and imitation like eye contact and joint attention. Importantly to the researcher and society, when no one (like the therapist) is watching, the child imitates what the robot does and puts it into practice.

This helps the therapist to achieve success in his assignment and thereby feel some sense of fulfilment. And with robotics, even the parents see and assess the development of the child, thereby giving the researcher the assurance that the outcome of his work is very helpful and beneficial.

Ms. Javed says she is very confident about the potential of this work, explaining that the aim is to promote an inclusive society for children with autism by helping them overcome their social and communication deficits. Elaborating on how this is achieved, she says, “We design child-specific interactions with the robot that would help children maintain eye contact, participate in conversations, indulge in gameplay with other children, and express how they feel about things.

With a robotic mediator, such activities become much easier to conduct because of the children’s inherent interest in technology in general, and robots in particular. With a robot, the target behaviors can be achieved with more ease as compared with humans.”

“From Qatar, we are reaching out to experts in other parts of the world. We are initiating research activities in this area, taking cue from the leadership of the State of Qatar at the UN in autism awareness. I think that the prospect of using robots as assistive tools in autism therapy will benefit the children the most,” Dr. Cabibihan said.

He and his team have investigated the use of physiological sensors, like heartbeat and galvanic skin response sensors, to determine variations in the internal state of research subjects. “We induced sadness by making them watch a movie. We found

that signals from both sensors increased as the subjects anticipated the highly disturbing parts of the movie, which was about an accident. Using similar sensors, it would be helpful to investigate further whether children with autism can show physiological signals that can provide warning signs to the caregivers that a meltdown is imminent,” he said.

According to him, there is an increasing trend showing that children have preference to interact with computers and robots than with other humans. “As a baseline study, I have documented the interactions of children as young as 11 months old as they interact with social robots. The videos that I have gathered provide a rich resource of how children with or without autism can interact with robots. Particularly, issues with safety, familiarity and acceptance would have to be addressed by robot designers,” he said.

“In addition, we have conducted human-to-human handshake experiments to determine the motion, force and finger joint angles. These data can be used for designing more compliant robotic arm and hand systems.”

Prosthetics

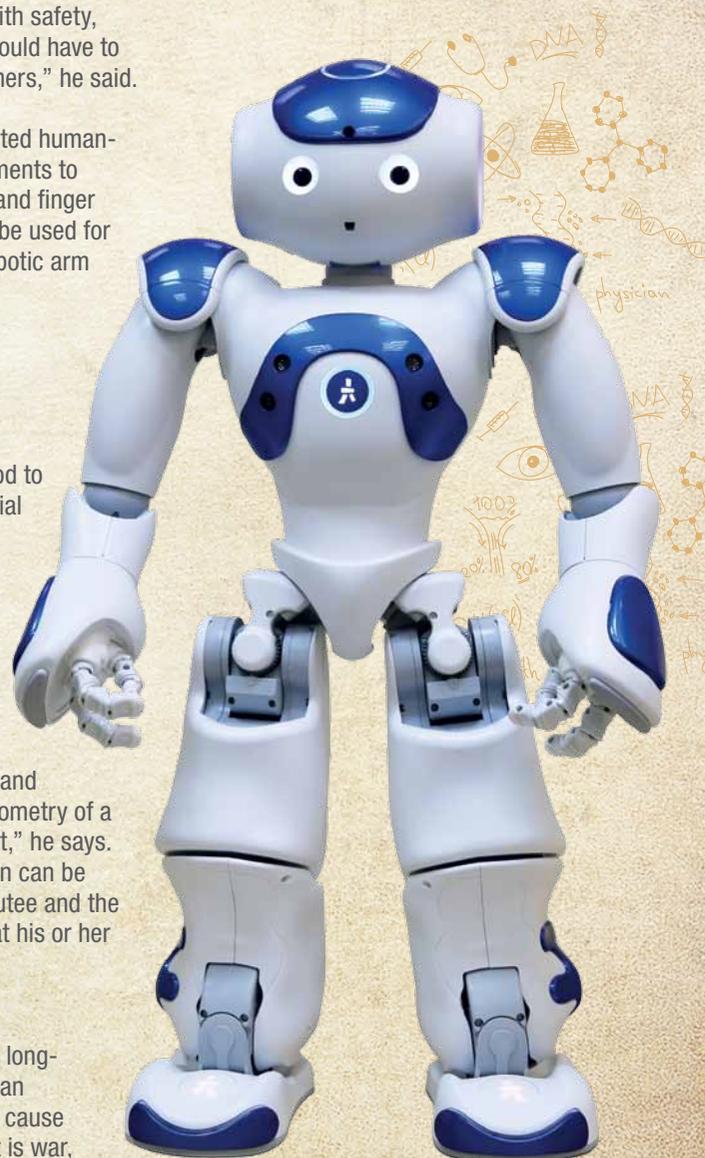
In the area of prosthetics, Dr. Cabibihan and his team have been able to develop a method to create patient-specific artificial hands and fingers without even seeing an amputee for measurements and fitting during the fabrication process.

“We used computed tomography (CT) scan data from the non-affected hand to accurately recreate the geometry of a missing hand in digital format,” he says. Using the data, reconstruction can be done remotely from the amputee and the prosthesis can be delivered at his or her doorstep.

The loss of limbs can lead to disfigurement and can cause long-lasting emotional damage to an individual. Irrespective of the cause of the amputation, whether it is war,

“**Robots help children with autism to practice the art of imagination and imitation like eye contact,**”

Dr. John-John Cabibihan





Robot makes demonstration



There's market need for prosthetics in Qatar and in the region,"

Mohammad Abubasha

vehicular or any work-related accident, the experience can leave an individual in a deep state of grief, depression, social isolation, and low self-esteem.

Prosthetics should have certain features that allow them to resemble natural limbs as close as possible. They must be naturally controlled by the user's thoughts and the sensations must be fed back to the user. To allow for smooth social interaction, the device must also not be discernible in a social situation to enable natural interactions.

This requires that the artificial limb appear just like the lost limb. Other than in appearance, the prosthetic device must also be human-like in terms of the warmth and softness. While many projects around the world have developed solutions for this, most remain too robotic, and too expensive, especially for developing countries.

Dr. Cabibihan with his team members have developed innovative solutions of their own. They have been experimenting with synthetic materials that have comparable softness to human skin. "We

also developed an embedded temperature control system that can create an illusion of the warmth of human skin at a temperature that adapts to the surrounding environment.

From the experimental subjects who were prevented from seeing the hands that touched them, we were able to confirm that the touch from the soft and warm artificial hand that we developed could not be distinguished from a touch from a human hand," he said.

Mohammad Khaleel Abubasha, another research engineer in the team, says, "I feel that the full impact of our research will not be noticed until we deploy these technologies out there. There's a market need for prosthetics in Qatar and in the region but many of these devices are being imported from elsewhere. Once we show the potential of our research, we hope to create a niche market for this."

Surgical robotics

To date, cancer remains a deadly disease. According to a 2012 data from the World Health Organization, there were over 14

million new cases of cancer that were diagnosed. Smoking increases the risk of cancer, especially in the Gulf region where there is a large number of smokers. In their research on surgical robotics, Dr. Cabibihan and his team focus specifically on the stomach.

A tethered robotic endoscopic capsule was designed to be swallowed by the patient in order to scan the stomach for the *H. pylori* bacteria that inhabit especially near the bottom of the stomach. Their prototype uses a single lab-on-chip version of an “electronic nose” to better visualize the stomach. Dr. Cabibihan says that this work can serve as an alternative tool for early detection of stomach cancer.

Helping to drive this is Xianming Ye, a post-doctoral research fellow in the team. He says, “The Tethered-Capsule Endoscope (TCE) Project promotes the technology for endoscopic inspection with improved performance and reduced discomfort of the patients.”

Surgical robots have plenty to offer and can help upgrade the state of medical infrastructure remarkably. “Surgical robots guarantee high quality of medical care,” he adds. This is guaranteed to play a pivotal role in the improvement of healthcare facilities in Qatar.

Interest in robotics

“For autism, I had a scare, based on the numbers from different countries, that my son might be autistic. My oldest son demonstrated some signs. We checked him out with the clinician and fortunately he was not having it. Since I worked on investigating it, I found out that some of my friends’ children had it. Even in school it was evident that they were being affected by their behavior,” Dr. Cabibihan said.

He got interested in prosthetics as a result of injuries arising from wars and accidents whereby arms and legs are amputated. “Apart from accidents, there are crises all around. What can be done to help the victims, their depression and emotions?” This question drives his motivation.

According to the WHO, 10 years ago 25.5 million people in Asia, Africa and Latin

America needed these devices. But they do not find them. “People are writing from all parts of the world asking for help. I am not a medical doctor to give them the solutions but I am an engineer.

It is quite heartening and encouraging for us to develop solutions for them. We are building all sorts of solutions. We have advanced technology to replicate fingers

and arms and we will try to do that.” For surgical robotics, it is the high number of cancer patients worldwide that has driven Dr. Cabibihan’s interest.

Inclusiveness

For autism the research team collaborates with care givers from the hospital and provides technology for them. And for



prosthesis, they try to address those who come to them for help. “We have not yet gone to the hospital for it. In respect of surgical robotics, we cannot do it alone as we have to work with the hospital,” Dr. Cabibihan said.

Expected risks

“We let them know that the technology is still at the research level and that they should not expect too much at this time. We collaborate with people to test the outcome of the research. We develop solutions for them to use outside of the lab so that they can give us feedback. “Human interaction is very necessary. We pilot test and send the technology out. Perhaps after this it will go on commercial level so that the speed of development will be faster to reach more people,” he says.

Fostering research culture

To widen knowledge and increase information on developments in this field, they organize conferences and contribute to journal publications. “We get our work published and people are getting interested. They know that this is one of the tools that can be available in the near future to help children,” he said.

He believes that the fastest way to diffuse the story is to create awareness and get people interested in what he and his team are doing that it is possible in Qatar, he says.

They have other research programs to attract undergraduate students. According to Dr. Cabibihan, “A mentor is very useful. He has the technology and the background. He talks to one student who in turn relates to other students.”

Looking forward

Dr. Cabibihan believes that one of the fastest ways to promote a research culture

in Qatar is to disseminate research success stories. He and his team, composed of postdoctoral fellows and students at various levels (PhD, Masters, and undergraduates) are always open to welcome visitors to the lab.

“I believe in the power of multiplication, getting the interest and enthusiasm of one person at a time can in turn multiply into others who can work towards the same goal for the benefit of other people, especially for those in need. In 5-10 years, some of these technologies will move out of the lab. I am excited about what that future can bring,” he says.



“

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Xianming Ye

News

Dr. Asmaa awarded for research on 'Role of hMPV in Pediatric Respiratory Tract Infection in Qatar'

Dr. Asmaa Al-Thani, head of the Department of Health Sciences at Qatar University, was awarded at the Arab Pediatric Medical Research Awards during the Arab Pediatric Medical Congress which took place in Dubai, UAE. Dr. Al-Thani, who is also the director of the Biomedical Research Center (BRC) at QU, was recognized for her distinguished research titled 'The role of hMPV in Pediatric Respiratory Tract Infection in Qatar'

Respiratory tract infections are ranked as the second leading cause of death regardless of geographical area in children less than 5 years of age. In the paediatric population, respiratory syncytial virus (RSV), parainfluenza virus (HPIV), and influenza virus (IV) are the major causes of bronchiolitis and lower respiratory tract infections (LRTI).

The newly described human metapneumovirus (hMPV) has been recently discovered as an aetiological agent of acute respiratory infections in infants and children, with similar clinical symptoms to those caused by respiratory syncytial virus (RSV).

The aim of the study was to determine the prevalence of hMPV and its potential role as causative agent of respiratory tract infections (RTIs) in children in Qatar.

Eighty-four outpatient pediatric patients aged one month to five years, who attended the Alsaad Pediatric Emergency Department, from February 2007 to March 2008, were recruited for the study. The patients' symptoms consisted of fever, running nose, coughing, sneezing, sore throat, pneumonia, bronchiolitis and other relevant signs and symptoms of URTIs and LRTIs.

The consent of the parents of the children was obtained before the children were co-opted for the study which discovered that the most common diagnosis in the patients was bronchiolitis (63.1%) followed by pneumonia (13.1%). Most of the children presented with cough, nasal discharge, shortness of breath and fever.

Sixty-four percent (64%) of the patients were positive for hMPV, which peaks in winter and more common in infants.

Dr. Al-Thani's study is the first report on the incidence of hMPV-related infections in children in Qatar. The data demonstrated a high incidence of the virus in children aged between six months and nine years with RTIs.

She was supported during the project by Dr. Ibrahim A. Janahi, pulmonary pediatric consultant at Hamad General Hospital; Miss Mooza al Khanji of the Health Science Department at Qatar University; M. al-Sheik and Fatma Ghalab. It was funded by the Undergraduate Research Experience Program (UREP) of Qatar Foundation's (QF) Qatar National Research Fund (QNRF); and Research Office of Qatar University.

An Associate Professor of Virology at the Biomedical Program, Department of Health Sciences, College of Arts and Sciences, at Qatar University, Dr. Al-Thani also fulfills roles as Adjunct Assistant Professor in the Department of Microbiology and Immunology at Weill Cornell Medical College in Qatar since 2011, Vice Chairperson of the Qatar Biobank Board at Qatar Foundation since 2010, Chair of National Genome Qatar Committee from December 2013 and Director of BRC at Qatar University from Fall 2014.

She has numerous published articles in her field of expertise including, 29 papers in peer-reviewed international journals and has also obtained several research grants, including seven Qatar University grants, 13 UREP grants and four National Priority Research Program (NPRP) grants.

She was the recipient of the First Prize of Sheikh Hummaid Bin Rashid for Culture and Sciences for research on "Bird Flu and means of prevention" in December 2006 and was awarded a prize by the Al-Jasra Cultural Club Qatar for student research competition titled, "Variety of resident nationalities in Qatar and its effect or presence of new disease in the Qatari society" in April 2008.

Dr Al-Thani was given recognition through the Qatar University Outstanding Faculty Service Award in 2012, College of Arts and Sciences Research Awards 2012 and Arab Pediatric Medical Research Awards 2015.

She was equally recognized for the best student award poster in the field of Health and Biomedical Sciences in the Qatar Foundation Research Forum 2012 and as second winner of QNRF's 6th Annual UREP Competition in 2014.

News

CSD moves to preserve Qatar's mangrove ecosystem



CAS Dean Dr. Eiman Mustafawi with officials during the 'International Training Workshop on Conservation of Biodiversity and Ecosystem'

Qatar is surrounded by sea on three sides with a coastal belt of about 700 kilometers. Mangroves and salt marsh habitats in Qatar which are adapted to highly saline conditions resulting from little rainfall and warm weather serve as a buffer between land and sea and hence protect against erosion. They reduce the hazards of tsunamis and cyclones, harbor a variety of life forms like fish, amphibians, reptiles, birds and are good sources of timber, fuel, fodder, tannins, honey etc. as well as sources of forage for camel, goat, livestock etc. Mangroves are breeding ground for fish, lobsters and prawns. Fisheries play an important role in the economy of Qatar and account for about 11.1% of its total agriculture sector. Local fish production during 1995-1999 varied between 4271 and 5425 tons generating QR6.2 million.

Rehabilitating the mangrove ecosystem, according to the Center for Sustainable Development (CSD) at Qatar University, would

enhance the fisheries industry in a big way and contribute in reducing global warming by sequestering 1.5 tons/hectare/year of carbon from the atmosphere. Planting mangroves may remove a substantial amount of carbon emission, 85 m tons a year in Qatar.

The CSD in an effort to create awareness about Qatar's mangrove ecosystem recently took students on a visit to Al Khor where they were enlightened about the significance of mangroves to Qatar. The Center also took the students on another trip to visit the mangrove in the creeks using small kayaks so they could really appreciate the forest where the only source of water is seawater.

To further the awareness drive, the Center took another group of students to the natural park at Al Wabra, the artificial reserves park for the national fauna, where they were educated on the importance of wildlife to the Qatar.

In another development, the Center for Sustainable Development is working to collect thousands of mangrove seeding from the local mangrove swamps and grow them under supervised conditions at the seedling plantation in Dakheera. "When the seedlings are ready we would invite the members of civil society, academia, government and public at large and get them involved in planting this species in their natural habitats," the Center said.

The Center contends that despite low cover, mangroves have 5-8 times higher capacity to sequester carbon than other trees. And therefore, considering the importance of this ecosystem there is an urgent need for their restoration and rehabilitation. Mangrove swamps are mainly found in Al Khor and Al Dhakhira and are under threat due to land-use issues, sewage effluent, rubbish disposal and land reclamation. Oil pollution in some areas has caused negative impact on biodiversity

and mangrove cover. In order to rehabilitate mangrove ecosystem, the civil society, according to the CSD, needs to be made aware of the severity of the problem and the benefit of the ecosystem to Qatar. "Through the active involvement of civil society we may be able to persuade private and public companies and the government to focus on this issue," it said.

A number of activities have been planned to make people at large aware of the existence of the mangrove ecosystem: educate them regarding its importance in their life; create a platform to promote the interest of civil society, academia, government and public at large to work for the rehabilitation of mangroves.

One activity to raise awareness about mangroves was the 'International Training Workshop on Conservation of Biodiversity and Ecosystem' which was jointly organized by the International Union for Conservation of Nature (IUCN) Commission on Ecosystem Management (CEM) and Centre for Sustainable Development, College of Arts and Sciences, Qatar University. The workshop was inaugurated by Dean of College of Arts and Science, Dr. Eiman Mustafawi.

She said that the workshop was part of the College's continuing efforts to enhance and

promote education, training and research for the conservation and management of ecosystems.

"By working together with the IUCN West Asia Commission on Ecosystem Management, we aspire to better promote the cause of the preservation of the environment and biodiversity in Qatar and the wider region," Dr. Mustafawi said. She added that the College of Arts and Sciences was proud to host such events in support of Qatar's National Vision 2030 which seeks to make Qatar's future path of development compatible with the requirements of protecting and conserving the environment.

Participants at the workshop included biological and environmental sciences faculty and students of College of Arts and Sciences, Qatar University experts and researchers from Qatar Foundation, Al Wabra Wildlife Preservation, Qatar Museums Authority, Friends of the Environment Society, and from various institutions in Qatar, Oman, Jordan, Pakistan, Bahrain, Iraq and Kuwait.

During the working sessions Dr. Mufleh Al Alaween, IUCN Jordan Climate Change; Prof. Shakeel A Khan, University of Karachi; Prof. Nobuyuki Yamaguchi, Qatar University; Prof. Ajmal Khan, Qatar University; Dr. Iqbal Saeed Khan, DG, Gorakh Hills Development Authority; Mr. Rafiul Haq, ecologist, and Prof. Nabil Zouari,

Qatar University delivered presentations .

Moreover, the Center had organized an "International Conference on Halophytes for Food Security in Dry Lands" where a number of scientists who are leaders in the field participated. Prof. Hans Bohnert and Prof. John Chessemann from University of Illinois, USA; Dr. Miguel Clusner-Godet, Director, Division of Ecological and Earth Sciences, World Network of Island and Coastal Biosphere Reserves, UNESCO, Paris; Prof. David Master, CSIRO; Prof. Sergy Shabala, University of Tasmania, Australia; and Prof. Hans W. Koyro from University of Giessen, Germany were among the halophyte biologists from Europe, Africa, Asia and the region who attended the meeting.

The conference aimed to provide forum for the exchange of ideas; provide specific ideas about conducting halophyte research in Qatar's arid and saline and establish a network of experts in the field. It also helped to foster research collaboration with different laboratories; promote exchange of students and faculty and develop joint research proposals, like exceptional proposal for Qatar National Research Fund (QNRF).



Students explore the mangrove in Al Khor

Interview with Researcher





Interview with Dr. Eiman Mustafawi
Dean, College of Arts & Sciences

“ Our aim is to foster research for national priorities.”

Qatar University’s College of Arts and Sciences (CAS) has been making giant strides in the area of research. The College was the recipient of the first National Priority Research Program (NPRP) exceptional project to be awarded to QU. This category of grants is highly competitive and provides a large funding of \$5 million (over QR18 million).

CAS also received the Biofuel Project grant which is a public-private research partnership to develop biofuel, food, and feed from sea algae. This has so far been the largest single grant to be awarded to QU amounting to \$12 million (QR44 million). CAS has recorded a high number of publications, an indication of a major output from the research activities of its faculty and students.

There have been about 200 annual publications attesting to the impact factor of the quality and impact of CAS’s research globally. In this interview, Dr. Eiman Mustafawi, Dean of the College of Arts and Sciences, sheds light on developments in the College, its achievements, aspirations and expectations.

Excerpts:

Researcher Profile

Dr. Eiman Mustafawi received her PhD in 2006 in Linguistics from the University of Ottawa in Canada. She specialized in Theoretical Phonology and her PhD dissertation was nominated for two awards: the Governor General's Gold Medal and the Pierre Laberge Prize for outstanding doctoral dissertations. Her MA studies focused on the linguistic constraints on the manifestations of linguistic outcomes of bilingualism. Dr. Eiman has participated in many international conferences and has a number of publications in specialized journals in her field.

She holds a BA in English/Education from Qatar University. Dr. Mustafawi joined QU in 2006 as Assistant Professor in Linguistics. In 2007 she was appointed as Associate Dean for Faculty Affairs at the College of Arts

and Sciences and in 2009 Associate Dean for Academic Affairs. She has been the Dean of College of Arts and Sciences since June, 23, 2011. During her tenure as Associate Dean for Academic Affairs and Dean for College of Arts and Sciences, she oversaw the development and launch of numerous undergraduate and graduate programs within the college such as the BA in Psychology, BA in Policy, Planning and Development, BSc in Public Health, MA in Arabic Language and Literature, MA in Gulf Studies, MSc in Environmental Science, MSc in Biomedical Science, MSc in Materials Science and Technology, the region's first PhD in Biological and Environmental Sciences, MSc in Public Health, MSc in Applied Statistics and the unique PhD in Gulf Studies. Moreover, during the same period, accreditation for

Mass Communication program, reaccreditation of the Biomedical program, equivalency for Human Nutrition program and accreditation of Statistics program were obtained.

Her accomplishments include the founding of three interdisciplinary research centers: Gulf Studies Center, Social Sciences and Humanities Research Center and Sustainable Development Research Center, and signing 30 Memorandums of Understanding with local and international Institutions.

As Dean of College of Arts and Sciences, she has led the establishment of an External Relations Office, a Service Courses Unit, the Student Support Unit, and an Educational Technology Center which assists faculty and students in all their educational technology needs.

Can you give us background information about the College of Arts and Sciences – where it was before and where it is now; what goals and achievements have been recorded?

The College of Arts and Sciences is the largest and most diverse college at Qatar University. It was established in the 2004-05 academic year by merging two colleges: the College of Humanities and Social Sciences and the College of Sciences, and has been a major part of Qatar University's drive for reform and development of interdisciplinary education.

The focus of the college is on promoting interdisciplinary teaching and research, and places priority on serving the needs of the country in alignment with the Qatar National Vision 2020 and the Qatar National Development Strategy. The

College has achieved a great deal: since 2008.

Seven of our degree programs have obtained accreditation, the first of which (the Biomedical program) was the first accredited program at the level of QU, is a mark of quality.

We have also introduced several undergraduate and graduate degrees in an effort to broaden the opportunities for our students as well as meeting the needs of the country.

Moreover, we are actively promoting interdisciplinary research through establishing three research centers: the Center for Gulf Studies, the Center for Humanities and Social Science, and the Center for Sustainable Development. The latter brings researchers from social sciences on the one end and basic

sciences on the other under one umbrella of interdisciplinary research.

What are your targets for the upcoming years? Is the college's focus mainly on teaching or do you also lay emphasis on research as you transfer knowledge to your students?

Our goal is to promote high quality teaching and learning, and equipping our students with the skills they need within the rapidly developing economy of Qatar. We recognize that one of the most effective ways for achieving this is through fostering research-led teaching. Research is an area which is one of our priorities as we seek the goal of nurturing interdisciplinary research that meets the needs of the wider society.

The College of Arts and Sciences has had notable success in attracting large scale

research grants and our newly established research centers are a key way for us achieving this.

More broadly, we also have a goal of fostering increased understanding of Qatar, the gulf region and Arabic language. The College of Arts and Sciences is home to the Center for Gulf Studies which is staffed by leading experts on the Gulf region from a multi-disciplinary perspective. We offer M.A. in Gulf Studies in addition to Ph.D. in Gulf Studies.

Our activities here allow us to not only foster research on this important area of the world, but also allow us to promote greater understanding through the degrees and public events that we host.

We also have a Center for Arabic for Non-Native Speakers which has a truly international student body. It is regarded as a leading center internationally for learning Arabic.

How do you relate with the associate deans and members of faculty to achieve the objectives of the college?

The College of Arts and Sciences is staffed with five Associate and Assistant Deans and has around 480 faculty members. The College strongly believes in shared faculty governance as a means for us to achieve our shared objectives.

Effective teamwork is the essence of my relationship as Dean with the Associate Deans and this is the means by which we are able to foster a positive work environment for our faculty, and most importantly a high quality learning experience for our students.

Creating and nurturing the right atmosphere to encourage productivity, creative innovation and collaborative teamwork are all key goals the College gives emphasis to.

What makes you think that students should choose CAS over other colleges in QU?

The College of Arts & Sciences is the largest academic and most comprehensive division of Qatar University. With a

myriad selection of academic disciplines, interdisciplinary programs, and research centers.

It is the academic heart of the University. The College's diverse curriculum is dedicated to discovery, to making knowledge matter, and to developing the community to its utmost prospective.

It equips students with the vital skills of critical thinking and effective communication that are cornerstones of a college education in order to transform the world around them.

In the classroom and beyond through study abroad, lecture series, internships and practice, research opportunities, and more the College opens doors to the world for its students, so that they can receive the preparation they deserve as future leaders and global citizens.

Our dedicated and talented faculty maintains vibrant and creative programs of study and research activities with active learning at the core of the educational experience, through which they advance the frontiers of knowledge and train students to become independent and engaged scholars.

As an additional measure of excellence, many academic programs at the College are accredited by international organizations. Accreditation ensures that a program itself meets quality standards and is recognized, regionally or internationally.

As dean, what are your main research interests? Do you have enough time to undertake research projects?

My main research interests focus on Arabic phonology, segmental phonology, Arabic dialectology, speech recognition, code-switching, language policy, and bilingualism.

Additionally, as a member of different research groups, I worked on automated speech recognition, intervention for assistive communication, aphasia tests, and neurophysiological investigation of Arabic.

Since the bulk of my time is dedicated to my role as a Dean, I try my best to devote some time for other endeavors, such as undertaking new research projects, especially if they align with the general goals of the institution.

Is the college a leading light in research within QU and outside? Are the impacts of your research output being felt within the country and the larger society?

The College plays a leading role in research at QU where both our faculty and students have obtained a large number of competitive projects in major national research priority areas.

A key uniqueness of the college is its diversity of disciplines allowing us to combine efforts of multiple disciplines and areas within a discipline to address complex problems that can't be studied from one angle only.

The wide range of research areas in both the arts and sciences gives us a goldmine of interdisciplinary collaborations inside the college itself, within QU and with external bodies.

The college manages a large cumulative portfolio of around 77 active funded research projects from the competitive National Priorities Research Program (NPRP) under Qatar National Research Fund (QNRF). The college also is the recipient of the vast majority of internal research grants funded by QU.

In most awarded external projects, CAS faculty has the role of Lead Principal Investigator (LPI) in collaboration with other top universities and/or companies worldwide.

Students also take part in projects funded internally and externally in addition to capstone and graduation projects all of which equip them with the research, methodology, and critical thinking skills. Many of our faculty and students get research awards, for example during this year 34 faculty members obtained 21 research awards and 40 students obtained 30 research awards.

Impact of faculty research?

Most of our research topics deal with applied aspects of research relevant to real life in the humanities, social sciences, health, environment, or applied natural sciences such as statistics, chemistry, and biology.

There have been major contributions by our faculty at national and international conferences and research symposiums to disseminate research findings. Many of these researchers received awards and recognitions for their research work and the impact.

Topics researched by our faculty are mostly in line with the Qatar National Research Strategy (QNRS) and top priorities for the country. We have been contributing to sharing of knowledge and new discoveries (patents), and there have been major

achievements especially in the areas of science which impact on the society at large.

Our growing in-house research expertise and activities have been contributing to the training of qualified undergraduate and graduate students.

This new generation of nationals and residents with critical thinking and research skills is already

contributing to building the country and achieving the vision for a knowledge-based society.

What major research endeavors have been undertaken by the constituent departments of the college?

Three research centers were introduced to promote interdisciplinary research and boost research productivity at the college level and across departments in major areas of interest: Sustainable Development, Humanities and Social Sciences, and Gulf Studies.

Each center was established based on a driver of research integration. For example, a theme focus on sustainability was used as basis for the Center for Sustainable Development to bring faculty in applied sciences and arts faculty to work on sustainability topics from various complementary angles to gain critical mass and maximize impact.

A geographical focus on the Gulf was used as driver of interdisciplinary research that brings researchers in various areas to collaborate on aspects of research relevant to the Gulf region (e.g., policy, energy, planning, socio-cultural, economic issues).

The Center for Humanities and Social Sciences was introduced to bridge the field of humanities and social sciences with focus on cultural heritage, identity, and globalization issues.

The three centers are now playing a major role in training faculty, staff and students while offering a large number of events that benefit stakeholders in Qatar, public and private, as well as the community at large.

We have introduced nine graduate programs (including two PhD



programs) in a diverse array of disciplines to cover areas of national need and provide human capital for increased research activities. Active CAS graduate programs have an enrollment of about 150 students, excluding the newly launched programs. CAS currently runs the following graduate programs:

- PhD in Biological and Environmental Sciences
- PhD in Gulf Studies
- MA in Arabic Language and Literature
- MSc in Environmental Sciences
- MA in Gulf Studies
- MSc in Material Sciences
- MSc Biomedical Sciences
- MSc Public Health
- MSc Applied Statistics
- PhD in Gulf Studies, MSc Public Health
- MSc Applied Statistics started in Fall 2015.

CAS every year organizes its Annual Research Day to showcase student research and award those with high research productivity. All departments compete in both the Arts and Sciences for the best student posters.

The College has annual research excellence awards for outstanding faculty researchers as a means of boosting competitive research. Faculty members from all departments are active in collaborations on research projects in line with national priorities.

The College now has collaborative projects with over 50 institutions around the world and 25 MoUs. Annually, CAS departments organize around five large scale conferences and around 80 smaller scientific intellectual functions.

Do you have impactful partnerships and collaborations with outside institutions and research institutes? How fruitful have they been?

The College has around 25 active Memorandums of Understanding (MoUs) with reputable universities and companies in Qatar and worldwide covering many fields being offered in the departments. Most MOUs have research components allowing collaborations for both students and faculty.

All collaborations either through MoUs or research- funded projects allow the sharing of resources and expertise which leverages research productivity. Graduate programs are identifying adjunct faculty from other organizations to supervise student thesis and dissertations in an effort to share expertise and train students. This allows us to involve world renowned experts in research training of our students and gives us access to top level research facilities. Some programs at the college are developing dual graduate degree programs with major universities such as Durham University, UK, and Korea University.

Have your courses achieved accreditation from external bodies? How were you able to achieve this? What is the import of these accreditations?

The College of Arts and Sciences is home to the largest number of accredited programs within Qatar University. We have in total seven degrees which are accredited. Our goal is to ensure that in cases where an accrediting body exists in the discipline of a degree we offer, we seek accreditation as a means of enhancing overall quality as a routine approach.

Our accredited degrees are: B.Sc. in Environmental Sciences; M.Sc. in Environmental Sciences; B.Sc. in Biomedical Sciences; B.Sc. in Chemistry; B.Sc. in Statistics; B.Sc. in Human Nutrition; and B.A. in Mass Communications.

In terms of us achieving accreditation, it was a lengthy and detailed process for all respective programs which required close coordination with faculty and College administrators. The importance of accreditation for us is that it demonstrates that our baseline level of quality is on a par with comparable programs internationally. For us, achieving accreditation is just the start as in many cases we strive to exceed the standards needed in order to ensure that our students receive the highest standard of education so they can make a valuable contribution in their professional life after University or that they move onto graduate study.

How do you see the future of research in Qatar's education space?

Through the generous support given by the State of Qatar towards funding research, we are steadily moving towards the goal of creating a basis for the achievement of a knowledge-based economy. What is important here is that focus is given on areas of importance for the country, in addition to fields where a critical mass exists, so it achieves the impact it is striving for. On this basis, it is desirable for research to be prioritized in areas where a comparative advantage exists, but also to see it infused with teaching and learning.

An example within the College of Arts and Sciences where this is being achieved is in the field of Gulf Studies and Arabic for Non-Native Speakers. In both areas, we are capitalizing on them as comparative advantages internationally, not just for the College, but for the University as a whole.

What contributions is CAS making towards achieving the Qatar National Vision 2030?

The strategic plan of the College hinges on the Qatar National Vision 2030, in addition to the Qatar National Development Strategy. Our aim here is to develop degree opportunities for our students, and foster research linked to the priorities of the country, in order to serve this goal.

The College also has had notable success within the College in terms of attracting highly capable Qatari students to the University scholarship program which is geared towards supporting them to go onto getting graduate degrees internationally, with the intent that they will rejoin the College as faculty members. This is a key part of the Qatar National Vision 2030's goal of developing highly capable graduates who can help the country achieve its goals. Attracting students to this program is a clear priority of the College, and we now have 38, the highest number of, students on this within Qatar University.

Research
Success
Story

QU

research

pioneers emerging

desalination technology



Qatar is one of the countries with very low fresh water resource which comes by desalinating seawater. On the other hand, conventional thermal desalination is associated with huge carbon footprint.”

Qatar like other GCC countries is severely water-stressed and relies heavily on seawater desalination for freshwater supply for domestic and industrial uses.

Traditional desalination methods including thermal and reverse osmosis require a considerable amount of energy currently

derived from hydrocarbon fuels like natural gas. This has a negative environmental impact in the form of carbon dioxide emissions and in the case of thermal desalination the efficiency is low since 70% of the energy input is rejected as waste heat.



In this project we were looking into using a different desalination technology with less environmental footprint to increase Qatar's water resources. It helped me to get involved in one of the two Grand Challenges Qatar recently identified which is the water grand challenge. It also helped me to find my research track in the field of water and environment."

Seeking an alternative desalination technology

Based on this scenario, it has become pertinent to find a more effective and environmentally friendly way to produce freshwater in Qatar. This prompted Professor Farid Benyahia, from the Department of Chemical Engineering in the College of Engineering at Qatar University, to ponder over it with his colleagues at ConocoPhillips Global Water Sustainability Center at QSTP, back in 2010.

And in order to strengthen the momentum for a new desalination technology in Qatar, they sought for additional industry partners such as Qatar Water and Electricity Company (QEWEC) and Qatar General Electricity & Water Corporation (Kahramaa) to benefit from their long experience in the water industry. The idea of a new desalination technology was translated into a joint research proposal funded by ConocoPhillips and supported by Qatar University. To bring it to reality, a research agreement was signed by Qatar University and ConocoPhillips Global Water Sustainability Center in October 2011 in the presence of senior administrators of QU and Conocophillips and representatives of QEWEC and Kahramaa.

The research work involves a special type of membrane called "hydrophobic membrane" that prevents salty water from passing through and only allowing fresh water vapor to permeate and condense as high quality distillate in a process called "membrane distillation desalination". This requires only low temperature feed of salty water often not exceeding 80 C and low pressure like atmospheric pressure. The mild conditions have potentially very significant positive economic and environmental implications. The objectives for this initiative had both research capacity building and new knowledge creation dimensions.

Capacity Building

The main component of the research led by Prof Benyahia consisted of building research capacity by sponsoring and supporting a number of graduate students in the Master of Environmental Engineering. The first two Master students were Yehia Manawi and Ahmad Fard. They were trained in membrane distillation technology

and mastered it to the extent where they developed a laboratory bench scale system which served them in their Master thesis. They successfully demonstrated that high quality freshwater can be produced from high salinity seawater from the coast of Qatar at moderate temperatures. They also developed a representative mathematical model that can predict reasonably the performance of membrane distillation. The results from their master thesis were published in three high impact journal papers in Desalination, IF 3.96, thus putting Qatar University at the forefront of an emerging desalination technology.

In parallel with the bench scale laboratory system at Qatar University, two pilot plants exploiting membrane distillation were commissioned and deployed at Ras Bou Fantas power and desalination plant to test the new technology under real industrial conditions and at larger scale. There was full cooperation with staff of QEWEC during the testing phase. These pilot plants were operated by a team from QU and Conocophillips and included the training of the Master students under the capacity building initiative. The results from the pilot plant tests were positive and highlighted a need for further work with respect to the membrane stability.

A further paper on the pilot plant results was published in Desalination, IF 3.96, a high impact journal, raising QU's profile further in the new technology. As a result of recommendations from the field tests conducted with ConocoPhillips, the project expanded further at Qatar University by supporting three additional Master students from the Environmental Engineering program. These are Mashael Al-Obaidli, a Qatari graduate student working at Qatar Petroleum Research Center, Amira Al-Khatib and Reem Younes who are chemical engineering graduates of Qatar University. Their Master thesis focused on resolving a membrane fouling problem discovered during the pilot plant testing under extended experiments.

The students' thesis scopes included characterizing the membrane fouling and fresh water flux reduction (Mashael Al-Obaidly), exploring different membrane module configurations to enhance efficiency and module compactness (Amira Al-Khatib) and membrane fouling mitigation methods (Reem Younes).

In addition, a team of three undergraduate students (Abdulla Al-Oodani, Seraj Ibrahim and Khaled Al-Tholoth) undertook a Qatar National Research Fund (QNRF) Undergraduate Research Experience Program (UREP) project in 2014 on membrane distillation using the equipment available at Qatar University. It is worth noting that UREP projects are aimed at research training and research capacity building. This is an excellent achievement in terms of capacity building and the work continues producing new knowledge to be published in reputable journals, thus contributing to the achievement of Qatar's envisaged knowledge.

The students who have participated in the project have had very interesting experiences and testimonies. They attest to its capacity building slant which has made it possible for them to contribute towards building a knowledge-based society.

Ahmad Fard, a Master student in 2011-2013 was fully sponsored by the ConocoPhillips project. He is now a research associate in Qatar Foundation and a PhD candidate. "As we all aware, Qatar is one of the countries with very low fresh water resource which comes by desalinating seawater. On the other hand, conventional thermal desalination

is associated with huge carbon footprint," Ahmad said.

"Therefore, in this project we were looking into using a different desalination technology with less environmental footprint to increase Qatar's water resources. It helped me to get involved in the one of the two Grand Challenges Qatar recently identified which is the water grand challenge. It also helped me to find my research track in the field of water and environment."

Yehia Manawi, another Master student in 2011-2013 fully sponsored by the ConocoPhillips project, is also now a research associate in Qatar Foundation and a PhD candidate. Speaking about the usefulness of the project he said: "Desalination is very critical for the socioeconomic and industrial growth of Qatar. It is the only way to provide freshwater necessary to keep the growth wheel moving.

Unfortunately, desalination has drawbacks such as high energy/material consumption in addition to its environmental footprint. Finding new research ideas that may help in reducing these drawbacks is a must in order to produce high quality freshwater with minimum fuel/membrane consumption.

"More than half of the worldwide desalination activity takes place in the GCC region; unfortunately, all of the technology is imported from outside. Building a knowledge-based society is very essential to tackle our own problems in the best way. The research experience I had on the desalination/waste heat recovery at QU has taught me the basic science of desalination and also opened the door for me to explore it more. This has enabled me to pursue a PhD degree in fabrication and modification of desalination membrane which combines both sciences (desalination and material sciences)."

Amira Al-Khatib, a Master student completing her thesis project is technically supported by the ConocoPhillips project: After receiving a bachelor degree in chemical engineering, she had the opportunity of studying in the Environmental Engineering master program. "Environmental Engineering was a good choice, as I always want to study a science that differ from the theoretical chemical principles and apply it to the surrounding environment. Membrane distillation was one of the projects that grabbed my attention and I went for with it," she said.

Amira said one of the advantages of membrane distillation is that it could be operated at lower temperatures than the



Dr. Farid Benyahia with Dr. Samer Adham at Ras Boufantas pilot plant.

thermal desalination and could be used to reduce energy consumption and cost, as well as minimizing the environmental impacts. Based on this, it could be considered as a more environmental friendly process of desalination.

“My project which consists of comparing the performance between hollow fiber and flat sheet membranes for desalination is not finished yet, however I gained a lot of knowledge and practice such as measuring the quality of water, identifying the actual problems that can affect the results and lower the permeate flux such as vibration caused by pumps or leakages of connecting pipes. I learnt also the different membrane configurations and types of processes,” Amira added.

Abdulla Al-Oodani, an undergraduate student who graduated in 2014 and now works for Qatar Petrochemical Company QAPCO, said that in the UREP cycle 15 project theme related to the ConocoPhillips new technology for desalination initiative because of its importance to his country Qatar that still relies on thermal desalination and wanted to gain new knowledge in emerging technologies for seawater desalination.

“With my UREP team members we were able to demonstrate that it is possible to obtain excellent quality freshwater at lower temperature and pressure than the current commercial processes. I had a hand-on experience in operating state of the art membrane distillation apparatus designed and built at Qatar University’s Chemical Engineering Department. I also learnt how to model mathematically a new desalination technology. For a chemical engineer it is important to describe mathematically processes in order to be able to improve them and scale them up in the future. I really benefitted in this research project and one day this new knowledge and practical experience will serve me,” Abdulla said.

ConocoPhillips, the project funding company was represented by Dr Samer Adham, Global Manager of ConocoPhillips’ Water Solutions in Qatar. He is also a co-investigator with the Qatar University team and co-author of several high impact publications arising from the joint project. “ConocoPhillips is very pleased to be involved with Qatar

University’s leading edge research on water desalination, which will translate into capacity building of qualified scientists and engineers who will ultimately support Qatar’s knowledge-based economy,” Dr. Adham said.

Where next?

As the membrane distillation desalination project proceeds into its fourth year next year a great deal of experience and knowledge has been acquired by the investigating teams from Qatar University and industry partner ConocoPhillips. The most significant outcome was recognition for the need to continue a collaborative work to improve membrane properties for long term usage and initiate thermal integration of this emerging technology with existing chemical processes in Qatar to exploit the vast amount of low grade heat that is currently being dissipated into the environment. This will undoubtedly reduce the energy consumption for freshwater production and help produce cheaper freshwater where it is needed.

Prof. Benyahia, the principal investigator at Qatar University recognized clearly the importance of this emerging technology for desalination and was offered a contract to publish a new book on membrane distillation desalination by a global publisher (Taylor and Francis). This will be the first book ever

dedicated entirely to desalination using membrane distillation and will contain all achievements at Qatar University and beyond.

“I take great pride in leading such important desalination project at Qatar University and helping to build capacity in the fastest emerging desalination technology. Mentoring graduate students in their quest for new knowledge gave me an immense sense of satisfaction and the success achieved so far has given me added impetus to push the boundaries of knowledge further, targeting a new area of research, namely thermal integration of membrane distillation desalination in petrochemical and power industries in Qatar and beyond,” Prof Benyahia said.

“I am also lucky to collaborate with a dynamic team of researchers at ConocoPhillips Global Water Sustainability Center. Their support to our graduate students and research assistants has been tremendous and I am ever so grateful for this. I look forward to the next milestone in our collaborative project, namely seeking smart solutions to membrane fouling to make commercial deployment of membrane distillation desalination that much closer to reality.”



News

Muroor, QMIC sign agreement on use of Masarak and Salamtek



Qatar Mobility Innovations Center (QMIC) recently signed a letter of Intent (LOI) with the General Directorate of Traffic (Muroor) for collaboration in the fields of strategic traffic studies, accidents prevention, and public safety awareness. The agreement was signed by the Director General of the Traffic Department, Brig. Muhammad Saad al-Kharji, and the Executive Director and CEO of QMIC, Dr. Adnan Abu-Dayya.

The letter of intent seeks to establish a high-level framework of cooperation between the two entities to carry out a number of activities that aim to save lives on Qatar's roads, improve safety, minimize travel time, and improve quality of life by alleviating traffic congestion through leveraging cost effective advanced technology.

"Areas of cooperation include, among others, conducting traffic studies on specific Doha roads using QMIC's Masarak to obtain factual data concerning the movement of vehicles at selected points to help the authority predict future traffic volumes and evaluate project alternatives in reducing congestion," said Dr. Abu-Dayya.

QMIC will also integrate new feature in its Masarak iTraffic application for reporting accidents to Muroor, he added. "We are very excited about leveraging QMIC's Masarak system to increase our knowledge about traffic flow in Doha, and to increase safety on the roads," Brig. Al-Kharji said. Muroor is prepared to form a work team in coordination with QMIC to set up a control center in Muroor HQ to view live traffic feed and accidents on the roads, he added.

In addition, the two parties agreed to meet regularly and conduct safety awareness workshops and campaigns. Masarak is the regional and national leading system in the areas of intelligent mobility, logistics management and road safety. The Masarak portfolio is continuously expanding with rich applications and services that are optimized for users in the GCC and Middle East region. It is one of QMIC's smart living services built on top of QMIC's Labeeb Platform. Professional Services is a new and crucial part of Masarak that supports its three main segments. Each of these areas caters to a specific audience in Qatar, such as the individual consumer,

enterprises and government institutions. Masarak's services are available via multiple channels including mobile apps, web apps, SMS, voice etc. The Products & Services page provides a glimpse of what Masarak has been working on and how this can an individual, business owner or a governmental institution.

Salamtek Initiative which is led by QMIC is a dedicated initiative and consortium focusing on developing, deploying, and promoting innovative solutions and applications tackling Distracted Driving due to mobile phones. This will complement other awareness-centric initiatives. It focuses on finding a number of solutions that work seamlessly together to create a system that can help manage Distracted Driving. Salamtek is the first initiative supporting innovations for distracted drivers in the Middle East. We are here to tell you that you can make a difference if you start with yourself and spread the word. Staying informed about driver behavior, technologies, innovations, and awareness campaigns will all play a role in building an eco-system in Qatar supporting and maintaining a new culture of safe driving.

Our Partners

Shell collaborative initiatives yielding fruits in QU

This section showcases the fruitful relationships between Qatar University and its partners and the positive outcomes that have been generated as a result. In essence, it will offer insight into research collaborations focusing on a distinct entity in each edition. It is an opportunity for companies and research-oriented establishments to showcase what they are doing to further enhance the achievement of the mandate of Qatar University as a teaching and research university.



Mr. Youssif Saleh

In this interview, Youssif Saleh, General Manager, Qatar Shell Research & Technology Centre, talks about the dynamics of the relationship with Qatar University.

Under the MoU, Shell supports Qatar University's educational programmes by sharing industrial and technical knowledge with faculty members and students through expert lectures and new research and development initiatives. These initiatives include internships and the recruitment of students by Qatar Shell, as well as the organisation of events, competitions and awards aimed at enhancing student engagement.

Tell us about the strategic partnership between Qatar University and Qatar Shell?

Qatar's National Vision 2030 encourages the personal and professional development of Qatari citizens through education, enrichment of experiences and career opportunities. Our goal at Qatar Shell Research & Technology Centre (QSRTC) is to broaden Qatar's research capacity, and we are committed to helping

young people discover the many rewarding career possibilities in this field. As such, we work to attract, train and retain young talent to play an essential role in transferring Qatar into a knowledge based society. Technology is at the heart of everything Shell does. It is with this in mind that QSRTC signed a Memorandum of Understanding (MoU) with Qatar University in 2013, to help promote Qatar as a global research and development hub.

QSRTC opened its doors in 2008, as the first anchor tenant at QSTP, with a \$100 million decade-long funding commitment. Our programme of dynamic collaboration with both local and international academic community enables Shell to remain steadfast in its support of the Qatar National Vision 2030 and the Qatar National Research Strategy (QNRS). The work at QSRTC is focused on the development and implementation of

technologies that support Qatar's specific needs, as well as supporting Qatar's role as the world's largest Gas to Liquids exporter.

Tell us about the Memorandum of Understanding (MoU) with Qatar University?

The MoU aims to consolidate the numerous collaborative programmes that already exist between Qatar University and Qatar Shell. Under the MoU, Shell supports Qatar University's educational programmes by sharing industrial and technical knowledge with faculty members and students through expert lectures and new research and development initiatives. These initiatives include internships and the recruitment of students by Qatar Shell, as well as the organisation of events, competitions and awards aimed at enhancing student engagement. These programmes are managed and implemented by a Joint Steering

Committee that includes representatives from both Qatar University and Qatar Shell management to facilitate greater collaboration between the two organisations. The strong partnership between academia and industry experts enables students to receive a world-class education by sharing skills and expertise with the best experts in the field. We aim to expand students' technical capability with hands-on industry experience whilst simultaneously building creativity, innovation and entrepreneurship. Furthermore, our collaboration programme positions the company as an active partner of Qatar University in three main areas: Outreach and Sponsorship, Knowledge Transfer and Research & Development (R&D).

What kind of collaboration initiatives do Qatar University and Qatar Shell have in place? Could you tell us more about the Outreach and Sponsorship?

As part of its ongoing university outreach programme, QSRTC hosted engineering students and faculty members from the College of Engineering at Qatar University (QU) for a visit to the Pearl GTL plant in Ras Laffan. Qatar Shell senior executives welcomed the students and gave them a comprehensive overview of Pearl GTL, the world's largest GTL plant, delivered by Qatar Petroleum and Qatar Shell, which cements Qatar's position as the GTL capital of the world. Another example of collaboration between Qatar University

and Qatar Shell involved the organization of a joint panel discussion to highlight the important role that Qatari women can play in shaping Qatar's future energy sector. The panel discussion, held at Qatar University, was jointly organised by Qatar University Alumni - College of Engineering chapter and Qatar Shell Women's Network. The panel aimed at encouraging young Qatari women to consider an engineering career in Ras Laffan through the creation of a networking and knowledge sharing platform. We are delighted to continue to sponsor 'Al Biraq', an outreach programme which encourages high school students to discover and practice research methodologies and innovative scientific experiments with the Qatar University Centre for Advanced Materials (CAM). We also sponsor Qatar University's 'Life is Engineering' programme which promotes engineering in a more accessible and fun way to high school students.

What do you mean by knowledge transfer?

The QSRTC outreach and university collaboration team continue to strengthen our partnership with Qatar University. Through various initiatives we strive to transfer our knowledge, skills and expertise by effectively linking our scientists with academic experts and students; and to partner on research and development projects. In the area of knowledge sharing, QSRTC continues to share industrial and technical knowledge

with university students and various faculty members through a series of lectures that focus on topics related to engineering, energy and environment sustainability. Some of the lectures that were held last year include technical lectures explaining Gas-to-Liquid Process 'Reservoir Engineering', 'Environmental Monitoring', 'Water Solutions' and, a topic close to Shell's global values on 'Health and Safety'.

How do QSRTC and Qatar University collaborate in Research & Development?

A cornerstone of our university collaboration is to position QSRTC as an active partner in supporting universities and other academic institutions through initiatives such as joint research and development programmes.

We are currently working on a number of Research & Development programmes at QSRTC to explore the efficient use and reuse of water. Naturally, we chose this resource as it is particularly crucial for Qatar, given its desert environment. It is our ambition to provide support to our Pearl GTL plant, by optimising existing water treatment facilities and developing more efficient water treatment solutions that can also be used in future plants. We are specifically committed to undertaking four themes under the umbrella of water focusing on reducing, reusing and recycling by-products in an environmentally sustainable way, which in the long term, will allow us to reduce costs, increase profits as well as make the best use of the planet's scarce resources while carrying out our business practices. Since 2008, Qatar Shell also funds a Professorial Chair for Sustainable Development at Qatar University, currently held by Dr. Ajmal Khan, one of the world's foremost experts on plant growth, using brackish water.

What kind of activities does Qatar Shell support? How is Qatar University involved in these?

Within the Qatar Shell Corporate Social Responsibility Portfolio, we have a number of initiatives that support the development of human capability such as 'Enterprise Challenge Qatar', 'Shell Ideas360' and Shell Eco-marathon.. We are very grateful to Qatar University for its energetic participation in all of these initiatives. We have been able to encourage students from Qatar University and



QU team at Shell Eco-Marathon



Participants at Shell Women in Energy event

other leading Qatari universities, to take part in Shell's global competitions to encourage research opportunities – not least through the 'Shell Ideas360'; a worldwide competition to tackle the problems associated with energy, water and food availability. Qatar University hosted one of several competition events and is competing to develop ideas into potentially investment worthy opportunities supported by Shell. With the support of mentors, students can address issues related to population growth, climate change and increased resource demands which affect the supply of energy-water and food. This programme presents an important opportunity for students to take research beyond the classroom and discuss with their peers, as well as Shell experts and mentors, new solutions to help solve today's environmental challenges. The best ideas will be considered for funding by the Shell GameChanger programme, which has worked globally with over 1500 innovators to date, investing over USD \$300 million to turn more than 100 ideas into reality. Last year was the first time the competition was held in the Middle East, providing an invaluable opportunity for students from the participating institutions in Qatar to collaborate with their peers around the world.

Qatar Shell and Qatar University share the same vision to enhance human capability. How is this achieved?

Qatar Shell recognises that cultivating entrepreneurship begins with another kind of investment - in young minds. In his foreword to the Qatar National Vision 2030, His Highness Sheikh Tamim Bin Hamad Al

Thani, the Emir of Qatar, says: "Qatar must invest in world-class infrastructure to create a dynamic and more diversified economy in which the private sector plays a prominent role." In 2012, Qatar Shell and Bedaya partnered to launch The Enterprise Challenge Qatar which encourages young people to consider entrepreneurship as a career option in the future. More than 700 student participants from 12 independent schools and 9 universities have taken part the 'Enterprise Challenge Qatar' in 2014, which brings together more than 100 volunteer mentors, most of whom are Qataris.

Another global competition is 'The Shell Eco-marathon' (SEM) which aligns perfectly with the Qatar National Vision 2030, touching the Human, Social and Environmental pillars through its focus on education, team-work, the environment and scientific innovation. At Shell Eco-Marathon, students are challenged to design, build and compete with energy-efficient cars. The winner is the team that travel farthest using the least amount of fuel.

Qatar University was one of the first institutions in the Middle East to join the SEM global competition in 2011. Recently, two teams from Qatar University College of Engineering (QU-CENG) including students from the College's departments of mechanical, electrical and industrial engineering participated in the Shell Eco-Marathon in Manila. The Qatar University team did extremely well in the Prototype Battery Electric category after passing the high-level safety and technical criteria.

How many Qatar University graduates are currently recruited by Shell and how are they doing in the workplace?

We are very pleased with Qatar University alumni and the expertise they bring to Qatar Shell. We have a number of graduates and experienced hires working for our company. The majority of recruits who joined Shell's ranks have previously participated in its internship programme, which continues to be the most effective route to recruit Qatari graduates. The programme allows undergraduate students to gain insight into the energy industry in Qatar by providing them with practical experience. By working alongside Shell employees in various departments, the undergraduates receive practical coaching from their supervisors, enabling them to join the work force and lead the delivery and operation of Shell's current and future projects once they graduate. As the backbone to Qatar's economy, the energy sector must accept that this role comes with a great responsibility. It is through our strong collaboration with Qatar University and other academic institutions that Qatar Shell is able to directly support the development of Qatar's most valuable resource – its people. At QSRTC we will continue our endeavours to arm young minds with the capabilities and knowledge required to develop a robust scientific culture in Qatar.

News

SEHHA grooms students for healthcare careers



The Science Education and Human Health Activity (SEHHA) program of the Department of Health Sciences (DHS) at the College of Art and Sciences, Qatar University has been continuing its campaign to support the healthcare sector in Qatar.

This valuable opportunity was established to give high school students in-depth learning experience in various health sciences, and offer them insight in the career opportunities available in the health professions.

SEHHA 3, the third cycle of the program, was a great opportunity for the students to gain more knowledge about health-related majors available at QU, meet new people, improve interpersonal skills, and get a taste of college life.

The initiative inspires the students to consider careers in the health sciences and increase the number of Qatari healthcare professionals accordingly. It has become an integral part of the Department's perception concerning the exposure of health science programs to the communities.

A remarkable success was achieved in the third cycle during which the DHS hosted 45 Qatari high school students from 15 independent and international schools to participate and get acquainted with the Department's facilities and laboratories. The students enjoyed themselves learning health-related science and conducting meaningful experiments that are routinely performed in clinical settings.

The structured field trips were also an essential component of the program, during which the participants were fascinated about their future career opportunities in various Qatari healthcare institutions such as Qatar BioBank and National Center for Cancer Care & Research (NCCCR).

The closing ceremony hosted guests from Sidra Medical and Research Center, the event's sponsor, which was represented by Ms. Noora Al-Fadala, Manager for Education Outreach. Dr. Asma Al-Marwani, clinical scientist at the Department of Laboratory Medicine and Pathology, Hamad Medical Corporation (HMC), and Ms. Tahani Al-

Kuwari of Laboratory Staff Development at HMC, were also among the distinguished guests.

Representatives of international and independent schools, health care institutions, academic institutions, and the participants' families also attended the ceremonial. Appreciation certificates and gifts were handed to all who contributed to the success of the SEHHA event.

The vision of QU's Department of Health Sciences for SEHHA is to eventually engage all the independent and international secondary schools in Qatar, and grant equal opportunity for all, who are interested to participate.

The initiative is committed to make the difference in the healthcare sector. Although it is yet a long way to harvest the fruits, but the sprouting seeds become evidence of the DHS's influence and dynamism in the community.

News

ExxonMobil, QU sign pact on science and technology chair



ExxonMobil Qatar and Qatar University (QU) have signed an agreement for the exclusive three-year sponsorship of an academic chair in science and technology education at the university. The agreement, a significant milestone in the long history of collaboration between the two organizations, was signed by Mr. Alistair Routledge, President and General Manager for ExxonMobil Qatar, and Dr. Hassan Rashid Al-Derham, QU President, in the presence of faculty members and university administrators at a ceremony held on the QU campus.

The ExxonMobil Chair in Science and Technology will work closely with QU's College of Education to explore methods that provide teachers with an improved educational experience in the fields of science and technology, in addition to increasing the numbers and quality of Arabic science and technology teaching and learning resources. The Chair will also collaborate with various QU faculty members in encouraging a larger number of students to enter science, technology, engineering and math (STEM) career pathways, among others.

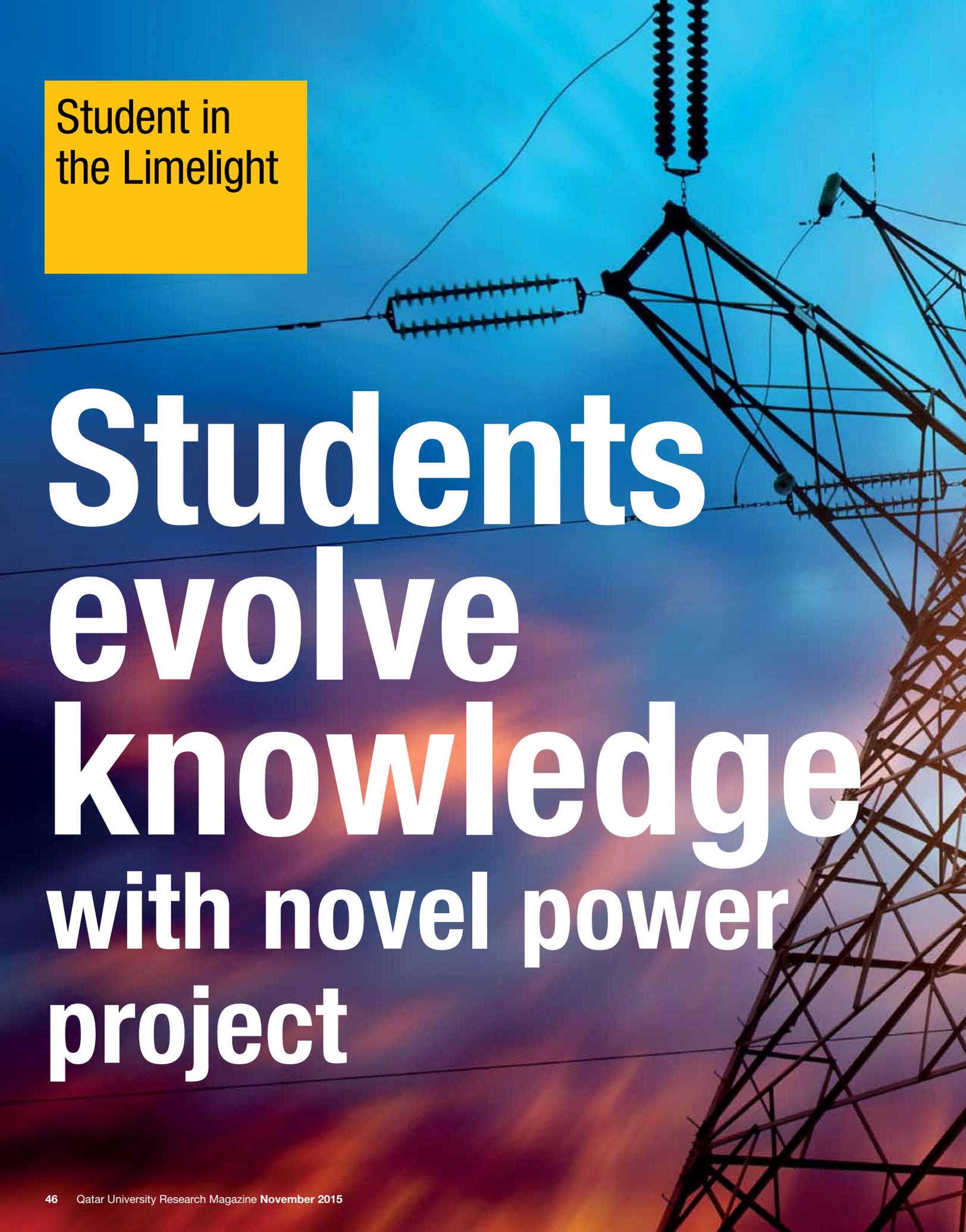
"We are delighted to begin yet another partnership with Qatar University, and to build on the excellent relationship we have developed over the years," Routledge said. "The ExxonMobil Chair in Science and Technology Education is a crucial position that involves strategizing and identifying opportunities for development, and we are honored to support the university in developing Qatar's next generation of scientists and engineers. We look forward to seeing the positive outcomes of this very important partnership for ExxonMobil Qatar and Qatar University, in line with our joint vision of providing quality education for Qatar's youth."

Dr. Al-Derham said: "This is another initiative in a number of agreements signed with ExxonMobil Qatar in recent days which attests to our long relationship with the organization that has yielded many academic and research opportunities on both sides. The ExxonMobil Chair in Science and Technology Education will bring added value and expertise to our faculty body, enriching not only Qatar University's interdisciplinary approach to science and technology but also the region's academic resources in this area. Further, the agreement

reflects and advances both institutions' strategic commitment to promoting science, technology, engineering and math among young nationals, as an initiative of critical importance to the country's development and progress."

ExxonMobil's Outlook for Energy predicts that by 2040, the world will need 35 percent more energy than consumed today, which means a corresponding increase in demand for professionals in fields such as the energy sector, which work to meet this demand.

To help address this upturn, ExxonMobil Qatar has made it a priority to reinvigorate students' interest in science and math at all ages – the key to building a competitive workforce and ensuring students get the education needed to become the engineers and innovators of tomorrow. For many years, ExxonMobil Qatar has partnered with QU and other local entities to support this mission through a variety of projects and programs that are driving human potential across the country; supporting research, safety, health and the environment; and helping sustain the country's already thriving society.



Student in
the Limelight

Students evolve knowledge with novel power project

A large, stylized yellow quotation mark icon, consisting of two thick, curved lines that form the opening of a quote. It is positioned on the left side of the page, partially overlapping the background image of a power tower and the blue circuitry overlay.

The national vision believes in the creation of a knowledge-based economy. This project is completely aligned with the vision. Knowledge based economy can be achieved by working and producing innovative ideas and products.”

For their novel power project, Ahmed Mohammed Tahir, Ihab Jehad Aljayyousi, and Ibrahim Lal Muhammad Al Malki, Abdulhadi Al-Qahtani, Ahmed Alagi, Mohammad Ali, students of Electrical Engineering in the College of Engineering at Qatar University dazzled at the 7th Qatar National Research Fund (QNRF) Undergraduate Research Experience Program (UREP) awards this year. They proved that with the right motivation and interest, students can venture into new areas of knowledge and make a point.



The students and their mentor Dr. Atif Iqbal.

“

We have strengths in different areas such as simulation development, software etc. We complemented each other's strength and worked jointly in the experimental part and found it to be very helpful.”

Students

Their project investigated a new topology of multilevel inverter with reduced number of power semiconductor switching devices. The proposed topology uses only six power switching devices such as IGBTs/MOSFETs, one DC link and one clamping capacitor in a single-phase configuration.

The output phase voltage waveform has 7 levels [$+V_{dc}$, $+2/3V_{dc}$, $+1/3V_{dc}$, 0 , $-1/3V_{dc}$, $-2/3V_{dc}$, $-V_{dc}$]. Inverters are power electronic devices that process electrical power and convert the direct current (DC) to alternating current (AC) with variable voltage and variable frequency outputs. For converting DC to AC inverters use power semiconductor switches.

Mostly, the power switches used are insulated gate bipolar transistor (IGBT) or metal oxide field effect transistor (MOSFET). These switching devices are

turned on and off quickly to process the electrical power. However, during switching on and off operations, a significant amount of electrical power is lost. This is called switching losses and this reduces the overall efficiency of the power converter and also large heat sinks are required. Power converters are switched at a particular speed called switching frequency. Higher switching frequency means large number of turn on and turn off of power converter.

The higher the switching frequency, the better the output voltage and current waveforms. However, the switching losses are also high. Thus a trade-off exists in the choice of value of switching frequency. Considerable research effort is put to reduce the switching losses in order to improve the conversion efficiency.



This research at QU is aligned with the same requirement of reduction in switching losses and improvement in converter efficiency. Another important issue in power electronic converter is rate of change of voltage across the power switches.

In conventional approach of DC-AC conversion, the power semiconductor switches operate between two voltage levels i.e. +0.5Vdc and -0.5Vdc (where Vdc is called DC link voltage). Such type of converters are classified as two-level converters. Hence the rate of change of voltage is $V_{dc}/\Delta t$.

The higher the value of rate of change of voltage, the higher will be the stress on the power switches and the reliability will be reduced. Further, this rate of change of voltage causes electromagnetic

interference and noise. The interference is higher when the rate of change of voltage is high.

Hence the research on power electronic converter is also to reduce the rate of change of voltage. This is accomplished by employing multilevel (more than two-level) converters. The higher the number of output voltage level of converter means the lower the rate of change of voltage level, e.g. in three-level inverter the three voltage levels are +0.5Vdc, 0 and -0.5Vdc and hence the rate of change of voltage is now $0.5V_{dc}/\Delta t$ which is half when compared with a two-level converter.

As such the rate of change of voltage reduces significantly with the increase in the number of output voltage level. Increasing the number of output voltage level is achieved by increasing the number of power switching devices. Increased number of switching devices means higher cost, higher volume and weight, and lower reliability.

Once more a trade-off exists when choosing the number of output voltage level. The project done at QU uses fewer number of switching devices when compared with existing solutions.

In existing inverter topologies the number of power switching devices is much higher such as in neutral point clamped (NPC) and flying capacitor inverter (FLC) topologies, it is eight. The lower the switch count, the higher the efficiency, simple control and reliability of the power converter.

The proposed inverter offers simple control and high efficiency solution. There is no need to control the neutral point voltage unlike the NPC inverter. Also, there is no need to control the charging and discharging of flying capacitors as in FLC inverter.

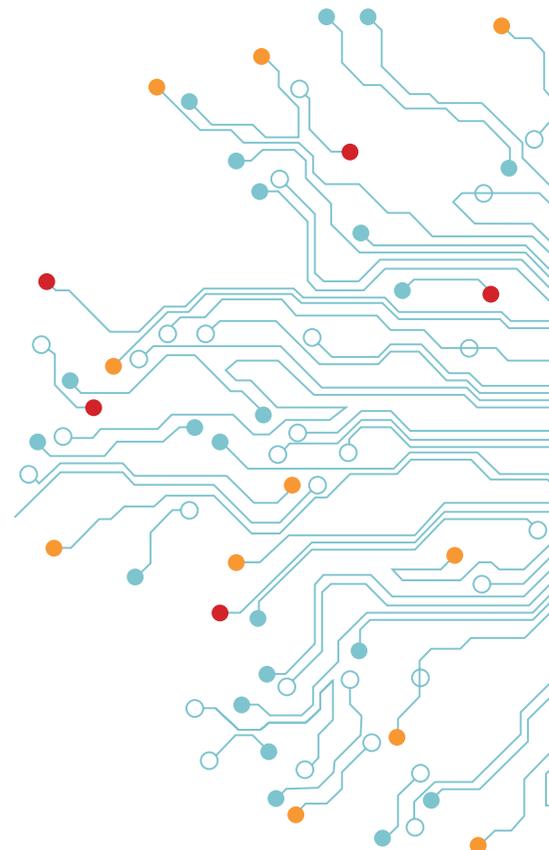
The students said their approach was based on theoretical development, simulation model development and finally experimental validation. They say they would not have been able to achieve success if they had not believed in team work and utilized its benefits fully.

“We have strengths in different areas such as simulation development, software etc. We complemented each other’s strength and worked jointly in the experimental part and found it to be very helpful,” they said.

Mentorship and supervision played a major role in their achievement. They got this in Dr. Atif Iqbal, Associate Professor in the Department of Electrical Engineering at QU, who is their main supervisor, and Prof. Haitham Abu-Rub from Texas A&M University, Qatar, their secondary advisor.

“Both of them were very helpful. We use to have regular meetings with them. Their critical judgment and suggestions were very useful throughout the project. Without their expert guidance, we could not have completed the project. We enjoyed their friendly and helpful nature, always available for meetings and discussions,” the team said.

To demonstrate and showcase what they have done, two posters have been published on the project. The posters are: Ihab, J., AlQahtani, H., Tarique, M., Iqbal, A., (2013), “Reduced Switch Count



“ Research culture is better developed among students at the undergraduate level. This will certainly help them to pursue higher studies and join academics, research institutions and R&D sections of organizations.”

Asymmetrical Flying Capacitor Multi-level Inverter for Variable Speed Drives Application”, available at <http://www.qscience.com/doi/abs/10.5339/qfarf.2013.EEP-044>; and Iqbal, A., Tariq, M., Rahman, K., Al-Qahtani, A., (2014), “Control of Packed U-cell Multilevel Five-phase Voltage source inverter”, Qatar Annual Research Forum, 10.5339/qfarc.2014.ITPP0493. One paper titled “A multi-cell three-level five-phase voltage source inverter”, was published in Imanager Journal of Electrical Engineering ISSN 0973-8835, vol. 7, no. 1, July-Sept, 2013, pp.1-8.

Paper publication and poster presentations by students will set new milestone in their career. The students gain good exposure to research writing that enhances their communication skills apart from the visibility of their research work.

Ahmed, Ihab, Abdulhadi, Ahmed, Ali and Ibrahim believe that the research efforts of youth in Qatar can contribute to the realization of the objectives of Qatar National Vision 2030.

“The national vision believes in the creation of a knowledge-based economy. This project is completely aligned with the vision. Knowledge based economy can be achieved by working and producing innovative ideas and products,” they said.

Following the success of their innovative project, they are encouraging other students to integrate themselves with on-going research projects at Qatar University, through their instructors as this would give them opportunity to explore a new world of knowledge and understanding and help them have successful careers.

According to Dr. Iqbal, their mentor and supervisor, the major impact of the research work was the opportunity it gave the students to develop team work spirit, interpersonal skills, communication skills, soft and technical skills, and above all, get flair of the dynamism of research.

“Research culture is better developed among students at the undergraduate level. This will certainly help them to pursue higher studies and join academics, research institutions and R&D sections of organizations,” he said.

“This project is a multi-disciplinary work that exposed the students to different aspects of cutting edge technology in the field of electric drive, power electronics, control system, instrumentation, digital signal processing, and computer software. The students were exposed to an innovative engineering solution which could have an interesting application in the local environment.”

Dr. Iqbal added that the project was extremely important because it helped the students to acquire practical skills, reinforced within the research background, to cope with the rising demand for skilled manpower in modern power electronics and electric drive industries as they would have acquired knowledge in in power electronics, electric drives, digital signal processing, electronic and digital instrumentation technology.

It is anticipated that the outlined research program would have several educational benefits for the participating students and many other students who may use it as their senior graduation project.

To Dr. Iqbal, it is expected that the undergraduate students involved in the project would have acquired essential analytical, design, experimental validation, and programming skills as well as gained access to career opportunities not only in academia but also in industry research and development labs. The students had smooth introduction to research for those of them planning to transit to graduate studies, while those of them entering the job market were equipped with tools that would assist them to start careers in electrical/electronic engineering.

Dr. Iqbal said supervising undergraduate students is always very interesting and challenging. “Research is new to them at the beginning but they grasp it very quickly. Students are more enthusiastic to work in new fields. They feel proud to produce something new. Students gain self-confidence when their work is recognized in the form of research articles. But it is also true that not all the students show the same level of interest. Some of them are distracted due to overloading. I wish to integrate more students to research through the NPRP and UREP,” he said.

News

QU and SCH sign agreement to promote maternal and child health



Qatar University (QU) and the Supreme Council of Health (SCH) recently signed a Technical Services Testing Agreement on the implementation of a comprehensive screening program against various pathogenic microorganisms that may affect maternal and child health in Qatar with special emphasis on viral diseases like polyomaviruses, Epstein–Barr virus (EBV), Cytomegalovirus (CMV), Hepatitis B virus (HBV), Hepatitis C virus (HCV) and parvoviruses.

Screening will also be undertaken for some pathogenic bacteria such as *helicobacter pylori*, one of the leading causes of gastric ulcer and cancer.

The program will be conducted by QU's Biomedical Research Center (BRC) in keeping with its mandate to advance biomedical research and technology in Qatar, and provide the community with high-quality services in diverse health-related areas.

The agreement arose from the Council's need to implement a cohort study to examine the impact of genetic and environmental factors

and transitional diseases (viral and bacterial diseases) and non-transitional, such as diabetes, obesity, blood pressure and mental illness), on the health of the mother during pregnancy, as well as the fetus and newborn life. OMICS technology such as OMICS genes and proteins will be applied in the project.

The program will utilize the BRC's well-equipped laboratories which will provide precision screening and accurate diagnosis for the identified groups of pathogenic viral and bacterial diseases.

Collaborative activities will also be conducted among BRC researchers and those of other QU colleges and research centers, and various health institutions in Qatar.

Dr. Faleh Mohamed Hussein, Assistant Secretary for Policy Affairs in SCH, explained that the study would lead to the achievement of the national vision in the medical genetics field, and national and strategic health objectives. In the light of the output of this study, he added, preventive strategies would be implemented to improve maternal and child health in the country.

“This highlights the Biomedical Research Center's competitive advantage through its diversified academic and training programs, reputable academic history, high quality facilities, and vast manpower of qualified and well trained personnel and students while focusing on research, training, and service in applied and basic biomedical research within three major areas of metabolic diseases, communicable diseases and drug discovery”, BRC Director Dr Asmaa Al-Thani said..

She added: “With partners such as the Supreme Council of Health, the Center shares the vision of improving the biomedical research profile in Qatar to reach world-class standard. For the Council, Qatar's national health authority, to have given us this project, shows the confidence it places in our competence and capability to execute it efficiently and effectively and at the same time train local researchers to conduct the kind of research that is related to the Qatari community”.

A photograph of a car driving on a road during sunset. The sky is filled with orange and yellow clouds, and the sun is low on the horizon. The road is blurred to indicate motion, and the car's rear is visible on the right side of the frame.

Research &
Innovation

Connected Vehicles: Cars for the future



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Connected Vehicles technology will bring in a huge step forward in terms of road safety by enabling data communication among vehicles which provides the car safety system much more detailed and accurate view of the surrounding.

Driving is an essential part of daily life in Qatar and around the world. With increasing number of vehicles and drivers on the roads, there are concerns about pollution, accidents and congested roads. There is a new technology which addresses these concerns. It is called Connected Vehicles. The Qatar Mobility Innovations Center (QMIC) is spearheading efforts to localize this in Qatar. In this interview, Dr. Hamid Menouar, Product Manager and R&D expert at QMIC, talks about the technology and the Center's efforts at domesticating the innovation in Qatar.



Can you talk about your background?

I graduated from the Telecom ParisTech University in Paris which was previously known as ENST Paris. I pursued an industrial Ph.D. program during which I was affiliated to the university and also worked as a researcher in one of the R&D laboratories of the Japanese firm Hitachi in France. I am a globally recognized expert in the field of Connected Vehicles, with valuable experience which started with active contribution in enabling the first Connected Vehicles field demo by the Car-to-Car Communication Consortium (www.car-to-car.org) in Europe in 2008.

In late 2010, I moved to Qatar and joined Qatar Mobility Innovations Center (QMIC) to contribute in making Qatar a leader in the fields of next generation of Intelligent Transport Systems (ITS) and Road Safety.

What is Connected Vehicles about?

Often when people hear “Connected Vehicles” they think about the already-in-the-market technology that lets a vehicle connect to the Internet either via an embedded SIM card or via a paired data-enabled mobile phone. But Connected Vehicles is much bigger than that, and it will enable a large number of new use-cases and applications that will change the way we look at our cars.

A Connected Vehicle is a vehicle which has the capability to communicate with other vehicles on

the road as well as with the road infrastructure in the surrounding. Such short range communication – few hundred meters – is based on a new Wi-Fi-like standardized wireless technology.

Nowadays cars are full of sensors and advanced technologies; where does Connected Vehicles fit here?

All the sensors you might have in your car today already do a great job, as they save lives by controlling the distance to the front vehicle, by controlling your car’s speed, by keeping your car within the lane, etc. Connected Vehicles technology will bring-in a huge step forward in terms of road safety by enabling data communication among vehicles which provides the car safety system much more detailed and accurate view of the surrounding.

Do Connected Vehicles communicate the same way like cellular phones do?

While your phone needs to connect through a local telecommunication operator base station to establish a communication with another phone, a Connected Vehicle does not need to do that. A Connected Vehicle will be able to communicate with other vehicles in the surrounding through a direct short range communication medium, similar to Wi-Fi.

Such type of localized and free communication is ideal to enable road safety applications that need fast communication. Cellular communication still has its place within the vehicle to enable

infotainment applications and services.

Why are Connected Vehicles important?

Connected Vehicles technology is the key enabler of next generation road safety, and as per a study by the US Department of Transportation, Connected Vehicles could potentially address up to 80% of road accidents involving non-impaired drivers, and this will be a considerable improvement in road safety. Connected Vehicles is also a key enabler of Autonomous Driving by enabling fast and reliable communication medium among vehicles within the same vicinity. Improving road safety is by itself a great benefit, but there are other benefits from driver comfort and traffic efficiency view points as this emerging technology will open a door for a large number of new applications.

Is this technology already available in the cars that we can buy today?

No, it is not yet there. The plan is to start equipping some car models in the next few years. Key car makers such as General Motors, Toyota and Volkswagen have already publicly announced that they will start integrating this technology in some of their new vehicle models in few years time.

Today you can find this technology in testing and prototype cars only, like the QMIC’s Connected Vehicles Testing Car in Qatar.



QMIC's Connected Vehicles testing car



How are Connected Vehicles relevant to Qatar?

Connected Vehicles are relevant to Qatar from many perspectives. Improving safety on the roads of Qatar has been a high priority in Qatar's roadmaps, and actually many local initiatives have been launched in the last years to support such initiatives. Indeed reducing the number of accidents on the roads is urgent and important for all countries, and here Connected Vehicles become an important component.

There are also economic benefits beside the indirect gains from reducing the number of accidents on the roads. Such an emerging technology offers a space for emerging countries like Qatar to become an active player in this new field and use such an opportunity to create new knowledge-based economies. I should also highlight that taking into account the small size of the country and the new legacy systems out there, Qatar is a great candidate to advance in the deployment of such a new technology and be among the world's first countries to feature a country-wide Connected Vehicles deployment. And this could be one of the technologies to be showcased during the FIFA World Cup 2022.

Will Qatar be ready to host such a great emerging technology?

This will be possible if the right actions are taken in advance and right now as this is not a kind of technology that you can just decide to buy tomorrow and expect it to be operational by next year. Indeed lots of efforts and long preparation are needed to make this happen in the right time and in the right way. Please let me highlight that there are more than one international standard out there and Qatar has to decide which one to adopt. If I take the example of the European and the American standards, even though they look very similar since they both operate on the same frequency band (5.9 GHz) and they are both based on similar architectures, they are still incompatible and unfortunately they cannot

cohabite. The selection of the most suitable standard for Qatar is not an easy and fast task project especially because such a decision has to be made at the GCC level.

And probably Qatar and the region might need a combination of different standards, or maybe an adaptation of one of the standards. In fact, the European standard is not suitable for the US, and the US standard is not suitable for Europe; then why should we expect that one of those standards as they are should necessarily suit our local needs here in Qatar and in the region?

What major breakthroughs have you achieved since joining QMIC and what is your next plan?

I joined QMIC in late 2010 and at that time we started working on Connected Vehicles. In the same year we started a three-year research project which was funded by Qatar National Research Fund (QNRF) and led by Dr. Fethi Filali from QMIC. That project was a good support for us to advance in the field of Connected Vehicles. During the few following years we have managed to enable locally the MENA-first standard compliant Connected Vehicles platform which supports the end-to-end architecture. Our Connected Vehicles platform was demonstrated in April 2014 in the Qatar Science and Technology Park (QSTP), and it was witnessed by H.E. Sheikh Abdulrahman bin Khalifa bin Abdulaziz al-Thani, Minister of Municipality and Urban Planning, and Dr. Sheikh Abdullah Al-Misnad, President of Qatar University at that time.

Standardization of such a communication technology is important to let vehicles from different brands talk the same language, and therefore it was important for us to be involved in the development of the related standards. In fact, we have been involved in the standardization activities in Europe within ETSI (European Telecommunication Standardization Institute). In early 2012 we hosted the 4th ETSI TC ITS here in

Qatar, and we have successfully participated in all the four Cooperative Mobility Services (CMS) Plugtests organized by ETSI. Our participation at these events has been a unique opportunity to test and validate our local Connected Vehicles implementation not only against the latest versions of the standards, but also against the implementations of other key players in the field such as car makers and key technology suppliers.

Now we are starting executing on the second stage of our roadmap to enable a large pilot of Connected Vehicles in Doha.

Do you see research and innovation in connected cars lasting into the future? What prospects do they have?

There is always space for further research in any field. In a few months we will be starting a three-year research project in the 9th cycle of QNRF's National Priority Research Program (NPRP) which aims at deploying a large Field Operational Test (FOT) of Connected Vehicles in Qatar. Such a local FOT will be a great and unique platform in the region to assess this emerging Connected Vehicles technology and its applications in the local environment. I should highlight that the already available standards both in the US and Europe are still basic even though they are enough for starting the deployment, but there are still many technical issues that are yet not well tackled such as channel congestion, security, privacy, etc.

The car of tomorrow will be able to communicate with other cars around, will be able to drive and park by itself, will be share-owned, etc. Even though some fractions of those amazing features will be delivered in some new car models in the near future, the full functionalities need further research, development and testing to reach the market.

Experts discuss salt tolerance at CSD conference



QU President Dr. Hassan Al-Derham



CSD Director Dr. Hamad Al Saad Al-Kuwari

The Center for Sustainable Development (CSD) at Qatar University's College of Arts & Sciences (QU-CAS) recently hosted the 2nd International Conference on Physiological, Biochemical and Molecular Argument for Salt Tolerance. The conference was organized by the Center in collaboration with the Qatar National Research Fund (QNRF) and Qatar Airways.

The 3-day conference aimed to provide a platform for scholars and professionals whose research interests focus on halophyte research in the Gulf region to share their ongoing research and expertise and promote the study of physiological, biochemical and molecular argument for salt tolerance in the region. It drew over 200 attendees including faculty and students from local, regional and international educational institutions.

The opening ceremony was attended by QU President Dr. Hassan Al-Derham, CAS Dean Dr Eiman Mustafawi, CAS Associate Dean for Research and Graduate Affairs Dr Mohamed Ahmedna, CSD Director Dr. Hamad Al Saad Al-Kuwari and a number of CAS faculty members.

Keynote speaker Dr. Mohammed Al Sheyab, program manager, Civil Engineering and Environmental at QNRF, gave an overview about research ecosystem in Qatar and the role of

QNRF. The opening lecture was delivered by Ms. Ekhlas Abdelbary, from Environmental Science Center, who gave a presentation on "Update on Halophyte Taxonomy".

The program agenda featured 40 presenters from local, regional and international universities. Their presentations were on topics such as "Microbiome of halophytes growing in Khewra Salt Ranges", "Transcriptomic analysis of the succulent xerophyte *Zygophyllum xanthoxylum* in response to salt treatment and osmotic stress", "Genetic studies of salinity tolerance mechanisms" and "Floating mangroves – an innovative multi-purpose approach for the production of seawater-based biofuel, cash crop halophytes and climate change mitigation"

In his welcome remarks, Dr. Al-Derham said: "Scientific research is absolutely crucial to achieving sustainable development in dry lands. QU created the Center for Sustainable Development to address water and food security and wider environmental management issues and to link this research with human, social and economic perspectives of Qatari society. One of the areas that the Center is addressing is food security.

"The Emir, His Highness Sheikh Tamim bin Hamad Al-Thani, has taken a number of

initiatives for the sustainable development of Qatar. His foresight is evident from the Qatar National Vision 2030, which rests on the four essential pillars of economic, human, social, and environmental development and commits to maintaining harmony between economic growth, social development and environmental management in building a bright future for the people of Qatar".

Dr. Mustafawi said: "I'm delighted to see scholars from many parts of the world at QU discussing new interdisciplinary approaches to enhance food and water security and contribute towards promoting sustainable development which is one of the tenets of Qatar National Vision 2030".

Dr Al- Kuwari said: "The Center for Sustainable Development pressing issues include climate change and reducing carbon foot print, land and Gulf environmental degradation, controlling pollution, biodiversity loss and conserving water. Though all of these problems will be subsequently addressed, the Centre for Sustainable Development would initially focus on the most pressing problems of food security, environmental conservation, waste management and development of algal technology program".

Celebrating
Excellence

Engaging and Competitive Research

In this section, we spotlight the winners of the Research Excellence Award who were announced during the 2015 QU Annual Research Forum. Those awarded were Dr. Atif Iqbal, Associate Professor of Electrical Engineering, for his outstanding work in power engineering; and Dr. Kaltham Ali Al-Ghanim, Director, Center for Humanities and Social Sciences, who has contributed so much towards solving prevailing social issues and challenges. For more about them, see the following pages.

Dr. Atif Iqbal

Associate Professor of Electrical Engineering, Qatar University

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**Dr. Atif Iqbal:
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His research interest is motivated by his background is based in power and electrical engineering. "Our curriculum in India was all oriented towards power. It is my basic interest. In my masters I majored in power systems. My PhD was also in the same area," he said. Dr. Iqbal obtained his Bachelor degree from Aligarh Muslim University in India, about 130 km north of Delhi. It is an old university which dates back to 1877. As a Gold medalist, he became a lecturer in electrical engineering in his alma mater and has been working since 1991. He did his master's degree in the same university and got distinction in all the courses he took.

He started his PhD in 2002 at the School of Engineering, Liverpool John Moores University in the UK with funding from the European Physical Sciences Research Council and finished in 2006. Dr. Iqbal returned to Aligarh Muslim University and was there for three years. In 2009, he joined the research group of Prof. Haitham Abu-Rub at Texas A&M University at Qatar (TAMUQ). He moved to Qatar University in 2011 as assistant professor in the Department of Electrical Engineering and was promoted associate professor, a year later.

He is still collaborating and working jointly with TAMUQ. "We started research on Power Electronics Motor Drive at TAMUQ. Prof. Abu-Rub is leading the team at TAMUQ and I lead the QU team. We work collaboratively. I have developed my lab at QU. I have three research assistants working with me.

We have one National Priorities Research Program – Exceptional Project (NPRP-EP). Prof Abu-Rub is the main PI. Our dean is also involved. It is about the solar photovoltaic inverter system," he said. Dr. Iqbal has just finished three NPRP assignments. One Exceptional Project is ongoing. He got one new project in the 8th NPRP cycle about wireless battery charging for electric vehicles. He did one with his

colleagues in Malaysia. Another one on multi-phase system is ongoing in Poland.

He is enthusiastic and positive that his research is making huge impact on the society. "Electrical energy is the main driving force for the modern society. If there is no electricity, the world will go back to the dark ages. Automated processes in factories use a lot of motor drives. Qatargas, for instance, uses 6,000 motors in one plant. All industries use motor drive systems," he says. In his reckoning, there has to be a reliable and efficient system so that there will be good finished products. "All this depends on power. If you have power, you have everything moving," Dr. Iqbal adds. He is passionate about research which he believes is the only key for the modern society because "whatever you see in the society today is the outcome of research".

On relevance of research in development in view of the objectives of the Qatar National Vision 2030 which seeks to create a knowledge-based society, he said: "We have to find alternative ways to stimulate and sustain the economic growth of the country. Our vision is to create knowledge through research." He works to empower students with knowledge by integrating them into his research projects. "In the last two years, 11 papers have been published by students under my direction.

I integrate them through Undergraduate Research Experience Program (UREP) projects. Every year I have one or two projects with students. My students won QNRF awards in March," he said. "When undergraduate students publish papers, it gives them an edge over other students. I encourage the good students to get published. It can motivate them for higher education and they can get scholarships for their higher degrees.

We need good people for higher education. It should not come as a burden to them. It should come naturally. When they win awards, they are motivated."



We have to find alternative ways to stimulate and sustain the economic growth of the country. Our vision is to create knowledge through research."

Dr. Kaltham Ali Al-Ghanim

Director, CHSS, College of Arts & Sciences

Social Impact Assessment of Intensive Development: High - Rise Life in Contemporary Qatar: A survey on Doha City residents

Lead PI: Kaltham Al-Ghanim: PIs : Abdulllah Badahdah

NPRP Grant 4 - 087 - 5 - 008

ABSTRACT

High rise buildings have become intertwined with khaleeji (Gulf) national identities. The study assessed the new urban form impact in residence patterns, social relations and cultural investment.

OBJECTIVES

This project seeks to begin to measure the potential impacts of Qatar's new built environment upon families and individuals in Doha City



The concept of vertical living has been hailed as a solution to control fast growth and urbanization of cities around the world. As vertical residential projects become more common, and sustainability.

Satisfaction Item	Percent of Satisfaction	
	HL	LB
How satisfied with greenery in building	86.3	61.1
How satisfied with car parking	96.4	73.6
How satisfied with the amount of living space	97.6	96.8
How satisfied with living environment physically overall	99.4	97.8

Item	Percent of Agree	
	HL	LB
High rise building are good for land use in Qatar	83	69
High rise buildings are not good for elderly people to live in	75	26.3
High rise buildings are good for raising children	78.8	27.1
High rise buildings are good for people with disabilities	65.1	18.3

RESULTS

A participants in HRB experienced more form of "Generalized Anxiety" compared to those in LRB

People in HRB were NOT happy with the level of noise in their building compared to those in LRB

HRB residents were NOT happy with the quality of the air in their building compared to those in LRB

Friendliness HRB less satisfied with the friendliness compared to people in low rise buddings

NO difference between HRB residents and LRB in their satisfaction with security



Poster of one of Dr. Kaltham Al-Ghanim's research projects

Dr. Kaltham Ali Al-Ghanim, Director of Center for Humanities and Social Sciences (CHSS), College of Arts and Sciences, Qatar University, was named for the QU 2015 Research Excellence Award for her numerous research and academic activities which border on prevailing social issues and challenges. A sociology graduate of Qatar University, Dr. Al-Ghanim had her Master in Sociology/ Urban Sociology in 1986, and PhD in Human Development in 1994, both from Ain Shams University, Egypt. On her return, she joined the faculty of the Department of Sociology at QU in 1995 and became the director of CHSS in 2014.

With many awards in her kitty, she has 16 articles in referred journals, authored 12 articles on cultural studies and 28 books with two published conference proceedings in her name. She has won 35 external and internal research grants and has also authored 12 reports. To her credit, Dr. Al-Ghanim has participated in 82 conferences, scientific symposiums, lectures and workshops and has been a member of 35 academic and advisory committees within QU. Dr. Kaltham leads several research projects funded by various national and international institutions. She is president or chair of boards of three agencies – Behavioral Healthcare Center, Social Rehabilitation Center and Children Literature Prize; and board member of Social Work Foundation. Dr. Al-Ghanim's research activities are motivated by and focus on social issues – violence, women studies, family issues and human development. "I have conducted research on risks associated with driving on Doha roads, sexual identity. I have had four on domestic violence, identity, women empowerment and leadership," she said. "When I notice any social problem, I try my best to study it and proffer solutions for the national agencies and ministries, through seminars and workshops to raise the capacity of the society to face the challenges." Dr. Al-Ghanim has conducted field research related to urbanization, human and cultural development, political participation, rights of workers and work values among young people.

She has authored three specialized university academic books and published several studies in the area of political participation, labor

rights, violence against women, and domestic violence. She has an interest in folklore studies, culture with a focus on local knowledge and an emphasis on the importance of sustainable development. She played a major role in preparing documents, and media publication for the Central Municipality as part of activities for the municipality council elections in 1998-1999.

Dr. Al-Ghanim works with students in teaching and research and, has won six UREP grants with students, engaging them in the Qatar Foundation (QF) Annual Research Forum. Her students also won prizes in the QU Annual Research Forum this year. In addition, Dr. Al-Ghanim supervises the capstone projects of graduating students.

The CHSS is newly established. Dr. Al-Ghanim was a member of the committee that worked on its establishment. "Thereafter, the dean nominated me as director. We have prepared a strategic plan covering a lot of things, research activities, community outreach services, publications, engaging students in research, establishing research groups, focusing on interdisciplinary research which aligns with College of Arts and Sciences and QU's strategic plan. We will try to support QU's research road map," she says. Having participated in the discussion and review groups for the Qatar national Vision 2030, she played an important role in formulating the national strategies with the Supreme Council for Family Affairs and Planning Council 2006-2009, and the Ministry of Culture in Qatar, 2011- 2013. She participated in formulating the idea for establishing a center for family consulting in 2002. Dr. Al-Ghanim was the main author for the first National Human Development Report for Qatar in 2006. She prepared the plan of action for the Social Rehabilitation Center in Qatar in 2008, and the strategic plan for Behavioral Health Care in 2014. She is working as a research consultant for several development institutions and is a consultant with the Qatar National Museum 2011-2017. Dr. Kaltham is a member of the Readers Committee for the second and third Arab Knowledge Report. She is also in the editorial board of two journals and a member of the Arab Social and Humanities Sciences Award.

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“When I notice any social problem, I try my best to study it and proffer solutions for the national agencies and ministries, through seminars and workshops to raise the capacity of the society to face the challenges.”

Profile

Name: Layla Jeeda Al-Mansoori

Major: Biomedical Sciences

Graduated in: BSc Biomedical Sciences 1997, MSc Biochemistry 2005

Occupation: Research Assistant in metabolic disease, Biomedical Research Center. Qatar University



Layla Jeeda Al-Mansoori

Can you talk about your academic background?

I received my Bachelor of Science in Biomedical Sciences in 1997 from Qatar University's College of Arts and Sciences. I worked for two years as a teaching assistant in the Department of Chemistry and Earth Science.

Since I joined QU, I developed much interest in research; thus I got a scholarship to pursue higher studies at King Saud University in Saudi Arabia where I got my MSc in Biochemistry in 2005. My work was mainly about studying molecular mechanism of an anti-cancer drug in breast cancer cell lines.

I am in the process of getting a scholarship for my PhD soon.

Do you see research and innovation in your field lasting into the future? What are the prospects?

We are blessed with high quality medical care nowadays compared to the past. This is built up on years of efforts by people in the medical field including the researchers. Their constant and continuous efforts have been producing and leading to many novel findings which have reduced or eliminated many life threatening diseases.

Our interests and research projects are mainly focused on such problems, trying to contribute new findings which might help in solving many healthcare problems.

What do you like most about your current job? The challenges?

I have always been very attracted to the research field since I graduated. The challenges I face while thinking of or

Layla Jedea Al-Mansoori:

“ My participation in research projects that will contribute in improving human health is aligned with the national priorities of Qatar.

carrying out a research inspire me to go deeper and put more effort to solve them. I have much interest in any new research topic that may have good impact on improving the health conditions of Qatari people. Lately, I have developed interest in and been focusing on the field of cancer and stem cells. Most of the challenges I have been facing are common with other scientists in the research field, as ordering procedures, but even these I can see them being solved and organized lately. For me, I don't see many challenges other than the ones that are related to the ideas and findings of the projects. These might force you to think differently to be able to understand them.

Does your work have correlation with the objectives of Qatar National Vision 2030?

Guided by our National Vision, Biomedical Research Center (BRC) at Qatar University is one of Qatar's institutes that take serious steps toward fulfilling that vision. My role in the biomedical research field contributes in establishing and enhancing the research culture in Qatar, human development and educational improvement.

Furthermore, my participation in research projects that will contribute in improving human health is aligned with the national priorities of Qatar.

What major breakthroughs have you achieved since joining QU? What major assignments have you handled?

Since I joined QU I have been in the academic field as a teaching assistant and then a lecturer. Most of my achievements there were in participating in improving courses syllabi and updating them to provide our students with the latest

topics. Other than that I was given several assignments one of which was establishing the animal cell culture facility in the College of Arts and Sciences, which was the first (by that time) in Qatar.

In research, a couple of projects I have worked in had significant findings that correlated with important applications. In a collaborative work with King Faisal Specialist Hospital and Research Center in Saudi Arabia, I had the chance to work with experts in the field of proteomics on prostate cancer tissue samples to screen for protein biomarkers. The presence of early biomarkers helps in the clinical diagnosis of prostate adenocarcinoma (type of prostate cancer which usually shows at late stages). The expression patterns of these biomarkers could successfully cluster adenocarcinomas as well as prostate cancer of low and high Gleason scores. Thus our findings in this study validated protein-biomarkers that can be useful for accurate diagnosis and prognostic monitoring of prostate adenocarcinoma.

I developed interested in the field of stem cell research because it has very broad applications in the treatment of several devastating killing diseases such as cancer, Alzheimer and many more. I worked with one of the most important and highly rated laboratories in North America carrying out embryonic stem cell research, at the University of Toronto in Canada.

Since embryonic stem cells are very primitive cells and upon differentiation they could give any type of mature cells, it is essential to control differentiation conditions to enrich them for the required lineage cells. In literature there are many protocols developed to differentiate them into osteogenic lineage, but they are little

different with varying yield of osteogenic rich population. We managed to optimize the embryonic stem cell differentiation conditions towards osteogenic lineage to give bone cells. Our findings would provide other researchers with more pure cell population to work with resulting in more precise data.

Recently, I have started with a project investigating the anti-cancer effect of extracts from a plant (from Qatar wild life). The anti-cancer effect will be studied on breast cancer cell lines, and if we found any of the extracts have anti-cancer effect i.e. apoptotic effect on breast cancer cell lines, we might test it also on cells from other tissue. Furthermore, the mechanism of the extract apoptotic action would be studied on the molecular level applying proteomic and genetic approaches. A small population of cells known as cancer stem cells are known to be one of the major factors resulting in cancer recurrence, the effect of the resulting extract can be tested for targeting cancer stem cells.

How were you motivated to go into your choice of career?

I have been blessed with many outstanding teachers, who enriched me with more knowledge and my way of thinking and provided me with the needed tools that have improved my capabilities as a researcher.

What work experiences did you have before joining QU?

I have been in QU since I graduated as an academic member of College of Arts and Sciences. Recently I joined the Biomedical Research Center as a research assistant.



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