



THE AMERICAN UNIVERSITY IN CAIRO

Book of Abstracts

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Table of Contents

| | |
|---|----|
| Faculty Abstracts – Pitch | 3 |
| Academy of Liberal Arts | 3 |
| Rhetoric and Composition Department..... | 3 |
| Graduate School of Education | 6 |
| International and Comparative Education..... | 6 |
| Libraries and Learning Technologies | 7 |
| AUC Libraries | 7 |
| Center for Learning and Teaching | 8 |
| Office of the Dean of Graduate Studies | 9 |
| School of Business | 10 |
| Accounting Department | 10 |
| Economics Department | 11 |
| Management Department | 12 |
| School of Sciences and Engineering | 14 |
| Architecture Department..... | 14 |
| Chemistry Department..... | 14 |
| Computer Science and Engineering Department | 16 |
| Construction Engineering Department..... | 18 |
| Mechanical Engineering Department..... | 19 |
| School of Global Affairs and Public Policy | 20 |
| Public Policy and Administration Department..... | 20 |
| Faculty Abstracts – Posters | 22 |
| Libraries and Learning Technologies | 22 |
| Center for Learning and Teaching | 22 |
| Rare Books and Special Collections..... | 24 |
| School of Business | 25 |
| Accounting Department | 25 |
| Management Department | 27 |
| School of Sciences and Engineering | 27 |
| Computer Science and Engineering Department | 27 |

| | |
|--|-----|
| Students Abstracts - Posters | 29 |
| | |
| Graduate School of Education | 29 |
| International and Comparative Education..... | 29 |
| Libraries and Learning Technologies | 30 |
| Rare Books and Special Collections..... | 30 |
| Office of the Dean of Graduate Studies | 31 |
| Sustainable Development..... | 31 |
| School of Business | 34 |
| Economics Department | 34 |
| Management Department | 37 |
| School of Humanities and Social Sciences | 37 |
| Political Science Department..... | 38 |
| School of Sciences and Engineering | 40 |
| Biology Department | 40 |
| Biotechnology Program | 44 |
| Chemistry Department..... | 50 |
| Computer Science and Engineering Department | 57 |
| Construction Engineering Department..... | 60 |
| Electronics and Communication Engineering Department | 67 |
| Environmental Engineering..... | 71 |
| Mechanical Engineering Department..... | 74 |
| Nanotechnology | 76 |
| Physics Department..... | 84 |
| School of Global Affairs and Public Policy | 91 |
| Journalism and Mass Communication Department | 91 |
| Law Department | 93 |
| Public Policy and Administration Department..... | 95 |
| The Academy of Liberal Arts | 100 |
| Rhetoric and Composition Department..... | 100 |

Faculty Abstracts – Pitch

Academy of Liberal Arts

Rhetoric and Composition Department

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Title: The Rhetoric of Education in the Arab Tradition: Insights for a MENA Core Curriculum

There is a growing awareness in the MENA region of the importance of establishing a ‘core curriculum’ that promotes and strengthens higher education liberal learning outcomes. A MENA General Education Network of universities was established in October 2015, specifically to work out a broad and cohesive framework of learning, specifically emphasizing

- the core knowledge, both enduring and contemporary
- the critical, creative and integrative competencies
- the lingual, mathematical, informational and technological literacies
- and the ethical and civic-minded dispositions

necessary for a twenty-first century regional and global citizen.

Yet, the network members recognize that most general education curricular models are imported from the west, particularly based on US conceptualizations of education - its historical roots, pragmatic definitions, socio-political purposes and liberal priorities. There is a pressing need in the MENA region to adopt, or develop, a model that reflects Arab epistemology and worldview, a view that recognizes contemporary needs and essentials, yet is organically integrated within an Islamic discourse and theory of knowledge.

This study is, therefore, a linguistic analysis whose aim is to search for an appropriate conceptual framework of knowledge and learning, drawing on the discourse of ‘education’ in the Arabic language and Islamic tradition. The methodology adopted is a corpus-based automated search of the traditional religious texts of Quran and hadith,

as well as contemporary journalese. The concordance tool used is Brigham Young University's arabicorpus.byu.edu.

The main research questions include the following:

1. What concepts form the semantic field of 'education,' and what are the collocates of each?
2. What metaphor patterns encapsulate the concept of education and related terms in the corpora?
3. What inferences can be drawn from the frequency and collocate statistics about the purposes, conceptual schemata and worldview represented?
4. What does the data say about the semantic prosody of education-related structures?

The study will yield both quantitative data of each key term and its derivatives, and qualitative data of the distinctive usage patterns and meanings. Example terms from the field of 'education' may include: 'ilm, hikmah, 'aql, taddabur, yaqeen, tafakkur, ibda', fiqh, amongst others.

The study is significant in that it sheds light on the main knowledge areas, skills, behaviors and dispositions that form the ingredients of an Islamic epistemological model. Such knowledge would help craft a regional framework for institutional core curricula that are driven by the mental structures and language of the region, emphasizing learning outcomes that are responsive to global and regional contemporary needs, yet are culturally rooted and traditionally appreciated.

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Title: Big Data Digital Humanities in Archival Collections

The principal investigators for this research project examine the relationship between big data research and digital humanities to connect separated academic silos in order to build strategic links that demonstrate a well-structured field of study utilizing specific objects

found in the Rare Books and Special Collections Library (RBSCL). We have identified three concentric areas of study and will demonstrate how challenges in each area can be addressed. We will also illustrate how the processing and interpretations of large cultural datasets can be organized linearly following a critical examination of the artifacts in RBSCL. We will make visible the challenges concerning digital culture at large around a network of relations between the new entities that have emerged with the digital revolution. This initial construct will help pave the road ahead and serve as an invitation to explore further the idea of Big Data Digital Humanities as a structured field for archival research.

Ghada Elshimi

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Title: Transformational Learning: Identity Insights

The undergraduate years are key developmental years in which students undergo significant identity transitions. Theories in student identity development provide insight on how relevant educational and social experiences may be transformational in bringing about such personal and cognitive transitions. Self-authorship has, in recent years, emerged as a leading theory in student development. It is a useful framework to gain insight on the developmental processes experienced by students in transition from high school to college, as it encompasses cognitive, interpersonal and intrapersonal growth in response to challenge and change. This session describes a mixed-methods study exploring self-authorship in students who have completed the freshman program at AUC. The findings identify various cultural and environmental impacts that characterize the development of self-authorship in this population of students, suggesting interesting pedagogical implications.

Iman Hamam

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Title: On the Road

I will present a paper about ways in which our experience of the city is shaped. I will concentrate on a series of "flash points" that have emerged as part of the formation of New Cairo and roads and construction sites that have mushroomed over the past 5 years, and how they have been shaped by what John Urry has referred to as the "System of Automobility". I attended the Provosts lecture series "AUC OUTREACH

& ENGAGEMENT WITH EGYPTIAN URBAN CHALLENGES: AN INTERDISCIPLINARY EXPERIENTIAL APPROACH" and was inspired to work on a formal paper that would bring together my research over the past few years. The paper will look at intersections between the city real and imagined - bringing together images from popular culture - specifically the Sherif Adel's comics "Pass By Tomorrow" - with scholarly approaches to the transformation of Cairo in Urban Studies by researchers such as Eric Denis and David Sims. The interdisciplinary nature of this study is something that I think would be relevant to a wider audience - the AUC community - rather than a more specialized audience in my own department. I am also keen to get input from AUC faculty and students in other departments - especially in the SSE and new department of Architecture.

Graduate School of Education

International and Comparative Education

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Title: Education for Sustainability in Egypt: Participants' Perspectives

The purpose of this study is to present the experience of students taking the Sustainability and STEAM Education course at the AUC Graduate School of Education. The aim of the course was to deepen students' understanding of education for sustainable development (ESD) as a societal and educational need for Egypt and for students to take the role of 'agents of change'. Students were also tasked with identifying factors that facilitate or hinder the infusion of sustainability in the current educational system. With a societal emphasis in mind and a local versus global interdisciplinary perspective, the 'STEAM2M education model' was developed. The model acted as the core driving theoretical framework for the course and the study. With the ten students enrolled in the course, representing a 'purposeful sample', students were provided the opportunity to engage into the various social, cultural, and environmental dimensions of ESD while being exposed to constructivist principles in their learning activities throughout the course. The activities resulted into data analyzed using quantitative and qualitative instruments following a

mixed methods approach. Four main instruments were utilized in this study: survey, reflections, focus group interviews, and content analysis of the photo-narratives and interdisciplinary units. Findings depicted the transformative process the students went through, what they identified as challenges, and opportunities for infusing ESD and their progressive perspectives of ESD. Students seemed to claim that external factors particularly in relation to policies, strategies and management were main roadblocks to sustainability. To them, a main roadblock lifter was education that could help reshape the culture and bring about change. Of interest is that education was no more tied to school and formal education. It extended beyond school walls to non-formal education and informal education in the community.

Libraries and Learning Technologies

AUC Libraries

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Title: Researchers' Identity Management in the 21st Century Networked World: A Case Study of AUC Faculty Publications

This project will explore how American University in Cairo (AUC) faculty members distribute their scholarly and creative works, and how their names are identified in author identifier systems and/or on the Web. The goal is to explore how best to present their data as linked data. The project will use the AUC faculty's names listed in AUC Faculty Publications: 2012 Calendar Year. Their names will be used to search in author identifier systems to determine whether they are registered on these sites, if their names are consistent or have variants, how the variants are handled, what metadata are included, sources of data, and other relevant data (e.g., ORCID, Researcher ID, Scopus Author Identifier, and arXiv Author ID). The data analysis and discussion will shed light on: 1) how some author identifier systems fail to represent some faculty members; 2) how the linked data model, such as BIBFRAME, can be used to better represent them and to increase their visibility on the Web, and, 3) the collaborative roles for librarians and faculty members to contribute data into these systems. The presentation

will conclude with the discussion on the faculty's potential use of the data to demonstrate the impact of their scholarly and creative works.

Mark Muehlhaeusler

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Title: Egyptian Arabic Stories Around 1800

This is a presentation on a long-term project to gather, transcribe, compare and publish variant versions of a text related to the 1001 Nights. The text in question is a story in colloquial Egyptian Arabic verse, composed around the time of Napoleon's Campaign in Egypt. It is of considerable interest to historical linguists, literary historians, and researchers interested in oral history, because the text(s) represents a long, and varied tradition of semi-literate transmission.

The presentation will also touch on questions of scholarly communication, and in particular, the mode of publication, since the edited version is being prepared for release as an Open Access book.

Center for Learning and Teaching

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Title: Critical Participatory Action Research: Reconceptualizing Approaches to Faculty Development at AUC and Beyond

How can teaching and learning centers re-envision/re-conceptualize faculty development to strengthen their transformational impact on teaching and learning? The proposed project seeks to address contextual, institutional and individual challenges to the improvement of educational practice in the university, and provide a flexible model for advocating for a faculty development approach that impacts faculty members' own growth and the quality of learning in the institution as a whole.

We propose multi-phase, critical participatory action research (Carr & Kemmis, 1986) conducted by practitioners (faculty and faculty developers, possibly involving students as researchers too) to re-

conceptualizing the approach to faculty development, in ways that are seen as more effective and transformational for stakeholders.

Uniquely situated as a liberal arts institution in a country recently affected by political instability, the American University in Cairo (AUC) in Egypt has historically educated many of Egypt's leaders and will continue to do so. The Center for Learning and Teaching (CLT) at AUC is the first and one of the largest such centers of its kind in Egypt and the region. Founded in 2002, it has had a successful track record in promoting excellence in teaching and learning, and providing outreach other educational institutions locally and regionally.

Office of the Dean of Graduate Studies

Hania Sholkamy on behalf of the SRC

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Title: Conditional Cash Transfers for Egypt: How an Idea Becomes a National Program!

Since 2008, the Social Research Center at AUC has been engaged in a series of research initiatives and projects that focus on the social rights and services of vulnerable and income poor people in Egypt. For this work to be meaningful and of consequence, center researchers opted for an approach that privileged the principles of applied social research. Researchers needed to find an entry point to government to ensure the possibility of implementation. A listening ear and a willing hand were needed so as to ensure that research finding and recommendations are relevant and meaningful. Researchers also had to cement relationships with donors so as to be able to fund their work and remain independent of government bodies. Of equal importance was the ability to locate this work in national and international networks of peers and academic institutions so as to ensure the scientific and critical substantive aspects of the research.

The work which was a pilot project in the area of Ain el Siar in Misr el Qadima became two national cash transfers programs called Karama and Takaful, which currently supply 260,000 families in Upper Egypt with a monthly income. This poster tells this policy story and shares the experiences of the center in pursuing policy-relevant applied social research. A documentary based on the pilot program in Upper Egypt will

be shown as well as the findings of statistical, qualitative and case study data collected throughout this long research journey.

School of Business

Accounting Department

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Title: Board Diversity and Corporate Governance in Egypt: The Good, the Bad and the Ugly

Egypt is one of the largest emerging economies of the Middle East. It was the second to witness the wave of political unrest that tapped the Arab region early in January 2011 in what was shortly named 'the Arab Spring'. The first revolution called for President Mubarak to step down. Another revolution took place on June 30, 2013 after having the Muslim Brotherhood ruling Egypt for one year, from June 2012 to June 2013 where it had to come to an end. The Arab Spring had people going on the streets calling for 'Bread, Freedom, Social Justice'. Social justice, plausibly, implies gender equality on corporate boards and in senior management positions.

This research has three main objectives: first, tackling the presence of women on boards of directors and in senior management teams of Egyptian listed companies' during the last ten years. Second, explaining whether the two major political events, 2011 and 2013 revolutions, have brought any changes to the trend of involving women in companies' senior management and board directorships. In other words, did the revolutions help bring social justice represented by gender equality? Finally, the research assesses the relationship between gender diversity and firm performance.

The relationship between gender diversity and firm performance is usually expected to be positive. Several advantages of having women on board have been identified throughout the literature including: bringing diverse opinions in the boardroom and thus, strategic input to the board, enhancing the decision making and leadership styles of the organization, providing female role models and mentors, developing company image with various stakeholders, and ensuring high quality of board development activities.

Data will be collected through three phases: firstly, using the ‘Disclosure Book’ published by the Egyptian Exchange, to collect data for years 2005 through 2011 where 2011 was the last year of publishing the book; whereas companies’ annual reports will be visited to collect data for years 2012, 2013 and 2014; secondly, developing a questionnaire to be sent to senior management and board members of the sample under study to check their opinions regarding women involvement in senior level positions including board directorships; and thirdly conducting interviews to verify the results and explain the quantitative analysis.

This research contributes to the literature as it is the first to date to be conducted assessing gender diversity in Egypt and the whole Arab region using panel data. In addition, assessing the relationship between gender diversity and firm performance, considering the political incidences in a large emerging market as Egypt, acts as a major contribution to the corporate governance literature. Moreover, results of this research could help regulators and policy makers understand and refine the current status.

Economics Department

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Title: Ladies and Gentlemen, Microfinance Needs to Consider your Different Social, Risk and Time Preferences: an Experimental Study in Rural Egypt

Although women empowerment is a preset objective of many microfinance institutions, we notice that even without targeting women, certain types and characteristics of microfinance loans are not appealing for men.

Gender differences do exist with respect to risk, time, social preferences and also competitiveness. The literature on gender preferences found that women are more risk averse and competition averse than men. Their social preferences are more malleable than men. The implications of such preferences are particularly crucial when designing financial and social protection policies, especially those directed towards the poor. If people in a certain community are extremely risk averse, they will be reluctant to take part in investment activities that may be slightly risky. If

they are highly impatient (have high personal discount factors), they will be reluctant to make long-term investments, whether financial, educational or even social. Social preferences and the degree of social coherence within a community affect its social capital. Social capital is especially important for group lending finance, since the lender usually relies on peer monitoring. Higher social capital will lower the cost of monitoring, and thus, will make the loan cheaper. Poor people are less patient than rich people, but how impatient is the impatient? And, are there gender differences with regards to impatience, even if they are both poor? Discount rate is a main factor in determining interest rates, without which, an appropriate rate of return cannot be set efficiently.

This research will experimentally investigate the effect of gender preferences on the choice of microfinance and how to incorporate measures of risk, time and social preferences for both men and women in the design of microfinance (and other financial policies that target the poor).

Management Department

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Title: The Pricing Behavior of Exchange Traded Funds

Exchange Trade Funds (ETF) are considered one of the most important and successful financial innovations in the past decade with a rapid growth of ETF assets under management in the US from \$230 billion dollars put exact date to over \$2 trillion dollars in 2016. ETFs are stock market traded securities that are created with the intention of replicating the returns of a market index for stocks, bonds or commodities. Since they are essentially identical to the underlying securities they follow, the popularity of ETFs has caused various scholars to examine the pricing behavior of ETFs relative to their underlying indices with the aim of exploring the pricing efficiency of ETFs. Due to the scarcity of high frequency data that is required to study both questions, previous studies have only focused on US exchange traded funds and largely ignored ETFs from other developed and emerging markets. The purpose of this research is to conduct a holistic empirical study of ETFs by examining

their pricing behavior; focusing on an international sample of ETFs from both emerging and developed markets through a unique sample of high frequency data from ETFs and their underlying securities from around the world. Our methodology for examining the pricing behavior of ETFs will involve analyzing whether there are intraday pricing deviations between ETFs and their underlying benchmarks; understanding the reasons for any appearance of deviations to appear; establishing whether arbitrage operations are efficient in closing any deviations between ETFs and their underlying securities during the trading day and finally examine the price discovery and transmission process between ETFs and their underlying securities. A clear understanding of pricing behavior of ETFs will help market participants refine investment strategies, identify additional sources of profits, and accordingly enhancing ETF pricing efficiency in this growing market.

Aliaa Bassiouny

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Title: Corporate Financial Policy in Egypt: Evidence from the Field

Our current knowledge of corporate finance is largely inspired by theory and evidence on corporate financial policy from the USA developed over the past 60 years. There is, however, a huge gap in our knowledge that arises from our lack of study on actual corporate financial practices related to investing, financing and dividend decisions for firms in Egypt and which hinders our capacity to link the success of corporate financial policy to firm performance. In this study, I aim to conduct the first large market wide study on corporate financial policy in Egypt, by developing and administering a survey to CFOs of a large sample and a broad cross-section of Egyptian firms to understand their practices relating to cost of capital, capital budgeting, and capital structure. I hope that finance academics will use the results of this study to potentially modify or abandon existing views related to corporate finance so that our recommended practices are more relatable to local and regional factors. I also hope that practitioners will benefit from this analysis by understanding how their practices differ from other firms in their field.

School of Sciences and Engineering

Architecture Department

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Title: An Architecture for Autism

It is currently estimated that one in every 45 children falls within the Autism Spectrum of disorders (CDC, 2015). Despite this almost epidemic rate there exists very little design literature, and little evidence based design strategies, to address the basic human right of access to education for these children, whether through the design of special schools or inclusive environments. This presentation outlines the award-winning and trademarked Autism ASPECTSS Design Index and its possible use to achieve this inclusiveness.

Chemistry Department

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Title: Developing Innovative Diagnostic Solutions for Detection of Heavy Burden Infections and Cancer: Employing Robotics, Nanoparticles, Chips, and Smart Phones

Millions die from infections and cancer each year. Global efforts to combat heavy burden infections such as Mycobacterium Tuberculosis (MTB) and hepatitis C virus (HCV) are challenged by limitations in rapid and sensitive diagnosis. This is evident in heavy burden countries where infections are most spread and resources are scarce. Early detection of cancer biomarkers is necessary for timely initiation of therapy but also requires the availability of affordable sensitive assays. To address these

challenges, we have developed novel platforms for accurate and low cost detection of biomarkers of MTB, HCV, and prostate cancer.

To streamline extraction of purified nucleic acids from biological specimen using magnetic nanoparticles, we have developed an automated system which is capable of performing several laboratory functions including pipetting, vortexing, centrifugation, heating, magnetic separation, and self-sterilization. A working prototype of the instrument, which employs magnetic nanoparticles, has been manufactured and a second generation system is currently under development. Extracted viral RNA was detected using gold nanoparticles (AuNPs). We have employed anionic and cationic AuNPs have to develop several diagnostic assays for colorimetric and fluorimetric sensing of MTB DNA. The colorimetric MTB assays have demonstrated high concordance with automated culture system and PCR. The assays had turnaround time of ~1 h, after DNA extraction and detection limit of 5.4 ng of DNA. The fluorimetric MTB assay had a sensitivity and specificity of 98% and 88%; respectively. Finally, a chip-enzyme immunoassay was developed for detection of prostate specific antigen. The assay is based on the use of magnetic nanoparticles and colorimetric signal was detected using a smart phone. In conclusion, recent technologies have revolutionized in vitro diagnostics and enabled the development of novel strategies for inexpensive, rapid and accurate detection of disease biomarkers.

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Title: Fabrication of Superior Nanoscaffolds of Electrospun Polysaccharide Composite Nanofibers and their Prebiotic and Antibacterial Activities

In an attempt to develop novel natural nanofibers with enhanced prebiotic and antimicrobial activities, polymer composites and

nanomaterials play vital roles and exhibit superior properties. Among the different types of nanomaterials, nanofibers have attracted a lot of attention in various fields due to their large surface area per unit mass and advanced mechanical performance. Electrospinning technique was used and the experimental parameters were optimized to fabricate uniform polysaccharide (Inulin and Honey) electrospun compo-site nanofibers (CNFs) to be tested for their prebiotic and antimicrobial activities. (Walaa et al; 2014 and 2015) The aqueous solution of the selected polysaccha-ride could not be directly electrospun into nanofibers. Therefore, electrospinning was aided by mixing those polysaccharides with polyvinyl alcohol (PVA) (Wang et al; 2011). We report the influence of different parameters (concentrations, applied voltage and solution flow rate) on the composite nanofibers fabrication. The most uniform nanofibers were obtained and were tested for their prebiotic activity with Lactobacillus sp. and antibacterial activity with E. coli and S. aureus bacteria, respectively. The fabricated electrospun composite nanofibers (CNFs) showed enhanced prebiotic and anti-bacterial activity compared to the original solutions with about 38% increase in Lactobacillus growth. Unlike polysaccharides solution, PVA/ polysaccharides electrospun CNFs showed noticeable antibacterial activities against both E. coli and S. aureus. Results illustrate the unique prebiotic and antibacterial properties of polysaccharides solution versus the nanoscale transformed polysaccharides composite nanofibers. Results also open new avenues for fabricating prebiotic and antibacterial products from natural materials with superior biomedical activities.

Computer Science and Engineering Department

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Title: Scalable and Extensible Cloud Metering

Cloud computing is based on the integration of various computing resources and technologies provisioning for their transparent, secure and efficient sharing among different concurrent applications. End-users expect to pay for resource use. Service providers also need to be fully aware of resource utilization details to meet existing demands and help in system maintenance and upgrades. Hence a fair and accurate cloud

metering framework is needed to charge application owners for their resource usage, rather than traditional inaccurate time share charging policies. Although most cloud systems provide metering capabilities, they are still very primitive reflections of low-level cumulative resource utilization that do not provide accurate metering neither to end-users nor to cloud service providers. New resources are constantly adopted into the system that either represent a complete new computing resource or a new service based on abstractions utilizing existing ones. We have introduced a new metering paradigm that facilitates real-time metering horizontally covering metering of primitive resources as well as vertically across the various abstraction layers of a cloud computing infrastructure. We provide a set of scalable and interoperable protocols, standards, and specifications for building unified scalable metering framework for cloud environments. The framework is based on a service oriented specifications that utilizes cloud resources to perform the metering functionalities. The framework is built on top of set of components that can serve in any service oriented environment, and it does not have to be metering; metering is one of them. Our metering framework is programmable allowing for scalability as well as extensibility and relies on a markup language for data representation and a distributed proc file system for data transport.

Mohamed Moustafa

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Title: Deep Neural Network Application to Classify Pornographic Images and Videos

It is no secret that pornographic material is now a one-click-away from everyone, including children and minors. It is no secret that pornographic material is now a one-click-away from everyone, including children and minors. General social media networks are striving to isolate adult images and videos from normal ones. Intelligent image analysis methods can help to automatically detect and isolate questionable images in media. Unfortunately, these methods require vast experience to design the classifier including one or more of the popular computer vision feature descriptors. We propose to build a classifier based on one of the recently flourishing deep learning techniques. Convolutional neural networks contain many layers for both automatic features extraction and classification. The benefit is an easier system to build (no need for hand-crafting features and classifiers). Additionally, our

experiments show that it is even more accurate than the state of the art methods on the most recent benchmark dataset.

Construction Engineering Department

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Title: Advanced Composite Materials in Structural Engineering Applications

Many reinforced concrete and steel structures currently need immediate strengthening to account for any required increase in service loads or deterioration of some of their structural elements. In the past two decades, advanced composite materials (ACMs) emerged as an effective and easy-to-use strengthening technique for many infrastructure applications. Furthermore, in the last couple of years many structures were totally constructed using ACMs. In this presentation, the author will outline the outcomes and findings of his past two decades of research and practical experience related to using ACMs in structural engineering applications.

The presentation will start by showing bridge girders that were dismantled from a real bridge and moved to the laboratory to be stretched using Carbon Fibre Reinforced polymers (CFRP) laminate in flexure and shear, and then tested to failure. Another application that will also be presented involved strengthening precast prestressed hollow core slabs using CFRP strips. These slabs were constructed, strengthened and tested in the backyard of their manufacturer. The author will also present the experimental work performed in the AUC structural engineering laboratory on reinforced concrete beams and slabs strengthened using CFRP strips and sheets.

On another front, the author will present his work in strengthening steel beams using prestressed CFRP strips. New prestressing and anchorage system was developed and used to experimentally test-to-failure steel beams strengthened using this technique. Furthermore, full scale testing of masonry diaphragm walls that were prestressed using CFRP strips with an anchorage system developed and patented by the author will be presented.

The presentation will end by showing two recent structures that were totally constructed using Glass and Carbon Fibre Reinforced Polymers. The author was the design reviewer for these two structures and actually performed full scale testing on parts of them.

Mechanical Engineering Department

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Title: Desalinated Water for Food Production in the Arab Region

The Arab region is one of the most water scarce regions of the world. Eighty-five percent of the water in the Arab region is used for irrigation. The region is also the world's largest importer of grains. The direct link between food and water limits the potential of water-stressed Arab countries to promote food production. However, the prospects for using unconventional resources for irrigation, such as desalination, constitute priority for consideration and action.

The concept of sustainability with its three economic, environmental and social pillars should be at the forefront of planning of any food production initiative using desalinated water. In addition to the economic feasibility of using desalination for irrigation, the carbon footprint, brine disposal and lowering water levels in shallow seas are serious environmental aspects to be considered. Arab countries should learn from previous good and bad practices. The attempt of Saudi Arabia to be self-sufficient in water-intensive crops, such as wheat, from the 1970s onwards is a clear example for unsustainable development.

Developing local capacity to adopt state-of-the-art desalination technologies should be on the agenda of Arab Governments. Serious support for R&D is urgently needed to help develop and pilot test new desalination technologies, such as Forward Osmosis.

School of Global Affairs and Public Policy

Public Policy and Administration Department

Ghada Barsoum

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Title: Private Higher Education in Egypt: New Challenges to an Old System

This on-going research project has three analysis modalities. The first modality provides comparative analysis of labor market outcomes of graduates of public and private higher education institutions with focus on the two disciplines commonly addressed by the private sector: Business Administration and Information Technology. Using a unique tracer survey dataset, our analysis shows that the type of the institution (whether private or public) does not have a statistically significant effect on labor market outcomes of earnings and access to job security. Ascribed pre-education characteristics and post-education employment characteristics, particularly those related to the sector of employment, were key determinants. The second modality zooms into the perceptions of graduates of some of the private institutions as they reflect on their post-secondary education experience. Building on in-depth interviews, this qualitative study discusses how these graduates appreciate the “easy” education they received, condemn it for not believing that it did not prepare them for the job market, yet still appreciate it for giving them access to a degree. The analysis in the paper supports arguments about degree fetishism, even if the quality of learning is compromised. The third modality focused on the governance structure of the higher education system in Egypt in relation to private institutions. The analysis in this modality places Egypt’s state steering approach within the global experience of higher education steering, particularly Europe’s post-Bologna experience. The paper argues that the growing tide of higher education marketization does not correspond with Egypt’s focus on education inputs. The paper seeks to elucidate the contentious relationship between education marketization and a priori assessment approaches, pushing for a more “evaluative” state role that is focused on outputs and outcomes.

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Title: Defense Spending and Ethnic Inequality

Ethnic inequality in fragile and non-fragile states is a possible source of conflicts. States with ethnic inequalities gear towards spending on armaments to protect the ruling ethnic groups at the expense of other marginalized groups. Moreover, the dominance of certain ethnic groups on state apparatus with its associated privileges, makes the states part of the conflict. In this context the state is no longer an autonomous entity, it is an instrument of social engineering; shaping and creating social groups and probably, worsening the ethnic inequalities. The states that are identified as ethnically unequal not only risk social implosion but also burden the society with noticeable military spending. Using the panel data for years 1988 – 2013 for 80 countries; the purpose of this paper to address the following question: to what extent do ethnic inequalities impact the military spending? Understanding the impact of the ethnic inequalities on defense, it increases not only the opportunity cost of the ethnic grievances and suppression but also lowers the society's general welfare. This study will be unique in linking the military spending with elements of ethnic repression. The key policy recommendation, the ethnic inclusion and respect of pluralism are critical to avert the burden of the defense spending.

Hamid E. Ali

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Title: INEQUALITY, ECONOMIC GROWTH AND NATURAL RESOURCES RENT: EVIDENCE FROM THE MIDDLE EAST AND NORTH AFRICA

The increase in inequality is one of the main reasons behind some of the present-day major global turbulence, such as the rise of the Islamic State of Iraq and Syria (ISIS) and the Arab Spring and its aftermath. The Middle East and North Africa (MENA) region is associated with natural resources endowment, including natural gas, forestry, coal and, in particular, oil. The oil in the MENA region is a very important factor that has contributed to the growth of the economy and the umbilical cord that feeds the political systems. The purpose of this paper is to address the following question: to what extent do the economic growth, natural resources rent, education for girls and child labor affect the economic

inequality in the MENA region? The panel regression data of inequality, the coefficients for GDP growth and energy use are positive and those for forest rent and oil rent are negative. Using a GMM model, the GDP per capita coefficient is negative across all models; however, economic growth is increasing the inequality in the region. The energy use coefficient is positive and statistically significant, reflecting the social disparities among half and half not. It is crucial that policymakers and governments in the Arab countries ensure that investment in the education of women and gender equality allowing more women to enter the workforce because it is one of the indicators behind the rising economic inequality in the region.

Faculty Abstracts – Posters

Libraries and Learning Technologies

Center for Learning and Teaching

Maha Bali

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Co-authors: Bali, M., Crawford, M., Jessen, R. L., Signorelli, P., & Zamora, M. (2015). What makes a cMOOC community endure? Multiple participant perspectives from diverse MOOCs. Educational Media International, DOI:10.1080/09523987.2015.1053290 (or see Author's Accepted Manuscript if you do not have access). Hamon, K., Hogue, R. J., Honeychurch, S., Johnson, S., Koutropoulos, A., Ensor, S., Sinfield, S., & Bali, M. (2015, June 4). Writing the unreadable untext: A collaborative autoethnography of #rhizo14.

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Title: Lifelong Learning - Evaluating Free and Low Cost Opportunities

Over the past two years, I have been involved in multiple lifelong learning/continuous professional development opportunities as a participant, facilitator and researcher. In this poster, I will share some of the outcomes of the published research I have conducted on MOOCs (Massive Open Online Courses) and the uses of free and low-cost social media to support the learning of academics and teachers. I will also focus on Virtually Connecting, an initiative I co-founded that aims to enhance access to conferences for those who cannot be physically present. This particular initiative has significance for academics in the developing world with limited access to travel funds, women with logistical and social barriers to frequent travel, and also graduate students, providing them access to social capital to participate in current conversations in their field.

This research is not uncritical. Even though I advocate for open and connected learning, and see its potential for reducing social injustice, I also recognize its limitations and barriers to benefiting from it, and I will highlight this as well.

Maha Bali

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Title: Critical Thinking in Context: Challenges of Teaching Liberal Arts at the American University in Cairo

(Note: this is based on the researcher's PhD dissertation and the abstract is slightly adapted from there):

Here at the American University in Cairo (AUC), critical thinking (CT) is considered essential for academic success, global employability, and effective citizenship. Nevertheless, CT remains a highly contested notion, with insufficient evidence that universities succeed in developing it. This study explores how CT develops in practice for diverse AUC students. Using a synthesized working definition of CT, I draw on interview evidence from students' perceptions of AUC experiences that contributed to their CT, illuminated further by faculty and administrator interviews, and relevant AUC documentation and research. Students' incoming CT levels differed according to high school experience, parental attitudes, and interaction with diverse others. Key factors fostering CT were found to be: liberal arts education, rhetoric and composition courses, opportunities for learning situated in authentic contexts, and intercultural learning. The poster will highlight how student

backgrounds and the institutional structure result in inequalities in students' access to, and capacity to participate in, those beneficial AUC experiences, and shows the limited notion of criticality developed through most of these experiences - findings that are applicable to other university contexts. I conclude that AUC needs a critical contextual approach to curriculum development and implementation: an approach that encourages stakeholders to continually question the values behind learning experiences, recognize power struggles within the learning environment, address ways of supporting students with diverse capabilities and privileges in order to develop their capacity for CT, and question what it means to be critical in Egypt's changing, uncertain context. Egypt's struggle for democracy after years of oppression and corruption needs a conception of critical citizenship that involves both a social dimension focusing on empathy, and a critical action dimension promoting a constructive social justice orientation. While the study addresses AUC stakeholders, it has relevance for all educational institutions aiming to develop CT in bi/multicultural contexts. Such institutions include Western-style universities located in Arab/Muslim countries, Western universities with large numbers of international students, and universities with local but diverse students and staff.

Rare Books and Special Collections

Ryder Kouba

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Co-authors: Steve Urgola - Rare Books and Special Collections Library

Title: Building Collaborative Collections at the Rare Books and Special Collections Library: From University on the Square and Beyond

The Rare Books and Special Collections Library of the American University in Cairo has a long tradition of embracing collaborative partnerships, openness, and accessibility to build collections. This presentation will discuss how the library has used participatory and inclusive strategies to create collections of national importance, especially its role (in collaboration with other units at AUC) in "University on the Square: Documenting Egypt's 21st Century Revolution" (UOTS) project. The speakers will discuss how this project sought to document

events in Tahrir Square, at AUC, and across the country from 2011 to the present day by framing the effort as a community-based archival project.

The project involved soliciting acquisitions of photographs, videos, artifacts, and oral history testimonies from a wide range of donors within the AUC community, including students, staff, and faculty, eventually expanding to individuals outside AUC as well. Currently, the project holdings at the Rare Books and Special Collections Library contains over 15,000 images, about 350 oral history interviews, several thousand artifacts like signs and souvenirs, as well as videos, art, scholarship, and websites related to the revolution. This mass collecting of resources has allowed the RBSCL to preserve and provide access to materials that may have otherwise lost.

University on the Square has achieved its goal of documenting the recent historic period in Egypt by involving donors intimately connected to the events being archived. This presentation will also address the potential this method has for creating new collections and adding value to existing collections at the library, by utilizing the materials and knowledge possessed by donors and participants in historic events. Other opportunities to expand crowdsourcing collection development will also be addressed, for example by continuing to solicit AUC community members for oral history interviews about their experiences at AUC for the University Archives, or by seeking donations of photographs from professional and amateur photographers. Additionally, the presentation will discuss how crowd sourcing can be expanded beyond the collection of material to its description, as has already begun to some degree for University on the Square.

School of Business

Accounting Department

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Co-authors: Dina Abdel Zaher, University of Houston Clear Lake

Title: Women on Boards and Firm Performance in Egypt: The Market Does Not Discriminate

There is increased interest in policy mandating women participation on corporate? boards worldwide. The recent period has witnessed growing research examining the impact of female board membership on firm value, but the evidence remains inconclusive. This is concerning given the evident need for informative research that aims to guide regulators and policy makers. In a market where women's presence in top positions remains lesser socially acceptable, the need to investigate the impact of such policy mandates is even greater. Using a unique dataset, we investigate the impact of women board diversity on firm performance on a sample of 114 Egyptian firms, representing all Egyptian publicly listed firms with data available for the year 2013. After accounting for firm size, board size, industry, CEO duality, and board member independence, our findings reveal a positive significant association between percentage of female board members and firm value (ROE) and also for robustness, we used Tobin Q as an alternate measure. We also find this direct effect to be positively moderated by industry (service sector). The results highlight that despite social misconceptions about female leaders, the impact of female board membership on firm value is positive when value is measured by ROE and Tobin q. The paper provides implications for management policies to prepare more females for senior roles and address the false preconceptions about expected market reactions to the appointment of females on boards.

Angie Abdel Zaher

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Title: Corporate Social Performance and Audit Pricing

This paper examines the relationship between clients who engage in different corporate social performance (CSP) and how that influences audit risk, reflected in the audit fees charged. We posit that poorly performing CSP clients tend to pose a higher audit risk for auditing firms than clients who have no CSP concern. We develop a regression model of audit fees that controls for governance mechanism and CSP concerns. We predict audit fees using CSP types as the predictor variable with other variables identified in earlier studies. We hypothesize that auditor's assessment of risk for corporate social performing firm will vary depending on the type of CSP concern. Using a unique data set from Kinder, Lydenberg, and Domini Research and Analytics (KLD), results reveal that CSP clients that have corporate social concerns to be

charged higher audit fees than CSP clients with no social performance concerns. Consequently, we come to understand that the auditor can differentiate between the types of CSP concerns and enhances his risk assessment accordingly. Our results add to the literature and bring a comprehensive view on the different sustainability reporting performance and the impact on auditor's risk assessment.

Keyword: audit Fees; Corporate social performance, client risk, audit effort

Management Department

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Title: SMS Advertising Acceptance: A Mixed Methods Approach

Despite the abundance of literature addressing SMS advertising acceptance, there are very few inductive studies that develop research models that are grounded directly to mobile users, rather than to previous theories and models. The objective of this mixed method study is to assess SMS advertising acceptance in Egypt through developing an integrative model of acceptance through a qualitative grounded theory study, and testing the model on a larger base of mobile users through a quantitative survey study. The results of the study present strong managerial implications to improve the success of SMS Advertising campaigns in Egypt, capitalizing on ad value and trust to boost acceptance. The results also support the application of the grounded theory approach in advertising, and open the door for future research exploring the resemblance between SMS advertising and other text-based and computer mediated advertising methods.

School of Sciences and Engineering

Computer Science and Engineering Department

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Title: Compiler-Directed Memory Management for Multidimensional Signal Processing

In real-time communication and multimedia processing applications, the manipulation of large amounts of data has a major effect on both energy consumption and system performance. Due to the significant amount of data transfers between the processing units and the large and energy consuming off-chip memories, these applications are often called data-intensive.

At system level, the energy cost can be reduced (and, at the same time, the system performance enhanced) by introducing an optimized custom memory hierarchy that exploits the temporal locality of data.

Hierarchical memory organizations reduce energy consumption exploiting the non-uniformity of memory accesses by assigning the

Frequently-accessed data to low hierarchy levels. This hierarchical assignment diminishes the dynamic energy consumption of the memory subsystem -- which expands due to memory accesses -- and it diminishes the static energy consumption as well, since this decreases monotonically with the memory size. Moreover, within a given memory hierarchy level, energy consumption can be further reduced by memory banking -- whose principle is to divide the address space in several smaller blocks, and to map these blocks to physical memory banks that can be independently enabled and disabled.

This presentation will introduce an electronic design automation (EDA) methodology for the design of hierarchical memory architectures in embedded data-intensive applications, mainly in the area of multidimensional signal processing. The input of this memory management framework is the behavioral specifications of the applications. This memory management framework employs a formal model operating with integral polyhedra, using techniques specific to the data-dependence analysis employed in modern compilers. Different from other works in the field, three optimization problems -- the data assignment to the memory layers, the mapping of multidimensional signals to the physical memories, and the banking of the on-chip memory are addressed in a consistent way, based on the same formal model.

Students Abstracts - Posters

Graduate School of Education

International and Comparative Education

Mariam Makramalla, Graduate

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Co-author: Dr. Heba El Deghaidy

Title: Culture Contextualization of Mathematics Instruction

This work intends to study preparatory school students' perception of mathematics instruction within the local context of the Egyptian teaching and learning culture. The target is to unveil some insight about the power dynamics between teacher and student as well as among the students in the classroom. To address students' perceptions of their own classroom mathematics pedagogy, the study adopts a sequential double filter integration method that is founded in literature. This method seeks to interpret preparatory school students' drawings in response to a given prompt. The analysis unveils an apparent paradox in relation to the classroom power dynamics that is perceived by students. The results are then addressed and further synthesized with the help of a contextual understanding of the wider cultural framework. In addition to that, some principles of the social cognitive theory also serve as a platform for explaining the results. Future work needs to consider adopting the results of this study as part of a contextual comparative analysis; contrasting classroom power dynamics of different teaching and learning environments.

Keywords: contextualization, mathematics pedagogy, social cognitive theory, power dynamics.

Nashwa Moheyeldine, Graduate

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Title: School and Society: Spaces for citizenship construction in Egypt

In contrast to research on achievement in reading, mathematics and science, comparative education research has not tended to examine the effects of schooling on political socialization. To examine Egyptian

perceptions and practices of citizenship, fieldwork was conducted in four secondary schools (a public school, an experimental school, a private language school and an international school). This qualitative study collected data utilizing ethnographic fieldwork. In order to capture attitudes and understandings of citizenship and subjectivity among citizens-to-be, semi-structured interviews were conducted across the four schools with seven participants per school, in addition to interviews with school teachers and administrators to gain insights into schools' daily routines, teaching practices and classroom interactions.

Libraries and Learning Technologies

Rare Books and Special Collections

Lauren K. Clark, Graduate *

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Title: Invisible Woman: The Politics of Afro Iranian Bodies in Iran

The recent work of Dr. Pedram Khosronejad of Oklahoma State University on the Afro-Iranian community has made headlines, regarding the issue of race and identity in the MENA region. With his recent work, *The Face of African slavery in Qajar Iran*, he examines the history of slavery in Iran, and the depiction of Black, male bodies.

One of the intriguing aspects of Dr. Khosronejad's work on Iranian photographs from the 1880's-1900's, and the depiction of Black Iranians is that it brings in another question: Where are Black Iranian women? Furthermore, how does their invisibility (with the exception of elder, Black, female bodies) bring to question the politics, surrounding Black, female bodies in Iran? What does their invisibility say about the construction of Black family hood in Iranian history, and what does it say about the role, and hierarchy, concerning female identity in Iran, and the construction of the nation-state, and the politics of motherhood? Such is to be addressed in the presentation and research.

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Psychology, AUC; Fahad Kimera (AUC African Fellow Graduate Student in Sustainable Development), Muhammad Mustapha Babakusa mmustapha03@aucegypt.edu (Graduate Student in Electronical Engineering)

Title: Oral History Interview Analysis as a Form of Psychological Epistemology for Migrant/Refugee Communities in Cairo

The art of oral history has served to address the cultural, societal, and anthropological context of particular communities. How oral history questionnaires are constructed can define whether migrant/refugee communities will be contributors (and knowledge-producers) in psychological care or, if they will be objectified. Understanding the culture, interacting with the community, and contributing to the community, shows a different approach concerning how questionnaires are developed. With the University on the Square Project at the American University in Cairo, an extension of the project for particular migrant/refugee communities has created an opportunity to assess migrant/refugee communities in creating a particular psychology that is suitable for different groups of migrant/refugee communities. How can rigid structures of the English (or the inverse shape of the Arabic language) language cripple an interviewer in capturing the testimony or epistemology of a migrant interviewee? How does this prevent the interviewer from seeing, or understanding the psychology of that particular migrant/refugee? Lastly, how does the understanding of instability or spontaneity contribute to the development of a specific psychology (developed by the community), and such being connected to the mainstream establishment of psychology?

Office of the Dean of Graduate Studies

Sustainable Development

Amira El-Shazly Mohamed, Graduate

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Title: Rooftop Agriculture in the Built Environment

Rapid growth in the world population makes the urban development growing too fast increasing the amount of concrete structure over green spaces. Thus, land desertification, water pollution, and air pollution reduces agriculture area and threatens food shortage. Urban agriculture

can assist in solving these problems by introducing intelligent productive landscape that can benefit the communities through many techniques and strategies. This study aims to discuss roof farming as one of the urban agriculture techniques and its capability to apply in Cairo to increase the green and agriculture space, and improve the air quality.

Eman Taha El Adawy, Graduate

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Title: Visitor-Oriented Approach for Museums Development

In the twenty-first century most Museums in Egypt have been facing great difficulty in sustaining a healthy flow of visitors and in developing new audiences. The Visitor-centric approach in museums focuses on providing a product and a service that is compatible with the needs and expectations of visitors. This research represents an initial step in analyzing the relationship of customers-satisfaction, the quality of the education service and the concept of social sustainability. The study aims to evaluate visitors experience and the educational service provided by a museum, and the learning outcome, which will help the management team to identify weaknesses and strengths in provided services, as well as to identify areas in which development will help the museum to sustain a reasonable flow of visitors. The context in which the study was conducted in the Egyptian Geological museum; a survey was carried out among 300 visitors using the SERVQUAL evaluation method, the Contextual Model of Learning and a construct for Social Sustainability.

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Title: Evaluation of Green Building Rating Systems for Egypt

Various green building rating systems, such as Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Methodology (BREEAM) have been developed worldwide in order to assess the potential impacts of the building on the environment, economy and society, and play a vital role

in defining the level of sustainability in the construction industry. This research evaluated eight different green building rating systems: (1) BREEAM, (2) Comprehensive Assessment System for Built Environment Efficiency (CASBEE), (3) Excellence in Design for Greater Efficiencies by the International Finance Corporation (EDGE IFC), (4) ESTIDAMA, (5) Green Pyramid Rating System (GPRS), (6) Global Sustainability Assessment System (GSAS), (7) LEED and (8) TARSHEED through a comparative analysis. Explicit criteria were defined for the selection of the rating systems and a specific framework was set for performing the assessment. A case study in the new construction phase measured performance using three rating systems; LEED, TARSHEED and GPRS. The outcome of this research was a set of recommendations to Egypt Green Building Council committee for the development of future versions of TARSHEED rating system.

Keywords: Green buildings, Green building rating system, Sustainable construction, Egypt Sustainable Development Strategy 2030

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Title: ADAPTING A METHODOLOGY TO CONVERT EXISTING RESIDENTIAL BUILDINGS TO NEAR-ZERO-ENERGY BUILDINGS IN EGYPT

Green architecture, sustainable buildings, environmentally friendly, and other terms have become recently popular in the construction fields among professionals and non-professionals as well. Although it is mostly needed and highly feasible, the application of these ideas is not yet at the same level of popularity in Egypt. The aim of this research is to propose a method to be used in solving the energy problem in the building sector in Egypt. Since it is concerned with the existing building stock, then the methodology will be addressed to retrofitting strategies not new design strategies. The research suggests the nZEB (near zero-energy buildings) methodology as a possible solution for the problem and provides a guideline to be used among the rest of existing building types. The research utilizes energy simulation to validate its initial assumptions and to test the feasibility of the proposed methodology. The final outcome of the research is a method that combines both retrofitting and renewable energy strategies that suit the Egyptian context and potential to convert existing buildings to nZEB buildings. The research

concludes a potential energy saving by applying nZEB strategies to existing residential buildings in Egypt. Future research is required on different building types to validate the nZEB across different building types.

School of Business

Economics Department

Karen Sameh Fanous and Rauda Amer, Undergraduate

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Title: Uber and the Taxi: An Application of “Market, Hierarchy, and Trust”

Using evidence from the new knowledge economy, Paul Adler amended the famous Schumpeterian prediction of the demise of capitalism and its replacement with socialism. After defining socialism in terms of a hierarchy being mitigated by authority, he predicted that the new knowledge economy would take up this socialism, yet, with a new element of rational “reflective trust”. In this research, we tested this hypothesis against the new sharing economy in the ride service sector, Uber, especially in NYC. We compared it to the old yellow taxi model and we use this comparison to test each element, reflective trust and hierarchy. We evaluated the type of trust present in the sharing economies and test edit against Adler’s criteria for “reflective trust”. Our research used a qualitative analytical approach that uses Adler’s criteria of evaluation. We collected six elements that characterize a hierarchy from Adler’s work and US labor laws, and examined both ride sector models. Results suggested that Adler is correct in predicting the prevalence of reflective trust as the mitigating factor in new knowledge-based economies. Yet, results also indicated that that Uber can’t be classified solely as a hierarchy despite its retention of some of its elements like driver discipline, contracts, and labor benefits.

Maram Khattab, Graduate

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Title: Is the Central bank shadowing Taylor rule?

The exchange and monetary policy in Egypt has witnessed remarkable variation during the previous two decades. Till the year 2003 the Central

bank of Egypt (CBE) fixed the Egyptian pound (EGP) against the United States Dollar (USD) for long episodes. Afterwards, a managed floating exchange rate regime was embraced. The CBE assumed that such policy would be essential and might not cause inflation. Throughout the years 2003-2009, the dollar creating events sustained the CBE's policy of keeping the exchange rate inside steady ranges. Nevertheless, higher inflation rates were verified during the same period relative to its main trading companions. This caused the EGP to be over valued, which led our competitiveness to decline. According to the CBE, their prevailing target is stabilizing prices to maintain economic growth. Surprisingly inflation is reported as a double-digit number of 11% by the end of the year 2015.

In 2005, they established "the corridor system" which depended on the "overnight interbank interest rates" as the nominal anchor. The monetary policy committee (MPC) "decided to set its key interest rates, the overnight deposit rate and the overnight lending rate, at 9.5% and 12.5%, respectively". A drop in the annual inflation rate was witnessed because of the contractionary policy embraced, the new exchange rate regime, as well as the drop of the international commodities' prices. The political scene during the 2011 strongly affected the financial markets as well as market liquidity. It had a downward pressure on the EGP and huge risks surrounded inflation and GDP attitude. "Since 2011, persistent negative output gap limited inflation control". During 2015, the annual rate speeded to 13.19%. "The MPC decided to raise the overnight deposit rate, overnight lending rate, and the rate of the CBE's main operation to 9.25%10.25%, and 9.75%, respectively". The CBE powerfully considers that "real negative interest rates" are completely unreliable with the constant and current work to eliminate inflation.

Meanwhile, should the CBE face inflation by short-term interest rates manipulation, taking into consideration the growths in money supply, as well as other elements that impact the essential rate of inflation? This proposed study should track the effect of embracing Taylor's rule and how it could be of use to unearth the effective monetary policy in Egypt.

Noor ElGhorab, Undergraduate

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Title: Beauty: Defining the Undefined

This research paper explores the effects of media and the beauty industry on women's perception of beauty, and further extends to the theoretical and pragmatic effects of westernization and consumerism on Asian and Middle-Eastern cultures. Results indicate that women's fascination with beauty has led to severe practices, such as the irrational expenditure on products and cosmetic surgeries, the involvement of children in beauty pageant contests, and the alteration of Asian facial features to match Western ones. The research finally concludes with a religious perspective on the matter of beauty, using Islamic and Christian scriptures to raise awareness on the significance of inner beauty.

Sarah Bahgat, Amira Boshra and Sarah Farid, Undergraduate

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Title: The Determinants of Patient Satisfaction: A Quantitative Approach Using Logistic Quantile Regression

While patient satisfaction has gained momentum as an important indicator of the quality of health care systems, nonetheless, studies pertaining to patient satisfaction have been heavily criticized for lack of objectivity, unreliability and inaccuracy. Using data on the healthcare system in the UK from the National Health Service (NHS), this paper studies patient satisfaction as an indicator, using logistic quantile regression (LREG), in order to better understand the variables affecting it. The significance of three main categories of variables were tested: those related to direct contact with the patient (such as timeliness in the health facility, confidence in the General Practitioner (GP) and the amount of time nurses dedicate to patients), accessibility (including working hours and ease of setting up an appointment), and finally, the clinical outcomes (as measured by the standardized mortality rate). Results show that points of direct contact with patients have the highest positive impact on patient's satisfaction; accessibility and clinical outcomes come next. Quantile analysis further clarified that the impact of patients' confidence in the treating GP is more or less constant throughout all patient satisfaction levels. The amount of time nurses give has a higher positive impact on patients who are less satisfied, while, contrastingly, accessibility measures have a higher impact as the level of patient's satisfaction increases. We recommend that the NHS implement customized development projects approaches for the health facilities according to patient satisfaction rates to increase satisfaction by the highest possible percentage. We also recommend that other variables

affecting patient's satisfaction not directly controlled by health care (such as government expenditure and socio-economic well-being of the patient) would also be examined.

Management Department

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Co-authors: Thesis Advisor: Dr. Islam Azzam

Committee Members: Dr. Neveen Ahmed, Dr. Ahmed Elshahat

Title: The Impact of Corporate Governance and Firm Maturity on Working Capital Management Efficiency: Evidence from Listed European Firms

The importance of studying working capital management efficiency (WCME) springs from its effect on a firm's profitability, value, and solvency. This study analyzes the effect of corporate governance in overseeing management handling working capital levels. In addition, this paper studies the role of firm maturity as a determinant factor of WCME. For this purpose, the paper at hand uses 583 listed European firms from 2002 to 2013. The design employs cross section random effect panel regression models, where various working capital characteristics are used as dependent variables. Along with the explanatory firm maturity proxy and the corporate governance variables, it controls for the effect of country and multiple firm-specific characteristics. Finally, this study suggests that both corporate governance (except for ownership concentration proxy) and firm maturity are significant factors of WCME. Yet, for some of the proxies used, it did not reach conclusive results regarding the direction of impact on working capital investment.

School of Humanities and Social Sciences

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Title: Sexual Violence Interpretation Depends on Where It's Interpreted

This research tries to show the various definitions of sexual violence across different states/countries/geographical areas. It shows that, a nation's general identification to an action as a "sexual violence", is dependent on too many factors. It tries to study the correlation between the level of progress a country achieves, and the level of its people's understanding of sexual violence definition. This study analyzes several case studies along with some surveys from different countries around the world to know how they define "sexual violence" and how close it is to the actual definition that can be concluded, as "any type of sexual contact or behavior that occurs without the explicit consent of the recipient." Data was collected from articles/books/laws, from some accredited websites, along with some other surveys. Results argue that action can be identified as sexual violence in some countries and not considered so in other countries, depending on different factors studied in detail in this research.

Political Science Department

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Title: Les Phalanges Libanaises: the Self and Other

The purpose of this research paper is to study the identity construction of the Lebanese Phalange Party, postulating that its view of the other is deeply entrenched within its own development. Strongly regarded as a model of Fascist thought and action, the Phalange, a popular manifestation of Maronite nationalist thought Lebanonism, seems to be destined for an eternal clash with a similarly endless Other, but this latter is not formulated on religious bases only. The conceptual idea behind the other remains the same throughout the Kataeb's history of conflict, but its face changes as the nature of the threat to the Phalange's political and economic interest changes. The Myth of the one, static Muslim Other is thus challenged and deconstructed. Taking into consideration the traditional political and economic features of Lebanese society, their interplay with the state's institutions, and the Phalange's role as a tool of mobilisation, this paper presents a more complex interpretation of the construction of the self and Other.

Roxanne Brook Vigil, Graduate

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Title: ISIS Case Study: Strategic Advantage of Visual Violence

ISIS makes headlines that shock everyone with the brutality of what their media release to the public sphere. What is new is the capacity to which they are able to create images of violence and release them to wide audiences and where the act of violence is staged for the visual effect. This study analyzes the beheadings, violent images and other visual content that ISIS publicizes. In attempting to determine the strategic advantages of ISIS choosing to publicize inhumane methods of killing its prisoners, this paper argues that through the mechanism of their videos and visual images, ISIS is utilizing a “target response” and “gaining legitimacy” strategy that Neumann and Smith identify as the goals of a terrorism campaign.

Sally Elfishawy, Undergraduate

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Title: Civil Rights Movements in the Comparative Politics Perspective

In my research paper, I provide a general understanding of the form of collective action known as social movements. I closely examine the US and Northern Ireland civil rights movements. Then, I compare and contrast these movements and apply the Marxist approach to them. Finally, I identify the reasons for their successes and/or failures. Through a Marxist lens, I argue that economic conditions are the main reason behind the emergence of both civil rights movements. The US civil rights movement originated from a labor muddle that imported slaves from Africa who received too few wages in return for their work, and thus, revolted. Similarly, the Northern Ireland civil rights movement took place at the hands of minorities who had little to no housing, and the issue became a main economic problem that eventually led to their revolt.

School of Sciences and Engineering

Biology Department

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Title: Antibiotic Resistance in the Red Sea

Antibiotic resistance is a complex problem with a global clinical impact. However, did this phenomenon begin in conjunction with the use of antibiotics in clinical settings or is it older? We studied antibiotic resistance in pristine environments to answer this question. We analyzed antibiotic resistance in several Red Sea brine pools together with overlying water column and underlying sediments. Being devoid of anthropogenic impact makes these sites perfect targets for the study. Analysis was carried out by alignment of 454 metagenomic sequencing reads using BLASTx to antibiotic resistant polypeptides contained in the Comprehensive Antibiotic Resistance Database. Reads were assigned to the best hit with more than 90% identity over at least 25 amino acids. Reads aligning to genes whose resistance is conferred by mutation were screened to pinpoint these mutations. Results showed the presence of several antibiotic resistance genes conferring resistance to different classes of antibiotics, including beta lactams, rifampin, fluoroquinolones, macrolides and aminoglycosides. These results provide new evidence that environmental organisms represent a reservoir for antibiotic resistance genes. Studying these genes can provide better insight into the evolution of antibiotic resistance in clinical practice.

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Title: Molecular Analysis of Epithelial Ovarian Cancer Tissues

Ovarian cancer is the most fatal gynecological cancer in women and the fifth most common cause of cancer death. It is always diagnosed at an advanced stage and patients have very low survival rates. The objective of this study is to determine the differential expression of different genes and assess their roles in the biology of epithelial ovarian carcinoma (EOC). These genes are MUCIN 16, CRP, BRCA1, COBRA1 and β -catenin. We obtained ten cancerous tissues from a hospital along with their clinical data, and examined the expression pattern of these genes at the transcriptional level using RT-PCR on these tissues. The levels of COBRA1 and β -catenin proteins were assessed for a subset of cancerous tissue using Western blot. MUC16 was upregulated in most malignant samples, except for the ones who had undergone preoperative chemotherapy treatment. We also found that CRP is differentially expressed in the different stages of EOC. BRCA1 as well as COBRA1 RNA levels were down regulated in 40% of tissue specimens. We established for the first time that COBRA1 was completely silenced at the protein level in two out of four assayed cancerous tissues. Interestingly, β -catenin protein levels were elevated in those cancer specimens that exhibited a deficiency in COBRA1 expression. Our results confirmed clinical data obtained from the hospital that included the serum levels of MUC16/CA125, and the stage of the cancerous tissues, by stressing the role of MUC16 as a diagnostic and chemotherapy predictive marker and CRP as a biomarker for staging EOC. COBRA1 follows the expression pattern of BRCA1 at the RNA level, and its inhibition might be the cause for the abnormal upregulation of β -catenin.

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Title: Isolation and Enrichment of Mouse Testicular Multipotent Stromal Cells.

Spermatogonial stem cells (SSCs) and Mesenchymal Stem cells

(MSCs) are two types of stem cells that have recently been studied by multiple researchers from across the globe for their great potential in regenerative medicine and therapeutics. Many researchers have reported the induction of pluripotent stem cells from these cell lines, however, these articles were met with great controversy due to the inconclusiveness of the developmental potential of the cells, origin, and identification- using previously specified questionable markers. Following a protocol adapted in the lab meant to select for MSCs, an 18-day cell culture was established for cells extracted from adolescent mice testes; aliquots were taken from several passages and examined using multiple markers. This was complemented with morphological observation of the cells. The results of running these markers and observation suggest that the cells isolated and propagated during the experiment are probably a mix of both, mesenchymal and spermatogonial stem cells- which decrease in the culture as it is passaged. Different markers are yet to be ran to further confirm the results. The cells are to be subjected also to differentiation protocols- mainly for the 3 cell types MSCs give rise to: osteoblasts, chondrocytes, adipocytes and myocytes, as well as other cell types to further expand our knowledge about their identity and potential.

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Title: Induced Pluripotent Stem Cells Derived From Mouse Germ Cells

While embryonic stem cells are well known to give rise to tissues comprising all three germ layers, only recently was it found that embryonic-like stem cells could be derived from the postnatal mice testis in culture. Embryonic-like stem cells from postnatal testes have shown that they can undertake most if not all, the functions of embryonic stem cells and recent reports have demonstrated that somatic cells can be induced to pluripotent stem cells, mostly with the addition of genes. This

work explores the potential of postnatal germ cells to become pluripotent, including expression of pluripotency-associated genes, embryonic stem cells morphology and histology, without the addition of genes.

We used 15 mice and harvested cells from the testes using a mechanical and enzymatic digestion technique to generate single cell suspension. We found that cells from the testis, when removed from their stem cell niche and when the appropriate growth factors and reagents are added, can be reprogrammed to pluripotency. Isolated cells from the testes at day 1 along with embryonic-like stem cells at day 14 were characterized using Reverse Transcription - Polymerase Chain Reaction (RT-PCR) using germ cells marker VASA, embryonic stem cells markers Nanog, Oct4, cripto TDGF1, Klf4, Esg1, and Thy1. Furthermore, Immunopheno typing was performed using Fluorescence Activated Cell Sorting (FACS) using embryonic-like stem cells marker SOX2, CD 90 (Thy1), CD15 (SSEA-1), CD117 (c-kit), and CD133. Samples were collected from our suspended cells at day 1 and day 14 and were sent for histology and cytology analysis.

Our results showed success in culturing cells harvested from the testes, along with their reprogramming to their pluripotency state. RT-PCR results confirmed the expression of VASA gene at day 1; these cells did not express embryonic stem cells markers (Nanog, Oct4, cripto TDGF1, Klf4, Esg1, and Thy1). However, embryonic-like stem cells at day 14 showed the expression of the previously mentioned embryonic stem cells markers, and did not express Vasa which is a germ cell marker. Immunopheno typing results showed a noticed elevation in embryonic stem cells markers (SOX2, CD 90, CD15, CD117, and CD133) at day 14 compared to those at day 1. Besides histology and cytology results revealed the change in the cells from day 1 encompassing spermatogonial stem cells, Sertoli cells and other germ cells, to cells at day 14 showing cells resembling embryonic stem cells.

Pluripotent stem cells can be derived from postnatal mice testis, as these cells show similar morphology and molecular gene expression to embryonic stem cells.

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Title: CURCUMIN IMPROVES FUNCTION FOLLOWING SPINAL CORD INJURY IN RATS

The inflammatory response that follows spinal cord injury (SCI) leads to the formation of a physical barrier that prevents axonal regeneration which prevents neuronal signals from reaching their targets beyond the level of the trauma. This produces long term disability and adds a significant burden on the patients who have to live with the consequences for the rest of their lives. Altering the inhibitory micro-environment in the spinal cord that results from the secondary damage specifically the inflammatory process and gliosis that follows the primary injury, has been a major challenge.

Natural antioxidants e.g. Curcumin (Turmeric root extract) has been used in traditional Chinese and Indian medicine for thousands of years. Studies on Curcumin show that it has a strong antioxidant and anti-inflammatory effects, reducing the expression of inflammatory markers in the liver, kidney and nervous tissue. The aim of this work is to study the antioxidant/anti-inflammatory role of Curcumin in modulating the inflammation that results from the secondary damage following SCI.

The present work shows that Animals treated with Curcumin showed better performance on motor tests (Grid walking & inclined plane tests) 2 weeks after surgery. Our preliminary data support a role for Curcumin as a natural antioxidant in reducing inflammation and improving recovery following rat SCI.

Biotechnology Program

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Title: Molecular Medicine Helps Orphan Diseases: A Study on Xeroderma Pigmentosum in Egypt

Xeroderma Pigmentosum (XP) is a rare genetic disease, Patients are often known as “children of the dark” owing to strict protection from sunlight to avoid photosensitivity of the skin and the eyes. Sun exposure puts the patients at 10,000 fold risk of developing UV- induced skin cancers at age younger than ten years. Patients can develop mental retardation and other neurodegenerative symptoms. Cancers of different body organs appear 10-20 folds higher in XP than in normal people. The common consequence is death caused by cancers and neurologic deterioration. XP is caused by a DNA mutation in one of eight genes responsible for DNA repair. When two parents are carriers for a specific mutation, there is 25% chance of having an XP child; this is autosomal recessive inheritance. Incidence is one per million worldwide with increased concentration in Japan (1:22,000) and North Africa (1: 50,000, 1:10,000 in Tunisia, 1:80,504 in Morocco). The high incident regions share the culture of interfamilial marriages, in addition to geographical isolation. Egypt is one of the North African countries in which XP was found to represent about 16% of genetic skin diseases. XP has no treatment, which highlights the importance of early diagnosis and preventive measures. Unlike the cases of Tunisia, Algeria and Morocco, no sufficient data exists on the common mutations causing XP in Egypt. Our study aims at identifying common genetic mutations causing XP in Egyptian patients. Knowing the exact XP mutation per patient is highly valuable for early diagnosis, carrier detection, prenatal diagnosis to combat the increase in disease spread, and proper genetic counseling. Future skin grafting and gene therapies depend on the patient’s type of XP mutation.

Our study included diagnosed XP and suspected XP Egyptian patients from different governorates. Blood samples were collected from patients after informed consents according to recommendations of the ethical committee of National Research center and the Institutional Review Board (IRB) of the American University in Cairo (AUC). DNA was extracted for amplification of two of the XP genes, and direct sequencing.

We identified specific mutations to be common in the Egyptian XP patients. Interestingly, one mutation was confined to the Egyptian population, another mutation was common in neighboring North African countries, and a third one was common to an African island, named Mayotte; this reflects the connection of the Egyptian population to different ethnic origins whether via common lineage or migration tides. Our findings pave the way for simple and cost effective molecular diagnosis for carrier detection, prenatal diagnosis and efficient genetic counseling.

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Title: Cofactor of BRCA1: A Novel Regulator of Proliferation and Migration in Hepatocellular Carcinoma

Cofactor of BRCA1 (COBRA1) is one of the four subunits that make up the Negative Elongation Factor Complex which is involved in the stalling of RNA polymerase II early during transcription elongation. As such, COBRA1 is able to regulate a substantial number of genes involved in a number of pathways, including cell cycle control, metabolism, cell proliferation and DNA repair. In the field of cancer, the role of COBRA1 is not yet fully understood. The aim of our study was to investigate the functional role of COBRA1 in the tumorigenesis of hepatocellular carcinoma (HCC). We investigated the gene expression pattern of COBRA1 in HCC tumors using the publicly available Oncomine Cancer Microarray Database. Analysis of HCC microarray data from three different datasets collectively demonstrated a significant overexpression of COBRA1 in HCC tumors versus their normal counterparts. To elucidate the biological significance for this overexpression in HCC, RNA interference was used to silence COBRA1 expression in the well differentiated HCC cell line, HepG2. The silencing efficiency was confirmed by both reverse transcription-polymerase chain reaction (RT-PCR) and Western blot analysis. Interestingly, knockdown of COBRA1 resulted in a significant decrease in cell proliferation, accompanied by a concomitant decrease in the expression of the proliferation marker, Ki-67. A scratch wound healing assay revealed a significant decrease in the migratory potential of the HepG2 cell line in culture upon COBRA1 knockdown. In addition, silencing of COBRA1 was associated with a significant decrease in the expression of survivin, suggesting that survivin might be one of the mechanisms by which COBRA1 mediates its role in HCC. Collectively, data findings presented here highlight an oncogenic role for COBRA1 in hepatocellular carcinoma. To the best of our knowledge, our study provides evidence for the first time to support a positive role for COBRA1 in the growth and migration of HCC.

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Title: The Expression Pattern of miR-590-3p in Epithelial Ovarian Cancer is a Potential Diagnostic Biomarker for Ovarian Cancer

Epithelial ovarian cancer (EOC) is the most common type of ovarian tumors. The biomarkers, which are being used for EOC screening, have low specificity and sensitivity leading to late diagnosis and high mortality rate. Thus, identification of effective biomarkers for early diagnosis of ovarian cancer has become a high priority in research. This study addresses this problem by studying the expression of a potential molecular marker, miR-590-3p, in EOC. We examined the expression of various acknowledged biomarkers including Cancer antigen-125 (CA-125) which is being used for EOC screening, CRP which expression was correlated with the stage of the disease and PAX2 whose expression is correlated with the histological grade to verify the clinical stage and the histological grade at the molecular level. We examined the expression of miR-590-3p in EOC patients' serum and EOC tissues, using real-time PCR. The levels of circulating miR-590-3p were found to be significantly elevated in 84.6% of the EOC patients' serum, with 76.92% sensitivity and 85.7% specificity at its optimal cutoff. Likewise, tissue miR-590-3p was found to be up regulated in EOC compared to normal ovarian tissues. The levels of tissue miR-590-3p were highly correlated with high-grade undifferentiated ovarian carcinoma. Additionally, we examined the mRNA and protein levels of the potential downstream target genes, SOX2, LEF1 and PAX2 that were predicted using miRanda and Targetscan Insilco tools. Among the examined potential downstream targets, PAX2 showed the most significant negative correlation with the levels of miR-590-3p in EOC tissues, suggesting that miR-590-3p could acquire its role in EOC carcinogenesis through regulation of cancer stem cells properties by targeting the expression of PAX2. Furthermore, the elevated level of the circulating miR-590-3p in EOC patients indicating that miR-590-3p has a strong potential as a biomarker for the diagnostic of EOC.

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Title: Anti-cancer Molecules from Red Sea Brine: Mining for Novel Anti-cancer Polyketide Synthases and Non-Ribosomal Peptide Synthases

Almost 60% of currently FDA-approved drugs are of natural origin, highlighting the value of natural sources in the pharmaceutical industry. Some soil microbes produce medically useful compounds, including anti-microbial and anti-cancer drugs. To tap into this biological mine, metagenomics is employed to search for novel enzymes or molecules. The AUC Red Sea Metagenomics team previously sequenced metagenomic DNA from Brine Pools (Mohamed et al., 2013; Siam et al., 2012). Enzymes synthesizing such compounds were previously expressed and bioactive compounds were isolated.

The aim of this study is to identify novel Polyketide Synthases (PKSs) and Non-Ribosomal Peptide Synthases (NRPSs) -which synthesize small molecules-, from the Red Sea and assess their antimicrobial and anticancer potential. A comprehensive database for biosynthetic gene clusters was used to identify genes involved in secondary metabolism – antiSMASH (Weber et al., 2015). In the dataset of the sequences of the water and sediment metagenomes, 6 Type III Polyketide synthases, 10 Non-ribosomal Peptide Synthases, 8 other Polyketide Synthases, as well as tens of other sequences were detected for other secondary metabolism pathways; for the Red Sea metagenome datasets. Consequently, selected candidate enzymes will be expressed and characterized. The produced compounds will be screened for antimicrobial and anti-cancer activities. The bioactive compounds

resulting from the enzymes will be characterized. Preliminary characteristics and anticancer activity of an isolate from the harshest, deepest and most secluded site in the Red Sea will be reported.

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Title: Establishment and Characterization of Ovarian Cancer Cell Lines from Solid Tumors of Egyptian Patients

Ovarian cancer (OC) is the most lethal of all gynecological cancers and is often referred to as the disease that whispers. Cell lines represent a very powerful tool in OC research. They are utilized for investigating the underlying pathogenic pathways associated with the disease progression, studying potential biomarkers and therapeutic targets. Most of previously established OC cell lines are not well characterized and insufficient information is provided by cell banks regarding the clinico-pathology (histotype, grade and FIGO stage) and the origin of the corresponding tumor from which the cells were generated. In addition to that, currently available OC cell lines do not represent all known ovarian cancer histotypes or different ethnic groups. In this research, we aim to establish a high quality ovarian cancer cell line that is derived from the solid tumor of an Egyptian patient. The cell line will be well documented at the donor patient level through collecting all relevant clinical data and at the cellular and molecular level by directing a number of experiments including morphological and growth rate examination, investigating a number of cellular markers by RT-qPCR and western blot, in-vitro response to cytotoxic drugs and genetic mutations analysis. To our knowledge, this will be the first ovarian cancer cell line to be established from an Egyptian patient.

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Title: A Novel Predicted Anticancer Homeodomain Peptide with Potential Gene Regulatory Activity

Cancer is currently one of the leading causes of mortality and morbidity

worldwide. Most cancer therapies rely on small molecule drugs (<0.5 kDa). As with all small molecule drugs, chemotherapy is highly toxic and presents many off-target side effects. Small peptide drugs combine the specificity of larger peptide drugs with the less invasive modes of action of small molecule drugs, such as the potential for oral administration availability. For this study, we scanned The American University in Cairo's Red Sea Metagenomic library for potential anticancer sequences; to this end, we developed several support vector machine (SVM) models. Furthermore, we conducted an *in silico* study in order to analyze the most promising peptide hit returned by the SVM pipeline. We were able to detect 58 potential anticancer peptides, of which only one was selected (based on cationicity, size, and SVM score). We observed that the selected anticancer peptide contains the C-terminal portion of the homeodomain structure, is sequence- similar to human Meis2, and structurally similar to human Pax6. Our peptide also aligns with an antennapidea homeodomain. We predict that our peptide will insert into the cell and then be transported to the nucleus, where it will modulate gene expression.

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Title: TiO₂-Graphene and TiO₂ Graphene Oxide Nanocomposites for Green Remediation of Water Pollution

TiO₂ as a model photocatalyst is gaining great interest due to its good activity, stability, low toxicity and cost-effectiveness. The rapid recombination of the photogenerated electrons and the holes on the TiO₂ surface can be diminished by using carbon-TiO₂ composites, especially Graphene (G) and Graphene Oxide (GO), which improve the photocatalytic activity of TiO₂ and stability under UV-visible light illumination. The determination of surface properties including surface acidity, polarity and surface area of photocatalysts allows the control and enhancement in the photocatalytic efficiency. This study

investigates the surface properties of TiO₂-G and TiO₂-GO nanocomposites using independent techniques, correlating these surface properties and photocatalytic activity and studying the effect of particle size and the amount of G and GO on these surface properties. TiO₂ nanoparticles of different sizes were prepared. The as-prepared TiO₂ nanoparticles were used to prepare TiO₂-G and TiO₂-GO nanocomposites. The photocatalytic degradation of methylene blue (MB) dye, as a model water pollutant, was used to evaluate the photocatalytic activity of the samples. The characterization results indicated that two methods of preparation gave two average sizes of 436 ±59 nm and 251 ±32 nm for the samples. The results for the photocatalytic activity of the prepared samples exhibited superior activity over the unmodified TiO₂ and the rate enhancement ranged from 9.2 to 69.2% for TS, and 18.8 to 237.5% for TL, showing the clear advantage of using nanocomposites as photocatalysts for pollutants. Photocatalytic activity of the samples is dependent on many factors such as surface acidity, surface area and, to a much lesser extent, the change in band gap energy; the overall effect is a complex combination of all these factors.

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Title: Gold Nanoparticle Based Sensor for Accurate Detection of Mycobacterium Tuberculosis Genomic DNA

In 2014, Mycobacterium tuberculosis (MTB) infected 9.6 million and killed 1.5 million individuals. Global efforts to combat MTB are hindered by limited accuracy and/or high cost of available tests necessary for timely initiation of therapy. This is more pronounced in heavy burden areas where MTB is most spread and resources are scarce. Therefore, there is a need to develop new accurate and inexpensive MTB diagnostic assays. We have developed a simple, rapid MTB assay that exploits the quenching properties of 40 nm gold nanoparticles (AuNPs) synthesized by the citrate reduction method. DNA was extracted, fragmented using sonication, denatured, and allowed to anneal to Cy3-oligonucleotide sequence specific to MTB 16s rDNA. AuNPs were then

added and fluorescence measured. The developed assay was evaluated using DNA extracted from cultures of 72 MTB positive samples and several other non-MTB strains as controls. All samples were tested with multiplex PCR using two sets of primers; one specific for MTB and the second specific for NTM. Random samples were amplified using 16S-23S ITS primers and amplicons were sequenced. Sequencing confirmed that 12/13 samples were MTB. FRET assay was performed with 16s rDNA specific probe and the cut off value of the relative fluorescence was 3. In positive specimens, the Cy3-oligo hybridized to the MTB 16S rDNA, AuNPs became separated from Cy3-oligo, and fluorescence was measured. In negative specimens, Cy3-oligo adsorbed onto the AuNPs and fluorescence was quenched. The assay successfully identified 16s rDNA gene of MTB samples with sensitivity of 98.6% and specificity of 90%. The concordance of multiplex PCR and FRET results was 97.6%. The test turnaround time after DNA extraction was 15 min and its detection limit was 10 ng DNA/ μ l. The reported AuNP assay is inexpensive and can be used for accurate detection of MTB DNA. A similar assay can be developed to detect genetic mutations responsible for MTB drug resistance.

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Title: Use of Altegina/Montmorillonite Nanocomposites as Drug Delivery System of Curcumin

Curcumin (Cur.) is a traditional medicine with anti-inflammatory and antioxidant properties. However, its low water solubility and rapid metabolism are main the main obstacles for its therapeutic applications. Different techniques were used to overcome the drawbacks of curcumin. Alginate/ montmorillonite (MMT) nanocomposites are used as a drug delivery system for a wide variety of drugs due to numerous advantages of both components. Accordingly, this study prepared curcumin loaded alginate/MMT nanocomposites and investigated their release properties. Exfoliated MMT clay was first prepared by stirring the clay in an aqueous suspension for 4 hours. Exfoliation was confirmed by X-ray diffraction and Fourier Transform infrared spectroscopy. Curcumin-loaded MMT was then prepared by dispersing the exfoliated clay into an ethanoic curcumin solution. Different parameters were tested, namely stirring time, curcumin solution concentration and ratio of MMT to

curcumin, in order to find out the maximum loading conditions. Maximum loading was 6.56 mg/g, which corresponds to entrapment efficiency of 25.62 %. Visible spectrophotometric measurements of the curcumin solution were used to determine the amount of curcumin loaded by measuring the absorbance of curcumin solution before and after the dispersion of the clay. The hybrid sample was then encapsulated into alginate beads with different hybrid to alginate ratios (W/W) using the ionotropic technique. XRD and FTIR analysis were used. The release of curcumin from different alginate/MMT nanocomposites was studied in different biorelevant media: fast gastric (FaSSGF), fast intestinal (FaSSIF) and fed intestinal media (FeSSIF). The curcumin release in gastric media was negligible, while, in the intestinal media, it was significantly higher and was found to be affected by both the feeding state and the ratio of hybrid to alginate. Accordingly, the percentage of curcumin released was higher in the fasting state than in the fed state. Curcumin release in both intestinal media demonstrated different behaviors: in FaSSIF sustained release behavior was found to occur for 24 hours, while curcumin release reached a plateau by 8 hours in the FeSSIF. This study reveals the promising use of alginate/MMT nanocomposites as a sustained release drug delivery system for curcumin.

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Title: Transcriptional Regulatory Networks in Hepatitis C Virus-induced Hepatocellular Carcinoma

HCV is an epidemic affecting an estimated 160 million individuals worldwide or approximately 2.35% of the world's population. This is partly because HCV exhibits high genetic variation, characterizing each region with its own genetic prevalence. Therefore, understanding the transcriptional regulatory elements that influence the progression of liver disease in the presence of HCV infection is crucial for diagnostic and therapeutic purposes. Systems biology provides a road map by which these elements may be easily identified. In this study, 124 microarray samples were assessed in order to determine differentially expressed genes for 4 tissue types/conditions (normal, cirrhosis, cirrhosis HCC, and HCC). Differentially expressed genes were assessed for their

functional clustering and those genes were annotated with their potential transcription factors and miRNAs. Transcriptional regulatory networks were constructed to visualize each pairwise comparison between the 4 tissue types/conditions. In this study, 12 transcription factors were found to have high expression patterns amongst all 6 pairwise comparisons and these transcription factors also provide insight the conditions of the liver as it progresses through hepatic cirrhosis, hepatic steatosis, and the induction of cancer. With the plethora of miRNAs that are found in the liver, each liver condition was found to have its own signature miRNA expression pattern. In the 6 pairwise comparisons 14 miRNAs were found to have high expression patterns in all 6 pairwise comparisons and their regulation in HCC was determined as well as their impact on cellular homeostasis. Based on the findings of this study and a systematic analysis of many studies, it can be concluded that as the liver progresses from cirrhosis to steatosis, eventually becoming carcinomic, there are specific transcription factors regulating this transition through each stage. Whereas the condition of the liver digresses, the downregulation of miRNAs' expression makes the transition of the liver through each pathological stage more apparent. Therefore, an understanding of the transcriptional regulatory attributes acts as a road map to provide interference strategies in order to target the stages in the progression of HCV induced HCC.

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Title: Preparation of Colloidal Garlic Oil Nanoparticles and Investigations of their Antibacterial Activities

In the present study, garlic oil (GO) colloid nano-particles (Colloidal NPs) were prepared by combining GO with poly lactic-co-glycolic acid (PLGA) polymer by the Single emulsion/solvent evaporation (SE/SE) method. Different PLGA/GO NP formulations were prepared by a high-speed homogenizer at different homogenization time intervals. A number of preparation factors were carefully controlled to achieve stable and uniform size distribution of the different PLGA/GO-Colloidal NPs formulations. Complete characterization of the particle sizes, zeta potential, polydispersity index (PDI), the GO% in each PLGA/GO-Colloidal NPs formulation, the morphology (using scanning electron

microscopy (SEM)) and the chemical structural characteristics (using Fourier transform infrared spectroscopy (FT-IR) and ultraviolet-visible spectrophotometry (UV-vis)), were carried out. In addition, an antibacterial assessment has been carried out against *Escherichia coli* (*E. coli*) and *Staphylococcus aureus* (*S. aureus*) bacteria using the colony counting method (CCM).

Interestingly, the size of the PLGA/GO-Colloidal NPs was found to be in the range of 201 – 319 nm (which was reduced by more than 10-fold compared with the GO particles). In addition, the antibacterial activities of the different PLGA/GO formulations against both *E. coli* and *S. aureus* were enhanced by 70-78 % bacterial inhibition compared with GO in the bulk form.

These results shed more insights into the important factors that need to be considered when preparing NPs conjugates from natural materials, and open new avenues in exploring other extracts with promising antibacterial activities.

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Title: Development of Honey/Chitosan Nanofibers Loaded with Apitherapeutics and Bacteriophage As Wound Dressing with Superior Antibacterial Activities

Prior to this study, we prepared electrospun honey (H), polyvinyl alcohol (P), and chitosan (CS) nanofibers of high H and CS concentrations. In this study, we loaded the HPCS nanofibers with apitherapeutics (HPCS-Ap) and tested their wound healing, cytotoxicity and antibacterial abilities in comparison with the commercial Aquacel® Ag wound dressing. Additionally, we loaded bacteriophage into the HPCS-Ap nanofiber mats and evaluated their antibacterial activities. The results of a preliminary in vivo study revealed that the developed HPCS-Ap nanofiber mats enhanced the wound healing process over the Aquacel® Ag as evident from wound (excisional 9 mm on the dorsal back of mice) closure rates and by the histological examination of the wounds. Cytotoxicity testing proved the biocompatibility of the developed nanofiber mats compared to the Aquacel® Ag which exhibited noticeable cytotoxicity. In vitro antibacterial testing against multidrug

resistant *Pseudomonas aeruginosa*, methicillin resistant *S. aureus* (MRSA), *Staphylococcus aureus*, and *Escherichia coli* was performed and compared to the Aquacel® Ag. Both the HPCS-Ap nanofibers and the Aquacel® Ag mats caused complete killing of *E. coli*. The HPCS-Ap nanofibers exhibited potent antibacterial activity against *S. aureus* and MRSA more than that of the Aquacel® Ag. However, the HPCS-Ap nanofibers exhibited no antibacterial activity against *P. aeruginosa* while the Aquacel® Ag exhibited potent antibacterial activity against it. Loading the HPCS-Ap nanofibers with *Pseudomonas aeruginosa* bacteriophage (HPCS-Ap/Phg) achieved instant and complete killing of *P. aeruginosa*. In conclusion, the developed HPCS-Ap/Phg nanofiber dressing based on natural materials and bacteriophages allow enhanced wound healing and exhibit broad spectrum antimicrobial activity.

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Title: Levels of Polybrominated Diphenyl Ethers and Novel Flame Retardants in Microenvironment Dust from Egypt: An Assessment of Human Exposure

Very few studies report on the concentrations of polybrominated diphenyl ethers (PBDEs) and novel flame retardants (FRs) or non-PBDEs in Africa and the Middle East. The present work is the first report from Egypt on the concentrations of fourteen PBDE congeners and eleven non-PBDEs flame retardants in dust samples collected from homes (n=17), workplaces (n=9) and cars (n=5) in the greater Cairo region. The median Σ PBDE concentrations were 57, 425 and 1608 ng/g in homes, workplaces and cars respectively. The highest PBDE levels were observed for BDE 209, with a median concentration of 40.2, 366 and 1540 ng/g representing 70% to 95% of the total PBDEs in homes, workplaces and cars respectively. This is about 8 to 46 times greater than the median concentration of the pentaBDE (represented by the most abundant compounds in this formulation, Σ BDE 47, 99 and 100). In the case of non-PBDE flame retardants, a detection frequency

between 52% and 100% was observed for several compounds including: hexabromocyclododecane (HBCD), hexabromobenzene (HBB), 2-ethylhexyl-2,3,4,5-Tetrabromobenzoate (EH-TBB), bis (2-ethyl-1-hexyl) tetrabromophthalate (TBPH), 1,2-bis (2,4,6-tribromophenoxy) ethane (TBPE), Ally-2,4,6-tribromophenyl ether (ATE) and Dechlorane Plus (DP). The \sum non-PBDEs median concentrations were 8.30, 28.9 and 49.9 ng/g in homes, workplaces and cars respectively with the highest level observed for HBCD in the three microenvironments. The detection of novel flame retardants in indoor environments may be due to their wide usage after the ban of the penta and octa BDE formulation. Results show the levels of PBDEs and non-PBDEs in Egyptian dust to be among the lowest levels reported from other countries. Different dust exposure scenarios using 5th percentile, median, 95th percentile and maximum levels were estimated for adult and children. The estimated dust intake results were several orders of magnitude lower than the oral reference dose values.

Computer Science and Engineering Department

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Title: Formal Verification Framework for Automotive UML Designs

Several factors discourage formal methods adoption in the industry of Ensuring Software specification. One major factor is the complexity of using formal methods; software specification compliance in automotive remains in the bulk heavily dependent on traceability matrix, human based reviews, and testing activities conducted on either actual production software level or simulation level. ISO26262 automotive safety standard recommends using formal notations in automotive systems that exhibit high risk in case of failure, but the industry still heavily relies on semi-formal notations such as UML. This leaves existing automotive software filled with hidden untested errors that appear during usage leading to potential loss of lives and money due to recalls. We propose a methodology where UML finite state machines are automatically compiled into formal notations, specification requirements are automatically mapped into formal model theorems and SAT/SMT solvers are utilized to validate implementation compliance to specification. We apply the methodology on AUTOSAR's FlexRay State

Manager state machine and Automatic Transmission Controller software component. Our experiments show the potential of our approach in automating software design verification guidelines as recommended by ISO26262 standards to pave the way for comprehensive and mathematically complete design validation in the early design stages of safety critical software applications. Results show how the framework automates the verification of UML based designs, the de-facto standard for automotive systems design, based on an implicit formal methodology while hiding the cons that discouraged the industry from using it. Additionally, the framework automates ISO-26262 system design verification guidelines that would otherwise be verified via human error prone approaches.

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Title: A Unified Framework for Metering Cloud Environments

Cloud computing integrates different computing technologies to achieve a computing model based on utility computing, where computing resources are consolidated and shared among different applications transparently. Cloud environments are like a market place, and hence a fair and accurate cloud-metering framework is needed to charge application owners for their exact resource usage, rather than traditional inaccurate time-share charging policies. Moreover, user Service Level Agreement (SLA) thresholds need to be monitored and governed in real time for fair resource usage. A novel Cloud Metering Framework based on distributed data modeling is proposed, allowing the standardization of cloud metering data representation, and opening the door for cross infrastructure metering in federated cloud environments. The proposed framework is characterized by its extensibility, and loosely coupled dependability on the underlying cloud infrastructure, topology, service type, virtualization technology, and middleware used for cloud management and deployment.

A tangible low level Bare Metal Service Oriented Architecture (SOA) approach is presented as the infrastructure for deploying the target-metering framework, with the least metering probe effect possible. A number of intellectual properties and inventions are incorporated to

enable cloud deployment of the framework and to solve other critical cloud environment problems, like cloud resource waste resulting from fragmentation, cloud scalability limitations, and environment elasticity constraints, which can all be used in other cloud computing domains. Bare Metal OS Markup Language (BOSML), Inter-Processor Interrupts over Ethernet Frames (IPloE), and Cross Node Hypervisor (Cross-Hypervisor) are three novel intellectual properties that were invented initially for cloud metering deployment. Nevertheless, their main objective is to solve the problem of cloud resources fragmentation and to allow the use of cloud wasted resources, realization of Single System Image (SSI), CPU Core-Based processing, and achieve maximum cloud deployment scalability and elasticity. Cross-Hypervisors can be achieved through the utilization of BOSML and IPloE, yet the three inventions can be used separately or in different combinations to serve Service Oriented Application that are characterized by native parallelization nature, and federated functionalities.

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**Title: Social Pervasive Systems: The Harmonization Between
Social Networks and Pervasive Systems**

Opportunistic social-aware forwarding algorithms are much needed in environments that lack network infrastructure or are vulnerable to frequent disruptions. Many applications are being developed to leverage the popularity of mobile opportunistic networks. However, many challenges are faced in this research area, including that most of these algorithms are oblivious to both the user's interest in the forwarded content and the limited power resources of the available mobile nodes and that building adaptive test beds can be costly and challenging. Through this work, we propose solutions for these two main challenges by building an efficient opportunistic network simulator that provides a variety of opportunistic environment setups, and evaluates our interest-and-power-aware proposed protocols with a comprehensive set of metrics.

Our first proposed solution is PI-SOFA, a framework for integrating the

awareness of both interest and power capability of a candidate node within the forwarding decision process. Furthermore, the framework adapts its forwarding decisions to the expected contact duration between message carriers and candidate nodes. PI-SOFA is applied to three state-of-the-art social-aware opportunistic forwarding algorithms that target mobile opportunistic content delivery.

Our second proposition is the SAROS simulator that simulates opportunistic networking environments with a variety of interest distributions, power consumption distributions, imported real traces, and social networks. For instance, SAROS successfully imports and manipulates real traces from one mall environment, two conference environments, and two university campus environments. The simulator provides a variety of evaluation metrics that are not offered by comparable simulators such as Effective Performance Index, the Efficiency Performance Index, and the Power-awareness Performance Index. SAROS also implements several opportunistic forwarding algorithms ranging from social-oblivious to interest-and-power-aware social-based algorithms.

Finally, we conducted a simulation-based performance evaluation by SAROS to demonstrate improved effectiveness, efficiency, reduction of power consumption, and fair utilization of the PI-SOFA's proposed algorithms in comparison to those of the original algorithms. Results show more than 500% extra f-measure mainly by disregarding uninterested nodes while focusing on the potentially interested ones. Moreover, power-awareness preserves up to 8% power with 41% less cost to attain higher utilization fairness through focusing on power-capable interested nodes. Also, a set of performance indices are devised to analyze the proposed algorithms' performance across environments of various interest distributions, power distributions, user densities and message sizes.

Construction Engineering Department

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Title: Assessment of Performance of Bio Self-Healing Mortar using Diatomaceous earth, Fly Ash and Silica Fume

Cracking represents a major threat to the integrity and performance of

structures. The self-healing concept has been introduced to construction materials in order to enhance their performance and extend their service life with less repair. This study assesses the performance of Portland cement mortar incorporating self-healing *Bacillus Pseudofirmus* bacteria using Diatomaceous earth to immobilize bacteria in mortar and lowering the pH level of mortar by using fly ash and silica fumes to provide a suitable growth environment for bacteria to generate limestone. The specimens were prepared at five different bacteria dosages and three Diatomaceous earth dosages and three different mix designs of cement, fly ash and silica fumes. Cracking of specimens was induced by load percent concept after 3 days and tests were performed at 7, 28 and 42 days. Microanalysis of the healed crack surface of the different specimens was performed and a parametric study was conducted to select the optimum dosage of bacteria, Diatomaceous earth and mix design combination as well.

The testing scheme for the mortar included sporulation tests over bacteria inside mortar specimens, compression test, indirect tension test, rapid chloride permeability test, Ultrasonic pulse velocity, chemical soundness test and X-ray. Results demonstrate that self-healing bacteria is a promising technique in minimizing cracking. It is recommended that this beexpanded work to cover more dosages of bacteria, different types of self-healing as well as concrete specimens.

Keywords: Self-Healing, Bacteria, Diatomaceous earth, Fly Ash, Silica Fumes, Mortar.

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Title: Seismic Performance of Steel Reinforced Concrete

The experimental study presented in this paper addresses the seismic performance of steel-reinforced concrete columns experiencing shear and flexural failures using different concrete grades and confinement details to mimic both existing buildings and modern tall buildings. Test specimens represent exterior columns modeled on a typical seismic design of a 30-story prototype new core wall-frame tall building and a

20-story prototype gravity existing building. Test parameters target failure mode, axial load ratio, percentage of longitudinal steel, structural steel section, concrete grade, and the transverse reinforcement volumetric ratio. The tests aim to establish criteria to classify the SRC column failure mode along with a preliminary attempt to establish backbone curve recommendations. The results show significant shear capacity of the tested columns that can be sustained by the composite section.

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Title: SOLUTION MODEL FOR URBAN TRAFFIC CONGESTION

Traffic congestions continue to be a major problem in many cities around the world resulting in massive delays, increased fuel wastage, loss of productivity, environmental issues and other negative consequences. The poorly planned road networks always lead to a common outcome, which is the existence of critical areas with hot-spots for congestion. Poor traffic management around these hot-spots potentially results in elongated unnecessary traffic jams.

Because of the seriousness of traffic congestion in Egypt, this study aims to establish a cost-effective basis to reduce the burden that excessive congestion imposes upon citizens throughout the urban road network. A model shall be established that sets guidelines on how to approach an Egyptian urban congested traffic area, to tackle the problem and choose the effective engineering solution in terms of either geometry and/or structure. The implementation of the final output of the model shall lead to a noticeable increase in the Egyptian living standards by minimizing extra costs wasted in extra gas and repair of cars, reducing daily travel time and simultaneously minimizing delay times of car riders. Additionally, marginal environmental and resource impacts of congestion, impacts on quality of life, level of stress, road safety conditions as well as impacts on non-vehicular road users such as the users of sidewalks shall be improved.

This research aims to deliver speedy, tangible and cost-effective improvements in the chosen study area. El Nasr Road in Nasr City, Cairo is a typical example of an artery with traffic congestion hot-spots, making it an excellent location to implement the traffic solution model

along the stretch between the intersection of Ahmed Fakhry road and the intersection of the Tayaran road with a total length of 2.4 km. Data was collected, including the traffic pattern and volumes in the chosen study area as well as the social, commercial, cultural and behavioral aspects. The analysis of the data points to the flag areas through peak traffic counts, simulation of the existing traffic conditions with the collected data to analyze the delayed travel times of vehicles, decide on the criticality of the traffic problem by comparing the existing traffic volumes to the capacity of the road and determine the level of services (LOS) for the current and proposed scenarios. The analysis output helps decide whether such a problem would be solved by geometric adjustments of the surface (i.e. intersections) or the problem requires a multi-layered intersection (i.e. building a new structure: tunnel or bridge).

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Title: Exploring Means to produce low Energy Concrete

Escalating demand on energy consumption as well as the scarcity of non-renewable energy resources represent a major concern worldwide. Hence, efforts are being exerted to resort to lower energy alternatives in almost all aspects of life. Portland cement concrete has been known to be an energy intensive material that emits large amount of CO₂ during its various stages of manufacturing. While concrete has been classified over the decades based on its performance, it has seldom been assessed based on its embodied energy.

This work evaluates concrete mixtures based on energy and CO₂ emission together with strength and durability characteristics. Alternative mixtures were targeted for both normal as well as high strength concrete as ones potentially having less energy and less CO₂. The results were used to establish a simplified user-friendly model for this process. Initial results reveal that environmental-friendly concrete can be prepared while fulfilling performance criteria and at a relatively less cost.

Keywords: (Low Energy, Concrete, CO₂, Environmental-friendly)

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Title: Plastic Roads

Egypt has long suffered from pavement distresses. Around thirty percent of paved roads in Egypt are in poor conditions. Another issue resides in plastic waste. Plastic constitutes around fifteen percent of Egypt's total solid waste. Its non-biodegradable nature makes plastic difficult to dispose of posing an environmental concern. Bearing both issues in mind, this research was aimed at developing a more sustainable hot asphalt mix with enhanced performance using recycled plastic as partial bitumen replacement.

To incorporate plastic into asphalt concrete, one of two methods can be used: the wet method or the dry method. This study investigated both mixing techniques to produce a range of mixes using each method with varying percentages of recycled plastic. ABS recycled plastic was selected for this research. Experimental work was divided into constituent material testing and mix testing. The recent Super pave bitumen tests were carried out as a part of material characterization testing. For the wet method, plastic modified asphalts were evaluated based on their Performance Grades. All plastic percentages proved to improve the original binder at high temperatures, and the maximum improvement resulted from the 8% and 10% plastic. As for the dry method, plastic modified asphalts were evaluated based on Stability. All plastic percentages proved to improve the stability of the mix compared to the virgin mix. The maximum improvement resulted from the 4% plastic mix, with a percentage increase in stability of 327%.

A comparison was made between the recycled plastic mixes, both wet and dry, a control mix using conventional materials and another mix that uses manufactured polymer modifiers. It was found that the 4% plastic led to better results, thus the dry method gave better modification for the asphalt mix than the wet method. As for the moisture susceptibility test, it found that all the tested samples failed to pass the moisture susceptibility specification and did not demonstrate resistance to moisture damage. However, it was noted that all plastic modified mixes had Tensile Strength Ratios greater than that of the control, where the 8% wet mix in particular had improved the Tensile Strength Ratio by

almost 6 times that of the control.

Finally an economic analysis was conducted, and it showed that the 8% wet mix is cheaper than that of the dry, control, and the commercially available plastic modifier. This is due to the fact that plastic is cheaper than the bitumen it replaces and that the selected AC% for it was close to that of the control. This experimental research showed that the addition of recycled plastic notably enhanced the properties of the road mix.

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Title: Managing Multi-Cultural Virtual Engineering Design Teams

The exercise of project management altered drastically over the past two decades and is currently driven by growing demand of standardizing the industry's practice and the emerging globalization of the industry. Studies show the influences of the culture complexity and social diversity on the multi-cultural team's performances, but most focused on the individual's experience within the context of developed countries. Given the global trend towards internationalization, there is a need to understand the parameters that determine the success of foreign firms operating in the Egyptian construction market. This thesis explores the influences of multi-national firms on designers in the Egyptian construction industry and the various obstacles faced by the former due to the diversity in their teams. The research employed a qualitative experiment on multi-cultural multi-located teams in one of the foreign firms in Egypt in order to capture the influences of social and culture diversity on their performances. A quantitative survey was conducted to gather relevant information about multi-cultural teams from Egyptian and foreign leaders in the construction industry. The verdict of the mixed method methodology illustrates the importance of considering the cultural index and various managerial techniques while operating in Egypt.

The data analyzed proposes a framework that includes key parameters to ensure superior performance by the multi-located and multi-cultural design engineering teams. A verification experiment is conducted on multi-cultural virtual teams, originally involved in the qualitative experiment, to ensure the significance of the framework developed in the real life situation. Following the framework's establishment, a model is developed to assist the foreign companies' rate their compatibility with

the Egyptian construction industry. The aim of the model is to elevate the performances of the international company from a managerial perspective and provide recommendations in regard to the challenges faced while operating in Egypt. The model is validated through an external validity exercise.

The framework and model developed are intended to provide a significant step to launch a successful operation of the multi-cultural and multi-located engineering teams in Egypt. The thesis concludes the importance of considering social and cultural aspects while developing a managerial approach, which is to be formulated through an effective straightforward organizational culture.

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Title: DESIGN OF OVERHANGING CANTILEVERED FALSE WORK

Construction of buildings with non-typical floors creates risky situations at which cantilevered slabs and beams are extended, while the floor beneath has no cantilevered slabs on which the false-work could rest. The design proposed in this paper is based on using cantilevered frames to support the form-work system with no need to extend the false-work along the height of the building. The optimal dimension of the overhanging portion of the structure was derived. A closed form solution for the temporary structure was formulated. A parametric study was performed using the closed form solution to study the variations of the straining actions within the structural members while changing their dimensions. The study was extended in order to pick the most economic dimensions of the structure for each cantilevered span.

Keywords: Structural Engineering; Construction Engineering; Structural Steel; Form-work Design.

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Title: Infrastructure Planning and Design, Al-Sharabia, North Cairo District

Al-Sharabia is a low-income neighborhood in north Cairo. It represents a neighborhood of strategic and economic importance that suffers severely from social, political and economic issues, which need further development. The main causes for these issues come as a result of the lack of organization and the unbalanced social structure in the neighborhood, including uncontrolled population growth, high crime rates, drug abuse, high unemployment and deteriorated public services. These problems are intensified in three major zones in the neighborhood, which represent a major safety threat to the rest of the areas in the neighborhood; hence this development project was triggered.

The Cairo Urban Development and Renewal Project initiated by the Egyptian Planning Authorities focused on this area and this study is the part of that effort that deals with engineering aspects directly affecting quality of life for residents in Al-Sharabia. It is dedicated to helping solve the engineering aspects of the mentioned issues. The study is divided into three main components for infrastructure systems design: transportation network planning and roads design, water distribution network, and sewage system network.

This study aims to set suitable bases of design and plan the infrastructure of Al-Sharabia neighborhood based on proposed urban development plans, which were created by urban planner to enhance the urban fabric of the neighborhood. The design will help increase accessibility, to reach all of the slums and areas in this neighborhood. It will enhance the living conditions by providing adequate water and wastewater network systems. This should to increasing the social standards.

The implementation of the conclusions of this study will lead to better living conditions and higher social standards among the inhabitants of Al-Sharabia Neighborhood. It may also lead to encouraging investors to purchase land there for potential projects, which will mean more chances for work opportunities and better living conditions.

Electronics and Communication Engineering Department

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Title: A Simple Hybrid 3-Level Buck-Boost DC-DC Converter with Efficient PWM Regulation Scheme

Energy harvesting offers continuously power integrated circuits from the surrounding environment without the need for a battery replacement. However, the harvested power often generates varying low output voltages that are not sufficient to power integrated circuits. Therefore, boost or buck-boost converters are required to provide the desired supply voltages for integrated circuits. Boost (or buck-boost) converters can be realized using two approaches: inductor-based or capacitor-based. Inductor-based converters can offer higher power conversion efficiencies but have the disadvantage of utilizing large bulky inductors which cause challenges for on-chip integration. On the other hand, switched capacitor (SC) converters are easily integrable on-chip but suffer from several performance limitations. On the other hand, hybrid DC-DC converters, with both capacitors and inductors involved in the charge transfer process, offer the potential to solve the limitations of the conventional DC-DC converters. Capacitors have been added to inductor-based converters to enhance their performance like the 3-level buck converter. Similarly, small inductors have been added to SC converters to overcome their limitations.

In this work, a hybrid buck-boost DC-DC converter is proposed with an output voltage up to double the input voltage. The converter has a hybrid structure between inductor-based converters and capacitor-based converters. The converter features smaller inductor size and current ripples as compared to the traditional buck-boost inductor-based converter while offering a high efficiency as compared to SC converters making it suitable for efficient on-chip integration. A prototype circuit has been designed on a 65nm technology using a 5-nH parasitic bond wire inductor. Simulation results show that the proposed converter features up to 20% improvement in the efficiency over a conventional 1:2 SC converter for a wide range of output voltage values.

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Title: The Development of an Portable Biochip for Diseases Identification and Detection

A Lab-On-a-Chip (LOC) is changed the traditional way by which biological samples are inspected in laboratories during analyses. This technology promises many advantages including better and improved performance, portability, reliability, and cost reduction. It is composed of three main parts: actuation, sensing, and electronics. In general, hybrid technologies are used for the three parts that have challenges in integration and increasing the cost. Although, Complementary Metal Oxide Semiconductor (CMOS) technology allows the functional integration of all parts including sensors, signal conditioning, and processing circuits using a signal homogeneous technology to develop a fully integrated LOC.

One of the first and most important tasks in biomedical process is the manipulation, concentration, sensing, and sorting of different types of biocells. There are many techniques that can be used for manipulating and sorting particles such as optical tweezers, ultrasound, magnetic sorting, and electric field based approach. A Differential electric-field sensitive Field-Effect Transistor (DeFET) sensor is based on an electric field-based approach. The main idea of DeFET sensor is based on a nonuniform electric field to manipulate the biocells.

Therefore, this work presents an equivalent circuit of a DeFET, characterizes the performance of DeFET sensor, propose a new integrated Lab-On-a-Chip (LOC) based on Differential electric-field sensitive Field-Effect Transistor (DeFET) sensor that is used in Biomedical Analysis. By using $0.13\mu\text{m}$ CMOS technology, the proposed system introduces a 16×16 DeFET sensor array that performs the sensing, actuating, and signal conditioning tasks for biomedical application.

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Title: RF MEMS Reference Oscillators platform for Wireless Communications

A complete platform for RF MEMS reference oscillator is built to replace bulky quartz from mobile devices, thus reducing size and cost. The design targets LTE (4G) transceivers. A low phase noise 76.8 MHz reference oscillator is designed using material temperature compensated AlN-on-silicon resonator. This thesis proposes a system combining piezoelectric resonator with low loading CMOS cross coupled series resonance oscillator to reach state-of-the-art LTE phase noise specifications. The designed resonator is a two-port fundamental width extensional mode resonator. The resonator, characterized by high unloaded quality factor in vacuum, is designed with low temperature coefficient of frequency (TCF) using SiO₂ as compensation material which enhances the TCF from -3000 ppm to 105 ppm across temperature ranges of -40°C to 85°C. By using a series resonant CMOS oscillator, phase noise of -123 dBc/Hz at 1 kHz, and -162 dBc/Hz at 1MHz offset is achieved. The oscillator's integrated RMS jitter is 106 fs (10 kHz–20 MHz), consuming 850 μ A.

Electronic frequency compensation is presented to further enhance the frequency stability of the oscillator. Initial frequency offset of ± 8000 ppm and temperature drift errors are combined and further addressed electronically. A simple digital compensation circuitry generates a compensation word as an input to 21 bit MASH 1-1-1 sigma delta modulator incorporated in RF LTE fractional N-PLL for frequency compensation. Temperature is sensed using low power BJT band-gap front-end circuitry with 12 bit temperature to digital converter characterized by a resolution of 0.075°C. The smart temperature sensor consumes only 4.6 μ A. 700 MHz band LTE signal proved to have the stringent frequency resolution specifications among all LTE bands. For this band, the achieved jitter value is 1.29 ps and the output frequency stability is ± 0.5 ppm over temperature ranges from -40°C to 85°C. The system is built on 32nm CMOS technology using 1.8V IO devices.

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Title: Error Recovery Mechanism Using Correction Function

As fabrication technology migrates towards nanometer scale, the time constraints of synchronous sequential circuits have become more critical. Process, voltage and temperature variations (PVT) increase the unreliability of the digital circuits. There are different techniques to tolerate the variability and to mitigate the critical timing of the sequential circuits. Traditional techniques, using clock skewing or soft-edge flip-flop, relax the timing conditions by stealing time from adjacent stages. In contrast to traditional techniques, using our proposed correction function technique gives an indication of the error rate which is useful to re-adjust the supply voltage or the operating frequency. The correction function technique is able to detect the error and correct it within the same clock cycle. The induced delays caused by PVT variations are tolerated by the correction function technique without flushing and restarting the pipeline to keep the throughput of the digital circuit.

Correction function technique is able to detect the error at the input of the combinational logic stage and correct the output of the stage according to the effect of the propagated incorrect input. The combinational logic stages depend on the binary system, which depends on two logic states: high and low. The incorrect input is the inverted logic state of the correct input. The incorrect input may lead to inverting the output of the combinational stage according to its functionality. Inverting the output of any combinational logic stage because of the error at one of its inputs can be determined by what we call: Correction Function. The proposed approach was applied on A 4x4 bit multiplier to tolerate an induced delay up to 35% of the clock cycle without flushing the pipeline with 45.9% overhead of area and 42.7% overhead of power.

Environmental Engineering

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Title: Using Waste Materials for Removal of Lead from Wastewater

Several industries utilize heavy metals in their industrial processes, eventually discharging them in their wastewater. Water contamination by heavy metals is a major environmental problem due to their acute toxicity and their accumulation in food chains. Industrial wastewater re-use in Egypt constitutes only 5% of the total water re-use, compared to agriculture and domestic water re-use, due to the presence of toxic contaminants in industrial wastewater (Abdel_Kader and Abdel_Rassoul 2010). Current available treatment technologies have major drawbacks, including high operating cost (Won, et al. 2014). Therefore, intensive research work has been carried out lately on the feasibility of various low cost materials for the removal of heavy metals from wastewater. The main objective of the current research was to examine the potential of a low cost waste material for the removal of Pb^{2+} from a synthetic lead solution.

The research work was divided into two core phases. Phase I was a preliminary comparative study among various agricultural wastes; sugarcane bagasse, rice straw and rice husk, two industrial wastes; cement kiln dust and marble powder, and a natural material; lime. The tests were batch equilibrium tests conducted using high-density polyethylene bottles and a mechanical shaker. Raw rice straw was deemed the most promising sorbent, because it is a low cost raw material that is feasible for an efficient uptake of lead from industrial wastewater without the need for costly pre-treatment. Most importantly, rice straw constitutes a large quantity of the agricultural wastes in Egypt; 5 M tons/year, (Abdelhady, et al. 2014) which causes severe air pollution; black cloud, due to open- field burning.

In Phase II, the feasibility of utilizing rice straw for biosorption of Pb^{2+} was profoundly investigated using batch equilibrium experiments. The effect of several operating parameters on the uptake of Pb^{2+} was tested, which are pH of the solution, contact time, rice straw dose, particle size, initial Pb^{2+} concentration and pre-treatment of rice straw. The percent removal of Pb^{2+} increased with increasing the pH, contact time, and rice straw dose up to the point of equilibrium; however, it

decreased with the increase in the particle size. The maximum removal achieved at the optimum conditions was 94.12% with an initial Pb²⁺ concentration of 40 mg/l. The pre-treatment of rice straw did not yield a considerable increase in the percent uptake of Pb²⁺. Langmuir and Freundlich isotherm models were used for the evaluation of the equilibrium experimental data. The maximum adsorption capacity of raw rice straw was calculated using Langmuir isotherm; 42.55 mg/g, which is higher than several adsorption capacities of rice straw reported in the literature.

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Title: Immobilized Titanium Dioxide for Disinfection and Emerging Contaminant Removal

There have been rising concerns about pathogens and micro-pollutants that are not efficiently removed by conventional wastewater treatment plants. These pathogens and micro-pollutants pose hazards whether the treated wastewater effluent is disposed to surface water or reused in irrigation. Titanium dioxide (TiO₂) photocatalysis is one of the most promising technologies for disinfection of viruses and pathogens as well as the removal of persistent non-biodegradable emerging water pollutants, depending on the generation of hydroxyl radicals which are strong unselective oxidizing agents.

The major obstacle hindering the widespread of TiO₂ photocatalytic treatment is the use of fine TiO₂ particles in suspension that requires costly post separation of the catalyst from the effluent to avoid catalyst loss and water contamination with TiO₂ particles. Despite the extensive research on numerous lab scale reactor configurations, the scale up to industrial scale and commercialization of TiO₂ photocatalysis treatment systems is still very limited. A reactor configuration that meets all the process requirements - light penetration to activate the photocatalyst, uniform reactor irradiation to avoid treatment dead zones, efficient mass transfer, continuous oxygen supply, and easy catalyst separation after treatment - is still challenging.

This research aims to design, construct and test a novel treatment unit based on using of supported TiO₂ as a photocatalyst for municipal wastewater disinfection and removal of emerging contaminants. The unit is based on generating a thin water film to allow for solar light

penetration and continuous oxygenation while using sand as a support for TiO₂ to allow for easy gravitational separation of the catalyst from the treated effluent. A simple room temperature sol gel technique is used for the TiO₂ immobilization on sand. The unit is designed to use both of solar light and artificial light to allow for a continuous flow and avoid any treatment interruptions during overcast days. The unit is based on a modular design allowing for easy development into full scale. The treatment unit performance evaluation is initially carried using phenol as a model for emerging contaminants and cryptosporidium as a model for chlorine resistant pathogens in simulated sewage effluent then finally using real secondary treated sewage effluent.

The key parameters for the treatment unit design and immobilization technique selection, in addition to efficiency, were easy operation and control, acceptable construction/manufacturing and operation cost.

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Title: One Dimensional Mixed Oxide Nanostructures Boost the Efficiency of Solar Fuel Production

It is well known now that the solar energy of only one hour exceeds world energy consumption in a whole year. Accordingly, the use of Titanium dioxide (TiO₂) nanotubes (NTs) as photoanodes for hydrogen production via water splitting has been the focus of many studies. Although TiO₂ NTs are very promising materials, a lot of work has been done to overcome their problems of wide band gap and photoconversion efficiency. Among many elements, Niobium (Nb) was found to increase conductivity when mixed with Ti. In this regard, nanotubes were successfully grown on Ti-Nb alloy via anodization and characterized with respect to morphological, structural, and photo-electrochemical properties. Field emission scanning electron microscope elucidated optimized and well aligned ultrathin wall nanotubes of thickness 5-8 nm, diameter 180-200 nm and length 2-2.8 μm which were synthesized on the surface of Ti-Nb alloy. The tubes were then annealed at different temperatures and the crystalline phases of the formed oxide layer were

detected using raman along with x-ray diffraction (XRD). The resulting peaks indicated combination of individual oxides of anatase as well as monoclinic Nb₂O₅. Moreover, this combination of oxides showed better stability at elevated temperatures up to 650 °C. X-ray photoelectron spectroscopy (XPS) confirmed the presence of such composition. On the other hand, UV-Vis test results accounted for small or negligible enhancement in absorption, whereas photo-electrochemical measurements showed much higher photocurrent for Ti-Nb alloys (0.3 mA/cm²) than bare TiO₂ (0.18 mA/cm²) prepared at the same conditions for the sake of comparison. Hence the Ti-Nb NTs were of enhanced stability over large range of temperatures where the transition from anatase to rutile was shifted to higher temperature in addition to increase in the photoconversion, thus more efficient water splitting.

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Title: Experimental Investigation of Oscillating Flow Around Plates with Different End Shapes Using Particle Image Velocimetry

The dynamic pressure wave is generated in thermoacoustic engine when a temperature gradient across solid parallel plates (stack) exceeds a critical limit. This standing wave can be converted into electricity using a linear alternator. This promising technology produces no emissions, and has a simple design with few mechanical moving parts that enhances the reliability and durability of these engines. The engines are easily driven with solar heat and/or waste heat, making them beneficial for sustainable development. To further enhance energy conversion efficiency, careful analysis of the flow pattern at the sudden contraction/expansion at the inlets/exits of the stack is needed. In this work, Particle Image Velocimetry (PIV) is used to visualize the flow pattern at these locations in order to reduce viscous losses, particularly in the non-linear range associated with large dynamic pressure ratios. This work investigates the size of the disturbance zone for different end plate shapes, namely rectangular, triangular and circular.

Nanotechnology

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Title: All Digital Data Pattern Generator Based on Self- Timed Rings

The data pattern generator is a basic component in testing of digital circuits, especially with the limited packaging I/O speed. If a data pattern generator is mounted on-chip with the main circuit under test, it should be simple, low in power consumption and has a high speed that allows efficient testing. In this paper, a programmable data pattern generator is designed with a very regular step size. A self-timed ring is used as the clock source; it has a minimum frequency of 28 MHz, a maximum frequency of 952 MHz and a step size of 21 MHz. The design is implemented on UMC 130 nm using Faraday standard cells. The proposed design has an overall area of 0.0513344 mm², with power consumption of 16.5 mW at frequency of 952 MHz.

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Title: Dispersion Analysis and Engineering of 2D Plasmonic Waveguides

This study investigates the low-order guided modes in a two-

dimensional (2D) hollow metallic waveguide. It identifies and analyzes the dispersion characteristics of the 2D hollow metallic wave guides. It proposes manipulating the dispersion by either changing the geometrical shapes from rectangular to trapezoidal waveguide or changing the material of the cladding region to TiN. The dispersion analysis of the 2D plasmonic waveguide using TiN is investigated for the first time in this paper. It studies the effect of varying the shape parameters on the cutoff in the modes dispersion. The trapezoidal shape waveguide that causes the most significant shift in the cutoff is selected and detailed dispersion analysis of its guided modes is performed. The effect of changing the plasmonic material on the dispersion curve key characteristics is also identified. Finally, the effect of shifting the cutoff on the enhanced transmission phenomena is investigated.

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Title: Improved Antimicrobial Activity of Electrospun Graphene-Chitosan/Gelatin Nanofibrous Nanocomposite Scaffolds

Chitosan/gelatin (CS/GL) blend is reported to be a promising polymer composite for diverse biomedical applications such as an antimicrobial matrix, because of the presence of both the naturally derived biocompatible and biodegradable polymers; chitosan and gelatin. Chitosan has a broad antimicrobial activity against both gram positive and negative bacteria such as *Staphylococcus aureus* and *Escherichia coli* respectively. This qualifies chitosan-based materials to be used as stitches, wound dressings or antimicrobial textiles. Moreover, gelatin increases hydrophilicity and cell proliferation tendency of the material. Electrospinning is the most reliable technique to fabricate interconnected polymer nanofibrous materials with well-controlled nanofibers dimension and porosity. This could be achieved through tailoring the different electrospinning parameters such as polymer concentration, viscosity, flow rate and the applied voltage. Here, we first fabricated CS/GL composite as casted films and electrospun nanofibers in order to investigate the difference in properties upon scaling down the same material from the bulk form into the nanofibrous form. Second, we report the reinforcement of CS/GL nanofibers with different concentration of graphene nanosheets (GNS) to examine its effect on the different properties of the produced electrospun nanofibers. The morphology of the produced CS/GL nanofibers before and after GNS reinforcement was investigated externally and internally using scanning electron microscope (SEM) and transmission electron microscope (TEM) respectively. Porosity, Swellability and biodegradability of the different fabricated scaffolds were estimated to evaluate both the effect of the different fabrication techniques and the different concentration of GNS reinforcement. Finally, the antimicrobial activity of the different fabricated films was evaluated using both *Staphylococcus aureus* and *Escherichia coli*. Our study showed that the antimicrobial activity of chitosan was much stronger to be able to totally block the bacterial growth enhancement ability of gelatin. The antimicrobial activity of the fabricated casted CS/GL composite film reached 60% bacterial growth inhibition. In addition, the bacterial growth inhibition activity of CS/GL electrospun nanofibers was 10% more than that of CS/GL casted film. Finally, the bacterial inhibition activity of GNS reinforced CS/GL nanofibers exceeded 80% when tested against both *Staphylococcus aureus* and *Escherichia coli*. Hence, GNS-CS/GL nanofibers could be promising candidates to be used in various applications such as biomedical applications (antimicrobial textiles, biodegradable stitches, and wound dressings) and environmental applications (antimicrobial

coatings and food packaging films).

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Title: RC-In-RC-Out Model Order Reduction Via Node Merging

In this paper, we introduce a method for the realizable reduction of extracted RC net lists by merging nodes. This method can achieve high reduction (reaching 96%) with high accuracy and can be used to complement existing techniques of realizable reduction such as TICER. The method preserves sparsity, has controllable accuracy and can result in lossless reduction (exact reduction) for certain circuits. The node merging translates to a simple matrix operation and thus can be easily adopted commercially and realized in CAD tools.

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**Title: Graphene-insulator-graphene Plasmonic Electro-optic
Modulator**

There has been lots of speculation about Moore's law reaching its limit; part of the reason is the bottlenecks due to interconnects. While smaller is better for transistors, as the wires get narrower, capacitance increases, increasing delays. Furthermore, as wiring density gets higher, signal coupling has surfaced as an important issue, where a signal in one wire may undesirably couple to a neighboring wire. Optical interconnects are seen as a possible solution to this problem, with the challenge being the relatively large footprint in optical waveguides. Plasmonic devices tackle this challenge by propagating sub-wavelength

waves. The guiding mechanism for plasmonic waveguides is based on surface plasmon polaritons (SPPs), which are oscillating electrons traveling along a metal-insulator interface. We designed a plasmonic electro-optical modulator to control the data flow between plasmonic waveguides operating with mid infrared wavelengths. Graphene is interesting because of its tunable Fermi level due to the applied electric field. When the Fermi level is close to the band gap, maximum absorption of photons occurs as the photons excite electrons from the valence band to the conduction band. When 1 to 2 volts are applied on the graphene, this causes the Fermi level to lie above the conduction band, which is already saturated. In this case, incoming photons are unable to excite electrons due to the Pauli principle, so graphene is transparent. Our modulator structure is composed of a layer of Si₃N₄ with thickness of a few nm between two graphene sheets, with a footprint of 80nm by 100nm. The design was analyzed using Finite Difference Time Domain (FDTD) simulations using Lumerical. Extinction ratio was 45dB, which is several factors better than state of the art electro-optical modulators. However, insertion loss was 10dB and can be reduced further by reducing the size further. This is feasible because of the extremely large extinction ratio. Due to the excellent carrier mobility properties in graphene, this modulator's performance is only limited by RC delays, which can be in the range of picoseconds.

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Title: Low Cost Fabrication of Nanostructured Substrates for Surface Enhanced Raman Scattering of Grapheme

We developed novel substrates for surface enhanced Raman scattering (SERS) using silicon nanowires and silver nanoparticles and measured the enhanced Raman signal of reduced graphene oxide. A wave incident on a metal nanostructure induces local surface plasmons, which enhance the electric field, causing enhancement of both the incident light and the Raman signal, which causes an enhancement factor on the order of E⁴. Graphene is becoming more popular as it finds its way in a variety of applications due its unique electrical, mechanical and optical

properties. Graphene characterization using Raman is a well-established method, but graphene nanostructures can be difficult to characterize because of the weak Raman signal; thus, its detection using SERS is greatly beneficial. Reduced graphene oxide has similar properties to graphene and is much simpler to fabricate. We optimized Hummers method: H₂SO₄, NaNO₃ and KMnO₄ were added in succession to graphite flakes followed by H₂O₂ and water, yielding graphene oxide sheets, which are essentially graphene decorated with epoxide and OH groups. Laser irradiation was then used to reduce the graphene oxide to a graphene-like material, which we call reduced graphene oxide. A simple method for fabricating n-type silicon nanowires with controllable diameter and length was optimized to achieve nanowires enhancing the Raman signal of reduced graphene oxide by a factor of 10. Silver nanoparticles were formed on silicon substrate, resulting in Raman scattering that is 7 stronger than on bare silicon or glass. The best Raman enhancement was found when we combined the two methods, decorating the silicon nanowires with silver nanoparticles, giving an enhancement factor of 15. Finite difference time domain (FDTD) simulations using Lumerical were used to analyze the electric field enhancement that lead to this Raman signal enhancement, and good agreement between simulation and experimental results were found. The fabrication is done using simple economical methods that can be easily optimized for different analytes to be detected and it can easily be used for different materials. The SERS substrates that we developed are feasible for large scale production.

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Title: A Novel Hybrid Nanocomposite of Layered Clays and Carbon-Based Structures for Improved Biomolecular Delivery

The objective of this work was to create a G/GO-Zn-Al-NO₃ LDH hybrids, in order to combine the properties of these two structures: layered double hydroxide (LDH) and graphene (G) or graphene oxide (GO). LDH has a great exchange, storing and drug release control capability. In addition, its biocompatibility and buffering effect make it a potential drug-delivery vehicle. The membrane permeability by piercing mechanism and large interacting surface of G and GO, in addition to the large exposed oxygenated surface of GO that allows the loading of all

kinds of drugs by different bonding interactions expanded its use to include biomedical applications. The hybrids were loaded with Alendronate sodium, which suffers from low bioavailability (< 1%) and gastrointestinal adverse effects, so that to improve its delivery, release and protect against its ulceration effect. The hybrids were loaded by co-precipitation and ion exchange techniques, incorporating 2% w/w of G or GO with two different M²⁺/M³⁺ ratios of LDH, 2:1 and 3:1. The samples were physically characterized by XRD, FTIR and the amount of drug loaded and released was determined by UV spectroscopy; the results were then compared to those of drug-LDH blanks. Samples A-Zn³-Cp, A-Zn³-G-Cp, A-Zn³-GO-Cp, A-Zn²-IE and A-Zn³-IE were successfully intercalated in bi-layered arrangement, with loading amounts ≈ 25.4, 36, 36.6, 51, and 50.5 % w/w respectively, showing a sustained release over 24 hours with a total release percentages of 3.4, 4.2, 2.9, 2.1 and 2.5 % respectively. While in samples A-Zn²-Cp, A-Zn²-G-Cp, A-Zn²-GO-Cp, A-Zn²-G-IE, A-Zn²-GO-IE, A-Zn³-G-IE, and A-Zn³-GO-IE, the drug was loaded via surface adsorption on brucite-like layers and G or GO. They have drug-loading amounts of 15.3, 16.4, 12.4, 57.3, 25.9, 22.4, and 24 % w/w respectively. This work had proven that the G/GO-Zn-Al LDH hybrids could be a potential sustained drug delivery system.

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Title: Lipid-based Nanoparticles for Altering Immune Response: A Step Towards Targeted Cancer Immunotherapy

Since cancer is an extremely heterogeneous disease of origin, scientists are always trying to define novel approaches to eliminate it. Over decades now, surgery, radiotherapy and chemotherapy have been the conventional methods to eradicate cancer. Unfortunately, cancer resistance has developed, in which tumor cells became resistant to the majority of chemotherapeutics. That is why scientists started to revisit cancer immunotherapy field after long years of its discovery. They are rapidly defining new approaches for harnessing the immune system

against cancer. Many studies have revealed nanotechnology to be a promising tool in harnessing immune system against cancer. However, targeting as a technique is still paving the way for the optimum particle-cell interaction. In the current study, we pave the way for targeting immune cells infiltrating the tumor. STAT3 (Signal Transducer and Activator of Transcription 3) pathway is one of the promising targets that, when inhibited, will reverse the immunosuppressed status of Dendritic Cells (DCs). Pegylated nano-liposomes were synthesized with size of 190 nm loaded with conjugated form of the drug in order to maximize the loading efficiency reaching $82\pm 4\%$ and physical stability with minimal changes in size and zeta potential. Cryo-TEM revealed the formation of predominant unilamellar structures. The drug-NP and free drug ($5\mu\text{mole}$) were added to the immunosuppressed DCs for 24hrs and maturation status was assessed using flow cytometry. Expression of CD86, MHCII and CD80 were evaluated after gating CD11c double positive population. Surprisingly there was a dramatic increase in MHCII with 3 folds higher expression in case of free drug. This reflects the sustained release of the drug from the NP. These results demonstrate the potential of the STAT3 inhibitor in reversing the immunosuppressed status of DCs in tumor microenvironment and its immunomodulatory role for the first time.

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Title: Light Trapping in Polymer Solar Cells using Titanium Nitride

Silicon solar cells are the most dominant type in the solar cell's industry. However, they require complex processing techniques which increase their cost. Polymers, on the other hand, are easier to fabricate, cheaper and flexible materials. Polymer solar cells have become attractive in the solar cell industry since the discovery of conductive polymers that could absorb light and produce photo-generated charge carriers. The main problem of polymer solar cells is their exciton low diffusion length and low charge carrier mobility, which limits the thickness of the material to few tens of nanometer resulting in poor light absorption. Metal nanoparticles (i.e. Ag and Au) have been used extensively in polymer solar cells to localize light in the thin active layer using localized surface plasmon resonance and surface plasmon polaritons techniques. This result in higher optical path length without physically increases the

thickness of the layer, thus maintaining their good electronic properties. However, Ag and Au are expensive materials and not compatible with the current fabrication technologies. In this work, TiN nanostructures, a cheap and abundant material proven to have plasmonic effect, are incorporated with polymer solar cells to trap light inside their active layer while maintaining the feasibility of fabricating the device on a large scale. This is believed to significantly contribute in the commercialization of such devices.

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Title: Large Scale Single Step Fabrication of Ultra-absorption Vertical Dense Crystalline Mesoporous SINWS Arrays with Tunable Filing Ratios and Their Formation Mechanism for PV Devices

An effective and economical one-step silver assisted wet chemical etching method in an aqueous solution of AgNO_3 and HF for synthesis of ultra-absorbance vertical crystalline dense SINWs array with controllable filling ratio over large area. The formation mechanism for SINWs array is explained in terms of localized Nano electrochemical cell with schematic representation for C-Si (100).the fabrication mechanism is examined for large area fabrication for different samples dimensions from $0.8 \times 0.8 \text{ cm}^2$ to $3 \times 3 \text{ cm}^2$.The large surface area SINWs has less reflection compared to the smaller surface area. The effect of the etching time from (30 min to 60 min) on the length, which increased from 9 to 20 μm and the filing ratio (diameter) from 118 nm to 1200 nm, is investigated. The x-ray diffraction patterns for different filing ratiom SINWs array confirm the crystallinity of the array like the parent Si wafer. The optical properties of the fabricated vertical dense SINWs array show remarkable very low reflection and ultra-absorption in the visible and IR regions. The change of the reflection is also investigated with changing the incident angle of light which proves that light is more oblique for large angle ($<40^\circ$) which increases the reflection. Moreover, the Raman

scattering Measurements showed a lower frequency shift in the first order transverse band compared to the spectra of C-Si, which confirms quantum size effect and phonon scattering in the vertical dense SINWs array with different filling ratio which caused due to the change of porosity and roughness of fabricated structure. Vertical dense crystalline SINWs array fabricated through single step MWECE shows a promising potential for use as an ultra-absorber material in both regions Visible and IR in PV applications, photonic devices, and optoelectronic applications.

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Title: Optical Transistors

Most of our prosperity in this age is built on the invention of transistors. Computational capabilities revolutionized every aspect of our life, embedded systems, the booming industry these years, biomedical applications that helped in diseases diagnosis, and research, and many others. But transistors are reaching their limits. The gate thickness goes down to atomic level, and the quest to find a new technology that can take over the electronics technology has begun. Many technologies are evolving and competing to pursue this goal, including DNA computing, Quantum computing, chemical computing, optical computing, and others. They all have their pros and cons, but Optical computing has the privilege of being based on a relatively older and mature technology than other technologies competing over the electronics technology. Optical devices have been used on the commercial level for years; even merging electronics and optics has been extensively researched. At the end of the last year, a group in Berkeley succeeded in connecting between processor cores by optical interconnects. This fact gives optical transistors, and optical computing steps ahead of the other technologies. In addition to the fact that it is able to reach much higher speeds than the electronics counterpart, and it does not have the heat problem. There are still many check points that optical transistors have to pass before they can be feasible in complex systems like fast memories or processors. We are trying to address these issues in our research. Challenges facing them include, the need for a cascaded optical transistors, which means that the output of a transistor should be

adequate to drive the next one, fan out, meaning that the output of one stage has to be able to drive at least two subsequent stages and logic level restoration, that the quality of the signal has to be restored at each stage, so that the problems in signals do not transfer through the different parts of a system. Input/output isolation is another challenge, because we do not want a signal reflected from a later stage to act as an input to the output of the previous state, and the absence of critical biasing, because we do not want each of our devices to need very precise design. Lastly, the logic level has to be independent of loss. Others have also suggested that a power level of 10 fJ/Bit or less is needed for a reliable optical computing system. We are working on building an optical transistor based on semiconductor materials and trying to solve these issues, so we can contribute in the jump to the next level of computational power.

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Title: Silicon Plasmonic-integrated Interferometer Sensor

We propose a novel structure with two input and output silicon waveguide ports separated by the Insulator-Metal-Insulator channel deposited on silicon nitride base. In principle, both the top surface insulator/metal interface and bottom surface can support SPP a decoupled modes. Once the SPP modes excite input silicon waveguide, the SPP signals from the two optical branches (the top and bottom interfaces) propagate to the output silicon waveguide. At the output waveguide, both branches interfere with each other and modulate the far-field scattering. The top surface is considered the sensing arm of this plasmonic Mach Zehnder interferometer (MZI). The bottom surface is considered the reference arm of the sensor. High sensitivity and small footprint is achieved using this integrated simple plasmonic design. The combination of sensitive interferometric techniques and the optimization process of the design and the material yields enhanced sensitivities up to 3000 nm/RIU.

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Title: Low Power Resonance Based Hybrid Plasmonic Electro-Optical Modulator

Optical communication channels have been considered as an alternative to electric ones due to their much higher bandwidth and low losses. Recently, photonic interconnects have been investigated even for on-chip data transfer instead of metal interconnects for the same reasons. However, the data processing is still to this day realized in digital and analog electronic domains.

In order to take advantage of the photonic interconnects, the data must be carried on an optical carrier wave. Electro-optical modulators (EOM) play a vital role in converting the electric signal into optical pulses. From a system point of view, the power lost in this conversion needs to be minimized. Therefore, an electro-optical modulator of small size and low switching capacitance has recently been in great demand. However, optical devices are known for their large guided mode sizes compared to their electronic counterparts. With the evolution of plasmonic devices, the confinement of the optical power in a smaller cross section area and enhanced light matter interaction has enabled compact EOMs. Nevertheless, plasmonics come with their own shortcoming of having high propagation losses which presents another source of conversion power loss.

In this work, we present an ultra-compact EOM based on a hybrid plasmonic ring resonator. The utilization of a hybrid plasmonic mode offers a good compromise between low propagation losses and high field confinement. A polymeric material is embedded between the silicon and the metal to provide electro-optical modulation. On each side of the input waveguide lies a hybrid plasmonic ring resonator in a push-pull configuration. The proposed modulator is designed and analyzed using 3D finite difference time domain simulations (FDTD). Upon the application of opposite voltages of equal magnitudes to the rings, an electro-magnetic induced transparency is observed in the transmission spectrum of the output and light is transmitted with low insertion loss 0.35 dB. The extinction ratio between the on and off-states is about 10 dB for an applied voltage of 2Vpp. The switching capacitance of each ring is estimated to be 1fF.

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Title: Self-Assembled Growth of Vertically Aligned ZnO Nanorods for Light Sensing Applications

This paper presents a facile low temperature anodization approach for the first time to synthesize aligned ZnO nanorods (NRs). The NRs have diameters in the range of 150–250 nm and lengths of 50–100 mm with hexagonal structures. Electropolishing and pre-annealing of the Zn foil before the anodization step was essential to produce ordered NRs. X-ray diffraction, transmission electron diffraction, Raman and X-ray photoelectron spectroscopy analyses confirmed the formation of ZnO. The photodetector made using the prepared ZnO NRs showed an excellent responsivity of \$1 A/W.

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Title: Thin Exfoliated Crystalline Silicon Foils using Epoxy and PDMS Stress-Inducing Layers for Solar Cell Applications

In 2007, Dross et al. presented the Stress-inducing Lift-off Method “SLIM-Cut”, which consists of inducing a tensile stress in the silicon substrate to initiate and propagate a crack at a given depth. In order to generate such a tensile stress field, a stress-inducing layer (stressor) is deposited on a thick silicon substrate. In this paper, we use Epoxy, and PDMS as stressors, then we expose the sample to high temperature. During the cooling step, the mismatch between the Coefficient of Thermal Expansion (CTE) of the stressor and that of silicon produces a tensile stress field, which is high enough to initiate and propagate a crack throughout the silicon parent substrate.

We demonstrated that exfoliated thin silicon foils with a good microstructural quality can be obtained using a kerf-loss free process fully based on thermo-mechanical properties, called the SLIM-cut

technique. A simple setup was developed to control the crack activation, avoid undesirable crack formations, and increase the temperature gradient. The problem of substrate break was solved by applying a new idea. The idea was to put the epoxy & PDMS on both sides the bottom and the top, using a 180 μm thick epoxy stress-inducing layer on the top and 45 μm of epoxy on the bottom. In addition, spin coater was used for uniform layers of epoxy. Smooth, thin silicon foils with an area of 4 cm^2 were obtained with a low curing temperature of 130 $^\circ\text{C}$ for (3-4) hours. In addition, using more than 500 μm thick PDMS stress-inducing layer on the top and bottom, smooth thin silicon foils with an area of 4 cm^2 were obtained with the same curing temperature and period of time as the case of epoxy. The peeled off foils feature non-uniform thicknesses, attributed to wave stress effects which could perturb the stress distribution at the crack tip.

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Title: Broadband Absorption Enhancement Using Asymmetric Double-Sided Pyramid Gratings

In this paper, a novel design of highly efficient modified grating crystalline silicon (c-Si) thin film solar cell is investigated and analyzed using 2D finite element method. The suggested grating is a double-sided pyramid structure. The incorporation of the modified grating in the thin film solar cell offers a promising route to harvest light into the few micrometers active layer. Further, a layer of Silicon Nitride is used as an antireflection coating (ARC). Additionally, the light trapping through the suggested design is significantly enhanced by the asymmetry of the top and bottom pyramids. The effects of the active layer height, and facet angle of the pyramid on the spectral absorption, ultimate efficiency (η), and short circuit current density (J_{sc}) are investigated. The numerical results show that 87.9 % efficiency improvement are achieved over the corresponding conventional thin film c-Si solar cell without gratings. Additionally, a J_{sc} of 27.73 mA/cm^2 is obtained by using the suggested solar cell.

The absorption enhancement of thin film crystalline silicon solar cell by using double-sided pyramid grating is studied using 2D finite element method. We identify the mechanism used to calculate the absorption,

ultimate efficiency, and J_{sc} . Inverse and up pyramids are compared. Two types of bottom pyramid (up air and bottom silicon) are used. We consider the influence of active layer height, facet angle of the pyramid, symmetry and asymmetry of the pyramids, in order to maximize absorption enhancement of the suggested structures. The asymmetric double-sided up pyramid with (down silicon) bottom pyramid, at apex position $L = w/4$ & $3w/4$ for the top and bottom pyramids respectively, offers considerable increase in the absorption of the photovoltaic layer. The numerical results using this structure show maximum ultimate efficiency $\eta = 33.9\%$ compared to the other investigated structures with $J_{sc} = 27.73 \text{ mA/cm}^2$.

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Title: Graphene Quantum Dots/Metal Oxide Hybrid Photoelectrodes for Efficient Solar Energy Conversion

With the looming energy crisis in the world, especially in our country Egypt, and the depletion of petroleum and natural-gas reserves, searching for sources of alternate fuel becomes very urgent. To this end, direct solar energy conversion into electricity or into storable fuels offers a promising solution to looming energy crises. One of the most critical issues is the development of a suitable photoelectrodes with high efficiency and long-term durability in different environments, such as aqueous media in case of fuel production or hot and dusty environment in case of electricity production. Despite present efforts, the capital cost as well as the stability of the material is still inconvenient for large-scale applications. Therefore, the proposed work aims at constructing high performance, affordable, and air-stable inorganic photoelectrochemical devices. The devices are based on graphene quantum dots/metal oxide hybrid architectures, which are abundant and environmentally benign, enabling long-term and scalable solar energy conversion and storage. The research includes materials design, fabrication, characterization and device assembly and testing.

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Title: Laughter in the Social Network: Tracking Political Humor in Egypt during the 2014 President Campaign

Humor, parody and satire are powerfully subversive forces against oppressive and out-of-date societal traditions and conventions. In contemporary times, these subversive forces of renewal can be employed through the medium of social networks and serve as counter-valence to traditional mores and power. The evidence of humor's potential to influence was demonstrated when Egypt overthrew Hosni Mubarak in 2011—popularly referred to as the 'Facebook Revolution'. Since the fall of Mubarak, Facebook has become even more popular within Egypt and user generated content—especially cartoons—has proliferated exponentially. However, the esteem afforded to Egyptian military has traditionally placed this sector of Egyptian society off limits. Thus, former Minister of Defense El-Sisi's blurring of the lines between Egyptian military and political life will provide an ideal litmus test to determine how far freedom of expression has come in post-uprising Egypt. Research into Egyptian political cartoons on Facebook will provide such insight by employing quantitative analysis to a purposive sample of Cartoons selected from Facebook. Significant dates within the Presidential campaign have been selected for study. Two theories are employed to interpret findings, Bakhtin's Carnavalesque and the SPIN (Segmentation, Polycentrism, Integration and Networking) Model. The two theories are utilized under the pretext of applying a macro-theory, Carnavalesque, and more micro approach, SPIN, in order to provide a full spectrum depiction of the level of freedom of expression exhibited by Egyptians on Facebook.

Keywords: Humor, Comics, Facebook, Egypt, Election, President, El Sisi, Mansour, Hamdeen, Carnavalesque, SPIN Theory

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Title: Religious and Spiritual Music in Egypt

Nowadays, spiritual music is very popular in Egypt. New trends such as the Egyptian Mawlaya are gaining so much popularity, tickets of concerts are fully booked, hundreds of thousands watch religious and spiritual music on YouTube, and most contemporary pop music singers have at least one religious song. The purpose of this research is to understand whether the popularity of spiritual music is dependent on the audience needs or is it media that played a role in popularizing it. Media studies must remain alert to changing cultural trends, especially those that incorporate a variety of fields such as religion and music. In that sense, the media is apt to explain the popularity of spiritual music among Egyptians in recent years. This paper poses the question of why religious and spiritual music has recently become so appealing to wide audiences in Egypt. It presents two hypotheses: firstly, that the media is the main reason behind the popularity of spiritual and religious music and, secondly, that the audience needing such an escape and spirituality are the two reasons behind the popularity of religious and spiritual music. Since most data showed that the media is a contributing factor to the success of religious and spiritual music but not the main factor, the first hypothesis is not supported by this study. The second hypothesis, however, is supported by both primary and secondary sources. That is, audiences' needs, such as an escape from problems or material life, and spirituality are considered to be the reasons behind the popularity of religious and spiritual music.

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Title: Media Literacy for Public in Egypt: Necessities and Possibilities

Some books have appeared over the last decades to discuss issues related to THE media and public in a rapidly changing world. Nowadays,

news, images and ideas grow virally and globally, but globalization alone cannot provide a proper explanation for how messages are made, globally circulated, their salience rapidly being dimmed and most importantly how fragmented audiences deal with this process.

This research paper focuses on three main issues. It surveys significant works on media literacy, does intensive interviews with news and media message makers, and uses the questionnaire method to understand how audiences perceive and interpret current media messages in Egypt. Finally, this study explores the possibility of making a book directed to publics in Egypt in an attempt to spread media literacy.

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Title: The Quest: Where do Muslims Fit the Best?

It is curious how a twenty-hour- flight can change your way of viewing things and get you to question the givens. This is a story about a female Egyptian Muslim who traveled to the other side of the globe to a non-Muslim country only to find herself getting to know her religion even better.

1.6 billion People around the world share the same beliefs and struggle. The struggle to fit in. Out of the 1.6 billion in this documentary, I managed to Skype interview four individuals from North and South America, Asia and Europe in an attempt to answer one question: Where do Muslims fit the most?

Law Department

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Title: Institutionalized Expressions: the Law and Art Production in Egypt

The centralized nature of art production in Egypt is almost always a given. The intricacies of such nature are, however, rarely shed light on. In Egypt, ministerial decrees --those particularly issued by the Minister of Justice-- can and do grant artists (actors, filmmakers, musicians, etc.) al-dabtiyya al-qada'iyya, a cyclical right of arrest. One such decree, decree number 3750, was issued in 2012 to grant seven theatre artists the right

of arrest, and is in turn used as the starting point of inquiry into the relationship that binds the law and art production in Egypt. This inquiry includes questions like: what this right of arrest is, what its legal basis and function is, who is eligible to receive it and finally, how such a right of arrest is instrumentalized by the Egyptian state. In an attempt to provide answers to those questions, this research project maps the laws, decrees, and various governmental bodies and institutions that together constitute the mechanisms by which the Egyptian state is able to exercise its control over, and at many times legally clamp down on, the arts in Egypt. Accordingly, this research project probes at the heart of the Egyptian law of syndicates, Law 35/1978 for the creation of the Federation of Artistic Syndicates and its respective amendments, as the legal basis for the decree in question and for those similar decrees that were later issued (for instance, decree 6614/2015). Through its reading of the law, an interview with the head of the Egyptian Body for the Oversight on Audio and Audio-visual Material (Hay'at al-riqāba 'ala al-muṣanafāt al-samā'iyya wa al-samā'iyya-baṣariyya), and another interview with a Cairo-based arts space curator, this research project provides solid insight into the inner workings of the law as it pertains to the organization of the arts in Egypt, and as it is put into practice against the backdrop of a fluctuating social and political scene in post-2011 Egypt.

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**Title: TERRORISM: AN ANALYSIS OF THE INTERNATIONAL LEGAL FRAMEWORK, INTERNATIONAL AND REGIONAL RESPONSES
CASE STUDY: SYRIA**

International law, as a discipline, is obsessed with crises, requiring reinterpretation of its basic principles to cope with them. Through this process of reinterpretation, it also creates new rules. Terrorism is one such 'crisis' that has impacted the international legal framework on the use of force, making it deviate from its basis established by the United Nations Charter. This thesis conducts a macro analysis of the changes in the legal framework for combating terrorism after 9/11 and the Arab Spring. It focuses on the Syrian conflict as a case study, analyzing the major actors and their different legal justifications. The Syrian conflict is a clear prototype of the changes that started to take place after 9/11. The development in the legal framework governing the use of force

happened in three dimensions. The first is the broadening of existing rules (such as favoring a purpose oriented interpretation of self-defense to include new forms such as anticipatory and pre-emptive self-defense). The second dimension is the creation of new rules through state practice that replaced existing codified ones, in an attempt to avoid the deadlock of the Security Council (SC) veto. For example, the —unwilling and unable standard is used to justify unilateral interventions without the SC authorization to fight terrorists in other states. A third dimension is the gradual decline of the use of collective security under the UN system, giving way to unilateral action by States.

Public Policy and Administration Department

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Title: Asset Based Community Development Approach in Rural Community of Egypt

Many communities in Egypt, specifically rural areas, are unquestionably distressed as a result of the major economic and political shifts that have occurred over the past few years. Strategies of community development are currently viewed as the radical remedy for poverty related problems. In Egypt, community development strategies are usually driven from traditional approaches including charity, needs- and rights-based approaches that focus on basic needs like shelters and food. These approaches have proved a deficiency as they ignore the structural causes of poverty and address symptoms only. In response to these shortages came an alternative capacity focused practice called asset based community development (ABCD) approach. This research posits that ABCD could offer a coherent strategy of sustainable development in poor communities in Egypt. Based on that, the main objectives of the research are to study the application of ABCD approach in rural areas, and in turn present a customized ABCD approach derived from international guidelines and the Egyptian experience. In order to fulfill these objectives, case studies from rural communities in Egypt that adopt ABCD approach were extensively studied through qualitative

research methods. The analysis and the findings of the current research are most relevant to developing countries and to those emerging from state capitalism and centralization. The results of the research give substantial contribution in understanding and identifying the ABCD approach. Thus, a possible way is paved to generalize this bottom up development strategy over poor communities.

Keywords: Asset based, community development, rural communities, developing countries, Egypt

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Title: Trade and Growth in the Relation between China and Sub-Saharan Countries

China's economic engagement with Sub Saharan countries has been substantially increasing since 2001. Trade has accelerated like never before. Sub Saharan countries' exports to China increased dramatically from US\$ 3.1 billion in 2001 to US \$31.2 billion in 2007. The growth of China – Sub Saharan Africa relations has increased interest in trade, because it involves crucial issues for the development of Sub Saharan Africa. Consequently, this thesis assesses the extent to which Chinese state-led drive for resources in Africa, especially Sub- Saharan countries, affects the economic growth of these countries. The answer to this question is quantitatively assessed, using t-test and regression analysis, to show that those countries that are highly involved in trade with China exhibit higher growth than those that are not involved. The results of the study imply that China has opened up new economic, political, diplomatic and strategic avenues for African states, yet this isn't limited to African leaders. It is also down to Africans, both people in power and the man on the street, to negotiate on their terms, identify priorities and leverage opportunities to further their own interests.

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Title: Towards a Child Centered Juvenile Justice System in Egypt

Concerns regarding youth and juvenile delinquency have been growing over the past years. It is estimated that there are at least one million children deprived of their liberty worldwide, with few published studies describing the Egyptian juvenile justice system. This research fills this

gap in current literature. It questions whether the current Egyptian juvenile justice system achieves its policy intent of preventing delinquency while rehabilitating and re-socializing juvenile offenders are on the rise. This research provides a comprehensive assessment of the current operational juvenile justice system in Egypt by analyzing the relevant policy and legal framework as well as practices governing it and setting its boundaries. On one hand, it will examine the level of compliance between the current legal, policy and operational framework of the juvenile justice system in Egypt and the various conventions, rules, guidelines, and core elements governing the work of juvenile justice systems worldwide. On the other hand, the research investigates the relevance of current practices based on the international theories on punitive versus rehabilitative approaches to juvenile justice in light of the work of Andrews et al (1990) on the importance of rehabilitation and the fundamentals of the “nothing works” approach of Martinson (1974). Eventually, the research provides policy recommendations on how to improve the current Juvenile Justice system to be more responsive and child centered.

The research is qualitative, using observation and interviews with stakeholders involved in the administration of the juvenile justice system in Egypt. It offers a conceptual framework that builds on the internationally pronounced United Nations Committee on the Rights of the Child’s 2007 core elements of a comprehensive policy of juvenile justice as well as a set of parameters informed by the 2007 UNICEF and UNODC measurement of the juvenile justice and the 2008 Violence Against Children in Conflict with the Law indicators.

The research argues that while the Egyptian Child Law of 2008 that regulates the juvenile justice system largely complies with the core elements of a sound and just juvenile justice system, its application does not necessarily reflect the same level of compliance. Indeed, while different official documents promote the establishment of a rehabilitative system, the current system is largely punitive, prioritizing public safety and youth offender accountability to human rights and youth development. The research calls for policy reform that promotes a more child-centered juvenile justice system in the country.

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Title: Advocacy and Social Change: the Case of Sexual Harassment in Egypt

Social Change and media advocacy are two related concepts. In Egypt, with the numerous changes taking place on the political level, social change is needed in parallel to achieve development. Sexual harassment has been growing in Egypt in the last few years. Media advocacy is a tool that should be included in the strategy to combat this phenomenon as it contributes to social change. This study reviews some of the media advocacy attempts in Egypt that target sexual harassment. It studies the role of governmental as well as civil society organizations in using media advocacy to combat sexual harassment and presents recommendations to maximize their benefits from using media advocacy to solve social problems in Egypt like Sexual Harassment.

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Title: Public Health Finance Protection Schemes in Egypt

Egypt is ranked 113 out of 187 countries on the UNDP human development index, with about 40% of population living below the international poverty line. This research assesses how effectively the state provides social protection policies/ systems in order to protect disadvantaged citizens in the healthcare service provision sector. Measuring healthcare coverage and protection against financial risks answers the main research question: To what extent does the legal-institutional framework of the Egyptian governmental healthcare system(s) protect the poor from the health-related financial burden?

The interventions that are subject to the study are Health Insurance (HIO), Payment on the Expense of the State (PTES) and Family Health Fund (FHF). The draft Social Health Insurance Law was also part of the study. The researcher found that the draft Social Health Insurance Law provides good protection against financial risks associated with catastrophic health expenditures and Out-Of-Pocket (OOP) health expenditures. On the other hand, FHF offers the best program providing universal health coverage for both Millennium Development Goals (MDGs) related diseases and Critical Conditions and Injuries (CCIs) related illness comparing to other programs.

This study recommends the formulation of unified framework of those systems in order to integrate together and the clear determination of the roles of each system.

Key Words: Healthcare System in Egypt, Health Insurance in Egypt, Poverty and Healthcare in Egypt, Governance in Healthcare System, Healthcare Sector Legal- Institutional Framework in Egypt, Healthcare System Coverage and Healthcare Financial Risk Protection in Egypt.

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Title: THE IMPACT OF POLITICAL SATIRE ON THE BALANCE OF POLITICAL POWERS IN EGYPT -THE CASE OF EI-BERNAMEG IN EGYPT

This research provides significant insight into the role of satire in Egyptian politics and how it has been received from the government's and viewers' points of view. It mainly sets out to test whether Bassem Youssef's satirical program has played a significant role in Egypt recent politics and to investigate the nature and extent of this role. In order to test this hypothesis, the researcher critically analyses one episode of Bassem Youssef's satirical show, El Bernameg. This dissertation further highlights that the aim of satire is to invite citizens to analyze, criticize and question people in power and the realm of politics rather than leave them untouched subjects, and that satire combines humor with critique in order to enhance citizens' political awareness and perhaps even political engagement. Moreover, the study identifies that Bassem Youssef's satire uses laughter as a medium to communicate his political message. By first informing the public and secondly engaging them through laughter, the show's satire plays a very constructive political role. Thus, it was argued finally that Bassem Youssef indeed plays an important part in the Egyptian political scene of today and this can be measured by the degree of censorship that he has been subjected to and the international and domestic reactions to his satirical show. At the end, this dissertation suggests that the measure of a strong government is its ability not only to accommodate satire, but also to learn from it.

The Academy of Liberal Arts

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Title: Zabaleen: Between Child Laboring and Right of Education

Cairo has suffered from the existence of slums since Nasser decided to temporarily displace the Canal's population to Cairo till the war ended and built Nasser's Facility, which is known for "Manshya'at Nasser". People kept coming from all over Egypt to Cairo forming slums till they become 1221 areas in Egypt. Slums' populations suffer from health problems, poverty, lack of job opportunities and the most destructive thing the high percentage of illiterate people that live there. Zabaleen is located in Manshya'at Nasser, the largest slum in Cairo with population of about 1.5 million. Garbage collection industry and raising pigs are the main sources of earning living in that area. During these 55 years people there have lost their trust in Egyptian education because it had never added to their industry, and to raise income through reinforcement of the child laboring. The consequences of the poverty, poor education, and ignorance from the government toward this area are 65% of women and 52% of men are illiterate.

According to these statistics, child labor becomes a crucial issue and government has to put an end for it or to mitigate it. Laila Iskandar, an Egyptian entrepreneur who received the Goldman Environmental Prize for her efforts towards saving the environment, founded the recycling school and introduced people there to a new method of education. She used experiential learning to teach children, making their misery their way to get educated. Her school offers proper education through experiential learning in order to help these children to overcome their daily challenges that they face during the work. This school alters their daily life experience into method to learn Math by calculating the number of wasted bottles and English by reading the names of products to sort them. Ms. Kamel succeeded to reach the intersection point between proper education and work and that what people in Zableen need.

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Title: Are Ethnocentric Learning Centers Better Able to Meet the Needs of African Children in Exile more than Government Schools?

In the late 20th century, two civil wars rose in Sudan between northern state and the south. These wars resulted in the deterioration of the country's economy and sent hundreds of thousands of Sudanese to seek refuge in Egypt, a participating country in the Geneva Convention, which entitles refugees to a free primary education. However, after the attempt assassination of President Hosni Mubarak, the treaty between Sudan and Egypt was compromised: the Sudanese are no longer allowed to enroll in Egyptian government schools; luckily, however, there are specific learning centers that accept them. One of these centers is the African Hope Learning Center. It offers three levels of education: primary, preparatory, and high school. Alongside education, the center provides medical care for students. As our first task as volunteers, we were assigned to help students in different subjects. Some of them were not comfortable at first, but when they began to see us regularly, the process ran more smoothly that it did before. During our visits, we collected enormous amount of data for our research.

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Title: Life Sustaining yet Lethal: Food

When you go to the supermarket, you're overwhelmed and excited about the hundreds of food products that you can purchase, from delicious sugary treats passing through meats and poultry all the way to fruits and vegetables. What is the difference between processed food and organic food, though? Are they healthy and safe or not? This is what this paper studies. . Despite the variety of the sources and their number, this study needs more investigation and time. The lack of previously published research on the consequences of consuming some of the most sold foods is very alarming yet nobody seems to emphasize the point. There

have been trials to solve our food problem but they have proven insufficient. In this study, other short term and long term solutions have been suggested, but need further research. Our gathered information ranges from an in-class interview with a local bee farmer, to documentaries, various books about food processing and electronically published medical studies.

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