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AUS Faculty Speak at Research Event

Seven AUS faculty gave presentations at a forum entitled 'Enhancing Collaboration and Sharing Experiences,' organized by the National Research Foundation (NRF) and Sydney University (Australia). The event, which was held at NRF's offices in Knowledge Village, Dubai, on 28 April, brought together researchers, professionals and government bodies with a view to sharing research findings and exploring future collaborative projects in areas of national interest to the UAE. The main themes were Food Security, Greener Commercial Aviation and Robotics, Renewable Energy, and Women in Leadership. Other speakers were from the University of Sydney, UAEU, UoS, Masdar Institute, Khalifa University, and the International Center for Biosaline Agriculture (ICBA). AUS participated in the forum with seven presentations as follows:

AUS Speaker	Presentation Title
Dr. Mamoun Abdelhafez (CEN, Mech Engg)	Fault Detection Algorithms for High-Integrity and High-Accuracy Automation Applications
Dr. Hamed Assaf (CEN, Civil Engg)	Water Resources Management Under the Impact of Climate Change
Dr. Mohammad Jaradat (CEN, Mech/Mechatronics Engg)	Intelligent Fusion for INS/GPS Navigation Systems
Dr. Mohammad Jarrah (CEN, Mech Engg)	Robotics Research in the Region
Dr. Linzi Kemp (SBM, Mgt)	Women in Leadership
Dr. Mehmet Fatih Orhan (CEN, Mech Engg)	Integrating Intermittent Renewables using Energy Storage or Smart/Future Grids
Dr. Aydin Yesildirek (CEN, Elec/Mechatronics Engg)	Mechatronics Activities at AUS

NRF Research Forum Participants

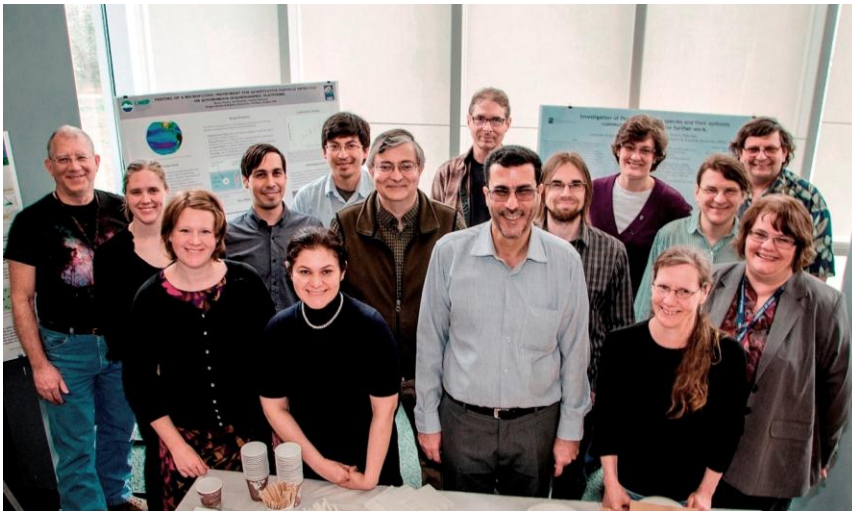


US Experience Will Advance Gulf Ecosystem Research

Nabil Abdel Jabbar, Full Professor in the Department of Chemical Engineering, CEN, has returned from seven weeks spent as part of his Sabbatical Leave as a Visiting Scholar at the Center for Coastal Margin Observation and Prediction (CMOP) in Oregon, United States. CMOP is described as 'a collaborative effort of many academic and industry partners, led by Oregon

Health and Science University (host institution), Oregon State University, and University of Washington.' CMOP's work 'characterizes complex physical and biogeochemical processes at work in river-to-ocean ecosystems and explores links between environmental and human health.' During his time in Oregon he worked on CMOP's computational models and observation network. CMOP is directed by Dr. Antonio Baptista, who leads the modeling team and who also hosted Dr. Abdel Jabbar on his visit.

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The CMOP team: Dr. Abdel Jabbar worked with Dr. Tuomas Karna (back row, 7th from left), a CMOP computational modeler and post-doctoral fellow in the lab of Dr. Antonio Baptista (back row, 5th from left). Dr. Baptista visited AUS in 2011 and has developed a computational model of Arabian Gulf water flow

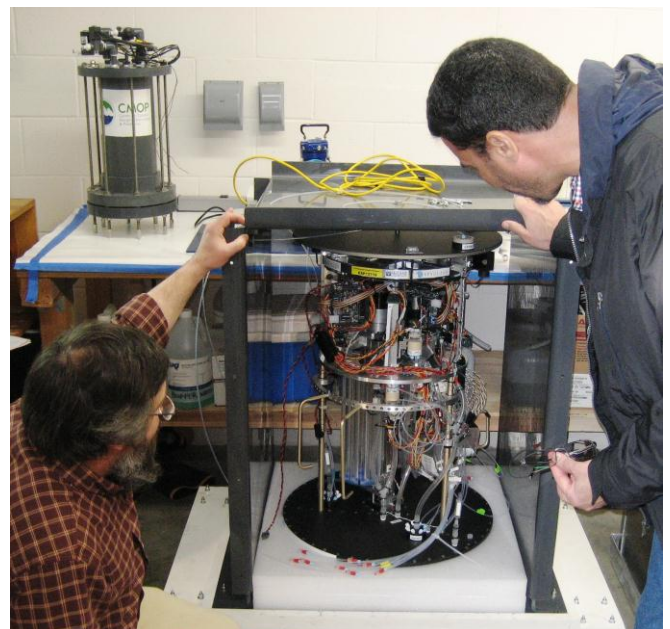
The visit, Dr. Abdel Jabbar says, was 'very fruitful and allowed me to gain knowledge which we will be able to transfer to AUS.' A key aspect of his research was to work on a model of the water circulation of the Arabian Gulf, the development of which will, he anticipates, have a positive impact on the country and region. AUS collaboration with CMOP is set to continue: 'CMOP computational facilities can be accessed remotely, and the goal is to develop the foundation for a high-resolution model that AUS coastal researchers could progressively maintain as an operational forecasting system. The work would involve forecasting operations, from automated harvesting of tidal, ocean, and atmosphere forcing, to scheduling of simulations and assessment and visualization of results.'

Abdel Jabbar's time at CMOP will also enable him to contribute to the mission of the university's Gulf Ecosystems Research Center (GERC), part of the work of which will be to monitor and conduct research on ecosystems. GERC aims to offer advice on long-term solutions to a number of ecological

problems: 'The development of Arabian Gulf models would help with prediction, for example of red tides which disrupt the processes of desalination of water for drinking and agricultural purposes. By using modeling to predict when a red tide will occur, we may be able to prevent damage to the water processing plants filtering membranes that filter the salt water.'

One of CMOP's sophisticated machines is an Environmental Sample Processor nicknamed the 'Lab in a box.' This is a portable, robotic laboratory used by the CMOP team to detect and analyze microorganisms in

the Columbia River Estuary. This research helps scientists monitor and predict algal blooms and low oxygen levels in the water (<http://www.stccmop.org/>)



Here, Michael Wilkin, CMOP Senior Research Associate, demonstrates the equipment at CMOP's Astoria Field Office

Nabil Abdel Jabbar visits a Columbia River coastal observation station used by CMOP researchers



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At CMOP Dr. Abdel Jabbar also worked with a three-dimensional simulation circulation model for the Columbia River-Pacific Ocean continental shelf off the Oregon and Washington coasts.

This, he says, 'was based on a case study of an ocean shelf model simulation, with the goal being to improve the parallelization of the computer software SELFE code and enable significant spatial refinement of computational grids.'

At CMOP Dr. Abdel Jabbar was particularly impressed by the quality of teamwork and the level of supportiveness that he experienced, as well as the Center's facilities and resources: 'The diversity of the oceanography work that the team carries out is amazing, as is the multidisciplinary nature of the research. It is an outstanding center in terms of the skill and dedication of the scientists and researchers who work there.'

NRF-Funded Project Studies Titanium Alloy Machinability



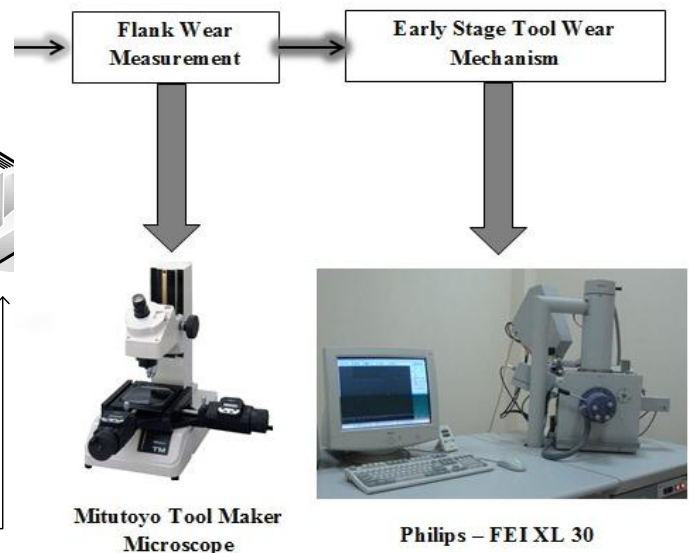
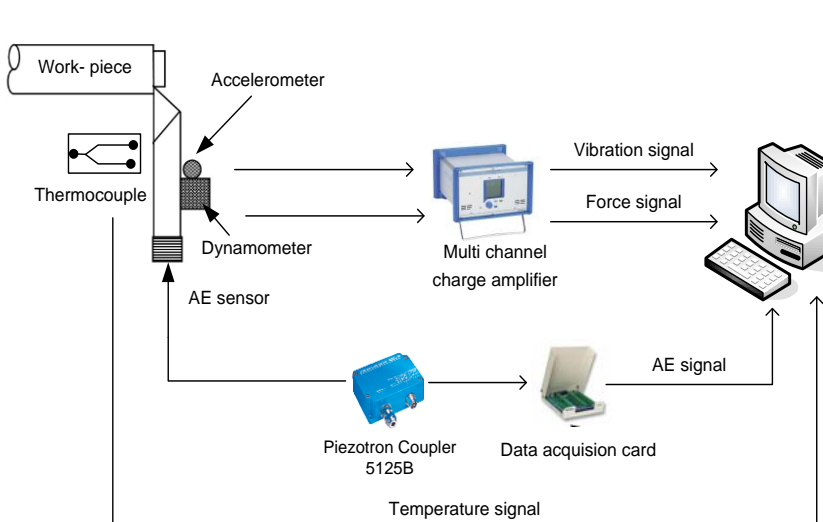
Dr. Ibrahim Deiab (Mechanical Engineering) is currently completing work for an external research grant from the National Research Foundation (NRF) University-Industry Research Collaboration Program (U-IRCP), entitled 'Machinability Analysis of Difficult-to-Cut Materials.'

The project has focused on studying the machinability of titanium alloys for aerospace industries, and developing metrics to assess machining process sustainability. The project involves working with Tawazun Precision Industries (TPI), parts supplier for Airbus. Dr. Deiab says: "Titanium alloys are of interest for aerospace industries due to their high strength-to-weight ratio, outstanding corrosion and erosion properties, and ability to operate at high temperatures. The main goal of the project is to

empower TPI to be more competitive and thus reach new markets by finding new applications for existing tooling, and improving productivity through process optimization. Machining difficult-to-cut materials opens up the potential for exploiting applications for materials with exceptional characteristics in terms of strength and weight. This will enable the manufacturing industry to realize new products or expand existing products to new markets by making them more cost-effective."

The research has been collaborative, involving colleagues from AUS (Dr. Basil Darras and Eng. Salman Pervaiz), Dr. Hossam Kishawy, University of Ontario Institute of Technology, Canada, and Dr. Amir Rashid at Royal Institute of Technology, Sweden. The study has investigated cutting tool wear and power consumption when machining titanium alloys under different cutting conditions. Experiments were designed to develop a test matrix that covers the range of cutting conditions used for machining titanium alloys by the industrial partner. Cutting forces, power consumption, tool wear and surface roughness have been measured and analyzed, and tool wear progression has been compared to trends available in the literature.

Schematic illustration of experimental setup



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'Scaling Up Research' Vice Provost Gautam Sen Reports on his Trip to the US to Further the University's Research Strategy

An important research strategy of AUS is to build strong collaborative partnerships with other institutions. With this purpose, and to nurture existing partnerships, in March/April 2013 I made a 'whirlwind' tour of the United States. The trip was very satisfying in that, in every case, my hosts showed great interest in collaborative activities with AUS, including making laboratory, sabbatical, and student and faculty exchange visits. I believe that even with the limited research funding we have available at AUS, we can still 'Scale Up' our research activities by becoming involved in fruitful collaborative research with other institutions. In this account I give the names of some of those with whom I met, and invite interested faculty to consider collaboration with any of these groups, or indeed with other groups that they may know of.

My trip focused on four broad areas of concentration:

water, atmosphere, renewable energy and analog electronics. Over three weeks I visited New York (Columbia University), Miami (University of Miami), Florida International University), Dallas (University of Texas at Dallas), Portland (Center for Coastal Margin Observation & Prediction (CMOP), Oregon Health & Science University), Boston (Boston University), and Woods Hole (Woods Hole Oceanographic Institution).

At Columbia University (CU) I introduced several groups to AUS's Gulf Ecosystem Research Center (GERC), specifying areas in which our faculty could collaborate with CU research groups. Among those I met was Dr. Upmanu Lall, Director of CU's Water Center and Silberstein Professor of Engineering, as well as members of the Earth Institute. I also met Professor P. Somasundaran, La von Duddleson Krumb Professor, who has been nominated for the Nobel Prize in Chemistry. It is likely that Prof. Somasundaran will visit AUS this year, when he

travels to give talks at some important organizations headed by his former students in the UAE and India. I came away from CU convinced that there are many areas (for example renewable energy) in which AUS faculty could develop fruitful collaboration with prominent researchers.

I also spent significant time with Dr. Nickolas Themelis, Stanley-Thompson Professor Emeritus of Earth & Environmental Engineering. He is a global leader on Waste-to-Energy and is the Chair of Global WTER Council. WTER will run a workshop from June 17-21 on waste-to-energy in Baku (Azerbaijan), and Drs. Themelis and Efstratios Kalogirou (President of WTER-Greece, and organizer) offered a lower registration rate for AUS students and faculty to attend. Information is available at:

<http://www.tamizshahar.az/seminar/>. Finally I

met Dr. Peter Kelemen, Storke Memorial Professor in Geochemistry, who is working on a long-term project on the Hajjar Mountains in Oman/UAE. Dr. Kelemen is doing interesting research on carbon sequestration, and proposes to test his idea of 'burying' carbon via deep crustal fluid-aided reaction with certain rocks that occur in the mountains. He

has submitted a continental deep drilling proposal to NSF and I act as 'advisor' to his proposed project. At the University of Miami I spent time with Drs. Dan Riemer and Peter Swart at the Rosenstiel School for Marine and Atmospheric Sciences, who work on atmospheric pollution measurements, coastal waters, coral reefs, etc. Dr. Swart is a leader in sophisticated stable isotope mass spectrometry, while Dr. Riemer has active research collaboration with our own Dr. Tariq Majeed (Physics). My visit was intended both as a show of support and to explore opportunities for other AUS colleagues. At Florida International University (FIU), where I worked previously as Associate Dean, I met with the Dean, Ken Furton, and Mike Heithaus, Executive Director of the School of Environment, Arts & Society. Both expressed interest in pursuing collaboration between the AUS Gulf Ecosystems Research Center and FIU's Southeast Research Center (SERC), which is a leader in coastal environment studies. SERC has global



Low Library, Columbia University, New York

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expertise in chemical, biological and remote sensing studies of coastal marine habitats, and is known particularly for its work on Florida Everglades.

The main goal of my visit to the Center for Coastal Margin Observation & Prediction (CMOP) at Oregon Health & Science University was to show our continued support of cooperation. At CMOP, I met Prof. Antonio Baptista, CMOP Director, and toured various facilities. Dr. Baptista recently hosted Dr. Nabil Abdel Jabbar (AUS CEN faculty member - see article in this Newsletter).

At Boston my host was Professor Michael Mendillo, a well-known astrophysicist

and a leader in monitoring planetary atmospheres. Professor Mendillo and his associates are interested in installing a permanent atmosphere monitoring station in this region, and the location of AUS is of particular interest in this regard. I anticipate that this will be the start of a fruitful, high-impact, collaboration with Physics.

Professor Don Anderson, respected expert on marine biology and 'Red Tide' (real name: Harmful Algal Blooms) at Woods Hole Oceanographic Institution (WHOI), was an inspiration for me to propose the creation of GERC. During my visit to WHOI he expressed enthusiasm about working with AUS faculty. Dr. Serter Atabay (CEN) has already spent two months working with Prof. Anderson's group at WHOI on models of water flow in the Arabian Gulf. I viewed the new, highly sophisticated trapping, sampling, and DNA identifier instruments that Prof. Anderson's group is using in monitoring phytoplankton activities in the coastal waters off the northeastern coast in the US.

With regards to analog electronics, a group of faculty (Drs. Lutfi Albasha, Hasan Al-Nashash and Nasser Qaddoumi, of the Electrical Engineering department) have had great success in obtaining significant external grants from Abu Dhabi's Advanced Technology Investment Company (ATIC) via the Semi-Conductor Research Corporation (SRC, Research Triangle, North Carolina, US). Texas Analog Center of Excellence (TxACE), located on the campus of the University of Texas at Dallas (UTD), is a leading SRC center of research in the area of interest to our faculty. This Center has funding of US\$16M,

Boston University Observatory



and I anticipate that by establishing collaborative arrangements with TxACE our faculty could develop joint research programs through mutual interest and interaction (e.g., sabbatical visits, periodic lab visits, joint projects etc.). While at UTD I gave a seminar in the Geosciences Department and, for the curious, my

talk was on giant volcanic eruptions in earth history and their impact on climate and mass extinction events. While at UTD I met with Drs. Bruce Gnade, VP of research, and Ken O, Director of TxACE. Dr. Gnade suggested that a number of areas in

which we could collaborate, while Dr. O offered to host AUS faculty and graduate students. The cost to AUS would be minimal (mainly travel by the faculty/students).

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These documents are in two sections: **Research section** includes resources relating to External Grants, Consultancies, Faculty Research Grants, Finance Forms, IRB, Sabbaticals and Student Research Awards. *These documents are updated from time to time. Please do not use old versions stored on your computer or from elsewhere.* **Graduate Studies section** includes resources relating to Graduate Student Assistantships and Employment and Graduate Thesis and Project writing and formatting guides and materials.

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