

**Proceedings of the  
6<sup>th</sup> International Conference on  
Recent Innovations in Science & Technology**



**RIST 2024**  
**26<sup>th</sup> & 27<sup>th</sup> April 2024**

Organized by:

**Holy Grace Academy of Engineering**  
**Thrissur, India.**

In association with:

**ISET Research**  
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## MESSAGE FROM THE CHAIRMAN



I am delighted to recognize the 6th International Conference on "Recent Innovations in Science & Technology" (RIST 2024), hosted by the esteemed Holy Grace Academy of Engineering. I applaud the organizing committee for their commendable dedication in orchestrating this conference and their steadfast commitment to showcasing innovative research discoveries and concepts. I extend my heartfelt best wishes to them for their continuous endeavors in advancing knowledge dissemination.

**Mr. Sani Edattukaran**  
Chairman  
Holy Grace Group of Institutions  
Thrissur, Kerala.

## MESSAGE FROM THE GENERAL SECRETARY



The Holy Grace Academy of Engineering is honored to host the International Conference RIST 2024. I extend my sincere thanks to the entire team at HGAE for their steadfast dedication in making this important event possible. This conference offers a superb opportunity for students and young researchers to enrich their understanding of evolving ideas and innovative methods in technology. I am confident that participants will benefit greatly from this event, gaining valuable insights and sharing their expertise. Wishing all attendees a fruitful and rewarding experience ahead.

**Mr. Benny John**  
General Secretary  
Holy Grace Group of Institutions  
Thrissur, Kerala.

## MESSAGE FROM THE PRINCIPAL



I am pleased to announce that Holy Grace Academy of Engineering, in collaboration with ISET Research, will host the 6th International Conference on Recent Innovations in Science and Technology (RIST 2024) on April 26th and 27th, 2024. This conference will serve as an exceptional forum for the exchange of ideas aimed at fostering scientific and technological advancements for future generations. I anticipate that the conference will address current national and international issues in the realms of Science and Technology, providing academicians, researchers, and technocrats with an opportunity to share their insights and perspectives on innovations within their respective fields. With a notable array of high-quality research articles slated for presentation, the conference will pave the way for pioneering advancements in Science and Technology. I extend my heartfelt congratulations and appreciation to the entire organizing team for their diligent efforts in orchestrating this international conference and wish them tremendous success in its execution.

**Dr. Arun M P**  
Principal  
Conference Chair  
Holy Grace Academy of Engineering  
Thrissur, Kerala.



## MESSAGE FROM THE DIRECTOR

Holy Grace Academy of Engineering takes immense pride in hosting its 6th International Conference on Recent Innovations in Science and Technology (RIST 2024). I want to express my sincere gratitude to the dedicated team at HGAE for their tireless efforts in making this event a reality. This conference offers a fantastic opportunity not only to educate students and young researchers but also to deepen their understanding of evolving ideas and innovative methods in technology. I am confident that this event will deliver an outstanding learning experience for both students and professionals, enabling them to gain new knowledge and exchange insights. I extend my best wishes to all participants for a productive and enjoyable conference experience.

**Prof. A.S. Chandrakantha**

Director

Holy Grace Academy of Engineering & Polytechnic College  
Thrissur, Kerala.

PAPER TITLE & AUTHORS	PAGE NO.
<b>A ROBUST PYTHON-BASED CLOUD PLATFORM FOR SECURE AND COLLABORATIVE THREAT INTELLIGENCE SHARING</b> D SAI NAVEEN, KOLLI SRIKANTH, D RAMALAKSHMI	1
<b>MEDICINAL PLANT IDENTIFICATION USING MACHINE LEARNING</b> MUGESH M, MAMANNAN K, MOHAN S G, DHASARATHAN D, BHAVANI SANKAR A	2
<b>NIGHT PATROLLING ROBOT FOR SURVEILLANCE AND WOMENSAFETY</b> V.DEVADHARSINI, G.PANDIESWARI, A.NISHETHA JEFLIN NIXON	3
<b>IMAGE DEMOSAICING USING NAÏVE BAYES CLASSIFIER FOR IMPROVED IMAGE METRICS</b> GURJOT KAUR WALIA, NAVNEET KAUR, CHAHAT JAIN	4
<b>ENVIRONMENTALLY FRIENDLY WASTE PLASTIC FUEL: AN ALTERNATIVE SOURCE OF ENERGY FOR AUTOMOTIVE VEHICLES</b> SAMARTH JAYESHBHAI SHELAT, SANJAY MAGANLAL PATEL	5
<b>IMPLEMENTATION OF INTELLIGENT RETRIEVAL ALGORITHMS FOR OPTIMUM MACHINING PERFORMANCE IN TURNING AND MILLING OPERATIONS – A BRIEF REVIEW</b> PALETI SRINIVAS, PADMINI RAPETI	6
<b>CARBON STORAGE AND SEQUESTRATION POTENTIAL OF NEEM TREES IN SOUTHERN REGION OF CHENNAI</b> S.ARUMAI SHINEY, A.HARINI, JONAH.S, KEERTHANA.S	7
<b>UNLEASHING THE POWER OF DATA IN DATA SCIENCE</b> HARLEEN KAUR, SHIVMANMEET SINGH, PREETI PANNU	8
<b>INVESTIGATIONS ON DRILLING CHARACTERISTICS OF GLASS-BAMBOO REINFORCED HYBRID COMPOSITES USING ANOVA AND REGRESSION MODEL</b> KUNDAN PATEL, DIPAL PATEL, VIJAYKUMAR CHAUDHARY	9
<b>INVESTIGATIONAL STUDY ON INNOVATIONS IN LOW-COST AND TIME-EFFECTIVE SLAB CONSTRUCTION</b> HENRY JOHN, ARAVIND BABU, JITTO P. TOM, PARVATHY S	10
<b>A MULTI STOPBAND FREQUENCY SELECTIV SURFACE FOR MOBILE SHIELDING APPLICATIONS</b> SRI REVANTH P, MUBARAK HUSSAIN S, TAMIL SELVAN S, BALAKUMARAN T, YATHAVI T, ABITHA THANGAM M	11
<b>A STUDY ON INDU-BALA PRODUCT OF GRAPHS CONCERNING SOME GRAPH PARAMETERS</b> JOHN JOY, LIJU ALEX	12
<b>DEVELOPMENT OF A WALL-STICKING DRONE FOR NON-DESTRUCTIVE ULTRASONIC TESTING</b> RITESH, SABIN B S, SARIKONDA ARUN REDDY, RAHUL KUMAR	13
<b>VISUAL INSPECTION OF AIRCRAFT USING AUTONOMOUS DRONE</b> BHANU KAPEENDRA MAJETY, B DAKSHESH, BOOPESH RAJA B B, AMIT KUMAR, RAHUL KUMAR, AMIT KUMAR THAKUR	14
<b>MODIFIED STARCH-POLYVINYL ALCOHOL BIODEGRADABLE FILM FOR FOOD PACKAGING</b> PRANALI ARUN NANVATE, BHAIRAVI SANJAYRAO RAUT, JAYANT MODAK	15
<b>STUDY ON AN UPDATED THRUSTER FOR MISSILES</b> ABHISHEK PATIL, ROHAN KUMAR SAINI, HARMANJEET SINGH DHILLON, VAISHNAVI MAHESH YADAV, JARIWALA DEVANSHI SHAILESHBHAI	16
<b>PERFORMANCE ANALYSIS OF RADIO OVER FSO FOR ADVANCED MODULATION FORMATS</b> RAMNEET KAUR SAHOTA, PREETI PANNU, GURJOT KAUR WALIA	17
<b>DESIGN AND ANALYSIS OF SINGLE STAGE GAS TURBINE USING EFFICIENT COOLANT SECTION</b> HARSH SINGH, SANJEEV KUMAR, GUDDU KUMAR, ABHISHEK KUMAR ARYA, ABHISHEK RAY	18
<b>CRIME TYPE AND OCCURRENCE PREDICTION USING MACHINE LEARNING</b> JAYABALAJEE S K, K. JAVUBAR SATHICK, A. ABDUL AZEEZ KHAN, ARUNRAJ	19
<b>EFFECT OF NANOPARTICLES ON PERFORMANCE OF SOLID PROPELLANTS</b> ROBINA, AKHILESH SINGH, ANGSHUMAN BARUAH, KAJAL, RAHUL KUMAR, AMIT KUMAR THAKUR	20

PAPER TITLE & AUTHORS	PAGE NO.
<b>NOVEL TECHNIQUE FOR VISUAL INSPECTION OF THE AIRCRAFT USING ARTIFICIAL INTELLIGENCE POWERED DRONE</b> AMIT, NOBOJEET DAS, GUDDU KUMAR, RAHUL KUMAR	21
<b>OPTIMIZATION AND PERFORMANCE EVALUATION OF MACRO-GROOVED HYDRODYNAMIC JOURNAL BEARINGS FOR INDUSTRIAL APPLICATIONS</b> ARUN BANGOTRA, SANJAY SHARMA	22
<b>ADVANCEMENTS AND APPLICATIONS OF 42CRMO4 SUPERALLOYS: A COMPREHENSIVE REVIEW</b> AROCKIARAJA P, SARAVANAKUMAR CT, WILSON KUMAR M	23
<b>AEROSPIKE-BASED DRAG REDUCTION METHOD FOR HYPERSONIC VEHICLES</b> ABHISHEK RAY, ABHISHEK KUMAR ARYA, ADARSH KUMAR SAH, ABUL HASAN, HARSH SINGH, RAHUL KUMAR, AMIT KUMAR THAKUR	24
<b>CORROSION MODELING TO PREDICT THE RATE OF GALVANIC CORROSION OF MAGNESIUM BONE PLATE AND STEEL BASED BIO-IMPLANTS</b> VIMAL SATHYANARAYANAN, M. D BINDU	25
<b>EFFECT OF HEAT TREATMENT ON MICROSTRUCTURE DEVELOPMENT OF NOVEL MG-5.5 ZN ALLOY</b> ANOOJA A U, BINDU M D	26
<b>DATA ANALYTICS FRAMEWORK FOR DIGITAL TWIN OF GRINDING MACHINE</b> KARTHIK.S, S.SHAHAR BANU	27
<b>IOT BASED HYBRID CHARGING STATION</b> AJMAL SUDHIR, DEEPAK DEVASSY, ANUPAMA.K.M, SIDHARTH.K.A, ANNIE BINCY C A	28
<b>SOLAR POWERED AGRICULTURAL ROBOT FOR PADDY CULTIVATION</b> MERIN ANTONY, ATHISH JOLLY, ISHAN P SEBAN, MARY KESIYA K M, STENY RAPHY	29
<b>SOLAR-DRIVEN HYDROGEN AND OXYGEN PRODUCTION FOR COOKING AND MEDICAL APPLICATIONS</b> JOYAL JOMON, JEETHU SHABU, MELVINA JOSE, NAVYA VICTORIA YUJIN, LINSS T ALEX	30
<b>PARAMETRIC OPTIMIZATION OF AL-SIC-GRAPHENE COMPOSITE IN CNC MILLING</b> ABHISHEK M, BINDU M D	31
<b>IDENTIFICATION AND RECTIFICATION OF ACCIDENT BLACKSPOTS</b> GANESH SANKAR C H, AKSHARA RAJU, ALEN MATHEW, AMAL BIJU	32
<b>ENERGY HARVESTING TILES FOR POPULOUS AREA</b> DENNES M S, UNNI DAS, SOLVIN BABU, SINTO SABU BABY	33
<b>THERMAL POWER PLANT USING PYROLYSED PLASTIC AS FUEL</b> DON MARTIN, BEVAN BERNARD, JOEL MANUEL, VIJOY V DELSON	34
<b>ELECTRICITY MONITORING AND AUTOBILL GENERATION USING IOT</b> AKHIL RAGHU, ASHNA JOSEPH, HELEN DYNA ROSE JOSE, SANJAYNATH S, PEARL ANTONETTE MENDEZ	35
<b>REVOLUTIONIZING LOCAL ORGANIC PRODUCE MARKETS THROUGH TECHNOLOGICAL INNOVATION</b> AJAY VISHNU E, ENRIC S NEELAMKAVIL, PAVEENA PETER, VARSHA BABU AKKARA, SUNI JOSE	36
<b>ELEVATED: A COMPREHENSIVE SOFTWARE SOLUTION</b> AMAL C P, MEGHA THOMAS, SURYA SUDHEER, VAISHNAV M J, PRASANTH K BABY	37
<b>QUIKHYR: SWIFT HIRING FOR HOME SERVICES</b> SURYA KIRAN P M, NAVANEETH K U, MALAVIKA SREEHARI, NOAH JOHNY, SUNI JOSE	38
<b>HIREME PLACEMENT MANAGER</b> MAGNIYA DAVIS, KRISHNANANDA T S, NEHA JOHNSON, PRANAV MADHU, SHANE BIJU	39
<b>MEDISCAN: STREAMLINING MEDICATION ACCESS IN A CONNECTED HEALTHCARE ECOSYSTEM</b> ALENSA ANTO, ALOYSIUS J KOLAPRAN, JAIVIN JOSEPH, PELLISSERY JOHN ANTONY, IRIS JOSE	40

PAPER TITLE & AUTHORS	PAGE NO.
<b>DESIGN AND DEVELOPMENT OF LOW -COST ST PORTABLE THERMOELECTRIC REFRIGERATION SYSTEM</b> A DHANESH, BANDARU SURYANARAYANA, B RAJ KUMAR NAIK, ANJAMETI VENKATA SUBBAIAH, C SOLOMAN RAJ	41
<b>ONLINE BOOKSTORE WITH SENTIMENTAL ANALYSIS</b> JASMINE JOLLY, AYSEL VARGHESE, JOB M O, JOE AMBOOKEN, NIYA ROSS SHAJI	42
<b>DEPLOYMENT AUTOMATION IN LINUX</b> AMAL PAUL, THEJUS KIRAN P S, THERESA T S, THERESA T S, BHAGYASREE P V	43
<b>SALES FORECASTING</b> SURYANATH G, ATHUL K A, JACIN JOY, RIZWAN SHAFEEK	44
<b>ADVANCEMENTS IN AERODYNAMIC EFFICIENCY FOR ENHANCED AIRFOIL PERFORMANCE</b> BHANU KAPEENDRA MAJETY, SAMUDRALA GUNADHEER, MEDAPALLY LAVANNYA, NEMATA SOUKEINA LATIFA OUEDRAOGO, BALAJI RAVI	45
<b>PULMONARY ANALYSIS SOFTWARE</b> PRASANTH K BABY, ANAGHA SEN, ALAN SHIBU, BIMALDEV T K, MOHAMMAD JASRIN	46
<b>INVO</b> NIKHIT KUMAR N S, SURYAGAYATHRI K P, KRISHNANAND U, CHITHRALEKHA M P, MINNU MOOTHEGAN	47
<b>MITIGATING HEAVY METAL CONTAMINATION A COMPREHENSIVE REVIEW OF BACTERIAL ALGAL CONSORTIUMS IN INDUSTRIAL REMEDIATION STRATEGIES</b> GOWRI M S, DEVIKA PRADEEP, GAYATHRI GOPAN, AILEEN ABRAHAM, MARIA PAUL, ANI LAWRENCE, GAYATHRI V	48
<b>DESIGN AND CONSTRUCTION OF MICROCONTROLLER BASED FLOATING WATER WASTE CLEANING ROBOT</b> SHAIK SADAK, TADIPATHRI HANEEF, SITHRAGITHU JAKEER HUSSAIN, SHAIK SAMEER, V AKHILESWAR REDDY, RUDRAPANKTI MANIKANTA	49
<b>POCKET PG</b> MINNA ELIZABETH MARTIN, AASTIN WILSON, ROSHAN PAUL, FERNANDES K J, VINCE PAUL	50
<b>EFFECT OF PARTIAL REPLACEMENT OF CEMENT WITH WASTEPAPER SLUDGE ASH ON THE MECHANICAL PROPERTIES AND DURABILITY OF FOAM CONCRETE</b> ANJALI V S, TAUFIQ A, PARVATHY PRADEEP R, SHEBA THANKAM MATHEWS, DHANYA G	51
<b>ASSESSMENT OF FUTURE WATER DEMAND AND SURFACE WATER BALANCE USING WEAP MODEL IN MEENACHIL RIVER BASIN, KOTTAYAM</b> GAYATHRI B NAIR, LAKSHMI G, PRIYA JOSEPH	52
<b>SMART POULTRY FARMING AUTOMATED MONITORING AND CONTROL SYSTEM USING IOT</b> D. BALAJI, P. SATHIYANARAYANAN, P. AADHESWARAN, S. ARUN KUMAR	53
<b>PROTOTYPE PROSTHESIS ARM USING MYOWARE SENSOR</b> MARSHAN.A, KESAVAN.V, VASANTH.M, VASANTH KUMAR.S, PAVITHRA V	54
<b>MICROSCALE ANALYSIS OF GEOPOLYMER PERVIOUS CONCRETE USING GGBS AND METAKAOLIN</b> JISHNU PRASANNAN, KAVUMKAL AMALA MARIA, MUHAMMED RIYAD, NANDANA S BABU, PROF. MANISH JOSE	55
<b>UNMANNED UNDERWATER VEHICLE FOR UNDERWATER EXPLORATION AND WASTE DETECTION</b> FRESHIL M SIMON, AARON ALEX, AGHIL SAJI, JOSEMON JOHNSON, LEKSHMI BABU	56
<b>VLF SYSTEM FOR SID MONITORING</b> ASHWIN BALAKRISHNAN, ATHIRA ANILKUMAR, RAHUL SAMSON, JINTO THOMAS, AMBILY JOSEPH	57
<b>ASSESSING THE SUSTAINABLE VIABILITY OF NATURAL FIBER DERIVED FROM RICE STRAW IN TEXTILE AND FASHION INDUSTRY</b> KAJAL SINGH, KAVITA CHOUDHARY, M.S PARMAR	58
<b>A STUDY ON AI BASED HAND AND FOOT REFLEXOLOGY</b> P.S. SUBIN, T KRISHNA KUMAR	59



PAPER TITLE & AUTHORS	PAGE NO.
<b>AN IN-SILICO APPROACH TO INVESTIGATE THE FEASIBILITY OF COMPOSITE POLYMERS FOR NON-INVASIVE EXTENDABLE IMPLANTS</b> ANKUSH PRATAP SINGH, SUBHADIP BODHAK, VAMSI KRISHNA BALLA	60
<b>TOXIC COMMENT DETECTOR</b> ERIN DAVIES, SHRAVAN FREDDY	61
<b>BIOHYDROGEN PRODUCTION FROM LIGNOCELLULOSIC SUBSTRATES USING E-COLI: A REVIEW AND EXPERIMENTAL STUDY</b> ARJUN BABU S B, SAFNA N, SREELEKSHMI B, P VARADHA PRIYA, GAYATHRI V, SUSMITHA KUMARI S	62
<b>EXPERIMENTAL INVESTIGATION ON WEAR BEHAVIOR OF PURE MAGNESIUM AND MAGNESIUM NANO HYDROXYAPATITE METAL MATRIX COMPOSITE</b> JERIN T JOJU, JACOB NICHOLAS, HADI ABDUL RAVOOF, AMGIRUS T G, RAHUL R, SAJITH BABU C	63
<b>ENSURING SAFETY THROUGH INTEGRATION OF AI IN MOTORCYCLES FOR DETECTING HELMET</b> ABHISHEK A S, ADARSH K P, AMALKRISHNAN A G, ARUN M S, SAJITH BABU C, SAJAN M P	64
<b>CFD APPROACH TO ANALYSE THE CENTRIFUGAL PUMP IMPELLER DESIGNED FOR DEEP SEA MINING APPLICATION</b> PRANAV SHARMA R, SHASHI K M, K G NITESH	65
<b>DESIGN AND NUMERICAL ANALYSIS OF SOLID ROCKET MOTOR AT DIFFERENT STAGES</b> ADARSH KUMAR SAH, ARVIND PALLELA, BOOPESH RAJA B B, MOHAMMED SHIBIN	66
<b>MASS DAMPING OF STRUCTURES WITH TMD</b> AYUSH GAJENDRA RAJPUT, TEJAS SACHIN BHATE, SUYASH VIJAYKUMAR CHAVAN, HARIOM SHIVDARSHAN BIRAJDAR, VIDYA NITIN PATIL	67
<b>DESIGNING OF COUMARIN-CONJUGATED NANOLIPOSOMES AS A PREVENTIVE STRATEGY AGAINST VENOUS BLOOD THROMBOEMBOLISM</b> M. POORNA SNEHA, SAMEERA MIRAJ, SIVAJEEVA RAJ P., NAVYA ANNA ROY, ROHINI SAMADARSI	68
<b>LONG TERM INFLUENCE OF SULPHATES ON PLASTICITY CHARACTERISTICS OF LIME STABILISED COCHIN MARINE CLAYS</b> SINDHU A R, BENNY MATHEWS ABRAHAM, ANITHA G PILLAI	69
<b>THE EFFICACY OF FOLATE RECEPTOR TARGETED GINGEROL-CHITOSAN NANOPARTICLES AGAINST COLORECTAL CANCER</b> NEETHU JOSE, NAVANEETH BAIJU, JIJO JOSE, BHAGYA R, DR. ROHINI SAMADARSI	70
<b>UNVEILING THE VEIL: EXPLORING FAKE FACE DETECTION METHODS</b> AJITH P J	71
<b>EFFECT OF POLYDISPERSE CEMENTITIOUS POLYMER BASED WATERPROOF COATED STEEL FIBERS AND POLYPROPYLENE FIBERS IN CONCRETE</b> CHITHIRA KRISHNAKUMAR	72
<b>ENHANCING STRUCTURAL INTEGRITY THROUGH RETROFITTING TECHNIQUES AND NUMERICAL ANALYSIS: A COMPREHENSIVE STUDY ON ABANDONED RESIDENTIAL BUILDING IN ERNAKULAM</b> CICIA MARY ROY, APARNA RENJITH, S VISHNU NARAYAN, TEVIN JOE BIJU	73
<b>OPTIMISING CONSTRUCTION EXPENSES: SOFTWARE DRIVEN EVALUATE MATERIAL CHOICES</b> NITHYA PRASANNAN, ALEENA VINOJI VALLIYAM THADATHIL, ALAN JOMON, THIMOTHY.S	74
<b>A COMPREHENSIVE REVIEW OF ZERO-DAY ATTACKS AND AI BASED INTRUSION DETECTION TECHNIQUES</b> SANAM E ANTO, M RAJESWARI, A M ANUSHA BAMINI, S RAJALAKSHMI, RANDEEP P R, RESHMA DAVIS, SOOSAN FRANCIS	75
<b>SHEAR RESPONSE OF DUAL STEEL COMBINED COMPOSITE COLUMNS IN NONPRISMATIC CONDITION</b> ABHINA MEENU M N	76
<b>EXPERIMENTAL STUDY ON LATERAL AND UPLIFT BEHAVIOR OF STEP TAPERED PILES IN SAND</b> ARCHANA PRAKASAN	77

PAPER TITLE & AUTHORS	PAGE NO.
<b>IMAGE DENOISING USING MACHINE LEARNING FOR HUGE AND INDIVIDUAL DATA WITH METRIC ANALYSIS</b> HAMSAVARDHINY R, BINDHIYA A, JANANI S, THIRUVENGADAM .C	78
<b>APPLICATION OF LEAN METHODOLOGY FOR REDUCING MANUFACTURING LEAD TIME IN THE GEAR FORGING PROCESS</b> HARIPRASAD P K, BALAKRISHNAN C R	79
<b>ANALYTICAL INVESTIGATION ON STEEL I BEAM WITH FIBRE REINFORCED POLYMER (FRP) PLATES AND STIFFENERS</b> MARIA ROSE	80
<b>AXIAL BENDING AND SEISMIC PERFORMANCE OF SPECIAL SHAPED HSS COLUMN SUBJECTED TO PARTIAL AND FULL CORRUGATION</b> FARZANA NOUSHAD	81
<b>ROBOTIC NURSING ASSISTANT USING ARTIFICIAL INTELLIGENCE</b> KIRAN JOSEPH, AJAY JOY, CHRISTO KUNJUMON, PARVATHY MR	82
<b>NORA.AI - AI THERAPIST FOR MENTAL HEALTH</b> VINCE PAUL A, ARAVIND V RAJ, AMAL JOBY, MARIA SAJU THERATTIL, SADIQ ABDUL NASSIR PUTHANKOT	83
<b>REVIEW ON LASER DRILLING OF ALUMINIUM</b> GIRISANKAR T R	84
<b>EXPERIMENTAL STUDY ON A TEMPERATURE CONTROL SYSTEM FOR CAR TYRES</b> EBIN JOSE, VIMAL K V, ADARSH A R, NANDU S, LEO YOHANNAN, SINJO JOSE V, AKHIL VINOD V, ARUN LAL	85
<b>LPG REFRIGERATION SYSTEM</b> ALBERT PAULY, JEEJO KJ, MOHAMED THAHSIN VH, LEO YOHANNAN, NANDU S, AKHIL VINOD V, SINJO JOSE V, ARUNLAL KA	86
<b>FACTORS AFFECTING THE PERFORMANCE OF INDIAN AVIATION INDUSTRY</b> NIKUNJ KUMAR, MANDEEP, HOMESH SAHARAN, GAURAV, MAYANK SINGH NEGI, PIU JAIN, GARIMA SHARMA	87
<b>THE EXPECTED CONTRIBUTION OF AI ADOPTION IN SUPPLY CHAIN MANAGEMENT</b> KAMRAN ALI, ADITYA KUMAR, PIU JAIN, GARIMA SHARMA	88
<b>MANUFACTURING, TESTING AND TUNING OF CONTINUOUS VARIABLE TRANSMISSIONS FOR AN ATV</b> SAKSHAM ANAND, ADNAN ANWAR, SIDDHARTH MONDAL, SIDDHANT SHARMA, RITESH JHA, RAKESH CHANDER SAINI	89
<b>WASTE TREATMENT USING BLACK SOLDIER FLY LARVAE</b> ALKESH M P, AVINASH P JOSEPH, MOHAMMED ABU	90
<b>DESIGN AND ANALYSIS OF HOSTEL BUILDING</b> BHAGYALEKSHMI N, GOPIKA MOHAN, ALEENA C S	91
<b>LOGISTICS EFFICIENCY ENHANCEMENT PROGRAM</b> MAYANK ARORA, KANAV BALI, GARIMA SHARMA, PIU JAIN	92
<b>SIGNEASE: A REAL TIME SIGN LANGUAGE TRANSLATION FOR INCLUSIVE MEETINGS</b> SOUMYA M. K, RIYA BIJU, DIYA P S, NITIN JOJAN	93
<b>VISION</b> ASWIN M S, ALEX BIJU, AEIBEL JOBY, SAYOOJ M S	94
<b>DUAL REDUCTION GEARBOX OF ALL TERRAIN VEHICLE WITH TRANSFER CASE AND SWITCHING MECHANISM TO CONVERT 4WD TO 2WD AND VICE-VERSA</b> ROMIL SHANKAR GUPTA, PRIYANSHU RANJAN, RAHUL PATHAK, NEERAJ JHA, DEEPAK JHA, RAKESH CHANDER SAINI	95
<b>DESIGNING OF STEERING SYSTEM FOR AN ALL TERRAIN VEHICLE</b> SAKSHAM SINGH, UTTKARSH JINDAL, UMANG GARG, SUGYAN KUMAR SAHU, ANAYAT AHMAD DAR, RAKESH CHANDER SAINI	96

PAPER TITLE & AUTHORS	PAGE NO.
<b>TEXTEMO VIDEO GENERATION</b> KEERTHANA K J, AISWARYA C B, GLADVIN M F, CHRISTO GEORGE, SOOSAN FRANCIS	97
<b>PLANT DISEASE DETECTION AND IDENTIFICATION</b> ABHINAV NP, FABIO THOMAS, JITHIN KV, SHREYA SUJITH	98
<b>EMERGENCY RESPONSE TEAM INFILTRATION AND EXTRACTION</b> ASWIN SEKHAR, HRITHIK PS, MANUEL THOMAS, TOM HARRIS PAZHAYATTIL	99
<b>NAV AR</b> LENA BALAJI P, ROSMI DAVIS, MARIYA JAMES, AISHWARYA M S, SOOSAN FRANCIS	100
<b>AUTHENTIQ: ADVANCING DIGITAL INTEGRITY</b> GAYATHRI RAJEEV, HRIDYA K P, SHIGA T S, AIBEL BABU, RESHMA DAVIS	101
<b>PROPERTY ANALYSIS OF CARBON FIBER AND HBN REINFORCED ALUMINIUM HYBRID METAL MATRIX COMPOSITES</b> ROJAN T P, SAJITH SEBY, SHON SHIBY, YADHUKRISHNA E R, NICE MENACHERY, SUKESH O.P	102
<b>THE EFFECT OF CARBON FIBER REINFORCEMENT IN ALUMINIUM METAL MATRIX COMPOSITES THROUGH POWDER METALLURGY ROUTE</b> KISHOR V GOPAL, AKSHAY V, ARUL DAS U A, HARIMADAV M, NICE MENACHERY	103
<b>WEFIT</b> HRISHIKESH T R, PETER TOMY, ARUN AR, SAAYOOJ	104
<b>LANE DEPARTURE WARNING SYSTEM</b> B.LEELA KUMARI, E.JYOTHI, K.RAMA MANI, B.NIVAS	105
<b>BUDGETBUDDY</b> NABEEL C.N, MOHAMMED NIHAL, ALJO ANTONY	106
<b>ANALYSIS OF ALS10MG-QUARTZ COMPOSITE MATERIAL FOR A CONNECTING ROD.</b> EDWIN JOY PULIKKOTTIL	107
<b>A SURVEY ON WEB DATA CLEANSING BY DETECTING XML DUPLICATE RECORD</b> ANAGHA PRADEEP	108
<b>INTEGRATED SMART TRANSPORT SYSTEM FOR ENHANCING SAFETY AND ACCESSIBILITY WITH ARM AND RASPBERRY PI</b> VIDYA DEVI K	109
<b>SMART ASSISTIVE SYSTEM FOR VISUALLY IMPAIRED PEOPLE ( SAS - VIPS)</b> BIYA BIJOY	110
<b>ANALYSIS OF FREE SPACE OPTICAL COMMUNICATION</b> JESNA A K	111
<b>DEMAND ANALYSIS AND CAPACITY MANAGEMENT FOR HOSPITAL EMERGENCIES</b> NAVEEN LAZAR K, SIDHARTH S D NAIR, EDWIN JOY PULIKKOTTIL	112
<b>FABRICATION AND TESTING OF LOW-COST SALT SPRAY TESTING MACHINE.</b> MANOJ KUMAR S, K.MUNI SHANKAR, D.MANI KUMAR, D.SAI CHARAN, K. VINOD KUMAR REDDY	113
<b>BEHAVIOUR OF STEEL CORRUGATED WEB GIRDERS</b> ANN MARY BABU, SAJIN T BABU	114
<b>COMPARISON OF ULTIMATE LOAD OF CONCRETE FILLED TRIPLE SKIN TUBE WITH OUTER SQUARE STEEL AND INNER CIRCULAR UPVCS (CTTSSCU) WITH SQUARE CFDSTS</b> SAJIN T BABU, ANN MARY BABU	115
<b>CRACK DETECTION ON BRIDGES: A COMPREHENSIVE REVIEW</b> NIBIN M	116
<b>REJUVENATION OF CLASSICAL SHADOW PUPPETRY EMPLOYING MODERN TECHNOLOGY</b> ARJUN K M, CHRISTY V VAZHAPPILLY, NAVANEETH NALESH C T, KISHOR V GOPAL, DEVADATH P R	117

<b>PAPER TITLE &amp; AUTHORS</b>	<b>PAGE NO.</b>
<b>A STUDY ON WIRELESS POWER TRANSFER: ELECTRICAL VEHICLES</b> ANU GEORGE PYNADATH	118
<b>SCIENTIFIC AND SYSTEMATIC APPROACH TOWARDS DIAPER WASTE MANAGEMENT AND GENERATING VALUE ADDED PRODUCTS FROM USED DIAPERS</b> ARJUN K M, NICE MENACHERY, NAVANEETH NALESH C T, KISHOR V GOPAL	119
<b>ANALYSIS THE PITTING CORROSION BEHAVIOUR OF NICKEL HIGH AND MEDIUM PHOSPHATE COATED AUSTENITIC STEEL AISI 304</b> MANOJ KUMAR S, RAJESH.J, HEMA NATESH.G, VAMSI KUMAR REDDY.C, PRABHAKAR.K, VENKATA SIVA SAI.G	120
<b>INVESTIGATING THE IMPACT OF CO-DEPOSITING NI P AND SI C COATINGS ON STAINLESS STEEL(SS304) AND ANALYZING THEIR TRIBOLOGICAL PROPERTIES</b> S MANOJ KUMAR, C RANGANATH, K HARI BABU, D NITHISH VARMA, K NASEER, G SIVAMUNI REDDY	121
<b>FUZZY LOGIC MPPT CONTROLLER FOR DC STANDALONE PV SYSTEMS</b> JOSE K J	122
<b>PERFORMANCE IMPROVEMENT OF PASSIVE SOLAR STILL HAVING 30MM SIZE OF BLUE METAL STONE CONNECTED WITH HEAT EXCHANGER</b> M JOTHILINGAM, RESEARCH SCHOLAR, N BALAKRISHNAN, C NITHYANANDAM	123
<b>EFFECT OF UNDERPINNED MICROPILE ON EXISTING FOUNDATIONS</b> ROSE SIMON	124



## **A ROBUST PYTHON-BASED CLOUD PLATFORM FOR SECURE AND COLLABORATIVE THREAT INTELLIGENCE SHARING**

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**Abstract:** This Python-based cloud platform is designed to enable secure and collective defense. The platform aims to address the challenges faced in sharing sensitive threat intelligence data among organizations by offering a robust and flexible solution. The platform leverages cloud computing technologies, providing scalability and ease of access for users. Security and privacy are given utmost importance, as the platform offers end-to-end encryption and anonymization techniques to protect sensitive information. Collaborative features allow users to contribute to threat intelligence in a secure manner, ensuring an open and efficient exchange of knowledge. The platform also incorporates data aggregation capabilities to analyze large volumes of threat intelligence data, aiding in the identification of trends and patterns. Furthermore, collective defense mechanisms are implemented to enhance the overall security posture of participating organizations. The platform is built using Python, a popular and versatile programming language, making it accessible and customizable for users. Overall, the platform provides an innovative approach to address the challenges associated with threat intelligence sharing, offering a secure and efficient solution for organizations to collaborate and defend against.

**Keywords:** *Threat Intelligence Sharing, Anonymization, Data Aggregation.*

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## MEDICINAL PLANT IDENTIFICATION USING MACHINE LEARNING.

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**Abstract:** Medicinal plants have been used for centuries in traditional medicine systems for their therapeutic properties. Accurate identification of these plants is essential for ensuring their safe and effective use. In this project, we propose a machine learning-based approach for the automated identification of medicinal plants from images. We utilize a dataset of images containing various medicinal plant species and employ convolutional neural networks (CNNs) to extract features and classify plants into their respective species. Additionally, we explore the use of transfer learning to leverage pre-trained CNN models for improved classification performance. Our results demonstrate the effectiveness of the proposed approach in accurately identifying medicinal plants, with potential applications in healthcare, biodiversity conservation, and traditional knowledge preservation. This project highlights the synergy between machine learning and botanical sciences, showcasing how advanced technologies can enhance our understanding and utilization of medicinal plants for the benefit of society.

**Keywords:** *Machine Learning, Image Classification, Convolutional Neural Network (CNN), Image Identification, Image Processing.*

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## NIGHT PATROLLING ROBOT FOR SURVEILLANCE AND WOMEN SAFETY

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**Abstract:** In a normal days safety for Women is the biggest concern in many parts of the world and surveillance of the area will reducing rapidly. So we propose a Night Patrolling Robot For Surveillance And Women Safety. This system uses 360 degree camera and mic fixed on robotic vehicle for surveillance and safety purpose. Using camera we can able to see nook and corner of the incidents. Mic is used to sense the sound of each persons which they shout or call for others to help. NightPatrollingRobot hears each and it starts moving towards the path of the sound. Then it will scans the area using its camera to detect the humans face and send the live vedio and SMS to the robot user. Robot provides continuous monitoring without any rest will be needed for our new designed security or night patrolling robot.

**Keywords:** *Surveillance-Security-GPS Tracking system-Alerting-SMS Features.*

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## IMAGE DEMOSAICING USING NAÏVE BAYES CLASSIFIER FOR IMPROVED IMAGE METRICS

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**Abstract:** Capturing minute details and transforming them into a complete image is a tedious task, which is accomplished by demosaicing process. Image demosaicing has gained popularity in forensics, low-light imaging, biomedical applications etc. in the present scenario. The proposed work presents the usage of naïve bayes classifier for the demosaicing mechanism on the images from Kodak dataset for the kernel size of 7\*7. The metrics Signal to Noise Ratio, Peak Signal to Noise Ratio have been used to decide the quality of the output images. The results after extensive simulations on Matlab have shown superiority over the existing KNN algorithm.

**Keywords:** *Naïve bayes, Demosaicing, Bayer pattern, SNR, PSNR.*

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## ENVIRONMENTALLY FRIENDLY WASTE PLASTIC FUEL: AN ALTERNATIVE SOURCE OF ENERGY FOR AUTOMOTIVE VEHICLES

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**Abstract:** As fossil fuels run out and carbon dioxide levels increase, the emphasis shifts to finding new energy sources that can provide significant substitutes for fossil fuels. The various literature undertakes an inclusive experimental investigation to assess the influence of diverse blends of plastic-derived fuels on engine parameters. The primary objective is to unveil the intricate interplay between fuel composition and operational load conditions, providing valuable insights for optimizing engine performance, efficiency, and environmental sustainability. Consequently, there is a demand for alternative fuels sourced from municipal plastic waste or municipal solid waste. This study is inspired by initiatives such as "The Swachh Bharat Mission of India & Municipal Solid Waste Management (SWM) in India". The present work focused on investigating IC engine performance, combustion characteristics and emissions parameters at constant speeds of 1500 rpm at 0% to 100% engine load conditions fuelled with available diesel and waste plastic fuel and different blends of 10% to 50%. The physicochemical properties of waste plastic fuel and its blends were found per the ASTM standards with low calorific value and higher viscosity. The results showed that waste plastic fuel can be used as a blend component to reduce the amount of diesel fuel used in diesel engines. The 10% to 30%, and for better results with 20% blends show good propensities to be utilized with diesel engines through the experimental results in this work. NO<sub>x</sub>, CO, HC, and smoke emissions are found to be to some extent lighter than diesel. Consequently, PO20D80 can potentially replace diesel in the compression ignition engine without requiring any further modifications. This research has tried to solve the twin problem of environmental concern and the need for an alternative and environmentally friendly fuel.

**Keywords:** *Alternative fuels, Combustion, Diesel engine, Emissions, Performance, Waste Management, Waste plastic fuel.*

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## IMPLEMENTATION OF INTELLIGENT RETRIEVAL ALGORITHMS FOR OPTIMUM MACHINING PERFORMANCE IN TURNING AND MILLING OPERATIONS – A BRIEF REVIEW

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**Abstract:** Machining process parameters and machining environment in metal cutting are key aspects to trigger efficacy of machining performance. Machining conditions, work-piece material, type of cutting tool, selection of appropriate machine tool and jigs and fixtures, selection of cutting fluid are some of the major factors which influence machining performance parameters. These parameters are cutting tool temperatures, cutting forces, vibration, surface roughness, tool path, machining time, tool wear and chip morphology etc. The conjunctive analysis of all the influencing factors on machining efficiency to minimize production cost and enhance productivity needs careful examination and implementable methodologies. Researchers have been implementing regression analysis, mono-objective and multi-objective optimization, and other procedures to handle the huge data pertaining to optimization of machining process. This is the point where Machine Learning Algorithms (MLA) or Intelligent Retrieval Algorithms (IRA) have become pivotal in minimizing computation time and resulting in optimum machining environment. Artificial Neural Network (ANN), Support Vector Machine (SVM), Particle Swarm Optimization (PSO), Artificial Immune System (AIS), Genetic Algorithms etc., have been implemented by researchers worldwide to optimize machining performance. Data acquisition, segregation and designing, analyzing, and predicting a model's performance are major tasks which are taken up by researchers while exploring various machine learning techniques to metal cutting operations. This review at first presents an overview of all the MLA followed by discussion of research works pertaining to turning and milling operations. This review is a congregation of works taken up by researchers since more than two decades ago in relation to application of machine learning algorithms to machining operations. The results reported were affirmative by way of machining performance improvement and enhancement of machining efficacy.

**Keywords:** *Machine Learning Algorithms, Optimization, Neural Network, Artificial Immune System*

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## CARBON STORAGE AND SEQUESTRATION POTENTIAL OF NEEM TREES IN SOUTHERN REGION OF CHENNAI

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**Abstract:** Urban areas are increasingly facing challenges due to climate change and environmental degradation. This necessitates the exploration of nature-based solutions to address these issues. The study focuses on investigating the carbon storage and sequestration potential of neem trees in the southern regions of Chennai, India. Neem trees are commonly found in urban landscapes due to their resilience, adaptability, and ecological benefits. By conducting field assessments and analysis, we were able to quantify the carbon content of neem tree biomass and evaluate its role in reducing atmospheric carbon dioxide levels. Our methodology included measuring tree dimensions, such as diameter at breast height (DBH) and height, and analyzing tree components like branches, leaves, and trunk wood for carbon content. We used established allometric equations to estimate biomass and carbon stocks. Initial findings indicate that neem tree biomass has a significant carbon storage capacity, especially in mature trees with substantial carbon sequestration potential. The aboveground biomass of neem trees plays a crucial role in urban carbon stocks, emphasizing the importance of these trees in climate change mitigation efforts

**Keywords:** *Carbon sequestration, Allometric equations, CNN.*

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## UNLEASHING THE POWER OF DATA IN DATA SCIENCE

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**Abstract:** Certainly, Data Science stands out as a transformative technology of our time, aimed at extracting valuable insights from data to address complex real-world problems. The burgeoning demand for Data Science can be attributed to the relentless generation of data at an unprecedented pace. In the era of the Fourth Industrial Revolution (Industry 4.0), the digital landscape is inundated with a vast volume of data encompassing statistics, facts, knowledge, and information from sources such as the Internet of Things (IoT), business operations, healthcare systems, mobile devices, urban environments, and security networks, owing to technological advancements. Deriving knowledge and practical insights from this wealth of data facilitates informed decision-making across various application domains. Data Science employs advanced analytics techniques, including machine learning models, predictive models, and intricate statistical analysis, to delve deep into data sets, enabling a deeper understanding and extraction of actionable insights. These techniques play a pivotal role in enhancing decision-making processes, streamlining computations, and bolstering the intelligence and capabilities of applications in diverse contexts. This paper provides an extensive overview of Data Science, elucidating its multifaceted analytics techniques and their potential to drive perceptive decision-making across a wide array of scenarios.

**Keywords:** *Big data, Data science, Deep learning, Decision-making, Correlation analysis.*

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## INVESTIGATIONS ON DRILLING CHARACTERISTICS OF GLASS-BAMBOO REINFORCED HYBRID COMPOSITES USING ANOVA AND REGRESSION MODEL

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**Abstract:** Polymer matrix composites possess better properties like great strength-to-weight ratio, stiffness-to-weight ratio, and noble corrosive resistance and consequently, are chosen for high-performance applications like in the aerospace, defense, and sport goods industries. Drilling is one of the vital methods for structure products with composite panels. By adjusting the cutting speed, feed rate, and tool geometry, this work aims to highlight the machining properties of the hybrid composites. The hand lay-up approach was used to create the hybrid composite specimens. Using MATLAB's image analysis technique, the damage caused by drilling is investigated. Regression analysis and ANOVA are used to analyze the data in order to reach the ideal condition. For drilling hybrid composites, it was found that the center drill, higher spindle speed (5500 rpm), and lower feed value (0.18 mm/rev) provide the least amount of delamination. For thrust force, it was discovered that the feed rate mattered more than the spindle speed and drill geometry.

**Keywords:** *Hybrid composites, Design of Experiments, Delamination Factor, Image Analysis, ANOVA, Regression.*

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## INVESTIGATIONAL STUDY ON INNOVATIONS IN LOW-COST AND TIME-EFFECTIVE SLAB CONSTRUCTION

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**Abstract:** The challenges and opportunities in contemporary slab construction methods seek to revolutionize traditional practices through innovative design approaches. The objective is to streamline and expedite the slab construction process while minimizing concrete usage and maintaining structural integrity. The study employs Ansys, a robust simulation tool, to analyze and optimize proposed designs, ensuring adherence to performance standards. Key goals include the incorporation of 3D printing technology to enhance efficiency and precision in slab fabrication. A systematic methodology evaluates normal slab and the designed grid slab. An innovative approach to concrete construction by integrating steel mesh and leveraging Ansys simulation in the design of a modular concrete block. Inspired by the efficiency of grid slab systems and the aesthetic appeal of waffle systems, the goal is to create a hole-deck modular block with improved structural performance and simplified construction. The study explores the benefits of steel fiber reinforcements, including enhanced crack resistance and flexural toughness. By unifying slabs and beams, we aim to optimize load-bearing capacities. The outcomes contribute to advancing construction practices by introducing practical solutions to contemporary challenges in slab design. The overarching goal is to pioneer a more efficient, eco-friendly, and structurally superior construction process, setting new standards for the future of slab construction. The modular concrete block is envisioned to resemble the grid slab system, akin in size to a unit of a waffle system, with a distinctive hole-deck appearance. This design not only contributes to a visually pleasing structure but also reduces overall block weight while maintaining strength. The modular nature of the block facilitates ease of assembly, making it adaptable to diverse construction applications.

**Keywords:** *Grid slab system, steel wire mesh, 3D printing.*

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## A MULTI STOPBAND FREQUENCY SELECTIVE SURFACE FOR MOBILE SHIELDING APPLICATIONS

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**Abstract:** Frequency Selective Surfaces (FSS) has been the subject of intensive investigation for their widespread applications in communication and systems. To shield mobile users from dangerous radiation, frequency selective surface (FSS) array filters can be utilized as a rear cover for mobile devices. Frequency Selective Surface (FSS) array filter simulation is carried out in Ansoft HFSS. The FSS unit cell design results yielded a gain of 5.9 dB and a transmission coefficient of -17.0734 dB at 1.8 GHz, -39.2064 at 2.4 GHz, -28.8682 GHz at 3.3 GHz, and -47.6187 GHz at 5.6 GHz. The power density is also calculated with the help of EM radiation tester. The results show that when FSS is used E-field value is 0.1 V/m as compared to that of 14V/m without FSS. Similarly the H-field value with FSS is 16 $\mu$ T as compared with that of 0.09 $\mu$ T with FSS.

**Keywords:** *Frequency Selective surface, Ansoft High Frequency Structure Simulator, Electromagnetic waves.*

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## A STUDY ON INDU-BALA PRODUCT OF GRAPHS CONCERNING SOME GRAPH PARAMETERS

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**Abstract:** The Indu-Bala product of two connected graphs  $G$  and  $H$  is denoted as  $G \blacktriangledown H$  and it consists of two disjoint copies of the join of  $G$  and  $H$  such that there is an adjacency between the corresponding vertices in the two copies of  $H$ . A vertex subset  $S$  of a graph  $G = (V, E)$  is said to be a dominating set if all vertices in  $G$  are either in  $S$  or adjacent to at least one vertex in  $S$ . The minimum cardinality of such a set is the domination number, denoted as  $\gamma(G)$ . In this work, the authors discussed Indu-Bala product of graphs concerning various extensions of domination and also about the chromatic number of the graph.

**Keywords:** *Indu-Bala product, domination, Roman domination, chromatic number.*

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## **DEVELOPMENT OF A WALL-STICKING DRONE FOR NON-DESTRUCTIVE ULTRASONIC TESTING**

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**Abstract:** Tall structures require constant inspection, maintenance of their structural health condition, and safety of the users; however, accessing these structures is getting more and more difficult due to their enormous height and size. In order to deal with this problem, many researchers have developed several robots for wall crawling, yet there is no guaranteed solution. One of the critical reasons why existing wall-crawling robots have not been available in the field is the risk of accidental fall due to operational failure from the harsh environment, like strong wind and the surface's unpredictable condition. Therefore, we attempted to develop a wall-sticking aerial robot platform that can approach any place of the structure by flying and sticking to the target place. The robot is equipped with rubber cup suction module with suction motor, which creates vacuum and helps to stick with surface to stick the sensor probe on the surface of the structure. This paper deals with installing the wall-sticking mechanism on the aerial robot.

**Keywords:** *drone, non-destructive testing, wall-sticking, UAV, contact based inspection*

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## VISUAL INSPECTION OF AIRCRAFT USING AUTONOMOUS DRONE

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**Abstract:** The topic relates to a new method and system for performing visual aircraft inspections in A type maintenance checks. Current inspection methods represent a safety hazard for maintenance workers and occur over a long period of time. As a means to address this issue, this method uses drones controlled remotely that are equipped with high-quality cameras and sensors. They fly around the aircraft and capture high-resolution images and videos of its exterior parts. The drones have predetermined flight paths that cover critical areas for inspection, including the fuselage and the wings, the tail and the engines on both sides. The data is then transmitted to a ground station in real time, from which the maintenance personnel can observe the inspection. The precision of detecting such anomalies like cracks, dents, scratches, and corrosion may be accomplished by implementing image processing algorithms. This method provides several advantages, such as improved safety, which is achieved by eliminating the need for personnel to ascend onto the aircraft's exterior, the increased speed of the inspection, and the ability to continuously cover all exterior surfaces. In addition, this approach allows the rapidity of maintenance-related decision-making, which ensures the aircraft's overall operative efficiency and safety. By implementing this innovation via the proposed patent, the visual inspection of A type maintenance checks may be cost-effectively completed, ensuring the adherence to all regulatory requirements and the maximization of aircraft maintenance's reliability.

**Keywords:** *Visual Inspections, Real-time monitoring, Efficiency, Anomalies detection, high-resolution images.*

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## MODIFIED STARCH-POLYVINYL ALCOHOL BIODEGRADABLE FILM FOR FOOD PACKAGING

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**Abstract:** A biodegradable film is synthesized using corn starch, polyvinyl alcohol and filler. It is being proposed to be used as an alternative to the synthetic non-degradable film for food packaging. Generally, the film synthesized from starch have poor mechanical properties and water sensitivity. The research incorporates the use of fillers namely carboxymethyl cellulose (CMC) and chitosan to enhance mechanical properties and water sensitivity of the biodegradable film. The film was prepared by solvent casting method, with varying proportions of CMC and chitosan added to the starch-Polyvinyl alcohol (PVAI) solution. The biodegradable film prepared has been tested and analyzed for specific properties of the film, such as mechanical properties, elongation, barrier properties, biodegradability and water solubility. The highest improvement in tensile strength was observed for the same concentration of CMC and chitosan composite film. The significant improvement in strength was observed for tensile strength to the tune of 8.78-fold, elongation 28.19-fold, water solubility retarded by 16% and migration found to be inhibited in 3% acetic acid, 15% ethanol and water simulants. The film degraded in soil within 7 days. The synthesis of biodegradable film using starch-PVAI and fillers presents a promising solution for sustainable food packaging, addressing both environmental concerns and practical application.

**Keywords:** *Biodegradable film, Food packaging, Corn starch, PVAI, CMC, Chitosan, Barrier properties, Tensile strength.*

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## STUDY ON AN UPDATED THRUSTER FOR MISSILES

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**Abstract:** Thrusters have been used with missiles for supplementary functions like increasing the thrust, range, and flight velocity of the missile. Thrusters are an integral part of modern high-speed missiles used in various application such as thrust augmentation, thrust vectoring, roll stabilization. While thrusters offer various upgrades to the missile, they come with their own problems that were missing in the erstwhile technologies. This study done is on a novel design of twin lateral thrusters coupled with trapezoidal fins in missile, making use of liquid propellants, for high-speed applications in missiles with enhanced range and agility of missile providing it rapid maneuverability enabling precise control of missile trajectory, facilitating rapid course corrections. Multiple factors are enhanced by the thrusters studied including the accuracy with minimized size and weight of the thruster. In addition, the effects of the enhancements on fuel consumption are also studied. The advantages found include reduce collateral damage, enhanced tactical and strategic flexibility to provide a strategic advantage and increase the mission success.

**Keywords:** *missiles, thrusters, thrust augmentation, thrust vectoring*

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## PERFORMANCE ANALYSIS OF RADIO OVER FSO FOR ADVANCED MODULATION FORMATS

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**Abstract:** Since Radio Over Free Space Optical systems are being preferred over other systems these days, so this paper presents a RoFSO system that works at 40 Gbps data speed. In the presented system with radio frequency mixing, different modulation formats viz. NRZ, CSRZ and RZ are evaluated based on varied power range and aperture diameter. Also, despite the number of benefits, the system needs to be evaluated for various launch powers and distances in terms of the Q factor. After extensive simulations, a comparison of CSRZ, RZ, and NRZ has been presented in terms of BER to detect the optimal modulation format for the RoFSO system from which it is deduced that the modulation format CSRZ outperforms the other techniques.

**Keywords:** BER, CSRZ, RZ, NRZ, RoFSO, Aperture diameter.

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## DESIGN AND ANALYSIS OF SINGLE STAGE GAS TURBINE USING EFFICIENT COOLANT SECTION

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**Abstract:** Modern gas turbine design is based on efficiency, which spurs constant innovation to improve performance while consuming the fewest resources possible. This research focuses on the design and analysis of a single-stage gas turbine blade, with a particular emphasis on effective coolant sections. This is an important area of gas turbine engineering. Unlike traditional approaches, ours is based on the idea that efficiency and design go hand in hand, and that improved performance is primarily dependent on cooling efficiency. In gas turbine technology, optimizing performance requires a careful balancing act between thermodynamic and aerodynamic efficiency. The objective of this study is to maximize efficiency on several fronts by providing a comprehensive investigation of novel cooling techniques inside the framework of a single-stage gas turbine blade design and analysis. The analysis work is done with the CFD simulation, the flow visualisation created with software called ANSYS FLUENT. Furthermore, the main analysis is to create the desired temperature and pressure distributions, this analysis performed with the increasing RPM, started from 3000 to 15000. The coolant section designed different along the span and chord length, to ensure proper cooling at specific RPM. The blade twisting and annulus provided to ensure the aerodynamic stability.

**Keywords:** *Thermal Strain, Aerodynamic Load, Thermal Stress*

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## CRIME TYPE AND OCCURRENCE PREDICTION USING MACHINE LEARNING

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**Abstract:** Crime Type and Occurrence Prediction Using Machine Learning” is a sophisticated Python project that leverages Machine Learning techniques, particularly Decision Tree Classifier and Bagging Classifier algorithms, to forecast and categorize various types of crime in Portland, Oregon, USA, spanning from 2015 to 2023. With a dataset of 505,063 data points covering 20 distinct crime classes such as ‘Larceny Offenses’, ‘Motor Vehicle Theft’, ‘Assault Offenses’, and ‘Drug/Narcotic Offenses’, the models achieved remarkable accuracy rates, with the Decision Tree Classifier scoring 98% on the training set and 95% on the test set, while the Bagging Classifier maintained a consistent performance of 98% on the training set and 95% on the test set. The dataset comprises 15 features including address, case number, crime against category, neighborhood, occurrence date and time, offense category and type, geographical coordinates, and offense count, providing a comprehensive foundation for precise predictions. This project holds significant promise for law enforcement agencies, urban planners, and policymakers, offering proactive insights for resource allocation and strategic decision-making to enhance public safety. By categorizing crimes and understanding patterns, stakeholders can implement targeted interventions and preventative measures, aided by the models high accuracy and reliability in real-world crime prediction scenarios. In conclusion, “Crime Type and Occurrence Prediction Using Machine Learning” stands as a powerful tool, combining advanced algorithms and rich data to offer precise crime prediction and classification, thereby contributing to safer urban environments and optimized law enforcement strategies.

**Keywords:** *Machine Learning, Decision Tree Classifier, Bagging Classifier, Crime Prediction, Portland Oregon Crime Dataset, Crime Categories, High Accuracy Rates, Urban Safety, Law Enforcement Strategies.*

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## EFFECT OF NANOPARTICLES ON PERFORMANCE OF SOLID PROPELLANTS

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**Abstract:** This study explores the impact of incorporating reduced graphene oxide (rGO) and manganese dioxide (MnO<sub>2</sub>) nanoparticles on the performance of solid propellants, aiming to enhance combustion efficiency and overall functionality. Through systematic experimentation and computational simulations, solid propellants with varying concentrations of rGO and MnO<sub>2</sub> nanoparticles are synthesized and analysed for combustion behaviour, encompassing parameters such as ignition delay, burning rate, and specific impulse. The results unveil notable enhancements in propellant performance attributable to nanoparticle additives: rGO augments thermal conductivity, facilitating improved heat transfer within the propellant matrix and consequently reducing ignition delay, while MnO<sub>2</sub> nanoparticles catalyse increased burning rates and heightened energy release. Importantly, synergistic effects between rGO and MnO<sub>2</sub> nanoparticles are observed, leading to further enhancements in propellant performance. This research contributes insights into the underlying mechanisms governing nanoparticle-induced improvements in solid propellant combustion, offering valuable guidance for optimizing propellant formulations to achieve enhanced efficiency and reliability. Such advancements hold promise for applications in aerospace propulsion and defence technologies, where improved propellant performance is of paramount importance. This work provides important recommendations for modifying propellant compositions to achieve increased efficiency and reliability by shedding light on the fundamental principles regulating nanoparticle-induced improvements in solid propellant combustion. These developments could have a significant impact on defence and aerospace propulsion, where better propellant performance is crucial.

**Keywords:** *Defence and Aerospace Propulsion, Reduced graphene oxide (rGO), Manganese dioxide (MnO<sub>2</sub>), Nanoparticles, Solid propellants, Efficiency and Reliability.*

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# NOVEL TECHNIQUE FOR VISUAL INSPECTION OF THE AIRCRAFT USING ARTIFICIAL INTELLIGENCE POWERED DRONE

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**Abstract:** This research paper investigates the development of a drone-based inspection technique for aircraft, which leverages artificial intelligence (AI). The technique involves autonomous flight and visual inspection, allowing for the detection of wear, damage, leaks, and asymmetry in aircraft structures. The drone is equipped with a spraying nozzle for deicing control surfaces, utilizing AI-powered sensors such as high-resolution cameras and infrared detectors to carry out these tasks. This approach minimizes human involvement and exposure to adverse conditions, offering a more efficient and comprehensive 360-degree visual inspection than traditional aerial platform methods. The paper examines design considerations for these drones, aiming to establish an advanced technique that transforms aircraft inspection, providing significant time and resource savings while reducing human error.

**Keywords:** *Drone technology, Artificial Intelligence, Visual inspection, Enhanced Autonomy, Deicing.*

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# OPTIMIZATION AND PERFORMANCE EVALUATION OF MACRO-GROOVED HYDRODYNAMIC JOURNAL BEARINGS FOR INDUSTRIAL APPLICATIONS

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**Abstract:** The present study investigates the static characteristics of journal bearings with rectangular macro-grooves. The static performance characteristics like load capacity and friction coefficient are determined using the finite element method by solving the governing Reynold's equation of lubricant flow. In this study, the effect of rectangular macro-groove distribution applied in various regions of bearing, variation of groove depth, and area density are considered for investigation considering the optimal geometrical parameters of journal bearings operating at lower and higher eccentricity ratios. From the simulated results, the static characteristics of the journal bearing are enhanced at both higher and lower eccentricity ratios. At a lower eccentricity ratio of 0.2, the maximum enhancement of 95.75% load capacity and 48.67% reduction in friction coefficient is found with four macro-rectangular grooves with an area density of 58.51% and a non-dimensional groove depth of 0.9 in the pressure-increasing region, while at a higher eccentricity ratio of 0.8, maximum performance was found with one groove in the pressure-increasing region at a depth of 0.3, where load capacity enhances by 27.78% and friction coefficient reduces by 21.36%.

**Keywords:** *Load carrying capacity, Finite element method, Hydrodynamic journal bearing, Coefficient of friction, Macro-grooves.*

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## ADVANCEMENTS AND APPLICATIONS OF 42CRMO4 SUPERALLOYS: A COMPREHENSIVE REVIEW

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**Abstract:** This comprehensive review paper delves into the advancements and wide-ranging applications of 42CrMo4 superalloys. By synthesizing existing research and industry developments, the paper provides a detailed analysis of the material's properties, manufacturing processes, and performance characteristics. The review underscores the versatility and durability of 42CrMo4 alloys across diverse sectors, including aerospace, automotive, and energy. Furthermore, it discusses the key challenges and opportunities associated with the utilization of these superalloys in various engineering applications. Overall, this abstract encapsulates the significance of 42CrMo4 superalloys in modern engineering and highlights avenues for future research and innovation.

**Keywords:** *superalloys types ; high temperature applications; AISI4140; 42CrMo4 and DoE*

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## AEROSPIKE-BASED DRAG REDUCTION METHOD FOR HYPERSONIC VEHICLES

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**Abstract:** This study delves into two crucial aspects of hypersonic flight simulation analysis: The reduction of high drag associated with blunt nose cones and the creation of a unique passive control approach for supporting laminar flow over high-speed air and space vehicles are two important components of hypersonic flight simulation analysis that are explored in this paper. The main objective is to reduce drag as much as possible during the ascent phase, which is a crucial prerequisite for maximizing payload weight and preserving the energy required to defy Earth's gravitational pull. The influence of an aerospike on the surrounding flow field is investigated over a variety of Mach values, including 5.0, 8.0, and 11.0. The usefulness of various aerospike tip modifications—such as a blunt spike, an aerodrome, and a sharp front— in lowering drag and heat load is investigated. We perform numerical analyses for various aerospike lengths, ranging from one to four times the nose cone's dome diameter, and include roughness components with heights of 40–60% of the local boundary-layer thickness. The work offers important insights into active and passive control strategies that improve aerodynamic performance in high-speed air and space transportation systems, greatly advancing the field of hypersonic flight technology.

**Keywords:** *Drag reduction, Blunt nose cones, Laminar flow, Mach Number, Mach Number, Boundary Layer Thickness, Hypersonic Vehicles*

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# CORROSION MODELING TO PREDICT THE RATE OF GALVANIC CORROSION OF MAGNESIUM BONE PLATE AND STEEL BASED BIO-IMPLANTS

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**Abstract:** Mg and its alloys undergo corrosion easily. If controlled, this behaviour is ideal for biodegradable Mg alloy implants. Metal based implants like steel 304 / 316L and Titanium alloys need to be removed after 6-7 months while bone tissues completely heal. When these implants (AZ91/Mg-Zn alloys) placed inside the body using steel bolts a galvanic corrosion cell develops. In such case elements with less nobility will start to degrade and tend to deposit over cathodic surface. Magnesium has a corrosion potential of -1.6 V while steel is -0.44V, due to this difference magnesium will corrode faster and deposit over the steel bolt. At the same time zinc has a corrosion potential of -0.77 V. The result of galvanic corrosion is the formation of pit in the galvanic interface. This pit will grow at particular rate and leads to complete fracture of the interface. In order to predict the life span of the implant alloy a numerical model can be used. The galvanic corrosion model based on diffusion and mass transport mechanism can be modelled based on Laplace equation interface available in the commercial software COMSOL. The current numerical model doesn't consider the effect of deposition product in corrosion acceleration. Under-deposit corrosion is another major drawback of galvanic corrosion.

**Keywords:** *Corrosion, Bio implants, Galvanic corrosion, Mg alloys.*

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## EFFECT OF HEAT TREATMENT ON MICROSTRUCTURE DEVELOPMENT OF NOVEL MG-5.5 ZN ALLOY

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**Abstract:** Magnesium stands out as a potential candidate for degradable implants in biomedical applications due to its light weight and appropriate mechanical properties. As an implant material Mg is biocompatible and biodegradable in human body fluid, thus eliminating the need for a second surgery to remove the implant. However pure Magnesium shows loss of strength as it is corroded away in the body fluid. Mg-Zn alloys can contribute to reduced stress shielding and better load transfer, which is essential for the long-term success of orthopedic implants. Besides, Mg-Zn alloy promotes bone growth and osseointegration, the process by which the implant fuses with the surrounding bone. In this study, a new Mg-5.5Zn alloy was fabricated using stir casting. The microstructure, porosity and hardness of as-cast and heat treated Mg-5.5Zn alloy for different heat treatment intervals (6h, 8h and 10h) were studied. The microstructure changes were examined using Optical microscopy. The result revealed significant alterations in grain structure and distribution of precipitates after heat treatment. The results identified eight hours as the optimum time interval for the age hardening of the new alloy.

**Keywords:** *Mg Zn alloy, Heat Treatment, Bio implants, Microstructure.*

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## DATA ANALYTICS FRAMEWORK FOR DIGITAL TWIN OF GRINDING MACHINE

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**Abstract:** In the development of a data analysis framework for the digital twin of a grinding machine, a multifaceted approach is employed to ensure a comprehensive understanding of its operational dynamics. Signal processing filters are used to enhance data quality by removing noise and artifacts. Subsequent clustering techniques segment processed signals into distinct operational phases, enabling a detailed analysis of performance across different stages of the grinding process. By computing average and maximum power consumption within each phase, the Material Removal Rate (MRR) is estimated, providing insights into process efficiency. Optimization techniques refine operational parameters to maximize key performance metrics such as throughput and surface finish quality, employing algorithms ranging from gradient descent to genetic algorithms. This integrated framework facilitates performance monitoring, predictive maintenance, and optimization, ultimately enhancing operational efficiency and product quality.

**Keywords:** *Material removal rate , signal processing ,clustering ,gradient descent.*

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## IOT BASED HYBRID CHARGING STATION

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**Abstract:** The document explores the global transition towards sustainable transportation, focusing on the emergence of electric vehicles, particularly electric two-wheelers. It emphasizes the necessity of specialized charging infrastructure to support the widespread adoption of these vehicles. The integration of solar and grid electricity is proposed as a sustainable solution for continuous charging. Real-time monitoring through IoT technology enables users to conveniently manage charging stations remotely, improving efficiency and resource utilization. Algorithms for dynamic load management optimize energy distribution for cost-effectiveness and sustainability. Understanding the evolution and importance of these charging stations is vital for the future of transportation and environmental sustainability.

**Keywords:** *sustainable transportation, electric vehicles, electric two-wheelers, charging infrastructure, solar integration, grid electricity, real-time monitoring, IoT technology, dynamic load management, energy distribution, cost-effectiveness, environmental sustainability.*

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## SOLAR POWERED AGRICULTURAL ROBOT FOR PADDY CULTIVATION

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**Abstract:** This paper "Towards Paddy Rice Smart Farming: A Review on Big Data, Machine Language, and Rice Production Tasks" provides an overview of the impact of Big Data, Machine Learning, and Internet of Things on rice production. The review emphasizes the increasing demand for food due to urbanization, soil erosion, climatic changes, and water shortages, necessitating a 70% increase in food production. However, approximately 33% of agricultural production is wasted due to poor logistics and storage. To address these challenges, precision agriculture and smart farming are proposed as solutions. Precision agriculture involves technology-enabled farming management that observes, measures, and analyzes the needs of individual fields and crops, while smart farming applies information and data technologies to optimize complex farming systems. The project highlights the potential of Big Data and Machine Learning in transforming rice farming, particularly in areas such as crop monitoring, yield prediction, disease detection, and resource optimization. Additionally, it emphasizes the need for high-resolution remotely sensed time series imagery data and effective image segmentation processes. The abstract sets the stage for a comprehensive exploration of the potential benefits and challenges associated with the integration of Big Data, Machine Learning, and Internet of Things in paddy rice cultivation.

**Keywords:** *Precision agriculture, Smart farming, Big Data, Machine Learning, Rice production, Internet of Things.*

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## SOLAR-DRIVEN HYDROGEN AND OXYGEN PRODUCTION FOR COOKING AND MEDICAL APPLICATIONS

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**Abstract:** The initiative for solar-driven hydrogen and oxygen production for cooking and medical applications represents a significant departure from conventional energy-intensive activities. It integrates three crucial components: solar power generation, hydrogen and oxygen gas separation and storage, and the application of these gases for cooking and medical purposes. This holistic approach is designed to revolutionize how we approach energy consumption in sectors that traditionally rely heavily on fossil fuels. The project begins by harnessing the power of sunlight through solar panels, converting this abundant and renewable resource into electrical energy. This shift towards clean energy sources marks a fundamental departure from reliance on non-renewable energy, aligning with global efforts to mitigate climate change and reduce environmental impact. By utilizing solar power, the project not only ensures sustainability but also contributes to reducing carbon emissions and pollution associated with traditional energy production methods. A key aspect of the initiative involves the electrolysis process, where water is separated into its constituent elements, hydrogen and oxygen gases, using the harvested solar energy. These gases are then stored separately in carefully designed containers with stringent safety measures in place. This ensures the safe handling and utilization of these clean fuels, mitigating potential risks associated with their use in cooking and medical applications. The innovative aspect of the project lies in the application of hydrogen and oxygen gases as sustainable fuel sources for cooking and medical purposes. When these gases combust, they recombine to form water vapor, releasing energy without emitting harmful byproducts or greenhouse gases. This clean combustion process not only provides a reliable energy source but also significantly reduces environmental impact, offering a promising alternative to conventional fossil fuel-based systems. By emphasizing clean energy practices and reducing reliance on traditional energy sources, this initiative aims to diminish the carbon footprint associated with energy-intensive activities. It presents an eco-friendly solution for households and communities, promoting sustainable development and environmental consciousness. The success of this solar-driven hydrogen and oxygen production initiative holds the potential to transform our energy landscape, paving the way for a more sustainable and environmentally conscious future.

**Keywords:** *solar-driven, hydrogen, oxygen production, cooking, medical applications, clean energy practices*

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In association with: **ISET Research, India.**



## PARAMETRIC OPTIMIZATION OF AL-SiC-GRAPHENE COMPOSITE IN CNC MILLING

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**Abstract:** In recent years there is an increased demand for the development of innovative light weight composite materials for greater efficiencies in automobile applications. The demand for advanced materials with enhanced mechanical and structural properties has led to the development of hybrid aluminum matrix nano-composites. CNC milling is a mass production technique. The surface finish of the CNC milled components depends the tool material width of cut, depth of cut cutting force and feed rate. Knowledge of the optimum parameter combination is required for the production of components with good surface finish. In this study, CNC milling parameters such as Speed, Feed, Depth of Cut are optimized for the CNC milling of SiC-Graphene nano composite. The experiments were conducted using the Box Behnken design of Response surface method. Desirability function analysis is carried out to optimize the surface roughness with respect to the input parameters. The result indicates that reducing the feed and speed the reduces Surface Roughness. The minimum value of surface roughness of 2.05  $\mu$  was obtained for feed 150 mm/sec and speed 1000 rpm.

**Keywords:** BOX BEHNKEN DESIGN, NANO HYBRID COMPOSITE, OPTIMIZATION, RSM, CNC

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## IDENTIFICATION AND RECTIFICATION OF ACCIDENT BLACKSPOTS

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**Abstract:** Road accidents are a pervasive global issue, necessitating proactive measures for identification and rectification of accident blackspots. This project report presents a detailed examination of the methodologies employed in pinpointing high-risk areas and implementing effective rectification measures to enhance road safety. The study begins with an in-depth analysis of historical accident data, utilizing advanced statistical models to identify patterns and trends. Geographic Information System (GIS) mapping is employed to spatially visualize accident locations and prioritize blackspots based on severity and frequency. To further understand the contributing factors, a comprehensive review of road design, traffic flow, weather conditions, and driver behaviour is conducted. This multifaceted approach enables a holistic identification of key elements influencing accident occurrence. Rectifying accident blackspots typically involves identifying hazardous areas on roads or intersections where accidents frequently occur and implementing safety measures to reduce the likelihood of future incidents. This can include adding, improving road markings, enhancing lighting, and implementing traffic calming measures like speed bumps or roundabouts. Regular monitoring and analysis of accident data are also crucial for identifying and addressing blackspots effectively.

**Keywords:** *GIS, Accident Blackspots, Spatial Analysis, Heatmap Analysis.*

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## ENERGY HARVESTING TILES FOR POPULOUS AREA

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**Abstract:** The growing environmental concerns and the escalating demand for sustainable infrastructure have led to the exploration of innovative materials for construction. One such avenue is the development of energy-efficient tile pavement using recycled plastic waste. The objective is to reduce waste by adopting practices such as recycling. The aim is to ensure the quality of products lasts for extended periods without significant wear or deterioration. Here we Generate piezoelectric energy efficiently by create eco-friendly tiles that reduces environmental impact while maintaining structural integrity and performance standards compared to traditional materials. These are a type of tile made from synthetic material such as Polypropylene This project focuses on the development and implementation of piezoelectric plastic tiles for energy harvesting. The tile utilises the piezoelectric effect to convert mechanical energy, such as foot traffic or vibrations, into electrical energy. This harvested energy can be utilized for various purposes, including powering low-energy electronic devices, contributing to energy efficiency, and enabling smart infrastructure solutions. Overall, this project aims to demonstrate the feasibility and effectiveness of piezoelectric plastic tiles as versatile solution for energy harvesting with implications for sustainable infrastructure development , mitigating from environmental challenges and to promote a greener future for the built environment like that of smart city initiatives.

**Keywords:** *Piezoelectrode, foot traffic, Polypropylene, versatile.*

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## THERMAL POWER PLANT USING PYROLYSED PLASTIC AS FUEL

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**Abstract:** Thermal power plant that uses plastic as fuel can be designed by integrating a 4-stage monotube boiler, an alternator for power generation, a Tesla turbine, an electrostatic precipitator (ESP), and a carbon filtration system for smoke suppression. The system can be monitored and controlled using a general electric control system. Plastic-tofuel projects are gaining traction in the energy industry as researchers are increasingly turning to alternative disposal methods for our mounting plastic output. Such projects use the chemical energy stored in the material's hydrocarbon structure to create fuel, a method praised for its economic and environmental benefits. However, these schemes are still in their developmental stage. The Tesla turbine is a bladeless centripetal flow turbine that is highly efficient and can operate on a wide range of fluids, including steam. The electrostatic precipitator (ESP) is a filtration device that removes fine particles, like dust and smoke, from a flowing gas using the force of an induced electrostatic charge. The carbon filtration system can be used to remove carbon and other impurities from the smoke generated during the combustion of plastic .

**Keywords:** *pyrolysis, Electrostatic precipitator(ESP), carbon filtration system.*

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## ELECTRICITY MONITORING AND AUTOBILL GENERATION USING IOT

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**Abstract:** This project aims to develop a smart IoT-based energy meter for tracking energy consumption via an Android app. The system sends consumption data to the user's phone as SMS, allowing for real-time and historical monitoring. Existing systems lack manual checking convenience, alarm features for excessive consumption, and transparency in billing. Our solution enables remote monitoring, accurate billing, and the ability to cut off power if consumption exceeds limits. It also facilitates online bill updates and cashless payments. Hardware includes current sensors, Arduino Uno for control, Nodemcu for Wi-Fi, OLED display for status, and relay for power cutoff. Arduino IDE, XAMPP server, and Android Studio with Java and PHP MySQL are used for coding and app development, respectively.

**Keywords:** *Real-time Monitoring, Automated Billing, Energy Efficiency, IoT Integration.*

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## REVOLUTIONIZING LOCAL ORGANIC PRODUCE MARKETS THROUGH TECHNOLOGICAL INNOVATION

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**Abstract:** Farm Cart is a mobile application platform designed to bridge the gap between dedicated home farmers and health-conscious consumers, revolutionizing the local organic produce market. Leveraging advanced technology such as geolocation services and a user-friendly interface, Farm Cart connects farmers directly with consumers, offering a digital marketplace for showcasing products and facilitating seamless transactions. The platform prioritizes sustainability, transparency, and community engagement, empowering home farmers economically while providing consumers with access to high-quality, ethically sourced products. Through extensive user research and iterative design processes, Farm Cart has been meticulously crafted to meet the diverse needs and preferences of both farmers and consumers. By expanding market reach for farmers and simplifying the organic produce purchasing process for consumers, Farm Cart aims to transform consumer behaviour and promote sustainable agriculture practices. This paper presents the design, development, and implementation of Farm Cart, highlighting its key features, technical architecture, and potential impact on local farming communities. With its focus on sustainability and community empowerment, Farm Cart represents a promising solution to the challenges facing the local organic produce market, offering a more transparent, accessible, and environmentally friendly approach to food production and consumption.

**Keywords:** *Farm Cart, Local organic produce market, Technological innovation, Mobile application platform, Geolocation services, Sustainability, Transparency, Community engagement, Economic empowerment, User research, Consumer behavior, Sustainable agriculture, Seamless transactions, Ethically sourced products.*

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## ELEVATED: A COMPREHENSIVE SOFTWARE SOLUTION

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**Abstract:** "ElevatED" is an advanced educational platform tailored to meet the evolving needs of modern learners. At its heart, the platform offers a transformative learning experience by combining innovative features and a diverse range of courses. Students are empowered to refresh their knowledge through daily quizzes, fostering continuous engagement and retention of studied topics. Beyond the daily quizzes, "ElevatED" provides an extensive library of courses spanning various subjects, ensuring that learners have access to comprehensive educational resources. With a focus on user experience and accessibility, "ElevatED" caters to three distinct user roles: students, faculties, and administrators. Students navigate the platform to access courses and participate in daily quizzes, while faculties contribute to course content and interact with students. Administrators oversee the platform's operations, managing user permissions and ensuring smooth functionality. Through its intuitive interface and robust user management system, "ElevatED" aims to revolutionize the educational landscape, empowering learners to succeed in their academic endeavors.

**Keywords:** *ElevatED, educational platform, modern learners, transformative learning experience, innovative features, daily quizzes*

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## QUIKHyr: SWIFT HIRING FOR HOME SERVICES

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**Abstract:** QuikHyr stands as an innovative platform poised to revolutionize the hiring process for skilled labor. Serving as a vital link between users and skilled workers, it aims to foster individual growth while contributing to the economic development of communities. By addressing the shortage of skilled labor, QuikHyr offers a seamless and user-friendly experience for both workers and users, enhancing livelihoods and ensuring efficiency throughout the hiring process. Its array of features includes personalized profiles, location-based search functionality, availability calendars, and a robust rating system for quality control. Additionally, QuikHyr advocates for fair hourly wage rates and facilitates same-day bookings, further streamlining the hiring process. With a built-in chat system facilitating communication between homeowners and workers, QuikHyr integrates seamlessly into the daily lives of its users, transforming the way skilled labor is hired and elevating the overall hiring experience. Utilizing Flutter for separate applications catering to workers and homeowners, QuikHyr's backend is powered by Firebase and Node.js. Furthermore, plans are underway to develop an admin dashboard and a showcase website using Next.js, further enhancing the platform's functionality and accessibility.

**Keywords:** *Hiring process, Location-based search, Same-day booking, Community economic development, Chat system*

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## **HIREME PLACEMENT MANAGER**

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**Abstract:** The current landscape of student placements faces significant challenges characterized by inefficiencies, redundancies, and a lack of precision in matching candidates with suitable opportunities. HireME addresses this need by providing a comprehensive platform that bridges the gap between students and Placement Officers, optimizing the placement process. HireME stands as a pioneering solution in navigating the intricacies of modern day placements, ultimately contributing to the success of students and the satisfaction of recruiting entities. The aim of this project is to create the HireME platform, to revolutionize the landscape of student placements by providing a cutting-edge, centralized platform that seamlessly connects students, colleges, and placement officers. Key features include User Management, Email Invitations Drive and Training Management, Drive and Training Approval, Employability Forecast, Percentile Score Assignment, Analytics. Technology used are Next js, TypeScript for frontend, Prisma ORM, Fastify, PostgreSQL for Backend, Python- FastAPI, scikit-learn for ML. HireME revolutionizes student placements by seamlessly connecting students, colleges, and placement officers.

**Keywords:** *Precision Matching, Percentile Score Assignment, Employability Forecast.*

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## **MEDISCAN: STREAMLINING MEDICATION ACCESS IN A CONNECTED HEALTHCARE ECOSYSTEM**

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**Abstract:** Aiming to revolutionise medication access through a connected healthcare ecosystem prioritising convenience, efficiency, and patient-centric care, Mediscan presents a web-based platform accessible on diverse devices. Connecting patients, pharmacies, and healthcare providers, Mediscan offers secure user authentication, streamlined medication management (ordering, refilling, delivery), cloud-based inventory with real-time updates and automated reorders, AI-powered chatbots for personalised support and collaborative tools to foster communication. Leveraging cloud infrastructure (AWS Free Tier), a lightweight database (MongoDB), and cross-browser compatibility (Chrome, Firefox, Safari), Mediscan ensures secure data transmission with basic SSL encryption. This project empowers patients, streamlines pharmacy operations, and fosters collaboration within the healthcare ecosystem, ultimately enhancing medication accessibility for all.

**Keywords:** : *Medication access platform, connected healthcare, cloud inventory, AI chatbots, telehealth, patient-centric care.*

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## DESIGN AND DEVELOPMENT OF LOW -COST ST PORTABLE THERMOELECTRIC REFRIGERATION SYSTEM

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**Abstract:** A cold storage thermo refrigerator employs the Peltier effect to chill and maintain a certain temperature within a storage chamber. The Peltier effect is the phenomena of producing a temperature differential by passing an electric current across two dissimilar conductors. A cold storage thermo refrigerator project is a research endeavour that seeks to design, develop, test, and optimize a cold storage thermo refrigerator for a specific function and setting. The growing global demand for refrigeration in fields such as refrigeration, air conditioning, food preservation, vaccine storage, medical services, and electronic device cooling has resulted in increased electricity production and, as a result, increased CO<sub>2</sub> emissions around the world, which is a contributing factor to global warming and climate change. Thermoelectric refrigeration, a novel option that may transform waste power into usable cooling, is expected to play a key part in addressing today's energy concerns. As a result, thermoelectric refrigeration is critical, especially in developing nations where long-term reliability and cheap maintenance are required. The goal of this research is to design and build a functioning thermoelectric refrigerator with a heat reject volume of 3L/min that uses the Peltier effect to chill and maintain a specified temperature between -2.3 °C and 10 °C. The design criteria are to cool this volume to temperature in 3 hours and maintain retention for at least the following half hour. The design requirements, available choices, and final design of the thermoelectric refrigerator for application are described.

**Keywords:** *Thermoelectric module, Peltier effect, heat sink optimization, self-cooling system, compact cooling system, COP increase.*

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## **ONLINE BOOKSTORE WITH SENTIMENTAL ANALYSIS**

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**Abstract:** This project introduces a novel online bookstore integrating sentiment analysis to revolutionize user engagement with book reviews. In today's digital age, where options are vast, our platform employs advanced natural language processing to evaluate and quantify the sentiment expressed in user feedback. Utilizing sentiment analysis algorithms, it provides users with concise summaries of overall sentiments for each book and delivers personalized recommendations based on emotional resonance. Using state-of-the-art machine learning models, reviews are categorized into positive, negative, or neutral sentiments, empowering users to make informed reading decisions. Furthermore, the sentiment-enhanced interface enhances user experience by offering a nuanced understanding of reader perspectives, fostering community and connection among book enthusiasts. This project aims to enhance user satisfaction, simplify decision-making, and cultivate a vibrant virtual space catering to diverse emotional needs. By integrating sentiment analysis, the online bookstore sets a new standard for personalized and emotionally intelligent literary platforms, reshaping the digital reading landscape.

**Keywords:** *Natural Language Processing, Machine Learning, Sentiment Analysis, Personalized recommendations, Emotional resonance, Community engagement.*

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## DEPLOYMENT AUTOMATION IN LINUX

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**Abstract:** The integration of GitHub with an application deployment platform marks a pivotal advancement in software development, revolutionizing the product delivery lifecycle. The scope of the project is to develop a web-based deployment platform, connecting version control systems, automating configurations, and providing a user-friendly interface. The application facilitates seamless integration of code repositories from GitHub or other Git providers, streamlining deployment processes. Automated configuration reduces manual intervention, leveraging connected repositories for efficient deployment. User authentication ensures security and authorized access, safeguarding sensitive data. Deployment status tracking offers real-time visibility into ongoing processes, aiding project management. Robust error handling provides clear feedback on deployment failures, enhancing user experience and facilitating issue resolution. This integration, saving time through simplified deployment and adaptability to diverse technologies, empowers companies to focus on core product development, fostering efficiency and competitiveness in the tech industry.

**Keywords:** *Application deployment platform, Git integration, project management, efficiency and competitiveness.*

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## **SALES FORECASTING**

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**Abstract:** Sales forecasting is the process of predicting future sales. It is the vital part of the financial planning of the business. Most of the companies heavily depend on the future prediction of the sales. Here, we have implemented the different machine learning techniques with different metrics. By analysing the performance, we have trying to suggest the suitable predictive algorithm to our problem statement.

**Keywords:** *Sales forecasting, Machine learning, Data science.*

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## ADVANCEMENTS IN AERODYNAMIC EFFICIENCY FOR ENHANCED AIRFOIL PERFORMANCE

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**Abstract:** Over the past century, there have been several advances in aerospace industry, including in the fields of aerodynamics, propulsion, and structural design. The aviation sector is extremely safe yet high risk. For stability, high lift, and stability, an improved aerodynamically efficient airfoil is constantly required. This rationale aided a large number of individuals in their efforts to create more aerodynamically efficient parts, like boundary layer controlling devices and high lifting devices for aircraft wings. A review of the literature and a computer analysis of an airfoil's static stability, dynamic stability, maneuverability, and aerodynamic efficiency are deeply discussed. A comparison between a cylinder slotted airfoil and a standard airfoil has also been offered, along with the delay in flow separation across a wing at specific low speed high-lifting configurations devices.

**Keywords:** *Aerodynamic efficiency, Boundary layer, Stability, High lift devices, Maneuverability.*

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## PULMONARY ANALYSIS SOFTWARE

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**Abstract:** The utilization of lung ultrasound has become pivotal for swift and effective diagnosis, especially in ongoing monitoring efforts. This research introduces an automated package for analyzing lung ultrasound videos, emphasizing advancements in severity classification, lung segmentation, and critical landmark detection. This innovative tool, developed using FastAPI, Python, and Node LTS, streamlines the diagnostic process by providing a summary of crucial frames, identifying indicators of lung infection, and offering tools for automating landmark detection and segmentation. Healthcare professionals benefit from rapid assessment of patients' lung health and prompt identification of potential infections. Its features include advanced video analysis, automation of diagnostic tasks, and integration with existing healthcare systems. Leveraging technological progress in the field, particularly through FastAPI, Python, and Node LTS, enhances efficiency and accuracy, ultimately contributing to more effective patient care during the ongoing pandemic. And the automated package for analyzing lung ultrasound videos, aiding in swift and accurate diagnosis of COVID-19 cases. It summarizes key frames, identifies infections, and automates landmark detection and segmentation, enhancing efficiency and supporting healthcare professionals in effective patient care amid the pandemic.

**Keywords:** *automated analysis, lung health, diagnostic efficiency.*

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## INVO

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**Abstract:** INVO is a cutting-edge web application designed to revolutionize inventory management for small-scale shopkeepers. The project addresses challenges faced by businesses in tracking stock levels, analyzing real-time sales data, and making informed purchasing decisions. INVO offers a standardized yet highly flexible solution, eliminating complexities associated with custom software development. Key features include real-time inventory tracking, sales monitoring tools, comprehensive bill logs, and customizable columns. The technical architecture utilizes Next.JS for the front end and Node JS for the back end, ensuring a responsive interface and seamless data handling with a self-hosted MySQL server for enhanced data security. The project aims to empower small businesses by providing simplified and accessible inventory management tools. It contributes to the digital marketplace by fostering growth and competitiveness. INVO aims to empower small businesses by providing a simplified yet comprehensive solution for inventory and invoicing management, fostering growth and competitiveness in the digital marketplace.

**Keywords:** *Inventory Management, Seamless Data Handling, Data Security, Digital Marketplace.*

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## MITIGATING HEAVY METAL CONTAMINATION A COMPREHENSIVE REVIEW OF BACTERIAL ALGAL CONSORTIUMS IN INDUSTRIAL REMEDIATION STRATEGIES

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**Abstract:** Industrial wastewater contamination by heavy metals poses a significant environmental threat globally. In response, the utilization of algal-bacterial consortiums emerges as a promising and efficient method for heavy metal removal from industrial effluents. These consortia, comprised of diverse microorganisms, offer numerous advantages over traditional remediation approaches. Algal-bacterial consortiums exhibit remarkable versatility, adaptability, and scalability, making them suitable for a wide range of industrial applications. Their synergistic interactions leverage the unique abilities of algae to absorb and accumulate heavy metals and bacteria to enhance degradation processes, resulting in enhanced efficiency in heavy metal removal. By effectively reducing heavy metal concentrations in industrial wastewater, algal-bacterial consortiums play a crucial role in safeguarding water quality, protecting ecosystem integrity, and mitigating human health risks associated with heavy metal exposure. Moreover, their cost-effectiveness and environmentally friendly nature make them attractive alternatives to conventional remediation methods. This review paper comprehensively examines the mechanisms underlying the effectiveness of algal-bacterial consortiums in heavy metal removal, highlighting their potential applications and benefits in addressing industrial wastewater pollution. Through a critical analysis of existing literature and research findings, this paper contributes to advancing our understanding of sustainable solutions for mitigating heavy metal contamination in industrial settings.

**Keywords:** *Consortium, Synergy, Remediation*

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## DESIGN AND CONSTRUCTION OF MICROCONTROLLER BASED FLOATING WATER WASTE CLEANING ROBOT

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**Abstract:** The "Floating Water Waste Cleaning Robot" project aims to address the pressing global issue of water pollution by developing an innovative robotic solution. With the proliferation of plastic waste and other pollutants in water bodies worldwide, there is an urgent need for efficient and sustainable cleanup methods. This project proposes the design, development, and implementation of a robot capable of identifying and collecting floating waste from water surfaces. The key objectives of this project include: Designing a versatile and maneuverable floating robot capable of navigating various water environments. Implementing intelligent sensing and detection systems to identify and classify different types of water waste, including plastics, debris, and other pollutants. Integrating conveyor mechanisms for efficient waste collection and removal from the water surface. Developing robust autonomous navigation to enable the robot to operate independently and cover large areas effectively. Incorporating environmentally friendly materials and energy-efficient technologies to minimize the ecological footprint of the robot. The project will involve interdisciplinary collaboration between engineers, environmental scientists, and robotics experts to leverage cutting-edge technologies such as mechatronics and robotics. Field testing and validation will be conducted in real-world water environments to assess the performance and effectiveness of the robot in cleaning up water waste. The outcomes of this project have the potential to significantly contribute to global efforts to mitigate water pollution, preserve aquatic ecosystems, and safeguard human health. By deploying autonomous floating water waste cleaning robots, it is envisioned that the project will make substantial strides towards achieving cleaner and healthier waterways for current and future generations.

**Keywords:** *Interdisciplinary, Plastic Waste, Pollutants, Ecofriendly, Human Health*

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**Abstract:** Many students studying far from home struggle to find lodging. They often lack knowledge about facilities like hostels and homestays and don't know whom to contact for details. Finding transportation to and from the hostel can be a struggle, especially if they are not aware of the public transportation system or don't have access to a vehicle. To solve this problem, we are planning to develop a website which can help users to find nearby hostels and homestays. Users can easily find out nearby available hostels with full details and facilities without a third person. They can also view the nearby popular locations and location distance from the hostel. The rating and feedback about the selected place would help the customers to validate the quality of service provided by them.

**Keywords:** *Student accommodation, Community engagement, Transparency, Geolocation integration, Dynamic hostel marketplace.*

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## EFFECT OF PARTIAL REPLACEMENT OF CEMENT WITH WASTE PAPER SLUDGE ASH ON THE MECHANICAL PROPERTIES AND DURABILITY OF FOAM CONCRETE

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**Abstract:** Cement, the primary binding agent in concrete, is associated with both economic and environmental drawbacks in its production process. To reduce these issues alternative material with lower production costs, reduced CO<sub>2</sub> emissions, and decreased energy consumption is utilized. This study investigates the impact of incorporating wastepaper sludge ash (WPSA) as a partial substitute for cement in the production of lightweight foamed concrete (LFC). The LFC is formulated using cement, natural sand, and foam generated from a foaming agent called marjanol. Five different mixtures of LFC were created with varying WPSA substitution from 0%, 5%, 10%, 15% and 20% of the cement mass. The addition of WPSA extended the setting times of the blended cement paste and increased its normal consistency. Mechanical properties like compressive and flexural strength, were evaluated at 7 and 28 days from curing to assess performance. Additionally, the durability of the foam concrete was tested using rapid chloride penetration tests. Optimal mechanical properties were achieved with a 15% substitution of WPSA for cement.

**Keywords:** *Wastepaper sludge ash, Lightweight foam concrete, Marjanol, Partial replacement of cement.*

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## ASSESSMENT OF FUTURE WATER DEMAND AND SURFACE WATER BALANCE USING WEAP MODEL IN MEENACHIL RIVER BASIN, KOTTAYAM

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**Abstract:** Water scarcity is an escalating concern worldwide, prompting the need for proactive studies to know sustainable resource management strategies. This project focuses on the Meenachil River in Kottayam, utilizing the Water Evaluation and Planning (WEAP) model to forecast future water demand and balance from 2022 to 2050. Drawing on meticulously collected data from 2010 to 2022, including discharge, water use, land use, population, rainfall, and evaporation, the study aims to understand historical trends and patterns influencing water consumption in the region. By analyzing these data, the research identifies key challenges such as competitive demands, land use changes, and climate change impacts, crucial for devising effective water management strategies tailored to the specific needs of the Meenachil River basin. Concurrently, the study conducts a Water Balance Assessment to evaluate current and future water availability in the Meenachil River. By assessing inflows, outflows, and overall water balance, potential areas of water stress or surplus are identified. This comprehensive evaluation serves as a foundation for targeted resource allocation, enhancing the efficiency of water resource management practices in the region. Furthermore, Scenario Analysis is employed to explore various factors affecting water dynamics, including population growth, agricultural and industrial activities. Integration of demographic projections, land-use changes, and sector-specific consumption patterns provides a holistic view of potential challenges, facilitating the development of sustainable management recommendations. In conclusion, this project contributes to a deeper understanding of water dynamics in the Meenachil River basin and offers a plan for sustainable water management strategies. By addressing evolving challenges from 2022 to 2050, the study provides essential insights for safeguarding the region's water resources. Further research is recommended to enhance understanding of water resource assets in the Meenachil River basin, ensuring continued progress towards resilient and sustainable water management practices.

**Keywords:** *Meenachil River, WEAP model, Water balance, Water demand scenario.*

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## SMART POULTRY FARMING AUTOMATED MONITORING AND CONTROL SYSTEM USING IOT

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**Abstract:** Smart Poultry Farming revolutionizes chicken farming with automated monitoring and control systems. By integrating sensors and an Arduino Uno microcontroller, it optimizes environmental conditions, feeding, and watering processes. The system adjusts temperature and humidity levels automatically, ensuring the comfort of the chickens. Manual controls for food delivery and water supply offer flexibility to the operator. Overall, it enhances efficiency and welfare, leading to improved productivity and animal care.

**Keywords:** *Sensors, Relays, Arduino Uno Microcontroller, DC Pump, DC Motor.*

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## PROTOTYPE PROSTHESIS ARM USING MYOWARE SENSOR

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**Abstract:** The prototype prosthesis arm integrates a custom-built myoware sensor system that precisely captures electrical signals generated by the user's muscles in the residual limb. These signals are then processed by a microcontroller to interpret the user's intended movements, enabling seamless control of the prosthetic arm's various functions. Through the use of machine learning algorithms and advanced signal processing techniques, the prosthetic arm can learn and adapt to the user's unique muscle patterns, providing personalized and intuitive control. This adaptability enhances the user experience by ensuring smooth and natural movements that closely mimic the functionality of a biological arm. The Myoware sensor technology not only enables precise control of the prosthetic arm but also offers real-time feedback to the user, allowing them to monitor their muscle activity and optimize their control strategies for improved performance. Additionally, the system is designed to be lightweight, comfortable, and easy to use, promoting long-term usability and user acceptance. Overall, the prototype prosthesis arm utilizing the Myoware sensor represents a significant advancement in the field of prosthetics, offering a cutting-edge solution that empowers amputees to regain independence and functionality in their daily lives.

**Keywords:** *Prototype, prosthesis, arm, myoware sensor.*

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## MICROSCALE ANALYSIS OF GEOPOLYMER PERVIOUS CONCRETE USING GGBS AND METAKAOLIN

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**Abstract:** The main source of carbon emissions is the construction sector. A significant quantity of energy is used in the processing of the raw materials to make ordinary Portland cement, and a large amount of carbon dioxide is released into the atmosphere, accounting for 7% of all greenhouse gas emissions. Alternative building materials to ordinary Portland cement (OPC), which is now employed in a variety of applications, include geopolymer binders. The low carbon footprint of the geopolymer binders have led to the development of pervious geopolymer concrete. It has the advantage of requiring less energy and greatly reduces urban flooding and stormwater runoff. This study aims in analysing the microstructure, compressive strength and infiltration rate of Fly ash- Ground granulated blast furnace slag (FA-GGBS) based and fly ash- metakaolin (FA-MK) based geopolymer pervious concrete (GPC). The geopolymer samples were prepared using different percentages of 20mm and 10mm aggregate and different binder quantity. The compressive strength of FA-GGBS based and FA-MK based geopolymer pervious concrete are 28.8 and 26.4 N/mm<sup>2</sup> respectively. The microstructure analysis of samples by Scanning Electron Microscopy reveals compact and dense structure for FA-MK based GPC and FA-GGBS based GPC shows loose and dispersed morphology.

**Keywords:** GPC, FA, GGBS, MK, SEM.

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## UNMANNED UNDERWATER VEHICLE FOR UNDERWATER EXPLORATION AND WASTE DETECTION

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**Abstract:** Unmanned Underwater Vehicles (UUVs) represent a groundbreaking advancement in the realm of aquatic technology. These remote-controlled underwater drones, operated from the surface, hold immense potential to revolutionize various aspects of aquatic operations, ranging from emergency medical aid delivery to environmental cleanup efforts. In times of emergencies at sea, every second counts. UUVs equipped with medical aid kits serve as invaluable assets, ensuring swift response and aid delivery to individuals in distress. Unlike traditional methods where victims must wait to reach shore or a vessel for treatment to commence, UUVs bypass this delay by directly transporting medical supplies to the affected individual. This expedited response significantly enhances the chances of survival and reduces the risk of exacerbating injuries, thereby saving precious lives. Moreover, the proliferation of plastic pollution in our oceans poses a dire threat to marine ecosystems and human health. Conventional methods of oceanic cleanup entail significant manpower and energy expenditure. Manual collection efforts or the use of heavy machinery incur substantial costs and time investments. However, with the deployment of UUVs, this arduous task becomes more efficient and cost-effective. Equipped with manipulator arms, these drones can navigate underwater environments, collecting and removing debris such as plastic bags, straws, and bottles with precision and agility. By streamlining the cleanup process, UUVs mitigate environmental degradation and safeguard aquatic habitats for future generations. Furthermore, the proliferation of invasive aquatic weeds poses a multifaceted challenge to various sectors, including agriculture, energy production, and public health. These fast-growing weeds, such as water hyacinths and duckweed, disrupt ecosystems, impede water flow, and foster the proliferation of harmful toxins. Traditional weed removal methods, reliant on manpower and heavy machinery, prove both time-consuming and economically burdensome. However, UUVs offer a novel solution to this pressing issue. With their maneuverability and dexterity, these drones can navigate through water bodies, efficiently uprooting and removing invasive weeds. By mitigating the adverse impacts of aquatic weeds, UUVs promote environmental sustainability and bolster socioeconomic resilience. Moreover, the versatility of UUVs extends beyond large-scale environmental cleanup efforts. These drones can also be employed to maintain the cleanliness of swimming pools and small water bodies.

**Keywords:** *UUVs, Aquatic Technologies, Environmental sustainability, Environmental cleanup.*

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In association with: **ISET Research, India.**

## VLF SYSTEM FOR SID MONITORING

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**Abstract:** This paper presents SID (sudden ionospheric disturbances) monitoring system based on the VLF method. The research focuses on the assembly of a solar flare monitoring system by monitoring a VTX3 and HWU transmitter with a working frequency of 18.2kHz and 18.3kHz respectively. The study also shows the effect of the VLF radio waves over the ionosphere. Results are presented of solar flares recorded at 'kerala', Kochi(9° 56' 23.568" N,76° 15' 36.792" E )on 19th April 2024 where C class and M class solar flares were observed. The results are compared with data from SpaceWeatherLive and solarmonitor.org. There is a similarity in the results obtained from different systems, and from different geographical areas, which proves the functionality of the proposed system and the method used.

**Keywords:** VLF, IONOSPHERE, SOLAR FLARE.

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## ASSESSING THE SUSTAINABLE VIABILITY OF NATURAL FIBER DERIVED FROM RICE STRAW IN TEXTILE AND FASHION INDUSTRY

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**Abstract:** India is the second-largest producer of rice in the world, behind China, according to existing data. In view of the 136 million metric tonnes of rice produced annually in India and the 572 million metric tonnes worldwide, 140–580 thousand metric tonnes of agricultural waste is generated each year. Due to the increased production of rice, there is a significant amount of residue left, some of this residue is utilised for feeding fodder to animals, and a significant portion is simply burned by the farmers. This makes for the emission of 149 million tonnes of carbon dioxide, 9 million tonnes of carbon monoxide, 2.5 lakh tonnes of Sulphur oxide, 12.8 lakh tonnes of particulate matter, and 70 thousand tonnes of Sulphur dioxide annually. It has a negative effect on the air quality in the nearby towns and cities as well as endangering the ecosystem and civilization. This study investigated sustainable fashion and textile materials developed from rice straw, including technical textiles, apparel, upholstery, and fashion accessories. Evaluating the physical and mechanical properties of natural fiber sourced from rice straw, it can serve as a substitute for synthetic fibers in various applications. The primary objective of this research is to investigate the potential of rice straw- derived natural fiber in offering sustainable alternatives to connect open-field-burning practices and synthetic materials in the textile and fashion industries.

**Keywords:** *Rice straw, natural fiber, sustainable alternatives.*

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## A STUDY ON AI BASED HAND AND FOOT REFLEXOLOGY

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**Abstract:** Reflexology of the hands and feet, which has its roots in traditional medicine, is well known for its therapeutic advantages in enhancing general health. The examination of hand and foot reflex zones using artificial intelligence (AI) technology is a novel method to reflexological studies presented in this paper. In order to provide insights into tailored wellness interventions and breakthroughs in healthcare, the goal of this study is to investigate the effectiveness and potential of artificial intelligence in improving the practice of reflexology.

The literature study looks at the theory and history of hand and foot reflexology as well as current advancements in AI applications in the medical field. Traditional reflexological approaches use manual methods for diagnosis and therapy; however, the introduction of artificial intelligence (AI) brings automation and data-driven analysis, completely changing the methodology of the profession. A mixed-methods approach is used in the methodology, integrating participant feedback that is qualitative in nature with quantitative measurements. Reflex zones are analyzed by AI algorithms, which link physiological reactions to related organ systems and medical disorders. During the implementation phase of the study, machine learning algorithms for reflex zone mapping and analysis, pattern identification, picture recognition, and other AI-driven reflexological tools are developed.

The study's findings show that AI-based reflexological analysis is a feasible and efficient method for locating reflex zones and spotting possible health problems. Reflexological examinations are more accurate and efficient when AI is integrated, allowing practitioners to monitor development over time and customize interventions to meet the needs of each individual. The study also emphasizes how AI may make it easier to conduct remote consultations and provide tailored wellness advice, thereby increasing access to reflexological care outside of conventional clinical settings.

The findings' ramifications for reflexology practice, healthcare delivery, and AI innovation are explored in the debate. The revolutionary potential of AI-based reflexological investigations in enhancing preventative care, holistic healthcare methods, and enabling people to actively participate in their own well-being is highlighted in the paper's conclusion. This study paves the door for future collaborative research endeavours at the nexus of reflexology and artificial intelligence by bringing cutting-edge technologies and traditional healing practices together.

**Keywords:** *Reflexology, Artificial Intelligence (AI), Reflex Zone Mapping, Machine Learning, Healthcare Innovations*

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## AN IN-SILICO APPROACH TO INVESTIGATE THE FEASIBILITY OF COMPOSITE POLYMERS FOR NON-INVASIVE EXTENDABLE IMPLANTS

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**Abstract:** With recent advances in imaging, chemotherapy and surgical techniques surgeons can perform local tumor resection followed by limb saving surgery. When the tumor is replaced via limb-salvage operations with standard fixed-length implants in skeletally immature patients (children) can result in limb-length discrepancy as the children grow. Therefore, non-invasive extendable implants has attracted much attention in recent years and are currently being used worldwide due to their ability to eliminate the concerns of failure associated with earlier designs. This study aims to evaluate the feasibility of high performing composite polymers as an alternative to the currently used metals like stainless steel or Titanium alloy. High performing polymer composite like PEEK have gained significant interest due to their exceptional mechanical properties and translucency under X ray imaging. A commercially available non-invasive extendable implant (M/s Stanmore Implants ) was modeled using Solidworks ( CAD modeling software). The finite element model was developed for the extendable implant with material properties Ti6AL4V, CF30-PEEK and CF60-PEEK. In the loading condition, a downward axial load of 700 N was applied vertically to the head of intramedullary nail to simulate the body gravity and the distal end of the implant was fully constrained in all the directions. Finite element analysis was used to evaluate the maximum von-Mises stress and deformation of the implant. It has been observed that non invasive extendable implant modeled with carbon fiber reinforced polymer can effectively distribute the stress uniformly without failure

**Keywords:** *Finite Element Analysis, Implant Design, Extendable Implant*

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## TOXIC COMMENT DETECTOR

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**Abstract:** Over the past decade, social media's exponential growth has led to an increase in toxic comments, posing challenges in combating online abuse. To address this, we propose a toxic comment detector using Machine Learning and Sentiment Analysis. This system aims to identify and categorize toxic comments, promoting respectful dialogue. Using Python, we train our model on Kaggle's sentiment analysis dataset, employing Keras for neural network development. Integration with the Gradio App enables real-time predictions, enhancing user interaction. The project's scope includes model training, web application implementation, and continuous performance enhancement.

**Keywords:** *Toxic Comments, Deep learning and Sentiment Analysis, Training Model, Feedback Loop.*

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# BIOHYDROGEN PRODUCTION FROM LIGNOCELLULOSIC SUBSTRATES USING E-COLI: A REVIEW AND EXPERIMENTAL STUDY.

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**Abstract:** A rising emphasis is being placed on switching to renewable energy options with less of an impact on the environment, given the growing environmental issues linked to non-renewable energy sources. The importance of bio-hydrogen a sustainable, clean energy source made from organic materials is highlighted by this change. This study investigates a novel method for producing bio-hydrogen through dark fermentation using commonly available and sustainable feedstock paper and cardboard trash from our surroundings. In order to break down the complex structure and make the material easier for microbes to digest, lignocellulose-rich materials (paper and cardboard) were first treated to improve bioconversion efficiency by fungal and acid hydrolysis methods (*Trametes versicolor* and H<sub>2</sub>SO<sub>4</sub>, respectively). In the next stage, *Escherichia coli* was used to produce hydrogen by taking advantage of its metabolic formate pathway. Degradation of waste materials for bio-hydrogen production not only provides a sustainable energy source but also helps reduce waste and promotes environmental sustainability.

**Keywords:** *Renewable energy, Dark fermentation, Acid hydrolysis, Lignocellulose, Bio-hydrogen.*

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## EXPERIMENTAL INVESTIGATION ON WEAR BEHAVIOR OF PURE MAGNESIUM AND MAGNESIUM NANO HYDROXYAPATITE METAL MATRIX COMPOSITE

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**Abstract:** The study analyzed the influence of wear properties, including load, distance, and sliding speed, on the wear mass loss and the coefficient of friction as a response, using Pure Magnesium (Mg) and Magnesium Nano Hydroxyapatite (nHAp) Metal Matrix Composite (MMC). Dry sliding wear tests were performed on pure magnesium and magnesium nHAp MMC using a pin-on-disc tribometer in accordance with ASTM G99-05 under ambient conditions. Response Surface Methodology (RSM) was employed for experimental runs to evaluate tribological behavior. The input parameters are sliding speed and sliding distance. The weight loss of the samples and the coefficient of friction was measured during these experiments. 534A99 steel discs with 150 mm diameter were utilized as counter pairs. HAp synthesized by microwave irradiation method and MMC were fabricated by stir casting method. The addition of nHAp resulted in a significant improvement in hardness and strength compared to pure magnesium. The hardness strength of the Mg 10% nHAp (synthesized) was measured at 50.9 HV, while pure magnesium exhibited a lower hardness strength of 38HV. The presence of nHAp within the metal matrix improves the material's resistance to indentation and enhances its hardness properties. The wear test results revealed that the Mg-HAp composites exhibited significantly improved wear resistance compared to pure magnesium. The wear rate of the composites was notably reduced, indicating their potential for enhanced longevity and reliability in load-bearing applications.

**Keywords:** *Nano Hydroxyapatite, Reinforcement, Microwave Irradiation, Wear.*

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## ENSURING SAFETY THROUGH INTEGRATION OF AI IN MOTORCYCLES FOR DETECTING HELMET

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**Abstract:** Violation of traffic rules by noncompliance of wearing helmets among motor riders by intentionally or unintentionally is the major cause of fatalities and serious head injuries in road accidents. This study endeavors to tackle the pressing issue of non-compliance of helmet among motor riders by harness the latest advancements in artificial intelligence and computer vision. The system employs compact, high-resolution AI cameras strategically positioned on motorcycles, equipped with real-time image processing capabilities. Through the utilization of machine learning algorithms, these cameras can accurately discern whether riders are wearing helmets. Upon detecting instances of non-compliance, the system promptly triggers alerts, prompting riders to wear their helmets. This initiative not only advocates for helmet usage but also cultivates a culture of safety consciousness among riders. The technology serves as a proactive measure to mitigate the risks associated with helmet non-compliance, ultimately diminishing the occurrence of severe head injuries and fatalities in motorcycle accidents. A data set of images with and without helmet is collected from various sources. A model is developed as per the requirement and have trained the model using the collected data set. On testing, the trained model detected whether a person have worn helmet or not with an efficiency of 80-95%. In summary, this approach will amalgamates technology and proactive safety measures to bolster road safety for motor riders and other road users.

**Keywords:** *Artificial Intelligence, Safety, Helmet, Accident, Detection.*

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## CFD APPROACH TO ANALYSE THE CENTRIFUGAL PUMP IMPELLER DESIGNED FOR DEEP SEA MINING APPLICATION

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**Abstract:** Deep sea mining is the process of extracting mineral resources from the deep ocean floor. Centrifugal pumps are crucial in deep sea mining operations since they enable the effective transfer of fluids and minerals required for collecting precious resources from the ocean floor. The CFD simulation and analysis of centrifugal pumps for deep sea mining applications is a challenging task. Centrifugal pump consists of Volute casing, impeller, and suction and discharge pipes.

An analysis of fluid flow through a centrifugal pump impeller using the 3D CFD has been carried out. The details of the internal flow physics are discussed by allowing a better understanding of the complex flow within the impeller. The impeller has a tip radius of 230mm and rotates at a speed of 980 RPM with the discharge of 0.3155 m<sup>3</sup>/s. The BLADEGEN is used to create impeller geometry and TURBOGRID is used to perform meshing operation. ANSYS-CFX is used to perform 3D CFD simulations.

A detailed steady state impeller blade 3D CFD analysis with complete description of the workingfluid properties has been considered. The SST turbulence model has been taken into account. In turbulence equations high resolutions scheme was selected. Impeller inlet was given a prescribed mass flow rate of 315.5 kg/s as inlet boundary condition. The impeller outlet was defined as the outlet boundary and a static pressure was specified. The simulation is considered to have converged when the RMS value falls below 10<sup>-4</sup> in our numerical calculations. The parameter contour plots such as pressure, temperature at meridional plane and blade-to-blade plane have been generated to investigate the fluid flow structure through the impeller blade passages.

**Keywords:** *Deep sea mining, Centrifugal Pump, CFD, Simulation.*

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## DESIGN AND NUMERICAL ANALYSIS OF SOLID ROCKET MOTOR AT DIFFERENT STAGES

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**Abstract:** Propeller grains come in a variety of forms that can be employed to create varied performance characteristics in solid rocket motors. This research focuses on cylindrical grain, which has a cylindrical core that runs along its central axis. There is nothing inside this cylindrical core. It is kept empty. The purpose of the paper is to study how properties like pressure, velocity and Temperature at the exit of nozzle behave as the combustion process progresses within the solid rocket motor . The propellant grain begins to burn as it ignites, and as the combustion process moves through the grain inside the solid rocket motor, the propellant grain's mass begins to decrease. This is evident in the continuous increase in the diameter of the cylindrical core that runs along the grain's central axis. This study explains how, as the combustion process continues inside the solid rocket motor, various parameters such as temperature, pressure, and velocity change at the nozzle's exit at different stages. The behavior of variables including pressure, temperature, and velocity along a CD nozzle is also studied in this research. Keeping that in mind, four distinct solid rocket motor designs are created, each featuring an identical CD nozzle. Each of these four designs has a varied core diameter to reflect the various stages of combustion that occur inside the solid rocket engine. ANSYS simulation is used to do numerical analyses for each of the four designs. Based on their values, the outcomes of four distinct designs created with ANSYS Fluent software are contrasted. These results can then be used to investigate how the solid rocket motor's properties such as temperature, pressure, and velocity behave at the nozzle's exit as the combustion process advances.

**Keywords:** *Solid rocket motor, Temperature, CD nozzle, Propellant grain, Pressure.*

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## MASS DAMPING OF STRUCTURES WITH TMD

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**Abstract:** Greater consideration is being given to lighter members, serviceability concerns including floor vibration and lateral sway, and occupant comfort in the design of high-rise structures. According to structural engineers, skyscrapers are considered "slender" if they have a minimum ratio of 1:10 or 1:12. Buildings having a width to height ratio of at least 1:10 are considered ultra-slim. We will be designing a Tuned Mass Damper System for a high-rise building in this project that we have dubbed a super-slim construction. A G+126-story building with a startling height of 440.5 meters above ground is what we plan to design. The building will be designed with structural stability in mind. The point of resonance is where the amplitude reaches its greatest when the frame experiences sinusoidal ground motion without TMD. Structures can experience less vibration because of devices called tuned mass dampers (TMDs). Installing TMDs on a structure lowers the vibration's amplitude when it encounters large lateral forces, such as wind, seismic vibrations during earthquakes, etc. By utilizing energy conservation principles, passive control devices such as tuned mass dampers and tuned liquid dampers effectively reduce the effects of wind and seismic forces. While tuned liquid dampers use sloshing energy to reduce vibrations, tuned mass dampers use pendulum motion to counterbalance outside forces. They effectively store and release energy by applying the concepts of mass and springs, guaranteeing ideal damping without wasting any. These passive control systems are crucial parts of contemporary building and infrastructure projects because they both provide affordable maintenance and repair options, can adjust to structural dynamics, and offer dependable protection against erratic environmental factors. With the appropriate software, the seismic and wind load analyses will be completed.

**Keywords:** *G+126 Story Building, Seismic Analysis, Tuned Mass Damper System (TMD), Tuned Liquid Dampers (TLDs), Wind and Seismic Vibration, Wind Load Analysis.*

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## DESIGNING OF COUMARIN-CONJUGATED NANOLIPOSOMES AS A PREVENTIVE STRATEGY AGAINST VENOUS BLOOD THROMBOEMBOLISM

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**Abstract:** Venous thromboembolism is the third most common cause of death worldwide and it is estimated to affect 1 in 1000 patients globally each year. However, its therapeutic window is too small to allow for a reasonable and successful course of treatment and its diagnosis has been limited to the late stages only. Moreover, allergic responses, inactivation, short half-life, and unnecessary tissue bleeding constitute some of the drawbacks concerning clinical thrombolytics. Nanomedicines have gained extensive attention in drug delivery, due to their convertible properties. Furthermore, the treatment of thrombosis using nanoparticles has also been widely studied these days. In the current study, Coumarin, a natural bioactive compound obtained from plants like cinnamon, sweet clover, and tonka beans, is conjugated with nanoliposomes as targeted delivery systems against thrombus. Coumarin is an anti-oxidant and anti-coagulant with numerous therapeutic properties. The liposomal drug delivery technology provides several benefits, including site-specific targeting, minimal toxicity, stability against chemical degradation, and controlled drug release. The liposomes can be internalized into cells providing an added advantage for the release of drugs. Herein, combined with the venous thromboembolism and Coumarin-conjugated thrombus-targeting nanoparticles regarding thrombosis treatment.

**Keywords:** *Thromboembolism; liposomes; Coumarin; Nanoparticles;*

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## LONG TERM INFLUENCE OF SULPHATES ON PLASTICITY CHARACTERISTICS OF LIME STABILISED COCHIN MARINE CLAYS

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**Abstract:** Lime stabilisation is a widely adopted method to improve the engineering characteristics of marine clays. However, the presence of sulphates in these soils can cause sulphate induced heave, posing challenges for construction projects. Lime stabilisation indeed has a significant impact on the Atterberg limits of clayey soil. When it comes to marine clay containing a higher percentage of sulphates, studying the plasticity characteristics, including the Atterberg limits, becomes particularly important. This study focuses on examining the impact of sulphates on the liquid limit, plastic limit and shrinkage limit of lime stabilised Cochin marine clays. Sodium sulphate and lithium sulphate are used in present study for this purpose. Test samples were prepared by incorporating 6% lime and 4% sulphates by dry weight of soil into untreated Cochin marine clay. Atterberg limits tests were conducted on lime treated clay with and without additives, immediately after preparation and over 1 week, 1 month, 3 months, 6 months, 1 year and 2 years of curing. Liquid limit of lime treated clay exhibited a decreasing trend with increase in curing period. Lime treated sulphate bearing clay also revealed the similar trend. Plastic limit of lime treated clay with and without sulphates showed only a marginal variation. Plasticity index values of clay treated with lime alone and lime along with sulphates revealed a decreasing trend with extended curing period.

**Keywords:** *Cochin marine clay, lime stabilisation, sulphates, Atterberg limits*

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## THE EFFICACY OF FOLATE RECEPTOR TARGETED GINGEROL-CHITOSAN NANOPARTICLES AGAINST COLORECTAL CANCER

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**Abstract:** Colorectal cancer (CRC) is a major health concern that requires the development of novel therapeutic techniques with minimal side effects. The potential of folate receptor-targeted, folic acid-conjugated chitosan nanoparticles for drug delivery in the treatment of colorectal cancer (CRC) is investigated in this work. One of ginger's bioactive components, gingerol, has anti-cancer capabilities, but it has drawbacks as well, including instability and low water solubility. Thus we suggest encasing gingerol in chitosan nanoparticles using techniques like ionic gelation or nanoprecipitation. These nanoparticles will target cancer cells by expressing folic acid, as its receptors are overexpressed in CRC cells. Tests in vitro and in vivo will be used to assess the effectiveness of this strategy. Onion bulbs (*Allium cepa*) are used to evaluate genotoxicity, zebrafish are used to evaluate cytotoxicity, and a gastrointestinal tract simulation will be used to simulate continuous drug release inside the body. This work aims to investigate if chitosan nanoparticles tailored to folic acid and gingerol provide a targeted and efficient treatment for colorectal cancer. This strategy could add significantly to current CRC therapies by maximizing treatment efficacy and decreasing adverse effects by specifically targeting cancer cells.

**Keywords:** *Nanoparticle, Folate receptor, Gingerol, Colorectal cancer, Genotoxicity, Cytotoxicity.*

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# UNVEILING THE VEIL: EXPLORING FAKE FACE DETECTION METHODS

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**Abstract:** The digital landscape is witnessing an unprecedented surge in data generation, with petabytes of information uploaded online every second. However, amidst this deluge of data lies a growing concern regarding the authenticity of content, exacerbated by the proliferation of deep fake technology. To mitigate the spread of deceptive media, robust detection techniques are imperative. This paper delves into the realm of fake face detection, focusing on the utilization of deep fake detection methodologies to discern the genuineness of uploaded content. Through a comprehensive analysis of various fake face detection methods, this study aims to provide insights into their efficacy and contribute to the ongoing efforts in combating digital misinformation.

**Keywords:** *DEEP FAKE DETECTION*

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## EFFECT OF POLYDISPERSE CEMENTITIOUS POLYMER BASED WATERPROOF COATED STEEL FIBERS AND POLYPROPYLENE FIBERS IN CONCRETE

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**Abstract:** Civil engineers are facing much problems regarding the quality of structures and also relating to the age prolongation of the structures with direct affects of natural calamities. To overcome above impacts as well as making the structure more stronger in every points, hybrid fiber addition along with the concrete can be introduced. The combination of hybrid fibers with concrete will provide immense physical and mechanical properties. Furthermore, corrosion resistance against the chemical attack , water seepage problems etc can be subdued by making a cementitious waterproof shield cover over the steel fibres. This experimental study comprises the effect of Hybrid fibres i.e. poly-disperse cementitious polymer based waterproof coated steel fibers and polypropylene fibre on M30 grade concrete. The percentage of hybrid fibre added is limited to 1% of volume of concrete, where variation in percentage of steel and polypropylene fibre is made for the study in this 1% . More over Steel fibres are given Styrene Butadiene Rubber (SBR) coating, which provides a massive protection boosting up the energy absorption capacity of the structure. The mechanical properties such as compressive strength, Split tensile strength and flexural strength are studied to obtain the effects of SBR Coated hybrid fibres on performance of concrete.

**Keywords:** *Hybrid Fibers, Waterproof coating , Styrene Butadiene Rubber (SBR), Mechanical Properties.*

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## ENHANCING STRUCTURAL INTEGRITY THROUGH RETROFITTING TECHNIQUES AND NUMERICAL ANALYSIS: A COMPREHENSIVE STUDY ON ABANDONED RESIDENTIAL BUILDING IN ERNAKULAM

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**Abstract:** This project delves into a thorough investigation of the structural integrity and rehabilitation strategies for a residential building located in Ernakulam, Kerala. The study initiates with an extensive structural audit, employing visual inspections and Non-Destructive testing methods, such as Rebound Hammer and Ultra-Pulse Velocity tests. Through careful examination, various defects and vulnerabilities within the building's structure were identified and documented. Building upon the findings of the structural audit, a series of rehabilitation techniques were proposed to address the identified deficiencies and enhance the overall structural performance of the building. These techniques encompass a range of approaches, from localized repairs to more extensive strengthening interventions. To assess the effectiveness of the proposed rehabilitation measures, advanced numerical analyses were conducted using ANSYS software. Detailed finite element models were developed to simulate the behavior of critical structural elements, such as beams and beam-column junctions, under varying loading conditions. Moreover, the impact of integrating Carbon Fiber Reinforced Polymer (CFRP) materials into the structural system was thoroughly examined. The results of the numerical analyses provided significant insights into the structural response and load-carrying capacity of the building components. Notably, the inclusion of CFRP demonstrated remarkable improvements in both strength and stiffness, validating its potential as an effective strengthening solution for deteriorated structures. This research contributes valuable knowledge and practical insights to the field of structural engineering, particularly in the context of assessing and rehabilitating existing residential buildings. By utilizing a combination of advanced testing techniques and numerical simulations, the study offers a systematic approach to enhancing the safety, durability, and resilience of built environments. The findings underscore the importance of proactive maintenance and the adoption of innovative materials and technologies in ensuring the long-term sustainability of civil infrastructure.

**Keywords:** *Structural auditing, Retrofitting techniques, Numerical Analysis*

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## OPTIMISING CONSTRUCTION EXPENSES: SOFTWARE DRIVEN EVALUATE MATERIAL CHOICES

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**Abstract:** Decent housing is one of the basic needs of human beings. Presently, millions of people do not have a suitable roof over their heads. The entire ecosystem now a days needs such type of materials that will be helpful in reducing the cost of the building unit without any change in its properties than conventional building has. Low Cost-housing materials is a comparative term that has a lot to do about financing that helps to reduce construction costs by using various new techniques like effective management, appropriate use of local resources, skills, and technology, without sacrificing quality or structural life. In this review, a comparison carried out between conventional building materials and various alternative low-cost housing materials AAC Blocks, Ferro Slab, GFRG Panels, Fibre Cement Board, etc. that are being used in construction industry without scarifying the integration of the structure. This project aims to revolutionize the construction expenses by integrating Excel spreadsheet analysis with 3D modeling capabilities offered by AutoCAD, Revit and V-ray software. The traditional construction cost estimation process often involves tedious manual calculations and lacks visual representation, leading to inaccuracies and inefficiencies. By leveraging the power of advanced software tools, this project proposes a comprehensive approach to streamline the construction expense optimization process. Through the creation of detailed 3D models, coupled with precise data input and analysis using Excel spreadsheets, stakeholders can visualize the entire construction project while simultaneously assessing costs at each stage. This integrated approach allows for real-time adjustments and optimization strategies, resulting in more accurate cost estimates, enhanced project planning, and ultimately, significant cost savings The study investigates the impact of this software integration on project timelines, budget adherence, and overall project quality, offering insights into a technology-driven strategy for sustainable and affordable housing development.

**Keywords:** *To optimise construction expenses in both conventional and low cost housing, why people prefer only conventional building, including AAC BLOCK and ferrocement low cost building materials*

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## A COMPREHENSIVE REVIEW OF ZERO-DAY ATTACKS AND AI BASED INTRUSION DETECTION TECHNIQUES

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**Abstract:** Zero-day attacks represent a formidable challenge in cybersecurity, exploiting vulnerabilities unknown to the security community and evading traditional defense mechanisms. This survey presents a comprehensive review of zero-day attacks and explores the role of AI-based intrusion detection systems (IDS) in mitigating this critical threat. It underscores the critical importance of addressing zero-day attacks and highlights the potential of AI-based intrusion detection systems in bolstering defense capabilities. By leveraging advanced AI techniques and fostering interdisciplinary collaboration, organizations can better detect and mitigate the risks posed by zero-day exploits, safeguarding their assets and data in an increasingly hostile digital landscape.

**Keywords:** *Cyber Security, Zero-day attacks, Artificial Intelligence, Machine Learning, Intrusion Detection Systems.*

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## SHEAR RESPONSE OF DUAL STEEL COMBINED COMPOSITE COLUMNS IN NONPRISMATIC CONDITION

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**Abstract:** Dual steel combined composite columns are composite structure, in which concrete fills the gap between the inner and outer steel tubes. With the great prospect for engineering applications, these structures are suitable to be used as the construction of bridge piers, power transmission towers, offshore platforms, and in super high-rise buildings. This project analytically studied the shear response of dual steel combined composite columns in nonprismatic condition. Likewise, no studies have been focused on the shear response in nonprismatic condition. The objectives of the project are to find the optimum shear span ratio for shear capacity, shear strength comparison of various cross-sections, significance of length of sections. A total of 66 models were analysed. It is expected that Specimens with lower shear span ratio has higher shear capacity and the shear response varies with type of cross section. The complete analytical model and extensive parametric studies have been carried out using a nonlinear finite element method in ANSYS software.

**Keywords:** *shear span ratio, mechanical performance, material properties, nonprismatic condition*

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## EXPERIMENTAL STUDY ON LATERAL AND UPLIFT BEHAVIOR OF STEP TAPERED PILES IN SAND

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**Abstract:** Pile foundations are used to account for huge vertical, uplift and lateral loads due to live loads, dead loads, earthquake, wind, impact, waves and lateral earth pressure etc. Uniform cross section piles are commonly used in the practice. For many structures on pile foundations, and subject to both axial and lateral loads, the ultimate capacity under lateral loads is important and may be the controlling factor in foundation design. Increasing loads on these structures has resulted in piles of large diameter and depth at a significantly higher cost. Analysis presented here is intended to provide important information to geotechnical design and research engineers regarding the behavior of the step tapered piles. As a result, significant saving in foundation cost, resulting from an economical design, may be achieved. Experiments were performed on single piles embedded in sandy soil under independent uplift and lateral loading, and combined lateral and uplift loading. The investigations were done by changing the taper length, L/d ratio of pile, and relative density of sand. Uplift, lateral, combined uplift and lateral load tests were performed in fine loose and dense sand bed. In each test, pile was installed by same method at the same embedment. Pile head upward and lateral movement was obtained using dial gauges. The data may be suitably presented on load – displacement curves.

**Keywords:** *Step tapered piles, lateral loading, Uplift loading.*

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## IMAGE DENOISING USING MACHINE LEARNING FOR HUGE AND INDIVIDUAL DATA WITH METRIC ANALYSIS

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**Abstract:** This paper presents a novel approach for multilabel classification of satellite imagery in deforestation monitoring using a Vision Transformer (ViT) model. Traditional convolutional neural networks (CNNs) have been widely used for image classification tasks; however, they often suffer from limitations such as fixed-size receptive fields and computational inefficiency. In contrast, ViT models have recently gained attention for their ability to capture long-range dependencies in images without relying on convolutions. We propose a customized ViT architecture tailored specifically for satellite imagery analysis, leveraging its self-attention mechanism to effectively capture spatial relationships and semantic dependencies across large geographic areas. Our model is trained on a diverse dataset of satellite images annotated with multilabel labels corresponding to different types of land cover, including deforested areas. To validate the effectiveness of our approach, we conduct extensive experiments on real-world satellite imagery datasets, comparing the performance of our ViT model with traditional CNN-based classifiers. The results demonstrate that our proposed model achieves competitive performance in multilabel classification tasks while offering several advantages, including reduced computational complexity and improved scalability. We showcase the practical application of our ViT model in deforestation monitoring by analyzing satellite imagery from regions experiencing significant deforestation activities. Through comprehensive evaluation and case studies, we highlight the capability of our model to accurately identify deforested areas and classify land cover types with high precision and recall. Overall, this research contributes to advancing the field of deforestation monitoring by introducing a convolution-free approach based on Vision Transformer models, offering a promising alternative for efficient and accurate multilabel classification of satellite imagery at scale.

**Keywords:** ENCODER, FOREST VIT ALGORITHM, MULTILABEL CLASSIFIER, AMMGR, DEEP LEARNING TECHNIQUE FOR DETECTION.

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## APPLICATION OF LEAN METHODOLOGY FOR REDUCING MANUFACTURING LEAD TIME IN THE GEAR FORGING PROCESS

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**Abstract:** Lead time is the amount of time that passes from the start of a process until its conclusion. It measures how long it takes to complete a process from beginning to end. In manufacturing, it often represents the time it takes to create a product and deliver it to a customer. It is calculated by adding any combination of the number of days to procure materials, manufacture goods and deliver finished goods. The time from the cutting of the billet to its packing could be consider as the lead time here. Raw materials shortage, unnecessary processes, shipping delays, inefficient inventory control etc can affect the lead time in an industry. Longer lead time will results in the delay of the processes thus leads to customer dissatisfaction, finally affects the reputation of the firm. So maintaining a proper lead time is very much important in the successful running of a company. The industry identified to study the lead time is a prestigious forging industry in Thrissur. It has professionally forged ahead to become a reputed manufacturer of critical and complex forgings for aeronautical/aerospace applications and railway locomotives etc. The main objective of the work is to monitor the time for various processes of a gear forging in order to want to reduce the lead time of the process. One of the major tools in lean manufacturing is VSM (value stream mapping). Current state value stream is mapped so as to identify and separate the non-value added activities in the process. By using lean tools analysis of the nonvalue added activities in the process is done and a future state value stream is mapped.

**Keywords:** *VSM, Lead time, Non value added activities*

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# ANALYTICAL INVESTIGATION ON STEEL I BEAM WITH FIBRE REINFORCED POLYMER (FRP) PLATES AND STIFFENERS

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**Abstract:** Corrosion poses significant threat to load carrying capacity (LCC) of steel structures which occurs due to long life and environmental exposure. Conventional repair methods involve replacing corroded sections or attaching additional plates to damaged areas. In response to this challenge, reinforcing steel structures with Fiber Reinforced Polymer (FRP) plates and stiffeners has gained popularity as an effective means to restore lost capacity due to corrosion. This research focuses on analyzing the yield load and load-carrying capacity of steel I beams with FRP plates and stiffeners under axial compressive loading. In analytical phase, finite element analysis, conducted using ANSYS software, models and predicts the yield load and deflection at load carrying capacity for steel I beam without FRP plates and stiffeners. This will compare with yield loads of steel I beams with Carbon Fiber Reinforced Polymer (CFRP) plates and steel I beams with Glass Fiber Reinforced Plates (GFRP) plates incorporating different thickness of stiffeners modelled in ANSYS software and finds out the beam with maximum yield load and optimum thickness of stiffener. The study explores the impact of different stiffener thickness on the yield load of steel I beams strengthened by FRP plates and stiffeners. The experimental phase investigates load-carrying capacity of steel I beams, comparing those without FRP components to beams retrofitted with FRP plates and optimum thickness of stiffeners got from analytical investigation tested under compressive loading from Universal Testing Machine (UTM). This comprehensive analytical-experimental approach enables a direct comparison between yield loads obtained through analytical modelling and experimentally observed load-carrying capacities. The findings offer practical insights for designing corrosion-resistant steel structures, addressing the challenge through application of FRP plates and stiffeners to reinforce and extend life of steel I beams under compressive loads. Results show that LCC and yield load of steel I beam is improved using FRP plates and stiffeners. Study contributes to understanding in structural integrity, providing solution to corrosion and showcasing effectiveness of FRP reinforcement for durable structural designs in corrosive environments.

**Keywords:** *Corrosion, Strengthening, Steel I beam, FRP plates, Yield load, Load bearing capacity, Stiffeners*

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# AXIAL BENDING AND SEISMIC PERFORMANCE OF SPECIAL SHAPED HSS COLUMN SUBJECTED TO PARTIAL AND FULL CORRUGATION

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**Abstract:** This study employs ANSYS software to investigate the axial, bending, and seismic performance of special-shaped High Strength Steel (HSS) columns, specifically focusing on the impact of partial and full corrugation. The research encompasses four primary objectives. Firstly, the study aims to compare the buckling behavior of special-shaped HSS columns equipped with partial and full corrugation, utilizing ANSYS simulations to conduct comprehensive buckling analyses under varying loading conditions, thereby discerning the differential effects of different corrugation patterns on buckling resistance and stability. Subsequently, the research endeavors to evaluate the axial capacity of these columns across various slenderness ratios, leveraging ANSYS software to perform numerical simulations and analyses, thus establishing the relationship between slenderness and axial load-carrying capacity, and providing insights to optimize design parameters. Furthermore, the investigation delves into exploring the enhancement in bending capacity of columns featuring corrugations, conducting ANSYS-based bending simulations to analyze flexural strength, stiffness, and deformation characteristics, aiming to quantify the augmented bending capacity and inform the design of more resilient structures. Finally, seismic analysis constitutes a critical aspect of the study, with the objective of determining the shear capacity, moment capacity, ductility, and overall seismic performance of the HSS columns. By utilizing ANSYS for seismic modeling and analysis, the research endeavors to assess the response of the columns to seismic forces under diverse loading scenarios, thereby contributing significantly to the evaluation of seismic resilience and guiding seismic design practices in earthquake-prone regions. Through these objectives, this research aims to provide a comprehensive understanding of the structural behavior and performance of special-shaped HSS columns with partial and full corrugation, leveraging ANSYS software to advance the domain of efficient and resilient structural design practices.

**Keywords:** *Buckling behaviour, seismic performance, corrugation, special shaped column*

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## ROBOTIC NURSING ASSISTANT USING ARTIFICIAL INTELLIGENCE

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**Abstract:** Robotic Nursing assistants using Artificial Intelligence help hospitals run 24/7 by assisting clinical staff with tasks like Running patient supplies, delivering lab samples, fetching items from a central supply, and food, and medication delivery. Medi robo assist will analyze and monitor the patient's BPM and Body temperature and receive useful medicines to the bystander. In case of emergencies, it will inform the required authorities in the hospital. It will help patients for getting needful medicine and assistance by medical mobile application. Medi Robo will move as per the direction of a doctor or nurse in a ward through the predefined path.

**Keywords:** *artificial intelligence, robots, robotics in nursing.*

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## NORA.AI - AI THERAPIST FOR MENTAL HEALTH

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**Abstract:** Our project endeavours to develop an AI Therapist harnessing Natural Language Processing (NLP) to deliver empathetic mental health support. By deciphering emotions and comprehending users' language, it furnishes personalised advice and solace, nurturing a secure and confidential space for individuals to articulate their innermost thoughts and emotions. Through ongoing learning and adaptation, the AI Therapist strives to enhance users' mental well-being by dispensing bespoke guidance and cultivating a profound sense of connection. Anchored in ethical principles and safeguarding user privacy, our aspiration is to furnish accessible and efficacious mental health assistance to those who seek it, thereby contributing to the amelioration of their psychological welfare.

**Keywords:** *AI Therapist , Natural Language(NLP), Empathetic support, Learning and adaptation, Mental well-being.*

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## REVIEW ON LASER DRILLING OF ALUMINIUM

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**Abstract:** The excellent mechanical properties, high strength to weight ratio, erosion-corrosion resistance and low density makes Aluminium a backbone material for the aerospace, automobile, packaging and medical industries. The requirement of high precise holes with higher drilling rate paves way to various non-conventional drilling techniques in industries. Among all non-conventional drilling techniques, the laser beam drilling (LBD) has shown more acceptability over other drilling techniques. This review highlights advancements in laser technology, process parameters, and their effects on drilling efficiency and quality, it offers insights into the optimization of drilling parameters for improved performance. The study synthesizes research findings on various laser drilling methods, including pulsed, continuous wave, and hybrid approaches, addressing their advantages and limitations. Effect of various process parameters on hole quality and their optimum values are discussed. Suggestions on possible gaps identified and scope for further research are also discussed.

**Keywords:** *LBD, Hole quality, Beam parameters*

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## EXPERIMENTAL STUDY ON A TEMPERATURE CONTROL SYSTEM FOR CAR TYRES

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**Abstract:** In regions characterized by extreme temperatures, such as the United Arab Emirates (UAE), the occurrence of tyre bursts poses a significant threat to road safety, with approximately 110 accidents reported in the past year alone. This urgent issue stems primarily from the escalating ambient temperatures, leading to heightened tyre temperatures and increased risk of burst. To address this pressing concern, we propose the development of an innovative cooling system designed to mitigate tyre overheating. Our solution leverages an Arduino microcontroller, programmed to activate water spraying onto the tyres through strategically positioned nozzles when the temperature exceeds a preset threshold. The Arduino intelligent control system ensures timely intervention by activating the cooling mechanism at critical temperature levels and deactivating it once the temperature returns to an optimal range, thereby minimizing water consumption and maximizing efficiency. This research offers a cost-effective and automated approach to enhance road safety by effectively reducing the incidence of accidents caused by tyre bursts in high-temperature environments. The adaptability and real-time responsiveness of the proposed system, facilitated by Arduino programming, demonstrate its potential to address similar climatic challenges in regions worldwide.

**Keywords:** *Arduino, microcontroller, critical temperature*

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## LPG REFRIGERATION SYSTEM

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**Abstract:** Supply of continuous electricity is still not available in several areas of the country and the world. At such places, this work will be helpful for refrigeration of food, medicines, etc... This paper investigates the result of an experimental study carried out to determine the performance of domestic refrigerator when a liquefied petroleum gas (LPG) which is locally available which comprises of 24.4% propane, 56.4% butane and 17.2% isobutene which is varied from company to company is used as a Refrigerant. The LPG is cheaper and possesses an environmentally friendly nature with no Ozone Depletion Potential (ODP) and no Global Warming Potential (GDP). It is used in the world for cooking purposes. The refrigerator used in the present study is designed to work on LPG. The performance parameters investigated are the refrigeration effect in certain time. The refrigerator worked efficiently when LPG was used as a refrigerant instead of R134a. Also, from the experiment, which was done in atmospheric condition, we can predict the optimum value of cooling effect with the suitable operating condition of regulating valve and capillary tube of the system. The use of LPG for refrigeration purposes can be environmentally friendly since it has no ozone depletion potential (ODP). Usually, LPG is used as a fuel for cooking food in houses, restaurants, hotels, etc. and the combustion products of LPG are CO<sub>2</sub> and H<sub>2</sub>O. In this work we have designed and analyzed a refrigerator using LPG as refrigerant. LPG is available in cylinders at high pressure. When this high-pressure LPG is passed through the capillary tube of small internal diameter, the pressure of LPG is dropped due to expansion and phase change of LPG occurs in an isenthalpic process. Due to phase change from liquid to gas latent heat is gained by the liquid refrigerant and the temperature drops. In this way LPG can produce refrigerating effect for a confined space.

**Keywords:** *Refrigeration, LPG, Refrigerant*

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## FACTORS AFFECTING THE PERFORMANCE OF INDIAN AVIATION INDUSTRY

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**Abstract:** This research is majorly focused on various factors that affect the performance of aviation industry in India. This research analyses various factors that contribute towards the overall success or failure or in business terms, loss or profit of an airline that operates on routes across India. The focus is to analyse the performance of this industry in the past one year and compare it to the post COVID-19 recovery phase. A framework showing how components are arranged at various levels and how one-factor impacts or is impacted by another is created using Total Interpretive Structural Modelling (TISM). The results of this study can be used for financial analysis and improvements in the field of aviation in India as it assesses the major and most important factors that play a vital role in profit or loss estimation of any airline.

**Keywords:** *Factors, Aviation, TISM.*

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## THE EXPECTED CONTRIBUTION OF AI ADOPTION IN SUPPLY CHAIN MANAGEMENT

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**Abstract:** Given the shifting nature of the economy today, adoption of AI in SCM has emerged as a key field of study. The integration of artificial intelligence (AI) into supply chain management has become a viable strategy for improving efficiency and creating a competitive edge. This study reviews the literature to determine why supply chain management (SCM) needs to adopt artificial intelligence (AI). The aim of this study was to encourage professionals to investigate the possibilities of AI technology to enhance several elements of the supply chain

**Keywords:** *Artificial Intelligence, Supply Chain Management, Industry 4.0.*

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## MANUFACTURING, TESTING AND TUNING OF CONTINUOUS VARIABLE TRANSMISSIONS FOR AN ATV

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**Abstract:** Continuously variable transmission (CVTs) has always been the first choice for All Terrain Vehicle (ATVs), because of their wide variety of gear ratios, seamless gear changes, and improved control. Unfortunately, there is a lack of customizability and performance issues still in the ATVs that are present in the market which gave us the reason to perform the research on the topic which is Manufacturing, testing, and tuning of a customizable Continuously Variable Transmission (CVT) For an All-Terrain Vehicle (ATV). The objective of this research is to address the issues of customizability, Weight reduction, and minimizing the owning cost of the CVT keeping in mind this research will also look into the attainable manufacturing techniques, material selection, and machining process that will be evaluated to ensure toughness and performance. Methods like Machining, CNC, Laser cutting, and Wire cutting are used keeping in mind the convolution and cost. The paper deduces by evaluating the performance of the customizable CVT system through CAE analysis before manufacturing and testing on an ATV after manufacturing. The CVT-equipped ATV demonstrates enhanced versatility, suitable for recreational, agricultural, and industrial use. This research contributes to ATV engineering by highlighting CVT advantages and their potential for broader applications in versatile off-road vehicles

**Keywords:** CVT, ATV, Weight reduction.

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## WASTE TREATMENT USING BLACK SOLDIER FLY LARVAE

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**Abstract:** The exponential growth of organic waste poses a threat to human health, biodiversity, and ecosystem integrity worldwide. Conventional waste management methods, such as landfilling, composting, and incineration, are fraught with drawbacks. As a result, there is a pressing need for sustainable alternatives to address the rapidly increasing organic waste crisis. This project explores the potential of black soldier fly (*Hermetia illucens*) larvae a solution for organic waste treatment by overcoming the limitations of traditional methods. BSFL possess the unique ability to efficiently convert various types of organic waste into high-value biomasses such as oils and proteins, while also reducing the initial weight of the waste by approximately 50% in a shorter time (20 days) frame compared to conventional composting methods. BSFL can feed on a wide range of organic materials including food waste, agro-industrial by-products, and animal manure by emitting less pollution, and minimising the need for landfill space. The experiment showed that the best feed for larvae from our samples was the combination of fish waste with food waste. It shows an efficiency of 90% of decomposition with larvae content of 1g per 1000g of waste. The main by-products of the BSFL treatment system, larvae and pre-pupae, with omega-3 content can be utilized as high-protein animal, bird and fish feed, while the residue (frass) serves as organic fertilizer, promoting soil health and fertility. Additionally, BSFL treatment results in minimal direct greenhouse gas emissions, making it an environmentally friendly option for organic waste management.

**Keywords:** *Black soldier fly larvae*

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## DESIGN AND ANALYSIS OF HOSTEL BUILDING

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**Abstract:** Nowadays, the software techniques are highly involved in the construction field for quick and better accuracy of analysis to execute the given project successfully. This project focuses on the planning, analysis and design of the hostel building. The main purpose of our project satisfies the residential needs of 100 students at Holy Grace Academy Of Engineering Mala. The plan of the three storeyed hostel building was completed as per Kerala Panchayath Building Rules (KPBR 2019) by using AutoCAD software and the analysis and design of structures were done by using ETABS software according to the specifications recommended in IS 456: 2000. The result of maximum displacement, maximum shear force and maximum bending moment were analysed from displacement diagram, shear force diagram and bending moment diagram respectively. The designed values obtained from software analysis are then compared manually with the designed values. Finally the accuracy of result obtained from ETABS and manual design were ensured. Thus an optimum and efficient design model of a G+3 hostel building were obtained.

**Keywords:** *AutoCad, ETABS, Design, Analysis*

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## LOGISTICS EFFICIENCY ENHANCEMENT PROGRAM

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**Abstract:** The Logistics Efficiency Enhancement Program (LEEP) stands as a pivotal initiative in the domain of supply chain optimization and logistical efficacy. This research delves into the core mechanisms and methodologies utilized within the LEEP framework, focusing on the comprehensive analysis of data-driven strategies to enhance logistics operations. By exploring various research papers, industry reports, and empirical data, this study unveils the nuanced benefits and use-cases of LEEP, shedding light on its transformative impact on supply chain management. Through meticulous examination of research methodologies employed across diverse studies, including quantitative analysis, simulation modeling, and case studies, this paper elucidates the systematic approach undertaken by researchers and industry experts in evaluating the efficacy of LEEP. The amalgamation of qualitative insights and quantitative metrics offers a holistic perspective, showcasing tangible improvements in logistical efficiency, cost reduction, resource optimization, and environmental sustainability attributed to LEEP implementation. Furthermore, this research synthesizes key findings, highlighting best practices, challenges, and future prospects for integrating LEEP into contemporary supply chain strategies. By elucidating the methodology, results, and implications of LEEP-based interventions, this paper aims to contribute substantially to the discourse on logistics optimization and strategic decision-making in supply chain management.

**Keywords:** *Logistics Efficiency Enhancement Program, supply chain optimization, supply chain management, cost reduction, resource optimization.*

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## SIGNEASE:A REAL TIME SIGN LANGUAGE TRANSLATION FOR INCLUSIVE MEETINGS

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**Abstract:** This project, which focuses on the interpretation and interaction with Indian Sign Language (ISL) gestures, marks a noteworthy advancement in the field of accessibility technology. The system's primary feature is its user-friendly interface, which is designed to transform accessibility and communication for people with hearing impairments. Its complex segment for video processing breaks down raw video data into individual frames so that it can be thoroughly analyzed for ISL gestures. Modern technologies like MediaPipe are employed in key modules for ISL sign detection and interpretation, guaranteeing unmatched gesture recognition accuracy. Through the automated interpretation of sign language, these modules enable users to effectively communicate in a variety of settings. The system's core is a strong database that stores important insights from video streams for later research and development. Furthermore, the smooth transformation of processed video data into text format improves integration with a wide range of applications, such as gesture-based control interfaces and sign language recognition. The architecture of the system is modular and consists of several modules: frame extraction, dataset creation, CNN-based sign detection and recognition, LSTM-based gesture recognition, and text output via label encoding. and audio output using GTTS. Every module works together to create a thorough pipeline that ensures accuracy and efficiency when interpreting and interacting with ISL gestures. By giving audio feedback in line with recognised ISL gestures, Google Text-to-Speech technology integration improves accessibility even further. This allows users to receive both visual and auditory feedback for efficient communication. This ground-breaking project has the potential to significantly influence inclusivity and empower people with hearing impairments in communication by bridging the gap between accessibility and technology. It sets a new standard for assistive technology solutions by integrating cutting-edge technologies seamlessly and taking a holistic approach to meeting the various needs of people with disabilities in society.

**Keywords:** *Indian Sign Language (ISL), Accessibility technology, Gesture recognition, Modular architecture, Inclusivity*

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## **VISION**

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**Abstract:** In this project we present an advanced helping system tailored for individuals with visual impairments, this comprehensive solution incorporates features. We utilizes Convolutional neural network for real-time object detection and Support vector machine for facial recognition ensuring users can identify obstacles and recognize faces effectively. The system employs text-to-speech technology to provide clear auditory instructions and enhances the user experience. This system empowering the visually impaired with a holistic tool for increased mobility and independence in their physical environment.

**Keywords:** *CNN,SVM,gTTS*

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## DUAL REDUCTION GEARBOX OF ALL TERRAIN VEHICLE WITH TRANSFER CASE AND SWITCHING MECHANISM TO CONVERT 4WD TO 2WD AND VICE-VERSA

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**Abstract:** This paper provides theoretical and practical insights into the design, manufacture, and methods of the Dual Stage Reduction Gearbox and Switching Mechanism for all terrain vehicles. It is an Analysis, Design and Testing report. This gearbox design complies with the BAJA SAE competition requirements as stated in the SAE BAJA INDIA rule book. The Gearbox transfers power and velocity from the engine to the wheels. The primary part of the transmission that allows us to regulate speed and deliver the necessary torque is the gearbox. When switching from two-wheel drive to four-wheel drive, or vice versa, the Switching Mechanism comes in handy. This report provides information on how to engage and deactivate the switching mechanism and select the ideal gear ratios in accordance with BAJA SAE event requirements.

**Keywords:** *Transmission, Four Wheel Drive Selector, Rear Wheel Drive selector, All Terrain Vehicle, SAE-BAJA, Dual Stage Gearbox, Switching Mechanism, Transfer Case, Axles.*

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## DESIGNING OF STEERING SYSTEM FOR AN ALL TERRAIN VEHICLE

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**Abstract:** Designing a Rack and Pinion Gearbox (RPG) with the appropriate steering ratio, zero play, and sensitive steering is the initial goal. Manual rack and pinion steering systems are widely utilized because of their small size and straightforward design. This paper's primary goal is to design and produce a manual rack and pinion steering system that better suits the vehicle's maneuverability requirements. Different design considerations are made based on the kind of vehicle because quantities such as turning circle radius, steering ratio, steering effort, etc. are interdependent. The rack and pinion kind of steering system is the most widely used in automobiles. The automobile industry as a whole seeks to reduce vehicle weight in order to increase speed and performance. The rack and pinion in the steering system transfers the steering wheel's rotating force to the tie rod's translational force, which rotates the vehicle. The steering system's job is to provide direction control for the vehicle. In order to do this, a gearbox is utilized, which changes the steering wheel's rotational motion into the tie rod's translational action, which turns the tires. While there are other kinds of gearboxes, the rack and pinion gearbox is the most common type found in all-terrain vehicles (ATVs).

**Keywords:** *Rack and pinion gearbox, Turning radius, Steering ratio, Steering effort*

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## **TEXTEMO VIDEO GENERATION**

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**Abstract:** This project represents a groundbreaking initiative to enhance the user experience on our college website by implementing a sophisticated content generation system. At its core, the system employs generative AI techniques to transform textual input into dynamic and engaging videos. The diverse set of video clips, sourced from various college students, serves as the raw material for the video generation process. The utilization of Gamma GAN ensures that the generated videos are not only realistic but also representative of the diverse student body. Simultaneously, multi-speaker technology is employed to convert the provided text into high-quality audio, achieving a seamless synchronization of speech with the generated video content. To facilitate user interaction, a chatbot has been seamlessly integrated into the college website, equipped with basic prompts that trigger specific video responses. This interactive feature allows users to engage with the AI system and receive personalized video content based on their queries or prompts. The integration of advanced technologies, such as auto lip sync and 3D reconstruction, ensures that the virtual speakers in the generated videos exhibit realistic facial movements and dynamic postures, adding an extra layer of authenticity to the content. Moreover, the implementation of densepose technology contributes to the diversification of the generated content by dynamically altering the posture of the virtual speaker in the video. This approach not only enhances the realism of the videos but also provides a visually appealing and engaging experience for users interacting with the college website. The holistic combination of these technologies results in an immersive and interactive platform where users can explore a wide array of AI-generated videos, each featuring a virtual representation of a college student. This project aims to redefine the way users engage with online content on the college website, creating a more personalized, dynamic, and captivating experience.

**Keywords:** *Generative AI, Gamma GAN, Auto lip sync, 3D reconstruction*

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## **PLANT DISEASE DETECTION AND IDENTIFICATION**

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**Abstract:** In agriculture, controlling plant diseases remains a significant challenge that necessitates the development of advanced detection technologies. To accurately identify diseases, an algorithm that analyzes images of plant leaves is used, where early detection is crucial for maintaining crop health and ensuring food security. This paper presents an implementation of a plant disease detection and identification system for various plants using the Convolutional Neural Network (CNN) algorithm. The importance of using high-quality image datasets is emphasized, along with employing robust methods to extract features from these images, which are essential for achieving optimal algorithm performance. This system has demonstrated high accuracy in detecting and identifying plant diseases and additionally recommends the necessary treatments. The ADAM optimizer algorithm is also employed for optimization, enhancing the efficiency and effectiveness of the CNN. This technological advancement empowers farmers with timely information to make informed decisions in managing and treating their crops, thereby increasing yields and reducing losses.

**Keywords:** *CNN, Adam optimizer, plant disease detection*

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## EMERGENCY RESPONSE TEAM INFILTRATION AND EXTRACTION

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**Abstract:** E.R.T.I.E., or Emergency Response Team Infiltration and Extraction, is an indoor navigation web app for rescue teams. It converts building floor plans into 3D models that visualize entry points, doorways, and windows. Emergency operators, who dispatch and manage first responders, use E.R.T.I.E. to find the shortest path to locations in a building during an emergency. E.R.T.I.E. runs on Python Flask and works with most building floor plans. First, OpenCV processes the floor plan to isolate walls and Numpy-STL converts it into a 3D model. Then, the A\* search algorithm finds the shortest path between marked locations and THREE.js renders the model onto the web app. By providing a comprehensive overview of the building's layout, E.R.T.I.E. equips emergency response teams with the knowledge and situational awareness needed to swiftly enter and exit buildings.

**Keywords:** *Emergency Response, 2D to 3D Conversion, Pathfinding, Image Processing*

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**Abstract:** NavAR (Navigation using Augmented Reality) addresses the challenge of navigating complex college buildings by harnessing the power of AR technology. This project aims to develop a user-centric system that overlays virtual guidance elements onto the real world, enabling users to efficiently reach their desired destinations. The core functionality revolves around creating a high-fidelity digital map of the college building. This is achieved using the Immersal AR platform, which captures 3D scans of each floor, generating a point cloud – a detailed representation of the building's spatial geometry. Additionally, Immersal AR creates reference points that act as anchors within the environment, facilitating user location tracking within the AR experience. For enhanced visual guidance, NavAR incorporates 3D models built in Blender, a 3D modeling software. These strategically positioned models act as clear directional cues, aiding users in navigating the intricacies of the college building. Unity, a powerful game engine, serves as the foundation for building the AR application. It plays a pivotal role in integrating all the components and functionalities of NavAR. C# scripting, a versatile programming language, is then employed to manage various aspects of the AR experience. Immersal's Software Development Kit (SDK) is utilized to track the user's location within the captured map. By combining this location data with the user's chosen destination, the system can dynamically determine the optimal navigation path. NavAR further implements the A\* shortest pathfinding algorithm to analyze the map data and calculate the most efficient route between the user's current location and their designated destination. Navigation mesh, a simplified representation of the environment focusing on walkable areas, is employed in conjunction with the A\* algorithm for efficient path computation. Unity's functionalities allow for building the application as an Android package, making it readily available for use on mobile devices. This user-friendly system has the potential to revolutionize the way people navigate and locate themselves within large indoor spaces, particularly on college campuses.

**Keywords:** *Navigation, Augmented Reality, Indoor Space, Complex Building, Unity 3D, Immersal*

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## AUTHENTIQ: ADVANCING DIGITAL INTEGRITY

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**Abstract:** This project represents a concerted effort to address the intricate challenges posed by misinformation and security vulnerabilities across various domains. In the realm of fake News detection, the amalgamation of Gradient Boosting, Logistic Regression, Machine algorithms underscores a commitment to nuanced pattern recognition within textual data, thereby fortifying the detection capabilities against diverse forms of misinformation. The phishing website detection module relies on the XGBoost algorithm for sequence prediction but also integrates the feature Extraction part and gives a clear idea about the URL's presented. Furthermore, the project extends its reach to counterfeit currency detection, utilizing a sophisticated combination of image processing, feature extraction, segmentation, and image comparison and using CNN model is used in which VGG16 technique is preferred to meticulously differentiate between genuine and counterfeit currency. This interdisciplinary initiative not only underscores the holistic nature of the strategy but also emphasizes adaptability, incorporating dynamic algorithms to counter evolving threats. With its diverse technological toolkit, this project holds significant promise in advancing the state-of-the-art in misinformation and security threat detection, offering a robust and versatile framework for addressing multifaceted challenges. The project is developed as a website utilizing the Django framework for backend development and Python for backend scripting. The frontend design is implemented using CSS and HTML, providing users with a seamless and intuitive interface for accessing various detection tools and resources.

**Keywords:** *Phishing website, counterfeit currency, fake news, XGBoost, Logistic regression, CNN, VGG16*

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## PROPERTY ANALYSIS OF CARBON FIBER AND HBN REINFORCED ALUMINIUM HYBRID METAL MATRIX COMPOSITES

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**Abstract:** This project focuses on optimizing the mechanical and tribological properties of AA7050 aluminium alloy through the incorporation of hexagonal boron nitride (hBN) and carbon fiber reinforcements. The fabrication process employs power metallurgy techniques, with pre-mixing using ultrasonication, magnetic stirring, and mechanical stirring to ensure uniform dispersion of reinforcements and prevent particle agglomeration. Subsequent ball milling further refines the dispersion, followed by conventional fabrication sintering for consolidation. Various milling parameters are systematically varied to optimize the process. Upon fabrication, a comprehensive characterization is conducted, including compression testing to assess compressive strength, wear analysis using the pin on disk apparatus to evaluate wear resistance and friction parameters, micro hardness testing to determine material hardness, and microstructure analysis using an optical microscope to examine the internal structure of the composites. Through correlation of these results, insights are gained into the performance of the fabricated composites, contributing to the development of high-performance materials for aerospace, automotive, and other demanding applications. This research represents a significant step towards enhancing the understanding and utilization of aluminium metal matrix composites in engineering applications.

**Keywords:** *Aluminium Alloy, hBN, Carbon Fiber, Conventional Sintering, Premixing*

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## THE EFFECT OF CARBON FIBER REINFORCEMENT IN ALUMINIUM METAL MATRIX COMPOSITES THROUGH POWDER METALLURGY ROUTE

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**Abstract:** Modern materials with a high strength-to-weight ratio and an eye toward economy are becoming more and more in demand. Although aluminum (Al) and its alloys are lightweight and appealing, their low thermal stability and high wear rate restrict the use of aluminum alloys (AA) to a certain degree. Numerous scholars have devised diverse composite materials to circumvent these limitations and enhance the functionality of aluminum and its alloy. The choice of reinforcement selection has a vibrant role in the manufacturing of metal matrix composites. In the present work Carbon Fiber (CF) reinforced Aluminium Metal Matrix Composites were successfully fabricated using powder metallurgy method. Planetary ball mill with optimum parameters were opted to produce composites with different ratios of reinforcement. Compaction and Sintering was done and the composites properties were studied by microhardness test, compression test, wear test. Morphological characteristics were studied by optical microscope where the dispersion of carbon fibers in different mixtures were examined. The results show the improvement in the properties with the addition of the carbon fibers.

**Keywords:** *Aluminium Alloy, Carbon Fiber, Powder Metallurgy, Compaction, Conventional Sintering*

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## **WEFIT**

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**Abstract:** This paper introduces an AI Trainer model aimed at making fitness accessible to all, regardless of age or health condition. Utilizing Human Pose Estimation via OpenCV, the model analyzes live video from a webcam to identify key points on the human body, creating a virtual skeleton in 2D. By setting exercise counts and durations, it guides users through workouts, offering real-time feedback and corrections. Unlike costly trainers or wearables, this AI solution democratizes fitness, making it available to anyone with a webcam. By leveraging CPU-based processing, it ensures broad compatibility and affordability. The model not only fosters physical fitness but also promotes mental well-being by enhancing mood and attitude through regular exercise. With its inclusive approach and advanced technology, the AI Trainer represents a promising solution for achieving health and wellness goals in today's fitness-conscious society.

**Keywords:** *OpenCv, mediapipe.*

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## LANE DEPARTURE WARNING SYSTEM

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**Abstract:** Lane Departure Warning Systems (LDWS) have emerged as pivotal tools in modern automotive safety, aiming to mitigate the risks associated with unintentional lane departures. This abstract delves into the core principles, functionalities, and advancements in LDWS technology, underscoring its significance in contemporary road safety initiatives. The primary objective of LDWS is to alert drivers when their vehicle drifts out of its designated lane without proper signalling. Typically integrated with cameras and sensors, LDWS continuously monitors the vehicle's position relative to lane markings. Upon detecting deviation, the system generates timely warnings, either through visual, auditory, or haptic cues, prompting drivers to take corrective action. Key components of LDWS include lane detection algorithms, image processing techniques, and sensor fusion methodologies. Advanced systems leverage machine learning algorithms to enhance accuracy in lane detection and minimize false alarms. Moreover, the integration of GPS data enables LDWS to adapt to diverse road conditions and environmental factors, further optimizing its effectiveness. The effectiveness of LDWS in reducing lane departure-related accidents has been extensively studied, with empirical evidence indicating notable improvements in driver awareness and reaction times. Studies also highlight the potential of LDWS to prevent collisions, particularly in scenarios involving driver fatigue, distraction, or impairment. Continual advancements in LDWS technology are poised to further augment its capabilities and integration within contemporary automotive safety suites. Future iterations may incorporate predictive analytics and vehicle-to-infrastructure communication, enabling proactive interventions to prevent lane departure incidents. While LDWS demonstrates considerable promise in enhancing road safety, challenges persist, including system reliability in adverse weather conditions, integration with autonomous driving technologies, and user acceptance. Addressing these challenges will be paramount in realizing the full potential of LDWS as a cornerstone of modern automotive safety systems. The approach in this article is to introduce Lane Departure Warning Systems which represents a critical advancement in mitigating the risks associated with unintentional lane departures, offering tangible benefits in terms of accident prevention and driver safety. Continued research and development efforts hold the key to further refining LDWS technology, ultimately fostering safer and more secure roadways for all stakeholders.

**Keywords:** LDWS, Image processing, automotive safety systems

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## **BUDGET BUDDY**

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**Abstract:** In today's financial landscape, BudgetBuddy is a crucial tool designed to enhance expense tracking and budget management for users prioritizing efficient financial control. The software offers a secure login system, ensuring data privacy, and provides users with the option to manually enter expenses or upload bills. Leveraging advanced Optical Character Recognition (OCR) technology, powered by Machine Learning algorithm like Long Short-Term Memory (LSTM), BudgetBuddy accurately extracts bill data. It consists of a PDF report generation option in which we can generate a PDF with the details of selected expenses. BudgetBuddy goes beyond basic features by incorporating a budget alert system, allowing users to set spending limits and receive pop-up alert when expenses approach or exceed these limits. Users can efficiently manage their expense history, even removing unwanted entries. For users seeking deeper insights, BudgetBuddy generates yearly, monthly or daily expense reports, offering a comprehensive overview of spending patterns to facilitate well-informed budget decisions.

**Keywords:** *Tesseract, OCR, LSTM*

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## ANALYSIS OF ALSI10MG-QUARTZ COMPOSITE MATERIAL FOR A CONNECTING ROD.

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**Abstract:** Connecting rod is one of the most important parts in engine assembly. In automobile engineering field, every vehicle runs on I.C. engine and uses at least one connecting rod. In this paper AlSi10Mg is used as matrix material and quartz is used as reinforcement. Stir casting method is used for preparation of AlSi10Mg-Quartz composite. The reinforcement size of 10, 20,30microns are taken and the composition is varied by 5, 10, 15% by weight. The Silica content in the composites have an effect in the mechanical properties of the composite. In modern automotive internal combustion engines, the connecting rods are mostly made of steel and aluminum. Aluminum is used for its lightness and the ability to absorb high impact. The AlSi10Mg-Quartz composite is used as a replacement for connecting rod. The increased Silica content in the quartz gives improved mechanical properties and microstructure

**Keywords:** *Connecting Rod, Combustion engine, Quartz, Internal combustion.*

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## A SURVEY ON WEB DATA CLEANSING BY DETECTING XML DUPLICATE RECORD

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**Abstract:** Duplicate means representing two real world objects to the same entity. Now XML is used for data transmission in web, presence of duplicates is the major problem that faced on XML mining. Due to the wide use of XML we have to identify the duplicates in it that may reduce the quality of data. By recognizing and eliminating duplicates in XML data could be the solution. For this a strategy based on Bayesian Network called XMLDup to detect duplicates is recently used. After that they introduce a new genetic based approach for xml duplicate detection called AGP. This will find out more duplicates with less error as compared with XMLDup

**Keywords:** *Bayesian Network, DELPHI, dogmatiX, duplicate detection, network pruning, SXNM, XML, XMLDup*

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## INTEGRATED SMART TRANSPORT SYSTEM FOR ENHANCING SAFETY AND ACCESSIBILITY WITH ARM AND RASPBERRY PI

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**Abstract:** Public transport remains the primary mode of transport for most Indian citizens, and India's public transport systems are among the most heavily used in the world. Our public transportation like buses are overpacked with passengers and people travelling on foot board and some hanging on the handles are common in India. Due to unsafe journey, passengers falling off from footboard and other accidents may occur and the number of people losing their lives or getting handicapped are on the higher side. This project deals with the implementation of traffic discipline aid system based on current challenges and problems in buses. The features of this system includes passenger counting, passenger on footboard detection, automatic headlamp dipper, and silent zone detection and disabling horn for safe and secure transportation. A bus detection system using raspberry pi that aims to ease the traveling and movement of blind people is also presented. It includes two parts; blind people detection and communication between a bus and bus station. LPC2148 which is the widely used IC from ARM-7 family and Raspberry Pi, which itself is a minicomputer of a credit card size are used as the processors. The bus detection system for blind people is programmed using Python and gTTS (Google Text to Speech) is used for giving announcement about the route of arriving buses at the bus station.

**Keywords:** *Smart transportation, Passenger safety on public bus, Blind assistance, Bus detection*

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## SMART ASSISTIVE SYSTEM FOR VISUALLY IMPAIRED PEOPLE ( SAS - VIPS)

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**Abstract:** Recent progress in innovation is making the life prosper, simpler and easier for common individual. The World Health Organization (WHO) statistics indicate that a large amount of people experience visual losses, because of which they encounter many difficulties in everyday jobs. Hence, our goal is to structure a modest, secure, wearable, and versatile framework for visually impaired to help them in their daily routines. For this, the plan is to make an effective system which will assist visually impaired people through obstacle detection and scene classification. The proposed methodology utilizes Raspberry-Pi 4B, Camera, Ultrasonic Sensor and Arduino, mounted on the stick of the individual. We take pictures of the scene and afterwards pre-process these pictures with the help of Viola Jones and TensorFlow Object Detection algorithm. The said techniques are used to detect objects. We also used an ultrasonic sensor mounted on a servo motor to measure the distance between the blind person and obstacles. The presented research utilizes simple calculations for its execution, and detects the obstructions with a notably high efficiency. When contrasted with different frameworks, this framework is a minimal effort, convenient, and simple to wear.

**Keywords:** *Machine learning, visually impaired people, object detection*

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## **ANALYSIS OF FREE SPACE OPTICAL COMMUNICATION**

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**Abstract:** Free Space Optical communication system is a revolutionary technology to be the replacement of conventional wired systems. FSO communication utilizes optical signals to transmit data wirelessly. FSO communication allows the use of high bandwidth and security for data transmission. FSO system requires line of sight, so any obstruction turns in between the channel can lead to loss of data. This paper aims to analyze the FSO system with modulation schemes and discuss the challenges associated with information transmission in FSO communication.

**Keywords:** *FSO-Free Space Optics*

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## DEMAND ANALYSIS AND CAPACITY MANAGEMENT FOR HOSPITAL EMERGENCIES

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**Abstract:** Demand analysis and capacity management for hospital emergencies is focused on improving the ability of hospitals to respond to sudden surges in demand for emergency services. By analyzing historical data and using mathematical models, hospital administrators can predict future demand for emergency services and optimize resource allocation to ensure that patients receive the care they need in a timely and effective manner. Hospital bed management can be done by developing models: one using Excel forecasting to predict demand for general beds, and the other using a queuing model to optimize the allocation of ICU beds. The Excel forecasting model will use historical data on bed occupancy rates, seasonal factors, and other relevant data to predict future demand for general beds. The queuing model will use data on ICU patient arrivals, wait times, and discharge rates to optimize the allocation of ICU beds and reduce patient wait times. Both models will be developed using real-world data from a hospital and validated using statistical techniques to ensure their accuracy and reliability. It is crucial to improve patient outcomes, reduce wait times, and increase the efficiency of emergency services, for the proper management of hospitals.

**Keywords:**  $\lambda$  : Arrival Rate  $\mu$  : Service Rate  $\rho$  : Ratio of Traffic Intensity  $U$  : Utilization Factor  $M/M/s$  : Multiple, Parallel Server, Single Queueing Model

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## FABRICATION AND TESTING OF LOW-COST SALT SPRAY TESTING MACHINE

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**Abstract:** The main aim of this project is to design and fabricate low cost salt spray testing machine which is able to identify the corrosion formation in any type of metals; from this testing process we can improvise the life span of the particular metal. A motorbike has a paint coated footrest made of stainless steel, so this part when comes in contact with atmosphere nearly after a year it is corroded so if salt spray testing machine is used at this point can found out that for additional coating of paint, whether it will withstand up to longer duration likewise, this process can be analysed. This salt spray testing machine is fabricated for low cost and the mild steel grade is tested and analysed.

**Keywords:** *Salt spray, 316L SS, weight loss, corrosion.*

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## BEHAVIOUR OF STEEL CORRUGATED WEB GIRDERS

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**Abstract:** A corrugated web steel girder is a new innovative structural system which has successfully emerged in past two decades for the construction of buildings & bridges. Corrugated web girders are a variation of hot rolled or welded I section. It usually comprises of wide thick plate flanges and a thin corrugated web. Due to accordion effect shear is primarily carried by the corrugated web while bending moments are resisted by the flanges. Under shear action 3 different modes of shear buckling may be realized in the web – local, global or interactive. Corrugated web girders in bridge construction can reduce the requirement for intermediate diaphragms which are used for transverse load transfer. Use of high-strength steel in bridges has increased when large & column free space is key design issues. Corrugated web girders are more economical than conventional plate girders and also help to improve the aesthetics of the structure. The main advantage of corrugated web girders is the increased resistance to shear buckling without the need of weld stiffeners to the web. The main advantage of providing corrugation in web is to make the cross section efficient to resist in-plan bending so that the maximum material should be placed as far as away from neutral axis as possible. As the depth of the section increases, depth of the web also increases and it becomes slender. To carry the moment section has to be slender but slender sections are susceptible to web buckling. So, the web loses its buckling strength. Hence to avoid this buckling and to gain maximum strength corrugations was provided on the webs instead of using stiffeners. This paper focuses on the study of analysis performed to investigate the buckling strength and behavior of girders with corrugated web. Finite element models with different web geometries were prepared and an elastic buckling analysis was performed in ANSYS. The influence of thickness and height of web and flange, effect of corrugation angle, were investigated. The non-linear finite element analysis is also carried out to assess the stress distribution and shear strength of corrugated web.

**Keywords:** *Steel Corrugated web beams , ANSYS, Web Buckling,*

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## COMPARISON OF ULTIMATE LOAD OF CONCRETE FILLED TRIPLE SKIN TUBE WITH OUTER SQUARE STEEL AND INNER CIRCULAR UPVCS (CTTSSCU) WITH SQUARE CFDSTS

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**Abstract:** This experimental paper is about the comparison of ultimate loads of CTTSSCU with conventional CFDSTs with different inner tubes. A Concrete Filled Double Skin Tube (CFDST) column consists of 2 tubes: One is outer and the other is inner with space between them is filled with concrete. Square outer tubes and inner tubes of circular, square cross section and one specimen of no inner tube are used. Concrete filled Triple skin Tube with outer Square Steel and inner Circular UPVCS (CTTSSCU) consist of outer square steel tube & two inner UPVCS (Un-plasticized Poly Vinyl Chloride) of different diameters. The space between all the three tubes are filled with concrete and inner core is left hollow.

**Keywords:** *Column, CFDST, tube, hollow, UPVC, triple skin, strength*

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## CRACK DETECTION ON BRIDGES: A COMPREHENSIVE REVIEW

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**Abstract:** Crack detection is a long-standing topic in structural health monitoring. Conventional damage detection techniques rely on intensive, time-consuming, resource-intensive intervention. Detection of cracks on bridge decks is a vital task for maintaining the structural health and reliability of concrete bridges. Robotic imaging can be used to obtain bridge surface image sets for automated on-site analysis. We present a novel automated crack detection algorithm, the STRUM (spatially tuned robust multifeature) classifier, and demonstrate results on real bridge data using a state-of-the-art robotic bridge scanning system. By using machine learning classification, we eliminate the need for manually tuning threshold parameters. The studies are categorized according to the computer vision aspect and at deeper levels to facilitate exploring the studies that utilized similar approaches to address the crack detection problem. Multiple visual features that are spatially tuned to these regions are computed. Feature computation includes examining the scale-space of the local feature in order to represent the information and the unknown salient scale of the crack. The classification results are obtained with real bridge data from hundreds of crack regions over two bridges. This comprehensive analysis shows a peak STRUM classifier performance of 95% compared with 69% accuracy from a more typical image-based approach.

**Keywords:** SHM, Structural Health Monitoring, STRUM, Robust Multifeature

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## REJUVENATION OF CLASSICAL SHADOW PUPPETRY EMPLOYING MODERN TECHNOLOGY

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**Abstract:** Shadow puppetry or shadow play is an age-old classical art form that uses flat articulated cut-out figures for storytelling and entertainment. This form of expression involves the creative use of primitive engineering skills, light, puppets, and a projection screen. It is evident that modern day cinematography evolved from ancient shadow theatres. This performing art which reflects the rich legacy of Indian culture has lost its importance over years. This work focusses on the rejuvenation of traditional shadow puppetry using technological intervention. At most importance is given to keep the inherent natural movements of the puppets unaffected. The project emphasizes on the resurgence of shadow puppetry incorporating modern technologies – Robotics, Automation, 3D Printing, Laser cutting etc. In the long run, this piece of work aims at projecting and transferring vivid Indian heritage to forthcoming generations worldwide.

**Keywords:** *Shadow play, Robotics, Automation, 3D Printing, Laser Cutting*

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# A STUDY ON WIRELESS POWER TRANSFER: ELECTRICAL VEHICLES

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**Abstract:** This paper outlines the current understanding of wireless power transfer, detailing its concept, implementation methods, and necessary devices through block diagrams. It discusses the technologies for transferring electrical power over short and long distances, focusing on electromagnetic induction as a popular method. The analysis covers factors such as the coupling factor, coil shape, core material, and coil positioning, exploring their impact on system properties. Additionally, it evaluates the advantages and disadvantages of these technologies. The paper further presents a wireless power transfer system for electric vehicle battery charging and future development trends in the field.

**Keywords:** *Wireless power transfer, EV, Inductive power transfer.*

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## SCIENTIFIC AND SYSTEMATIC APPROACH TOWARDS DIAPER WASTE MANAGEMENT AND GENERATING VALUE ADDED PRODUCTS FROM USED DIAPERS

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**Abstract:** One of the biggest problems encountered in the 21st century is the disposal of sanitary napkins and adult/ baby diapers which are non-biodegradable, posing risks to the environment and human health. When compared to other forms of garbage, diapers require a lot more fuel to burn since they are made of cotton pulp and plastic and swell to four times their original weight after being used. This results in significant amounts of carbon emissions and exorbitant waste disposal expenses. According to the 2016 Bio-Medical waste management rules, anything contaminated with bodily fluids and blood are considered bio-medical waste and must be burned, microwaved, or autoclaved to kill microorganisms. The lack of reliable statistics on the issue is proof of the need for attention in sanitary waste management, since more adult diapers are finding their way into the waste stream every day. Extensive research is essential to transform this uncontrollable waste into something useful, particularly in India because of the country's high ratio of elderly and disabled people. This proposal aims to convert the used diapers into value added products or as a secondary energy source and minimize the carbon emissions to a considerable level compared to incineration. The project tries to generate maximum income and job opportunities in the field of waste management, ensuring maximum clean and healthy working conditions to the employees by installing automation and latest technologies like Artificial Intelligence and Robotics.

**Keywords:** *Non-biodegradable, autoclaved, disabled people, Robotics*

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## ANALYSIS THE PITTING CORROSION BEHAVIOUR OF NICKEL HIGH AND MEDIUM PHOSPHATE COATED AUSTENITIC STEEL AISI 304

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**Abstract:** In this study, a high and medium -phosphorus Ni-P coating was prepared by electro deposition method. The characteristics and corrosion property of electroless Ni-P coating were investigated by surface analysis techniques and electrochemical measurements, and compared with L80, corrosion resistant alloys such as 13Cr steel, 304 stainless steel. The results showed that the high- phosphorus Ni-P coating with amorphous structure contained 88.3 wt.% Ni and 11.7 wt.% P, and improved the corrosion resistance of L80 steel substrate by more than 90% in Cl-containing medium. The corrosion resistance of Ni-P coating was close to 13Cr steel but, 3104 stainless steel . Nevertheless Ni-P coating, similar to Inconel and 28Cr steel, had better resistance to pitting corrosion than 304 stainless steel in Cl-containing environment. Durability test was conducted on the SS 304 surface by completely dipping in ferric chloride water for 36 days and another case partially wetted. Partially wetted surface did not show any sign of corrosion even after 24 hours. MP AND HP ELECTRO PLATED of SS304 steel surface is a simple and effective process to decrease corrosion in environment. The HP15 SS 304 steel surfaces demonstrated excellent corrosion resistance with corrosion rates less than an order of magnitude compared to that of the OTHER SS surface

**Keywords:** *Electroless Ni-P coating; Corrosion resistant alloys; EIS; Polarization; Pitting corrosion*

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## INVESTIGATING THE IMPACT OF CO-DEPOSITING NI P AND SI C COATINGS ON STAINLESS STEEL(SS304) AND ANALYZING THEIR TRIBOLOGICAL PROPERTIES

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**Abstract:** Initially, uncoated AISI 304 stainless steel substrate was analyzed for their microstructure and composition (EDX). The surface hardness and surface roughness of the uncoated AISI 304 SS was investigated. Empirical relationship regression equation was derived using Response Surface Methodology (RSM) in order to study the effect of applied load, sliding velocity, sliding distance and temperature on the specific wear rate and Coefficient of Friction (COF) of the uncoated AISI 304 SS against pin counter body using Pin-On- Disc wear testing apparatus. The results clearly indicate that the specific wear rate of the uncoated AISI 304 SS increased with increasing applied load, sliding velocity and temperature but it was also found that the specific wear rate decreased with increasing sliding distance.

However, an optimum value of sliding distance for lowest specific wear rate was found to be 1000 m with specific wear rate value of in addition, the COF of the uncoated AISI 304 SS increased with increasing applied load, sliding velocity and sliding distance.

As the sliding distance was increased beyond 5000 m, the COF value reduced with increasing sliding distance. Furthermore, it was observed that the COF value reduced with increasing temperature.

In this present work, also presents the comparison of specific wear rate and Coefficient Of Friction (COF) of uncoated AISI 304 SS, Different ceramic layer coatings at same dry sliding wear test condition.

**Keywords:** wear, Electroplating, stainless steel

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# FUZZY LOGIC MPPT CONTROLLER FOR DC STANDALONE PV SYSTEMS

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**Abstract:** Effective tapping of renewable energy sources demands efficient and economically feasible, subsystems. Among the other renewables, the potential of solar energy is prominent in many countries like India. This work proposes an efficient maximum power point tracker which include a Quadratic boost converter and fuzzy logic control system. Unlike conventional MPPT, this one is also able to prevent over voltage and subsequent damage, during the abnormal insolation and light load conditions. As the quadratic boost converter permits the reduction of number of PV modules in strings, minimization of the ill effects of partial shading is also possible.

**Keywords:** SPV, MPPT, Fuzzy logic, QBC

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## PERFORMANCE IMPROVEMENT OF PASSIVE SOLAR STILL HAVING 30MM SIZE OF BLUE METAL STONE CONNECTED WITH HEAT EXCHANGER

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**Abstract:** In this paper, an endeavor has been made to figure out the impact of Blue metal stone on heat move coefficient for a uninvolved single-slant refining framework associated with heat exchanger in summer climatic condition. 30mm size of Blue metal stone is utilized as a Reasonable intensity stockpiling material in the solar still. The tests have been directed on a south-bound, single slant, sun powered still of 10° tendency of gathering cover, in summer climatic condition for 24 h on various days for Changed and this is at last looked at by utilizing conventional still.

**Keywords:** *Heat transfer coefficient, Absorbing material, Solar radiation.*

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## EFFECT OF UNDERPINNED MICROPILE ON EXISTING FOUNDATIONS

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**Abstract:** Micropiles are said to be relatively low diameter piles with diameter upto 300mm. Micropiles are useful for various range of applications such as underpinning of existing foundation, foundation support of light-weight structures, slope stabilization etc. The installation process of micropiles cause minimal disturbance to adjacent structures, soil and environment. Micropiles can be installed in all type of soils and ground conditions with restricted access. Thus, understanding the micropile behavior and predicting the capacity of micropiles under axial loading are important topics in foundation engineering. In the present study the bearing capacity of waveform pile, screw pile and conventional pile in sand was discussed. A series of model test were conducted in the laboratory to investigate the behaviour of micropiles under vertical loading. Using load settlement curves obtained from tests, the bearing capacity and settlement of micropiles were calculated and compared. The test results showed that the bearing capacity of the micropile was greater than that of the conventional micropile in groups. Bearing capacity of two piles were equal (helical pile with double helices and waveform pile with 5 waves) and a 29% of settlement reduction was observed in the case of helical pile with double helices.

**Keywords:** *Micropiles, Foundation Support, Vertical Loading, Helical Pile.*

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