Full Paper Abstracts

Information Systems & Information Technology

Paper ID	546
Title	Simulated Penetration Testing And Attack Automation Using Deep Reinforcement Learning
Authors	Ismael Jabr, Yanal Salman, Motasem Shqair, Amjad Hawash ismael1@protonmail.com, Ynal.salman@gmail.com, chrismotasem11@gmail.com, amjd@najah.edu
Affiliation	An-Najah National University
Abstract	This paper presents a novel approach to automated penetration testing using deep reinforcement learning. The proposed approach uses a deep Q-learning network to learn how to generate attack sequences that successfully exploit vulnerabilities in a target system. The approach is evaluated using a simulated environment, and the results show that it is able to find vulnerabilities that are not found by manual penetration testing. The work depends on a set of tools like Deep Q-learning network, MulVAL, Nmap, Virtualization - VirtualBox, Containerization - Docker, National Vulnerability Database (NVD), and Common Vulnerability Scoring System (CVSS). The proposed approach is a significant improvement over traditional automated penetration testing tools. It is able to find vulnerabilities that are not found by manual penetration testing, and it is able to adapt to changes in the target system.Moreover, it has the potential to significantly improve the efficiency and effectiveness of penetration testing, and it could help to make computer systems more secure.
Index Terms	Pentesters, Nmap, DQN, MulVAL, CVSS

Paper ID	3374
Title	USING TECHNOLOGY IN EDUCATION: THE CASE OF AN-NAJAH UNIVERSITY IN PALESTINE
Authors	Mohamad Abdelhaq, Mohamad Hantoli, Maher Safadi, Abdalah Yahya, and Safa'a AbuJarour safaa.abujarour@najah.edu
Affiliation	An-Najah National University
Abstract	The impact of technology on education in Palestine has been significant, including An-Najah National University in Nablus. Using online learning platforms has increased the accessibility to higher education, particularly for students in rural and marginalized communities. However, there are also challenges to the widespread adoption of technology in education in Palestine. Despite the widespread adoption of technology in education, many students do not have access to the necessary technology or internet connectivity, leading to a digital divide. To address this issue, teacher training on effective integration of technology in the classroom is needed to

	ensure equal participation and benefits for all students. Despite these challenges, the potential for technology to greatly enhance the learning experience in Palestine remains.
Index Terms	Technology, Education, Online Learning, University, Palestine.

Paper ID	3937
Title	Mobile Forensics Analysis For Instant messaging applications namely TamTam and Botim
Authors	Alsharif Hasan Mohamad Aburbeian, Majdi Owda, and Amani Yousef Owda a.aburbeian@student.aaup.edu
Affiliation	Palestine – Nablus, Ramallah
Abstract	Cybercrimes rapidly increasing in parallel with the usage of digital tools. Criminals can use a lot of methods to carry out their crimes, including the Internet, mobile devices, and instant messaging applications. Because of that, it is important to perform forensics analysis for instant messaging applications to retrieve artifacts from mobiles that may be involved in cybercrimes. The research aims to retrieve artifacts from TamTam and Botim applications under the Android operating system platform. This paper was able to retrieve the text messages, photos, and contact list from the mentioned applications after deleting them from the device (Galaxy J7 Prime mobile). Our study adds to the existing body of knowledge by demonstrating the feasibility of retrieving evidence from instant messaging applications using a commercial tool and provides valuable insights for forensic investigators. In future work, the analysis of these applications under other operating systems platforms may offer valuable artifacts for investigators.
Index Terms	Cybercrime, digital forensics, mobile forensics, physical acquisition, android, artifacts.

Paper ID	4853
Title	A Comparison of Heuristic Algorithms for Solving the Traveling Salesman Problem.
Authors	Younes Khdeir, Ahmed Awad younes.khdeir@gmail.com, ahmedawad@najah.edu
Affiliation	An-Najah National University
Abstract	The Traveling Salesman Problem (TSP) is a challenging computational problem in combinatorial optimization that aims to visit all cities exactly once and return to the first city. Despite numerous theoretical solutions proposed, finding the exact optimal solution remains computationally infeasible due to the NP-hard nature of the problem. To address this, many heuristic and optimization approaches have been developed to generate probabilistic results that are often approximations. This paper presents a comparison between four popular algorithms: steepest ascent hill climbing, simulated annealing, a genetic algorithm with partially matched crossover, and Particle Swarm Optimization (PSO). The study examines how these algorithms can solve

	problems and avoid local minimum values while achieving a balance between research exploration and exploitation for an optimal solution. For a relatively large number of cities, the simulated annealing algorithm and genetic algorithm produced very good results, although the genetic algorithm took longer to execute.
Index Terms	Traveling Salesman Problem (TSP), Simulated Annealing (SA), Genetic algorithm (GA), Particle Swarm Optimization (PSO)

Paper ID	6395
Title	Transliterating Arabic Names into Latin Languages
Authors	Mohammed AbuJarour m.abujarour@xu-university.de
Affiliation	XU Exponential University of Applied Sciences Potsdam, Germany
Abstract	Because of several fundamental differences between Latin languages and Arabic language, in particular, the alphabet and vocals, it is not always possible to find a one-to-one mapping for Arabic names from their original scripts into Latin ones. This indeterminism causes several problems with respect to Arabic names in Western countries, such as name matching and data inconsistency. For instance, the name 'Qaddafi' has more than 100 different variants. In this article, we discuss potential reasons for this problem, and its aspects, and give some recommendations.
Index Terms	Data Quality, Similarity Search, Duplicate Detection

Paper ID	8332
Title	Real-time Analysis of Twitter Data using Big Data Techniques: Mapping Word Frequencies across Time and Space
Authors	Younes Khdeir, Abdullah Khatib, Hamed Abdelhaq younes.khdeir@gmail.com, khatib.sartawi@hotmail.com, hamed@najah.edu
Affiliation	An-Najah National University
Abstract	The huge number of tweets posted on social media platforms like Twitter and Facebook, along with their associated timestamps and locations, can serve as a valuable source of data for real-world events. In this paper, we introduce a new system that utilizes big data techniques to analyze Twitter data streams in real-time and map word frequencies across time and space

	using Count-Min Sketch. Our method involves calculating the frequency of words over a sliding window and linking those frequencies to their corresponding geographic locations. The system employs the robust capabilities of Apache Spark to provide periodic information and statistics about events, their spatial distribution, and the temporal frequency of relevant words. The results are illustrated using a histogram to display the daily frequency of words over time and a map to demonstrate their spatial distribution.
Index Terms	Social Media, Count-Min Sketch, SpatioTemporal Analysis.

Paper ID	8583
Title	Learning Sentiment Lexicon for Palestinian Dialects
Authors	Murad Asaad, Hamed Abdelhaq, Othman Othman M.M. murad.asaad@stu.najah.edu, hamed@najah.edu, othman.omm@najah.edu
Affiliation	An-Najah National University
Abstract	Analyzing the sentiment of posts published via social media services has become an important task in many application domains, such as online marketing and public opinion mining. This task, referred to as "sentiment analysis", allows for quantifying the sentiment (emotion) user shows when discussing a certain topic. For this, many sentiment lexicons have been built to support models generated for this task and to boost prediction accuracy. However, most of these lexicons are tailored to the English language and there are only few lexicons for Arabic content. In this paper, we build sentiment lexicon for the Palestinian dialect from posts published in public Facebook pages. Results from the experimental evaluation reveal that the generated lexicon can be successfully employed in the sentiment analysis process, yielding an F-score of about 0.8 in case of predicting the sentiment polarity of unseen Facebook posts.
Index Terms	Sentiment Analysis; Natural Language Processing; Sentiment lexicon; supervised classification

Innovation and Sustainability in Engineering and Technology

Paper ID	515
Title	Innovation and Sustainability in Engineering & Technology: Revolutionizing the Future of Education through Virtual Labs
Authors	Mona Hasan muna.alhasan@stu.najah.edu
Affiliation	An-Najah National University
Abstract	This paper discusses the importance of incorporating sustainable and innovative Virtual labs into engineering and technology education. It highlights the benefits of this approach in preparing students for the future and promoting sustainable practices in their future careers. Virtual labs are revolutionizing the future of education by leveraging collaboration technology to create a global classroom. Virtual labs help students learn new material and interact with their peers, attending classes from anywhere in the world. They can receive the highest quality teaching delivery possible. Virtual labs provide a platform for developing students' manual skills, making them equivalent to learning improvements in general engineering labs when it comes to developing students' laboratory skills. Virtual labs have become increasingly popular in recent years, while also meeting the requirements of school districts across the country. Virtual labs are transforming the way we teach and learn STEM subjects, offering students the opportunity to attend live classes and provide active learning opportunities. They also allow students to learn at their own pace and access their entire distributed workforce, making it easier to collaborate and generate innovative solutions. Virtual labs are transforming the educational sector by using ICT tools, making it feel like they are face-to-face with students. Virtual labs have revolutionized the educational sector, helping students understand complex theoretical concepts in subjects like engineering and physics. 'Engineering Tomorrow' labs, providing students with guided experiences and impactful applications in engineering. This paper shows the applications of Virtual labs in several Engineering fields. Experiments can be conducted using virtual labs. Virtual labs have proven to be effective in teaching and learning, and in developing critical thinking and problem-solving skills. As the world becomes increasingly digitized, students can learn and innovate from anywhere in the world.
Index Terms	Virtual labs; Education; Innovation; Sustainability; Industry4.0; Engineering Labs

Paper ID	3362
Title	Assessment and Potential of Using Passivated Emitter and rear cell (PERC) in Palestine
Authors	Ramez Abdallah, Mahmoud Assad, Salameh Abdel-Fattah, Belal Bazari, and Abdallah Shawhnee ramezkhaldi@najah.edu
Affiliation	Industrial and Mechanical Department-Faculty of Engineering & Information Technology. An-Najah National University
Abstract	Energy sources in the Palestinian territories are very limited and depend on importing different types of fuel from neighboring countries, hence, there is a need for renewable energy; such as solar energy. Solar energy is one of the most important and promising sources of clean renewable energy at present, which contributes to saving money and effort. Solar energy is absorbed and collected by solar panels. Several types of solar panels are currently available, and solar panels are constantly being developed to obtain maximum solar energy, reduced maintenance, and a longer endurance period. This work is aiming to experimentally investigate the behavior of the PERC unit and compare it with the performance of the polycrystalline solar cells unit under the influence of the Palestinian climate. The temperature of the PERC panel was lower than that of the polycrystalline panel, due to a heatreflecting layer used in the PERC panel and thus increasing the efficiency of the PERC panel. The efficiency of the two panels was compared at the same value of solar radiation. It is noticed that the efficiency of PERC is higher at the same value as solar radiation. In fact, the solar radiation absorbed in the PERC panel is greater due to the reflective layer that enables the PERC cell to benefit from the solar radiation as much as possible. PERC panels produced more power per unit area than the polycrystalline panel.
Index Terms	Polycrystalline; PV; Palestine; Solar energy.

Paper ID	3442
Title	Solving environmental Problems of microparticles size Pyrolysis Carbon Black(PCB) by adding to the concrete mixture
Authors	Dr. Osayd Abdulfattah, Ramez Abdallah osaydaf@najah.edu, ramezkhaldi@najah.edu
Affiliation	Mechanical & Mechatronics Engineering Department, Faculty of Engineering & Information Technology, An-Najah National University
Abstract	One of the biggest issues with environmental solid waste in the globe is tire waste. Because it emits dangerous poisonous fumes, used tires cannot be burnt or processed in landfills. So, a number of approaches to the treatment of waste tires have been suggested. Tire pyrolysis is regarded as the most advantageous approach out of all waste disposal options. Waste tires are converted by pyrolysis into gases, fuel oil, steel, and pyrolyzed carbon black (PCB)as a byproduct. PCB, which makes up 30-35 weight percent of waste tire products, creates another issue with solid waste. In this experimental study, an effort was made to include PCB in the concrete used in

	construction. in the current research, the impact of the size of black carbon particles on concrete was investigated. Six distinct PCB particle sizes were used in the testing, which was conducted in the compression test. The findings demonstrated that the strength may be arranged in an escalating manner in the 28-day compression test, with the smallest particle size (75 m) providing the maximum compressive strength. Additionally, there is no routine organization during the 7-day test.
Index Terms	Concrete, pyrolyzed carbon black (PCB), Properties of Concrete, Pyrolysis. concrete; sustainable waste management.

Paper ID	5264
Title	Conceptual Viability of a Portable Containerized Decentralized Wastewater Treatment System for Rural Areas
Authors	Mahmoud Sallam, Amal Yaseen, Leena Refai, and Amjad El-Qanni a.elqanni@najah.edu
Affiliation	Chemical Engineering Program, Faculty of Engineering & Information Technology, An-Najah National University
Abstract	To efficiently handle wastewater in densely populated rural areas, decentralized wastewater treatment systems are required as an alternative to constructing large centralized plants. Thus, this research assesses the conceptual viability of constructing a portable and containerized wastewater treatment system that can effectively treat wastewater and is suitable for various applications, with the capability to treat wastewater generated by up to 4000 individuals. The proposed system is comprised of two stages. The initial stage includes a standalone primary sedimentation tank located outside the container. The subsequent stage consists of a container housing all the equipment utilized in the treatment process beginning with aeration, followed by secondary sedimentation, and ending with filtration and chlorination. Although the system is designed as a single container, in practice, it will consist of two containers with identical units. The second container will ensure continuous operation mode in case of maintenance in the first container. An initial cost evaluation was conducted, and the projected cost for one container is roughly $9,760, which is feasible. Additional research can be undertaken to explore the running cost and the level of efficacy attained.
Index Terms	Portable, wastewater treatment, decentralized, containerized, rural.

Paper ID	7781
Title	Towards Energy Independence: Biodiesel Production from Used Cooking Oil in Palestine for Sustainable Development Goals
Authors	Ahmad Ashqar, Fihme Hantoli, Maher Abdulkareem, and Ihab H. Alsurakji isurakji@najah.edu
Affiliation	An-Najah National University, Department of Mechanical Engineering
Abstract	As non-renewable energy sources continue to be depleted worldwide, finding alternatives to fossil fuels is increasingly essential. Biodiesel is one

	such alternative, that is considered an environmentally friendly alternative to gasoline, and importantly it can be used by diesel engines. The transesterification reaction is the process by which vegetable oils or animal fats are converted into biodiesel. Biodiesel may be one of the renewable resources that could help Palestine both develop its renewable energy capacities and become energy independent. This research investigates the possibility of building an in-house machine that converts used cooking oil to biodiesel that is suitable for domestic use. Currently, used cooking oil in Palestine is not properly treated and is instead dumped directly onto the soil causing significant environmental damage. Thus, in addition to the importance of halting this environmental damage, the used cooking oil has the potential as a renewable energy source for Palestine if it was made convenient to convert the oil domestically. Therefore, the aim of the current study is to build a machine that is easy to use, cheaper than current market prices, and has a low running cost. An in-house prototype was built in An-Najah National University workshop with a lowest possible cost of 4,500 NIS~1320$. In addition, a series of laboratory experiments were performed to test the characteristics of the used cooking oil and the reaction conditions, e.g. temperature needed in each stage, speed of mixing, and the suitable catalyst. Overall, it was found that the production cost of the fabricated machine is 25% lower than the cost of diesel and holds similar performance standards on diesel engines.
Index Terms	Energy Independence, Biodiesel, Transesterification, Renewable resource, Used Cooking Oil.

Paper ID	8276
Title	Evaluating the Effect of Water Cooling on the Efficiency of PV Modules in Palestine
Authors	Ramez Abdallah, Aiman Albatayneh, Abdulaziz Sheikh Ali, Aseel Nasassrah, and Mahmoud Kashef ramezkhaldi@najah.edu
Affiliation	Mechanical & Mechatronics Engineering Department-Faculty of Engineering & Information Technology. An-Najah National University Energy Engineering Department, School of Natural Resources Engineering and Management, German Jordanian University, Amman 11180, Jordan
Abstract	Energy production in the world has changed in the past few years. The use of renewable energy increased since it has no negative impact on the environment compared to other energy sources that pose a great danger to the environment due to the pollution it causes, for example (fossil fuel, nuclear energy, etc..), in addition, the production cost for renewable energy is low compared to fossil energy. Solar energy is one of the types of renewable energy, the technologies used to transform solar radiation into a stable power supply have significantly advanced in the past few years and have proven their high efficiency in energy production, therefore demand for energy has increased significantly recently. Photovoltaic (PV) modules are the most widely used technology since it produces energy directly. PV modules are one of the most important methods to obtain energy from the

	sun which itself is one of the most important renewable energy sources, here a project was carried out with the basic idea of improving the work of PV modules and raising their efficiency. This project presents an experimental study carried out to investigate the effect of PV module cooling and the best cooling method on the performance of PV modules under Nablus City (Palestine) climate conditions. It was found that the best cooling method is the horizontally divided box with a decrease in temperature by 30% and an increase in efficiency by 0.5%.
Index Terms	PV module; Photovoltaic; Palestine; PV cooling; PV efficiency.

Paper ID	8494
Title	Exploring an architectural paradigm for the 15-minute city planning model: Towards reforming gaps of services in Nablus
Authors	Diana Enab, Zahraa Zawawi , Nadia Mounajjed diana.enab@najah.edu, zahraa.zawawi@najah.edu
Affiliation	Department of Architectural Engineering, An-Najah National University Urban Planning Engineering Department, An-Najah National University Department of Architecture and Design, Abu Dhabi University, Abu Dhabi, UAE
Abstract	Schemes of conceptual strategies, responsive street transformations, and innovative urban development projects has been tackled in the literature of the 15-minute city planning model, however, little is shared about how the architecture of a 15-minute city may look like. The planning model highlights the time-space relationship of services in the spatial scope of neighbourhoods, which is argued to be used as a scientific method for filling missing services in neighbourhoods of Nablus. Collected local observations about service type, proximity, and mobility in the neighbourhoods of city of Nablus stressed the need to reenvision the neglected inclusiveness, density, and accessibility of services. The paper further notices a changed pattern of prioritizing services during Covid, that by itself raises a strong correlation with the time-space consideration in the model. In a post-covid reality, this instant change of relation between resident to services opts for adding flexibility in the geometry and the type of offered services through a suggested architectural paradigm. In response, this paper explores the potential of using the building technology of prefabrication in setting urban service units as an architectural sustainable paradigm for achieving the planning model. By integrating analysis of the structural system, the contextual environmental considerations, and the norms of sanitization into the model, the architectural paradigm is set. Temporality that follows the building technology makes the application of the paradigm responsive to the lack of vacant lands in the city's existing planning schemes
Index Terms	15-minute city; Architecture; Building technology, Post-Covid, Urban units, Nablus.

Mechanical, Metallurgical, Energy, Industrial, Management and Chemical Engineering

Paper ID	1407
Title	Recycling and Reinforcing of Expanded Polystyrene by Woven Mat and Short E-Glass fibres
Authors	Shadi Sawalha sh.sawalha@najah.edu
Affiliation	Chemical Engineering, Faculty of Engineering and Information Technology, An-Najah National University
Abstract	Expanded polystyrene (EPS) polymers are widely used in isolation and packaging applications. If their waste hasn't been managed well and due to there long degradation time, they will cause severe environmental problems for human beings, plants and animals. Therefore, recycling could be one of the acceptable solution to overcome such problem in addition to reinforcing them to recover the lost properties resulted after recycling. In this work two types of EPS have been recycled at different temperatures and reinforced by E-glass fibres in mat form and as random short fibres leading to composite samples with different properties. The samples have been prepared by homemade thermal press and several parameters (i.e. processing temperature, fibre content, and fibre length) have been studied with regard to tensile properties such as strength, modulus, and ductility. Furthermore, the interfacial adhesion has been investigated by estimating the strength and modulus efficiency factors. The results shows that the fibre could improve the strength with more than 300% enhancement and fibre length affects significantly the mechanical properties based on the fibre critical length.
Index Terms	Expanded polystyrene, Fibre mat, short fibre, thermal press, strength efficiency and modulus efficiency

Paper ID	3129
Title	Smart Energy Consumption Management in Residential Buildings Based on the Residents' Knowledge and Behavior
Authors	Baraa Hakawati, Allam Mousa, and Fadi Draidi allam@najah.edu
Affiliation	AI & VR Research Center, An-Najah National University, Nablus, Palestine
Abstract	Smart energy consumption management is an emerging technology that leverages IoT principles to improve energy use and reduce waste in buildings. This study examines the impact of using smart energy consumption management systems on reducing public energy consumption while minimizing environmental damage. The research model evaluated the knowledge and consumption behaviors of residents in buildings through a survey of 100 valid responses in Palestine. However, Smart-PLS software was employed to evaluate the research model through partial least squares structural equation modeling (PLS-SEM). The results showed that adopting

	smart energy consumption management systems in residential buildings could lead to a more sustainable future by reducing energy use and improving overall building performance. However, education and awareness campaigns are necessary to increase residents' knowledge of these systems to promote energy savings. Such smart energy consumption management systems represent an important innovation in building management and can help create more sustainable and efficient buildings.
Index Terms	Smart Energy Consumption Management, Internet of Things (IoT), Residents' Knowledge, Residents' Behavior, Cost, Environmental Effect

Paper ID	4212
Title	Risk Assessment in Broiler Poultry Production in the West Bank, Palestine
Authors	Shahd Abu Baker , Abdelhaleem I. Khader, Abdel Fattah Hasan abubakershahd@gmail.com
Affiliation	Faculty of Graduate Studies, An Najah National University Civil Engineering Department, An-Najah National University
Abstract	This study aims to explore and assess the risks of broiler poultry farms within the Palestinian farms to gain more understanding of the risks and the existing situations in Palestinian farms. Specifically the Primary data collected with the use of four in-depth interviews conducted with experts and farm managers of poultry sectors. In addition, 266 surveys were collected on the topic of the study. Statistical Package for the Social Sciences (SPSS) software used to analyze the collected survey data. The results of this research illustrate risks of broiler poultry farms from farmer's perspectives. The results showed that the majority of poultry farmers (47.7%) had a university degree and highly educated, (78.6%) of farms located in north of West Bank (WB), (21.4)% had a member ship to cooperative , (41%) had a farm license from the Palestinian ministry of agriculture (MOA), (53%) had an existence of neighboring farms, (48.5%) of the housing system were open design and the majority of breeding pattern (39.8%) were a traditional farms (not – automated). The significant variables influencing consequences of price and marketing risks in broiler poultry farms were farm membership to the cooperative ($p < 0.05$), contracting with (customers, feed supplier, DOC supplier, vaccines and medicines supplier) ($p < 0.05$). Also the significant variables influencing risk consequences (biological, technological, political) in broiler poultry production were existence of a license ($p < 0.05$). Based on the findings of the study, it was therefore recommended that the price and marketing risk is the highest frequent and consequent risk and there should be organized marketing strategy to reduce marketing difficulties.
Index Terms	Broiler poultry, Risk assessment, Risks, Consequence, Palestine

Paper ID	5470
Title	The Current Status of Stone-Cutting Waste Management in Palestinian
Authors	Ahmad Ramahi, Yahya Saleh, Rahaf Ghozzi, Bara' Abu Baker, Abdelraheem Khateeb, and Saad Jodalla ramahi@najah.edu
Affiliation	Industrial Engineering Department, An-Najah National University
Abstract	This paper aims to demonstrate the current status of solid waste management practices in stone and marble industry (SMI) facilities in Palestine. To this end, a mixed qualitative and quantitative approach has been adopted. More specifically, field visits and semistructured interviews, and questionnaires have been employed to gather needed data from a randomly selected sample of Palestinian SMI faculties. Such data include facilities' demographics, infrastructure and production inputs, solid and liquid waste estimated quantities, and current waste management practice. Statistical analyses show that SMI facilities are highly-heterogeneous in their profiles and practices. Besides, it was found that surveyed respondents from SMI facilities are highly aware of the importance of waste management and are willing to apply effective waste management practices in their facilities. To this end, a set of practical recommendations have been presented to help different stakeholders in the SMI in employing more effective waste management practices in their facilities and hence improve their social, environmental and economic sustainable organizational performance.
Index Terms	stone and marble industry, stone-cutting waste, waste management practices, sustainability

Paper ID	6456
Title	Suitability of additive manufacturing for planetary gearbox system
Authors	Mohammed Amer, Chung-Cheng Lin, Hasan Ismail, Shin-Hung Wu, Bo-Rong Lu, Zhang-Yang Wu, Shih-Feng Chen, and Chung-Wei Cheng mohammed.amer@ptuk.edu.ps
	Department of Mechanical Engineering, Palestine Technical University – Kadoorie, Tulkarm, Palestine Department of Mechanical Engineering, National Yang Ming Chiao Tung University, Hsinchu 300, Taiwan
Abstract	Additive manufacturing dominates modern manufacturing technology due to its simplicity, precision, time and material savings, and flexibility in design. The purpose of this study is to propose and print a 3D model of a planetary gear train since planetary gear trains are more efficient than conventional gear trains and offer many benefits over them. It is imperative that the input and output axes of planet gear trains are collinear in order to achieve compact space requirements. The space between the planets in a gear train can be balanced in such a way as to balance both static and dynamic forces when the planets are evenly spaced

	around their central axis. Additionally, multiple planets are capable of producing high torques. lastly, it also has the ability to provide a wide range of speeds. The printed model of this type performed exceptionally well when it came to performance, and it can be used both for educational and industrial purposes, with the ability to cope with high levels of stress. Finally, A series of remarkable results have been obtained as a result of the assembly and testing of the printed parts.
Index Terms	Additive manufacturing; Assembly; 3D printing; Planetary gearbox system

Paper ID	6903
Title	Optimizing Energy Usage in a Dairy Factory in Palestine using RETScreen Expert
Authors	Aysar Yasin, Buthayna Qutaina2, Saif Al-Saqqa Aysar.yasin@najah.edu
Affiliation	Energy Engineering and Environment Department, Faculty of Engineering, An-Najah National University, Nablus,Palestine Energy Research Center, An-Najah National University, Nablus, Palestine School of Engineering Technology, Al-Hussein Technical University, Jordan
Abstract	This paper discusses the optimization of energy usage in a dairy factory located in Palestine, using RETScreen Expert. An energy audit study is conducted to analyze and study the current situation of the dairy factory. The study focuses on seven energy efficiency measures, including lighting, insulation, maintaining steam traps, steam leak reduction, heat recovery, and installing a solar water heater. The research also takes into consideration environmental issues, such as estimating CO2 emissions, and evaluates the economic viability of these measures. The results of the study demonstrate that implementing these energy efficiency measures can significantly reduce energy consumption and CO2 emissions while simultaneously increasing economic viability. Overall, this paper provides insights into the benefits of implementing energy efficiency measures in industrial settings and highlights the importance of considering both environmental and economic factors when making energy-related decisions.
Index Terms	Energy Efficiency, RETScreen Expert, Palestine, Energy Management

Paper ID	9979
Title	Optimal Installation of PV Solar Panels: Optimum Tilt Angles and Incident Solar Radiation as Solutions of the Annual Electric Power Peak Demands in Palestine
Authors	Bashir M. Y. NOURI, and Ma'ali B. Y. SAUDI bnouri@najah.edu
Affiliation	Mechatronics Engineering Department, Faculty of Engineering and Information Technology Department of Economics, Faculty of Economics and Social Sciences, An-Najah National University

Abstract	An important parameter that affects the performance of fixed solar panels and flat plate solar collectors is their tilt angle with horizontal. In fact, variation of tilt angle changes the top loss coefficient of solar panels and the amount of solar radiation reaching the absorber plate. A mathematical model is developed and used for calculating the absorbed energy for a typical solar panel in Palestine Capital City; Jerusalem (N 31° 47', E 35°14'), on the daily, monthly, and seasonal basis. The optimal tilt angle (b) for a solar panel oriented to the south is also obtained for two periods: the first is named Cold-Weather or Winter optimal installation tilt angle for the period (September 23 – to – March 21) and the other is named Hot-Weather or Summer optimal installation angle for the period (March 22 – to – September 22). The annual optimal average installation tilt angle is (bAvg = 31.69°), the average optimal cold- weather installation tilt angle is (bAvg = 46.36°) and the average optimal hot-weather installation tilt angle is (bAvg = 17.43°). The obtained results show that using two annual installation tilting angles is more efficient than using the annual average installation tilting angle and the obtained direct solar radiation is very close to that obtained by using single axis auto tracking solar panels.
Index Terms	solar photovoltaic, optimum tilt angle, model evaluation, maximum power, solar panel orientation.

Electrical & Computer Engineering

Paper ID	1005
Title	Control strategy of photovoltaic inverter supporting the main grid based on virtual synchronous generator concept
Authors	Noor Aldeen Basem Ghazzawi, Moien A. Omar, and Marwan M. Mahmoud moien.omar@najah.edu
Affiliation	Faculty of Graduate Studies, An-Najah National University Electrical Engineering Department, An-Najah National University
Abstract	This paper proposes a control scheme for virtual synchronous generators (VSG) in PV inverters that does not require external energy storage systems. Instead, reserve active power is used to improve grid frequency and reactive power to improve the voltage. The concept of reserve power is applicable in the smart grid context since some power inverters are smart and controlled by a central unit. The grid operator can reduce the output power from these inverters if it exceeds the load requirement, while active power can be adjusted without using external storage, which can be expensive. The case study involved a 50 kVA rated PV inverter, a 50 kW rated PV system, and a 380 V grid voltage. Under low solar radiation of 200 W/m2 and high load power of 120 kW and 37.5 kVAr, the load voltage dropped to 202.4 V. The proposed control strategy improved the voltage by 17.6 V, resulting in a final value of 220 V. On the other hand, under high solar radiation of 1000 W/m2 and low load power of 20 kW and

	7.5 kVAr, the load voltage rose to 230 V. The proposed control reduced the voltage by 10 V, resulting in a final value of 220 V. Moreover, when the frequency varied within ±0.4 Hz from the nominal frequency of 50 Hz, the proposed control improved the frequency by ±0.4 Hz, resulting in a final value of 50 Hz.
Index Terms	Voltage improvement, Frequency, improvement, Virtual synchronous generator, PV inverter.

Paper ID	2751
Title	Robust Control Algorithm for a Bi-directional EV Battery Charging System
Authors	Ali Sharida, Sertac Bayhan, and Haitham Abu-Rub ali.sharida@tamu.edu
Affiliation	Texas A&M University, College Station, USA Qatar Environment and Energy Research Institute, Hamad Bin Khalifa University, Doha, Qatar Texas A&M University at Qatar, Doha, Qatar
Abstract	This paper proposes a robust sliding mode control (SMC) for a bi-directional electric vehicle (EV) battery charging system. The proposed controller consists of two-cascaded controllers, the first one is responsible to generate the current reference signal based on the error of the DC link voltage in case of grid-to-vehicle (G2V) operation. The generated reference current is fed to the second controller to control the grid currents. The main objectives of the proposed controller are to achieve both V2G and G2V functions using a single controller, to control the DC link voltage to charge the battery, to control the grid currents with a unity power factor, balanced grid currents, and fast and accurate tracking of the reference signal. According to the simulation results, the proposed control technique achieves the control objectives and provides fast tracking with zero steady-state error and can overcome disturbances, measurement noise, and uncertainty.
Index Terms	EV battery charging, bi-direction converter control, V2G, G2V, SMC, robust control.

Paper ID	6185
Title	Smartphone Crowdsourcing for Evaluating the Performance of Palestinian Mobile Network Operators
Authors	Rami Sawalmeh, Mohammad Barakat, Nadeen Shanan, Safa Nassereldin, and Ali Jamoos ali.jamoos@staff.alquds.edu
Affiliation	Department of Electronic and Communication Engineering, Al-Quds University, Jerusalem, Palestine
Abstract	The key performance indicators (KPIs) of the Palestinian mobile networks are usually monitored by the mobile network operators (MNOs) through the operation

	support subsystem and the drive tests. This include the received signal level, received signal quality, drop rate, handover success rate, packet loss, latency, throughput, etc. The Palestinian ministry of telecommunications and information technology as a regulation body also conduct performance measurements for the mobile networks through drive tests to monitor the declared quality of service (QoS) from each mobile operator and compare with the standard KPIs benchmark limits. However, these performance measurements either from the MNOs or the regulation agency are limited and do not reflect the exact end user experience. Therefore, in this project, we address the performance evaluation of the Palestinian MNOs based on smartphone crowdsourcing technique. Indeed, smartphone crowdsourcing can collect continuous realtime data on network performance from a large number of smartphone users with various locations, which can be used to evaluate the quality of experience (QoE) from the end user perspective. Our objective is to develop and implement a smartphone application for crowdsourced mobile network measurements.
Index Terms	smartphone crowdsourcing, mobile network operators, key performance indicators, quality of experience.

Paper ID	6607
Title	The Effect of Power Increment on Cell Breathing and Capacity
Authors	Rahaf Khraim, Ahmad Qashou, Yousef Dama yasdama@najah.edu
Affiliation	Department of Telecommunication Engineering, An-Najah National University Jawwal co., Nablus-Palestine
Abstract	With the introduction of Universal Mobile Telecommunications System (UMTS) technology and 3rd Generation (3G) systems, a new problem called "cell breathing" has emerged. This phenomenon arises from the interdependent relationship between capacity and coverage, where an increase in user traffic leads to greater interference and reduced cell coverage. As a result, network planning and optimization have become more complex. To tackle this issue, we suggest a power control technique that ensures continuous service within a cell as the user load increases. The proposed technique involves increasing the power transmitted to active cells, optimized and tunning that according to what coverage plane and geographical plan imposed to maintain consistent coverage. The proposed solution is designed to provide a more efficient approach to managing the dynamic behaviour of cell breathing and enhancing overall network performance.
Index Terms	3G, Cell Breathing, Power control

Paper ID	6952
Title	Plastics Detection by Hyperspectral Sensing for Environmental Monitoring and Waste Management
Authors	Marco Balsi, Soufyane Bouchelaghem, Monica Moroni marco.balsi@uniroma1.it
Affiliation	Dep. of Information Eng., Electronics and Telecommunications, Sapienza University of Rome, Italy Dep. of Civil, Construction and Environmental Eng., Sapienza University or Rome, Italy
Abstract	A hyperspectral sensing system operating in the SWIR band (900-1700nm) was developed for detection of plastics polymers. The system may be employed indoor on a fixed support for sorting objects made of different plastic polymers for purposes of recycling waste materials, or outdoor on a drone or aircraft for detection of plastic litter in the environment. The detection software is based on a multiple linear classifier trained on examples. Detection results are obtained in real time.
Index Terms	drones, environmental monitoring, hyperspectral sensors, plastics waste.

Paper ID	8407
Title	Investigative Study on Potential Electrical Signals from Palm Trees in Gaza Strip
Authors	Hatem A Elaydi, Amal F Al-Astal, Aseel N Abed and Nora H Alaydi helaydi@iugaza.edu.ps
Affiliation	Electrical &Smart Systems Engineering Department, Islamic University of Gaza, Gaza, Palestine
Abstract	This paper aims to analyze the electrical signals in a group of palm trees in the regions of Gaza City and Deir Albalah. It also investigates the stimuli of electrical potential (EP) in dates palm trees. It also explains factors such as: light, temperature, water level, tree age, sunset, direction, changing the reference, distance and proximity to the reference and electrode placement as stimuli on the EP of date palm trees. It assesses electrical signals (Ess) types in dates palm trees, generation and propagation of several ESs such action potential (AP), virtual potential (VP). The paper also demonstrates energy harvest potential, perspective applications and practical applications. The paper also provides a review summary of the effects of ESs on tipping, pruning, sunset, daybreak, photosynthesis, of lighting conditions, water availability.
Index Terms	Energy Harvesting, Trees electrical signals, Renewable energy sources.

Paper ID	9808
Title	Usage and Impact of smart home technology in achieving sustainability & security by enhancing Home Automation with IoT
Authors	Mohammad Shreem, Ali Irshaid, and Abdallah Rashed a.rashed@najah.edu
Affiliation	An-Najah National University
Abstract	This research paper presents a smart home system that incorporates various IoT principles, the proposed system utilizes a range of sensors that integrate with a user-friendly mobile application. By comparing live values with the vital and environmental value of international standards, the system can act and notify homeowners to avoid any critical changes that could damage the house. The system is designed for stable sustainability and offers enhanced security, optimized home environments, and remote and automation monitoring capabilities. The research paper describes the system's key objectives, including designing an automatic water system that is responsive to soil moisture levels, creating an air quality monitoring & automatic system that can be integrated with a ventilation system, developing a system that notifies homeowners when a stranger gets in their private parking\garden spot, integrating a smart call system that notifies homeowners when someone rings their doorbell, and developing a monitoring system that can read the amount of electricity, water consumed by the house, CO, dust, and Humidity and take actions based on standards.
Index Terms	smart home system, IoT principles, home automation, remote monitoring & security.

Civil, Architecture and Building Engineering

Paper ID	408
Title	Reliability-based live load reduction factors in axial force of columns in residential and office buildings
Authors	Monther B. Dwaikat and Mahmoud M.S. Dwaikat montherdw@najah.edu
Affiliation	An-Najah National University
Abstract	According to most building codes, the axial live load effect in columns of multi-story buildings may be reduced by some reduction factor. The justification for such a reduction is that there is a small probability for having all spans and floors of the building occupied with nominal live load value. While this justification is jointly adopted by all buildings codes and standards, there are significant variations in the degree of reduction as allowed by these building codes. A probable cause for such significant variations is that these reduction factors were not based on reliability analyses, but rather on some extrapolation of different stochastic live load models to multi-story buildings. This study re-establishes the live load reduction factors based on reliability analysis, specifically, by maintaining the same reliability index for the columns. To achieve this goal, Monte-Carlo technique is utilized through the finite element software "ANSYS" on several thousand models of multi-story buildings. Live load and geometric variabilities are taken into consideration at many levels of statistical representation. The resulting stochastic F.E. analysis gives the probabilistic distribution of axial live load in columns, which is then used to re-calculate the characteristic "nominal" value for the axial live load based on a reliability index. The obtained "nominal" value of axial live load in columns is then compared to the axial live load value obtained using nominal load value as given in codes and standards distributed uniformly over all spans and floors of the building. Based on this comparison, the reduction factor is readily defined as the ratio between the two values. The resulting reduction factors are then compared to those given in codes and standards and conclusions are then drawn. In spite of the large variation in the stochastic results, an equation is proposed to predict the live load reduction factor.
Index Terms	Stochastic Finite Element, Reliability Analysis, Live Load Reduction Factor, Design Codes

Paper ID	4944
Title	Bio-mimicry in architecture: An explorative review of innovative solution toward sustainable buildings
Authors	Aya Al-Masri , Mira Abdulsalam , Nadine Hashaykeh , Waseem Salameh Aya14.almasri@gmail.com, Miramarwan12@gmail.com, Nadeenhashaykeh@gmail.com, was-s@najah.edu
Affiliation	An-Najah National university

Abstract	Bio-mimicry is the imitation of the way nature solve problems . Architects and designers can utilize the ways nature follow to solve problems to address design problems aspects, especially in the field of architecture. From the dawn of history, people constructed special buildings to suit their needs. At first, the building process was hard, and the structure was simple and rigid with rough details and they kept repeating the same form. Therefore, architects have been searching for answers for their building complexes, and they found that nature was the best source of solutions. The structures then took different forms, were decorated with deep and graceful ornaments, the walls become thinner, more openings were constructed and the buildings became more beautiful and had more dignity. So, nature imitation has become the best approach for architects to deliver bold ideas to their surroundings. We can still see how the ancient unique buildings are standing still until this time, as in some Egyptian temples, Greek and Roman columns, and Byzantine ornaments. Imitation of nature in buildings is either through aesthetic, structural, or sustainability aspects. In this research, we are exploring the potential of Bio-mimicry to support sustainability, using a number of case studies throughout history, classifying and analyzing them.
Index Terms	Bio-mimicry, Sustainability, Innovation, Gothic architecture, Contemporary architecture.

Paper ID	5966
Title	Reducing carbon footprint by using thermal insulation materials in Palestinian buildings
Authors	Rafif Hanaishy , and Abdelhalem Khader a.khader@najah.edu
Affiliation	Faculty of Graduate Studies, An-Najah National University, Nablus P4110257, Palestine Department of Civil Engineering, An-Najah National University, Nablus
Abstract	this study discusses on the potential impact of using insulating materials on reducing carbon dioxide emissions and electricity consumption in buildings in the West Bank region of Palestine. The thorough survey of buildings in the region and the use of data from various sources, including the Palestinian Census Report and annual reports from the Palestinian Engineers Association, provide a solid foundation for the study's findings. The study's approach of calculating the energy consumption and savings for each governorate separately is also commendable, as it allows for a more precise assessment of the potential impact of insulating materials in different regions of the West Bank. Additionally, the consideration of the source of electricity used in Palestine, whether from natural gas, coal, or renewable energy, is an essential factor in evaluating the impact of insulating materials on carbon dioxide emissions. The use of standards set by ASHRAE (The American Society of Heating, Refrigerating and Air-Conditioning Engineers) and the International Energy Conservation Code to determine appropriate insulating materials for the West Bank region also demonstrates a commitment to using established guidelines and best practices in the field. The findings of the study, indicates that insulating

	materials can decrease electricity consumption by about 24% and reduce carbon dioxide emissions by about 28%. The results suggest that the use of these materials should be encouraged in both retrofitting existing buildings and new construction Building. The estimates of the cost recovery period for implementing insulating materials in buildings are also helpful for decision-makers looking to weigh the financial costs and benefits of such projects.
Index Terms	Carbon footprint, CO2 Emissions, thermal insulation material, CDD, HDD, U- Value, RValue, Cost benefit analysis.

Paper ID	6430
Title	Application of treated wastewater for cultivation of marigold roses (Tagetes erecta) in a semi-arid climate in Palestine
Authors	Abdelhaleem Khader and Tareq Abubaker a.khader@najah.edu
Affiliation	An-Najah National University, Nablus, Palestine United Graduate School of Agriculture Science, Tottori University, Japan
Abstract	Local communities in many parts of the West Bank, Palestine have very limited water resources available for irrigation. And since these communities are traditionally agricultural communities, water shortage and the lack of innovation in the agricultural sector had led to loss of jobs in this sector. This in turn had led young people to start looking for jobs in different sectors and even increased migration to urban centers. The reuse of treated wastewater can provide a viable solution to irrigation water shortage. It can help in creating jobs in the marginalized communities in the West Bank, especially in areas under full Israeli control (Area C according to Oslo Accord). Furthermore, it is important to select crops that can resist the effects of climate change and create revenue for the farmers at the same time. In this research, we studied the impact of irrigating marigold (Tagetes erecta), which is a flower plant commonly used in the Palestinian market, with treated wastewater from Nablus-West wastewater treatment plant (NWWTP). Twenty-six marigold plants were planted, half of them were irrigated with the treated wastewater and the other half with tap water. Observations of length, number of roses, rose size, days to flower, and flowering days were recorded for both cases. Statistical analysis of the results shows that there is no significant difference between marigolds irrigated with treated wastewater and those treated with tap water, in terms of Plant Height, Rose Number and Rose Diameter.
Index Terms	Wastewater Reuse; Tagetes erecta; Palestine

Paper ID	6795
Title	Effects of Incorporating Bacillus subtilis Bacteria on the Mechanical Properties of Macro-Synthetic Fibrous Concrete
Authors	Amr G. Ghoniem , Louay A. Aboul-Nour , and Hilal A. Hassan amr.gamal.87@gmail.com, agghoneim@zu.edu.eg
Affiliation	Lecturer, Structural Engineering Department, Faculty of Engineering, Zagazig University, 44519, Egypt Associated Professor, Structural Engineering Department, Faculty of Engineering, Zagazig University, 44519, Egypt
Abstract	Calcite sediment remediation techniques are capable of filling inaccessible concrete pores resulted from the use of fibres in concrete. This research investigated the impact of calcium carbonate precipitation induced by the activity of four microbial strains known as Bacillus subtilis at cell concentrations of 105 cells/ml on M40 concrete strengthened with macro-synthetic fibre having different properties and content ranged from 0 % to 4 %. The homogenized properties of such composite materials as elastic modulus, shear modulus, and Poisson's ratio were computed numerically by the ANSYS software package. Thirty-four mixed designs with different fibre percentages (0%, 0.3%, 0.5%, 0.75%, 1.0%, 1.5%, 2.0%, 3.0%, and 4.0%) were considered for evaluation of the effects of these bacteria and macro-synthetic fibre strength on the concrete mechanical properties. As result validation, the elasticity and shear moduli showed a good agreement with the analytical models that maintain results very close to the experimental results. The results indicated that the simultaneous addition of bacteria and high-strength macro-synthetic fibre was effective and improved elasticity modulus, shear modulus, and Poisson's ratio up to 15.4 %, and 15 %, and 4.3 % related to the reference conventional concrete, respectively. In contrast, increasing dosages of low-strength macro-synthetic fibres makes the elasticity and shear moduli follow the trend of gradually decreasing. Based on the study results, B. subtilis bacteria enhance the properties of fibrous concrete composite for several structural applications compared with other traditional concrete.
Index Terms	—calcium carbonate precipitation; composite materials; elasticity and shear moduli; finite element analysis; macro-synthetic fibre

Paper ID	6859
Title	A Systems thinking approach to determine the factors affecting the attitude of local authorities towards composting
Authors	Majed Ibrahim Al-Sari', A. K. Haritash majedsari@gmail.com
Affiliation	Department of Environmental Engineering, Delhi Technological University Bawana Road, Shahbad Daulatpur, Delhi – 110042, India Universal Institute for Applied and Health Research, Palestine
Abstract	Understanding the factors that affect the attitude of local authorities (LAs) towards composting of organic municipal solid waste (MSW) is a major contributor to the successful implementation of composting programs. LAs

	are the keyservice provider for solid waste management (SWM) in Palestine, where the organic solid waste (SW) fraction is the largest and unsustainable management practices of this waste stream. Therefore, this study aims to assess the factors affecting the LAs' attitude towards organic MSW composting in southern West Bank/Palestine, Hebron and Bethlehem governorates. A structured questionnaire was designed, and the data was collected from all LAs that provide SWM service in the study area through face-to-face interview, email and over phone. The data analysis was conducted using binary logistic regression model (LRM). The model output showed that the LAs' perception of compost contribution to SW reduction, availability of proper place, financial capacity, community awareness, and prevalent SWM bylaws are significant predictors of LAs' attitudes toward organic MSW composting
Index Terms	Organic Waste; Attitude; Local Authorities; Composting.

Paper ID	7853
Title	A Study of the Expansion of Solid over Void in Palestine: A Case Study of Al-Basateen Area in Nablus city
Authors	Reema Mansour , Dua Mallah r.mansour@najah.edu, dua@najah.edu
Affiliation	Department of Architecture, An-Najah National University
Abstract	This research aims to develop and create more green areas in Nablus by preserving the Al-Basateen area and converting it into a green and agricultural area. This is due to the need for more green space in the West Bank. Thus, this paper presents an analysis of the current situation in the AlBasateen area, as it also determines the extent to which the void and solid ratio has changed in this area throughout the years, specifically from 1997 to 2022, through comparisons of aerial photos. Results indicate that the Al-Basateen area is suffering from increasing rates of construction (solid) over green open areas (void), from 91% void in 1997 to 54% void in 2022. Therefore, it is recommended to maintain this 54% void by halting all construction activities in the Al-Basateen area and converting it into a green and agricultural area.
Index Terms	Solid, Void, Expansion, Agricultural and Green areas, Urban Planning, Urbanization, Land use.

Paper ID	7857
Title	Green building progress assessment: analysis of registered and certified buildings for LEED rating system
Authors	Iyad Ghazal, and Sameh Monna samehmona@najah.edu
Affiliation	Architectural and Civil Engineering Department, An Najah National University, Nablus, Palestine
Abstract	Green buildings are of great importance to overcome climate change effects and the depletion of natural resources. This paper aims to provide a review of the progress in green building construction that uses the LEED rating

	system for the last two decades. To do this the researchers have analysed the data of around 61000 LEED-registered buildings studying different factors affecting green building growth and trying to spot any possible correlation between LEED and each factor. The review will provide the researchers and the construction industry with the necessary information about the analysis of green building development. The results showed the trend in the green building progress and provided insight analysis for the reasons behind this progress.
Index Terms	LEED, green buildings, big data, rating system

Paper ID	7893
Title	Estimation of Synthetic Unit Hydrographs' Parameter Values: The Case of Wadi Al-Badan Sub-Catchment, West Bank, Palestine
Authors	Ghossoun Hamedallah , Sameer Shadeed sshadeed@najah.edu
Affiliation	Faculty of Graduate Studies, An-Najah National University, Nablus, Palestine Department of Civil & Architectural Engineering, An-Najah National University, Nablus, Palestine
Abstract	Developing unit hydrographs is critical in gauged catchments. Due to the lack of local data, engineers should strive to estimate discharges based on empirical (synthetic) methods in ungauged catchments. Synthetic unit hydrographs methods, such as the Snyder and Soil Conservation Service (SCS), are popular and play an essential role in hydrology. These methods are simple, requiring only catchment characteristics. Therefore, these methods are valuable tools to simulate runoff in ungauged catchments. This research paper focuses on Al-Badan subcatchment, which is located at the northeastern part of the West Bank in Palestine with an area of 83 km2 . The study used a de-convolution matrix approach to develop an average one-hour unit hydrograph (UH) by selecting four significant rainfall events in the period (2005-2007), and the direct runoff hydrographs which are measured by AlBadan flume located in the outlet of the sub-catchment. By computing the characteristics of the average one-hour UH with a peak discharge of 4.52 m3 /sec and time to peak of 5 hours, Snyder and SCS UHs were developed to suit AlBadan sub-catchment physical characteristics. The parameters were determined for the Snyder; peaking coefficient depends on the storage capacity of the catchment Cp = 0.88 and non-dimensional regional coefficient representing catchment storage effects and slope Ct = 1.26, and for the SCS; Cp = 1.90 and the coefficient depending on the total runoff volume occur before peak discharge C = 2.92. These synthetic one-hour UHs were examined for two selected rainfall events that occurred in the period (2017–2019) by comparing observed and simulated direct runoff hydrographs. The performance was tested statistically. Results showed that the synthetic UHs are suitable for application and that the SCS method is more applicable.
Index Terms	Unit hydrograph; Synthetic unit hydrograph; direct runoff hydrograph; Ungauged catchment; Al-Badan sub-catchment; Palestine.

Paper ID	8163
Title	Preliminary Analysis of the Aftershock Sequence of the February 6, 2023, Turkey Earthquake
Authors	RJ El-Kelani, and AT Atatri radwan@najah.edu
Affiliation	Faculty of Engineering, Civil & Architectural Engineering Department, An-Najah National University Palestinian Seismological Observatory (PSO), An-Najah National University, Nablus, Palestine
Abstract	The February 6, 2023 Turkey earthquake with a moment magnitude (Mw=7.8) will be recognized as one of the most powerful earthquakes to strike a large metropolitan area in recent memory. This quake occurred in southern Turkey near the northern border of Syria along the southern western branch of the East Anatolian Fault (EAF). This major event was followed by numerous significant aftershocks, with 14,107 earthquakes occurring as of March 5, 2023. Preliminary data analysis in this study of aftershocks a month after the main earthquake (Mw=7.8) indicate that the majority of the aftershock sequence concentrated near the epicentre of the main shock displaced numerous fault segments within the EAF zone and can have indirect effects on neighbouring fault systems. As a result, notable earthquake activity was observed along the northern section of the Dead Sea Transform (DST) fault system in Syria, Lebanon, and Palestine. According to statistical seismological analysis, 81% of aftershocks with magnitudes less than 3 occurred after the main shock, while 38 aftershocks with magnitudes 5 or greater occurred within the first 6 days, including shocks with magnitudes 7.5 and 6.8 on the Richter scale. The depth distribution of the large main shocks and the aftershocks was located at shallower crustal depth. The aftershock sequence is distributed in the first 15 km of the earth's crust, with significant occurrences occurring between 5 and 19 km deep. The expected aftershocks scenario of such large earthquake is to continue for several months or longer, possibly years.
Index Terms	The 2023 Turkey earthquake; East Anatolian Fault (EAF); Dead Sea Transform (DST); Foreshocks; Aftershock analysis; Focal depth.

Engineering Education

Paper ID	222
Title	The ChatGPT Dilemma: Navigating the Opportunities and Risks in Engineering Education
Authors	Ramiz Assaf , Amjad El-Qanni , Ihab H. Alsurakji and Mahmoud Assad ramizassaf@najah.edu
Affiliation	Industrial and Mechanical Engineering Department, Faculty of Engineering & Information Technology. An-Najah National University
Abstract	Artificial intelligence (AI) tools are spreading rapidly and extensively in most fields with various applications. ChatGPT is the most recent and fashionable AI tool, right now. It is getting unprecedented attention in media, industry and academia. This work tries to explore the ChatGPT features and its benefits focusing mainly on engineering education. It also presents the best practices, potential challenges and ethical considerations of using ChatGPT in engineering education. Educators in the engineering field should emphasize the importance of addressing the limitations of AI-based tools (mainly ChatGPT) to fully harness their benefits, hence they can help enhance students' problem-solving and soft skills (21st -century skills) within engineering education. This can lead to improved student proficiency and success in utilizing these powerful tools.
Index Terms	ChatGPT, Engineering Education, Artificial intelligence (AI)

Paper ID	968
Title	The Impact of Virtual Reality on Motivation and Skill Development in Vocational Education
Authors	Loay Abu Shamseieh , Allam Mousa s12053244@stu.najah.edu, allam@najah.edu
Affiliation	AI & VR Research Center An-Najah National University, Nablus, Palestine
Abstract	This study aims to show the effect of virtual reality on vocational education students' motivation, where motivation is an important parameter to ensure the student's passion for continuous learning. This is represented by the introduction of technology in learning and the application of virtual reality in the process. The study used the quantitative method through the questionnaire, which was built based on the structural model, which includes the four variables; motivation, ease of use, usefulness, and virtual reality features. The study shows the positive effect of virtual reality on increasing students' motivation and how it interacts with other variables. This has a role in enhancing enrolment in vocational education and the demand for it, as well as enhancing students' capabilities and facilitating their integration into the labor market
Index Terms	virtual reality, vocational education, technology, motivation, VET education

Paper ID	4363
Title	Teaching Sustainability in Architecture through Collaborative Online International Learning
Authors	Dr. Marika Snider, AIA, Dr. Sameh Monna , and Alia Gilbrecht mesnider@memphis.edu
Affiliation	University of Memphis, Memphis, USA An-Najah National University
Abstract	This case study assesses the efficacy of integrating collaborative online international learning exchange (COIL) and cross cultural dialogue pedagogy into a sustainable architecture studio course to develop students' architectural and intercultural competencies.
Index Terms	COIL, collaborative learning, international, architecture, sustainability, disaster, resilience

Paper ID	7436
Title	Towards a set of Technological Design for Fine Arts Classrooms and Their Relationship to the Performance of Their Users.
Authors	TAWFIQ A. JEBRIL, AHMED S. SHANTI tawfik.gebreel@gmail.com
Affiliation	School of Human Settlements and Civil Engineering, Xi'an Jiaotong University, Xi'an, China Head of Architects at Centre for Engineering & Planning, Gaza, Palestine
Abstract	The present paper focuses on the effects of designing a technological atmosphere of a classroom for fine arts students at Al-Aqsa University in Gaza; to determine the relationship between the interior design of fine arts studios and the behavioural performance of its users, to reach the formulation of criteria and directions for designing an educational space that stimulates the generation of positive behaviours and reduces negative behaviours by providing an architectural environment that stimulates creativity. To achieve this goal and verify the validity of the research hypothesis, the research adopted a methodology based on two points: The first point is based on a review of the most important theories and previous studies that dealt with the relationship between interior design and students' classrooms to improve the performance of users in fine arts colleges. The second point is based on a comparison between the current situation prevailing in the Faculty of Fine Arts at Al-Aqsa University in the Gaza Strip and the proposed situation after design. The results of the comparative analysis reached the considerations of design characteristics of the elements of the fine arts studio space that contribute to achieving the needs related to the behavioural aspects of its users and the formulation recommendations such as lighting, natural ventilation, sound insulation, colours, furniture, soft music, and artificial lighting, which contribute to improving the performance and behaviour of students.
Index Terms	Visual study, Technological Design, Fine Arts Studio, Performance, Creativity

Paper ID	7740
Title	Virtual Exchange in Engineering Education to Solve Industrial Problems
Authors	Mahmoud Assad , Tracey Carbonetto , Nadia Cheikhrouhou , Alia Gilbrecht , Islem Megdiche and Ramiz Assaf m_assad@najah.edu
Affiliation	Industrial and Mechanical Engineering Department-Faculty of Engineering & IT. An-Najah National University Penn State University - Lehigh Valley, 2806 Saucon Valley Rd, Center Valley Pa 18034, USA Higher Institute of Technological Studies of Béja. Environment Boulevard, 9000 Béja, Tunisia. Office of International Development and External Affairs, An-Najah National University
Abstract	The Virtual Exchange (VE) approach is spreading among educational institutions. It has increased in recent years due to the advancement of digital exchange stemming from the COVID-19 pandemic and as a suitable option for inperson exchange. This study aims to present the uses of Virtual Exchange in solving industrial problems between the Higher Institute of Technological Studies of Beja (ISET Beja, Tunisia), An-Najah National University (ANNU, Palestine), and Penn State Lehigh Valley University (USA). The collaboration between the three international institutions aims to implement the Virtual Exchange in engineering education for different specializations. Participants need to maximize the benefits of virtual exchange in engineering education by using the appropriate implementations. A survey was used to assess the students' feedback on the Virtual Exchange program and results show that it has improved the students' skills in problem-solving, creativity and innovation, teamwork, digital literacy, public speaking oral communication (21stcentury skills).
Index Terms	Virtual Exchange, Engineering Education, Problem Solving, Innovation, Entrepreneurship

Paper ID	7987
Title	The effectiveness of the digital competency based Training program in Design Thinking practices development
Authors	Assma H. S. Abu Mousa assma5252@gmail.com
Affiliation	Islamic University of Gaza, Palestine
Abstract	: The study aimed to reveal the effectiveness of a designed training program based on digital competencies in developing design thinking practices among Palestinian teachers. And a teacher working for the Ministry of Education. The results of the study showed that there were statistically significant differences at the level of significance (α = 0.01) between the average scores of teachers in design thinking practices in the pre and post applications of the observation card, and that the training program based on digital competencies has an effective impact on developing the practices of The design thinking of teachers, and the study recommended linking

	digital competencies with the roles of the digital teacher in designing competency-based training, and singling out digital competencies for teachers and linking them to performance expectations and expected teaching practices in the light of various variables such as experience, specialization, readiness, and the degree of teacher contribution in the educational digital content industry.
Index Terms	(Digital Competence, Thinking Design, Practices, Training Program)

Paper ID	8100
Title	Augmented Reality in Higher Education: Perspectives of Telecommunication Engineering Students
Authors	Kifaya Ahmad Sabbah , Fayez Mahamid , Allam Mousa kifaya.sabbah@stu.najah.edu, allam@najah.edu
Affiliation	An-Najah National University
Abstract	This paper explores the learners' perspectives on using AR technology in the learning environment. The researchers classified the generated themes into seven codes, which include: Prior experience, initial impression, Benefits, Challenges, Hope for the Future, Reflection, and Attitudes. The highest frequency was for benefits with 34.6% and the lowest frequency was for prior experience with 6.3%. Results revealed that AR-based learning improves learners' motivation through teamwork, feedback, achievement, exchange of experience, and time/place flexibility
Index Terms	Augmented Reality, Educational Technology, Telecommunication Engineering.

Poster Abstracts

Information Systems & Information Technology

Paper ID	5610
Title	A Dynamic Ontological Framework for Bukhari Ahadith
Authors	Areej Sawwan, Amjad Hawash and Mohammad Jetan areej.suwan@gmail.com, amjad@najah.edu, m.jetan@najah.edu
Affiliation	An-Najah National University
Abstract	The honorable Sunnah is the second source of Islamic legislation after the Holy Qur'an. Muslim scholars have been interested in preserving and codifying Ahadith because of their roles in the statement of the Holy Qur'an by allocating the general, restricting the absolute, and clarifying the total. The Prophet's Sunnah was transmitted orally by isnad which began oral and then documented by the Ahadith scholars later on to form chains of narrators. Enriching Islamic electronic content is a great challenge for researchers. Although Arabic is a global language and ranked as the sixth most used language around the world that is spoken by more than 400 million people, it does not have a sufficient presence on the internet, compared to other languages. The Hadith is referred to everything narrated from the Prophet Muhammad (PBUH) in terms of sayings, actings, or reporting. It is composed of two parts: Sanad and Matn. The importance of Hadith science can be summarized in An important source of legislation in Islam which scholars and jurists rely heavily on in order to devise provisions that are an essential reference for people in their behavior and dealings, Interpretation and clarification of many of the provisions that were originally unexplained in the Holy Quran, Introducing the characteristics of the prophet Mohammad (PBUH) and an explanation of his life and how he dealt with his family and neighbors and Finally One of the ways of telling the unseen, in which belief is part of the Islamic faith. The Hadith Isnad tree is one of the branches of hadith science concerned with the study of the hadith chain of narrators, and it is a graph that clarifies the methods of the hadith narrations and shows the narrators and their ranks. It plays a major role for researchers in studying hadith more clearly and accurately way to judge both Ahadith and their narrators. Ontology as a way of knowledge representation is a data model that depicts a group of concepts from a particular domain together with the relationships between those concepts. It has a great role in knowledge representation as it is simple and easy to understand and implement, in addition to being a method that organizes ideas systematically. This study aimed to build a dynamic ontological framework through which specialists in hadith science will be able to provide sufficient information about hadith, so that the ontology is able to save Ahadith, taking into account linking them to each other and with their narrators, which makes the process of Ahadith information retrieval easy and fruitful. The study was conducted on the Ablution Book from Sahih AlBukhari. To build an ontological framework we used a graph database

	represented as ontology O = (N, E) where the set N contains all nodes in the ontology O and they represent all possible data related to Ahadith like Rawi, Hadith, Place, Date, ...etc. and E is the set of the possible relations between nodes like "He told us", "we heard", "from", "I saw", etc. To implement this work, we used tools like Neo4j, Python, and MySQL. The ontology framework development process consists of several steps: Determine the domain of the ontology, Pre-processing of the corpus, Enumerate the important concepts in the ontology, Define a class hierarchy of the ontology, Define the properties of classes (slots), Define the facets (role restrictions) of the slots, and Create the instances. Neo4j is used to create the ontology while Python, HTML, and MySQL implement other system functions. This work is developed of a set of components: User Web Interface, Narrator Database, Narrator Web Service, Searching Services, and dynamic Ontology Framework that links a given hadith with all its related data upon its addition to the database. Ontology evaluation is the task of measuring its quality and the process of evaluating it's an important part of ontology development. Ontology can be evaluated from two key perspectives: quality and correctness. These two perspectives dealt with several criteria: Accuracy, Completeness, Conciseness, Adaptability, Clarity, Computational efficiency, and Consistency. This research was distinguished from other related research in several points: the process of expanding the ontology is totally automated by linking an added Hadith with all related ones that exist in the Ontology, the execution time of the different ontology operations (add, search, delete) is better than the traditional manual methods and databases, and the ability to visualize the narrator's nodes and their relationships as an interactive graph which makes it easier for specialists and those interested in the sciences of Hadith to identify new meanings through the connections between the narrators to open new horizons for research. This work is evaluated by executing several queries about the narrators, Ahadith, and the chain of Isnad that reflected promising work with respect to locating the proper information within a reasonable amount of time.
Index Terms	Hadith, Hadith isnad tree, Ontology, Dynamic Ontological Framework

Paper ID	9445
Title	IT Self Service: Job and Organizational Outcome
Authors	S. Zaza sam.zaza@mtsu.edu
Affiliation	Middle Tennessee State University, USA
Abstract	Service quality has been established as a crucial factor for the success of information systems. Internal IS staff's services to their colleagues determine the service quality of an organization. IT personnel, whether on-

	site or online, are expected to exhibit traits such as reliability, empathy, and responsiveness to indicate superior customer service. As a result, more corporate IT portals are available, and users can use their own IT devices, become self-sufficient, and try to solve their IT problems independently. IT self-service provides more benefits than just reducing service desk contacts. Organizations can consolidate knowledge and identify trends through incident analysis and training opportunities. Despite these advantages, user resistance to adopting new systems continues to be a concern for researchers and practitioners. This phenomenon suggests that there is a need to understand the mechanisms that affect users' shift towards engaging in IT self-service. This study examines the impact of habits and inertia on users' engagement in IT self-service and investigates the factors that motivate or demotivate users in adopting IT selfservice engagement behavior. The study develops a theoretical model that focuses on habits and inertia and proposes IT empowerment as a mechanism to alleviate the effect of habits on inertia and inertia on IT self-service engagement. The study builds on the work of Zaza and Junglas (2016) and aims to investigate the working professionals' habits, inertia, and engagement in IT selfservice, considering individual and IT environmental differences as potential sources of varianc
Index Terms	IT self Service, Inertia, Empowerment, Innovative Work Behavior

Innovation and Sustainability in Engineering and Technology

Paper ID	3138
Title	Solar Photovoltaic System Design for Agricultural Pumps – Case Study from Palestine
Authors	Mohammed Ramadan, Qusai Al-Khalil, Mohannad Tobah, and Ihab H. Alsurakji isurakji@najah.edu
Affiliation	Masaryk University, Department of International Relations and European Studies, Brno, Czech Republic Ministry of Transportation, Department of Traffic Engineering and Safety, Tulkarm, Palestine An-Najah National University, Department of Mechanical Engineering
Abstract	This research is dedicated to investigating the need of using Renewable Energy (RE) as a solution to the Palestine's dependency problem on the imported electricity. With a high average of sunshine days, the Palestinian region has high potential to benefiting from Solar Energy (SE). The specific application discussed in the current research is powering agricultural pumps used to get underground water and distribute it to different irrigation systems. Powering agricultural projects with SE in Palestine is essential due to i) the cruciality of agriculture sector in Palestine, ii) to contribute to energy independence and limit the influence of occupation on Palestine, and most importantly iii) save energy to be used in other sectors. Accordingly, investigations and comparisons of implementing solar photovoltaic (PV) powering systems amongst pumps and wells

	located in Tulkarm District are carried out. Herein, two pumps have been selected which are operating for the same well with powers of 250 hp and 150 hp. The results of this research presented all design details and the technical and financial characteristics of a solar PV system. The designed system covers around 50% of the pumps' energy needs with a payback period of around 2.5 years.
Index Terms	Renewable Energy, Solar Energy, Palestine, Agriculture, Energy Independence, PV systems.

Paper ID	3729
Title	Remote-controlled platform for green roof plants monitoring via hyperspectral sensors
Authors	Patrizia Piro and Monica Moroni
Affiliation	
Abstract	The careful design and management of green infrastructures may contribute to mitigate flooding and pollutant discharges into receiving water bodies. Other extreme climate impacts on the long-term basis and water cycle variability may be alleviated with such facilities. These small-scale, low-cost nature-based engineered solutions, take advantage of soils and vegetation to capture, infiltrate, transpire, and, in combination with other measures, reuse stormwater. The vegetation health state ensures the green infrastructure effectiveness. The huge potentiality of vegetation monitoring via the analysis of hyperspectral data is largely documented in the literature with interesting applications aimed at identifying different plants and the eventual start and evolution of stress situations. In particular, vegetation health-state detection is feasible due to the modifications the typical vegetation spectral signature undergoes when abnormalities are present. The effectiveness of such an approach was demonstrated through a ground spectroscopy monitoring survey of the green roof installed at the University of Calabria fulfilled via the acquisition and analysis of hyperspectral data. A spectroradiometer, placed on a fixed stand, was used to identify stress conditions of vegetation located in areas where drought could affect the plant health state. Broadband vegetation indices were usefully employed for this purpose. Data acquired agree well with direct observations on the ground. The analyses carried out have shown the remarkable performances of the broadband indices Red DVI, SR and TVI in highlighting the vegetation health state and encourage the design of a remote-controlled platform for monitoring purposes.
Index Terms	vegetation monitoring, green roofs, remote controlled platform, hyperspectral sensors

Mechanical, Metallurgical, Energy, Industrial, Management and Chemical Engineering

Paper ID	682
Title	Green Synthesis of Carbon Nanodots as Anti-Cancer Agents
Authors	Amal Barham, Hala Badawi, Zeina Barham and Shadi Sawalha
Affiliation	An-Najah National University
Abstract	The most recent and brilliant nanomaterials for photoluminescence (PL) are carbon nanodots (CNDs). These carbon-based surface-passivated nanostructures compete with other closely related (PL) materials, they have properties such as small size, optical quantum, and photochemical characteristics, and a variety of intriguing optical properties (UV-Visible absorption, quantum yield, and fluorescence emission) that make them suitable for a variety of applications, including antibacterial and cancer nanomedicine applications. CNDs have been synthesized using a lot of resources, natural resources, man-made, and waste materials. Hydrothermal, chemical oxidation, microwave, and different techniques can all be used to produce CNDs. This work aims to introduce a green and simple hydrothermal synthesis to prepare CNDs from sage at 200˚C for 6 hours. The resulted CNDs are well dispersed in water due to their high negative surface charge. The CNDs synthesized from sage have a product yield of 15% with an average particle size of 3.6 nm. The synthesized CNDs showed excellent anticancer activity toward liver cancer (HeP3B) cell lines, the cells treated with CNDs at 50-250 µg/ml concentrations and resulting that the cell activity decreased with increasing the concentration from 92% at 50 µg/ml to reach 23% at 250 µg/ml. In addition, the cytotoxicity of the CNDs was analyzed in a liver normal cell (LX2) resulting that the CNDs at a concentration of 50 µg/ml still active with 98.5%, also 86.7% of the LX2 activity was achieved at high concentration (250 µg/ml CNDs). Herein, it would be concluded that the synthesized CNDs from sage are higher selective to liver cancer cell more than normal ones.
Index Terms	Carbon nanodots, Sage, HeP3B, Hydrothermal

Paper ID	1174
Title	Capacitive Sensors for Cultural Heritage Monitoring
Authors	Izzeddin Abboushi and Maen Ishtaiwi izzeddinabboushi@gmail.com, m.ishtaiwi@najah.edu
Affiliation	Department of Physics, An-Najah National University
Abstract	This research discusses the usage of capacitive sensors for cultural heritage monitoring in museums, as exhibits are highly affected by their surrounding environmental factors such as humidity, which is to be treated as a mechanical quantity. Capacitive sensors for the detection of mechanical quantities all rely on a displacement measurement, meaning that the effect can be measured, and if the mechanical quantity (a dielectric with a specific value of κ, such as water

	vapor that causes humidity) controls the movable electrode, a sensor is realized. Since the value of the capacitor is directly related to its size. The capacitive sensor model is simulated via COMSOL Multiphysics to observe the change in capacitance when the dielectric is replaced by another. That is, neglecting the assumption that the dimensions of a parallel-plate capacitor are infinite (to simulate as when in practice), in order to consider the fringing fields forming on the outer tips of the plates of the capacitor. As well as optimizing capacitance by manipulating the dimensions to make the plates as thin and wide as possible (making the angle between the plates θ = π rad). This serves the purpose of making the capacitor function as a humidity sensor, and as an alarm to keep tracking the humidity level within the tolerated range, in order for the cultural heritage exhibits to be protected from decaying.
Index Terms	Capacitive Sensors, Cultural Heritage, COMSOL

Paper ID	1234
Title	A Palestinian Deodorant Product as an Alternative for Foreign Exported Ones: A Business Plan
Authors	Dana Qamhiyeh, Waleed Farhood, Noor Rehan, Sabreen Quzmar and Shadi Sawalha
Affiliation	An-Najah National University
Abstract	This work aimed to develop a business plan for the production of a Palestinian deodorant product. We selected deodorant, as it was not readily available in the local market, easy to produce, and a product that is in high demand for daily use. After conducting a survey and analyzing the results, we identified our competitors and potential customers, and determined the most popular type of deodorant among people. We decided to produce a 150ml gel-formulated deodorant. Our research revealed that approximately 41% of people in Palestine use deodorant. Based on a market share of 3%, we calculated an annual production of 116,000 L/year, which translates to approximately 3,000 bottles per day. A production facility with an area of 100 m2 planned, consisting of an office for the manager, a room for raw materials, and a space for measurement and inspection operations, as well as a mixing area, storage tank, packaging area, and designated storage space. We developed attractive product names and a logo, with "MISK" for the female product and "MANHOOD" for the male product. While the business plan includes many details, the most important figures are the Total Capital Investment (T.C.I) of $74,990 and the projected cash profit of $300,000 per year.
Index Terms	Deodorant, Business Plan, Cash profit, Foreign products

Paper ID	2200
Title	Nano-Catalytic Development for Pyrolysis of Scrap Tires
Authors	Yazan Oudeh, Ihab Alsurakji and Amjad El-Qanni
Affiliation	An-Najah National University
Abstract	The production of scrap tires by vehicles, especially automobiles, has resulted in numerous environmental issues since their inception. However, the need for an effective and efficient method of managing and recycling these waste tires to mitigate environmental problems and obtain valuable products from them has arisen, and pyrolysis is one such method. This study aimed to develop a nano-catalytic material that can efficiently convert scrap tires into valuable chemicals through pyrolysis and to lower the activation energy needed for the pyrolysis process to occur, thereby reducing the total amount of energy required to perform such a recycling method. The use of scrap tires as a feedstock for the production of valuable chemicals is an attractive solution for waste management and sustainable development here in Palestine. The proposed nano-catalytic material will enhance the yield and selectivity of the pyrolysis process, which will lead to the production of high-value chemicals such as fuel oils, carbon black, and syngas. This project involved the synthesis and characterization of the metal oxide silica-based catalysts, optimization of the pyrolysis conditions, and evaluation of the catalytic performance. An experimental setup was designed and constructed for this purpose, with the catalysts being prepared in the chemical engineering department laboratories at An-Najah National University. The outcome of this study would contribute to the development of an environmentally friendly and economically viable solution for the utilization of scrap tires. Having that said, in the experiments, metal oxide silicabased catalysts were used. According to the previous observations, we expected that the most suitable weight was 0.2 g at a temperature of 700 °C with a heat rate of 5 °C/min. The figure shows that the percentage of the remaining tires after performing the experiment is 0.48%. It can be seen that when the catalyst was used in the pyrolysis process, the percentage of the remaining tires was remarkably decreased to almost zero.
Index Terms	Nanocatalysts, Catalytic Pyrolysis, Scrap Tires

Paper ID	4170
Title	Synthesis of Nitrogen Doped Carbon Nanodots from Ethylene Amine Derivatives
Authors	Anhar Azizi, Ansam Zedan and Shadi Sawalha
Affiliation	An-Najah National University
Abstract	Carbon nanodots are new emerging class of carbon allotropes having excellent properties which make them good candidates for different applications. CNDs can be doped with different elements such as N, S, and P. N-doped CNDs have been synthesized by different researchers by using different resources and variety methods. In this work, N-doped CNDs will

	be synthesized from triethylenetetramine and pentaethylenehexamine by direct thermal method, studying the effect of using hydrogen peroxide as an oxidant and/or catalyst agent on completion time, product yield, quantum yield and optical properties such as energy bandgap. It was found that the addition of hydrogen peroxide improved the completion time and product yield for both precursors with a minimum of 7 minutes to synthesize CNDs from triethylenetetramine and highest product yield of 46% for CNDs from pentaethylenehexamine. About 15% Quantum yield has been attained for CNDs synthesized from triethylenetetramine in absence of hydrogen peroxide with gradual decay upon the addition of H2O2. The presence of H2O2 also affects the energy bandgap of CNDs prepared from triethylenemelamine with slight decrease upon its increase .
Index Terms	N-Doped CNDs, Quantum yield, ethylene amines, Oxidant agent

Paper ID	5253
Title	Investment in Manufacturing Silicon as New Alternative Product in Palestinian Market: Business Plan
Authors	Aseel Qadi, Ansam Zedan, Hisham Arabi, Reem Abu Shqair, Shadi Sawalha s11924469@stu.najah.edu
Affiliation	Chemical Engineering Department, An-Najah National University
Abstract	In this project, we have developed a business plan to produce silicon. The Silicon factory project involves the production of silicon paste used in construction and building processes. Silicon is a fundamental product used in many constructions, regular maintenance, and emergency repair works. The project relies on modern and advanced technologies to meet the growing demand and needs of the local market for its products across various sectors, particularly in the construction and industrial sectors. This outlines an economic feasibility study and financial analysis for producing Silicon locally in Palestine, a product with a low demand from consumers. The analysis includes estimating annual production based on a projected market share of 3%. the objective of the study is to provide insights into the potential profitability and viability of this venture. Results indicate a production rate of 25,256 can/year and 7,072 kg/year, with a total capital investment of 170,000 ILS and projected net profits for the years 2023 through 2027 of 158,000 ILS/year, 196,000 ILS/year, 316,000 ILS/year, 550,000 ILS/year, and 1,023,000 ILS/year, respectively.
Index Terms	Palestinian Market, Business Plan,Silicon, Economic feasibility study,Financial analysis

Paper ID	6779
Title	Investment in Manufacturing Dishwashing Tablets as New Alternative Product in Palestinian Market: Business Plan
Authors	Mahmoud Sallam, Mohammad Debes, Anhar Aziza, Zeina Barham and Shadi Sawalha

Affiliation	An-Najah National University
Abstract	Analyses after the Covid-19 pandemic identified the chemical detergent market in Palestine as a lucrative investment. Among the products reviewed, dishwasher tablets were deemed a prime candidate for local production due to the absence of local competition and limited global competitors. This project was initiated to establish a local plant that could manufacture these tablets, which would compete with international products in terms of quality and price. A business plan was created to evaluate the project's feasibility, comprising a market study, technical study, and economic study. The market study aimed to understand how Palestinians think of and use dishwashers and showed that there is increasing adoption of dishwashers. The market is also easily penetrable as there are only two main competitors. The study estimated a total production rate of about 70 tons per year with a market share of 5%. The technical study was then conducted to identify the appropriate raw materials and production process, which helped to estimate an initial investment of 102,227 $ and annual operating expenses of 266,316 $. Lastly, the economic study evaluated the financial feasibility and profitability of the project, which indicated a total revenue of 389,972 $ per year with a cash profit of 52,517 $ per year, and an estimated payback period of approximately 1.95 years. Furthermore, by conducting a forecast analysis that predicts a 2% growth in market share over the next two years, it becomes possible to achieve the initial profit within this timeframe.
Index Terms	Feasibility study, Local production, Investment, Quality, Chemical detergent market, Market study

Paper ID	8996
Title	OSEC: On-Site Electrolytic Chlorination
Authors	Andrea Micangeli
Affiliation	
Abstract	OSEC Project (On-Site Electrolytic Chlorination) ts into the health and hygiene sector, regarding the production and the distribution of sodium hypochlorite disinfectant, but it is also closely linked to the education sector. The diculties related to the accessibility to drinking water for the entire world population have gradually become the most important and urgent issues to be addressed globally: even today, in the world, 884 million people have no access to drinking water. The universal access to safe water and sanitation is one of the 17 Sustainable Development Goals (SDGs) of the United Nations Development Program (UNDP) to be reached by 2030. Among the main issues related to the consumption of contaminated water there is certainly the transmission of pathogens that aects not only the developing countries with low standards of hygiene, but also the developed ones. The link between poverty and water crisis becomes more evident every year. With the acronym OSEC, it is indicated a category of devices capable of producing locally diluted sodium hypochlorite. Starting from a solution of sodium chloride (common salt), the device produces disinfectant through the electrolysis from salt water. The functioning of OSEC is based on the

	principle of the electrolysis of a solution of sodium chloride (3%), which provides, at the end of the process, a solution of sodium hypochlorite and hydrogen gas, with a concentration of about 7-8 g/l of chlorine equivalent, equal to 0.8%. The device needs a source of electricity to start and sustain the process, which is not spontaneous. The production in loco of sodium hypochlorite through OSEC technology has numerous economic, social and environmental benefits. Economic benefits Lower costs: in the local market, a liter of sodium hypochlorite to 2.4% costs a lot more of the salt needed to produce 3 liters of sodium hypochlorite to 0.8% when purchased in bags of 10 kg. With the use of photovoltaic energy both for the electrolysis and for water pumping, there are no other costs. Elimination of costs for the transportation and storage of the product in isolated communities: a lot of salt up to 10 kg can be easily transported on a motorcycle and it can be used to produce 333 liters of hypochlorite sodium to 0,8% (equivalent to 111 liters of sodium hypochlorite to 2.4%). In case of accident, the dispersion of the salt is less dangerous to people and the environment compared to sodium hypochlorite. Decreasing waste: with OSEC technology, production can be adjusted according to real consumer needs. Security benets Decreasing of transportation risks: there is not a dual-use of salt in war scenarios, so transportation is easier and safer. Environmental benets Low toxicity: the product is made by electrolysis, without the addition of chemical pollutants usually used for industrial production to lengthen the period of decay, such as in soda production. The solution to 0.7% -0.8% retains all the features of the disinfectant products on the market, which usually report concentrations around 3-5%. Anyway, it is less dangerous than sodium hypochlorite. Elimination of problems associated with the disposal: expired chlorine(after around a week) can normally be disposed of, resulting in non-polluting substances because of its very low residual concentration. Energy alternatives to traditional fossil fuels: OSEC models are designed to easily use energy that comes from renewable sources. Minor use of plastic: at a global level the bottles used in commercializing sodium hypochlorite have a signicant environmental impact because of their production and transportation. Social benets Development of micro-local entrepreneurship: OSEC technology focuses on the political and social structure of the community, leading to develop the concept of selfproduction of chlorine, which well applies to the context of the struggle for "Sovrania", i.e. independence from the external market for some of the products used in cooperatives. Populations are given the means and the knowledge to get a product often indispensable and thus bring down the cost of manufacturing. Health education: Wateraid's is the main English agency active in water supply and sanitation solutions in developing countries. Its philosophy is to let people helping themselves. In order to do so they work in partnership with local organizations, supporting them to form the locals. The same philosophy is the basis of the research and development of TS that, through the study and installation of OSEC technology, allows on-site production of sodium hypochlorite. This allows even the smallest rural communities to have suficient means to meet their
Index Terms	Water, Purification, WEF Nexus

Electrical & Computer Engineering

Paper ID	7929
Title	High Performance Field-Effect Transistor (FET) Based on MoS2
Authors	Asmaa Salim, Maen Ishtaiwi and Muna Hajjyahya asmaasaleem60@gmail.com, m.ishtaiwi@najah.edu, m.hajjyahya@najah.edu
Affiliation	Department of Physics, An-Najah National University
Abstract	Molybdenum disulfide (Mo$S2$) is the best example of two-dimensional (2D) materials with intrinsic atomic-level thicknesses which are strong candidates for the development of deeply scaled field-effect transistors (FETs). Focusing on this material because of their non-zero band gap, mechanical flexibility, and optical transparency. In this research, an efficient model of MoS2-FETs that is based on simulating the 3D geometry by using the COMSOL Multiphysics software have been presented. We study different models of FETs simulations: (1) Mono-layer of MoS_2 (2) Four-layers of MoS_2 (3) Mo$S2$ Transistor with HfO_2 (4) MoS_2 Transistor with $Hf_{0.3}Zr_{0.7}O_2$ and compare between them. The best result has been obtained when using MoS_2 Transistor with $Hf_{0.3}Zr_{0.7}O_2$ which obtained the largest drain current comparing with other issues. From overall evaluation, we can state that our model provided good results also for this different kind structure when change of the thickness of MoS_2. This indicates that the change of thickness greatly affected on the efficiency of FET transistor.
Index Terms	FET, COMSOL, 2D materials

Paper ID	9645
Title	The design and simulation of chipless RFID tags using resonators
Authors	Omar Tamimi, Falah Mohammed, Sana Salama and Salah Sharabi
Affiliation	
Abstract	Due to its potential applications in a number of industries, including logistics, supply chain management, asset tracking, and security access control, chipless RFID has attracted the attention of numerous researchers. Chipless RFID tags' potential is constrained by their expensive cost as compared to barcode technology. The only practical choice is to provide fully editable tags that can be written on with a specific ink. Utilizing small hexagonal and square-shaped resonators, a unique chipless RFID tag with enough coding density has been developed. Over the UWB frequency range of 0.5 GHz to 6.0 GHz, the length of each resonator has been chosen to offer a distinct resonance frequency. Each tag can have a different frequency signature by adjusting the length of each resonator. A small, inexpensive tag having large frequency signatures is shown in this work. The behaviors of the RFID tags are assessed using standard electromagnetic simulators.
Index Terms	Chipless RFID, backscater, timed domain, frequency domain, retransmission

Civil, Architecture and Building Engineering

Paper ID	1883
Title	Resilience Assessment Framework for Transportation Infrastructure against Natural Hazards: A Case Study for Nablus City, Palestine
Authors	Ethar Aqel, Khaled Al-Sahili and Jalal Al-Dabbeek
Affiliation	An-Najah National University
Abstract	The resilience of transportation infrastructure as part of the community's critical infrastructure represents a new way of managing their safety when exposed to disrupting events including natural hazards. Surface transportation networks in Palestine are substantial parts of the integrated critical infrastructures; they form the only basic networks to support emergency operations. Therefore, their disruption might cause severe consequences in cases of disasters. This paper aims to develop a macro-scale assessment framework for qualitatively measuring resilience against natural hazards (earthquake, flood, and snow) using a case study of Nablus City's transportation infrastructure. The desired level of resilience was identified through building multi-hazard risk matrix then translating resulted risks to resilience levels. Suitable resilience dimensions were determined, and measurement spreadsheets were developed to assess the current level of resilience. These were completed by interviews with the city's key stakeholders responsible for the management and safety of its critical infrastructures. Finally, the proposed framework was formulated. The research concludes that this framework could be adopted by decision-makers for resilience analysis of different critical infrastructures against several natural hazards scenarios, as it helps in identifying existing weaknesses that resulted in decreasing the existing resilience level and proposing methods to increase the existing level.
Index Terms	Hazard identification, Resilience Assessment, Natural hazards, Palestine, Transportation network

Paper ID	2260
Title	Exploring Optimal Location Model and Performance Level for Heliport Emergency Medical Services (HEMS) in the West Bank
Authors	Khaled Al-Sahili and Anas Dirawi
Affiliation	An-Najah National University
Abstract	Currently, emergency medical services (EMS) in Palestine are provided through ground transportation. This study examines providing the Heliport Emergency Medical Services (HEMS) in Palestine and their optimum locations, and evaluates its anticipated performance for the purpose of improving emergency health care and saving lives. The existing EMS demand is 83,000 trips/year, and many rural communities experience a long response time. Selecting the optimum number and locations of HEMS is complicated by the consideration of several factors simultaneously. These include the topography, maximum covering distance, population coverage, nearest hospital, and optimum response time as well as the costs and

	benefits of the system. The Maximal Covering Location Problem technique was used through ArcMap GIS to identify the most appropriate locations for HEMS achieving the highest population coverage within the least possible response time. The results showed that two helipads, each with one helicopter achieve a maximum response time of 25 minutes for 100% population and geographical coverage. The queuing theory analysis showed that this would achieve a good performance level in terms of total service time and delay. The benefit-cost analysis of the proposed HEMS system showed that the cost per saved life is worthwhile. Therefore, the Palestinian government should institutionalize a policy to initiate the HEMS services for the benefit of citizens.
Index Terms	HEMS, Response Time, Medical Emergency, Optimum Location, Road Crash, Queuing Theory

Paper ID	2845
Title	Seismic performance assessment of a novel self-centring concentrically braced frame system
Authors	Hatim Alwahsh and Jamie Goggins
Affiliation	
Abstract	A novel self-centring steel concentrically braced frame (SC-CBF) structural system has been developed for seismically active regions. The novel system allows for energy dissipative structural elements (e.g. braces) to be easily replaced after a large earthquake. This is facilitated by using a post tensioning (PT) arrangement that will allow the structure to return to its original position, eliminating residual deformations that are typically observed for traditional CBFs after large earthquakes. This self-centring system makes strategic use of post-tensioned interfaces between the main structural elements (such as, beam-column) where the PT elements are placed along the beams to create rocking joints behaviour under seismic loads. This system not only improves the resilience and robustness of CBF structures, it also improves their sustainability. A series of laboratory experiments at the material and frame level have been conducted to investigate the behaviour of the novel self-centring system. Experiments on the coupons include monotonic tensile tests and low cyclic fatigue tests. Frame tests include the shake table and cyclic pushover tests. OpenSees is used to develop and verify a numerical model using the results from tested frames. Material and geometry nonlinearity are incorporated in the model. This finite element model allows for improving the understanding of seismic behaviour in self-centring braced frame systems, and assessing seismic requirements for performance-based design. The main goal of this research project is to validate and further develop the novel SC-CBF system proposed by University of Galway to be used in CBF buildings subjected to natural hazards such as earthquakes.
Index Terms	SC-CBF, OpenSees, dissipative elements

Paper ID	4008
Title	Optimizing Building Design with BIM-Based Energy Analysis
Authors	Ahmad Saleh
Affiliation	
Abstract	Building Information Modeling (BIM) has provided a collaborative and data-rich approach to the design process in AEC industry. Energy analysis become one of the significant applications of BIM, where it empowers designers to assess and at the same time enhance the energy buildings' performance during the early stage of the design process. This paper presents the state of the art in the use of BIM-based energy analysis in the design process, exploring the methodologies, tools, and best practices employed in this field. It provides an overview of the key concepts and methodologies used in BIM-based energy analysis, including energy modeling, daylight analysis, renewable energy integration, and energy code compliance. Also, It reviews the latest research and innovations in BIM-based energy analysis use, and case studies that reveal the role of BIM in supporting energy analysis. It highlights the advantages and limitations of using BIM for energy analysis, as well as clarifies the challenges and opportunities in incorporating BIM-based energy analysis into the design process. Furthermore, this research provides insights into the impact of BIM-based energy analysis on the building design decision-making process and its role in developing sustainable building practices. Future research directions and opportunities for further advancement in BIM-based energy analysis in the design process are also discussed.
Index Terms	Energy Analysis, Building Information Modelling BIM, Design Process

Paper ID	4702
Title	Municipal Solid Waste (MSW) Composition with Emphasis on Plastic Waste in Nablus City, Palestine
Authors	Issam A. al-Khatib , Ayah Alassali , Anas A. Draidi , Sawsan Y. Abu Amara ikhatib@birzeit.edu
Affiliation	Institute of Environmental and Water Studies, Birzeit University, Birzeit, Palestine Hamburg University of Technology (TUHH) CREM - Institute of Circular Resource Engineering and Management Blohmstraße 15 D-21079 Hamburg, Germany Universal Institute of Applied and Health Research, Nablus, Palestine
Abstract	In order to achieve a significant reduction of waste amount flowing into landfills, it is important to first understand the composition of the solid municipal waste generated. Hence the detailed analysis of municipal solid waste composition has been conducted in Nablus city. The aim is to provide data on the potential recyclable fractions in the actual waste stream, with the focus on the plastic fraction. Hence, waste-sorting campaigns were conducted on mixed waste containers from five districts in Nablus city. The districts vary in terms of infrastructure and the average income. The target is obtaining representative data about the potential quantity and quality of household plastic waste. The study has measured the composition of

	municipal solid waste collected/ transported by Nablus municipality. The analysis was done by categorizing the samples into eight primary fractions (organic and food waste, paper and cardboard, glass, metals, textiles, plastic, fine fraction (<10 mm), and others). On the other hand, the plastic waste fraction was further categorized into seven secondary groups – Polyethylene Terephthalate (PET or PETE), HighDensity Polyethylene (HDPE), Polypropylene (PP), Polyvinyl Chloride (PVC), Low-Density Polyethylene (LDPE), Polystyrene (PS), and others. The study results reveal that the MSW stream in Nablus city has a significant bio- and organic waste fraction (about 68% of the total MSW). The second largest fraction is the paper and cardboard (13.6%), followed by plastics (10.1%), textiles (3.2%), glass (1.9%), metals (1.8%), fine fraction (0.5%), and other waste (0.3%). As per the characterization of MSW collected in Nablus, and taking into account the content of biodegradable organic matter, it is suggested to find solutions to the bio- and organic fraction. Hence, biowaste composting is proposed as an efficient and feasible solution, especially due to the location of the city of Nablus that is surrounded by agricultural areas, which could be a natural outlet to the compost product. Different waste management options could be practiced in the future in addition to composting such as recycling, which results in a greater possibility of reducing substantial amounts of waste that are disposed of at landfills while recovering resources into the production lifecycle.
Index Terms	Municipal solid waste, composition, composting, recycling

Paper ID	4930
Title	Impacts of COVID-19 Pandemic on Intersection Crashes in Tulkarem Governorate
Authors	Khaled Al-Sahili and Mohammad Teebi
Affiliation	An-Najah National University
Abstract	Traffic crashes in Tulkarem Governorate has generally been increasing over the years, and there are limited study of road safety in the governorate. With the outbreak of COVID-19 pandemic in Palestine, the government imposed several measures to control the spread of the virus for the period of March 2020 to July 2021, which affected travel pattern, and; therefore, crashes. The main objective of this research is to evaluate the impact of the COVID-19 pandemic on intersection crashes in Tulkarem Governorate. Crash records for the period of (2016–2021) were obtained from the Tulkarem Traffic Police Department. The pandemic period was divided into two periods; March - December 2020 and January - July 2021 due the difference in government measures during these periods. Crashes in Tulkarem Governorate for the period of 2016-2019 (pre-pandemic) were compared with crashes during the two pandemic periods. Results showed that the number of intersection crashes in Tulkarem Governorate decreased by 80.5% during the pandemic due to the imposed measures. Thursday witnessed the highest number of crashes before and the during the pandemic, while Friday had the least before the pandemic. On the other hand, the least number of crashes occurred on Saturdays in the first period of the pandemic and on Wednesdays in the second period. The period of

	10:00-14:00 was the most prevalent in intersection crashes during the pandemic period, and this is in line with the opening of some sectors and facilities by the governmental decisions. During the two periods of the pandemic, pedestrian crashes constituted 19% of the total crashes in the governorate. Approximately, 64% of crashes involved injuries; 86% minor, 9% medium, and 5% severe. These percentages were close to the period before the pandemic. During the two pandemic periods, males constituted the majority of victims (67%), and the age group of 21–30 were the most affected by these crashes. When compared to the years before the pandemic, younger age groups were the most affected. Spatially, Tulkarem City had the highest number of intersection crashes in the governorate during the pandemic periods (41%), while it was 53% before the pandemic. The rate of crashes involving pedestrians per 1,000 people was also the highest in Tulkarem City, a decrease by 87% compared to before the pandemic, followed by the town of Anabta; decrease by 64%. The localities that witnessed relatively higher frequency of crashes were Deir al Ghusun, Attil, and Qaffin in the north, and Faroun in the south. It is concluded that measures taken during the pandemic reduced the number of crashes; however, severity level was almost the same. Outskirt localities witnessed relatively high number of crashes, in addition to Tulkarem City as being the central city in the governorate. These are attributed to the various levels of police control. Therefore, it is strongly recommended to increase the human power of the traffic police and improve their control over traffic laws in order to improve the safety level, at all periods.
Index Terms	Road Crashes, COVID-19, Intersection Crashes, Tulkarem, Palestine

Paper ID	7807
Title	Hybrid Vehicles for Nablus Intra-City Public Transportation -An Environmental and Economic Feasibility Study
Authors	Khaled Al-Sahili and Sharif Salman
Affiliation	An-Najah National University
Abstract	There is a worldwide concern about the increase in vehicles' exhaust emissions of traditional fuels and the rise in fuel prices. Nablus city is a major urban area in the West Bank, Palestine that bears the peculiarity of the various topography, and suffers from traffic congestion. This increases fuel consumption and the gas emission of the diesel operated public transport (PT) shared-taxi vehicles in the city. Therefore, this paper aims to investigate the viability of introducing hybrid vehicles to the urban shared-taxis PT in highly congested areas with peculiar topography. Interviews were conducted and questionnaires were distributed among PT drivers and route managers through which the operational characteristics of each route and associated costs were obtained. Then the existing financial aspects (expenses and revenues) and environmental impacts (gas emissions) of diesel vehicles were analyzed. Financial analysis of existing conditions revealed that there is no immediate urgency in switching all diesel-fuel shared taxis to hybrid. Therefore, two scenarios were developed to improve existing conditions. The first was replacing old PT cars (2009 or older) with

	hybrid vehicles, which provided an average financial saving of 20.9% with a reduction in exhausts emission of CO by 33%. The second scenario included replacing PT vehicles with production dates from 2009-2014, which produced financial savings of 15% and reduction of exhaust emissions by 35%. The comparison showed a preference for the first scenario at the current time, while implementing other scenarios gradually. The first scenario is simple and close to reality; as old vehicles should typically be replaced. The study recommends using hybrid vehicles for each new PT vehicle introduced to the service, and establishing national level policies to encourage the use of alternative fuels for the transportation sector, with particular focus on PT.
Index Terms	Hybrid, Public transport, Shared-taxi, Financial feasibility, Palestine

Paper ID	8638
Title	Detecting and Analyzing Motorcyclists' Riding Behavior at Hazardous Locations: A Case Study from Nablus City
Authors	Mohammed Abdul-Hadi and Sameer Abu-Eisheh M.K.AH@outlook.com, sameeraa@najah.edu
Affiliation	Faculty of Graduate Studies, An- Najah National University Department of Civil Engineering, An- Najah National University
Abstract	The motorcycle is becoming an important transportation mode in the recent years in many countries, including Palestine. Nablus Governorate has witnessed the highest rate of increase in the registration of motorcycles in Palestine, and therefore is selected to study the behavioral safety-related aspects of this mode. The aim of this paper is to present the results of a study on the behavior of motorcyclists at one of the hazardous locations in Nablus City. The study location was identified to be a key intersection based on spatial analysis conducted to generate motorcycle crash maps for the city, based on data obtained from Nablus Traffic Police Department covering the period from January 2019 to November 2021. Using the footage from installed cameras at the representative indicated location, the behavior of motorcyclists when crossing the intersection was observed for a three-day period in July 2022. Analysis of the motorcyclists' behavior at the studied intersection shows that there were more than 70% of motorcyclists who crossed the intersection, commit at least one behavioral violation, with most as illegal overtaking, crossing the red light, and mingling. Moreover, for the delivery use and private use motorcyclists, the percentages of those with legal behavior and wearing helmets were only 12.7% and 5.1% of total, respectively. ANOVA was conducted to investigate whether there have been significant differences in the behavioral violations among key relevant variables, such as the days, the user groups, or the presence of a rear passenger. Based on the outcome of the analyses, relevant recommendations are highlighted to better adhere to traffic regulations by motorcyclists, and to reduce the potential and severity for motorcycle traffic safety crashes.
Index Terms	Motorcycle Traffic Safety, Behavior of Motorcyclists, Palestine

Paper ID	8893
Title	How Do Drivers Behave at Roundabouts in a Mixed Traffic? A Case Study Using Machine Learning
Authors	Farah Abu Hamad, Rama Hasiba, Deema Shahwan and Huthaifa Ashqar
Affiliation	
Abstract	Driving behavior is considered a unique driving habit of each driver and has a significant impact on road safety. Classifying driving behavior and introducing policies based on the results can reduce the severity of crashes on the road. Roundabouts are particularly interesting because of the interconnected interaction between different road users at the area of roundabouts, which different driving behavior is hypothesized. This study investigates driving behavior at roundabouts in a mixed traffic environment using a data-driven unsupervised machine learning to classify driving behavior at three roundabouts in Germany. We used a dataset of vehicle kinematics to a group of different vehicles and vulnerable road users (VRUs) at roundabouts and classified them into three categories (i.e., conservative, normal, and aggressive). Results showed that most of the drivers proceeding through a roundabout can be mostly classified into two driving styles: conservative and normal because traffic speeds in roundabouts are relatively lower than in other signalized and unsignalized intersections. Results also showed that about 77% of drivers who interacted with pedestrians or cyclists were classified as conservative drivers compared to about 42% of conservative drivers that did not interact or about 51% from all drivers. It seems that drivers tend to behave abnormally as they interact with VRUs at roundabouts, which increases the risk of crashes when an intersection is multimodal. Results of this study could be helpful in improving the safety of roads by allowing policymakers to determine the effective and suitable safety countermeasures. Results will also be beneficial for the Advanced Driver Assistance System (ADAS) as the technology is being deployed in a mixed traffic environment.
Index Terms	Driving Behavior, Driving Style, Roundabouts, Vehicle Kinematics, Machine Learning

Engineering Education

Paper ID	9118
Title	VR earthquake simulator
Authors	Ro'ya AL-aqraa, Ahmad ghabbish , Allam mousa allam@najah.edu
Affiliation	Department of Electrical and Computer Engineering AI and VR research centre An-Najah National University, Nablus, Palestine
Abstract	In recent years, virtual reality technology has been rapidly advancing, making it possible to create immersive experiences that can simulate virtually any scenario. One such application of this technology is in disaster preparedness training. By utilizing virtual reality, individuals can be trained on how to handle various emergency situations without putting themselves

	in danger. This is where my project comes in: designing a virtual reality application using Unity and uploading it to the Oculus Quest 2 to simulate an actual earthquake and teach users how to behave during this catastrophe. Virtual reality (VR) has emerged as a breakthrough technology over the last few years. The ability to create a simulated environment that mimics real-life scenarios creates an opportunity to learn and experience circumstances that may not be safe or feasible in reality. The present paper aims to discuss the design of a VR application using Unity that simulates an earthquake disaster. The application will be uploaded to Oculus Quest 2, the leading wireless VR platform, for an immersive experience that will help users comprehend how to handle such a catastrophe and behave during it. Learning about metaverse understandin and how modern technologies like XR technologies are applicable to various sectors and also why and what sectors adopting them in the first place, what is the history of VR software and hardware and what is the VR system architecture, and practice oculus quest and know how it work. looking on previous work about VR fundamentals with unity.
Index Terms	virtual reality(VR) , unity, disasters , scene, environment, interaction, metaverse .