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ABSTRACT BOOK

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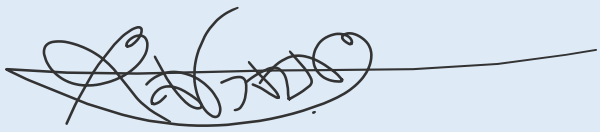
PREFACE

The book of abstracts contains a collection of selected papers from 1st National research Conclave 2024 (NRC 24), which was organized by the Department of Mechanical Engineering, Military Institute of Science and Technology (MIST), Bangladesh. The event was held on 1st October 2024 in General Mustafiz Multipurpose Hall, MIST. The main topic and focus of the conference are already reflected in its name – NRC stands for research endeavors and fostering technology dissemination among students and research scholars. It aims to engage scholars in addressing research relevant to Engineering challenges and provides a platform for identifying technological advancement. Additionally, the Conclave encourages scholars to be deeply committed to their research endeavors, promoting the generation of impactful research outcomes. Through this gathering, scholars from various institutes exchange ideas on a wide array of topics spanning current trends and future advancements in engineering and applied sciences domains.



Assistant Professor Md Insiat Islam Rabby

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1st National Research Conclave 2024

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KEYNOTE ABSTRACT

Improving Chemical Safety Management in Tanneries: A Sustainable Approach to Occupational Health and Safety, an initiative by SusLeather Project.

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Abstract: The leather industry in Bangladesh faces considerable challenges in ensuring occupational health and safety, with chemical safety management in tanneries being a particularly overlooked area. The SusLeather Project seeks to address these challenges by introducing sustainable practices aimed at improving chemical safety and protecting workers' health. The initiative focuses on identifying hazardous chemicals, enhancing handling and storage protocols, improving productivity and providing comprehensive training for tannery workers. By utilizing both qualitative and quantitative methods, the project aims to minimize chemical exposure, prevent health risks, and foster a safer working environment. The anticipated outcomes of this initiative are expected to set a new standard for the industry, showcasing that sustainable chemical safety management is not only practical but crucial for the well-being of workers and the long-term sustainability of the leather sector in Bangladesh.

Keywords: *Chemical Safety, Occupational Health and Safety, Sustainable Practices.*

ABSTRACTS FOR ORAL PRESENTATION

Abstract ID **001**

Numerical Investigation of the Aerodynamic Performance of NACA 4412 Equipped with Leading Edge Rotating Cylinder

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Abstract: Magnus effect is one of the prominent aerodynamic phenomena that occurs when a rotational body inside of a fluid domain experiences force perpendicular to its direction of motion. As the body rotates, the boundary layer separation occurs at two different points from the upper, and lower surfaces of the rotating body, for which pressure gradient develops, which causes the emergence of magnus effect. In this research work, a numerical investigation was done over NACA 4412 airfoil, which was equipped with a rotating cylinder at its leading edge. For simulation, Ansys Fluid Flow (Fluent) was used, and realizable K-epsilon model was chosen as the turbulence model. A clean NACA 4412 was first analyzed numerically with an objective of comparing the numerical data with the experimental data of NACA 4412 for the validation of the simulation model. Afterwards, a rotating cylinder was employed at the leading edge of the NACA 4412 airfoil, which was simulated under the same condition of the validated numerical model. The simulation was carried out at five different angles of attack (AoA): 0°, 5°, 10°, 15°, and 20°. Lift coefficients, and drag coefficients of respective angles of attack were investigated in order to find out the aerodynamic performances. After performing numerous simulations, significant enhancement of the lift coefficient was found for the case of rotary cylindered NACA 4412 airfoil.
Keywords: *Magnus effect, Turbulence model, Airfoil, Lift coefficient, Drag coefficient.*

Abstract ID **002**

Understanding the Perception and Attitude toward Electric Vehicles among young citizens of Bangladesh

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Abstract: This study examines young people's understanding of and opinions about Electric Vehicles (EVs) in Bangladesh, acknowledging their importance as potential customers and industry decision-makers. Initial results from a poll with 102 participants show that people's awareness and opinions toward electric vehicles (EVs) differ, which emphasizes the necessity for focused education initiatives. The study investigates the connection between Electric Vehicle acceptance and awareness, pinpointing critical elements affecting the viewpoints of the youth. In addition to its academic value, the study provides policymakers, educators, and industry stakeholders with insights that will aid in the creation of customized plans to encourage adolescents to use electric vehicles. The goal of this research is to support Bangladesh's transition to a greener, more sustainable future by promoting positive and informed attitudes regarding sustainable transportation solutions.
Keywords: *Electric Vehicles, Awareness, Attitudes, Sustainability, Transportation.*

Abstract ID **003**

The Impact of ICT on Household Technology Usage: Trends and Shift

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Abstract: This study provides a comprehensive examination of the utilization of Information and Communication Technology (ICT) in households, in accordance with recent survey data. The inquiry concentrates on the dynamic adoption and utilization trends of several ICT technologies, including computers, internet, mobile phones, and television. It is important to note that the data indicates a substantial increase in the utilization of these technologies, which is indicative of their indispensable role in contemporary domestic activities. However, the research emphasizes a substantial decrease in the utilization of fixed phones, suggesting a transition in communication preferences toward more adaptable and mobile alternatives. Furthermore, there is a fascinating pattern in the utilization of radio: an initial decrease followed by a revival, indicating a renewed fascination or adjustment of radio in modern media consumption. This pattern may be linked to the integration of radio into digital platforms and the variety of material that appeals to a broader audience. The investigation gives unique insights into the shifting landscape of home ICT usage, underlining the consequences for service providers, regulators, and scholars interested in the interface of technology and daily life. The findings emphasize the importance of continuing monitoring and adaptation to shifting trends in order to better understand the drivers of technology adoption and establish policies that encourage the accessibility and usability of ICT in the home.

Keywords: *Household, Utilization, Technology, Adoption, Preferences.*

Abstract ID **004**

Enhancing Mixed Convective Heat Transport using Dissipative Particle Dynamics Simulation within Graphene Nanolubricant Enclosure

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Abstract: This study explores the efficacy of Dissipative Particle Dynamics (DPD) in understanding heat transfer mechanisms in cavities, focusing on conductive, viscous, and random processes. It also investigates heat transport enhancement in mixed convection within vertical lid-driven enclosures containing graphene nano-lubricants. Thermal conductivity will be computed using DPD units by averaging the constant heat flux vector in the solution domain. The model equations will be refined by incorporating the viscosity and thermal conductivity of nanofluids. The study will examine the effects of variables such as pH level, viscosity, nanoparticle shape, and concentration on thermal conductivity. The impact of different Richardson numbers on the heat transfer process will also be quantified. The research aims to advance our understanding of DPD's capability in describing heat transmission mechanisms and the potential applications of nanofluids in enhancing heat transfer processes. Using the Groot-Warren velocity-Verlet integration scheme, the DPD model will simulate the impacts of particle volume fraction, nanoparticle size, interfacial thermal resistance, and Brownian motion. The study will validate its findings against experimental and analytical data. It will also analyze the mid-height cavity velocity, showing a decrease in heat transfer for nanoparticle volume fractions above 1% for all Rayleigh numbers examined. The results will illustrate that increased Rayleigh numbers enhance mixing and create horizontal isotherms,

reducing the thermal boundary layer thickness near the hot wall. This comprehensive study contributes to the understanding of heat transfer mechanisms using DPD models and the potential enhancement capabilities of nanofluids.

Keywords: *Dissipative Particle Dynamics, Thermal, Nanofluid, Simulation, Graphene.*

Abstract ID **005**

Impact of LULC changes on NDVI and LST in Rajshahi Division: A Remote Sensing Approach

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Abstract: This research investigates the effects of Land Use and Land Cover (LULC) changes on the Normalized Difference Vegetation Index (NDVI) and Land Surface Temperature (LST) in the Rajshahi Division of Bangladesh for the years 2015, 2019, and 2022. Utilizing Landsat 8 OLI satellite data, the study evaluates climate variability and its impact on agricultural patterns and vegetation yield. Findings indicate an inverse relationship between NDVI and LST, suggesting that the expansion of non-vegetated areas leads to increased temperatures, potentially affecting human health and ecosystem components. This study underscores the critical need for sustainable land management practices to mitigate the adverse effects of LULC changes on the environment.

Keywords: *Land Use and Land Cover (LULC), Normalized Difference Vegetation Index (NDVI), Land Surface Temperature (LST)*

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Abstract ID **006**

Validation of Gamma Radiation Attenuation Parameters in locally developed Shielding Material by Using Geant4 Monte-Carlo Code

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Abstract: In this study, gamma radiation attenuation parameters like mass attenuation coefficient, linear attenuation coefficient, buildup factors and relaxation length were calculated using monte carlo code Geant4 for Polyboron, Borated polyethylene, Pure polyethylene, water and ordinary concrete which are developed locally and can be used in radiation shielding. Geant4 is a software package composed of tools which can be used to accurately simulate the transport of particles through matter. The obtained values were calculated for photon energy range 0.1 MeV-20 MeV. For each energy, 10000 particles were transported through the slab. For each shielding highest mass attenuation coefficient was obtained for 0.1

MeV i.e. lowest energy photon. At this energy for Polyboron, ordinary concrete, Pure polyethylene, Borated polyethylene, water and the obtained values are 0.16754, 0.176, 0.1694, 0.1576, 0.1709 cm^2/gm. The lowest mass attenuation coefficient was obtained for 20 MeV. The values are 0.015145, 0.0209, 0.01571, 0.0155, 0.017 cm^2/gm respectively. According to the decrease, the order of the materials in mass attenuation coefficient over the energy mentioned is, Ordinary Concrete > Water > Polyboron > Pure Polythene > Borated Polyethylene The obtained result illustrates the dependency of the linear attenuation coefficient, mass attenuation coefficient and relaxation length of the shielding materials on the photon energy. The study's findings can be used as preliminary data for biological shielding, nuclear reactor shielding, containment buildings, nuclear spent fuel transportation and storage casks and other shielding scenarios. This study is also a validation of Geant4 simulation code as the obtained results were in a good agreement with standard literature values from XCOM database and theoretical calculations.

Keywords: *Gamma, Radiation, Attenuation, Shielding Material, Simulation.*

Abstract ID **007**

Numerical Investigation of Aerodynamic Performance Enhancement of Vortex Generator Integrated NACA 4412

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Abstract: Vortex generator is a type of aerodynamic component that works on hindering the flow separation by enhancing the boundary layer attachment. It creates small vortices along the upper surface of the airfoil, causing the high energy free-stream air with the boundary layer of low energy, which leads to the energization of boundary layer and delay of flow separation. In this research work, the aerodynamic performance of NACA 4412 airfoil equipped with vortex generators were investigated through numerical method. The validation of a numerical model was performed by simulating a clean NACA 4412 airfoil, after which the vortex generators of ogive shape were integrated on the upper surface of the airfoil. Comparative analysis between clean airfoil, and vortex generator equipped airfoil was done in order to investigate the enhancement of aerodynamic performances by parameterizing the lift and drag properties. After going through numerous simulations, vortex generator integrated airfoil was found to have significantly better aerodynamic properties. For this research work, Ansys Fluid Flow (Fluent) tool was used, and k-epsilon viscous model was employed.

Keywords: *Vortex Generator, Ansys, Simulation, Airfoil, Viscous Model, NACA 4412.*

Abstract ID **008**

Assessing Economic Factors behind the Infrastructure Development in Response to Mega-Projects: A Land-Use Change Analysis of the Rooppur Nuclear Power Plant

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Abstract: In Bangladesh, Government started one of the big projects at Rooppur in Paksey union, Bangladesh which is one of the greatest mega projects in Bangladesh history. This study analyzes the past and present conditions of the region and identifies economic factors with potential for infrastructure development and urbanization of Rooppur. The research employs a mixed-method approach, utilizing a questionnaire survey, individual interviews, and key personnel interviews. Six important variables (gender, age, occupation, land ownership, land rent, land use) behind the impact of economic and infrastructure development of Rooppur are investigated in relation to income as the dependent variable by using Agent-Based Models (ABM). The model can be used for incorporating social, economic, and environmental factors influencing land-use change. The findings reveal significant correlations between these factors, suggesting potential impacts like increased income with age and occupation. The study concludes that the RNPP project has the potential to bring positive changes such as income growth, job diversification, land-use transformation, and an influx of skilled labor. However, concerns regarding worker compensation, incentives, and potential safety risks are also identified. Overall, the research suggests that approximately 30% of the working population perceives significant benefits from the project.

Keywords: *Megaproject, Multiple regression analysis, Labor force, Agent Base Model (ABM), Economic development.*

Abstract ID **009**

Impact of Artificial Intelligence (AI) in Job Sector from Different Perspectives

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Abstract: The advent of artificial intelligence (AI) is influencing the traditional way of job and illustrating across different industries. This paper explores statistical data about different cases of its advantages and disadvantages of Artificial Intelligence including economic, social, and ethical dimensions. Looking from an economical viewpoint, AI and automation have affected the dynamics of jobs. From the social view, it is influencing collaboration between man and AI on corporate jobs and industries. Also, some ethical issues arose after the invention of AI. Waves of uncertainty washed over many current job holders when multiple new AI tools were released in the market in 2022-2023. A survey by World Economic Forum estimated that by 2025, AI will have created 97 million new jobs for the 85 million jobs it would have replaced. So, according to their study, 12 million new job opportunities are created. In the automotive industry, operational efficiency increased by 15% because of integrating AI. That is why the statistical data of this paper collected from different perspectives of people. And tried to understand and provide a comprehensive overview about the reshaping process of the job market. The aim of this analysis is to provide a reliable exploration about the impact of AI in traditional job sectors. Also, it aims to suggest proper guidelines to gain enough skill to deal with this invention and make oneself more competitive, more qualified for the job sector. It will also inform policymakers and industry leaders about the benefits and drawbacks of incorporating AI into production or workplace environments.

Keywords: *Artificial Intelligence (AI), Employment, Reskilling, Job Roles.*

Abstract ID **010**

Understanding the Perception of Young Citizens of Bangladesh toward the Rooppur Nuclear Powerplant

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Abstract: This study recognizes the potential stakeholder role of young individuals in Bangladesh in energy policy decisions by investigating their perspectives toward the Rooppur Nuclear Power Plant. Different viewpoints and levels of knowledge about nuclear power are assessed through a survey of 105 participants, highlighting the necessity of focused educational programs. The study explores the variables that impact public views and concerns regarding the Rooppur Nuclear Power Plant. Beyond its scholarly ramifications, the study guides campaigners, educators, and legislators on how to educate young people about nuclear energy. Through comprehending and tackling the issues raised by youth, this study seeks to promote positive discourse and expedite the formulation of sustainable energy policies in Bangladesh.

Keywords: *Rooppur Nuclear Power Plant, Attitudes, Young Citizens, Public Perception, Energy Policy.*

Abstract ID **011**

Measurement of Global Warming Potentiality in Wards of Khulna City Through Carbon Footprint Assessment

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Abstract: This environmental profiling report evaluates the carbon footprint and global warming potential (GWP) of Wards 7, 8, 13, 17, 18, and 19 in Khulna City, Bangladesh. The study focuses on identifying heat sinks and major sources of greenhouse gases (GHG) through a comprehensive life cycle assessment (LCA) across different land uses, including commercial, residential, and industrial sectors. Data collection involved literature reviews, intensive field monitoring, occupant surveys, and both quantitative and qualitative analyses to evaluate constructional and operational stages of carbon emissions over a 60-year life cycle. The study utilized hotspot analysis and carbon emission-relevant equations, in addition to NDVI (Normalized Difference Vegetation Index) and NDBI (Normalized Difference Built-up Index) indices, to assess vegetation health and land use dynamics. The findings reveal significant variations in CO_2 emissions among different land uses, with industrial and commercial areas being the primary contributors to GHG emissions. In Ward 8, industrial areas dominate the land use, releasing 54% of carbon dioxide emissions, which is 2.5 times more than residential areas. Carbon emissions during the production phase are twice as high as during the operation phase in five wards, with Ward 8 being an exception where the operating phase emits more carbon as industries consume a large amount of energy, which typically relies on fossil fuels, leading to significant CO_2 emissions. Road circulation is identified as the highest single source of emissions, accounting for 650,367.48 metric tons of carbon emissions annually. Additionally, the vegetation index (NDVI) decreased by 19% between 2018 and 2022.

Keywords: *Carbon footprint, Global Warming Potential, Life Cycle Assessment, Hotspot Analysis, NDVI, NDBI, Land use dynamics, Heat sinks.*

Abstract ID **012**

Design and Structural Analysis of Double Helical Gear with Varying Helix Angle in ANSYS

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Abstract: Double-helical gear is combined by the left-handed and right-handed helical gears with the same twist angle, which smoothly transmits power between two parallel shafts on heavy loads for reduced noise and vibration operation. Helix angles influence the stress and deformation of double-helical gears before structural failures or breakdowns. Thus, the variation in helix angles can result in wear, fatigue, increased stress, misalignment, and uneven load distributions. In this paper, we modeled double-helical gear using SolidWorks software. By applying ANSYS 23.0, the impacts of helix angles on stress distribution and overall performance are carried out. Then the evaluated data from both the ANSYS and AGMA (American Gears Manufacturing Association) approaches were compared, and this comparison achieved the result of a decrease in stress and strain with the increase in helix angle along the wider face width. At the helix angle of 30 degrees and the constant value of face width, the stresses are found to be 1.4491 MPa and 1.5346 MPa for pressure angles 20° and 14.5°, respectively, in ANSYS. After comparison, discrepancies of 0.287% and 6.204% were identified between the evaluated stresses from ANSYS and AGMA standards.

Keywords: *Stress, Helix angle, Ansys, AGMA, Gear.*

Abstract ID **013**

Understanding Commuter Choice and Preferences and Assessing Factors Influencing Bicycle Adoption as a Commuter Mode: A Case Study on Pabna Municipality, Bangladesh

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Abstract: Analysis of commuters' mode choice behavior is essential for transportation planning and management. This knowledge helps us design systems that meet commuter preferences and accommodate demand for different transportation options. This study investigates factors influencing commuters' preference for bicycles compared to other para-transit options (CNG, rickshaws, autorickshaws) in Pabna Municipality, Bangladesh. It highlights the importance of mode choice analysis in transportation planning. Through a questionnaire survey at key locations, the study explores how journey cost, access time, egress time, waiting time and in vehicle time influence mode selection. Multinomial logistic analysis is performed using SPSS software, although some basic statistical data analysis is performed using Microsoft Excel. Multinomial logistic analysis reveals that bicycles offer significant advantages. The research identifies travel cost, access time, in-vehicle time, comfort, health and safety as the primary reasons for choosing bicycles. It is shown in the factor

analysis, more than 50% commuters' response that the travel cost, safety and comfort are the main causes of preferring bicycle as a safe mode of transport. Furthermore, it emphasizes the need for bicycle infrastructure, such as dedicated lanes, secure parking, and improved intersections, to promote safe and comfortable cycling. By demonstrating the potential of cycling to reduce traffic congestion, fuel waste, and pollution, the study suggests that implementing bicycle infrastructure in Pabna Municipality can be achieved through a well-planned and systematic approach.

Keywords: *Mode choice behavior; Multinomial logistic model; Utility and probability analysis, User satisfaction index (USI), Community effect index (CEI).*

Abstract ID **014**

Impact of the Rohingya Influx on Land Use and Land Cover in Cox's Bazar: A Decadal Analysis (2010-2020)

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Abstract: This study presents a detailed examination of land use and land cover (LULC) changes in Cox's Bazar city, Bangladesh, spanning the decade from 2010 to 2020, with a specific focus on the socio environmental consequences of the Rohingya refugee influx in 2017. The area, renowned for its expansive sandy beaches, has experienced significant environmental transformations due to the establishment of the largest refugee camp, accommodating over 655,000 Rohingya refugees. Using Landsat imagery captured in 2010, 2015, and 2020, we conducted supervised classification to map various LULC categories, including vegetation, barren lands, water bodies, and built-up areas. Our analysis reveals profound shifts in land cover dynamics, notably a decline in vegetation from 56% (116.49 km²) in 2010 to 42% (87.67 km²) by 2020, and an increase in barren land from 27% (57.32 km²) in 2010 to 15% (31.21 km²) in 2020, largely converted to built-up areas. Built-up areas expanded significantly from 10% (21.31 km²) in 2010 to 28% (58.04 km²) in 2020, reflecting rapid urbanization driven by refugee settlement needs, while water bodies remained relatively stable at around 5% (10.66 km²). Change detection analysis, supported by accuracy assessments exceeding 80% overall accuracy and kappa statistics above 0.7, underscores the environmental degradation precipitated by the refugee crisis. The shift from vegetative cover to barren land and built-up areas poses significant implications for local biodiversity, soil stability, and hydrological processes. This research underscores the critical necessity for integrated land management and sustainable development strategies to address the adverse socio-environmental impacts of humanitarian crises. Our findings offer essential insights for policymakers and urban planners striving to balance immediate humanitarian needs with long-term environmental sustainability and resilience in Cox's Bazar.

Keywords: *LULC, Cox's Bazar, Rohingya Influx, Land Management, Refugee.*

Abstract ID **015**

Development, and Numerical Investigation of Thermoelectric Refrigeration Module Along with Varying Assigned Materials

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Abstract: In this research work, a small-scale thermoelectric refrigerator was developed, and experimental data acquisition from the refrigeration unit was done, with an objective of validating the simulation model that was developed using Steady State Thermal tool of Ansys Workbench 2021R2. The refrigeration unit was equipped with heatsinks, thermo-electric Peltier modules, humidifier module, thermocouples, humidity sensors, micro control boards, etc. The refrigerating space was made with Mild Steel sheet, and the outer surface of the refrigeration unit was insulated to hinder the heat loss. After the fabrication of the refrigeration unit, experimental data acquisition was done. After the validation was done by comparing the experimental and analytical data with the numerical data, further simulations were performed by varying material assignment for the case of the heatsink portion of thermo-electric refrigerator. After numerous simulations were done, comparative analysis between the results were done in order to find out the most suitable material for the heatsink. Based on our comparative analysis, we chose Aluminum to be the most preferred heatsink material due to its good thermal conductivity, lightweight nature, and low cost. The tool that we've used for simulation was Ansys Steady State Thermal.

Keywords: *Thermo-electric, Peltier Module, Ansys, Heatsink, Simulation.*

Abstract ID **016**

Harvesting Renewables from Sewage Sludge for Environmental Remediation by Cultivating Energy

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Abstract: This research investigates the use of sewage sludge as a renewable energy source and its potential for environmental remediation. Despite its organic content and ecological risks, recent advancements in anaerobic digestion technology offer the potential for transforming sewage sludge into biogas. Waste-to-energy methods can effectively convert waste into usable energy, addressing waste management challenges. In Dhaka City, approximately 4 million individuals reside within an 80 km^2 area, including districts such as Gulshan, Banani, Baridhara, Baridhara DOHS, Bashundhara, Badda, Vatara, Banasree, Kuril, Parliament Bhaban area, Shukrabad, Farmgate, Tejgaon, Aftabnagar, Niketon, Satarkul, and adjoining areas of Hatirjheel. The collective population generates an average sewage volume of 8,703,149.67 m^3 per month, equivalent to 290,105 m^3 daily. This sewage yields approximately 9,832.67 m^3 per month or 328 m^3 per day of sludge, characterized by a moisture content of 78% and a calorific value of 15,140.40 J/g. The Dasherkandi Sewage Treatment Plant, managed by Dhaka WASA, serves this region and processes the considerable volume of generated sludge. The plant uses fossil fuels to dry and incinerate the sludge, releasing significant residual heat. This heat is transformed into vapor using water as a heat exchanger, which can then generate electricity, potentially making the system energy-neutral. The study shows that the energy wasted in the process is roughly equaled by the power produced from the residual heat. It recommends sustainable sludge management, energy neutralization, and mitigation of greenhouse gas emissions for economic and environmental benefits.

Keywords: *Sewage, Sludge, Renewable Energy, Environment, Remediation.*

Abstract ID **017**

Optimizing Water Resources: Advanced Tools and Technologies for Effective Water Management

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Abstract: Water is a vital resource essential for all life forms and a key environmental element. With the global population growing, water scarcity has become a critical issue, potentially leading to future conflicts. Effective water management tools and methods are crucial for preserving and efficiently using this resource. Smart Water Management involves planning, developing, distributing, and managing water resources using IoT technologies to ensure sustainable usage. The primary benefits of Smart Water Management include reducing waste in water-intensive industries, monitoring water quality to combat pollution and diseases, improving water system efficiency, raising awareness of household water use, and providing innovative solutions for running water. Supervisory Control and Data Acquisition (SCADA) is a significant tool in this field, helping cities manage complex water systems by collecting data from various assets and displaying it centrally for technicians and managers. SCADA systems are used in filtration plants, pump stations, distribution and sewer networks, and for site security and record-keeping. District Metered Area (DMA) management is another crucial tool, especially for old and poorly maintained distribution networks like in Dhaka city. Introduced in the UK in the 1980s, DMA involves defining specific districts within a distribution system, metering water entering and leaving these districts, and analyzing flow to detect and address leaks. This method improves system control, reduces water losses, and facilitates pressure regulation, significantly lowering non-revenue water percentages. Smart metering technology has revolutionized water management by providing accurate, real-time water usage measurements. Unlike traditional meters, smart meters offer automated readings, reducing human error and enabling efficient billing, leak detection, and water conservation efforts. Consumers can monitor their water usage through web portals or mobile apps, making informed decisions to manage their consumption better. The advantages of smart metering include improved water consumption measurement, enhanced leak detection, real-time monitoring, reduced water bills, efficient billing for utility companies, and better data analysis for water management initiatives.

Keywords: *Water Resources, Water Management, SCADA, DMA, Distribution System.*

Abstract ID **018**

Dhaka WASA's Dasherkandi Sewage Treatment Plant: A Holistic Approach to Sustainable Wastewater Management

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Abstract: Dhaka Water Supply and Sewerage Authority (Dhaka WASA or DWASA) is the sole Bangladesh government agency responsible for providing sewerage services to the densely populated city of Dhaka's 22.4 million urban residents.

Dhaka WASA took a holistic approach by formulating a Sewerage Master Plan to meet the aforementioned challenges. Out of five sewage treatment plants, the first establishment was Dasherkandi Sewage Treatment Plant (DSTP), a state-of-the-art facility in Bangladesh treating 500 million liters of sewage per day (500MLD) and the largest single completely biological wastewater treatment plant which has highly efficient for Biological or chemical oxygen demand, Phosphorus and ammonia. This treatment plant is also equipped with UV disinfection facilities to neutralize the pathogen. Moreover, the treatment plant has separate and dedicated sludge treatment facilities. This treatment has the provision of co-treating septage (fecal sludge) to ensure sewage treatment for hard-to-reach areas. DSTP was designed to keep the circular economy in high consideration. Dhaka WASA is determined to achieve SDG-6.2. The effluent which is treated through a biological process has negligible or no chemical residue ensuring sage and habitable aquatic ambiance. Thus, DSTP is contributing to the aforementioned SDG. 50 tons of fly ash are produced as a by-product through significant volume reduction. The sludge treatment facilities and incineration plant are equipped with spray drying technology as well as a flue gas purification system to ensure the purity of the by-product and the emission. Sludge has huge economic potential as fly ash, fertilizer, landfill, masonry products, and bio-diesel. Moreover, the heat energy produced during incineration can be utilized to generate electricity which eventually neutral the residual energy. Dhaka WASA is exploring more efficient resource recovery.

Keywords: *WASA, DSTP, Wastewater Treatment, UV Disinfection, SDG.*

Abstract ID **019**

Design & Implementation of Non-Conductive Electromechanical Braking System

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Abstract: In this experiment, an Electromechanical Braking System is developed following, drivers and other road users' safety and comfort. Most of the conventional braking systems like mechanical systems, hydraulic systems, and pneumatic systems have certain limitations. In mechanical brake systems, erosion of the mechanical pads is carried out by frictional force and requires periodic replacement of the bearing. and electromechanical braking system is used to respond to stoppages or slowing down of the vehicle quickly. This braking system has also been more efficient. This project aims to create an electromechanical braking system model capable of applying brakes without any friction loss and without losing the energy supplied. It uses two electromagnets which runs by the supply of power from the Battery. Also, there is a wheel which is attached to the motor so when the power is supplied, by the help of motor the wheel rotates. A metal bar is in the vicinity of the electromagnets and wheel so when the electromagnets produce eddy currents which stops the rotating wheel or rotor. This model helps in a way to be a used a retardation equipment in vehicles. It works on electricity and does not need their placement of parts like in mechanical braking systems and also does not release toxic chemicals in the surroundings like hydraulic braking systems hence it is eco-friendly. We tested some performance test to verify its performance. We tested input voltage (12V DC) to the electromagnet system and the current of motor (0.4A) and the electromagnet coil (5.5A). We also tested vibration (0 mm/s) of our system. We tested the temperature of the coil (39.7 °C) and the braking disc (34.2 °C) of the wheel. In our system, the wheel was running at a speed of 104 RPM. When we applied electromagnet brake, the wheel stopped within 0.9 second without any heat generation at brake disc.

Keywords: *Braking, Electromagnetic, Non-conductive, Mechanical, Brake.*

Abstract ID **020**

Integrated Model of Rooftop Cultivation and Rainwater Collection System

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Abstract: The "Integrated Model of Rooftop Cultivation and Rainwater Collection System" brings together two distinct studies: (a) Rooftop Cultivation on existing building structures from recycling domestic waste water and (b) Sensor-based automated rooftop rainwater collection system. This research aims to utilize the empty and abundant building rooftop for rooftop cultivation and rainwater collection. The integrated model introduces an innovative way to recycle septic tank wastewater into the building rooftop cultivation system. This system utilizes hydroponic and aquaponics technologies to treat the water, making it suitable for irrigation purposes. By integrating this wastewater treatment system, the research takes a step towards more comprehensive sustainable urban practices, emphasizing environmental resilience and resource conservation. This multi-faceted approach highlights the potential for positive impacts on urban living.

In parallel, the Rooftop Rainwater Collection System incorporates a rain sensor-based model to gather rainwater from the building rooftop, facilitating residential consumption. The study quantifies the amount of rainwater collected during various months of 2018 for the modeled building and contrasts it with the demand for drinking water quality data. By synergizing these two pivotal aspects: rooftop gardening and rainwater harvesting, the integrated model presents a holistic approach to sustainable urban practices, bridging environmental resilience and resource conservation. This research not only underscores the importance of innovative systems but also highlights their potential to positively impact urban living and resource management.

Keywords: *Rooftop Cultivation, Rainwater Collection, Rainwater, Rainwater Quality.*

Abstract ID **021**

A GIS Analysis of Mohammadpur: Evaluation of Three Canals' Morphological Changes and Environmental Impacts

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Abstract: Rapid urbanization in cities like Dhaka, Bangladesh, has created environmental problems and water shortages, affecting socio-economic development and drainage systems. The Mohammadpur region is the focus of this article as well as we examine three khals (Katasur, Ramchandrapur, and Rayerbazar) to recognize conditional changes and their impact on the environment. Utilizing GIS assessment, this inquiry distinguishes alterations in khals boundaries and watersheds due to infringement and discontinuity. This study also uncovers noteworthy decreases in khals' measurements compared to cadastral overview maps, affecting their discharge capacities. For instance, Ramchandrapur, Katasur, and Rayerbazar have

discharge capacities of 24.46 Cumec, 15.42 Cumec, and 32.76 Cumec, respectively, with inflows for sewage and stormwater at 51.708 Cumec, 47.26 Cumec, and 21.886 Cumec. These results display that Katasur and Ramchandrapur go past their limits, but Rayerbazar remains within its limit. The report highlights how critical it is to move forward with the existing drainage design to reduce waterlogging and enhance the surrounding area in Mohammadpur. By reviewing these statistical adjustments, runoff tendencies, and drainage supporting capability, this paper also gives essential new views for possible city-making plans and green water control plans in densely populated regions managing comparable challenges.

Keywords: *Urbanization, Morphological changes, Drainage systems, Water-logging, GIS analysis.*

Abstract ID **022**

Sewage-Water Treatment and Sludge Production Process in Bangladesh

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Abstract: The removal of numerous pollutants from the sewage treatment process, such as solids, organic carbon, nutrients, inorganic salts, metals, and pathogens, is the primary goal of the procedure. Environmental and public health considerations make efficient wastewater collection and treatment crucial. The Dasherkandi Sewage Treatment Plant (DSTP) is the first and largest modern waste water and sewage treatment plant at Dhaka city in Bangladesh, capable of treating 500 MLD per day which is 20 to 25% of the total sewage in the capital. It is the largest single sewage treatment plant in South Asia and first modern sludge drying-incineration in Bangladesh which capacity of about 540 tons per day. It is a modern method of biological sewage treatment. The four key processes applied to treat sewage water are chemical, biological, physical, and sludge treatment to remove these contaminants and produce environmentally safe treated water. The treatment is divided into four stages: pretreatment, primary treatment secondary treatment and disinfection. Between untreated and treated sewage, there was a noticeable difference in the values of pH, suspended solid (SS), dissolved oxygen (DO), biochemical oxygen demand (BOD), and chemical oxygen demand (COD). The ultimate goal for achievement is to sustain natural parameters for treating sewage water. The DSTP has a substantial positive impact on the beneficiary areas by reducing environmental pollution and improving water quality in the Rampura area. The treated fly ash is usually used as raw materials in cement factories.

Keywords: Sewage, Sludge, Biological.

Abstract ID **023**

Flow separation control of NACA 23018 airfoil by semi -circular dimples at low Reynolds numbers

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Abstract: The aim of this paper is to delay flow separation and increase the aerodynamic efficiency of NACA-23018 airfoil through adding semi-circular dimples on the upper surface of the airfoil. The semicircular dimples of diameter 10 mm are positioned at 75% of the chord from the leading edge. In this work, we compared the modified airfoil with a clean NACA 23018 airfoil by experimental analysis. The main goal of this experiment is to compare Lift co-efficient, drag co-efficient and lift to drag ratio with respect to different angle of attack for optimal aerodynamic efficiency.

A subsonic wind tunnel (600 X 305 X 300 mm^3) is used to investigate the effect of using dimples over the airfoil surface. The NACA-23018 airfoil was set initially at a perfect horizontal position (zero incidence angle) for calibration. After the wind tunnel being started, the velocity was set to 20 m/s at first and then to 25 m/s afterwards. The airfoil angle of incidence was adjusted in steps from zero degree to upwards until the lift began to reduce because of the stall.

Our research gap is that how semi-circular dimples control flow separation in a 5-digit asymmetric airfoil over 4-digit airfoil.

After analyzing the data, it was found that the flow separation was delayed after adding the dimples on NACA 23018 as the dimples can increase significantly the value of Lift co-efficient and lift to drag ratio both 20 and 25 m/s and can decrease the drag co-efficient for 20 m/s.

Keywords: *NACA 23018, Flow Separation, Dimple, Reynolds Number, Airfoil.*

Abstract ID **024**

Revolutionizing Dementia Care with Automated Medicine Dispenser

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Abstract: The "Automated Medicine Dispenser Machine with Reminder" represents a major step forward in healthcare technology, offering crucial support for dementia patients in managing their medication schedules. This innovative device is designed to improve healthcare delivery by reducing medication errors and ensuring adherence to prescribed regimens. Its user-friendly interface accepts direct inputs and accurately dispenses the required medication at the appropriate times. Equipped with a voice reminder system, the dispenser alerts dementia patients to take their medication, enhancing adherence to treatment regimens. An integrated ECG system provides real-time health updates, allowing continuous monitoring of the patient's cardiovascular status. This feature is vital for patients with chronic conditions, facilitating timely medical interventions. The dispenser is designed with eco-friendly materials and energy-efficient technologies, reflecting our commitment to environmental sustainability. It is an essential tool for elderly patients, individuals with chronic illnesses, and those requiring complex medication regimens. Through rigorous research and development, this project aims to improve patient outcomes and become an integral part of future healthcare systems. By merging advanced technology with user-friendly design, the Automated Medicine Dispenser Machine with Reminder aspires to set a new standard in medical device innovation, offering significant benefits for dementia patients and their caregivers

Keywords: *Dementia, Automated Medicine, Dispenser, Medical, Patients, ECG.*

ABSTRACTS FOR POSTER PRESENTATION

Abstract ID **025**

Optimizing Data Management in Cloud Computing for Enhanced Monitoring and Performance of Power Plants

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Abstract: Cloud computing offers scalable, flexible, and cost-effective solutions for managing and analyzing large volumes of data from power plants, enhancing real-time monitoring, performance optimization, and environmental sustainability. This research explores the implementation of a cloud-based data management system designed for the monitoring of power plants. The main goal is to harness the scalability, flexibility, and accessibility offered by cloud computing to improve data storage, processing, and retrieval, which employs Google Cloud for storing data and predicts electric power consumption, net electricity generation, grid stability, and carbon dioxide emissions by utilizing different models (Gradient Boosting and Ensemble Learning). The results of these predictions are evaluated using metrics (accuracy, precision, recall, RMSE, etc.). The integration of cloud computing into the data management processes of power plants presents numerous advantages (enhanced data accessibility). Extreme Gradient Boosting, Random Forest, and Support Vector Machine demonstrates the best results (considering accuracy) for predicting electric power consumption (97.08%), net electricity generation (99.78%), and grid stability detection (98.91%) respectively. This centralized approach allows for seamless data collection from multiple sources and optimization of plant performance. Moreover, the adaptability of cloud computing facilitates the inclusion of sophisticated analytics and machine learning algorithms, offering predictive insights for maintenance requirements and energy output optimization. This research presents significant innovations in data management for power plants by efficiently handling diverse datasets and employing predictive models to mitigate environmental impacts. Future work will focus on incorporating real-time data from power plants and implementing deep learning models to further enhance the system's predictive capabilities.

Keywords: *Efficient Data Management, Cloud Computing, Machine Learning, Electric Power Consumption, Net Electricity Generation, Grid Stability Prediction, Gradient Boosting Classifiers, Ensemble Learning Classifiers.*

Abstract ID **026**

Investigation of Radiation Properties in a PWR-Based VVER Reactor Fuel Assembly Using GEANT4 and EpiXS: Analysis of Chromium-Coated Zirconium Alloy (E110) and Silicon Carbide (SiC) as Cladding Materials

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Abstract: Nuclear fuel cladding materials serve as protective shields for UO_2 pellets, providing essential corrosion resistance and maintaining low neutron absorption cross-sections. To enhance the accident-tolerant fuel framework (ATF) and protection of nuclear fuel cladding, this study investigates the application of chromium-coated zirconium alloy (E110) and Silicon Carbide (SiC) as cladding materials in a PWR-Based VVER reactor fuel assembly. The inner-side degradation of the irradiated cladding surface, caused by fission fragments produced during nuclear fission reactions, is a critical concern addressed in this research. SiC demonstrates superior resistance to chemical attacks compared to Zircaloy, oxidizes less aggressively at high temperatures, exhibits higher yield strength, and has a substantially lower creep rate and neutron capture cross-section. However, the application of a chromium coating influences the radiation properties of both cladding materials. The objective of this study is to estimate the minimum thickness of the chromium coating necessary to protect the inner surface of the nuclear fuel cladding. The study employs GEANT4 simulation software to assess the performance of E110 and SiC cladding materials with thin chromium coatings. The approach utilizes a dataset from GEANT4 to model and simulate radiation interactions and subsequent degradation. Results are validated and compared with the EpiXS software dataset to ensure accuracy and reliability. The findings aim to contribute to the development of more resilient cladding materials, thereby enhancing the safety and efficiency of nuclear reactors. Furthermore, the results underscore the reliability of GEANT4 in evaluating the radiation properties of materials exposed to photons and neutrons. This research provides critical insights into optimizing cladding material performance under irradiation conditions, supporting advancements in nuclear reactor safety technology.

Keywords: *UO_2, Accident-Tolerant Fuel (ATF), Zirconium Alloy (E110), Silicon Carbide (SiC), Geant4, EpiXS, Pressurized Water Reactor (PWR), VVER.*

Abstract ID **027**

Super Quick Microwave Irradiation: An Unconventional Method of Growing ZnO Nanorods

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Abstract: ZnO nanorods were successfully synthesized by the microwave irradiation method in this project. The procedure verified the highest yields, least expense, and fastest synthesis of pure, fine-grained, single-phase ZnO nanorods; additionally, the procedure is ecologically friendly. Same-scale size nanorods displayed varying d-spacing values with the Hold time changed at a constant temperature of 150°C in the microwave reactor, as supported by the TEM results. HRTEM pictures verified the ZnO nanorods' perfect form. The quality of the nanoparticles' crystallization was demonstrated by SAED patterns and data. The hexagonal wurtzite structure of ZnO nanorods is further supported by the matching of the diffraction rings in the SAED image with the peaks in the XRD pattern. Based on the data analysis, we concluded that the d-spacing values in ZnO nanorods at various nanometer scales increased. The absence of diffraction peaks from other contaminants indicated a high level of purity in ZnO samples. All the diffraction peaks were in good arrangement with those of the hexagonal structure of ZnO (JCPDS No. 00-036-1451). Only the elements zinc (Zn) and oxygen (O) appeared in the EDX data, and the mass fraction was calculated. In the UV-visible absorbance spectrum, the absorbance peak located at the wavelength of 376 nm was the characteristic peak for hexagonal wurzite ZnO. The bandgap for ZnO nanorods held for one minute at a constant temperature of 150 °C is 3.24 eV; the binding energy gap for samples maintained for five minutes is 3.25 eV; and the binding energy gap for samples held for fifteen minutes is 3.28 eV, as determined by the UV-vis data. The presence of a peak at 432 cm^{-1} at 1 min Hold Time ZnO nanorods FTIR data, 434 cm^{-1} in 5 min Hold time ZnO nanorods FTIR data, and 451 cm^{-1} proved a characteristic vibration of the Zn-O bond in the wurzite structure of ZnO. Therefore, at a constant temperature of 150°C, the distinctive peaks of ZnO nanorods increased with variations in hold duration.

Keywords: *ZnO. Fine Nanorods. Microwave Reactor. Nanomaterials. Best synthesis Method.*

Abstract ID **028**

Mitigating Blasting Hazards: A Study on Advanced Machine Learning Models for Precise PPV Forecasting

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Abstract: Ground vibration from blasting, measured by peak particle velocity (PPV), poses significant risks to nearby structures, inhabitants, and rock masses. Accurate PPV prediction is essential for mitigating these hazards. Using 88 datasets and 9 input variables, an artificial neural network (ANN) was employed to predict PPV in a quarry mine. The SHAP (Shapley Additive Explanations) method assessed feature importance, highlighting that the new scaled distance (SD) significantly impacted the models. Models were evaluated using Pearson correlation coefficient (R), determination of coefficient (R2), root-mean-square error (RMSE), and mean absolute percentage error (MAPE). The ANN model yielded impressive results, with R, R2, RMSE, and MAPE values of 0.9657, 0.9306, 2.0853, and 17.6107, respectively. The ANN model outperformed support vector machine (SVM) and k-nearest neighbors (KNN) models, with an 18.51% reduction in PPV using genetic algorithm (GA) during blasting.

Keywords: *Peak particle velocity (PPV), Artificial neural network (ANN), Ground vibration, Blasting, SHAP (Shapley Additive Explanations).*

Abstract ID **029**

Impact of Competitive Programming Skills on Engineering Performance and Career Success: A Statistical Analysis

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Abstract: Competitive programming has become an important field for improving logical proficiency and problem-solving skills in engineering professionals and students worldwide, especially in Bangladesh. In the context of Bangladesh, this study looks into how competitive programming abilities affect engineering performance and career success. This study used primary data from online survey and secondary data from related sources and research papers for statistical analysis to identify connections and relation between academic achievements, job success, and competitive programming. The goal of the study is to find out a clear understanding of how competitive programming skill affects engineering advancement like decision making, innovation, critical thinking and so on. This research also shows a straight path which provides a significant evidence - based insights that guide professional development routes. This also helps educational initiatives in Bangladesh to make decision in changing the curriculum with programming-based education which improves problem solving skills and other institution to make a strong human resource in engineering field for technological advancement.

Keywords: *Competitive programming, Engineering performance, Career success, Technological advancement.*

Abstract ID **030**

Eco-Ink Sustainability Through Pollution

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Abstract: Bangladesh is facing an increase in air pollution in recent years, due to an increase in urbanization, industrialization, and energy consumption in major cities. Bangladesh with particulate matter about 15 times the level recommended by the World Health Organization, Dhaka has ranked fourth on the list of cities worldwide with the worst air quality. Air pollution is a risk for all-cause mortality as well as specific diseases. The specific disease outcomes most strongly linked with exposure to air pollution include stroke, ischaemic heart disease, chronic obstructive pulmonary disease, lung cancer, pneumonia, and cataract. It is responsible for approximately 20% of premature deaths in the country, according to a World Bank report. This study investigates the innovative conversion of pollution into ink, demonstrating its potential for significant environmental and industrial applications.

Keywords: *Sustainable Ink, Pollution Conversion, Carbon Soot, Kaalink Device, Detoxification Process.*

Abstract ID **031**

AI in Healthcare: Revolutionizing Diagnosis and Treatment through Machine Learning

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Abstract: Each day the remarkable development of information technology, especially regarding artificial intelligence is proficiently handling our challenges. From exact diagnosis to automation of processes to drug repurposing to medical image analysis to genomic research in the healthcare industry, the evolution of machine learning within artificial intelligence has produced major innovations in numerous domains. This paper investigates the effectiveness of Artificial Intelligence in the healthcare field. A few years back, the mortality rate was alarmingly high, typically because of misdiagnosis or inadequate disease identification. But since artificial intelligence has become so prevalent, these numbers have dropped significantly. This research mainly aims to guarantee the delivery of better treatment and use machine learning for the exact detection of diseases in a fraction of the time. The deployment of AI chatbots has enabled patients to receive guidance and instructions for the subsequent actions in their treatment programs in a very short time. Additionally, machine learning technology has the capability of analyzing genetic data in order to predict the response to treatment aftercare. By performing statistical analysis, this paper aims to determine the notable influence of artificial intelligence and machine learning on the healthcare sector, particularly in the domains of diagnosis and treatment. This paper attempts to provide important viewpoints and suggestions on efficiently using artificial intelligence and machine learning to improve patient care, operational efficiency, and the general healthcare experience to policymakers, medical professionals, and researchers.

Keywords: *Healthcare, Artificial intelligence, Diagnosis, Technology.*

Abstract ID **032**

Blockchain-Based Smart Contracts: Transforming Loan and Mortgage Processing in Banking

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Abstract: Nowadays blockchain technology is trendy and known for its distributed and secure nature. It offers transformative potential for the banking sector, specifically in loan and mortgage processing. This paper investigates how blockchain based smart contracts can be used to do more simplification and upgrade the efficiency of these processes. Traditional loan and mortgage transactions have need of multiple negotiators, evolving in delays, higher costs and potential for fraud. Blockchain technology diminishes these issues by delivering accountability, transparency, visibility, temper-proof and automated systems. Smart contracts allow self-executing agreements with presumed rules and conditions, assurance in security and trust. This study explores the construction of blockchain technology highlighting the benefits for both money lender organizations and borrowers. By utilizing blockchain technology, banks can magnify operational efficiency, weaken risks and provide more advanced services to customers. We detail the design and execution of blockchain-based smart contracts for loan and mortgage applications, focusing their ability to automate processes and decrease office administration costs. The adoption of blockchain-based contracts manifests a vital advancement in the modernization of loan and mortgage

processing. Upcoming cooperation between technology developers and financial institutions is needed to notice the benefits of this creative approach.

Keywords: *Blockchain technology, Banking sector, Mortgage processing, Loan processing, Smart contracts.*

Abstract ID **033**

Impact of Implementation of Blockchain Technology for Cybersecurity in Banking System

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Abstract: The banking sector, a prime target for cyberattacks, faces the challenge of protecting massive volumes of sensitive financial and personal data. Conventional cybersecurity defenses against complex and dynamic threats are becoming less and less effective. This study looks into how blockchain technology might strengthen cybersecurity in the banking industry. Banks may improve their security posture and solve significant weaknesses by utilizing the core characteristics of blockchain technology, including decentralization, immutability, and cryptographic security. The study explores the use of blockchain in automated smart contracts, strong identity verification, safe financial transactions, and sophisticated fraud detection and prevention. This article highlights the concrete advantages and real-world implementation issues of implementing blockchain in banking cybersecurity through an analysis of case studies and current implementations. It also explores problems with regulatory compliance, scalability, and barriers to broad adoption. According to the research, blockchain technology has the potential to significantly alter cybersecurity in the banking sector by offering a transparent and robust framework to counter the expanding array of cyberthreats, thereby promoting increased confidence and security in financial operations.

Keywords: *Blockchain Technology, Banking Cybersecurity, Decentralization, Smart Contracts, Fraud Detection.*

Abstract ID **034**

Suitability Analysis, Site Analysis, and Conceptual Satellite Town Planning Within the KDA Planning Area, Khulna

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Abstract: Our proposal entails presenting a residential area layout plan within a 20-kilometer buffer zone between the KDA (Khulna Development Authority) and the KCC (Khulna City Corporation) areas. We chose a suitable location after analyzing factors from five primary sites using AHP weighting. Then, for further planning, we thoroughly analyzed the chosen site. The site is located in Rayarmahal (Ward No. 14, Khulna City Corporation). This residential area will be developed on low-value agricultural land. The main philosophy of this layout plan is to provide residences for the increasing population near Khulna city. The layout plan is developed with basic needs facilities so that the dwellers don't need to go to the city for their basic needs. When creating a layout design, a variety of aspects are taken in to account, including roadways, plots, community facilities, public utilities, the economy, and aesthetics, etc. Landscape, safety, and traffic circulation are the guiding principles of the street system. The layout concept proposes a number of communal and public facilities. The philosophy of aesthetics is landscaping, environmental preservation, and urban design. A large high road close to the area improves demand by improving external connectivity. In the computation of facility installation, the "Space Standards for Urban Community Facilities in Acres by Population Size 2012" is used.

Keywords: *Khulna, KDA, KCC, Suitability Analysis, Landscape, Site Analysis.*

Abstract ID **035**

Design and Fabrication of a Water Layer Purification Mechanism Integrated with AI

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Abstract: Our research work entitled water layer purification mechanism is remote controlled and also a mechanized autonomous River Surface Cleaning Robot. To minimize the product cost as well as to give more speed in any real-life challenge, robots are always the first priority in this modern world. In this modern world, every problem in the mechanical field needs a smart and low-cost solution. Our mechanism will play a very vital role in this river surface cleaning problems of different lake areas of our country. Sensors and other devices are used to connect objects of the material, and also the gear unit of the body makes the work very efficient. The design and the controlling of this rover is very easy that we can easily launch it in a consumer level in our first production unit. Addition of robotic system and automation speed up in the cleaning operation such as dust finding, water cleaning, pH controlling and low-cost handling is a huge milestone in respect of Bangladesh. It will play a very vital role in the cleaning process in terms of river cleaning through automation and using of rover in a country like Bangladesh. It can easily replace and vanish these types of error and can do its work in a level of 100%. Using of AI in our project makes it better than thousand time of manually controlling the dust of surface area of the certain river.

Keywords: *Internet of Things, Artificial Intelligence, Wireless Network, Control, Automation.*

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