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وزارة التعليم العالي والبحث العلمي

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المؤتمر الدولي الاول للابتكارات في تكنولوجيا المعلومات وتأثيرها على التنمية المستدامة

25-27 نيسان 2025

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Book of Abstracts

The First International Conference on Innovations in Information Technology and Their Impacts on Sustainable Development

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المتحدثين الرئيسيين

Prof. Dr. Amin Abbosh

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Faculty of Information and Communication Technology. International Islamic University Malaysia. Kuala Lumpur, Malaysia.

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Abdulnasir Hossen got his Ph.D. from the Ruhr-University in Bochum-Germany.
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Associate Professor, Engineering Program Director, School of Engineering, University of Southern Queensland, Toowoomba, QLD.

جدول اعمال المؤتمر

#	KEYNOTE SPEAKER	TIME
1	**Prof. Dr. Amin Abbosh**	10:15 - 11:00
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Started 13:30 PM – To 15:30 PM Baghdad Time / Hall No.: D1- Lab Building – First floor
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Session Coordinator: Dr. Wissam Hazim Jwad

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7	Ali Othman Al Janaby Mahmood Fawzi alfathee Abdul Majeed Ahmed Maryam Qusai Abdulqadir Sama Salah, Hoor Abdul Satar Maryam Adnan, Hajer Khalid Summar	Designing a LoRa-WAN Network for Fuel Transport Management in Smart Cities

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Session Chair: Prof. Dr. Mannar Kashmolla
Session Coordinator: Asst. Prof. Ali Othman

Track: Artificial Intelligence and Machine Learning

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4	Shaymaa Ammar Ali Othman Al Janaby Hussain al Rizzo Manar Kashmula	ISAC Employing Artificial Intelligence and the Deployment of 6G Networks for Drone Detection at Multiple Altitudes
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Session Coordinator: Dr. Yahya Taher Qassim

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2	Ali H. Al-Shakarchi Huthaifa L. Mohamed Yousif Khalid Yousif Salama A Mostafa Ali Khairi Altoohafi Abdulamjeed Sulaiman	Machine Learning Approach for Malware Detection in Software-Defined Networks
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5	Salama A. Mostafa	IoT-Enabled Automated Plant Watering System Based on Real-Time Soil Moisture Monitoring
6	Zainab Saadi Hussein AL-hilali, Muhamad H.Omar AL-Saidaly Khaled A.Khaled AL-bakooh Momen F.Fouad AL-taiee	Software of automatic search for an anonymous person in the voice database
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Track: Big Data and Data Science

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2	Rahmah J. Abdulkareem Younis MAbbosh Dia M. Ali	Synthetic Microwave Inversion Techniques for Medical Imaging
3	Dr. Ahmed Saeed Rasheed	The Level of Awareness of Modern Information Technology and Its Relationship to the Improvement of Sports Performance Among University Futsal Team Players in Iraq
4	Prof Dr Hikmat Said Alsalim	Bridging Geology and Petrophysics for Smarter Reservoirs
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6	Enas Abdulkarim Mohammed Younis M. Abbosh Dia M. Ali	CHANNEL ESTIMATION IN 5G AND BEYOND BASED ON DEEP LEARNING
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تحديات ومخاطر تطبيقات الذكاء الاصطناعي في القرآن والسنة النبوية

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الخلاصة: يعتبر القرآن الكريم والسنة النبوية من المصادر الأساسية للشريعة الإسلامية، ولغة القرآن الكريم هي اللغة العربية وهي لسان العرب الذين كانوا ولا زالوا أداة الإسلام، وهي أصعب اللغات الطبيعية قاطبةً نطقاً وصياغةً ولها تراكيب معقدة نحوياً وتمتاز بتعدد لهجاتها وخطوطها وتنوع معاني كلماتها باختلاف تشكيل حروفها لذلك لم تنجح جميع محاولات ترجمة القرآن الكريم الى لغات اخرى. كل ذلك أدى الى عدم قدرة الآلة الإلمام بكل هذه المزايا بصورة جيدة للوصول الى نتائج صحيحة، لذا كان من الصعب بمكان تدريب نماذج الذكاء الاصطناعي بشكل فعال على اللغة العربية ومكنوناتها المتعددة ومعجزتها كتاب الله العزيز (القرآن الكريم) لبلاغته وتعدد دلالاته ولا تستطيع الآلة الصماء القيام بدور المتفقه بكتاب الله العظيم وسنة رسوله الكريم قياساً بالعلوم والتخصصات الأخرى وبقي هذا التخصص محدود النجاح في تقنيات تطبيقات الذكاء الاصطناعي ونتائجه غير دقيقة وشافية وبحاجة الى المزيد من البحث والجهد والتقدم.

ومن جهة اخرى لازالت اللغة العربية والشريعة الإسلامية بالذات تعاني من ضعف في مصادرهما الرقمية حيث لا يتجاوز المحتوى العربي على شبكة الإنترنت ٤٪ قياساً بالمحتوى الانكليزي الذي تجاوز ٩٠٪، وحيث أن وجود قاعدة بيانات ضخمة ودقيقة وموثوق بها هي من أهم العوامل التي تعمل على نجاح الذكاء الاصطناعي في هذا المجال.

لذا يجب الحذر كل الحذر من فتح الباب على مصراعيه أمام الذكاء الاصطناعي للعمل على النص القرآني والحديث الشريف ومبادئ الشريعة الإسلامية وخاصة ما يتعلق بالذكاء الاصطناعي التوليدي وخوارزميات انشاء محتوى نصي والتنبؤ به والترجمة الآلية وتلخيص النصوص وغيرها من تطبيقات الذكاء الاصطناعي، حيث لا يجوز شرعاً التصرف بالنص القرآني والحديث الشريف والاستنباط الشرعي والفتوى دون دراية فقهية واجتهاد مقبول. كل ذلك يمثل تحديات تواجه القرآن والشريعة من التقنيات الحديثة بصورة عامة والذكاء الاصطناعي بصورة خاصة يجب الانتباه لها ومتابعتها بشرياً من قبل متخصصين بالشريعة.

يلقي هذا البحث الضوء على بعض التحديات والمخاطر للذكاء الاصطناعي تجاه القرآن والسنة النبوية والشريعة ورصدها وتشخيصها حاضراً ومستقبلاً وتصنيفها واقتراح الحلول والتوصيات وأساليب معالجتها، اضافة الى مقارنة نتائج تطبيقات الذكاء الاصطناعي الحالية مع نتائج التطبيقات التي تعتمد على محتوى محدد وتقنيات قواعد بيانات محمية من جهات معروفة وموثوق بها.

Session: 1 (No. 2)

Convolutional layer unit for FPGAs Based Object Detection Systems

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Abstract. The paper proposes a scheme to design a hardware convolutional layer as a part of hardware object detection systems like convolutional neural network CNN, region convolutional neural network RCNN, single shot multi box detector SSD and you only look once YOLO. Hard object detection systems play an important role in machine vision techniques as it can be easily connected to a robot circuitry. Soft core processor system is developed and configured on Spartan 6E using embedded design techniques to constitute the hardware system media which is accommodated to behave as a hard convolutional layer. External memories, EEPROM and dual data rate synchronous dynamic RAM, were attached to the system via processor local bus to meet the intensive computation requirements. Ethernet IP core is added to the system to act as data acquisition port. The designed configuration performance is tested and compared with mat lab results with error less than 0.002%.

Classification of News Articles Using NLP Techniques and Machine Learning Algorithms: Comparative Study

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Abstract. News primarily aids people in recognizing the events that have occurred in their surroundings. Since news is essential as a venue for social interaction, daily newspapers, whether online or in print, emphasize news. In contemporary times, the majority of individuals access news through online platforms. However, not all readers engage with every news category; instead, each reader tends to exhibit preferences for specific categories of interest. Consequently, the news category is crucial. Getting all the news from a single news website is really challenging. Occasionally, it might not have the category the user wants. To overcome these challenges, news articles are systematically categorized using advanced classification techniques. Accordingly, this paper presents multiple classification methods to categorize news articles into distinct categories, including sports, economy, politics, and business. The dataset undergoes preprocessing by eliminating punctuation, spaces, symbols, and stop words. Subsequently, feature extraction is performed using two techniques: Term Frequency-Inverse Document Frequency (TF-IDF) and Bag of Words (BOW). Following this, three machine learning algorithms—Support Vector Machine (SVM), Random Forest (RF), and Neural Network (NN)—are employed to classify the news articles into their respective categories. A standard dataset called AG news classification is used in this study. The experimental results revealed that the neural network is outperformed in most metrics.

Real-Time Human Activity Recognition on Smartphones Using Machine Learning Algorithms

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Abstract. Human Activity Recognition (HAR) using smartphone-embedded sensors, such as accelerometers and gyroscopes, provides an efficient, cost-effective, and non-intrusive solution for monitoring Activities of Daily Living (ADLs). This capability is particularly valuable in healthcare monitoring, elderly care, and surveillance, where continuous activity tracking can enhance safety, early detection of health issues, and automated behavioral analysis. While various machine-learning approaches have been explored for HAR, this study focuses on supervised learning models to classify human activities using a benchmark Kaggle dataset. Through rigorous experimentation, Linear Discriminant Analysis (LDA) was identified as the most effective model, outperforming other classifiers with an accuracy of 96%, precision of 97%, recall of 96%, and an F1-score of 96%. An Android-based HAR application was developed to bridge the gap between research and real-world implementation, enabling real-time sensor data collection and classification of human activities using the trained LDA model. The application facilitates seamless integration of HAR technology into mobile platforms, making it accessible for practical deployment in diverse environments.

Assessing the Efficacy of Machine Learning Techniques in the Design of Microwave Filters for Advanced Communication Systems

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Abstract. As wireless networks for data transmission have grown rapidly, there has been a need for microwave filters because it is has many advantages, such as being smaller and less costly in addition to being more efficient. This study showed how machine learning can be used to enhance the Butterworth Low-Pass Filter (LPF). FR4 dielectric material was employed to build the filter operating at 3.6 GHz cutoff frequency and utilizing the Advanced Design System (ADS) modeling program to ascertain the good response of the transmission coefficient (S21) and the reflection coefficient (S11). The design steps involved finding the necessary filter design parameters (width and length) and training using a variety of machine learning algorithms(ML) , including Artificial Neural Networks (ANN), Decision Trees (DT), Linear Regression (LR), and Support Vector Machines (SVM). As communication technology have advanced, it is necessary to provide designs that are more practical and responsive, which take a lot of time and work for designers to deal with a lot of mathematical equations making them subject to human error. ML methods are helpful because they save time and effort compared to the traditional ways. The length and width factors of each part of the filter circuit put into a database at different frequencies. The ADS program's optimization tools were used to make these numbers better in building the database. The ML algorithms models were trained by writing their own code in Python language to get the width

and length, these techniques helped make the best design and achieve better response.

Session: 1 (No. 6)

Random Forest Algorithm for Satellite Image Classification Using Google Earth Engine: Iraq Case Study

Muneera Yousif[10000-0003-2012-5735], Asmaa E. Hamdoon[2], Maryam Abdulsattar Mohammed Khudhur[3], Sabaa Mohammed Salih Jameel[4], Saeif Zeyad Mohammed[5], Arwa Ammar Anes[6]and Zainab Ihsan Mahmoud[7]

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Abstract. The unmanned aerial vehicles such as drones and satellite constellations are essential systems for monitoring land surface dynamics remotely play a vital role in collecting data aspects of life, local weather patterns and climate change have led to number of problems for farming industry. Thus, this study aimed to create classifier can quickly produce and accurate land cover maps to classify (Water, Fallow, Cropped, Sand, and Forest areas) on the Iraq territory, especially for hard-to-reach areas and to avoid the problems of data download and storage space.

In the Google Earth Engine (GEE) platform, there is the ‘‘Classifier’’ package that manages supervised classification by collecting training data and

assembling properties that store the known class label and numerical values for the predictors. By using random forest method builds multiple decision trees based on 80% training samples and data for different periods of the year 2023, the overall accuracy rate of the random forest algorithm was 99%.

Session: 1 (No. 7)

Designing a LoRa-WAN Network for Fuel Transport Management in Smart Cities

Ali Othman Al Janaby[1], Mahmood Fawzi alfathee[2], Abdul Majeed Ahmed[3], Maryam Qusai Abdulqadir[4]Sama Salah[5], Hoor Abdul Satar[6], Maryam Adnan[7], Hajer Khalid Summar[8]

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Abstract: The internet is a global interconnected network connecting huge numbers of devices and users worldwide. Internet services provide many benefits and advantages that positively impact the daily lives of individuals and businesses. Despite the strength and importance of this network, the internet can experience disruptions in certain situations and conditions. Technical problems such as technical malfunctions in the internet network, or natural disasters like earthquakes or hurricanes can cause interruptions in internet service. This paper presents a LoRa WAN network design, using OMNET +, to be an alternative internet network that can be of great importance in special circumstances. For example, in providing local services, some entities such as governments or large companies may need to create a private or an alternative internet network to offer dedicated local services that require full control without dependence on the internet. This paper uses a long range (LoRa) technology as an alternative service to determine the quantities of fuel required for cars in queues at fuel pump stations by providing smart routing devices. These devices use artificial intelligence (AI) and data analysis techniques to guide

drivers to the appropriate pump based on the car's fuel tank size and the required fuel quantity. These devices can also provide additional information such as fuel prices and special offers at the station. Drivers can then direct their cars to the appropriate pump, saving time and effort in waiting in long queues at the station.

Session: 2 (No. 1)

ALGORITHM TO ANALYZE THE HEART SOUND TO DIAGNOSE SOME HEART DISEASES

Abdulrahman A.Mahmood AL-TANAKCHI

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Abstract. In this thesis, a novel algorithm will be created with the goal of analyzing heartbeat sounds. Heartbeats and the interval between the two main heart sounds, S1 and S2, must first be counted in order to determine how many there are. The counting of heartbeats and the measurement of the interval between the two main sounds of the heart are two objectives of this research. In the context of this investigation, we talk about a peak detection-focused methodology. Our current main research goals are to filter and quantify the temporal gaps between the two most significant cardiac sounds, S1 and S2. The proposed method showed a high degree of accuracy in identifying S1 and S2 as the source of the data when using the data gathered by our system. When they collected and analyzed the heart sounds of donors, they found that this accuracy was approximately 95,6%. By recording and interpreting the donors' heart sounds, this was discovered. Each of the 15 donors was distinctive in their own way, and they ranged in age and gender (both male and female). However, when utilized using data that was freely available online, the tool's accuracy decreased to 75.194% due to the subpar recordings. This resulted from the low

quality of the recordings. The system calculated the heart rate in addition to the S1 and S2 intervals, and bar graphs were used to display the results of these computations.

Session: 2 (No. 2)

Verification of Speech Signal Using DWT and MFCC Features

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Abstract. For speaker verification, Wavelet Modified features of Mel Frequency Cepstral Coefficient (W-MFCC) using wavelet-decomposed sub-bands of various frequencies are proposed in this study. The performance of Mel Frequency Cepstral Coefficient (MFCC) features is examined and evaluated with the features of W-MFCC. Discrete Wavelet Transform (DWT) with the Daubechies filters that provide good time-frequency localization is used in the study. A database of two speakers who intonate the text- dependent word "ALLAH" is used to simulate the results. The performance of the suggested features for the text-dependent speaker verification system has improved and outperformed by about 3.6% of the MFCC features.

Session: 2 (No. 3)

The impact of some generative artificial intelligence tools via search engines on the development of cognitive awareness: An analytical study of the opinions of a sample of employees of Al-Hamdaniya University and Nineveh University in Mosul city

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Abstract

The research aims to develop cognitive awareness (knowledge awareness, task awareness, and thinking strategies awareness) for a sample of employees of Hamdaniya University and Nineveh University in Mosul, via generative AI tools (ChatGPT, Upword, Grammarly, Consensus, Elicit, SheetAI App, AI Excel Bot) via search engines, The research used the analytical descriptive method to measure the research variables, as it relied on the questionnaire as a tool to collect data for the opinions of a sample consisting of (90) individuals from some employees of Hamdaniya University and Nineveh University in the city of Mosul, The research used the analytical descriptive method to measure the research variables, as it relied on the questionnaire as a tool to collect data for the opinions of a sample consisting of (90) individuals from some employees of Hamdaniya University and Nineveh University in the city of Mosul, The data was analyzed using SPSS V26 statistical analysis program and the research reached many results, the most important of which is the existence of a statistically significant direct relationship between generative artificial intelligence tools and cognitive awareness.

Session: 2 (No. 4)

ISAC Employing Artificial Intelligence and the Deployment of 6G Networks for Drone Detection at Multiple Altitudes

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Abstract: The swift progress in sixth-generation (6G) wireless networks has created novel prospects for integrated sensing and communication (ISAC) applications, especially in the detection of unmanned aerial vehicles (UAVs). This study investigates the implementation of 6G networks employing Integrated Sensing and Communication (ISAC) for drone detection at different altitudes. A deep learning model utilizing Long Short-Term Memory (LSTM) networks is created to estimate drone altitudes based on Doppler shift, target distance, and Signal-to-Interference-Plus-Noise Ratio (SINR) as input variables. Experimental findings indicate that 6G-enabled sensing improves altitude estimation precision, particularly in high SINR environments. The results underscore the promise of THz-band communications, beamforming, and massive MIMO in enhancing UAV detection capabilities. This research establishes a basis for forthcoming ISAC-based 6G networks and their function in next-generation aerial surveillance.

Session: 2 (No. 5)

Diseases of Vegetable Plant Recognition Based on Enhanced Squeeze Net Algorithm

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Abstract: This paper introduces the recognition of plant diseases using a deep learning (DL) algorithm called SqueezeNet. To achieve this, the SqueezeNet network was adapted to recognize plant diseases. However, one drawback of SqueezeNet, it has a large number of parameters and relatively low recognition accuracy. To address this issue, the network was enhanced in this paper by simplifying its structure and improving its feature recognition capabilities. Specifically, adjustments were made to the fire module by modifying the size of the convolution kernel, the number of network layers, and the channels in the Expand layer. Additionally, the model was combined with the Efficient Channel Attention (ECA) module, which assigns attention values to each channel through local cross-channel interaction, thereby enhancing the network's ability to learn key features. The algorithm was tested against three others—LeNet, MobileNet, and the traditional SqueezeNet—using the "PlantVillage" dataset. The proposed model achieved a high accuracy rate, performing better than the traditional SqueezeNet with an accuracy of 97.29%.

Smart and Cooperative Waste Management System in Smart Cities using QR Code

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Abstract: The system designed to connect users with recycling plants to promote environmental sustainability. The system facilitates household waste collection by involving three key stakeholders: the users (citizens), the sorting workers, and the system manager. Users play an active role by collecting waste materials, such as gas cans and other household waste, and delivering them to designated exchange points. At the exchange point, users scan a QR code and attach it to their waste bag. This QR code is essential for tracking and rewarding users. Upon scanning the code, users earn points through a mobile application that runs on both Android and iOS platforms, developed using Flutter. These points can be exchanged for discounts or coupons at partner stores, creating an incentive to participate in the recycling process. Sorting workers are responsible for assessing the amount and type of waste delivered. They use a separate mobile application, also developed with Flutter, to scan the QR code on each bag, calculate the user's points based on the waste amount, and update the user's account accordingly. This streamlined approach ensures accurate tracking and rewards distribution. The manager of the recycling system oversees the entire process through a desktop application, also built using Flutter. The manager's application enables the generation of QR code stickers for users and provides access to real-time statistics on waste collection and recycling efforts, which aids in decision-making and performance monitoring. The system's backend infrastructure is powered by Firebase, which offers services such as user authentication, data storage, and real-time updates. Firebase ensures that the system is secure, scalable, and easy to maintain, allowing for seamless integration between the different applications and stakeholders. This innovative system not only simplifies the recycling process but also encourages user participation through a rewards program, contributing to a more sustainable environment.

Develop, Analyze and Improve The Scheduling of The University Management System (Learning Management System)

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Abstruact

Technology-enabled learning is increasingly important and pervasive in .higher educationCalled Course Management Systems (CMS) or Learning Management Systems (LMS), web-based systems allow instructors and students to share instructional materials, make class announcements, submit and return course assignments, and communicate with each other online.Learning management technology makes it possible for colleges and universities to collect, store, and mine data for business intelligence, descriptive, and predictive analytics.Every LMS, a learning management system, has its own unique set of features. This is what differentiates each product. At the same time, although the features may differ, there is a certain standard set of features and settings that are most common and present in virtually any LMS. This set typically solves basic learning tasks such as enrollment, educational achievement monitoring, planning, content management, communication, and teamwork. Some sys In this research, we study the scheduling problem University management system (LMS learning management system). Suggest our solution to solve it. We have explained that change management is Also an essential part of the system. Comparative analysis of standards A Learning Management System (LMS) has been implemented, representing the learning materials of the courses and a well-known Learning Management System (LMS). The conclusions were made based on the gathered and presented material. The new system developed and implemented in a number of educational institutions was presented in this work The research is illustrated with the images of particular systems as well as the comparison table and brief information blocks to systemize the material representation.

Track: Cybersecurity and Privacy

Session: 3 (No. 1)

Enhancing Image Security with Hybrid, Symmetric, and Asymmetric Encryption: A Comparative Study for Sustainable Cybersecurity Solutions.

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Abstract. The study suggests a new method for encrypting and securing images called the hybrid algorithm, which combines symmetric and asymmetric techniques and compares it with AES, RSA, and encryption algorithms. Five high-resolution grayscale photos of different sizes were used for encryption and decryption. The images were encrypted using AES, RSA, and hybrid algorithms. Performance analysis criteria like entropy, PSNR, correlation coefficient, and elapsed time were used to evaluate the algorithms' performance. Python was used for programming all simulation algorithms and criteria's.

finding that hybrid encryption outperforms AES and RSA in terms of image size, strength, and encryption quality. It also outperforms RSA in PSNR and elapsed time for total encryption and decryption. The hybrid algorithm is 2% faster and has the lowest entropy value, making it resistant to statistical attacks. It has been discovered that the combination of symmetric and asymmetric encryption techniques creates a highly efficient algorithm for data security.

Session: 3 (No. 2)

Performance Analysis of Hybrid Cryptography and Steganography for Sustainable Cybersecurity and Data Protection

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Abstract. The study combines block and hybrid encryption techniques with steganography techniques to protect text files and hide them inside images. This approach makes it difficult to detect private information hidden in a file, image, or other material. Steganography techniques help hide the existence of a secure channel while identifying and marking the encrypted file, communication, or network packet payload. The study uses the AES block cipher algorithm and a hybrid algorithm of symmetric and asymmetric encryption techniques to encrypt the hidden image, preventing cyberattacks and limiting their impact between the sender and receiver. The study found that the method is almost undetectable across all image sizes and that the encryption methods are flexible and compatible with high-quality stash methods. Based on the standards of encryption quality analysis and masking techniques (NPCR&UACI, Histogram, PSNR), the flexibility and compatibility of encryption methods with masking methods appeared with high quality. By following the standards of image quality and encryption, we find that the image matching rate was 100% and the encryption quality reached 99.6%.

Session: 3 (No. 3)

Integrating Exploiting Modification Direct and Improved LSB Methods in Data Hiding Approach

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Abstract. The swift expansion of covert operations through communication networks has created a growing demand for effective data hiding techniques to safeguard confidential information from harmful intrusions. Three crucial elements payload, imperceptibility, and robustness that inevitably include a trade-off relationship determine how effective data concealment is. Thus, the goal of this research is to create a technique that can embed a significant amount of secret data into a grayscale host image while maintaining the image's aesthetic appeal and boosting resilience against any security risks. By combining the Exploiting Modification Direction (EMD) and Least Significant Bit (LSB) approaches, a novel solution is created to meet the study's goals. To increase the payload capacity within the cover image, the secret message is first transformed into a series of secret numbers, each of which is represented by a maximum of five bits. The cover image is then split into two separate sections: the first uses the EMD approach for data embedding, and the second uses the LSB method. The cover image is divided into 13-pixel groups in the first stage**.** The secret digits are embedded into these groups by modifying, at most, one grayscale value to encode the data within a (2ki + 1)-ary notational system. In the latter phase, the remaining secret digits are embedded using the LSB method. To further enhance robustness, the Knight’s Tour technique is integrated with the LSB method, ensuring a more secure and resilient data embedding process. Experiments show that the suggested approach greatly increases robustness when compared to the original EMD methodology and conventional LSB embedding. The suggested approach ensures little visual distortion in the stego-image and performs better than the LSB method in terms of imperceptibility**.** Additionally, the proposed method achieves a higher payload capacity than the original EMD method, making it a more effective solution for embedding large

volumes of secret data while maintaining image quality and robustness against potential threats.

Session: 3 (No. 4)

Simplify Attack Graph Using Critical Path Preserving Graph Reduction

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Abstract. The use of network technologies has increased in recent years. Although the network is beneficial for individuals to work and live in, it does have security challenges that should be rectified. One of these issues is cyberattacks. The attack surface for hackers is growing as more devices are linked to the internet. Recently, many approaches have been proposed to detect and predict attacks; one of these approaches is attack graphs. The main reason for designing the attack graph is to predict the attack as well as to predict the attack's next step in the network. However, current attack graphs are suffering from a few issues. Scalability is the main issue the attack graph generation is facing. For this issue, this study proposes using personal agents to reduce the reachability time in calculating between the nodes and use the critical path preserving graph reduction algorithm to remove unnecessary edges,

minimizing the attack graph's complexity. The results show that the proposed performance better than the exiting attack graph. The proposed attack graph reduced the generation time and the attack graph complexity.

Session: 3 (No. 5)

Network Intrusion detection and classification Based on-Hybrid intelligence techniques: new method

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Abstract. The increasing sophistication of cyber-attacks presents significant challenges for securing modern networks. Traditional Intrusion Detection Systems (IDS) often struggle to identify new threats due to their reliance on predefined attack signatures. To address this limitation, hybrid intelligence techniques that combine clustering and optimization algorithms have arisen as promising solutions for enhancing the detection and classification of network intrusions. In this study, we propose a novel hybrid approach that integrates K-means clustering, Genetic Algorithm (GA), and Particle Swarm Optimization (PSO) to improve anomaly detection and misuse detection in intrusion detection systems. The method was evaluated using the KDD CUP 99 dataset, a widely used benchmark for intrusion detection research. The proposed Hybrid Clustering Algorithm II (HCAII) optimizes the detection process by reducing false positives and achieving high accuracy rates for identifying various types of network attacks, including Denial of Service (DoS), Probe, User to Root (U2R), and Remote to Local (R2L) attacks. Comparative analysis with existing methods demonstrates that HCAII outperforms traditional clustering and optimization techniques by achieving improved detection rates and

classification accuracy. The proposed method effectively addresses the challenges of both anomaly and misuse detection, providing a robust solution for safeguarding network infrastructures against evolving cyber threats.

Session: 3 (No. 6)

Performance Investigation of Physical Layer Authentica-tion Using Federated Learning in the Presence of Mali-cious Collaborator

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Abstract Lightweight authentication based on the physical layer attributes/metrics is considered a promising area in wireless communications, particularly for resource-constrained Internet of Things (IoT) devices. With the increasing need to provide security services on these devices, emerging technologies are required to augment the authentication procedure. Federated learning has been introduced as an effective model based fusion solution, enabling multiple devices to collaborate with a central node to train an artificial intelligence model aimed at improving security. However, one of the main challenges is the possibility that one of the collaborating devices may become untrusted, which could affect the federated learning process by sending false models. In this paper, the impact of these malicious devices on the federated learning process is evaluated, particularly in the context of physical layer authentication for IoT systems. In addition, a strategy for detecting malicious collaborators and eliminating corrupted models from the federated learning process

has been discussed. The validity of this study was confirmed using a measured dataset of Channel State Information (CSI), which helps to illustrate the effectiveness of the developed scheme. Keywords: Internet of Things, Physical Layer Authentication, Federated Learning, Mean Aggregation.

Track: Big Data and Data Science.

Session: 4 (No. 1)

Synthesizing Wide Beam Patterns for Low Earth Orbit Satellite Communication Systems for Global Internet Access Applications

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Abstract: Low Earth Orbit (LEO) satellite communication systems are crucial for future global internet access due to their ability to provide higher downlink capacity and smaller link budgets. Expanding the beamwidth in remote or sparsely populated regions is essential to ensure widespread coverage, particularly in areas where traditional terrestrial infrastructure is not viable. The challenge faced by these systems is the design of antennas with wide beam patterns that can offer internet access in such hard-to-reach areas.

This paper investigates various array beamforming techniques for generating wide beams to cover the required regions. This paper suggests to use Woodward-Lawson Method as well as Quadrature-Phase Excitation method to synthesis such wide beams. Further, it can be synthesized these arrays using amplitude-only excitation weights or phase-only control.

The performance measures of these two methods were compared and analyzed using the following radiation characteristics; directivity, Half-Power Beamwidth (HPBW), Peak Sidelobe Level (PSL), and Main Beam Ripples (MBR). The simulation results will consider various antenna array sizes like 20, 60, and 100 array elements.

Moreover, the wide beam array can be synthesized using an optimization algorithm like genetic algorithm to optimally find the amplitude and phase excitations of the array elements. The results indicate that the Woodward method and the Quadrature -phase are both capable to provide the required array pattern coverage.

Session: 4 (No. 2)

Reducing Mutual Coupling in THz Band MIMO Antennas for 6G Applications

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Abstract. For upcoming 6G wireless communication applications, a rectangular Multiple Input Multiple Output (MIMO) antenna that operates in the terahertz band is suggested in this paper. Because of its exceptional high-speed transmission capabilities, graphene is used in the design of the antenna. In order to improve the isolation between the two radiating elements, Defected Ground Structure (DGS) decoupling techniques were applied. To examines the importance of employing these techniques, a parametric study is conducted. The CST Microwave Studio simulator is used to study the performance of the designed MIMO antenna in terms of various metrics. The achieved resonant frequency is 4 THz, antenna efficiency 95% with a smaller antenna physical size compared to other antenna designs in the literature.

The Effect of HfO_2 Buried Layer Thickness on the Electrical Performance of 20 nm n-MOSFETs

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Abstract. The rapid progress in technology and the demand for higher operating speeds are driven by the increasing density of devices per unit chip area, and the ability to employ a nano scale regime to improve the hardware used in artificial intelligence and machine learning. However, as MOSFETs are scaled down, challenges such as short channel effects (SCE) arise, degrading device performance. The integration of high-k materials as gate dielectrics, along with the implementation of buried layers, offers significant performance enhancements. High-k materials reduce gate tunneling leakage current, while buried layers effectively suppress bulk leakage current, collectively improving the reliability and efficiency of MOSFET devices. The current study used Silvaco TCAD ATLAS to simulate a 20 nm channel length MOSFET utilizing a box of HfO2 as a buried layer. The study examined the impact of increasing the buried layer thickness from 10 nm to 60 nm. Key aspects, including electric field distribution, fringing fields, and primary device parameters, were analyzed. Compared to a standard MOSFET without a buried layer, the presence of the buried layer redirects electric fields within the device and reduces fringing fields at the source and drain as the layer's thickness increases. This adjustment leads to a reduction in leakage current (I_{off}) by approximately 13% and a slight decrease in ON current (I_{on}), resulting in an I_{on}/I_{off} ratio improvement of about 20%, even at a thickness of 50 nm. The breakdown voltage increases to 158.3 V at a buried layer thickness of 40 nm but decreases when the thickness reaches 50 nm.

Session: 4 (No. 4)

IoT-Enabled Automated Plant Watering System Based on Real-Time Soil Moisture Monitoring

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Abstract. This study details developing a fully automated plant watering system with soil moisture sensing. This system uses automated watering devices and sensors to water plants based on the soil's moisture levels automatically. The technology makes gardening easier and more efficient by eliminating the need for constant human oversight and the associated risk of forgetting to water the plants. The system consists of elements such as light-emitting diodes (LEDs), resistors, transistors, a breadboard, a water pump motor, a soil moisture sensor, and connecting cables. The ESP8266 module is utilized for data transmission and cloud connectivity, allowing for continuous real-time study of soil moisture conditions. To prove the system's claim that it can reduce water use while increasing plant vitality, we'll talk about how it was built and how we analyzed and displayed the data it collected. The Automated Plant Watering System's eco-friendly approach to plant maintenance helps preserve the planet while providing a convenient automated plant watering solution.

SOFTWARE OF AUTOMATIC SEARCH FOR AN ANONYMOUS PERSON IN THE VOICE DATABASE

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Abstract :

The objective of this research is to investigate efficiency and develop a software system for the formation of voice databases containing information messages from anonymous individuals. The system is designed to automatically search for individuals in the database based on the similarity of voice characteristics. The proposed approach utilizes advanced feature extraction techniques, including Mel-frequency cepstral coefficients (MFCC), chroma features, and spectral contrast, to identify and match voice patterns . This method is crucial for identifying individuals in scenarios where voice recordings are anonymous, such as criminal investigations involving corruption, bribery, and extortion . The system is implemented using Python, with a graphical user interface (GUI) for ease of use, and stores voice features in an SQLite database. The experimental results demonstrate the system's ability to accurately identify individuals based on voice characteristics, with a similarity threshold that can be adjusted by the user. While the system shows high accuracy, it is sensitive to various factors such as accents, background noise, and voice changes. Future work will focus on improving its robustness and accuracy by incorporating additional features and testing on larger, more diverse datasets. This research contributes to the field of voice recognition by providing a practical tool for law enforcement and security agencies to identify anonymous individuals in large voice databases.

Machine Learning Approach for Malware Detection in Software-Defined Networks

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Abstract. Software Defined Network (SDN) has been developed to provide an enhancement to the network via separating the control plan from the data plan. However, increasing the adaptation of these networks has introduced security challenges, especially the potential infection of malware attacks. Classical security mechanism strife to maintain protection and mitigation due to continuous changing behavior of SDN traffic. To address security issues, this paper proposed a new framework for malware detection in the SDN environment by injecting a new detection module that integrates Machine Learning (ML) techniques within SDN 's control plan and utilizes the CIC-MalMem-2022 dataset for training purposes. Four machine learning algorithms named (Naïve Bayes, Logistic Regression, Support Vector Machine, and LightGBM) were selected and evaluated based on their classification capabilities for discriminating malicious and benign traffic. Experimental results show that LightGBM algorithm reveals the best performance by achieving the highest accuracy of 100% and outperforming other algorithms. Moreover, as the suggested approach enhances detection behavior and maintains low

network overhead, it opens the way in near future to adopt deep learning for maintain security of network in the next generation.

Session: 5 (No. 1)

Internet of Things Performance using Raspberry Pi for Body Temperature and ECG with GPS

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Abstract. This paper aims to discuss how the research produced unique results that are comparable to the results of traditional devices for ECG and blood temperature, as well as the patient's location. It does this by examining previous studies, the study's criteria, and the proposed results. The majority of earlier research findings made it impossible to quickly and effectively compare patient data. Since all sensors must be used to show general results, the majority of earlier studies were unable to display results when only one sensor was used. The results of this study show that the most expensive traditional devices can be replaced with sensors and technologies that connect to the Internet of Things and Raspberry Pi to accomplish similar tasks with more flexibility when handling patient data. Aside from financial savings, integrating multiple sensors into a single device is a unique and innovative process that saves a much of time and effort. When handling his medical cases, the doctor can have more privacy thanks to the desktop system's data security, which also keeps unwanted parties from accessing patient information.

Synthetic Microwave Inversion Techniques for Medical Imaging

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Abstract : Microwave imaging has demonstrated potential in medical diagnosis, providing a noninvasive, inexpensive substitute for conventional imaging techniques such as MRI and CT. Some methods, including deep learning-based artificial neural networks (ANNs), Contrast Source Inversion (CSI), and iterative reconstruction algorithms like DBIM-TwIST and ISSWOMP, have been attempted to improve imaging accuracy, computational speed, and real-time imaging. However, the research field still faces enormous challenges. Many procedures remain computationally demanding and consume a lot of processing time, hindering their application in clinical practice.

Most systems also rely on MRI or CT segmentation, indicating the need for independent microwave imaging technology. Furthermore, noise sensitivity, signal interference, and high contrast complexity issues require the development of more robust algorithms. Despite such limitations, machine learning and AI integration have enhanced microwave imaging accuracy but posed matters related to data quality, algorithm generalization, and clinical validation.

This work reviews recent progress in microwave imaging for stroke, brain tumors, and breast cancer detection. Also, it explains the concept of synthetic microwave inversion techniques, examines the limitations under which they work,

and describes the key challenges that must be overcome to reach their full potential in medicine.

Session: 5 (No. 3)

مستوى الوعي بتكنولوجيا المعلومات الحديثة وعلاقتها بمستوى تحسين الاداء الرياضي لدى لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات

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هدف البحث الى:-

١- التعرف على مستوى الوعي بتكنولوجيا المعلومات الحديثة لدى لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات.

٢- التعرف على مستوى تحسين الاداء الرياضي لدى لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات.

٣- التعرف على العلاقة بين مستوى الوعي بتكنولوجيا المعلومات الحديثة ومستوى تحسين الاداء الرياضي لدى لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات.

واستخدم الباحث المنهج الوصفي بأسلوب الدراسات الارتباطية لملاءمته وطبيعة البحث. ويتمثل مجتمع البحث الأصلي للدراسة من لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات والبالغ عددهم (٦٨٤) وبنسبة (١٠٠٪), واشتملت عينة الدراسة على (٢٠٠) لاعب وبنسبة(٢٩,٢) وتم اختيار العينة بالطريقة العشوائية من مجتمع البحث, وتوصل الباحث الى النتائج الاتية, يتسم مستوى الوعي بتكنولوجيا المعلومات الحديثة بالمستوى العالي بينما كان مستوى تحسين الاداء الرياضي لدى لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات بالمستوى المتوسط, وتوجد علاقة ارتباط ذات دالة معنوية بين مستوى الوعي بتكنولوجيا المعلومات الحديثة ومستوى تحسين الاداء الرياضي لدى لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات.

وتوصل الباحث الى اهم التوصيات وهي:-

١- حث لاعبي منتخبات الجامعات العراقية بكرة قدم الصالات القيام بتنظيم المحاضرات والدورات التثقيفية حول مفهومي الوعي بتكنولوجيا المعلومات الحديثة وتحسين الاداء الرياضي.

٢- إجراء المزيد من الدراسات التي تتعلق بمفهوم الوعي بتكنولوجيا المعلومات الحديثة لدى منتخبات الجامعات العراقية والاندية العراقية للالعاب الاخرى.

٣- اعداد برامج للاعبين التي من شانها تعزيز الوعي بتكنولوجيا المعلومات الحديثة للاعبي منتخبات الجامعات العراقية والاندية العراقية.

ويقترح الباحث ما يلي:-

١- استخدام بحث مستوى الوعي بتكنولوجيا المعلومات الحديثة في كافة الالعاب الرياضية.

٢-ودراسة مستوى الوعي بتكنولوجيا المعلومات الحديثة مع متغيرات اخرى مثل علاقته بالشخصية الايجابية الرياضية, وتغيرات نفسية اخرى مثل الذكاء الانفعالي ودافعية الانجاز الرياضي.

Session: 5 (No. 4)

Bridging Geology and Petrophysics for Smarter Reservoirs

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Abstract

Nanotechnology is emerging as a transformative tool that strengthens the collaboration between geologists and petrophysicists in subsurface reservoir analysis. By enabling high-resolution, real-time measurements at the nano- and microscale, nanotechnology bridges the gap between structural geology and fluid dynamics. Geologists now utilize nano-tracers, nano-imaging agents, and micro-CT scanning to map lithological variations and fluid pathways with unprecedented detail. Petrophysicists benefit from nano-enhanced logging tools, nanosensors in drilling fluids, and nanofluids for core flooding experiments, enabling more precise

evaluation of porosity, permeability, and saturation. The integration of these nano-derived datasets leads to unified reservoir models that improve simulation accuracy, guide optimal well placement, and enhance recovery efficiency. Looking ahead, innovations such as AI-trained models, autonomous nanorobots, and smart nano-coatings will further evolve reservoir management.

Session: 5 (No. 5)

The Impact of Information Technology Governance on the Quality of Human Resources Management Information: A Survey Study of the Opinions of Human Resources Department Employees at the University of Ninevah

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Abstract

The current research aims to identify the infrastructure and critical success factors that enable human resources management in organizations to standardize employee information and achieve the quality of that information through the accuracy, speed, clarity, reliability, and legality provided by information governance systems as essential factors of information quality. The intended benefit of the current research lies in integrating information technology, in accordance with the

governing frameworks, into human resources management processes, particularly employee information systems, in a manner that reduces the effort, time, and cost of accessing the information needed about job performance. The research design is based on formulating a set of questions. The research used a descriptive analytical approach through content analysis, which includes analyzing opinion polls conducted by research and studies, analyzing the results of studies, and the organization's records on the study's variables to test its hypotheses. One of the research limitations is that information technology governance is a modern topic that suffers from resistance to change and a lack of understanding of its variables in public organizations, which poses a challenge in proving the impact of such governance on human resources information. Regarding practical justifications, utilizing IT governance dimensions and exploring the relationship with HR information quality are fundamental justifications for enhancing and improving HR management processes. The originality and value of the current research lie in its being one of the first to address the dissemination of IT governance and assess its impact on HR information quality.

المؤتمر الدولي الاول للابتكارات في تكنولوجيا المعلومات وتأثيرها على التنمية المستدامة

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