



49th Annual International Conference for the Association of Egyptian American Scholars In Partnership with Ain Shams University

Under the Auspices of

H. E. Prime Minister of Egypt, Dr Mostafa Madboly

H.E. Dr. Ayman Ashour, Minister of Higher Education and Scientific Research

The Support of H.E.

Ambassador Suha El-Gendy Minister Immigration and Egyptian Expatriates Affairs

In Partnership and Hosted by

H.E. Dr. Mahmoud Elmeteini, President of Ain Shams University

Towards 2030:

Climate Change Solutions, Global Health and Egypt's Development



Dates December
27 – 29 , 2022

Conference Co-chair Canada and USA
Dr. Mohamed Attalla

Conference Co-Chair Egypt
Dr. Ghada Farouk



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***Climate Change
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About The Association of Egyptian American scholars (AEAS)

The idea of creating the Egyptian-American scholars association started by a discussion between Dr. Mohamed El-Wakil of Wisconsin and Dr. Ahmed Shouman of New Mexico in 1968. They both pursued the formalization of the group supported in Cairo by the Egyptian government and the Society of Friends of Egyptian Scholars Abroad. In 1971, fifteen Charter members were declared, and by 1972 the registration list reached 62 members. In 1973, the Association of Egyptian-American Scholars in the United States and Canada was formally established, and by 1974 it was officially incorporated in the State of Wisconsin, with Dr. Mohamed El-Wakil as its President. Through the years close to 600 scholars have joined the Association, very many are still active and supportive.



First Biannual Egyptian-American Scholars conference held under the auspices of President Mohamed Anwar Sadat, December 1974

Since 1974, the Association of Egyptian-American Scholars has contributed abundantly to the scientific and cultural development of Egypt on one hand, and to the academic collaboration of its members in North America. A few examples of these achievements are highlighted below:

- Through the affiliation of several members with research centers in US and Canada, an important link has been established between them and Egypt.
- Since its birth, the AEAS has maintained strong ties with Friends of Egyptian Scholars Abroad (FOESA) in Cairo, which helped reunite them occasionally with the local scholars.
- So far, AEAS has participated in ten of the biannual Cairo conference on "Egypt - The Year 2000," held by FOESA delivering most of the papers there from overseas and has regularly published those conference proceedings.



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- Several libraries in Egypt were supplied with books, scientific periodicals, and microfilms. Some members donated their own personal libraries.
- Numerous members have participated in United Nation TOKTEN program, which contributed significantly to transforming technological knowledge through Egyptian expatriates of North America.
- Through distinguished members, AEAS has placed Egypt under a program that benefit twelve nations in family planning; has helped Egypt to benefit from several applications of the American satellite research and development; and has placed Egypt among six countries receiving technical information from the American Institute of World Resources.
- Members gave several gifts (i.e., needed equipment/spare parts) to Egypt's universities and centers; and others donated money to cultural and charitable organizations, pharmaceutical chemicals were donated to the Cairo National Research Center, a bilingual computer/printer were offered to FOESA to assist in preparing Cairo conference.
- AEAS contributed to the reconstruction of Alexandria's ancient library and established a special fund to its project of "Dar El-Adeeb El-Misri" where great Egyptian writers can be displayed. This effort amount to over \$10,000 cash donation to the Bibliotheca Alexandrina.
- The Association donated several computers to. Egypt's Ministry of Education to establish three Centers where secondary school teachers can be trained to use them.
- An anonymous AEAS member has donated \$10,000 to the Egyptian Minister of Scientific Research restricted to cancer treatment research in Egypt.
- AEAS has conducted several conferences in North America dealing mainly with development in Egypt where the Egyptian Ambassadors in US and Canada served as guest speakers.
- AEAS has invited the two top students among Egyptian Secondary School graduates to visit US major cities and historic sites, hosted by Egyptian-American families.
- Several members participated in a study tour visiting main Egyptian cities and meeting with some dignitaries there. Besides, AEAS has donated a few scholarships to Egyptian-American students to take summer courses in Egypt.
- Some grants and research fellowships have been offered to college graduates in Egypt through AEAS members; and a pattern has been initiated to recognize and honor distinguished scholars among our members.
- AEAS has maintained a periodic newsletter including member news, opinions, abstracts, budget updates, and other concerns. The newsletter mailing list has been updated and enhanced to reach over 500 names.



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AEAS Presidents

Dr. Mohamed El-Wakil	1975 - 1978
Dr. M. Cherif Bassiouni	1979 - 1980
Dr. Mohamed El-Wakil	1981 - 1984
Dr. Ibrahim Oweiss	1985 - 1988
Dr. Mohamed Selim	1989 - 1990
Dr. Badr El-Din-Ali	1991 - 1994
Dr. Wagiha Taylor	1995 - 1998
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Dr. Adel Elmaghraby	2015 - 2018
Dr. Naser ElSheimy	2019 - 2020
Dr. Mohamed Hegab	2021 - Present

<http://www.aeascholars.org/AEAS-Directory-Full.pdf>



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Ain Shams University

Ain Shams University, the third Egyptian university, was founded in July 1950 under the name of 'Ibrahim Pasha University'. It participated with the two earlier universities, 'Cairo University' (Fua'd the 1st) and 'Alexandria University' (Farouk the 1st) in fulfilling the message of universities and meeting the increasing demand of youth for higher education.

When it was first established, Ain Shams University comprised several distinguished faculties and academic institutes, which were later developed into university.

Ain Shams University is an educational, research, and service institution that adopts innovation and qualifies, academically and skillfully, a graduate capable of competing in the labor market and community service in accordance with international developments.

In our strategic plan, we invest many of ASU strengths such as its long academic history, time-honored university traditions, and widely acknowledged achievements in academia, research, and community. These points reinforce our presence both nationally and internationally and create an environment conducive to the promotion of innovation culture which plays an important and pivotal role in this plan. This plan is a high-level agenda that aims to develop our knowledge-sharing ability locally and internationally by opening to the world and sharing experiences with various academic, research and community institutions in order to achieve balance and integration between our national and international activities.



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Dr Mohamed Hegab

President of the Association of Egyptian American Scholars
California State University

Welcome to the 49th International Conference of the Association of Egyptian-American Scholars (AEAS). This year's conference, "Towards 2030: Climate Change Solutions, Global Health, and Egypt's Development," brings together members from around the world to discuss and explore the ways in which we can strengthen the development of indigenous science and technology in Egypt.

Through this strategic plan, we hope to invest in Egypt's future social and economic development and enhance its participation in the global community. By setting priorities, building infrastructure, and creating investment opportunities, we can pave the way for a bright and successful future. One of our key goals this year is to support and mentor our junior scholars.

We are pleased to see such a strong representation of graduate students at the conference and are excited to launch a new program aimed at meeting their needs as future leaders in the field. I am heartened by the dedication and passion of our members and am confident that, together, we can build on past achievements and work towards our shared goals. I would like to thank everyone for their participation and contributions, and I hope you have a productive and enjoyable conference.

The AEAS Conference Organizing committee, welcomes all the conference delegates and guests to the 49th Annual Conference of the Association of Egyptian American Scholars (AEAS). AEAS was established 49 years ago in Canada and the USA with a mission to create a forum for North American Egyptian Scholars that facilitates dialogue and promotes partnerships with Egyptian counterparts to implement beneficial scholarly endeavors.

Over the past 49 years, AEAS members and affiliates have worked collaboratively to build partnerships with their counterparts inside Egypt to advance Egypt's Social, Scientific, and Economic developments. AEAS members contributed significantly to many programs such as Higher Education Enhancement Programs, Engineering Code developments, manufacturing, Accreditation of Higher education programs, University Strategic Planning, university international classification, JESOR programs and many other academic and scientific projects.

This year's conference come at a time where Egypt was entrusted with hosting COP27, this is why AEAS has chosen a major theme for this year's conference to focus on Climate change solutions. 32 AEAS colleagues have contributed to this conference with topics related to Sustainability, Climate Changes, digital transformation, medical felids and many more.

I wish to take this opportunity and thank H.E. Dr. Ayman Ashour for supporting the conference and advancing the collaborative mission of AEAS. I wish to also thank H.E. Ambassador Suha Gendy for continuing an open channel and dialogue with AEAS and the strong support to Egyptian expatriates. Many thanks to H.E. Dr. Mahmoud El-Meteini and the entire team at Ain Shams University for hosting this year's conference and their great support.



Dr. Mohamed Attalla

Conference Chair, and AEAS Past President
Vice Chancellor, City University of New York



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USA & Canada ABSTRACTS



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The Future of Eco-Smart Cities: Can Universities Bridge the Sustainability Gap

Salah S. Hassan

The George Washington University

The Future of Eco-Smart Cities: Can Universities Bridge the Sustainability Gap Prof. Dr. Salah S. Hassan, Ph.D. The George Washington University This presentation underscores the critical importance of building greater advocacy of climate action and stimulating university engagement to create an inclusive dialogue on adaptation and mitigation measures in support of Sustainable Development Goals. Promoting higher levels of advocacy among key stakeholders involves developing a deeper understanding of sustainability issues and action programs in support of local communities in key sectors like clean energy, sustainable tourism, green project management, and smart transportation. Bridging the sustainability gap requires “changing the mindset” through promoting higher levels of awareness, engagement, and advocacy among youth through the development of green leadership skills. In an influential study (2020) by the United Nations Industrial Development Organization (UNIDO), key findings highlighted a critical gap between sustainability policies and the green qualifications and skills needed by the future workforce. This presentation will showcase a sustainability strategy framework for eco-smart cities to improve people's quality of life standards using a phased approach that is based on green business best practices, digital technology, public-private partnerships, and community engagement. It will showcase a roadmap for developing the “green skills” needed for the workforce of the future through youth development initiatives that include co-creating eco-smart entrepreneurial innovations, green business startup development, and workforce empowerment for green economic transformation. Empowering youth and their communities with green leadership skills aim to deepen understanding of climate change issues and develop the eco-entrepreneurial skills needed for the growing opportunities related to green business and eco-smart projects that are integral parts of the green economy. Developing green leadership skills among the youth aims to have a positive impact on increasing community engagement in support of sustainable development goals. Further, the power of engaging the youth in co-creating and sharing innovative content through media platforms will change their perspectives on climate change issues and will transform their communities. Hence, the key imperative of this presentation rests on the fact that green youth leaders' co-created green innovations and related media contents will connect with their communities more effectively than any other traditional awareness programs. To bridge the sustainability gap seamlessly, this presentation offers an effective and integrated strategy encompassing the triple-bottom-line of sustainability: people (community), environment, and economy



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Organic Wastes: Is It Really WASTE?

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Environmental Research for Resource Recovery (ER³) group is developing technologies to convert waste to value added products such as energy and chemicals. We are working among other scholars to change the perspective of seeing garbage and wastewater as WASTE and consider it as resources. We are mainly working on two processes, anaerobic digestion, and dark fermentation, to convert the waste to bioenergy and chemicals. Anaerobic digestion is a process where bacteria consume organic waste and produce biomethane that can be used for many applications such as renewable natural gas for transportation. Dark fermentation process can convert the waste into either hydrogen or value chemicals such as volatile fatty acids. Those two processes, anaerobic digestion, and fermentation, have many challenges. In the presentation, I will briefly cover the basics of anaerobic digestion and dark fermentation, current status, associated challenges with these technologies and our current research going on for overcoming the technologies limitations with novel approaches. We are investigating different techniques to improve the efficiency of anaerobic digestion such as combining acidification process with thermal pretreatment prior to the anaerobic digestion process. We are also investigating different pretreatment technologies such as chemicals (acid, alkaline, oxidants), mechanical (ultrasonic), and thermal both individual and in combination. On the other hand, I will also share some successful approaches in overcoming some of the dark fermentation process to produce high grad volatile fatty acids from organic wastes. Various techniques to improve the dark fermentation process will discuss such as vacuum fermentation, decoupling the solid retention time from hydraulic retention time by solid-liquid separation, temperature, and thermal pretreatment prior to fermentation process.



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Role of Big Data and AI in Personalized Medicine

Ayman El-Baz

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The term “Big Data” refers to the amalgamation and processing of huge data sets that are composed of different data types (e.g., clinical, genomic, imaging, pathological, etc.) and have rapidly become more massive and complex, particularly with the advent of new technologies. Big Data within the context of biomedical research is a major problem that needs to be solved due to substantial increases in the amount of medical data routinely generated and collected by healthcare providers over the last two decades. A recent PubMed search for the term “big data” yields 1470 entries, with the earliest occurring in 2003. A breakdown by year shows the majority of publications are from 2012 or later. In 2011, the McKinsey Global Institute issued a 156-page report titled “Big data: The next frontier for innovation, competition, and productivity”. This report indicated \$300 billion in potential annual value in Big Data to health care in the U. S., with a shortage of 140,000 to 190,000 individuals with the required deep analytical skills, indicating a need for programs to train the next generation of scientists with the necessary skill set to deal with all aspects of Big Data. The current main challenge is that our ability to advance medical care and efficiently translate science into modern medicine is bounded by our capacity to process and understand these big data. So, there is an urgent need to develop and integrate new statistical, mathematical, visualization, and computational models with the ability to analyze Big Data in order to retrieve useful information to aid clinicians in accurately diagnosing and treating patients to improve patient outcomes. Thus, the main objective of this proposal is to develop new computational models and implement new state-of-the-art machine learning approaches to analyze and integrate multiple data types for the creation of a decision matrix that aids clinicians in the early diagnosis and identification of high-risk patients for human diseases and disorders.



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Introducing Multidimensional Parallel Decoder For Exascale Data Storage Devices

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The latency and complexity of decoders are critical to performance of devices as memory and buffers. The number of locations to be accessed in an address could be in billions. We propose a multidimensional parallel decoder that divides the address space into multiple of smaller dimensions each is decoded separately in parallel. The decoding of a much smaller address is simpler compared to the decoding of the whole address space. A combination circuit combines the outputs of the smaller numbers of decoded outputs that correspond to the different dimensions to obtain the full decoded address space. We also propose a time multiplexed decoder that divides the whole address range to multiple dimensions in time and uses the multidimensional parallel decoder to obtain the decoded outputs. The results of the multidimensional parallel decoder show reduction in the cost of implementation and latency by multiple folds compared to the conventional decoder.



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UAV mapping in support of high throughput phenotyping

Tian Zhao, Sang-Yeop Shin, Mina Joseph, and Ayman Habib

Digital Photogrammetry Research Group

Lyles School of Civil Engineering, Purdue University, USA

In many agricultural applications one wants to characterize physical properties of plants and use the measurements to predict biomass and environmental influence, just as an example. This process is known as phenotyping. Traditional collection of phenotypic information is labor-intensive and time-consuming. Use of imagery and LiDAR is becoming popular for high throughput phenotyping. In this paper, we present challenges, prerequisites, and processing of image and LiDAR data in support of high throughput phenotyping. This paper is dealing with: 1) algorithmic developments for improved system calibration of multi-sensor/multi-platform UAV-based phenotyping; 2) challenges facing UAV-based Structure-from-Motion strategies for deriving point clouds from imagery over agricultural fields; 3) benefits of integrating imaging and LiDAR systems onboard UAVs; 4) applications of UAV-based remote sensing systems for plant height estimation, row/alley detection, and canopy cover estimation; and 5) interactive visualization of multi-sensor/multi-platform/temporal geospatial data for improved comprehension of delivered products. The paper will present results related to UAV-based phenotyping of maize and sorghum seed breeding trials.



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A Geospatial Method for Quantifying Coastal Land Loss: An Example from the Mississippi River Delta

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The Mississippi River Delta is one of the most rapidly changing areas on Earth, with large areas losing land. High rates of relative sea level rise, reduced sediment inputs, canal dredging, and subsidence are the main drivers of land loss. One topic that has received a lot of attention is the role of "river diversions," of land building processes. This study investigated this debate in the Cubits Gap Subdelta, an analogue for a large river diversion, by testing the hypothesis that areas of land gain and/or resilience to erosion occurred in areas that actively received river sediments, resulting in mineral-rich soils with high shear strength. The Normalized Difference Water Index (NDWI) was developed using Landsat imagery from 2000 and 2015. The NDWI was calculated from $(Blue - SWIR) / (Blue + SWIR)$, where SWIR is the shorter wavelength, and resulted in land/water boundary maps with a resolution of 30 m. Results indicate that the majority of land gain occurred in this subdelta, where sediments were imported from Mississippi River crevasses and/or dredging. Typically, land loss occurred in the distal regions of the subdelta, which had lower sediment supply levels and greater wave exposure. This study suggests plans to restore the region by partially diverting the flow of the Mississippi River will be most successful if they carry high loads of sediment.



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Climate Change and Children's Health: Public Health, Moral, Legal, Language and Cultural Considerations

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With Egypt hosting the COP27 Climate Change Conference this November in the Sinai Peninsula, it is commendable that the Association of Egyptian Scholars (AEAS) has chosen "Climate Change" as this year's theme for its 49th annual conference that is held in Cairo, Egypt. In President's El Sissy welcoming remarks, he noted that the hosting of COP27 in the green city of Sharm El-Sheikh marks the 30th anniversary of the adoption of the United Nations Framework Convention on Climate Change. According to Dr Yasmin Fouad, the Egyptian Minister of the Environment, Climate change is the most challenging crisis of our century. Climate change represents a change in the average earth conditions including rainfall and temperature in a particular region over a long period of time. In the US, NASA scientists have noted that the Earth's surface is warming with most of the warmest years happening in the last twenty years. There is a scientific consensus that human activities represent the main reason of the Earth getting warmer in the past 50 to 100 years. Over the years a number terms have been used to describe this condition including Global Warming, Climate Change and most recently Global Climate Change. Global climate change indicates average long-term changes affecting the entire Earth. These include warming temperatures, changes in precipitation, as well as the effects of Earth's warming such as unexpected changes in plant and flower blooming time, shrinking glaciers and rising sea levels. Children's health and education are primarily casualties. Children under 5 years of age are the most affected by diseases resulting from a climate disaster. Children Represent more than 30 percent of the world's population with many of them are being raised in an environment characterized by global climate change. Millions of children would witness their education interrupted each year because of a crisis due to global climate change. Among other vulnerable populations, the impact is severer on children suffering from poverty and other forms of inequality. Children in the Arab World are subject to the same impact. The impact of Climate Change is a public health issue as much that it is a moral issue as well as a legal issue. These children, representing the future of our humanity, have the right to grow up in a safe and healthful environment characterized by food security, good education, a decent life and above all the right to health and survival. This is also a legal issue as expressed in the United Nations Convention on the Rights of the Child (UN-CRC). It is not only the foundation of the work of UNICEF, it is also the most widely ratified human rights treaty in the world. And,



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that is in itself is a combined legal and moral commitment made by nations in support of their future generations. The UN-CRC estimates that annually about 175 million children will be affected by disasters related to climate change including drought, floods, etc. In Africa alone, water shortage will affect up to 125 million children negatively. Undernourishment, and following health consequences, is expected to affect more than 25 million children by the year 2050. Water scarcity, such that facing Egypt and Iraq in the Arab Region, due to different reasons including those due to climate change or affecting the flow of water resource by upstream neighbors has health implications with serious impact on children. Solutions to climate change are urgent requiring scientific data and a moral dimension as well as legal protection. On October 4, 2022 the US National Academies of Sciences, Engineering, and Medicine issued a report entitled "Greenhouse Gas Emissions Information for Decision-Making: A Framework Going Forward" calling for the creation of a global clearinghouse for greenhouse gas emissions information to support decision-makers working" to address climate change including those gathering in Egypt, this November, at the 27th United Nations Climate Change Conference in Sharm El-Sheikh. In the first legal case of its kind, the UN Human Rights Committee has ruled against the Australian government for violating the rights of the people of the four Torres Strait islands located at the northern tip of Australia. The Islanders have suffered from the the damaging effects of climate change including flooding, coastal corrosion and rising sea level. The UN Committee found that Australia have violating the rights of that population by failing to protect them from the devastating consequences of climate change. Furthermore, the UN Human Rights Committee ordered the Australian government to compensate the population for harm caused by climate change. Such a ruling may have an impact on similar cases for failing to take action against the harmful effects of climate change. There are other legal cases being considered at this time. Taking every thing in consideration, these are positive movements forward in spite of major global climate concerns. In addition to modern considerations of public health, moral and legal issues, there are other cultural consideration going back to Ancient Egypt where the Ancient Egyptian religion gave attention to the environment and particularly as it relates to the pollution of the Nile. Additionally, the Arabic/Islamic culture considered humans as custodians of God's creation indicating that "God Mandated Goodness on Every Thing". Addressing the moral dimension of climate change, Egypt's Dar al-Ifta issued a fatwa charter on October 8, 2022 promoting practices that are environmentally friendly based on Islamic law. Furthermore, the Egyptian Ministry of Environment and Al-Azhar launched an initiative known as "Our Climate is Our Lives". These cultural and religious considerations are expressed not only in the moral format, but also in the Hieroglyphic and Arabic languages as this paper will show.



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Small Steps with Big Results for the individual and the state

Essential Communication Skills

Hussam Nabil Fatahalla

Licensed Professional Counselor

Anyone who has spent more than 5 minutes in Egypt will have likely learnt that Egyptians argue often, and argue intensely. It is a very common scene on Egyptian streets to see a customer arguing with their Taxi driver over the fare, a driver arguing with another driver, a car owner arguing with the infamous “sayes”, and a citizen arguing with a civil servant over required paperwork. These arguments and the accompanying frustration that come with them are all too often a direct result of miscommunication. Although seemingly these miscommunications appear to be mostly harmless, clinical psychological observations suggest that such interactions reduces trust between society members, and between citizens and civil servants. This leads to a considerable waste of time, energy and resources managing the arising conflicts that would be better used to tackle the actual challenges the citizens were trying to solve. As Egypt moves full steam ahead towards the New Republic announced by president Sisi, It is of crucial importance for the new cohort of civil servants soon to move to the new capital, as well as for Egyptian citizens in general to acquire better and more efficient communication skills that allow for smoother interactions between the government and the citizens, as well as between citizens and their fellow citizens. More than merely exchanging information is required for effective communication. It is necessary to comprehend the emotion and purpose underlying the information. In addition to being able to clearly deliver a message, you must also be able to listen in such a way that you grasp the whole meaning of what is being said and make the other person feel heard and understood. It appears that effective communication should come naturally. However, all too often, something goes wrong when we try to communicate with people. We say one thing, but the other person hears something quite different, resulting in misunderstandings, frustrations, and disputes. For people interactions to produce the results they hoped for, they need to communicate with each other clearly and in a straightforward manner. To fully understand each other, there is a need to learn effective communication tools which help to understand and make a strong connection. These communication tools could be verbal or non-verbal and can be learned easily when adapting to the culture. Government employees need to communicate properly with citizens to increase customer satisfaction. Effective communication can also increase the level of trust between the government and the citizens. The above-described tools are simple to learn and implement in a short amount of time, and would have an immediate and dramatic effect on improving effective communication between Egyptians once applied correctly. Last but not least, I would like to stress the importance of proper training on basic communication skills for the new cohort of civil servants moving to the new capital to ensure that the move is substantive and institutes for a completely new way for the Egyptian government to interact with citizens.



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Towards A Sustainably Safe Urban Network: The Role of Advanced Technologies and Big data

Tarek Sayed

Canada Research Chair in Transportation Safety and Advanced Mobility

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Urban transportation seems to be on the cusp of a new era of “Smart mobility”. The application of Information and Communication Technologies (ICT) will lead to interconnected road infrastructure, travelers and transportation modes resulting in higher safety, enhanced mobility, and minimum adverse environmental impacts. New technologies such as connected and autonomous vehicles (CAVs) are expected to provide considerable social and economic benefits. As well, the availability of a tremendous amount of real-time data “Big Data” is expected to completely change the ways in which urban transportation systems are designed, built, operated and maintained. One particular area that can benefit significantly from the application of advanced technologies is road safety. The importance of reducing the social and economic costs of road accidents cannot be overstated as 1.35 million people are killed annually in road crashes and many more are severely injured. The application of innovations that are both progressing and disrupting the status quo represents an opportunity for improved transportation safety. However, with the introduction of new modes of mobility and the complex interactions created by these different technologies within the transportation system, governments will need to rely on advanced research and analysis techniques to support policies towards the transition to these new forms of mobility. All these issues will be discussed and several methods and techniques developed in this area will be described with example projects from several agencies worldwide.



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Identifying Adaptation Strategies for Mitigating Climate Change Impacts on Soybean Yields: Case Study from Alabama, USA

***G. El Afandi, D. Elum, J. Essamuah-Quansah, S. Fall, R. Ankumah**
Tuskegee University, Tuskegee AL, USA

Adaptation strategies for climate change are still a new concept that needs to be mastered. Climate change drastically impacts crop production with the increase of greenhouse gases, temperature changes, and water depletion. Adaptation strategies can positively affect crop growth and reduce crop yield loss. Adequate adaptation options reduce the vulnerability of the world and its systems to relatively sudden change and offset the effects of global warming. The objective of this study is to identify adaptation strategies for soybean production in different counties in Alabama under the criteria of early planting, plant spacing, and depth. The strategies were analyzed by running various crop model scenarios of the Decision Support System for Agrotechnology Transfer (DSSAT). Properly calibrated CROPGRO soybean models were used to simulate crop physiological growth processes and resulting impacts on yields under the climate change adaptation scenarios. The parameter affected by climate change that is considered for this study is the yield at harvest maturity. Changing management strategies for the selected crop were evaluated based on the General Circulation Models (GCMs) IPSL-CM5A-MR. The simulations were done under various high, medium, and low 4.5 RCP's (Representative Concentration Pathways) emission scenarios with and without CO₂ fertilization, for the years 2045 and 2075. Results indicated that early planting, modified plant spacing, and depth increased overall soybean yields by 4-35% in perspective counties.

Keywords: Climate Change, CROPGRO-Soybean, DSSAT, General Circulation Model (GCM), Representative Concentration Pathway (RCP) Emission Scenarios.



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Improving the Yield of Biodiesel Production Using Waste Vegetable Oil Considering the Free Fatty Acid Content

Saanyol Ityokumbul Igbax, Daniel Swartling, Ahmed ElSawy*, and Stephen Idem

Tennessee Technological University Cookeville, TN, U.S.A.

This paper investigates the use of waste vegetable oil (WVO) for production of biodiesel. The goal of this study was to explore the improvement of biodiesel production to achieve high yields. Different oil streams, including virgin canola oil and WVO, were used as the raw material for the transesterification processes. These oils had different fatty acid contents as a result of environmental or previous processing conditions. The main objective of this study was to assess the impact of free fatty acid (FFA) content on the resulting yield. In addition, the yield was influenced by production parameters such as reaction time, reaction temperature, molar/volume ratios of oil to alcohol, catalyst amount, and mechanical mixing. This was accomplished by automating the biodiesel production from WVO, thereby achieving improved processing and requiring minimal direct human involvement. A biodiesel production apparatus was developed with a Raspberry Pi 3 microcomputer to control the process. It was shown that the particular choice of these process parameters depended on the particular oil type. This research used mixtures of virgin and waste vegetable oils at different volume ratios (oil to alcohol) of 4:1, 6:1, and 8:1, which was determined by the FFA content of the oil. In addition to mechanical mixing, ultrasonication rated at 500W, 20kHz was used to enhance mixing by adding 450 kJ to the process, thereby reducing both the processing time and the amount of methoxide needed to perform a base-catalyzed transesterification. The production temperature was held within the range of 50-65oC. This research demonstrated that optimal yield depends on temperature, catalyst concentration, FFA content of the oil, and the energy introduced by sonication. A 96% yield was achieved with the following parameters: an oil to methanol volume ratio of 6:1, 0.6% weight concentration of catalyst (NaOH) at 6.25 g, and FFA values of approximately 5%. It was determined that the proposed system can produce acceptable quality biodiesel.



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Thermal Management and Development of Electric Vehicles for Improved Environmental Quality

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FIAT Chrysler Automobiles (FCA)

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Due to the stringent environmental regulations and strict emission requirements, vehicle electrification has emerged as a potentially viable alternative to conventional vehicles with internal combustion engine (ICE). Conventional vehicles produce direct emissions through the tailpipe, as well as through evaporation from the vehicle's fuel system and during the fueling process. Electric vehicles therefore are considered as an alternative to reduce air pollutants and improve the overall environmental quality. Types of eclectic vehicles include battery electric vehicles (BEV), hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV) and range extended electric vehicles (REEV). For each of these electric vehicles, an efficient vehicle thermal management strategy is required to enhance vehicle driving range, improve battery life, enhance vehicle safety, reduce CO₂ emissions and greenhouse gasses (GHG). Efficient thermal managements strategies are therefore considered as critical enabler for improving electric vehicles performance, durability, and enhancement of battery life. Battery life estimates are evaluated through transient thermal analysis combined with battery thermal degradation models and customer duty cycles. In this presentation, recent advances in battery thermal analysis and thermal management are discussed and the impact of electric vehicles on overall emission reduction and environmental quality improvements are addressed.



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Engineering Education and Future Opportunities in the Development of Hybrid and Electric Vehicles

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Recent years have witnessed a significant world-wide increase in the development and production of hybrid and electric vehicles (HEV/EV). Due to recent advances in the development of high voltage battery technologies and due to environmental advantages, it is expected that battery driven vehicles will represent 40% of all vehicles on the roads by the year 2030. The rise of HEV/EV technologies and the associated technical issues represent significant opportunities and challenges to the automotive industry professionals. Therefore, a multidisciplinary approach is required in order to address various technical aspects of future vehicle technologies and provide engineering graduates and professionals with the necessary skills. This approach mandates collaboration between various engineering departments including Chemical Engineering, Mechanical Engineering, and Electrical Engineering. From industrial point of view, this presentation will give a high-level description of the role of each engineering major in various levels of vehicle development. Chemical Engineering department for example can focus on the electrochemistry of Lithium-Ion (Li-Ion) batteries, heat and mass transfer within the battery cells, cell design and construction. In addition, chemical engineering concepts can be applied for prediction of battery ageing kinetics and hence estimation of battery life and performance. Mechanical Engineering department can play a major role in the design of battery package and design of the thermal management strategy for controlling battery temperatures, analyzing of the heat exchange between the battery and the vehicle environment as well as maintaining adequate performance for the HVAC (Heating Ventilation and Air Conditioning) systems. The role of Electrical Engineering department should cover the design and optimization of electric powertrain components, system architecture, management of power distribution, optimization of battery operating conditions for enhanced battery performance, and design of battery charging systems and design of power supply networks. Therefore, an undergraduate engineering specialty or a graduate certificate program in HEV/EV vehicles can be designed to provide interested engineers with the required technical training and skills. With the gained knowledge through these specific courses, the trained engineers will have much better opportunities to support or lead the development of hybrid and electric vehicles in Egypt, the Middle East and perhaps in Europe and the USA.



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Mental Health Access and Suicide Prevention (MHASP)

Mohamed Aziz

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A country-wide survey by Egypt’s Ministry of Health in 2018 indicated that 25% of Egyptians suffer from mental health issues. This number has only continued to increase due to the Covid -19 pandemic. A general lack of mental health awareness and high treatment costs have prevented progress in the mental health arena. The Egyptian Journal of Psychiatry conducted a study in 2020 that indicated almost 44% of 300 patients with diverse mental health conditions reported victimization in the past year. It is extremely important to provide instant support to suicidal individuals. Like suicide, receiving treatment in Egypt is somewhat taboo, which makes many mentally ill people reluctant to reach out for help. The National Council for Criminal and Social Research reported that 2,584 individuals completed suicide in 2021 in Egypt. Implementing a MHASP line allows individuals to speak to a trained crisis counselor who listens to the caller, understands how their problem is affecting them, provides support, and shares appropriate resources. In the United States, 988 Lifeline studies show that callers are significantly more likely to feel less depressed, less suicidal, and more hopeful after speaking to the crisis counselor. The crisis counselor is also able to dispatch emergency services if needed. However, the goal of the counselor is to assist the caller in the moment in order to de-escalate the situation and connect the caller with appropriate community resources for ongoing treatment. Establishing a MHASP line will help save lives and increase Egyptians ability to safely and confidentially access needed life saving support.



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Transpacific Testbed for Real-Time Cybersecurity Experimentation

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The transpacific testbed for real-time experimentation is a generic routing encapsulation (GRE) tunnel built between CUNY City College (CCNY), USA and Kyushu Institute of Technology (KYUTECH), Japan. The tunnel, built through internet2, originated from CCNY through the JGN network in Seattle and terminated at Kyutech in Japan. The testbed defines the future of the Internet by focusing on addressing research challenges associated with enabling trustworthy networks, supporting the Internet of Things (IoT), which encompasses everything connected to the Internet and cyber-physical systems (CPS) - a controlled mechanism monitored by computer-based algorithms. In this paper, we describe the setting up and testing of the testbed. Furthermore, we describe the real-time experiments conducted on the testbed and present the results. The experiments are classified into two: blockchain-based cooperative intrusion detection system (CoIDS) and Secure Virtual Machine introspection. In each of the experiments, we describe the method and present the result. Finally, we look into the ongoing works of extending the testbed to the COSM-IC global testbed.



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Navigation Technologies for Future Autonomous Vehicles

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There are three ‘pillars’ that define the performance or usefulness of a navigation technologies – cost, accuracy, and continuity. Navigation is a field that has been fascinating humankind for thousands of years and these pillars have been evolving with new technological advancements. The current market in positioning and navigation is clearly dominated by GNSS. Besides being globally available, it meets two important pillars: accuracy and cost by providing the whole range of navigation accuracies at very low cost. It is also highly portable, has low power consumption, and is well suited for integration with other sensors, communication links, and databases. At this point in the development of navigation technology, the need for alternative positioning systems only arises because GNSS does not meet the continuity pillar as it does not work in all environments. Furthermore, there has been a constant market push to develop navigation systems that are accurate, continuous and easy to afford. Needless to say, that cost, and space constraints are currently driving manufacturers of cars, portable devices (e.g. smartphones), and autonomous systems (e.g. self-driving, drones and agriculture machine systems) systems to investigate and develop next generation of low cost and small size navigation systems to meet the fast-growing autonomous vehicles and location services market demands. This presentation will provide a state of the art and future trends of sensors used for navigation of autonomous vehicles: possibilities, limitations and various design approaches. Emphasis will be on sensors and technologies that can navigate autonomous vehicles everywhere and at any time independent of weather and light conditions. Some of the current developed and possible future system’s accuracy performance will be demonstrated through different implementations/applications using Propound Positioning Inc technologies.



Construction Projects: Creating a Holistic Performance Index

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Schedule slippage and cost overruns are frequent occurrences in construction projects. Therefore, being able to assess a project's present performance is essential for good project management. The success of a project can be evaluated in terms of many different performance areas, including cost, time, quality, safety, and many more. The goal of this study is to create a project performance index that gives each aspect the proper amount of weight. According to the occurrence in the pertinent literature, the weight has been determined. The performance of various initiatives can be compared using the created holistic index.



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Technology Trends for Behavioral Health

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The recent advances in technology including Artificial Intelligence (AI) coupled with the increase in Internet of Things (IoT) devices and data science techniques such as deep learning are having a great impact on Healthcare and on understanding of Wellness. The use of AI as related to Healthcare will be presented in the context of Health 4.0. Additionally, an expanded interest in visualization and use of gaming and virtual reality has become of great interest to researchers and practitioners will be discussed. Examples include Applications to predictive analytics for patient care, medical image analysis and annotation, document and social media text analysis. This work is part of a larger project to have integrate a variety of information sources from clinical data, social media, and professional literature to better guide our understanding of health and wellness. The AI techniques used include Deep Learning, NLP and ANN and applied to doctors’ annotation and public sentiment combined with medical literature. Imaging work has significantly reduced the effort of medical professionals to allow them to focus on the patient. We shall also discuss emerging topics as they relate to e-health, such as Industry 4.0, Precision Medicine, Mobile Health, 5G, Big Data, and Cyber-physical systems.



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NEXT GENERATION SCADA FOR DISASTER MITIGATION OF WATER & WASTEWATER NETWORK INFRASTRUCTURE

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With an annual water deficit of around seven billion cubic meters, the Egyptian government is taken very serious remedial steps to mitigate this critical shortage. Currently, the government is developing ways to mandate water conservation, recycling wastewater, as well as its major investment in constructing desalination plants at different parts of the country with an estimated budget of \$2.5 billion. Water management is considered to be one of the most effective ways for conserving water. Rapid detection of damage caused by natural, ageing and manmade hazards enables an efficient and effective emergency response minimizing human and property losses as well as societal disruption. Techniques that could be used to provide early warning, damage detection and assessment of water and wastewater systems are presented. This paper focuses on water supply networks with a demonstration of a monitoring system consisting of a wireless network of power-efficient sensors for a rapid identification of the extent and location of pipe damage immediately after a disastrous event. The highlight of this paper lies in taking advantage of sharply transient change in hydraulic parameters such as the water head due to the damage, and in verifying the simulation result by experiments. The result suggests that a simple inverse analysis can locate the damage in a pipe segment between two neighboring sensors among the pervasively installed along a pipe at which the absolute values of water head are observed to be local maxima. Separate experiment and analysis show that the sharp transient change in water head in the pipe flow induces a correspondingly sharp change in the acceleration of pipe vibration. This fact is used for damage identification in this study.



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DECENT LIFE INITIATIVE FOR A CLIMATE RESILIENT AFRICA: A CASE STUDY

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Many countries, including Africa, are facing a critical situation when it comes to developing agricultural, food security, housing, educational, and infrastructure systems for low-income and poor citizens. Achieving a sustainable living standard, as well as a higher quality of life (QOL) is beyond the usual scope of free market-driven economic systems. This protocol echoes the objective of the Egyptian Decent Life Initiative for A Climate Resilient Africa that was announced at the COP27 Conference. The lecture proposes a strategy aims at establishing eco-communities in different nations. This strategy focuses on a housing-first approach to reduce homelessness and poverty, recognizing that housing stability is essential for self-sufficiency and full societal participation. Rather than providing only housing for low-income people, the proposed concept seeks to integrate into the process the involvement of the people in designing, constructing, and maintaining an infrastructure. In this lecture, a recent case study of building ten sustainable and affordable houses, by volunteers, in one day for needy people in Sonora, North Mexico, will be described in detail.



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Electricity Peak Shaving for Commercial Buildings using Machine Learning and Vehicle to Building (V2B) System

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Reducing electricity peak demand is essential to maintain the balance between supply and demand side in electricity power markets, as well as reduce utility costs and environmental impacts. With growth in adoption of Electric Vehicles (EVs), there is an emerging opportunity to balance electrical power demand of buildings by storing electricity in EVs during low demand periods and discharging electricity into buildings during peak demand periods. Due to uncertainty in time and magnitude of peak demand, decision makers are always faced with a challenging task to identify optimal schedules for charging and discharging EVs to minimize peak electricity demand. This paper presents the development of a novel system that is capable of predicting building electricity demand profile and identifying optimum schedule of charging and discharging EVs to minimize electricity peak demand. The system is designed to comply with preplanned EV trip schedules and minimum state of charge (SOC). The system consists of (1) machine Learning (ML) model to predict electrical power demand, and (2) demand management optimization model to identify optimal schedule for charging and discharging EVs. Four methods are explored to develop the ML model, including histogram-based gradient boosting, random forest, deep artificial neural network (DNN), and long short-term memory (LSTM). A case study of multi-tenant commercial building is analyzed to evaluate the performance of the system and demonstrate its new capabilities. The results of the case study shows that LSTM has the best performance in terms of mean absolute error, root mean square error, and mean absolute percentage error with average values of 7.44, 17.78, and 20.08%, respectively. Five scenarios for shaving peak electricity demand, including combinations of two electric vehicles, a stationary battery, and a PV system are investigated. Scenarios including the stationary battery and the PV system are considered to evaluate the full potential of peak demand reduction in the case study building. The results of the demand management optimization model show up to 36% reduction in peak demand using two EVs, one stationary battery, and PV system of 40kW capacity.



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Five - Technologies that Help Make the Food System Carbon Neutral

Mohamed Elhalwagy

PIONEER HI-BRED International, Canada

The global food system, from fertilizer manufacture to food storage and packaging, is responsible for up to one-third of all human-caused greenhouse-gas emissions, according to the latest figures from the Consultative Group on International Agricultural Research (CGIAR), a partnership of 15 research centres around the world. The key to unlocking the benefits of new agricultural technologies is to develop food systems where the waste products from one step become valuable inputs in another, or new technology.

Drs. Rene Van Acker, dean of The Ontario Agricultural College and Evan Fraser, director of the Arrell Food Institute, Department of Geography, Environment and Geomatics, University of Guelph; and Dr. Lenore Newman, Canada Research Chair, Food Security and the Environment, University of The Fraser Valley This article is republished from The Conversation Canada under a Creative Commons licence

1. Dr. Evan Fraser, director Arrell Food Institute. Today, most of the greenhouse gas emissions linked with our food come from producing the food, and are emitted when the soils are plowed. This is important as undisturbed soils store carbon.
2. Traditionally, it takes a lot of fossil fuels to turn nitrogen from the air into fertilizer. Additionally, it is challenging for farmers to put exactly the right amount of fertilizer in the right place, at the right time, for crops to use it efficiently. Fertilizers are often overapplied, and not used by crops, ending up as pollution, either as greenhouse gases or water contaminants. But a new generation of fertilizers aims to fix these problems.
3. Humans have used micro-organisms to turn sugars and starches into fermented products such as beer, wine and bread since the dawn of history. But before long, precision fermentation will be used to produce a great many more products.
4. Vertical gardening tomatoes in a greenhouse (Unsplash / Markus Spiske) While nothing beats fresh fruit and vegetables, picked ripe and eaten immediately, the sad reality is that most of the fresh produce eaten in Canada, northern United States and northern Europe comes from industrial farms in the southwestern United States or the southern hemisphere.
- 5- The manure from livestock facilities is challenging to manage as it can become a source of water pollution and greenhouse gas emissions. However, if livestock manure is placed in an anaerobic digester, it's possible to capture the naturally occurring methane as a green natural gas.



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Power Grid Decarbonization and Modernization: The New York City Case

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¹ ²Smart Grid Interdependencies Laboratory, Department of Electrical Engineering, City University of New York, City College, New York, USA

The power grid is the most critical infrastructure serving any city; its inability or destruction causes debilitating societal and economic impacts. Power distribution grids around the globe are facing profound challenges including: (1) the imperative to decarbonize the grid by accommodating high penetration of renewable energy, in order to combat global warming; (2) the growing load demand due to electrification (e.g., of transportation and heating sectors); (3) the need for increased resiliency in the face of low-frequency high-impact events, such as hurricanes and cyber attacks; and (4) the need for trained workforce to cope with the emerging technologies. In this talk, these challenges along with some of the emerging advances and key solutions (e.g., energy storage, microgrids, and smart inverters) will be discussed. The talk will summarize lessons learned and key findings of multiple relevant projects that the presenters led, in collaboration with the utility company and other industry partners in NYC. In addition, research facilities and capabilities at the City University of New York relevant to the topic will be highlighted.



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On the Use of Wayside Energy Storage to Rescue Subway Trains During Power Outages

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The electric railway system is a major consumer of electricity in New York City (NYC). The presenter has been leading multiple projects that aimed at improving the energy efficiency and reliability of NYC’s subway. Our analysis proved that wayside energy storage (WESS) can potentially lead to major energy savings (i.e., around 35%), due to improved recuperation of regenerative braking energy. This talk, however, will highlight the resiliency benefits of WESS. Specifically, we will focus on investigating the feasibility and effectiveness of using wayside energy storage systems as a means to rescue subway trains during a power blackout. A case study centered around New York City’s (NYC) subway system using real data has been performed to evaluate the benefits and limitations pertaining to this approach. It has been found that proper deployment of such systems can help rescue thousands of subway passengers, getting them to the nearest accessible passenger station up to 2000-ft away.



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Internet of things recent Evolutions and Scientific applications

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Ontario Tech University, Canada

The emergence of the Internet of Things (IoT) coupled with artificial intelligence has changed the way we carry out everyday business to become smarter, productive and much safer. There have been many recent revolutions that IoT brought to a wide range of business and industrial sectors including smart cities, healthcare, emergency response, intelligent transportation, industrial automation and agriculture. At the IoT Research Laboratory, we are engaged with industry and community partners to develop innovative technologies to bring business intelligence to many sectors. In this talk, I am going to provide a quick update on the status quo of how IoT impacted our lives and what are the opportunities yet to unfold at the current progress pace. I will also highlight some of our current projects.



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Can Egypt join the world of manufacturing microchips?

Mohamed Elmasry

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Canada

The global microchip market has surpassed \$20B and predicted to reach over \$57B in 2031. Microchips are essential components used in consumer goods eg cars and cell phones, and military equipment eg rockets and drones. Microchips involves two aspects one is the design and the other is manufacturing. And microchips are of two types one is standard microchips and the other is custom designed microchips. The number one company in standard microchip design and manufacturing is the American company Intel who has design and manufacturing facilities in the US, Ireland, Malaysia and Israel. Giant telecommunication companies have their in-house design facilities and some have their own manufacturing facilities as well. Egypt has several design houses and my ex-PhDs work there.



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Bloom’s Taxonomy

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Bloom’s Taxonomy is a hierarchical framework for cognition and learning objectives. In 1956, Benjamin Bloom with collaborators published a framework for categorizing educational goals: Taxonomy of Educational Objectives. Familiarly known as Bloom’s Taxonomy. This Framework has been applied by generations of K-12 teachers and college instructors in their teaching. The framework elaborated by Bloom & his collaborators consisted of six major categories: Knowledge, comprehension, Application, Analysis, Synthesis, and Evaluation. The categories after Knowledge were presented as “skills & abilities”, with the understanding that knowledge was the necessary precondition for putting these skills and abilities into practice. While each category contained subcategories, all lying along a continuum from simple to complex and concrete to abstract, the taxonomy is popularly remembered according to the six main categories.

The Old Taxonomy 1956:

The six categories of Bloom’s Taxonomy are:

Knowledge; Comprehension; Application Analysis; Synthesis; Evaluation

The Revised Taxonomy 2001: Lorine Anderson, a former student of Bloom’s, published with his collaborators in 2001 a revision of Bloom’s Taxonomy with the title of “A Taxonomy for Teaching, Learning & Assessment”. This title draws attention away from the somewhat static notion of “educational objectives” in Bloom’s original title, and points to a more dynamic conception of classification. The authors of the revised taxonomy underscore this dynamism, using verbs and gerunds to label their categories & subcategories {rather than the nouns of the original taxonomy}. These action words describe the cognitive processes by which thinkers encounter and work with knowledge.

Remember; Recognizing, Recalling, Listing, Naming, Defining Understand; Interpreting, Classifying, Summarizing, Explaining, Inferring Apply; Executing, Implementing, Integrating, Articulating, Judging Analyze; Differentiating, Organizing, Attributing, Breaking down, Illustrating Evaluate; Checking, Critiquing, Arguing, Testing, Debating Create; Generating, Planning, Producing, Composing, Role playing



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Sustainable E-mobility Transportation Feasibility Study for Integrated Solar Roads with Wireless Charging and Applicability of Vortex Bladeless.

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One of the most challenges that are facing modern transportation now, and in the future is to completely transit into sustainable e-mobility. So, this research targets to develop a feasibility study and prototypes implementation for integrated solar roads with wireless charging capabilities and to investigate the use of small-scale vortex bladeless along the roads. Because there is an essential need for such as this viability research to incorporate wireless power transfer technology with solar roadways for solar power generation and investigate the influence of magnetic fields to alleviate the related matters related, mainly the lessening in mutual coupling owing to eddy currents produced in the back part piece of the solar cell. Additionally, enhancing the cost of the wireless power charging pads materials, and optimal solar power generation. Consequently, various coils and materials have to be researched to reduce losses, identify charging pads' thermal and power density boundaries, investigate cooling issues, and build efficient layouts/ systems. To satisfy these needs, solar roadways equipped with inductive wireless systems will be investigated and implemented via developing magnetic field allocation models and their effects on solar ways to help the current, and future roads designers. Moreover, developing sustainable energy sources has become a global priority and solar energy is one of the more mature of these, having been developed and implemented for several decades. The deployment of solar energy panels has increased rapidly since the early 2000s thanks to their improved efficiency and increased public awareness. It is expected that market demand, as well as improvements in the technology, will make solar power generation more competitive, effective, and efficient when combining PV panels and roadways with a non-reflective film coating applied to address this problem reduced electricity generation. Several states and the FHWA have conducted studies to encourage the use of renewable energy technologies, including solar, with PV panels representing one of the most popular options. Therefore, one of the main objectives of this research is to conduct an innovative cost-effective development of solar power generation systems embedded in solar roads. Another sustainable option that will be investigated is to utilize the development, design, and implementation of innovative bladeless wind turbines to help in more power generation with any amount of wind for helping in the e-mobility transition process in Indiana along with the solar generation. This new turbine is working on the base of mechanical resonance to extract the wind energy that is called wind-vortex technology. So, the turbine is oscillating to capture the wind energy instead of the traditional rotational movement of the turbine based on the Kármán vortex concept.



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Cost-effective AI-Power Conversion Framework for Hydrogen Generation based on Waste-to-Energy Integrated System

Adel El-Shahat

Purdue University, USA

Sustainable energy can be generated from different resources such as biomass, solar, geothermal, wind, ocean, biomass, and hydro energy via various electrochemical, thermochemical, and biochemical processes. However, the bio-waste-to-energy path is one of the highest potential and most economical and efficient solutions in the world. But it needs more investigation, and assessment from the perspective of cost-effective power conversion, and efficiency via modern technologies. Since the hydrogen electrolyzers are innately dc in their conversion phases, it makes sense to be integrated these gadgets via a dc structure. Employing power electronic conversion raises the efficiency but also the cost of the whole system. So, there is a need to optimize this operation and quantify the benefits and drawbacks of all possible options. Power electronics is one of the efficient technologies for the decarbonization of renewable energy systems conversion. To assist power electronics converters design, and implementation, analytic calculations, and numerous specific software are available facilitating the designers from the side of circuits simulation, electromagnetic FEM, thermal analysis, etc. Recently, the AI approaches can be a corresponding tool to the conventional software to expedite the computation time. So, it is vital to create an AI-based tool for the layout of power electronics elements with the required cost-effectiveness and overall system efficiency in real physical designs nature.

The research targets the following:

- Speed up the energy conversion towards green energy via the integration of renewable energy sources, storage mechanisms, control schemes, maximum power point tracking (MPPT) devices, and bio-waste-to-energy conversion technologies.
- Create an artificial intelligence (AI) framework for the design of power electronics converters associated with the proposed hydrogen generation system from waste.
- Various conversion designs and topologies will be qualitatively and quantitatively analyzed for hydrogen electrolysis system interconnection.
- Build an AI, and simulation platform to bring together the key circuit emulators, FEM software, and analytic converter models for system automation, and the design of power electronics converters.



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Defining and Building the Engineering Workforce of the Future

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In view of the digital revolution and information age, and in response of fast changing technologies, there is a genuine interest across the globe in exploring the challenges and understand different perspectives of the future engineer. Efforts are underway to develop and share a future vision for engineering and to Identify the core behaviors, capabilities and skills required to achieve these visions The talk explains how to define and build the engineering workforce of the future. We will discuss the future engineering matrix which include Technical Knowledge, Technical Skills, and Technical Attributes which are addressed in view of the trade off between domain specific and multidisciplinary education and training. In addition to the technical aspects of the future engineer, the professional aspects include Professional Knowledge, Professional Skills, and Professional Attributes, in conjunction with Personal Knowledge, Personal Skills, and Personal Attributes. We will detail each matrix entry and elaborate by examples on the future engineer persona. The talk will report on the critical competencies required for a future-ready engineering workforce for the Industries of Tomorrow which includes, but not limited to, Quantum, Spectrum, AI, Cybersecurity, Biotech and Advanced Manufacturing. We will reflect on prioritizing the future needs and identifying the gaps compared to current provision.



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Weather Modification and Sediment Management for Egypt and Sudan

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Egypt and Sudan are countries facing water and food shortages. It is estimated that 16 km³ of water are lost each year over Lake Nubia-Nasser by evaporation. In the case of Egypt, this amounts to 20% of its annual consumption of water. This problem is accentuated by the loss of water storage through the accumulation of 8 billion cubic meters of sediments since 1965. In Sudan, Lake Nubia, forming the 150 km south part of the Aswan High Dam Reservoir, is 90% sedimented. A dual prone approach is therefore needed. The first prone consists of weather modification to recuperate water lost by evaporation. Large reservoirs create their own weather. Evaporation varies between 5 and 10 mm per day throughout the year but peaks in July. The water lost by evaporation is transported south by the winds towards the Equator. To recuperate this loss, cloud seeding over Lake Nasser is recommended. The artificial rain can then be directed to new farmlands on the shore of the reservoir. Cloud seeding aircraft used over Lake Nasser in the summer can also be used in the winter over the north coast of Egypt, when winds from the Mediterranean Sea encourage the formation of clouds. Fog catching was practiced by the Ancient Egyptians and can be revived on the shores of the Nile for additional water. The second prone consists of deep dredging the AHD reservoir, particularly between Abu Simbel and Toshka. Accumulated sediments would be transported by slurry pipelines to new farmlands along the shores of the reservoir. These sediments will constitute topsoil of nutrients. Water provided for transport of the sediments as well as water recuperated from artificial rains would provide the resources for strategic crops.



UNDER THE PATRONAGE OF
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Egyptian ABSTRACTS



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Improving Green Accounting Methods for Sustainable Development

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This research aims to identify applicable advanced managerial accounting methods that can be utilized in sustainable economic development. This is done through analyzing cost leadership strategy such as Lean Production, Lean Six Sigma and continuous enhancement (Kaizen) methods, that aim to improve the manufacturing processes by reducing waste and defects within cost elements. The importance of this research stems from the management's need to employ advanced managerial accounting methods that provide effective and deeper analysis for the reasons of production waste and how to efficiently avoid it. Therefore, this research addresses the shortcomings of traditional managerial accounting methods in providing a deeper analysis to the causes of production waste, and their inability to provide sufficient, low-cost relevant information to help the management's sustainable strategy to reduce waste. Through a research synthesis, this research presents a critical analysis of previous research on managerial accounting methods that can be utilized in a sustainable avoidance of production waste. Consequently, this research synthesis can provide the basis for future empirical studies testing the applicability of these methods according to Grounded Theory.

This paper is structured as follows:

1. An analysis of the managerial methods presented in this research
2. The relevant accounting information needed to improve cost reduction decisions in light of the firm's sustainable cost leadership strategy
3. The utilization of lean production accounting techniques in conjunction with Lean production, Six Sigma and continuous enhancement Kaizen methods to provide relevant information on the causes of production waste and how to avoid them.
4. Conclusion and recommendations for future research.

Keywords: Cost Leadership, lean production, Six Sigma, Lean production, Sustainable Development.



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Transactive Energy System Platform

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Renewable energy sources, electric vehicles, energy storage, and responsive (intelligent) loads encompass the most significant technology innovations that local distribution markets are embracing. These technologies offer immense opportunities to introduce energy commerce and peer-to-peer energy economy into the current regulated local distribution company (LDC). In this context, there is a need to analyze the several existing options for interfacing between these new entities on the distribution level and the transmission bulk power system. This analysis includes the development of several models for transactive energy market on the distribution level and further comparison amongst them to reveal their benefits and drawbacks on from both technical and economical perspectives. To complete this task, it is necessary to identify the agents that will be able to trade with the operator in charge of the distribution system market and set in place appropriate procedures to enable this energy transactions. In this work, several models for a transactive market settlement at the distribution system level and their required procedures and interfaces for coordination of the energy trade with bulk power system. A load distribution operator (LDO) is assumed in this work as the entity in charge of the distribution market settlement. LDO is capable of forecasting demand along the distribution feeders, forecasting energy prices at the interconnection nodes, collecting bids from the participants of the distribution system, and settling the market. To enable a functional transactive energy market, the following attributes have been developed.

- (i) a market settlement procedure which establishes how the participants will interact within the market, and how the distribution system market will interact with the bulk transmission market,
- (ii) a mathematical formulation for the distribution market, which will optimize its operation, determining the supply/demand to be dispatched and the distribution local marginal prices (DLMP) at each node. These market models are developed with different objectives and have been tested on different benchmark systems. The conducted tests and obtained results demonstrate the good performance and the high accuracy of the proposed transactive market models.



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Giving Parents a Voice: Views of Inclusive Education In Egyptian Private Schools

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Limited research is available on the current state of inclusive education in the Egyptian educational system. This study sought to increase the amount of available information to researchers, practitioners and policy makers by providing data on how parents view the current state of inclusive education in private Egyptian schools. Electronic surveys were distributed via social media, NGOs and private organizations serving parents of children with special educational needs and disabilities. A total of 246 survey responses were collected. Participants were asked to provide feedback on a number of areas related to inclusive education such as the admission process, school information, how inclusive education was implemented in their child’s school, role of support teachers and what social issues they felt impacted inclusive education in Egypt. Descriptive statistics are provided to summarize the survey findings. This information can be used to develop further research and focus the attention of school administrators and Egyptian policy makers on the most salient issues related to successfully implementing inclusive education in Egyptian private schools.



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Challenges and Successes of Inclusive Education in an Egyptian Private School

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Within Egypt there is limited information available about the state of inclusive education, its successes or challenges. This study aimed to add to this body of knowledge by collecting qualitative data about how inclusive education was being implemented in a private international school in Cairo, Egypt. The school served as a critical incident case study, to assess how the participants viewed inclusive education, where they thought the school was successful and what the biggest challenges were for inclusive education in the Egyptian context. Semi-structured interviews were conducted with five participants from the school's administration and teaching staff. The results indicated that the participants viewed inclusive education similarly to international standards and they reported that the inclusive educational environment provided academic, social, emotional and behavioral benefits to all of the students. Participants noted several areas of success, particularly in creating an inclusive community at school, but faced challenges related to limited resources that hindered what they were able to do for students. Social stigma related to special educational needs was noted as one of the largest challenges to overcome in order to make inclusive education successful in the Egyptian educational context. Suggestions for future research, policy actions and increased public acceptance are provided based on the participants' feedback.



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Climate Change and Autoimmunity

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The personalized immune function can influence by the climate change. At the long-term the kinetic change of the climate has altered our antigen exposure. It is potentially disrupting antigen-specific tolerance by the cellular and humoral immune responses against the epitopes mimicry within our body. The autoimmune diseases as multiple sclerosis and systemic lupus erythematosus (SLE) are mostly stimulated by the climate change. Sunshine as climate factor can influence the progress of SLE. Also, the moisture may be risk factor for SLE disease immune activity. The air pollution by the crystalline silica stimulates several systemic autoimmune diseases by enhancing the secretion of autoantibodies. The most important return from this study is the recognition of the immune link between the autoimmune diseases and the climate changes.

Keywords: Climate, autoimmune, multiple sclerosis, systemic lupus erythematosus, epitopes.



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Digital Transformation, Responsible Artificial Intelligence and Cybersecurity in Oncology

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Digitalization of oncology transforms management of cancer patients, oncology processes, oncology education and oncology research. Purpose: This article has two aims: the first is to review how digital transformation was implemented in Clinical Oncology department, Ain Shams University. The second is to highlight responsible artificial intelligence opportunities and cyber security major threats. Methods and Materials: a review has been conducted of digital transformation implementation of a pilot project then a megaproject. To achieve this strategic goal of digital transformation, all processes were revised and optimized. This required close cooperation with information technology engineers to have a common understanding of all oncology processes and to adapt industrial digital tools to our academic needs. Furthermore, knowledge of all related laws and regulations during digital transformation was a necessity in order not to violate during developing the new needed processes, followed by training to upskill and reskill all stakeholders. Then a literature review of the emerging role of responsible artificial intelligence and cybersecurity threats in oncology was conducted. Results: Digital transformation can be done in an oncology department in a low-middle income country, our experience during implementation can benefit other entities who are in the process of implementation. Currently, responsible artificial intelligence has several applications in oncology throughout the cancer continuum and in multidisciplinary practice. Cybersecurity threats continue to evolve, combatting these attacks are becoming more difficult for health care organizations which require change in strategies, tactics, and culture around cyber security in oncology. Conclusion: Although the process of digital transformation is hard and needs extra work from oncologists, the opportunities are worthy. Artificial intelligence has a promising role in oncology and cybersecurity is mandatory so that oncology systems will not be exposed.

Keywords: Digital transformation, responsible artificial intelligence, cybersecurity, oncology



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**Problem Based Learning (PBL); Five Years of Application in
Al-Azhar Medical School
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Problem Based Learning (PBL) is now widely adopted in medical programs internationally. In contrast to rote learning and memorization, PBL is an active learning process that involves interaction, pursuing information, collaborative problem-solving, sharing ideas, and testing hypotheses. In 2018-2019, the integrated medical program has been launched in all medical schools in Egypt, including Al-Azhar medical schools. Our objective is to discuss the pros and cons of the application of PBL in Al-Azhar Medical School. PBLs have been developed with intended learning outcomes (ILOs) and discussed in two sessions throughout the week. In the first session, students sit down with a tutor “facilitator”. He asks the students to elect a leader and a reporter for the session. The students finish their session by selecting ILOs which are translated into further reading in certain topics or disciplines related to the problem as anatomy, physiology, pathology, etc. Again, one of the students is assigned to be a doctor and another one as a patient as a matter of simulation. In the second session, the leader will debrief the PBL scenario, and a clinical scenario will be simulated by the doctor and patient. Students will present and discuss the topics related to the problem. Feedback is taken and an evaluation form is also filled. A video record was kept for some cases. PBL is applied in different modules, e.g., renal, endocrine, or infection control. After five years of its application, it was found that some colleagues do not moderate the PBL session as a facilitator and behave as a lecturer. They either do not convince about PBL or do not know how to deal with it?. In conclusion, PBL is one of the principal pillars of integrated medical education. More training, convincing, and commitment from other faculties are still needed.



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Climate change effect on appearance of dangerous agricultural pests and how we can face that

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Climate change is the changes in environmental factors such as temperature, humidity, CO₂, and other greenhouse gases increasing, and precipitation over many years caused by the ecosystem pollutants caused by human effects. Exactly this change affects the plant species' varieties, crop health, and quality leading to its attack by different pests including pathogens and insects that may migrate from their original place to another place to adapt to this climate change causing huge harm to the plants. These migrating insects such as the fall armyworm (maize pest, *Spodoptera frugiperda*) and white grubs such as (strawberry pest, *pentodon algrinum*) cause huge harm and losses in crop production. So there is a strong need to find solutions for Climate change and for control of these insect pests. There are suggested solutions for Climate change including increasing the green area especially trees to absorb the raised CO₂ and to decrease the temperature, also inhibiting industrial factories building on agricultural lands, rainwater storage to preserve it as an important source of water, desert reclamation, inhibiting waste throwing in the river Nile, inhibition of using of chemical pesticides and using eco-friendly control agents, and using a clean energy source such as solar energy. Nuclear polyhedrosis virus is a double-stranded DNA virus, it is a safe specific insect pest control agent and it is considered an eco-friendly control agent so it can be recommended against these insect pests.



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Tracing and assessment shoreline dynamics on the New New Alamein City, Mediterranean Coast of Egypt, applied geomatics technique

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Shoreline is constantly changing over different time and spatial scales. Multiple processes control its dynamical trends and rate of change, including marine processes (waves and currents, land agents (geology and topography) and anthropogenic impacts. On the Mediterranean coast of Egypt, the development project, namely the New Alamein City being under construction since 2016, alters depositional and erosional patterns along City's coastal zone (extends up to 13 kilometers). A Geomatics technique is proven powerful and accurate tool for monitoring coastal zones. In the current case study we integrate high resolution satellite images (Planetscope constellation), Terrestrial Close Range Photogrammetry (CRP), Field Survey (station GPS survey) and GIS techniques (Digital Shoreline Analysis Software) for tracing and assessment a high dynamic shoreline. It is found that the construction of some engineering measures such as Jetties, groins and suspended concrete marina left a high rate of accretion in some subsectors reaching 50 meters per year; on another hand such sea defense works caused significant erosions in some hotspots (like sea cliffs and pocket beaches) exceeding 20 meters per year. Accordingly, this coastal zone requires some degree of management and planning, considering the current and future land use and occupations and applying soft measures in such fragile environment.

Keywords: Geomorphology; Anthropocene; Sustainability, Coastal Management; Smart City



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Prohibition of Chemokine Gene Marker Declines Cancer Cell migration and Invasion: In Vitro Study

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Understanding the molecular and cellular behavior of chemokines attributes to target cell division, invasion and migration, which consequently contribute to decline metastases as one of the main mortality reasons among cancer patients. In the present research, we treated different cancer cell lines with specific small interfering RNA (siRNA) targeting mRNA of the target chemokine gene marker. Methodology: We measured cytotoxicity by MTT. Then, we monitored knocking-down of genes related to cell division, invasion and migration by qRT-PCR, evaluated protein expression by immunofluorescence, DNA damage response by Comet assay and cell migration by wound healing protocol. Results: When cancer cell lines were transfected by chemokine inhibitor, cells viability were reduced significantly in a concentration dependent manner. The observed tail DNA percentages were elevated remarkably after 48h of transfection. Moreover, the chemokine gene and protein expressions were extremely down regulated. The potency of chemokine inhibitor to diminish cell propagation extensively was noticed after measuring gene markers related to cell division, invasion and migration. Furthermore, Transfection lessened cell migration in silenced cancer cell lines regarding to non-transfected cells as measured by the gap area of migration. Conclusion: Target gene therapy by knocking-down chemokine contributes to inhibit cell division, invasion and migration. Further investigations to understand chemotactic mechanisms of metastasis are required to terminate primary cancer cells prior to their metastasis to induce secondary tumors after cessation of primary ones and so contribute to improve public health.

Keywords: Chemokines; Transfection; siRNA; Cell viability, Cell migration, DNA damage.



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Evolution of matrix cracks from fiber/matrix debones in unidirectional fiber composites

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The increased demand for clean energy forces industry to improve the economics of renewable energy resources. Wind energy industry is competing with other forms of electric power generation. Blade lengths reach ~ 45m to increase turbine powers to 5 MW and larger. Carbon fiber already has proven to be advantageous for turbine manufacturers for structural areas of the blade taking advantage of the lighter weight despite their greater cost. Fiber-reinforced polymer (FRP) composites have been extensively used over the years in engineering applications, for example in aerospace, automotive and energy industries. Due to their complex nature, different types of damage are observed that alter their properties in a negative way especially their stiffness. Delamination, matrix cracks, fiber breakage and waviness, fibers nonuniform distribution and fiber-matrix debond are mostly observed imperfections in composites. Matrix cracking evolution is investigated numerically using a finite element model in unidirectional composite under transverse tension. The model representative volume element (RVE) encloses nonuniformly distributed fibers. Under applied tension normal to fibers cavitation at the matrix /fiber interface is found to be the plausible mechanism. Consequent debonding and debond growth and kink-out process are investigated. The Energy Release Rate (ERR) of debond crack tip was calculated using Virtual Crack Closure Technique (VCCT) to study the debond growth. Results show that the debond initiation site and its growth behavior is affected through stresses perturbations in the vicinity of nonuniform adjacent fibers.



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Future of Renewable Energy in Egypt: Challenges and Opportunities

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Egypt's energy strategy aims to increase the share of renewable energy to reach 20% of the country's energy mix by 2022 (short term target) and 42% by 2035 (long term target). In 2022, the share of both the solar and wind energies is 5% of the total generated energy in Egypt, and the share of hydropower is 7%, totaling to 12%, still far below the short term target, and raising doubts about the long term one. Challenges to the future of renewable energy in Egypt include: Slow increase in the demand due to energy efficiency measures. The existence of huge amount of surplus electric generation capacities (60 GW) compared to the peak load (35 GW), thus, plans to add new generation plants (including renewables) will slow down. Recent natural gas discoveries will lead to increased reliance on natural gas. High capital costs of renewables makes the investment unattractive. Agreements to build four nuclear power plants will decelerate renewables. Opportunities for transition to renewables in the near future include:

Abundance of land, sunny weather and high wind speeds, with published Solar Atlas and Wind Atlas. Egypt's environmental commitments to Paris Agreement (PA), its Nationally Determined Contributions (NDCs) and its latest hosting to CoP27. New policies and regulations such as the issuance of green bonds, taxing low customs for renewable equipment, Feed-in Tariff (FiT) for purchasing renewable energy from customers and attractive Power Purchase Agreements (PPA) with utility scale investors. Initiative to introduce green hydrogen (resulting from electrolysis of water by renewable sources) into its energy mix.

This paper questions the long-term target of having 42% of the total generated energy produced from renewables by 2035 and suggests a roadmap for a more realistic energy transition in Egypt.



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The Impact of the Quality of Scientific Research on processing the Phenomena of Climate change In light of Vision 2030

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Scientific Research is an important tool for development, and modernization processes cannot take place in any field in its absence. Quality of scientific research is based on these processes, and it draws the future map for leadership and the Egyptian citizen. Because of climate change issues have become the talk of the hour, It has been noted in present time that, there is an increasing interest in the phenomenon of climate change, and with this interest, the role and responsibility of researchers, scientific is increasing to intensify research efforts related to climate issues. So, that the scientific paper explanation the impact of the quality of scientific research in the light of Vision 2030 in (4)parts. The first part is explain the quality of scientific research. This part included an explanation of the concept and quality of scientific research, the concept of climate change, climate change strategies, the importance of the quality of scientific research, and the mechanisms and methods that investment in scientific research. The second part is explain Climate Change and includes the concept of climate change, the causes of climate change, the effects of climate change, the risks of climate change, the climate change strategy, and indicators for measuring the goals of the climate change strategy. The third part explain a proposal of mechanisms which the quality of scientific research processing the phenomena of climate change in the light of Vision 2030. Each part includes shapes and figures. The scientific paper ends with the references.



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Stand Alone Agricultural Greenhouse to Mitigate Climate change and Helps Facing IWRM Challenges in Egypt

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Water is the core of life on the earth. Freshwater on the earth is limited and faces many challenges that limit its availability. The case in Egypt is not exceptional. Egypt's per capita water share indicates a serious water scarcity situation. Therefore, integrated water resources management (IWRM) is a must in Egypt and other MENA countries with similar conditions. The different challenges including facing the application of IWRM in Egypt will be presented. Both the external and internal challenges will be presented with the major steps to transfer these challenges into grants. Internal challenges include lack of funding, deterioration of water quality, climate change impact, lack of public awareness, lack of institutional cooperation, ...etc. While the external challenges include the construction of storage dams on the upper Nile without the agreement of all concerning parties, lack of collaboration, political challenges, ...etc. The presentation will include the outcomes of a novel stand-alone agricultural greenhouse with desalinated water and renewable energy as a promising solution to mitigate climate change impact and as an adaptation strategy to save more water and produce food.

Keywords: Water Resources, Management, IWRM, Water Quality, Agricultural Greenhouse, desalination, Renewable Energy, Climate Change.



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The importance of balanced diet for our health after climate changes role of Science, Technology, and Innovation (STI) in achieving sustainable development goals- 2030

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Nutrition plays a crucial role in our health either to be beneficial or harmful. Maintaining a good healthy state is emerged as a crucial item for our life as per WHO we are in need to one health. The pandemic COVID confirmed high mortality with presence of co morbid diseases/ metabolic diseases, as well as the peoples whom have balanced diet /nutrition was in safe and mild infection with high cure rate .Non-alcoholic fatty pancreatic disease (NAFPD) or fatty pancreas emerged as health problem parallel to obesity with serious complications than Non Alcoholic Fatty Liver Disease(NAFLD) . NAFPD can lead to diabetes mellitus, chronic pancreatitis and pancreatic cancer Extrapancreatic complications to cardiovascular system is reported more than expected than NAFLD /NASH. Cancer pancreas raise up as 3rd causes of death which is related to NAFPD.By 2030 NAFLD will be the first indication for liver transplantation with high economic burden to the countries . Aim was: To give attention to 1- the emerging of NAFPD which preceded the development of DM type 2 obese or non obese . 2- evaluate the frequency of DMtype2 with its complications . 3- Evaluate cardiovascular system affection in NAFPD compared to NAFLD in the form of Aortic Intimal Medial thickness and Carotid Intimal Media thickness(subclinical atherosclerosis) with consequent side effects especially to young youth >30 years old whom the back bone of the countries . Methodology Both sex male and females was included 88 subjects , age from 20-60 years old obese or non . Routine investigations done, fasting blood sugar, HbA1c%, liver profile , lipid profile , serum insulin level for calculating insulin resistant (IR). Abdominal Ultrasound for diagnosis,grading of fatty pancreas and fatty liver and measurement of intimal thickness of both aorta and carotid artery will be done .Statistical analysis done accordingly . Results: Fatty pancreas grade 3(82%) compared to Fatty liver grade 3(32%). The normal health subjects with no DM non obese still have NAFLD, NAFPD and CVS affections due to unbalanced nutrition / malnutrition ? Conclusions: Still we need to adjust our nutrition to get a good health inspite of normal BMI and no DM ,as there is NAFLD/NAFPD in normal BMI , non DM type 2 which confirm that NAFPD is leading to DMtype2



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FPGA Design and Implementation for Adaptive Digital Chaotic Key Generator

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Information security is very important in today's digital world, especially cybersecurity. The most common requirement in securing data in all services: confidentiality, digital signature, authentication, and data integrity is generating random keys. These random keys should be statistically tested. Hardware security is more recommended than software. Hardware security has more speed and less exposure to many attacks than software security. Software security is vulnerable to attacks like buffer overflow attacks, side-channel attacks, and Meltdown-Spectre attacks. The best solution that introduces both benefits is FPGA Security Implementation. In this paper, we introduce an FPGA Implementation to the adaptive digital chaotic generator. The algorithm is proposed and tested before. We introduce its implementation as hardware. The target FPGA is Xilinx Spartan 6 XC6SLX4-2CPG196. We used MATLAB HDL Coder for the design. Keys blocks of different lengths are produced.



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Optimizing Techniques for using MATLAB HDL CODER

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MATLAB HDL Coder, for designing and implementing FPGAs became a very useful tool for fast proof of concept in one face and in easily Testing and verification on the other face. Recent research shows that MATLAB HDL Coder has Main drawbacks over these advantages it generates a code that's not optimized for both area and frequency. In this paper we provide techniques for optimizing both area and frequency without losing the main advantages. For area optimization the most affecting problems are for loops, calling specific function multiple times with different inputs, and that the synthesiser chooses look up tables instead of block memory which results in over use of the resources. The paper introduces each problem with example of both MATLAB script and before and after techniques implementation. The paper also introduces a technique to make frequency optimization with the same method of example. The example here is based on the Advanced Encryption Standards. The AES is a symmetrical key algorithm that is widely used in cyber security, information security in general.



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Unconventional solutions in architectural design to meet the challenges of climate change

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The crisis of climate change is increasing day by day, which makes it imperative for all of us to be part of the solution instead of being part of the problem. Since the construction sector is one of the most significant energy-consuming and emission-emitting sectors, starting with the early stages of raw material production and during the construction and operation stages, ending with the demolition or reconstruction stage. The research assumes that from the preparation stage of the design, the architectural designer can create unprecedented architectural solutions or even develop traditional solutions to enable the building to adapt to the phenomenon of climate change through creating an innovative design that can efficiently interact with the constantly changing ambient conditions and surrounding environment. The research paper presents a number of exceptional solutions for various projects at which the designer tried to mitigate climate change and deal with Egypt's location more efficiently to reach the best solutions in the light of many economic, urban, planning and construction constraints, especially during the development of the existing projects. The study discusses the development of Cairo International Stadium, through proposing an innovative shading system integrated with photovoltaic and micro wind turbines systems where the environmental impact and the economic issues are clarified during the study. While the integration process of different environmental design solutions during early design stages have been clarified and discussed through the last two projects (AIG headquarter & (Al-Qibla) grand mosque at Alshrouk city), where efficient design solutions for natural ventilation and daylight, have been implemented .



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Life cycle emissions assessment for buildings in Egypt

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The International energy agency stated that the building construction and operation industry accounted for 36% of the global energy used and 40% of energy-related Carbon dioxide emissions as stated in the global status report, 2019. The first step to tackle such a problem is to measure the carbon emission embedded in various stages of the construction industry and identify different strategies to mitigate these emissions which requires an extensive database. In the Middle East region; especially in Egypt, lack of data used to measure the carbon emissions hinders the steps to minimize GHG emissions from construction. This paper provides a methodology to develop a database to serve as a tool to evaluate a building's energy consumption and carbon emissions. The model uses the principles of life cycle assessment methodology as identified by ISO14040. A process-based life cycle energy and life cycle carbon emissions analyses are applied on residential buildings to measure the embodied energy and carbon emissions at building materials production stage and building onsite construction stage. This is done for the three main building materials used in Egypt; namely, concrete, steel, and masonry. The model also measures the operating energy and carbon emissions at the building operation stage. Building materials production stage data was collected using a questionnaire, this information was used in an energy analysis software to measure the expected emissions. This study will help stakeholders assess their buildings carbon emissions and derive more informed decisions for material selection to reduce the carbon emissions from the building construction industry.



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International Roughness Index Prediction for Continuous Reinforced Concrete Pavements using Artificial Neural Networks

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International Roughness Index (IRI) is a key parameter that indicates the ride quality and user comfort and reflects the performance condition. Furthermore, as the road roughness increases, road serviceability decreases. Consequently, vehicle speed decreases and the travel time increases which will produce more carbon dioxide emissions and reflects adversely on the environment. The prediction of IRI and other performance parameters is very imperative to Pavement Management Systems (PMS) and to sustainable development in general. Several studies have been devoted to predicting IRI of flexible pavements. However, very few papers focused on rigid pavement performance prediction. In the current study, an Artificial Neural Network (ANN) model was developed to predict the IRI of Continuous Reinforced Concrete Pavements (CRCP). To develop IRI model, the Long-Term Pavement Performance (LTPP) data was used as a reliable source of data. The data used in the current research paper is the same data and inputs used for the development of the Mechanistic-Empirical pavement Design Guide (MEPDG) IRI model for CRCP. The number of data points are a total of 90 IRI measurements. The model inputs are; initial IRI, number of medium- and high severity transverse cracks, number of medium- and high-severity punchouts, percentage pavement surface with patching (Medium to High severity flexible and rigid), pavement age in years, freezing index, and percent subgrade material passing the No. 200 U.S. sieve. The results of this study show that the ANN prediction model for CRCP yielded good prediction accuracy with low bias ($R^2=0.81$, 0.97 , and 0.92 for training, cross validation, and testing, respectively plus an overall R^2 of 0.85).

Keywords: IRI, ANN, CRCP, Punchout, Transverse Crack



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Chronic Kidney Disease Prediction a Comparative Analysis using K-Nearest Neighbor, Logistic Regression, and Optimized XGBoost

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The progression of the chronic kidney (CKD) disease and methodologies to diagnose chronic kidney disease is a challenging problem which can reduce the cost of treatment. CKD include all degrees of decreased kidney function, from mild, moderate, and severe chronic kidney failure, the recognition and prevention of CKD remain deficient. CKD is a worldwide public health problem; in Egypt, it is one of the major health challenges, it affects approximately 13% of the adult population, resulting in significant morbidity, mortality and health care costs. Many researches have been carried out using machine learning techniques on the detection of CKD at the premature stage. In this paper, various classifiers were employed for the classification of a CKD dataset. The utilized algorithms were K-nearest neighbor (K-NN), Logistic regression (LR), and optimized XGBoost (eXtreme Gradient Boosting). The accuracy and mean absolute error(MAE) were as follow: 90% and 0.1 for K-NN. 95.8% and 0.042 for LR, 100% and 0 for optimized XGBoost respectively.

Keywords: chronic kidney disease; K-NN; Logistic Regression; optimization; XGBoost; F-measure; precision; sensitivity



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Nanomaterials Rule in Increasing Water thermal properties of Decentralized solar still

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Enhancing heat and mass transfer using nanofluids increases the desalination rate of single basin solar still. The study includes a mathematical model that reflects the effect of different nanoparticles on the desalination rate. The model predicts an increase in the cumulative productivity by 98% using 0.01% Volume fraction percentage Al₂O₃ Nanoparticles and 105.8% using CuO nanoparticles. The materials were characterized by SEM with integrated EDS, XRD, FTIR, UV-spectrophotometry, and DSC. CuO shows 91.9% absorptivity and 0.15% emittance. The average particle size is 40 ± 5 nm and with a specific heat capacity of 450.7 J/kg·°K. The powder color is dark brown. A little amount of CuO nanoparticles suspends in fluid and most of the particles precipitate after using a thermostatic water bath shaker. Further investigations are required to examine the effects of nanoparticle size, amount of nanoparticles, stability of the nanofluids, and the dispersion procedure.

Keywords; Nanofluids, Desalination, Solar still, Water scarcity



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Fossil Groundwater Reserves in Egypt: Optimal Exploitation Approaches for Sustainable Use

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Egypt's food crisis has prompted the reclamation of new groundwater-dependent areas. Thus, a massive development project that aims to turn vast expanses of desert into productive agricultural land has been proposed (the national project for land reclamation). Despite the urgent need for such rural development, it is perilous to just rely on fossil groundwater sources. The related policy of heavy groundwater withdrawal would alter the dynamics of the aquifers significantly, which could threaten its ability to serve upcoming purposes. Therefore, it is crucial to use these groundwater resources extremely carefully. Therefore, effective groundwater management is unavoidably needed, along with long-term feasibility assessments to ensure the project's sustainability, to avoid or limit the severe repercussions of resource misuse that are expected. It is extremely difficult to achieve agricultural sustainability while using groundwater resources wisely, especially at the projected heavy pumping rates. The proposed study seeks to give the local government the necessary scientific backing so it can develop policies that support the best groundwater supply for the current and future rural communities and agricultural areas north of the western desert. The goals go beyond just choosing a safe pumping schedule to prevent aquifer depletion and/or saltwater intrusion. However, implementing groundwater simulation models based on optimality approaches would bring about exploitation strategies that both maximize agricultural investment and guarantee the aquifers' suitability for prolonged development. The installation of brackish water scavenger wells and underground barriers, for example, are suggested as effective mitigating techniques to stop or slow the intrusion of saline water. The desired results would undoubtedly serve as the foundation for wise local water management choices that may balance environmental protection and the socioeconomic well-being of our country. This abstract is based upon work supported by Science, Technology & Innovation Funding Authority (STDF) under grant number (46278).

Keywords: Groundwater modeling, fossil groundwater, sustainable development, agricultural sustainability and climate change



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Sustainable Development in Egypt: Challenges and Opportunities

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Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. In 2015, the United Nations adopted 17 SDGs to balance social, economic, and environmental sustainability. They hoped to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. In Egypt, there is a problem with increasing population at high rate more than two million habitants/year. There is also a high level of certainty that the population will continue to grow in the coming decades. The number of populations in 2022 is 104 million habitants and It is expected to be 134 million habitants after ten years in 2032. The big challenge is how to satisfy their needs from water and energy (SDG#6: Clean water and sanitation, SDG#7: Affordable and clean energy). In this paper, out of box solutions are proposed to overcome these problems. Atmospheric Water Generators (AWG) are proposed for clean drinking water needs and Vertical Axis Wind Turbines (VAWT) for electrical energy needs.



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MODEL PREDICTION FOR THE MODIFIED DYNAMIC DUAL MIXED MEDIA FILTER

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This study aimed to produce a simplified model simulates the dynamic up flow dual media filter using the experimental results of the pilot operation for the best solution technically and financially found. The produced model covers all the requirements to ease direct filtration the design for the dual media dynamic filter and simulate its main criteria to establish good design for such type of treatment. The study had produced a simulation equation for the dynamic filter using the dual media to ease the design and fast it with accuracy 90% at different rates of filtration against different TSS loads as follows: $T.R.E \% = k [-1.20 \times ROF/0.01a] + C$ Where: a = Influent suspended solids in ppm. ROF = Rate of filtration $\geq 100m^3 /m^2 /d$. k = Factor of media property (1.59). C = Constant (104.3)



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Critical thinking skills and dispositions among nursing students applying problem based learning: An analytical research study

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Critical thinking is a necessary competency in nursing care. It is helpful for the efficient determination of nursing diagnosis and effective satisfaction of patient needs, hence high-quality health care. Different educational approaches and strategies are used to improve this competency among nursing students. Problem Based Learning (PBL) is one of them. Purpose: To assess critical thinking skills and disposition among nursing students applying PBL in nursing courses. Methods: Following comparative and correlational designs, the data were collected from nursing students using the Arabic versions of the California Critical Thinking Skills Test and California Critical Thinking Dispositions Inventory. Results: Deduction skill scored the highest mean (53.13 ± 13.75) followed by analysis (52.22 ± 18.89) compared to evaluation (41.43 ± 16.43) and induction (39.23 ± 16.92), with a statistically significant difference for total critical thinking skills along with academic batches among nursing students applying PBL in nursing courses ($p=0.000$). Self-confidence scored the highest mean (86.85 ± 10.74) followed by inquisitiveness (77.17 ± 9.83) compared to open mindedness (55.14 ± 6.81) and truth seeking (45.97 ± 9.86), with a statistically significant difference for total critical thinking dispositions along with academic batches among nursing students applying PBL in nursing courses ($p=0.002$). Also, there is a statistically significant correlation between critical thinking skills and disposition ($p=0.029$). Conclusion: Studying nursing courses applying PBL contributes to critical thinking skills and disposition improvement among nursing students along with academic batches with a positive relationship between both. So, taking measures to improve thinking skills and disposition will lead to each other improvement putting into consideration dedication skill besides open mindedness, truth seeking, and maturity dispositions. Also, energizing PBL System components is needed for both improvements.

Key words: Critical Thinking Dispositions; Critical Thinking Skills; Educational Approaches; Nursing Education; Problem Based Learning.



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Concept Mapping and Enhancement of Problem Based Learning Practices among Nursing Students: A Quasi-Experimental Design

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In the light of the current era of abundant information and technology which characterized by rapidly changing data and knowledge, the nursing students must be able to link the new knowledge with the previously learned facts, concepts, and principles to make rational decisions in nursing practice. So, nursing educators target the educational strategies that can help their students in this process. Concept Mapping and Problem Based Learning (PBL) are two of these educational strategies. They complement each other towards enhancing cognitive abilities and problem-solving of students and hence their effective performance in nursing and patient care. Purpose: To study the effect of a training program on using concept mapping in the enhancement of PBL practices among nursing students. Methods: The study was conducted on 77 first-year nursing students following a quasi-experimental design using five data collection tools namely as; Students' knowledge questionnaire about concept mapping, Structured tool for assessment of concept map in PBL, Students' performance in PBL sessions questionnaire, Students' opinion about working with concept mapping scale and Concept maps of brainstorming sessions. Results: The training program had a significant positive effect on the knowledge and practice of students. There was a significant correspondence between the preset learning objectives and the learning objectives\issues generated by study groups students compared with control groups at the follow-up phase. Also, there was a significant improvement in students' attitude towards using concept mapping in PBL sessions along with phases of training program. Conclusion: Concept mapping improves nursing students' practices in PBL sessions represented in extracting more learning objectives\issues, improving students' performance in PBL sessions, and maximizing their attitude towards using concept mapping in PBL process enhancement and memorization of relevant information. So, it is recommended to take needed measures towards adopting and monitoring using of concept mapping strategy in PBL sessions as one of the teaching-learning strategies.

Keywords: Brainstorming session, Concept Mapping, Debriefing session, Nursing Students, Problem Based Learning.



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Work Hazards Training Program and Its Effect on Quality of Work Life and Turnover Intention among Staff Nurses during COVID-19 Pandemic: A Quasi-Experimental Design

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No one occupation never faces hazards that could be originating from the practice of the workforce themselves or from the equipment, machines, the structure of the workplace itself, or the environment of the organization as a whole. The nature of nurses' work or its organization is a source of many types of work hazards, which affect their work life and might consequently lead to the turnover intention that could be maximized in case of a pandemic such as COVID-19. Training staff on work hazards could be effective in their management. So, the aim of the study was to assess the work hazards training program and its effect on the quality of work life and turnover intention among staff nurses. Methods: Following the quasi-experimental design, the data were collected from 184 nurses working at inpatient units in Suez Canal university hospital from the beginning of November 2020 to the end of August 2021, using four tools namely; Work Hazards Knowledge Questionnaire, Work Hazards Practice Questionnaire, Quality of Work Life Questionnaire, and The Anticipated Turnover Intention Scale. Result: There were statically significant differences before and after the work hazards training program regarding knowledge satisfaction (20.7%, 91.8%, and 83.7%), the practice represented in actual hazards (54.9%, 37.0%, and 44.0%) and preventive measures (28.6%,74.5%, and 67.4%) along with pre, immediate post and follow up phases of training program respectively. The same was found for quality of work life (83.2%, 81.0%, and 88.0%) and turnover intention (56.0%, 50.5%, and 53.0%) along with phases of training program respectively. Conclusion: Work hazards training program causes improvement in work hazards management whether the level of staff nurses' knowledge satisfaction or practice represented in decreasing exposure level to actual hazards and increasing preventive measures during the COVID-19 Pandemic. Also, it causes improvement in the quality of work life and turnover intention of nurses. The staff and organization have complementary roles in work hazards management. So, the conduction of regular work hazards training program for nurses and other health professional staff is needed for work hazards management that is strengthened by the organizational role in their management.

Key words: work hazards, preventive measures in health services, quality of work life, turnover intention.



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Dr. Adel El-Shahat is currently an Assistant Professor - Energy Technology, School of Engineering Technology at Purdue University, USA. He is the Founder and Director of Advanced Power Units and Renewable Distributed Energy Lab (A_PURDUE). He has more than 20 years of working experience in academia and industry. He has good experience in funding grant proposals, and He got some awards and recognitions due to his research work. He has good experience directing research for both graduate and undergraduate students for funded projects. He served as principal investigator, and co-investigator for multiple external, and internal funded proposals. He holds full-time academic positions at

Purdue University, Georgia Southern University, the University of Illinois at Chicago, Ohio State University, USA, and Suez University, Egypt. He received a B.Sc. in Electrical Engineering from Zagazig University, Egypt, in 1999. the M.Sc. in Electrical Engineering (Power and Machines) from Zagazig University, Egypt, in 2004, and the Ph.D. degree (Joint Supervision) from Zagazig University, Egypt, and The Ohio State University (OSU), Columbus, OH, USA, in 2011. His research focuses on Modeling, Design, Optimization, Simulation, Analysis, and Control of various aspects such as , Renewable Energy Systems; Smart Nano & Micro- Grids; Electric Mobility & Transportation Electrification; Wireless Charging of Electric Vehicles; Climate Change; Electric Vehicles; Special Purposes Electric Machines; Deep Learning Techniques; Distributed Generation Systems; Thermoelectric Generation; Special Power Electronics Converters; Power Systems; Energy Storage & Conservation; and Engineering Education. So far, He has 10 books, 5 chapters in books, 70 journal papers, 73 conference papers, and 106 other publications with his collaborators, and students related to his research interests. Additionally, He has distinguished professional training, and He is a Senior Member in the IEEE and IRED institutions along with 21 professional memberships in other societies. He served as a book editor for 6 books, and a reviewer for 8 books. He is a guest editor and editor-in-chief for two international journals. Also, He is a reviewer for other 35 international journals. Moreover, He served as invited conference sessions chair and reviewer for 33 international conferences along with other community and academic services.



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Dr. Adel S. Elmaghraby is the Director of Industrial Research and Innovation and Winnia Professor of Computer Science and Engineering at the Speed School of Engineering - University of Louisville. He has also held appointments at the Software Engineering Institute - Carnegie-Mellon University, and the University of Wisconsin-Madison. He advised over 60 master's graduates and 36 doctoral graduates. His research contributions and consulting spans the areas of Cybersecurity, Intelligent Multimedia Systems, Neural Networks, Visualization,

AI, and Simulation. His research applications include Smart Cities, Data Analytics, Medical Imaging, Bioinformatics, and Computer-Aided Diagnostics. He is a well-published author, a public speaker, member of editorial boards, and technical reviewer. He was recognized for his achievements by several professional organizations including a Golden Core Membership Award by the IEEE Computer Society at the 50th anniversary celebration. Dr. Elmaghraby continued collaborations, mentoring, and scientific contributions have resulted in research funding, international collaboration, and published articles in many prestigious journals such as IEEE-TMI, Medical Physics, Journal of Neuroscience Methods, and Protein Engineering. He is the former President and lifetime member of the Association of Egyptian American Scholars.



Jennifer Lynn Gordon is a Board Certified Family and Psychiatric Nurse Practitioner with more than 13 years of hands-on patient experience and leadership. Collaborate among staff and interdisciplinary teams to ensure comprehensive quality care from birth to end of life. Develop clinical based treatment plans in compliance with standards of care and professional practice guidelines while possessing an intrinsic aptitude for compassion and support. She earned a Doctorate of Nursing Practice in 2020, a Master's Degree, Nursing (Family Nurse Practitioner Track) in 2015, a Bachelor's Degree, Nursing 2005 also from Bellarmine, and Bachelor's Degree, Psychology in 1997 with all degrees from Bellarmine University. Dr. Gordon has

particular interest in the use of Artificial Intelligence and Virtual Reality for diagnosis, therapy, and wellness.



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Dr. Ahmed Ali A. Mohamed (El-Tallawy) is an Associate Professor of Electrical Engineering (EE) at the City University of New York (CUNY). He is the EE PhD Program Advisor and Director of the Smart Grid Interdependencies Laboratory (smartgrid.ccny.cuny.edu). Professor Mohamed's research interests include critical infrastructure interdependencies, smart grids, renewables, and transportation electrification. He's been leading various projects sponsored by private and government agencies, e.g. National Science Foundation and New York State Energy Research and Development Authority. Prof. Mohamed serves on the editorial board

of multiple journals, including IEEE Transactions on Transportation Electrification. He is the recipient of the NSF CAREER Award, among several other honors and awards.



Dr. Ahmed ElSawy joined Tennessee Technological University (TTU) as a Professor and Chairperson, Department of Manufacturing and Engineering Technology in July 1999. Prior joining TTU, he was a professor and graduate program coordinator in the IT Department at the University of Northern Iowa. Before that, Dr. ElSawy was the founder director of Manufacturing Engineering Program at St. Cloud State University in Minnesota. He served as a full professor at the Department of Mechanical Design and Production in Cairo University till 2006. Dr. ElSawy teaching and research interests are in the areas of material processing, metallurgy and manufacturing systems, recycling and reuse of solid waste materials, and renewable energy. Dr. ElSawy received ~ \$2M of state, federal, and industrial grants in support of his laboratory development, graduate students and research activities. He advised

several masters and doctoral students who are holding academic and industrial positions in the USA, Germany and Taiwan. Dr. ElSawy has numerous publications in national and international conferences and refereed journals. Dr. ElSawy is dedicated to serve the Engineering and Technology education community. He is a member of the American Society of Engineering Education (ASEE), American Society of Engineering Education (ASME), Society of Automotive Engineering (SAE) and participate regularly in the ASEE and ASME conferences. Most importantly, Tennessee Technological University's Engineering Technology program had a very successful initial ETAB of ABET visit and received an official notice from ABET regarding the initial accreditation status in summer 2016 under Dr. ElSawy's Leadership.



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Dr. Alaa El-Sharkawy, is currently a global manager and technical fellow at FIAT-Chrysler Automobiles (FCA) in Michigan, USA. He earned his B.Sc. in Chemical engineering from Alexandria University, Egypt, and MSc. and PhD. degrees in Chemical Engineering from Wayne State University in 1990. Dr. El-Sharkawy is also a certified professional engineer in the state of Michigan and holds DFSS black belt certificate. He received the “Special Achievement Award” from the GM VP for R&D. He also received the “Excellence in Teaching Award” from Wayne State University. He was awarded the Walter P. Chrysler technical fellow position in recognition of his technical contributions. Dr. El-Sharkawy published and presented over 50 technical papers and was also a keynote speaker for several technical conferences in the USA, China, and Egypt.



Dr. Amer El-Ahraf Named by the Journal of *Environmental Health* as one of fifteen leaders of environmental health; and by a California Publication as a Renaissance Man, Dr Amer El-Ahraf is a founding member and a former President of the Association of Egyptian Scholars (AEAS). He is a nationally and internationally recognized leader in environmental and public health. He obtained his Master's and Doctorate degrees in Public Health (with Distinction) from UCLA. He taught at the University of Cairo, UCLA, UC Irvine, California State University, San Bernardino, and Dominguez Hills. During his academic career, he occupied the positions of Professor, Founding Department Chair, Chief Information Officer, Chief Fiscal Officer, Associate Vice President, Vice President, and President. He is a Veterinarian, a Sanitarian/Environmental Health Specialist, and a Health Scientist. Dr El-Ahraf is a Past President of the National Environmental Health Association and recipient of its highest awards i.e. the Mangold and Snyder Awards. He is a Past President of the California Environmental Health Association and recipient of the Publication and Education Awards. He is the Founding Chair of the International Environmental Faculty Forum. Dr Amer El-Ahraf is the author of Journal articles, book chapters and textbooks among which is "The Impact of Public Policy on Environmental Quality and Health." He served as a Consultant for the World Health Organization, and he is a Visiting Professor in a number of international universities where he lectured on five continents and supervised PhD and Post Doctoral work. In addition to being a scientist, he is a published poet.

Dr Amer El-Ahraf is the recipient of the AEAS's Long Time Distinguished Service Award. A Past Chair of the Board of Directors of the Egyptian American Organization (EAO), he is the recipient of its highest award i.e. the Life Achievement Award. He is a former Chair of the Los Angeles-Giza Sister City Program. Dr. El-Ahraf is noted in "WHO'S WHO in AMERICA".



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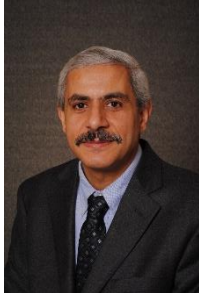
Dr. Ashraf Ansara, Over 30 years of experience in real estate development in Florida and North Carolina. Regency has developed and purchased more than 400,000 sf of construction of commercial and health care facilities with for over \$120 million. Currently, Regency Holding partnership with Everest Group of Companies (www.everestplace.com) to develop 250,000sf of mix use new construction under the name of Regency Health which include 78,000 ambulatory surgical center, radiology center, diagnostic lab, and pharmacy under one roof. Additionally, Regency will develop 75,000sf “CORPOS” (www.corpus.com) for the first time in the USA, a landmark medical museum and educational center and retail shopping center for boutique international shops such as Valentino, Coach, Channels, Christian Dior, etc.



Dr. Ayman El-Baz, Professor, Distinguished University Scholar, and Chair of Bioengineering Department at the University of Louisville, KY. Dr. El-Baz earned his bachelor's and master degrees in Electrical Engineering in 1997 and 2001. He earned his doctoral degrees in electrical engineering from the University of Louisville in 2006. In 2009, Dr. El-Baz was named a Coulter Fellow for his contribution in the biomedical translational research. In 2018, Dr. El-Baz was named an American Institute for Medical and Biological Engineering (AIMBE) Fellow for outstanding achievement in medical imaging and outstanding leadership in education, scholarship, and service to the field of bioengineering. In 2020, Dr. El-Baz was named a National Academy of Inventors (NAI, the first one from the Middle East) Fellow for his contribution in the filed of Artificial Intelligence (AI) and Medical Imaging (MI). In 2022, Dr. El-Baz was named an Biomedical Engineering Society (BMES) Fellow for outstanding achievement to the field of bioengineering. In 2017, Dr. El-Baz was selected by the Biomedical Engineering Society to be an ABET program evaluator. Dr El-Baz has 21 years of hands-on experience in the fields of bio-imaging modeling, big data, artificial intelligence, assrnd non-invasive computer-assisted diagnosis systems. His work related to novel image analysis techniques for autism, dyslexia, and lung cancer has earned multiple awards, including the Wallace H. Coulter Foundation Early Career Translational Research Award in Biomedical Engineering Phase I & Phase II, a Research Scholar Grant from the American Cancer Society (ACS), first place at the annual Research Louisville 2002, 2005, 2006, 2008, 2009, 2010, 2011 and 2012 meetings, and the "Best Paper Award in Medical Image Processing" from the prestigious ICGST International Conference on Graphics, Vision and Image Processing (GVIP-2005).



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Dr. Ayman Habib is the Thomas A. Page Professor at the Lyles School of Civil Engineering at Purdue University. He is the Co-Director of the Civil Engineering Center for Applications of UAS for a Sustainable Environment (CE-CAUSE). He is also the Associate Director of Purdue University's Joint Transportation Research Program (JTRP). He received the M.Sc. and Ph.D. degrees in photogrammetry from The Ohio State University, Columbus, OH, USA, in 1993 and 1994, respectively. His research interests include the fields of terrestrial and aerial mobile mapping systems using photogrammetric and LiDAR remote sensing modalities, UAV-based 3D mapping, and integration of multi-modal, multi-platform, and multi-temporal remote sensing data for applications in transportation, infrastructure monitoring, environmental protection, precision agriculture, digital forestry, resource management, and archeology.



Dr. Ayman S. Mosallam is a Professor of Structural and Earthquake Engineering, also a Professor, Materials & Manufacturing Engineering Technology and served as the Director of the UCI Structural Engineering Testing Hall at the Civil & Environmental Engineering Department at University of California, Irvine (UCI). He is a fellow of the American Society of Civil Engineers (ASCE). He is a registered Structural Professional Engineer in the District of Columbia and has more than forty years of experience in affordable housing, materials, environmental, and structural engineering with a particular interest in innovative sustainable building systems and green construction including three-dimensional sandwich panels, bamboo structures, recycled plastics, solar systems, water recycling, efficient cooling system rehabilitation. He is an international leading authority in the area non-conventional sustainable building systems. He is a member of ASCE Construction Institute Materials Directorate (Executive Committee) and a Control Member on the ASCE Structural Composites and Plastics Committee (SCAP). Professor Mosallam serves on the Technical Advisory Board of the International Accreditation Service (IAS). He has published over 500 technical papers, chapters, and reports on structural performance of structural systems and authored, edited and co-edited seven books in this area. He is the author of the ASCE Design Manual for FRP Composites Connections (ASCE MOP 102) and the co-developer of the ASCE/PIC Prestandard Document on Structural Design of Pultruded FRP Composite Structures. He has served on the editorial board of Composites: Part B Journal for over twenty-two years and the Guest Editor for special issues on Infrastructure Applications for Composites for several journals including, Reinforced Plastics and Composites Journal, Materials and Design, Advances in Civil Engineering, Smart Structures and others. He is the Founder of the Egyptian Green Building Council and the principal author of the Green Pyramid Rating System (GPRS). Professor Mosallam is the recipient of numerous prestigious awards including the Outstanding Research Award from the International Conference of Composites Engineering, Best Design Paper Award from Composite Institute, the Industry Impact Award from McGraw Hill, Best Paper Award from SPI, and the Outstanding Engineering Educator of Year Award from American Society of Civil Engineers.



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Dr. Hanaa Rezk is the co-founder and vice president of Education and Training of Smith MacCoy & Associates, USA. For the past fifteen years or so, Dr. Rezk has played a leading role for developing innovative strategies for education and training programs at both the school and professional levels. She has also served as the director of training at Alpha Star Corps among other major companies such as Enbuil Ltd., Hong Kong, Sigma Composites, USA, and InsuMore, Egypt.

In the last few years, Dr. Rezk detected the bulk of her effort towards establishing strategies to assist people-in-need to gain their position in the society through housing, education and job creations. With her unique multi-discipline expertise in business administration, education, and medical fields enabled her to work with both private sector and NGO's for developing and executing effective models for eco-communities at different parts of the world.



Dr. Ehab Kamarah is currently serving as the Associate Vice Chancellor and Executive Director of Facilities and Services at University of Illinois, at Urbana-Champaign campus, leading a Dr Kamarah team of 1200 professionals with operating and Capital budget of approximately \$800M to manage the University's 24 million square feet of physical space, 19 miles of roadways, 5000 acres of grounds. Dr. Kamarah has led the Capital Programs division for Facilities & Services, where he oversees active capital improvement projects

totaling ~\$600M. Previously, Dr. Kamarah served as the Director of Facilities Development and Engineering Services at York University, the third-largest university in Canada. His professional career has also included roles as the Director of Design and Construction for McMaster University in Hamilton, Ontario, as well as a project supervisor for the Toronto School District Board. Dr. Kamarah is a registered Professional Engineer in Canada and received his master's and Ph.D. in construction engineering and management from the University of Waterloo.



Dr. Elsayed Elbeshbishy is an Associate Professor and the Associate chair of the undergraduate program at Civil Engineering Department at Toronto Metropolitan University. He is the President of the Canadian Association on Water Quality (CAWQ) and President of the Canadian National Committee of the International Water Association (CNC/IWA). He is a Governing Member-IWA Canada. Dr. Elbeshbishy has extensive experience on developing new technologies for value-added products recovery from wastes. His areas of expertise include wastewater treatment processes, anaerobic digestion, pretreatment technologies, fermentation process, and solid waste

management. He is the director of Environmental Research for Resource Recovery Group. Dr. Elbeshbishy focuses in developing new solid pre-treatment technologies to enhance the anaerobic digestion and dark fermentation processes. He is the director of Environmental Research for Resource Recovery Group.



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Prof. Gamal El Afandi got his bachelor’s degree in sciences from Menoufia University, Egypt (1989) where he majored in Physics. He got two higher graduate Diplomas from Cairo University in meteorology (1992) and natural resources (1994) in addition to professional training in meteorology: Class I, Meteorological Personnel (1992). Prof. El Afandi got his master’s degree in Sciences (M.Sc.) in meteorology from Cairo University, Cairo Egypt. Besides, he received his Ph.D. jointly between Cairo University in Egypt and the University of Gottingen in Germany (2001-2005), with a specialization in climate change impacts on crop production, modeling of climate change phenomena, and atmospheric sciences. He has over 30 years of experience in the field of meteorology and atmospheric science with outstanding

expertise in modeling and prediction of adverse climatic events. His work is largely attached to data acquisition and data handling with atmospheric models. Also, he has computer skills dealing with Windows, Linux, parallel computing, high-performance computing, FORTRAN LANGUAGE, GRADS, NCL, and a lot of software that serve the science of meteorology. Besides, his fields of specializations are climate, climate change, and adaptation, climate modeling, agricultural meteorology, and crop modeling, extreme weather events (drought, heatwaves, flash floods, desertification, etc.), air pollution and quality, decision support, and early warning systems, numerical weather prediction, renewable energy; wind and solar energy and the impacts of meteorological conditions on the human and animal health sectors. He has participated in developing an early warning system for flash floods over Sinai Egypt; in collaboration with the Egyptian ministry of water resources and irrigation and the Belgian-Egyptian team. In addition to participation in several local, regional, and international research projects.



Dr. Iman Abul-Fotouh, Born & Raised in Egypt. Got a medical degree M.B.B.Ch from Faculty of Medicine, Cairo University 1977, Master’s M.Sc. & Doctorate Ph.D. degrees from Faculty of Medicine, Zagazig University 1985.

Got ECFMG/USMLE Certificate from St. Luke’s Presbyterian University 1996, & NJ Teaching Certificate, Kean University 2002.

In New Jersey, taught as a Medical & Computer Instructor at the Cittone Institute, AP Biology teacher in Plainfield High school, AP Reader with the College Board & Educational Testing Services, Adjunct Professor in Middlesex County College & now a Professor at Rutgers University,

Piscataway Campus., USA



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Dr. Khalid Elgazzar, is a Canada Research Chair and associate professor with the Faculty of Engineering and Applied Science at Ontario Tech University, Canada. He is also an adjunct professor at Queen’s University. Dr. Elgazzar is the founder and director of the IoT Research Lab at Ontario Tech University. Prior to joining Ontario Tech, he held faculty positions at University of Louisiana at Lafayette and Carnegie Mellon School of Computer Science. Dr. Elgazzar was named the recipient of the outstanding achievement in sponsored research award from UL Lafayette in 2017 and the distinguished research award from Queen's University in 2014. He also received several recognition and best paper awards at top international venues. Dr. Elgazzar is a leading authority in the areas of Internet of Things (IoT), intelligent software design, real-time data analytics, and mobile computing. Dr. Elgazzar is currently an associate editor for Frontiers Internet of Things, Future Internet, Springer Peer-to-Peer Networking and Applications Journal and Wireless Communications and Mobile Computing. He is also chairing a number of IEEE conferences and symposia on mobile computing, communications and IoT. Dr. Elgazzar is Senior IEEE Member and an active volunteer in technical program committees and organizing committees in both IEEE and ACM events.



Dr. Moatassem Abdallah , Associate Professor in the Civil Engineering Department at University of Colorado Denver (CU Denver), and Co-founder and CEO at Commutrics. My research work focuses on sustainability of buildings and infrastructure systems. I use operations research and operations management to model and simulate technical, business, and social elements to understand the impacts of our systems and behavior on the built environment to enable better decision-making processes. My research work and interests are geared toward ideas and concepts that result in tools and systems that serve our society with business opportunities. My students and I developed various models and decision support systems to identify optimal upgrades and maintenance interventions to maximize sustainability of existing buildings; understand and influence commute behavior of employees with shared destinations to minimize transportation emissions and cost; measure and prioritize maintenance of roadways using low-cost sensors, analyze Vehicle-to-Grid (V2G) for electricity demand optimization, community resilience, and energy justice; promote sustainability competencies in construction engineering education; and identify optimal plans for construction projects to simultaneously minimize project time and cost while maximizing quality.



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Dr. Moeness Amin received the B.Sc. degree in electrical engineering from Cairo University in 1976 and the Ph.D. degree in electrical engineering from the University of Colorado in 1984. Since 1985, he has been with the Faculty of the Department of Electrical and Computer Engineering, Villanova University, USA, where he became the Director of the Center for Advanced Communications in 2002. Dr. Amin is the recipient of: the 2022 IEEE Picard Gold Medal in Radar Technologies and Applications; the 2017 Fulbright Distinguished Chair in Advanced Science and Technology; the 2016 Alexander von Humboldt Prize; the 2016 IET Achievement Medal; the 2014 IEEE Signal Processing Society Technical Achievement Award; the 2009 EURASIP Technical Achievement Award; and the 2015 IEEE Aerospace and Electronic Systems Society Warren White Award for Excellence in Radar Engineering. He is also the recipient of the IEEE Third Millennium Medal.



Professor Mohamed Ali has more than 35 years experience in IT and telecommunications research. He is the author and co-author of more than 200 refereed journal papers, invited talks, book chapters, and conference presentations. His research synthesizes and extends results over the full discipline of mobile/fixed networking technology and architecture, from the physical layer of devices and components to the architecture layer of local access, Metro, and global carriers. His most recent work focuses on smart grid technologies and applications including Microgrids, plug-in electric vehicle (PEV)-to-grid (V2G) systems, and distributed energy resources as well as the interdependencies between the national civil critical infrastructures.

Much of his work has centered on interworking between network elements and interaction among different protocols; his expertise in NC&M includes the entire stack, from Layer 1 to the highest layers including the newest generation of Software Defined Networking (SDN), Network Function Virtualization (NFV) and Cloud/Edge-based computing technologies. Dr. Ali has consulted and conducted joint research and development effort for/with several major carriers in the US including Verizon, Bellcore and AT&T. Dr. Ali received his MS and Ph. D., all in Electrical engineering from the City University of New York in 1985 and 1988, respectively.



Dr. Mohamed Aziz is currently the CEO and Medical Director for Professional Psychiatric Services, LLC in Ohio. He also served as the Chief Clinical Officer for 14 years and as a professor at the University of Cincinnati. During his tenure as the Chief Clinical Officer, Dr. Aziz was pivotal in developing a comprehensive and collaborative model for treating mental health. He designed an award-winning program similar to MHASP which significantly improved service utilization for individuals with mental health disorders. He has been involved in designing cost effective health care programs to enhance access to care for over two decades.



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Dr. Mohamed Attalla, P.Eng., MBA, obtained both a Masters and a Ph.D. in Engineering Management from the University of Waterloo in Canada as well as an Executive Master of Business Administration from McMaster University. As the current Vice Chancellor at the City University of New York, Dr. Attalla is part of the Chancellor’s Cabinet at the largest urban University in the world. Dr. Attalla is a major player in forming the university policies and supporting its strategic direction. Prior to his current role, Dr. Attalla held senior executive positions at the University of Illinois in the USA and McMaster University in Canada. Furthermore Dr. Attalla is responsible for the delivery of an

appropriation program of \$3 Billion Dollar. Dr. Attalla’s teaching and research expertise is in the areas of Energy Conservation, Sustainability, Renewable Energy, and Infrastructure Assets management in addition to Management and Leadership, Strategic Planning and Organizational Behaviour and Effectiveness. Dr. Attalla received several awards such as the Engineering Medal in Management and Leadership from the Engineering Association in Canada, The Walter Shanely Award from the Canadian Society for Civil Engineering (CSCE), inducted as a Fellow of CSCE, and recipient of the Award of Excellence from the Minister of Infrastructure Renewal in Canada. Dr. Attalla published/presented over sixty papers in international journals and refereed conferences in wide disciplines including Sustainable Construction, Renewable Energy, Infrastructure Management as well as Education and Research Management.



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