Arab Republic of Egypt

Ministry of Higher Education and Scientific Research

Giza Engineering Institute

The International Conference on Engineering, Technology and Sciences

(ICETS'25)

21st & 22nd of January 2025

Giza Engineering Institute

Giza

Egypt

Preface

The Giza Engineering Institute (GEI) is pleased to organize the 2025 International Conference on Engineering, Technology and Sciences (ICETS'25), in the period January 21 – 22, 2025. The main objective of this conference is to bring together scientists, researchers, engineers, and their colleagues in academic and industrial institutions worldwide. This occasion provides a chance to exchange information in the following designated fields of interest:

1- **Electrical Engineering**
2- **Chemical Engineering**
3- **Civil Engineering**
4- **Architecture Engineering**
5- **Mechanical Engineering**

From (144) abstracts submitted to the conference, a number of (104) abstract was accepted for possible submission to the conference, and the rest of the abstracts were rejected or not relevant to conference topics.

From these (104) abstracts, (99) full manuscripts were submitted to the conference rapporteur and were peer-reviewed. Just (70) papers have been accepted for suitable presentation at the conference, and (28) papers were rejected. Finally, a No. of (42) paper was delivered for possible presentation at the conference and publication in its proceedings.

The selected (42) papers will be presented during the conference interval, from 21 to 22 January 2025 in different (7) scientific sessions. In addition to scientific sessions, the conference activities include different Workshops and Invited Lectures.

An alphabetic index of the authors of the papers is provided at the end of this booklet, which will serve to identify the session in which the paper will be presented. Finally, the conference's high committee hopes that the conference will achieve its planned mission and would like to acknowledge all contributors, members of the scientific committee, and chairmen of the conference sessions.

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GIZA ENGINEERING INSTITUTE

ICETS'25
THE INTERNATIONAL CONFERENCE ON ENGINEERING, TECHNOLOGY AND SCIENCES

List of Contributed Countries:

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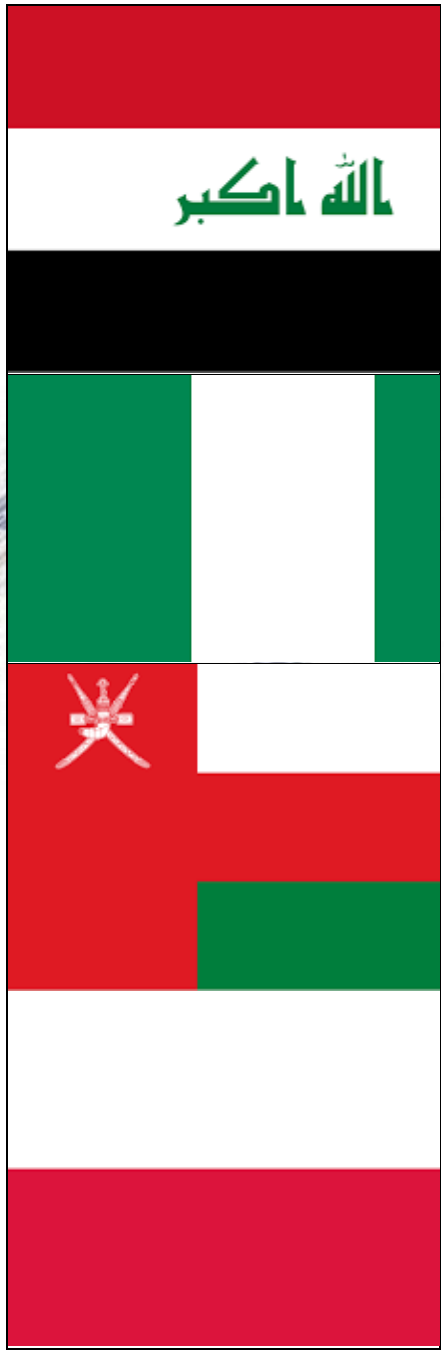
Canada

Egypt

Iraq



Nigeria

Oman

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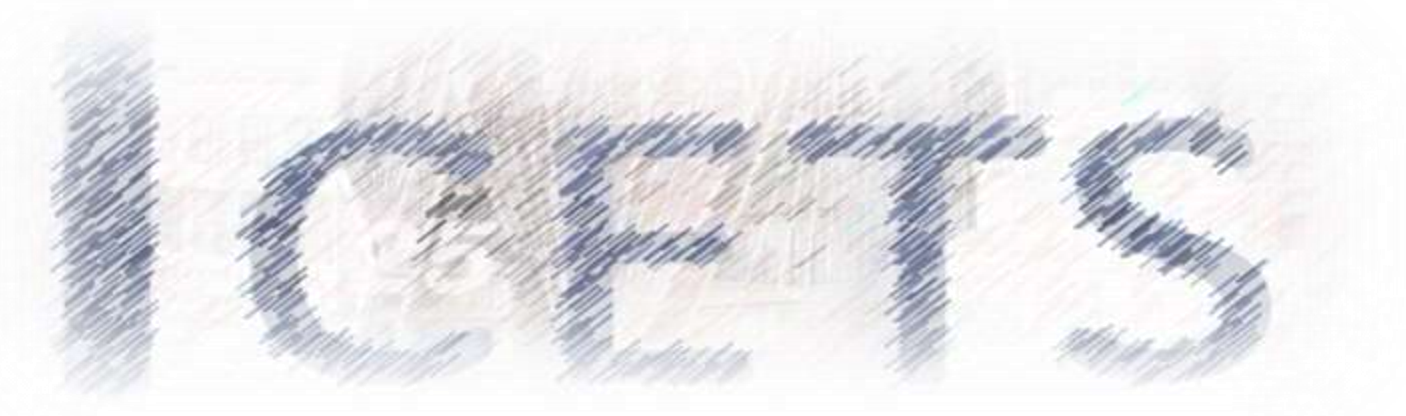

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The International Conference on Engineering, Technology and Sciences (ICETS'25)

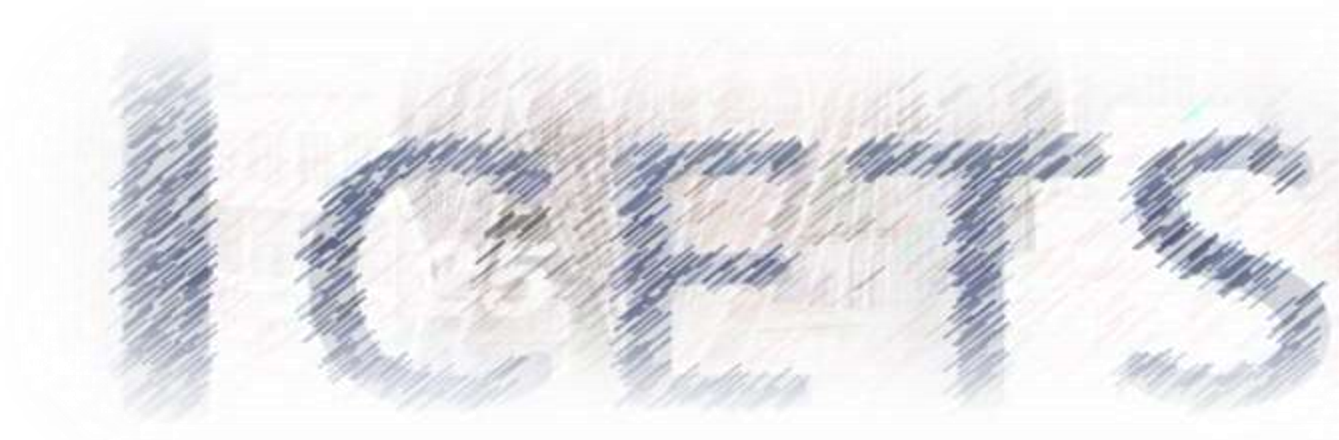
21st & 22nd of January – Giza Engineering Institute

Conference Program

Day 1 - Tuesday 21st January 2025	
9.00 – 9.45	Registration
9.45 – 10.00	Welcome and Introduction – Mahmoud Hassan Hall
10.00 – 12.00	Opening Session, Guests of Honors, and Protocols Signing – Mahmoud Hassan Hall
	Holy Quran
	National Anthem
	Mr. Sabry Mahmoud, *Chairman of the Board of Directors, Giza Engineering Institute*
	Prof. Hala ElKady, *Dean, Giza Engineering Institute*
	GEI-CAU Protocol; Prof. Ashraf Mansour, *Head of Architectural Engineering Department, University of Central Asia*
	GEI-HUAWEI Protocol; Eng. Amany Said, *Representative of Huawei*
	GEI-MESCOUP Protocol; Eng. Hatem Hussein, *Chairman of MESCOUP*
	Eng. Hatem Hussein; Title "Nationalization & Sustainability of Renewable Energy in Egypt"
12.00 – 13.00	Opening of the Job Fair and Exhibition - Coffee Break
13.00 – 13.20	Assoc. Prof. Dr. Mohamed Sayed Selim; Title"Hydrophobic nanocomposites as eco-friendly maritime antifouling Surfaces"
13.20 – 14.00	Honoring – Mahmoud Hassan Hall
	GEI Students Competitions; Assos. Prof. Emad Hamdy, *Giza Engineering Institute*
	GEI Alumni
	Participating Companies
14.00 – 15.00	Launch, Group Photos, and End of Day 1

Day 2 - Wednesday 22nd January 2025				
Session A1 – Room A (004 – Ground Floor) **Electrical Engineering 1**				
Chairmen: **Prof. Ragab Abdelaziz El-Sehiemy, Kafr El-Seiekh University** **Prof. Mohamed Mahmoud Samy, Beni Suef University**				
Time	**Paper No.**	**Title**	**Authors**	**Country**
10.00 – 10.15	0915	Led Lamp Harmonics Minimization	Eman Adel Elbehiry Waheed Sabry	Egypt
10.15 – 10.30	0918	Energy-Efficient Design of Microwave Transceivers for Battery-Constrained Devices	Saad A. Assi Muhsin Selman Ali Hatem Ibrahim Mohammed	Iraq
10.30 – 10.45	1002	FACTS - DG Coordination in an Integrated Transmission and Distribution Network (IT & DN)	A. A. Sadiq I. A. Damari M. Buhari S. S. Adamu J. G. Amabfi	Nigeria
10.45 – 11.00	1016	LEO Satellite Constellations Network Routing Algorithms	Eman Adel Elbehiry	Egypt
11.00 – 11.15	1018	Design of Cellular Device for Home Automation based on IoT Technology	Youssef Samir Abdulrahman Shykhoon Mahmoud Mohamed Omnia Tarek Nora. A. Ali	Egypt

11.15 – 11.30	1019	Weather Feature Selection for Robust and Optimized Energy Load Prediction (online)	Mohsen Tavakolian Hamidreza Zareipour	Canada
11.30 – 11.45	1020	Impact of Solar Farm Location on Power Losses and Voltage Fluctuations in Distribution Networks Using PSCAD	Kareem Elhammamy Hassan Nouri	UK
11.45 – 12.00	1024	Enhancing Power Efficiency in Meeting Rooms of Commercial Buildings Using Smart IoT Devices (online)	H. Elmaghrabi	Egypt
12.00 – 12.15	1030	Voltage Stability Enhancement of PV/Wind Power System using STATCOM based on Fuzzy Logic Controller (online)	Ahmed A. Zaki Diab Ibram Y. Fawzy Ahmed M. Elsawy Ayat G. Abo El-Magd	Egypt



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Day 2 - Wednesday 22nd January 2025				
Session B1 – Room B (108 – First Floor) Chemical Engineering				
Chairmen: Prof. Mohamed Hamdy El-Awady, National Research Center Prof. Ayman El-Gendi, Giza Engineering Institute				
Time	**Paper No.**	**Title**	**Authors**	**Country**
10.00 – 10.15	0905	Sustainable Green Hydrogen Production from Wastewater by an Integrated Solar-Microbial System	Mohamed Mahmoud	Egypt
10.15 – 10.30	0907	Diethyldithiocarbamate Chelates as Eco-Friendly Precursors to Sustainable Metal Chalcogenide for Energy Storage Applications	Rania Emara Mamdouh S. Masoud Sayed Abboudy Ahmed M. Ramadan	Egypt
10.30 – 10.45	0911	Studying the Effect of Polymer Solution Composition on Membrane Morphology	Ayman El-Gendi S.A.R Ahmed H.A. Talaat N. M. A. EL-Monem	Egypt
10.45 – 11.00	1021	Optimizing Molten Carbonate Electrolysis for Sustainable Fuel Production: Experimental Insights and Machine Learning Enhancements	A. Martsinchyk J. Milewski	Poland

Day 2 - Wednesday 22nd January 2025

Session C1 – Room C (012 – Ground Floor)
Civil Engineering

Chairmen:
Prof. Mohamed Sadek, Giza Engineering Institute
Assoc. Prof. Mostafa Shaaban, Giza Engineering Institute

Time	Paper No.	Title	Authors	Country
10.00 – 10.15	0908	Mechanical Properties of Metakaolin-based Concrete Exposed to Elevated Temperature	Tarek Ibrahim Selouma Mostafa Shaaban	Egypt
10.15 – 10.30	0909	GIS-based Framework for Identifying Site Suitability of Water Pumped Hydroelectric Storage in Egypt Using Multi-Criteria Decision Analysis	Salem S. Saleh Bahaa A. Shaheen Nasr M. Saba	Egypt
10.30 – 10.45	0910	A Methodology to Enhance Tower Crane Operational Safety Against Wind During the Construction of Tall Buildings	Mostafa Shaaban Ashraf Ahmed Talaat	Egypt
10.45 – 11.00	0912	Finite Element Analysis of Steel-Jacketed Reinforced Concrete Columns under Axial Loads	Eslam Abd-El-Nabi Mohammed Hammadi Safaa Z. Mohammed	Egypt
11.00 – 11.15	0914	Blast-Induced Failure of Steel Base Plate-Column Connections	Ahmed M. Abd-El-Latif Kareem M. Salaheldin	Egypt

			Safinaz Khalifa	
11.15 – 11.30	0916	Numerical Study on the Dynamic Behavior of Masonry Walls Subjected to Blast Load	Salma Ashraf Afify Ibrahim A. El-Azab Amr R. El-Gamal Ibrahim M. El-shenawy Hala Mohamed Refaat	Egypt
11.30 – 11.45	1001	Comprehensive Paper on Arbitration Systems in the GCC	Raed H. AbuZeyad	Bahrain

Day 2 - Wednesday 22nd January 2025				
Session A2 – Room A (004 – Ground Floor) Electrical Engineering 2				
Chairmen: Prof. Mohamed Mahmoud Samy, Beni Suef University Assoc. Prof. Nora Ahmed, Giza Engineering Institute				
Time	**Paper No.**	**Title**	**Authors**	**Country**
10.00 – 10.15	0903	Performance Analysis of 5G Mobile Network using Massive MIMO and AMC	Sherif Saber Zeyad Sayed Ibrahim Yasser Mohamed Salah Dawlat Ibrahim Aya Fathy Nora Ali	Egypt
10.15 – 10.30	0917	A Self-Moving Shopping Trolley Autonomously Following Customers with Automated Billing System	Maher Eltayeb Mahmoud Hassan Mourad Salma Alaa Hamdy Aya fathy Mohamed Hassan M.	Egypt

10.30 – 10.45	1012	5th Generation Planning for Multi-Antenna Transmission using Atoll	Atef Salama Eman Adel Elbehiry	Egypt
10.45 – 11.00	1013	High-Speed High-Swing Charge-Steering Latches (online)	Omama M. Elrefaei Sameh A. Ibrahim Hani F. Ragaai	Egypt
11.00 – 11.15	1017	Automated Drive Testing Tool for Mobile Base Station	Mahmoud A. Moussa	Egypt
11.15 – 11.30	1022	A WDM Ring Network Based on Integrated Reconfigurable Optical Wavelength Add/Drop Multiplexers	AbdelRahman M. Abdalla	Egypt
11.30 – 11.45	1023	Revitalizing Fintech: Leveraging Refactoring Techniques to Enhance Legacy System Performance and Maintainability	Mahmoud Raafat Elrashidy	Egypt
11.45 – 12.00	1027	Design of a Reconfigurable CDC for a Multiplexed Industrial Sensor Fusion	Karim M.Abozeid Hassan Mostafa A.H.Khalil Mohamed Refky	Egypt

Day 2 - Wednesday 22nd January 2025				
Session B2 – Room B (108 – First Floor) Mechanical Engineering				
Chairmen: Prof. Ahmed Hamza, Assiut University Prof. Zakareya Emara, Kafr- Elshiekh University				
Time	**Paper No.**	**Title**	**Authors**	**Country**
10.00 – 10.15	1007	Fuel Saving and Energy Efficiency in the Aviation Catering Systems using Phase Change Materials (PCMs)	S. M. Sadrameli A. Al Habsi	Oman
10.15 – 10.30	1011	Mathematical Study on a Direct Contact Humidifier of a Humidification-Dehumidification Desalination System	Mohamed Ashraf Galal Raouf N. Abdelmessih Ehab M. Mina	Egypt
10.30 – 10.45	1025	Structural Analysis of an Electric Vehicle Chassis using Finite Element Analysis	Omar Zamzam Mohamed Abdelaziz Tamer Elnady Aly A. Ramzy Ayman A. Abd El-Wahab	Egypt
10.45 – 11.00	1034	Increasing the Efficiency of Gas Turbines by using Part of the Exhaust Gases	Ali F. Ali FADIEL Wael M. El-Maghlany Ali I. Shehata Mohamed T. Mito	Egypt

Day 2 - Wednesday 22nd January 2025				
Session C2 – Room C (012 – Ground Floor) Architectural Engineering				
Chairmen: Prof. Hala Elkady, Giza Engineering Institute Assoc. Prof. Emad Hamdy, Giza Engineering Institute				
Time	**Paper No.**	**Title**	**Authors**	**Country**
10.00 – 10.15	0904	The NUBEO Quality of Life Indicators Methodology for Analytical Assessment of Urban Community Public Satisfaction and Sustainable Development	Reham Salah Hanaa Elsappagh	Egypt
10.15 – 10.30	0906	Postmodern Architecture in Egyptian Public Buildings: A Focus on Cairo Opera House and Smart Village	Hanaa Elsabbagh Reham Salah	Egypt
10.30 – 10.45	0913	Evaluating the Role of Postmodern Architecture in Balancing Historical Identity and Functional Design In Egypt	Hanaa Elsabbagh Reham Salah	Egypt

Day 2 - Wednesday 22nd January 2025				
Session D2 – Room D (104 – First Floor) Students' Session				
Chairmen: Prof. Waheed Sabry, Giza Engineering Institute Prof. Ragab Abdelaziz El-Sehiemy, Kafr El-Shiekh University				
Time	**Paper No.**	**Title**	**Authors**	**Country**
10.00 – 10.15	S1	Wi-Fi Smart Home based on Internet of Things	Ibrahim S. Ibrahim Mennatallah S. Gad Mustafa M. Sallam Nora A. Ali	Egypt
10.15 – 10.30	S2	Social Engineering: Human Manipulation Strategies and Their Impact on Cybersecurity and Prevention Methods	Mohamed Ahmed	Egypt
10.30 – 10.45	S3	Bank Customer Churn Prediction using Machine Learning	Mohammed A. Ragab Eman Adel Elbehiry	Egypt

10.45 – 11.00	S4	A New Conceptual Explanation for Terrestrial Wormholes and Earth's Magnetic Field Deviation Effects	Mai M. Mabrouk Waheed Sabry	Egypt
11.00 – 11.15	S5	Study of Artificial Intelligence Revolution in Burn Treatment	Dina Ayman Youmna Ayman Mustafa M. Sallam Waheed Sabry	Egypt
11.15 – 11.30	S6	Arduino and Microcontrollers	Abdul Rahman H. Al-Badri Youssef Hazem El Badry	Egypt
11.30 – 11.45	S7	Artificial Intelligence	Mahamed Asaad Kamel Roaa Ashraf Ibrahim Samah Ahmed Araby Ahmed Salem Sayed Ahmed Esam Moawad Ahmed Ibrahim Salah Mohamed E. Mohamed Ahmed Wageeh Mahamed Basant Raafat Shahdy Omar Mahmoud Ma'rouf	Egypt

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The International Conference on Engineering, Technology and Sciences (ICETS'25)

21st & 22nd of January – Giza Engineering Institute

Conference Papers

The International Conference on Engineering, Technology and Sciences
21-23 January 2025, Cairo, Egypt

Performance Analysis of 5G Mobile Network Using Massive MIMO and AMC

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Abstract- The progress of telecommunications has been characterized by successive generations, each revolutionizing connectivity and communication. Innovations have changed the landscape from the first generation (1G) of analog voice transmission to the start of the fifth generation (5G) era. This article traces this path taking into consideration the crucial role of Massive Multiple-Input Multiple-Output (MIMO) technology in shaping the future of 5G networks. Massive MIMO offers improved performance in terms of data rate and spectral efficiency while accommodating numerous users.

This paper aims to offer a comprehensive yet introductory exploration of MIMO technology evolution and challenges. By examining potential system improvements, it aims to shed light on the path toward harnessing Massive MIMO's transformative potential in the realm of 5G telecommunications.

Also, the paper investigates the 5G performance in the presence of adaptive modulation. Adaptive Modulation and Coding (AMC) is considered a crucial advancement in achieving the 5G objectives. AMC signifies a fundamental shift in wireless communication, allowing for real-time adjustments of modulation schemes and coding rates based on the current wireless channel conditions.

Keywords: ***5G, Massive MIMO, Beamforming, Adaptive Modulation.***

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The NUBEO Quality of Life Indicators Methodology for Analytical Assessment of Urban Community Public Satisfaction and Sustainable Development.

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Abstract: **The growing problems of urbanization, economic development, and environmental sustainability have shifted the emphasis of contemporary urban studies to the quality of life in urban populations. Measuring quality of life helps cities measure citizens' overall contentment and suggest areas for improvement, offering valuable information to urban planners and politicians. One well-known instrument for this purpose is the **Numbeo Quality of Life Index**, which collects data on important factors such as cost of living, healthcare, pollution, safety, and housing affordability. The purpose of this research is to examine the effect of utilizing the Numbeo Index to assess quality of life, with a particular emphasis on how its indicators affect public satisfaction and contribute to sustainable urban development. This study examines Quality of Life Indicators, Sustainable Development Indicators, and Numbeo Quality of Life Indicators. It compares their index scores to identify trends and establish the importance of these elements in determining urban citizens' well-being. In addition, the research sheds light on the Numbeo Index's potential as a practical tool for assessing and improving the quality of life in a variety of urban settings. This research aims to educate future urban planning methods and assist policies that promote sustainable, livable cities.**

Keywords: ***Quality of Life (QoL), Public Satisfaction, Sustainable Development, Numbeo Index.***

The International Conference on Engineering, Technology and Sciences
21-23 January 2025, Cairo, Egypt

Sustainable green hydrogen production from wastewater by an integrated solar-microbial system

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Abstract: **This study demonstrates the development of a hybrid system, in which a microbial fuel cell (MFC) fed with wastewater was used as a power source to drive sustainable production of green hydrogen (H2) in a photoelectrochemical cell (PEC) based on stacked titanium dioxide nanotubes (TiO2 NTs) as a photoanode. The integrated system showed superior current output and hydrogen generation in comparison with the control PEC. The integrated PEC–MFC system utilizing the stacked TiO2 NTs photoanode demonstrated impressive efficiency in H2 production, achieving 0.45 m3-H2 m3- d-1 with no applied power when exposed to solar light. This study opens up new opportunities for developing eco-friendly and highly efficient approaches to sustainably produce H2 from renewable resources, highlighting the advantageous function of MFCs in producing electricity, which enables self-biased hydrogen production in PECs.**

Keywords: **Integrated solar-microbial system; Photoelectrochemical cells; Green hydrogen; Microbial fuel cell; wastewater treatment.**

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Postmodern Architecture in Egyptian Public Buildings: A Focus on Cairo Opera House and Smart Village

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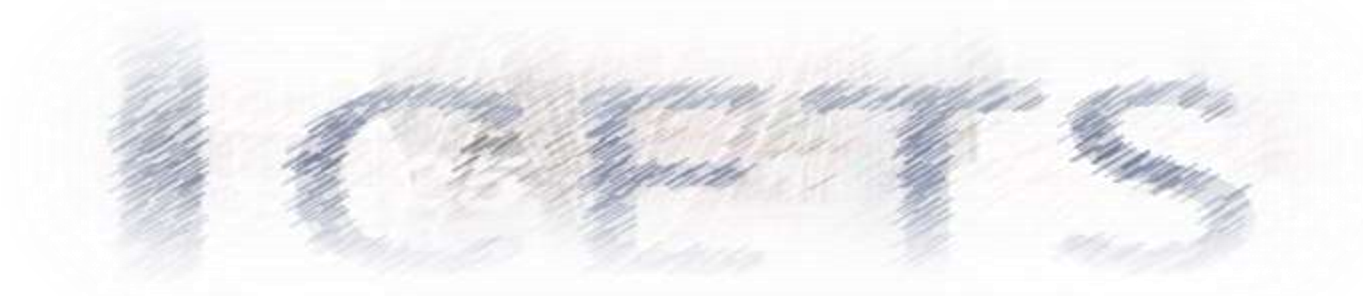
Abstract

The role of architecture through history has always been important because it is a physical frame of social life and also a symbol of social values and aspirations. In the 1950s there was a reaction against the Modern Movement which is presented in reinforced concrete, glass curtain wall and precast elements. Postmodernism was one of the most significant cultural developments of the twentieth century. Postmodernism had implications for all forms of culture, as well as philosophy, history and science, but it's fair to say that postmodernism was first identified in architecture and design, in which field it can best be understood as a reaction against the Modern Movement of the early twentieth century.

This study explores the influence and appropriateness of postmodern architecture in Egyptian public buildings, focusing on user satisfaction, cultural alignment, and functionality. Through qualitative case studies, surveys, and interviews, this research examines two key buildings: the Cairo Opera House and the Smart Village Office Building. Results indicate that postmodern architecture, with its integration of historical elements and modern functionality, resonates with cultural identity and enhances user experience. Findings offer insights into postmodernism's adaptability within Egypt's urban landscape and its significance in preserving heritage in a globalizing context.

Keywords: postmodern architecture, user acceptance, historical features, aesthetical perception, functional response.



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Diethyldithiocarbamate chelates as eco-friendly precursors to sustainable metal chalcogenide for energy storage applications

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***Abstract*- The production of energy from nonrenewable resources is currently a major concern due to issues including ozone layer depletion, water pollution, global warming, environmental degradation, and the rise of new diseases. The increasing demand for energy transfer technologies and energy storage devices has obtained significant attention worldwide. In the field of inorganic chemistry, binary, ternary, quaternary, and multinary metal sulfides have been praised for their potential in energy conversion and storage. Metal complexes function as a precursor for metal chalcogenides based on their structure, stability, and thermal breakdown. Since structure and energy are two of the fundamental characteristics of molecules, they represent important concepts in modern chemistry. The synthesis of metal chalcogenide nanoparticles using single source precursors (SSP) has several advantages over alternative techniques. This article discusses the usage of diethyldithiocarbamate chelates as a single molecular precursor for a variety of metal sulfides, both binary and multicomponent. The use of these generated sulfides for energy storage is also covered.**

Keywords- ***Metal Complexes, Single Source Precursor, Metal Sulfide, Energy Storage.***

Mechanical Properties of Metakaolin-based Concrete Exposed to Elevated temperature

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Abstract

As buildings are often exposed to high temperatures due to fire, understanding the thermal resilience of construction materials is critical. This research highlights the need for further exploration of building materials that can withstand extreme temperatures to ensure structural integrity and safety. Four concrete mixes were produced with locally available materials of ordinary Portland cement (OPC), metakaolin (MK), crushed fire brick as fine aggregate, and crushed dolomite as coarse aggregate. These concrete mixes were tested for physical and mechanical properties at room temperature and after exposure to elevated temperature of 250 °C, 500°C, 750 °C, 1000 °C, 1250 °C and 1500 °C.The results demonstrate that compressive strength generally increases with temperature up to 1000 °C, with the K20 mix (20% MK) exhibiting the highest strength at this temperature. These findings indicate that metakaolin incorporation significantly enhances concrete's thermal performance, suggesting that K20 is a promising candidate for fire-resistant construction applications.

Keywords: Metakaolin, elevated temperature, refractory brick, thermal concrete.

GIS-Based Framework for Identifying site suitability of water Pumped Hydroelectric Storage in Egypt using Multi-Criteria Decision Analysis

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1. Abstract

The renewable energy resources is the best and clean source to increase the power generated against the peak load consumption. The evaluations of location suitability consider the first step for installing a new pumped hydroelectric storage (PHES) power plant. The incorrect decision in site selection leads to project fails which carries out more economic and time impacts. This study presents of weighted linear combination (WLC) method based on a multi criteria decision analysis, concerning on an overview of the site suitability selection process framework and its stages, the involved criteria in each stage, the tools to support decision making that can be used and the how to applying a formal process of decision making. The main objective of this study is demonstrating full control procedure in order to find the most suitable PHES sites with involving Multi criteria spatial analysis in this investigation.

Keywords: Egypt; Criteria; GIS; MCDA; PHES; Spatial analysis.

A methodology to enhance tower crane the operational safety against wind during the construction of tall buildings

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Abstract

This study presents a comprehensive methodology for ensuring the safe operation of tower cranes against wind forces during the construction of tall buildings. Tower cranes are critical for high-rise construction projects, but their susceptibility to strong winds poses significant risks to both personnel and equipment. The proposed methodology integrates wind load assessment, crane design optimization, and operational safety protocols to enhance safety measures. First, a detailed analysis of wind patterns and their effects on crane stability is conducted, utilizing both historical data and real-time meteorological observations. This analysis informs the development of a robust wind load assessment framework tailored for various crane configurations and site conditions. Next, the methodology emphasizes the importance of crane design adjustments, including the selection of appropriate counterweights, the use of advanced materials, and modifications to crane height and structure to enhance resistance to wind forces. Furthermore, the study outlines operational safety protocols, including real-time monitoring of wind conditions, operator training programs, and the establishment of clear guidelines for crane operations during adverse weather events. By combining these elements, the proposed methodology aims to minimize risks and improve safety in the operation of tower cranes, ultimately contributing to the successful and safe construction of talls. The implementation of this methodology is expected to foster a safer construction environment, reduce accidents, and enhance overall project efficiency.

Keywords: Towere crane,crane safety,tall building,wind speed

Studying the Effect of Polymer Solution Composition on Membrane Morphology

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Abstract

The membrane morphology depends on several parameters as polymer type, solvent, additive. Membrane casting technique is a permanent competitive process among other techniques used in membrane preparation. Several researchers, have investigated different parameters affecting the quality of casting and characteristics of membrane. Membrane separation Systems are significant contributors to water and wastewater treatment fields. Continuous endeavors to improve membrane performance and strength should be sustained. The performance of polyamide membrane prepared by wet casting technique is largely governed by composition, casting procedures and conditions. This paper addresses preparation of polyamide membrane by wet casting technique. The major components of composition are polyamide (10-20) wt % , polyethylene glycol (4-6) wt % and the rest is fatty acid. Further, the polyethylene glycol/polyamide ratio ranges from 0.2 to 0.5. The surface morphology of the prepared sample has been assessed by SEM device. The results reveals that the controlling parameters of wet casting are polymeric concentration, polymers ratio and process conditions. All prepared samples with different polymeric concentration and ratio prove to operate under pressure up to 10 bar. According to SEM characterisation and operating conditions the prepared membranes are classified into MF, UF and NF categories.

***Keywords*:** Polyamide membrane, preparation, Casting, Morphology

Finite Element Analysis of Steel-Jacketed Reinforced Concrete Columns Under Axial Loads

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Abstract- **This research presents a finite element analysis of reinforced concrete (RC) columns strengthened using steel jackets to improve axial load capacity. The study models various configurations of steel-jacketed columns, focusing on the effect of lacing plates with or without batten plate connections between two steel C-channels surrounding the RC columns. Utilizing Finite Element Analysis (FEA) in Abaqus/CAE, six column models were examined, each with a cross-section of 300x300 mm and a height of 2500. The models included both partially and fully enclosed steel jackets, with varying numbers of lacing and batten plates. Results indicated that steel jacketing of RC columns significantly enhanced load-bearing capacity. Using a relatively rigid steel jacket of c-channels connected with lacing plates could increase the failure load by 37.96%. Also, Notably, a fully enclosed steel jacket with a single large plate around the column yielded the highest performance, improving failure load capacity by up to 75.92% over unstrengthened columns. These findings underscore the structural benefits of specific steel-jacketing configurations in enhancing the durability and load resistance of RC columns.**

Keywords- RC columns; Steel jacket; Strengthening of RC columns; Numerical analysis; Finite element analysis.

Evaluating The Role of Postmodern Architecture In Balancing Historical Identity and Functional Design In Egypt

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Abstract

The postmodern architecture began as a solution for the rejection of the modern architecture due to ignoring the human needs and the public taste. The familiar features and ornaments inspired from their heritage which are introduced make the building friendly and close to the users and provide a social dialogue between the users and the building. The main feature of the postmodern condition is looking towards the history with its rich, originality and uniqueness content. The history represents the civilization and the cultural values. The grand narratives (in literature, history, art, and philosophy) which must be studied and analyzed are shared ideas, concepts and values that form the basis of society. A sample of postmodern architecture projects are chosen as case studies to evaluate the influence and reluctance to use of the postmodern architecture introduced with its historical features on the functions required in order to determine the validity of the postmodern architecture to be diffused in Egypt. Finally, the research recommends the postmodern architecture to be applied due to its acceptance from most of its users in the sample studied.

Blast-Induced Failure of Steel Base Plate-Column Connections

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Abstract- **Base plate-column connections BPCC are critical structural elements that transfer loads between various structural components. Their performance under extreme loading conditions, such as blast, is paramount for ensuring structural integrity. This study utilizes finite element analysis (FEA) to numerically examine the dynamic response of steel-to-concrete bolted connections SCBC and steel-to-steel welded connections SSWC subjected to blast loads of varying intensities.**

A comprehensive three-dimensional finite element model was developed using the Coupled Eulerian-Lagrangian (CEL) method within the ABAQUS/CAE software. Realistic material properties were assigned to the steel, concrete, and TNT explosive components to accurately simulate the structural response. The model was subjected to blast loads generated by TNT charges of 200 kg and 500 kg, positioned at a standoff distance of 2.0 meters.

The numerical simulations yielded valuable insights into the deformation patterns, stress distributions, and failure modes of the connections under blast loading. The results demonstrated that the connection's response was significantly influenced by the magnitude of the blast load and the connection's rigidity. This research contributes to a deeper understanding of the blast resistance of steel-to-steel welded connection and steel-to-concrete bolted connections. The findings can be leveraged to inform design guidelines and mitigation strategies for structural systems exposed to blast threats.

Led Lamp Harmonics Minimization

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Abstract- **The cost of electricity is growing these days, and a lot of individuals have decided to reduce their emissions in order to conserve the environment and cut their living expenses. Reducing the electricity usage of the utilized electrical gadgets is the first step. A lot of firms redesign and enhance their products to meet the new requirements. Take the energy consumption of standby appliances, for instance.**

In actuality, the first step in replacing our traditional (incandescent) light sources with more energy-efficient ones in our home is to install retrofit light-emitting diode (LED) or compact fluorescent (CFL) lamps. The classic incandescent lights, which typically have an energy efficiency level of E or G, are no longer allowed to be sold. The European Union supports this strategy by passing laws that forbid trading in light sources with an energy efficiency class of C or higher.

Because CFLs are reasonably priced in relation to their entire luminous flux, this has hastened the proliferation of alternate light sources. As LED technology has advanced over the past several years, more LED lamps are being used in homes. The major LED lamp problem, is the harmonic export to the grid. In this paper, the design of a cheap extra driving circuit to the lamp in order to reduce harmonic emissions.

Keywords- LED, THD, pf

Numerical Study on the Dynamic Behavior of Masonry Walls Subjected to Blast Load

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Abstract- **Hazardous blast loads pose significant structural challenges to buildings and infrastructure. Masonry walls, widely used in commercial, manufacturing, and residential constructions are susceptible to blast loads due to their rigidity and limited energy dissipation capacity. Understanding the effects of blast loads on masonry walls is essential for designing structures capable of withstanding such forces, thereby minimizing structural damage and ensuring occupant safety. This study investigates the impact of explosive loading on masonry walls, encompassing failure mechanisms, and strategies to evaluate and mitigate blast damage. ABAQUS/Explicit 2017 was used for a numerical evolution to assess eight masonry wall cases, comparing the performance of clay- brick masonry walls including as well as without a core made of reinforced concrete under blast loads and to figure out the importance of lateral wall support. The outcomes demonstrated that the resistance throughout clay-brick masonry walls to explosions decreases in terms of maximum displacement, stresses, and damage patterns as wall thickness increases. Conversely, walls with thicker RC cores demonstrated significantly improved performance by absorbing most of the energy from the air blast. Furthermore, side-supported walls outperformed free-standing walls in terms of displacement, stress distribution, and overall damage resistance, with the latter experiencing total collapse in several scenarios**.

Keywords- ***Explosion, TNT, Brick Wall, Rc Core, ABAQUS, URM.***

A Self-Moving Shopping Trolley Autonomously Following Customers with Automated Billing System

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***Abstract*- A shopping center is a place where customers regularly go to purchase and pay for their items. Consequently, the number of commodities sold must be calculated to create the customer's bill. It is therefore exhausting to wait in queue for the billing of all things. Also, minor collisions often occur due to human error, while more serious accidents occur due to trolleys with loaded products, children, and other customers. The proposed solution aims to eliminate these accidents by using smart trolleys that can keep track of the customer and make the calculation for billing system. The purpose of this project is to design and build a motorized, automated shopping cart prototype that can follow customers while also having the intelligence to steer clear of obstructions. This feature has made it possible to examine how to implement the broad capability of following customers around a mall. The shopping cart in an intricate mall would be able to avoid obstacles if they were present. Besides that, through designing an automated billing system to make the customers no need to wait in line for scanning of the product items. The project is based on board technology from Arduino Uno, as well as some modules and sensors such as GSM module, RFID reader module, Ultrasonic sensor, and database that come together to form an intelligent shopping cart. The customer purchases the item and adds it to their cart. The RFID detector scans each item when it is added to the basket and updates the mall's database. With the assist of the Arduino Uno board. The final bill will appear on the cart itself when you're done purchasing through using LCD Screen and the total bill will be sent to the cashier management using GSM module. This cart does more than just minimize the requirement for human labor by moving itself. The Arduino Uno board and ultrasonic sensors that track a person through the mall enable this cart's self-moving feature. The batteries and motors that drive the shopping cart are located at the bottom of the cart.**

Keywords- ***Shopping trolley, Customer Movement, Billing, GSM, RFID, Arduino Uno, Ultrasonic.***

Energy-Efficient Design of Microwave Transceivers for Battery-Constrained Devices

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Abstract

The power consumption of transmitters and receivers in recent years has a significant impact on the battery life of these devices, which made the focus of the research problem on the problems that have emerged in the recent period around the design aspects of energy-efficient microwave transmitters and receivers as an alternative to devices with limited battery due to increased demand. On these devices with limited batteries, which include, for example, mobile phones, Internet of Things devices, and wearable technology, since these devices rely heavily on wireless communications, especially microwave transmitters and receivers that rely on sending and receiving data. Therefore, the aim of the study was to explore different design techniques and strategies that can be used to improve the energy efficiency of microwave transmitters and receivers in devices with limited batteries and to rely on research methodology to find mechanisms and ways to overcome many problems by imposing new designs of microwave transmitters and receivers. Energy-saving microcircuits for devices with limited battery capacity and relying on technologies that have emerged in light of the research studies that focused on this field and arriving at practical results that end with recommendations regarding this topic and comparison between the studies and their results and the practical aspect of what the current study should reach.

Key words : Possible conditions for the study - Energy saving - Microwave transceivers - Devices with limited battery - Energy-aware computing - Energy management strategies

Comprehensive Paper on Arbitration Systems in the GCC

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***Abstract*— Arbitration is a crucial mechanism for resolving commercial disputes, offering an effective alternative to traditional court litigation. This comprehensive research paper provides an in-depth analysis of the arbitration frameworks, key institutions, recent developments, challenges, and opportunities within the Gulf Cooperation Council (GCC) member states: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). The study begins by examining the arbitration frameworks of each GCC country, highlighting their legal structures and prominent arbitration institutions. It then discusses recent developments in GCC arbitration, including legal reforms, institutional enhancements, technology integration, and increased training and awareness programs. Challenges and opportunities within the GCC arbitration landscape are also identified, such as the need for consistency and harmonization, enforcement of awards, cultural factors, and the development of local arbitration capacity. The research concludes by emphasizing the significant progress made by the GCC in developing and modernizing its arbitration systems, thereby positioning itself as a competitive hub for international commercial arbitration.**

Keywords— arbitration, gcc, commercial disputes, legal framework, institutions, developments, challenges, and opportunities

FACTS - DG Coordination in an Integrated Transmission & Distribution Network (iT & DN)

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***Abstract*- To support improved performance and a sustainable power supply amid growing demand, modern power grids increasingly integrate Flexible AC Transmission Systems (FACTS) together with Distributed Generation (DG). However, planning studies often treat FACTS and DG independently, overlooking their mutual influence on system optimization. The work herein presents a bi-level optimization strategy designed to coordinate DG and FACTS for enhancing ATC, minimizing active losses, and reducing deviations in voltages. The methodology involves two optimizations: the Inner and Outer (IO and OO). The inner deploys a hybrid of the active flow Performance Index and PSO to plan Flexible AC Transmission Systems while Outer leverages Multiple objective variants of particle swarm optimization (MOPSO) to plan DG within a case study distribution network. The test network includes a distribution and transmission components, specifically using the Western Systems Coordinating Council's 9-bus system and the IEEE 16-node model. PV and PQ DG models are synchronized with two types of FACTS, TCSC and SSSC. Findings indicate notable ATC improvements, particularly with TCSC - PQDG and SSSC - PQDG combinations, and the Pareto front curves reveal a non-linear trend, where ATC gains plateau beyond a certain maximum value as the Pareto slope nears zero.**

Keywords- DG, FACTS, FACTS-DG Coordination, Transmission and Distribution network, PSO

Fuel Saving and Energy Efficiency in the Aviation Catering Systems Using Phase Change Materials (PCMs)

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Abstract

The aim of the study was to prove the feasibility application of Phase Change Material PCM in aviation catering for the purpose of cooling and heating food and beverages. Although Phase Change Material is increasingly becoming popular for its various applications, this study sheds light on the applicability in aviation.

By experimental testing, PCM proved reliable applicability and feasibility. For the cooling process, the results proved better outcomes from PCM when compared to other existing methods such as ice and chiller cooling. In the traditional systems a chiller is required for the cooling process during the flight while using PCM this can be done on the ground using a refrigerant cooling cycle to solidify the PCM to be utilized during the flight. It surpassed the conventional cooling in parameters of thermal capacity and customizability. Performance output exceeds the expectation for the cooling process. It is recommended that the aviation industry should consider the application of PCM in the field of supply chain to be ahead of competition. The economic benefits, if properly implemented, outweigh any obstacles that may arise. The benefits go beyond being economically feasible to participating in the reduction of CO2 emissions by saving hundreds of tons of fuel annually. On the other hand, the heating of catering food using PCMs showed promising results. Perhaps better outcomes can be achieved considering different material selection options and enhancement of the trolley design. Yet it remains promising and can be improved. Full economic feasibility studies is under progress and will be presented in our next publication. Due to the limited length of pages of the paper this is not included in the paper.

Keywords *HDPE* *High Density Polyethylene*

MFB *Marginal Fuel Burn*

PCM *Phase Change Material*

TES *Thermal Energy Storage*

High-Speed High-Swing Charge-Steering Latches

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***Abstract*- This paper introduces two novel charge-steering (CS) latches that can achieve a high output swing by accelerating the operation of the tail capacitor. These latches are particularly well-suited for use in hybrid circuits, such as demultiplexers (DEMUXs) and clock and data recovery (CDR) systems, as well as in mixed-mode circuits like analog-to-digital converters (ADCs). The proposed latches address the increasing demand for power-efficient solutions in high-speed transceivers, where balancing performance and energy consumption is critical. Implemented using 40-nm CMOS technology, the latches operate at data rates of 28 Gb/s while consuming only 290 µW and 304 µW from a 1V supply. They achieve differential output swings of 941 mVpp and 1.22 Vpp. This represents a significant improvement in output swing. By incorporating NMOS capacitors in the tail, the latches demonstrate an increase in output swing of up to 50% compared to previous designs, with only a small increase in power consumption. Simulation results confirm the high-speed performance and power efficiency of the design, making it highly suitable for next-generation communication systems.**

Keywords- ***Charge Steering, Clock and Data Recovery, Analog Digital Converter, Demultiplexer*.**

5th Generation Planning for Multi-antenna transmission Using Atoll

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***bstract*- With a worldwide research race to build the sixth-generation (6G) mobile communication system, it is imperative to** seek **technologies that can provide the ultimate global coverage for all environment. The powerful Atoll network design and optimization software is used by international telecommunications companies. With the advent of 5G technology, network planners and engineers are now more required than ever to develop and optimize 5G networks using Atoll. The primary focus of this book is on investigating fundamental aspects of 5G NR, such as massive MIMO and beamforming, and their modelling using the network design and planning tool Atoll. To do this, we set up a two-cell network in a representative location in the Dokki district and ran numerous simulations to estimate the coverage, signal quality, and capacity. We looked at various factors, including the height of the receiver and transmitter, the number of antennas used for transmission and reception, the number of beams employed by beam-based antennas, and the number of users, and various MIMO techniques.**

Keywords- ***5G, Network, MIMO techniques, antenna transmission.***

LEO Satellite Constellations Network Routing Algorithms

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Abstract- **The drive for information globalization has led to the rapid development of communication technologies. The main battlefield for competition for next-generation communication is gradually shifting from terrestrial to satellite communication systems, which have the advantages of wide coverage and less demands on the physical environment. The low-orbit (LEO) communication satellite is close to the planet, has a small communication latency, and can transfer large amounts of data. The rapid advancement of terrestrial and Internet technologies has negatively impacted the conventional geostationary orbit communication business, and low-orbit satellite communication development has become a widespread trend. The integrated circuit industry's rapid expansion has allowed for ever-smaller and more affordable satellites performing the same functions. Moreover, the creation of a LEO communication satellite network can become more feasible and economical with the help of the new technology symbolized by the reusable rocket, which can further reduce the cost of launching a LEO satellite. When compared to the terrestrial communication network, the low-Earth orbit (LEO) satellite network can offer global communication services and more affordable communication in remote locations, high-altitude regions, and maritime areas. However, there are a number of ways in which the LEO satellite network is very different from the terrestrial network. To the best of our knowledge, this research is a survey paper that focuses on routing protocols algorithms for LEO constellations networks.**

Keywords- ***Satellite Constellations networks, Routing algorithm, challenges, LEO, Star-link, Delta.***

Automated Drive Testing Tool for Mobile Base Station

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***Abstract*- The automated drive testing of mobile base station performance is the topic of this research. It necessitates having solid understanding of mobile communication systems and drive testing automation. Because the fourth generation (GSM) of mobile communication systems is more readily available, It has been decided to test it after surveying other mobile communication systems and design automated performance testing. For mobile communication network access, the SIMCom company's GSM module SIM900 is chosen. Quality level, power level, received signal strength, and bit error rate during a voice contact are the factors that need to be checked. The completed project is a PC running a MATLAB software and a GSM module connected via USB and a serial cable. Utilizing MATLAB and a graphical user interface (GUI), the test program is put into practice. It can capture and analyze the tested parameters and comparing them to a reference value before reporting the test result (PASS/FAIL).**

Keywords- ***GSM, Mobile base station, Drive testing, SIM900 module.***

Design of Cellular Device for Home Automation based on IoT Technology

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***Abstract*-** This paper presents a new device for controlling electrical devices using a SIM card, harnessing the power of cellular Internet of Things (IoT) technology. With the growing reliance on the internet and the increasing popularity of smart devices, automated systems have become a preferred choice for managing everyday tasks. The proposed system integrates both hardware and software interfaces, providing users with comprehensive control and real-time monitoring of electrical outlets and lighting systems. This not only saves time and effort but also contributes to energy efficiency. A significant feature of the system is the incorporation of voice control via a dedicated mobile application, which is particularly beneficial for individuals with special needs and the elderly, offering them enhanced accessibility and ease of use. A key innovation lies in the use of a SIM card, simplifying the setup process and eliminating the need for complicated installations. Additionally, the system employs NodeMCU ESP8266 technology, which facilitates the control of appliances and sensors. The mobile application is designed to be user-friendly, supporting multi-user functionality, thereby offering an efficient and convenient solution for smart home management and energy optimization. This approach makes smart home automation more accessible and practical for a wide range of users.

Keywords- ***IoT, Smart home, SIM card, NodeMCU, SYMO.***

Impact of Solar Farm Location on Power Losses and Voltage Fluctuations in Distribution Networks Using PSCAD

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Abstract **- This paper reports on the impact of PV farm location in Low-Voltage Distribution Networks (LVDNs) in terms of power loss and voltage profile.**
Simulation results from a five node or bus radial network within the Power Systems Computer Aided Design (PSCAD) software, successfully demonstrate the effect of the solar farm interface at different network buses on the degree of power loss and voltage variation under three load power sizes, namely 5%, 50% and 100% of the rated power. The results also suggest that the generators' phase angle, point of coupling location, inverters and associated converters switching algorithms have great influence on the aforementioned issues. Furthermore, the injected power by the PV farm at the load side will decrease the power demand from the substation. This in turn leads to the loss reduction and voltage profile improvement within the network. However, if the PV farm power generation is more than the load demand, some power may flow towards the substation. Consequently, a voltage rise can be expected along the distribution network. The rise of the voltage limits the amount of penetration level that can be installed in the distribution networks.

Keywords – PV Farms, Distribution Networks, Power Quality

Optimizing Molten Carbonate Electrolysis for sustainable fuel production: Experimental insights and machine learning enhancements

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***Abstract*- This paper presents an in-depth investigation into Molten Carbonate Electrolysis (MCE), combining experimental research with advanced machine learning-based modeling. MCE is explored for its potential in producing hydrogen and syngas, which are critical components for sustainable energy systems. This study examines the behavior of a single molten carbonate cell under various operating conditions and employs Artificial Neural Networks (ANN) to model and optimize the electrolysis process. The findings underscore MCE's viability for fuel generation and demonstrate the effectiveness of ANN in predictive modeling and operational optimization, offering significant insights for future energy systems.**

Keywords-***Molten Carbonate Electrolysis, MCE, syngas generation, experimental investigation, Machine Learning, Artificial Neural Networks, ANN, mathematical modeling***

A WDM Ring Network Based on Integrated Reconfigurable Optical Wavelength Add/Drop Multiplexers

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Abstract- **A novel architectural design for an optical wavelength division multiplexed (WDM) ring network is presented and analyzed. The topology for the proposed network is based on a double fiber ring. The stations are connected to the ring through an Integrated Reconfigurable Optical Wavelength Search Add/Drop Multiplexers (IROWSADM). This device is used for inserting the transmission of each station at a certain selected free wavelength from the wavelength pool used. Also, the adddrop multiplexer has the ability to drop the incoming acknowledgment signals on the node wavelength from the destination node. A protocol for fast circuit switched applications is proposed for use with the proposed architecture and its performance evaluated.**

Keywords- **WDM ring network, Add/Drop Multiplexers,**

Revitalizing Fintech: Leveraging Refactoring Techniques to Enhance Legacy System Performance and Maintainability

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Abstract- **This paper explores the critical role of refactoring in modernizing legacy fintech systems, which often become obstacles to innovation and operational efficiency as they age. Legacy systems, while historically reliable, can accumulate technical debt, suffer from performance issues, and struggle with scalability in the face of evolving technology demands. The paper highlights how refactoring techniques such as modularization, dependency management, and performance optimization can transform outdated architectures. By breaking monolithic systems into modular components, modularization enables more manageable and flexible structures that support parallel development and easier system updates. Dependency management reduces the tight coupling between components, increasing flexibility and adaptability, while performance optimization addresses inefficiencies to improve transaction processing and overall system performance. Through an in-depth case study, the paper demonstrates the tangible benefits of refactoring, showcasing how these techniques can reduce technical debt, improve maintainability, and increase system scalability. Refactoring not only aligns legacy systems with modern fintech requirements but also facilitates integration with emerging technologies such as AI, blockchain, and real-time processing. The paper concludes by emphasizing the need for automating refactoring processes to further streamline modernization efforts and proposes directions for future research, including the development of automated tools to assist in refactoring legacy fintech systems for greater efficiency and sustainability.**

Keywords- ***Refactoring, Legacy Systems, Fintech, Technical Debt, Code Modularization, System Performance, Maintainability, Software Engineering, Dependency Management, Code Optimization.***

Enhancing Power Efficiency in Meeting Rooms of Commercial Buildings Using Smart IoT Devices

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Abstract- **Inefficient manual control of Air Conditioning (AC) units is a significant source of energy waste in meeting rooms, particularly in commercial buildings. To address this issue, we propose a cost-effective solution using the M5StickC IoT development kit, equipped with an Infrared (IR) emitter and a Real-Time Clock (RTC) for automating AC operation. This system eliminates the need for manual intervention by synchronizing with Google Calendar to detect scheduled meeting times, automatically turning the AC on before meetings and off afterward. Further enhancing energy efficiency, a Passive Infrared (PIR) sensor monitors human presence near the AC unit, allowing it to deactivate during periods of inactivity. Additionally, a simple web service is developed which enables users to easily track room occupancy and AC status remotely. Tested with a Gree AC unit in a meeting room, the solution achieved significant energy savings, demonstrating its potential as a highly effective and economical approach to reducing electricity consumption.**

Keywords- ***power efficiency, IoT devices, energy saving.***

Structural Analysis of an Electric Vehicle Chassis using Finite Element Analysis

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Abstract- As the world focuses on tackling climate change and finding sustainable energy solutions, electric vehicles are becoming a vital part of building an environmentally sustainable future. One of the critical tasks faced by vehicle designers is the structural analysis of the chassis. This ensures the structural integrity of the vehicle as well as the safety and comfort of passengers. This study focuses on assessing the performance of an electric vehicle chassis under static loading conditions using two finite element methods: the conventional mesh-based method using Autodesk Inventor software and the meshless method using SimSolid software. Stress distribution, displacement, and safety factor were analyzed to assess the structural integrity of the chassis. The results showed a maximum stress of 98.11 MPa and a safety factor of 2.46 in Inventor, with SimSolid producing closely aligned results and a maximum relative error of 4.96% compared to the Inventor results. The findings confirm that the chassis experiences only elastic deformation, validating its structural safety for practical use. Additionally, the study highlights the efficiency of the meshless method in reducing computational time by eliminating the time-consuming process of mesh generation while maintaining accuracy, making it suitable for the structural analysis of complex chassis designs.

Keywords- Structural analysis; Electric vehicle; Chassis; Finite element analysis; SimSolid.

معهد الجيزة للهندسة
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Enhancing Voltage Stability in PV/Wind Power Systems with STATCOM Utilizing Fuzzy Controller

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Abstract- **Renewable energy sources (RES) has gained pivotal importance due to the depletion of fossil fuels, coupled with increasing electricity demand and escalating environmental concerns. The integration of renewables into power systems significantly impacts grid performance. Addressing transient performance issues remains a critical area that requires further investigation. This paper explores the deployment of a Static Synchronous Compensation Device (STATCOM) utilizing a controller based on fuzzy logic (FLC) to tackle voltage stability issues in the IEEE nine-bus investigation, specifically considering the incorporation of Photovoltaic (PV) and Wind energy. The STATCOM based on FLC is considered as a dynamic voltage recovery aimed at sustaining voltage stability, thus preservation of RES through and after occurring disturbances. A virtual simulation is performed utilizing Matlab/Simulink environment with Proportional Integrative (PI) controller and with FLC of the STATCOM under different conditions to prominence the variation which the offered STATCOM presents concerning transient stability. The study aims to illustrate the effectiveness of FLC over PI controller for enhancing the system stability at different locations using STATCOM device. The obtained results inspect that STATCOM contributes better response through FLC under abnormal conditions as compared to PI controller.**

Keywords- *Power System, renewable energy sources (RES), Wind, PV, STATCOM, PI Controller, Fuzzy Logic Controller (FLC), Faults, and Voltage Stability.*

Design of a Reconfigurable CDC for a Multiplexed Industrial Sensor Fusion

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Abstract - This paper presents a novel design for a reconfigurable CDC as a multiplexed sensor fusion that converts three analog signals (as a case study) into digital output bits with different resolutions. The proposed reconfigurable CDC design uses SAR technique that introduces small chip area and low power consumption with respect to other techniques. The proposed novel CDC uses a capacitive DAC with switching technique. The re-configurability is done through this switching capacitive DAC. There are many applications that use the multiplexed sensor fusion with the proposed technique as biosensors, automotive sensors and sensors of weather stations. In this paper three analog signals are used in a weather station (as a case study) to be converted. These signals are temperature, pressure and humidity that are sensed using BME-280 Bosch sensor. Simulation is performed using Cadence virtuoso with hardware-calibrated TSMC 130 nm CMOS technology. All CDC's specifications are measured as DNL, INL, ENOB, SNR, SFDR, FOM, power consumption and chip area for each reconfigured number of output bits (4, 8 and 12 in this case study). The used supply voltage is 1.0 V and sampling frequency is 100 kHz. The 12-bit resolution consumes 2.54 µW, ENOB is 11.47 bits, SNR equals 73.4 dB, SFDR equals 67.54 dB and FOM 9.65 fJ.mm^2/conversion. The 8-bit resolution consumes 1.7 µW, ENOB is 7.39 bits, SNR equals 46.24 dB, SFDR equals 57.45 dB and FOM 10.6 fJ.mm^2/conversion. The 4-bit resolution consumes 1.68 µW, ENOB is 3.58 bits, SNR equals 23.45 dB, SFDR equals 32.65 dB and FOM 1427.5 fJ.mm^2/conversion. The total chip area is 0.18 mm^2.

Keywords- *Capacitance to Digital converter (CDC); Successive approximation register (SAR); Digital to Analog converter (DAC); Signal to noise ratio (SNR); Effective number of bits (ENOB).*

Increasing the efficiency of gas turbines by using part of the exhaust gases

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***Abstract*- the research aims to Explain the importance of increasing the efficiency of gas turbine stations by using part of the exhaust gas and how to apply this to raising the efficiency of the gas turbine station by using a reheated and a heat exchanger before the combustion chamber and using the combined cycle, and comparing them in terms of efficiency, in terms of operating cost, in terms of life span. Invasive through methodology combines description, application, and analysis methodologies using simulation technology. The results indicated that the heat exchanger reheating method increased the efficiency at a rate ranging from five to 15%, the cost of increasing the efficiency was 33.1%, and the life expectancy of the station was 23years. In comparison, the combined cycle method cost 34.5% and increased the efficiency by a rate ranging from 6% to 18%. The expected lifespan is 22 years, while the emissions rate in the first method was 20% better than the second method.**

Keywords- ***sustainability, gas turbines, power plants, exhaust, combined cycle, efficiency.***

Mathematical study on a direct contact humidifier of a humidification-dehumidification desalination system

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***Abstract*- In a humidification-dehumidification (HDH) water desalination system, the humidifier is a significant component that directly impacts the overall process of producing fresh water from saline or brackish sources. In this study, a heat-mass transfer numerical model between the hot sprayed seawater and air on a direct contact humidifier was developed to investigate the effect of inlet seawater temperature, seawater mass flow rate, inlet air temperature, and air mass flow rate on humidifier effectiveness and freshwater evaporation rate. The results show that the optimum value of humidifier effectiveness is achieved on a unity mass flow rate ratio between seawater and air, and the seawater inlet temperature and the mass flow rate ratio between seawater and air are the most critical parameters influencing the productivity of the humidifier. The maximum value of water evaporation is 341 kg/hr that occurs at operating conditions of inlet seawater temperature of 90°C, inlet air temperature of 30°C, inlet air relative humidity of 50%, and seawater to air mass ratio of 5. The findings found that freshwater productivity improves by approximately 25% when the seawater temperature is increased by 10%.**

***Keywords*-** *heat and mass transfer, humidifier, humidification-dehumidification desalination, packing, direct contact.*

Wi-Fi Smart Home Based on Internet of Things

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Abstract- Human life is becoming increasingly efficient due to rapid advances in automation. Automated systems are now preferred over non-automated systems. As the number of Internet users' increases, the Internet of Things (IoT) has become an increasingly important technology, greatly impacting daily life and education by providing information and completing tasks while users focus on other activities. This paper presents a prototype of Wi-Fi Smart Home based on automation system, which demonstrates how effective it is at managing power, controlling home devices, and improving security within Wi-Fi coverage. By managing power usage more efficiently, enabling

precise control of household devices, and bolstering security within Wi-Fi coverage, the system enhances convenience and safety for users, ultimately contributing to the growing trend of smarter and more efficient living spaces.

Keywords- IoT; Home Automation; Wi-Fi; Smart Home; Sensors; Microcontroller

Bank Customer Churn Prediction Using Machine Learning

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Abstract- This study investigates customer attrition prediction in the banking industry using a comprehensive customer-level dataset from ABC Multinational Bank. By leveraging historical client behavior, we identify critical factors influencing future attrition. To ensure robust and unbiased comparisons, we evaluate the performance of several supervised machine learning algorithms, including random forests, logistic regression, decision trees, and elastic nets, using a standardized cross-validation framework. The results demonstrate that random forests achieve superior predictive accuracy compared to other methods. Our analysis reveals that customers with stronger relationships with the bank, greater utilization of its products and services, and higher loan uptake are significantly less likely to terminate their accounts. These findings underscore the economic relevance of the predictive model and emphasize the importance of targeted upselling and cross-selling strategies to enhance customer retention. This research offers valuable insights for financial institutions aiming to mitigate attrition and optimize long-term client engagement strategies.

Keywords- ***Churn, Churn prediction,*** **Financial services Machine learning, Random forests.**

A New Conceptual Explanation for Terrestrial Wormholes and Earth's Magnetic Field Deviation Effects

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Abstract- The fields we know up till now are electric and magnetic. These fields can be classified according to different categories; from these categories, the field nature category consists of natural or artificial (electromagnetic) fields. One of the most essential artificial electromagnetic fields is the rotating magnetic field (RMF). In this paper, RMF will be used to explain one of the mysterious physical phenomena: wormholes. The paper will present how it can contribute to solving one of wormholes' problems in modern physics: the construction of artificial terrestrial wormholes. Also, in this paper, the interaction between electric and magnetic fields will be presented, and a new idea about the biological life nature of all living things, especially humans, will be proposed.

Keywords- ***Magnetic Field, Electric Field, Electromagnetic Field; Rotating Magnetic Field (RMF).***

Artificial Intelligence

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Abstract- Telecommunications: AI has large scale impact especially in 5G era. Deals with weak transmission/reception issues, frequency interference of big data processing and network security respectively. Universal network monitoring, error detection and better user experience with cost-efficiency are the major Key benefits from this, A high-quality human intervention is absolutely needed to fully derive the power of AI-bridging a partnership enabled by next-gen communication technologies.

Keywords- ***Artificial Intelligence (AI), Telecommunications Network Performance, Network Security.***

Social Engineering: Human Manipulation Strategies and Their Impact on Cybersecurity and Prevention Methods

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***Abstract*- Social engineering is a critical and growing threat in the realm of cybersecurity, where attackers manipulate human behavior to gain unauthorized access to sensitive information or systems. Unlike traditional cyberattacks that rely on technical vulnerabilities, social engineering exploits the inherent trust and psychological weaknesses in individuals. This paper explores the various forms of social engineering attacks, such as phishing, pretexting, and physical attacks, and examines their profound impact on both individuals and organizations. Furthermore, the paper provides a comprehensive analysis of preventive measures, including awareness training, multi-factor authentication (MFA), and behavioral analysis systems. Through simulated experiments and case studies, we evaluate the effectiveness of these security strategies in mitigating the risks associated with social engineering. Finally, we propose innovative solutions and practical experiments that can be employed by organizations to strengthen their defenses against these increasingly sophisticated attacks. The findings of this research aim to enhance the overall cybersecurity posture by emphasizing the importance of human-centric defenses in addition to technological solutions.**

***Keywords*-** Social Engineering, Phishing, Cybersecurity, Human Vulnerabilities, Prevention, Multi-Factor Authentication

"Arduino: Open-Source Platform for Blood Transport Plane"

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Abstract Arduino is an open-source electronics platform that combines hardware and software for developing interactive projects. Affordable and user-friendly, it supports projects from simple LEDs to complex IoT systems. Arduino boards like Uno, Mega, and Nano are programmed using a simplified C/C++ code in the Arduino IDE, making it ideal for education and prototyping.A blood transport plane quickly delivers blood and medical supplies between hospitals, especially in emergencies, ensuring rapid, temperature-controlled, and compliant delivery for critical care, disaster relief, and medical coordination.

Keywords- Arduino - Open-source - Electronics platform - Hardware and software - Interactive projects – Affordable - User-friendly - LEDs - IoT systems - Arduino boards (Uno, Mega, Nano)- C/C++ programmin - Arduino IDE

Weather Feature Selection for Robust and Optimized Energy Load Prediction

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***Abstract*- This study explores the impact of weather features on short to medium electricity load prediction across diverse geographical locations. Using hourly load data, we evaluated the effectiveness of several feature selection methods, including Mutual Information (MI), Principal Component Analysis (PCA), Lasso, and Heatmap correlation. We benchmarked these feature selection methods with a hybrid deep learning model to investigate the impact of choosing the correct multiple weather features instead of temperature. For this purpose, we practiced different combinations of temperature, relative humidity, dew point, air pressure, and wind speed benchmarked with the base case of single feature (temperature). The comparison was performed based on the load prediction accuracy improvement. The hybrid Artificial Neural Network (ANN) and temporal setup was implemented to predict energy loads across four different lead times (1, 6, 12, and 24 hours ahead) to not only study the feature selection methods, but also its behavior at different lead time predictions. Moreover, this study inspected the dynamic behavior of weather features selection by location to explore the need for location-specific feature engineering. All steps and theories were examined by a real-world dataset from a location of interest and the result was visualized across the geographical extent, offering insights into the spatial variability of feature importance. Future work will investigate the development of lead-time-specific models to further improve load prediction accuracy. This research highlights the importance of an in-depth inspection of weather feature selection and its dynamic behavior for enhancing energy load forecasting models.**

Keywords- ***Energy load prediction, Feature selection, Weather parameters, Machine learning, Artificial Neural Network (ANN), Temporal models*.**

Study of Artificial Intelligence Revolution in Burn Treatment

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Abstract- Artificial Intelligence (AI) is an essential tool in the medical field, particularly in the treatment of burns, as it aids in disease diagnosis, data analysis, and treatment planning. Additionally, it speeds up and improves the accuracy of diagnosis, which helps to improve patient and injured care. In this paper, the focus will be on skin burns which are among the most frequent injuries and need to be diagnosed quickly and accurately in order to assess the extent and severity of the burn. The World Health Organization reported that every year, 300,000 people pass away from burns as a result of improper diagnosis, which can also have major repercussions and long-term issues. Patient's body skin layers with AI and without AI are assessed. Two main mathematical expressions and numerical results are estimated to validate the performance of the study. An open discussion is well introduced at the end of the methodology section.

Keywords- Artificial Intelligence; Skin; Burn; Fluid; Body; Patient

End of Abstract Conference Book