



# 1<sup>st</sup> INTERNATIONAL CONFERENCE

On

## Sustainable Materials Manufacturing & Energy Technologies (SMMET-2022)

*Conference Proceedings*

(JUNE 24-25, 2022)



**Editor-in-Chief**  
**Dr. Ashok Kumar Yadav**

**Organized by :**  
**Department of Mechanical Engineering**  
**Raj Kumar Goel Institute of Technology**  
**Ghaziabad, U.P. India**





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# **Message**



**Shri Akshat Goel**  
Vice Chairman  
RKG Group of Institutions Ghaziabad

It gives me immense pleasure to know that Department of Mechanical Engineering, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India is organizing International Conference on Sustainable Materials, Manufacturing & Energy Technologies (SMMET-2022).

I am sure that this conference will provide a forum to national and international students, academicians, researchers and industrialists to interact and involve in Research and Innovation. Such academic events benefit the students, teachers and researchers immensely and widen the horizons of their knowledge and work experience in the field of Sustainable Materials, Manufacturing & Energy Technologies. I sincerely appreciate the humble efforts of the Institute in providing a platform for students, academicians, researchers and industrialists to share their ideas and research outcome through the forum of this Conference.

I give my best wishes to all delegates and organizing committee to make this event a grand success.

# **Message**



**Dr. Laxman Prasad**  
Advisor,  
RKG Group of Institutions, Ghaziabad

*Innovation has been the backbone for the economic development ever since mankind started to live on this earth. Bill Gates observed “Never before in History has Innovation offered promise of so much to so many in so short a time”.*

It gives me immense pleasure to know that Department of Mechanical Engineering, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India has chosen “Sustainable Materials, Manufacturing & Energy Technologies” as the theme for conducting an International conference SMMET-2022. I am sure the conference will provide adequate opportunity for all the participants to share their knowledge and deliberate on various current issues connected with the subject.

I wish all success to this conference.

# **Message**



**Dr. D. K. Chauhan**  
Director Executive  
RKG Group of Institutions Ghaziabad

It is a matter of great pleasure for me to know that Department of Mechanical Engineering, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India has chosen “Sustainable Materials, Manufacturing & Energy Technologies”

Education is always a sign of development and learning. It should be research-oriented helping society to create something new. Thinking in an innovative and new way is significant to cope with technological changes. It is also relevant for exploring and searching various aspects of education through the sustainable materials, manufacturing & energy technologies.

The response of contributors and likeminded educational fraternity showing their keen interest in this conference is highly motivating. Presentation of such research papers is extremely beneficial for research scholars and stimulating factor for us to organize such conferences frequently in future. I sincerely offer my earnest gratitude to those who have contributed through their research papers at the conference.

I am sure that the conference would achieve its objective by providing a suitable platform for learning and experiencing the latest advancement in the field of industry. The cohesive efforts of a dedicated and committed team become necessary for organizing such conferences. We are fortunate enough for having such a hardworking team with us.

I wish for the grand success of the conference.



# **Message**



**Prof. (Dr.) D. R. Somashekar**  
Director, RKGIT Ghaziabad

I am indeed happy to know about the effort taken by Department of Mechanical Engineering, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India in organizing this I<sup>st</sup> International Conference on Sustainable Materials, Manufacturing & Energy Technologies (SMMET-2022). I have gone through the list of invited speakers, technical tracks and topics of this two days technical event, and I am sure that it is going to be an enriching experience for the participants of this conference.

The conference is very topical in today's context when sustainable materials, manufacturing & energy technologies play an important role in most of our societal, business and research decisions. I am sure this conference will bring people with such skills together. The researchers, scientists, academicians and students working in this area will be deliberating together during this conference on various issues and challenges sustainable materials, manufacturing & energy technologies.

I thank Department of Mechanical Engineering, RKGIT Ghaziabad for managing this important event.

I wish the conference to be a grand success.

# **Message**



**Dr. Ashok Kumar Yadav**  
Head of Department, Mechanical Engineering  
RKGIT Ghaziabad

With great pride and honour, I take this opportunity to welcome you all to 1st International Conference on Sustainable Materials, Manufacturing & Energy Technologies (SMMET-2022) on 24-25 June 2022 organized by the Department of Mechanical Engineering, RKGIT, Ghaziabad, Uttar Pradesh, India. SMMET-2022 shares insight on various significant topics with upcoming trends & technologies in the field of Material, Manufacturing & Energy Technologies.

The conference seeks to provide a forum with broad blend of high-quality academic papers to promote communication, learning and exchange of ideas amongst researchers, scientists, and engineers in the field of mechanical engineering. As the convener of SMMET-2022, I firmly believe that the conference will serve as a nodal conjunction between the Researchers, Academicians, Learners & the Industry.

The Conference will witness deliberations, discussions and sharing of innovative thoughts & ideas that will bolster the efforts to take up new challenges and initiatives in the field of mechanical engineering & its allied areas. It's a matter of immense pleasure that Academia from various IITs, NITs, Central, State and Foreign Universities, Industry Stalwarts and Scientists from various reputed organizations will enlighten us with their knowledge and experience in the Conference.

Being the HoD-ME Department, I take this opportunity to extend my heartiest thanks to the management of RKGIT for their valuable support and also, convey my heartiest congratulations to the Organizing Committee to undertake an arduous task in the most impeccable manner to accomplish the same. On behalf of the entire team, I welcome you all for SMMET-2022 and hope your stay turns intellectually stimulating and professionally enriching. With long lasting memories and a strong legacy to emulate, I am confident that every individual will be benefitted and feel enriched through this conference. I personally as well as on behalf of Mechanical Engineering Department wish SMMET-2022 a GRAND SUCCESS.

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**[SMMET-01]**

**A Review on Enhancement Techniques for Thermal Efficiency of a Non-Concentrating Solar Collector**

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**ABSTRACT**

Solar collectors can be considered under the category of heat exchangers, because when solar radiation is incidences on it, solar collector converts this incident energy (Solar Radiation) into thermal energy and then the energy is transferred to the heat transfer fluid (HTF). The thermal energy which is transferred by the HTF either used directly to the demand or to the energy storage unit. Moreover, the efficiency of a flat plate solar collector (non-concentrating) was found to be highly connected to the overall efficiency of a solar system. Thus, the flat plate solar collectors that are used in solar systems are very important component to investigate for obtaining higher efficiencies. The emphasis of the present study is on a method for improving the performance of flat plate solar collectors by altering the geometry and design of the systems under consideration. The papers that were considered covered a wide range of topics relevant to this type of collector, including augmentation strategies, the design of its structure, and the methods that were used to improve it.

**Keywords:** - Solar Collectors, Heat Transfer Fluids, Heat Exchangers, Flat Plate Solar Collector.

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**[SMMET-02]**

**Effect of material removal rate and surface finish in ECM process when machining D3 die steel with brass electrode and copper powder as an electrolyte**

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**ABSTRACT**

Electrochemical machining (ECM) is a controlled anodic dissolution process of an anode and a cathode in an electrolytic chamber during an electrolysis process. In this process, the part to be machined is made as cathode and the tool used for machining is made as anode. The working principal of the experiment is based on the faraday law. To optimize the ECM process parameters with the D3 Die steel as a workpiece material and Brass electrode as a tool material. ECM machining parameters are as voltage, powder concentration and electrolyte concentration on which MRR and surface finish (Ra) of the job is to be calculated total 9 experimental runs were conducted as per experimental scheme i.e., Taguchi L9 orthogonal array which is performed on the Minitab software. Regression analysis, Signal-to-noise (S/N) and the analysis of variance (ANOVA) are employed to find the optimal levels and for analysing the effect of electrochemical machining parameters on MRR, SR. The results of these experiments revealed that increase in voltage and electrolyte concentration decreases the MRR and surface roughness initially increases then decreases. Further, increase in voltage MRR linearly decreases, surface roughness also increases. It is also noticed that increase in powder concentration MRR decreases and then decreases linearly with increase in surface roughness.

**Keywords:** ECM, Material removal rate, Surface roughness, Powder concentration (Cu), Electrolyte.

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**[SMMET-03]**

**Response Surface Methodology based performance optimization of solar PV water Pump**

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**ABSTRACT**

In remote areas of developed nations, the solar photo-voltaic water pumping system (SPVWPS) is a cost-effective solution. Solar electric power was a good solution for remote water pumping because of its affordability and dependability. However, in developing nations, where irrigation and drinking water are top priorities for the majority of the population, the SPVWPS has yet to prove its worth. However, in underdeveloped nations, where drinking water is a top priority for the majority of the population, the SPVWPS has yet to prove its worth. The impact of solar radiation, ambient temperature, azimuthal angle and tilt angle on a solar irrigation system is investigated in this paper. SPVWPS is a PV system that transforms solar energy into electrical energy to power a DC or AC motor-driven water pump. Using RSM optimization techniques, the influence of all input parameters is adjusted to maximise the properties of SPVWPS. The response surface method of the CCRD model was incredibly helpful in constructing the experiment, and statistical analysis facilitated in finding the significant factors that had the biggest influence on the performance of the solar PV water pump. This RSM model saved time by lowering the number of trials required and represented statistically proven models for all responses. The head, max power, and overall efficiency were determined to be 27.03m, 5.4 kW, and 28.3% correspondingly with optimal input parameters of 361 W/m<sup>2</sup>, AT of 25.8°C, SAA of -17.5°, and TA of 68.2°.

**Keywords:** *Solar radiation; Solar photovoltaic water pump; Response surface methodology.*

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**[SMMET-04]**

**Automatic Electromagnetic Braking System**

**Ashish Dewangan, Abhinav Kumar, Divyanshu Singh Chamiyal, Abdullah Ahmad Siddiqui, & Abdus Samad**

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**ABSTRACT**

This paper is intended to showcase the modern emerging as well as efficient type of brakes i.e. automatic electromagnetic brakes. The principle used to fabricate these kinds of brakes is electromagnetic induction. It is intended to calculate brake torque & brake power & enhance it from previous values. Introduction of an IOT system to electromagnetic braking system. Study & benefits over other brakes. Material selection for disc is analyzed. Scope is studied. Feasibility of EM Brakes is discussed. Selection of motor is also explained.

**Keywords:** *Automatic, Disc, Torque, Power*

[SMMET-05]

**Numerical Simulation of a Wavy Channel Microchannel for Methanol and Water Mixing**

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Uttar Pradesh, India

**ABSTRACT**

The microchannel has piqued the interest of academics over the last two decades due to its unique design features. Microchannels are now being researched extensively in a variety of applications. The current research is focused on microchannel exploration for use in hydrogen production using methanol steam reforming (MSR). On COMSOL Multiphysics, the homogeneity of water and methanol mixing in a wavy microchannel with a V-shaped inlet port is assessed in this study. Individual species' concentrations (methanol and water) are measured along the microchannel's arc length. The concentration of each species decreases until it reaches its average value. And the difference in species concentrations equalled zero, indicating that the mixture was homogeneous. There was a minimal change in the average velocity in the microchannel which makes the wavy channel more prominent as a microreactor. The mixing index was calculated along the flow direction of the mixture, and it was found to increase along the arc length.

**Keywords:** *Wavy microchannel, methanol, homogeneity, COMSOL Multiphysics, Mixing index.*

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[SMMET-06]

**Experimental Investigation on Micro-Electrical Discharge Machining Process For Heat Treated Nickel-Based Nimonic 80A**

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**ABSTRACT**

Nimonic 80 A is a nickel based alloy having diverse applications in aerospace, automotive, biomedical, military sectors due to its immense strength to weight proportion and resistance to corrosion at raised temperatures. As a result of the problems associated with its conventional machining, unconventional machining, in particular EDM is preferred. Micro-machining has become a key attraction point for manufacturing organizations. This requires having a comprehension of the process in terms of the impact of control factors on the performance characteristics. In the prevailing experimentation, micro holes were drilled on heat treated Nimonic 80A plate. Current, pulse-on time, pulse-off time are considered as the control factors and tool wear ratio, drilling rate as the performance variables. The experiments were designed using RSM. Furthermore, the effect of process parameters on the multi-response using ANOVA has been analyzed. The SEM analysis of the drilled hole was carried out for examining quality of the holes. Copper and zinc diffused around the micro drilled area, were identified through elemental composition of drilled sample using EDX. Further, the measurement of thickness of recast layer was performed. Finally, minimum tool wear ratio (0.78) and the maximum drilling rate (0.77 mm/sec) were obtained.

**Keywords** - *μEDM, SEM, EDX, RSM, RCL*

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**[SMMET-07]**

**A study on Visco elastic and Thermo- Fractography Investigation of Cor fiber reinforced with Kondagogu gum Resin Composites**

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**ABSTRACT**

A complete systematic technique for fabricating and characterizing the various features of Kondagogu gum resin (KGR) and Coir fibre (CF) reinforced bio composites is described in this study. Following hand lay-up technique to prepare the bio composites with treated and untreated 4mm length, 05 weight percentages were related to a number of characterization tests. To improve the interfacial bonding properties of CF, the surfaces were treated with sodium hydroxide. The visco elastic properties were analysed using a dynamic mechanical analyzer (DMA) and thermo gravimetric analysis (TGA), as well as Scanning electronic microscope (SEM). The loss modulus ( $E''$ ), storage modulus ( $E'$ ), and damping factor ( $\tan\delta$ ) were determined as a function of alkaline treated fibre loading, and the peak is high for the  $\tan\delta$  curves was also investigated. When compared to the untreated, the treated Coir fibre has the high storage modulus ( $E'$ ), loss modulus ( $E''$ ), and low damping factor ( $\tan\delta$ ). TGA displays the low weight loss in treated one when compared to raw and neat KG resin. The composites CF/KGR with treated fiber have strong composite dynamic and thermal characteristics as a whole. Therefore, the CF / KGR composites may be used as primary packaging material effectively in future on the basis of those observations.

**Keywords:** *Dynamic mechanical analysis (DMA), Kondagogu gum (KG), NaOH, Coir Fiber, Thermal properties, bio composites.*

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**[SMMET-08]**

**A Review on Advanced Driver Assistance Systems on Indian Traffic Scenario (ADAS)**

**Lalit Kumar, Dr.Bhupender Singh, Dr.Bhaskar Nagar**

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**ABSTRACT**

Since the last few years, the number of road accidents and death are continuously increase over the world. The survey by World Health Organization (WHO) road accident are eight leading causes of death globally and majority of these death occurs in low- and middle-income countries and they notice that the driver error is most common error is behind in any accident. Now day's huge change take place in automobile industries, automation and machine vision technology is recently connected to vehicle. New car is manufacturing by companies are fully equipped with many different safety systems. Now vehicle is loaded with passive safety parts like- Airbags, seatbelt etc. But the passive system works only when during any accident, and minimize any damage and reduce the risk of injury during the impact of vehicle. Engineers are discovered new safety system is called Active Safety System and other name is Advance Driver Assistance System (ADAS). This system works always when you drive the vehicle and continuously work to keep you from getting into an accident. In present scenario, ADAS system is only provide in fully loaded vehicle and they are more expensive and require more maintenance than the other vehicle. The purpose of this paper is providing a brief summary of available ADAS system and including development system and research prototype.

**Keyword:** - *Advanced Driver Assistant System development, (ADAS), Car safety, Car sensors technologies, RADAR, LiDAR*

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**[SMMET-09]**

**Effect of Internal Combustion Engine Parameters by Uses of Higher Alcohol in Diesel Fuel: A Review**

**Amardeep, Prakhar Srivastava, Shreyash Negi, Shubham Namdeo and Vikash Kumar**

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**ABSTRACT**

This paper reviews articles related to various alcohol-diesel blends that has been used in the past researches. It gives a complete idea of the performance and emission changes with use of these blends. It has been noticed that by changing the alcohol, emission and performance changes, somewhere negatively whereas somewhere positively. It also has been noticed that very few researches have been done on the higher alcohol blends also compression ratio is not considered as an important parameter in various researches.

**Keywords:** *diesel, blends, performance, combustion, emission.*

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**[SMMET-10]**

**Combined Effect of Bio-Gas and Bio-Diesel on Performance of a Diesel Engine**

**Mohammad Raquib and Aditya Raj Verma**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

The majority of today's energy needs are met by fossil fuels. However, uncertain issues such as declining petroleum products and rising air pollution have compelled specialists to look for another fuel that can be utilized as a replacement or limit the use of fossil fuels. In light of these concerns, an attempt was made in this research to investigate the possibility of using bio-diesel from algae and bio-gas obtained from kitchen waste as fuels to operate a compression ignition (CI) engine in a dual fuel mode. The kitchen waste was collected from RKGIT Campus hostels mesh. Bio-diesel-bio-gas was used in a 5.2 kW, single cylinder, DI diesel engine that ran at a constant speed of 1500 rpm for testing. Experiments were carried out in dual fuel mode to evaluate the engine's performance and emission characteristics. The experiment's results were examined, compared to the diesel operation, and then given in this publication.

**Keywords:** *Algae Bio-diesel, Bio-gas, Diesel Engine Performance, emission*

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**[SMMET-11]**

**Development and Testing of Nanohybrid Composite Material**

**Raja Singh, Robin Tyagi, Akshu Tyagi and Prince Giri**

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**ABSTRACT**

The current study looked at the production and characterization of Nano particle reinforced composites. Nano powders are powdered materials having individual nanometer-scale particles or materials with nanometer-scale crystals. Because of its availability, Nano particle fly ash has been actively investigated for numerous technical applications. Fly ash is a fine grey

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powder made up primarily of spherical, glassy particles that is generated as a byproduct of coal-fired power plants. It is the cheapest nano powder and is widely accessible in poor nations. According to ASTM requirements, they have high compressive strength, light weight, minimal water absorption, chemical inertness, and strong heat resistance. The composite is prepared using the hand layout approach.

**Keywords:** Nano fly ash, powder, grapheme

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### **[SMMET-12]**

#### **Design and Development of Air Purifier**

**Nishant Verma, Sunil Pathak, Pankaj Kumar Pal, Vivek Pandey, Saurabh Kumar Gupta**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

#### **ABSTRACT**

Indoor air pollution from sources like this can irritate your lungs and contribute to allergies and asthma. The trouble is, if you use an ordinary vacuum cleaner, you might simply be "rearranging the dirt": your cleaner will trap some of the dust inside the bag or cyclone filter but let the rest pass straight back into the room. nowadays air pollution is a major concern our we are making a Arduino based air purifier having 3 inlet working on solar energy having HEPA filter and activated carbon filter. If you suffer from asthma or another breathing difficulty, you may find a (sometimes defined as "high-efficiency particulate air," sometimes as "high-energy particulate arresting") air purifier (or a vacuum with a filter) well worth the investment

**Keywords:** AQI, HEPA filter, CARBON FILTER.

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### **[SMMET-13]**

#### **Design and Experimental Analysis of Amphibious Vehicle**

**Dinesh Chandra, Shivam Yadav, Ajay Yadav, Nilesh K Singh**

Department of Mechanical Engineering, Raj Kumar Goel Institute of Technology, Ghaziabad

#### **ABSTRACT**

An Amphibious vehicle is a means of transport, viable on land as well as on water even under water. It is simply may also called as Amphibian. Amphibious vehicle is a concept of vehicle having versatile usage. It can be put forward for the commercialization purpose with respect to various applications like in the field of military and rescue operations. Researchers are working on amphibious vehicle with capability to run in adverse conditions in efficient way. This paper focuses on concept of amphibious vehicle in detail. In later stage of paper we have explain and described the design and analysis of amphibious car. We have followed proper design procedure and enlisted the material used in detail. Capabilities of efficient amphibious vehicle will fulfill all the emerging needs of society. Success of every concept largely relies on research and development, though amphibious vehicle is yet to travel a long journey of innovative development, it has shown excellent potentials for future benefits.

**Keywords:** Amphibious vehicle, design and analysis, Application area

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[SMMET-14]

**Newtonian and Non-Newtonian Fluid Flow Analysis through Different Stenosis Shape and Size**

**Piyush Kumar, Kuldeep Kumar, Mitansh Pandey, Sushant Tyagi and Saurabh Singh**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

The cardiovascular system's principal job is to transfer nutrients and oxygen to various body areas via blood circulation in arteries. Arterial stenosis is an artery disease that causes constriction of the artery due to the disintegration of smooth muscle cells and the presence of lipids in the artery, which results in stenosis. Changing the cross-sectional area of an artery from one location to another may raise the risk of a heart attack. Newtonian and non-Newtonian fluids in a stenosed artery for basic pulsatile and physiological blood flows are investigated using numerical modelling with hard arterial walls in this study. Under various pulsatile flows, a comparison of Newtonian and non-Newtonian flows is shown.

**Keywords:** Solid works, Ansys, Meshing

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[SMMET-15]

**Development and Testing of Natural Fibrous and Green Composites**

**Karan Gupta, Harshit Patel, Rohan Singh and Shwetank Mishra**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

The processing and characterization of organic jute fibre reinforced composites have been examined in the current investigation. Natural fibers are eco-friendly, cost-effective, lightweight, renewable, and have better thermal properties and corrosion resistance capabilities. Out of all-natural fibers, jute has been extensively considered for many engineering applications due to its availability. Jute fibers are cheap among all the natural fibers and are abundantly available in several developing countries. The static mechanical properties namely hardness, yield strength, Ultimate tensile strength, flexural strength, and impact were obtained as per ASTM standards. Hand layup technique is employed for the preparation of composite and the total fibre content considered is 45%.

**Keywords:** Jute, Epoxy, Hardener, Glass Fiber

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[SMMET-16]

**Design and Analysis of Aeroleaf Wind Turbine (Vawt)**

**Vivek Kr Tiwari, Abhishek Kr Gautam, Shakib Hussain, Abhinay Tyagi, Shaurabh Singh**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

This venture (Design of Aero leaf Wind Turbine) is set designing and production of Vertical Axis Wind Turbines VAWT to switch the wind pace to a rotational movement the usage of those mills. These mills may be connected to a synthetic tree so as to appear to be a current design, which may be hooked up in and round any public vicinity together with park, road, public facilities, or enterprise offices. Aero leaf wind turbine is designed to provide strength with every turbine. This venture affords a overview at the overall performance of Savonius wind mills. This sort of turbine isn't always typically use

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and its packages for acquiring beneficial strength from air circulation continues to be taken into consideration as an opportunity source. Low wind pace start-up, operating with any wind direction, and the much less noise are a few benefit of VAWT- Savonius model. This venture includes 3 phases; designing, fabrication, and evaluating. By provision of an aero-leaf we will store large quantity of fossil fuel, strength and capital.

**Key words:** *Aeroleaf, carbon free, land saving, natural gas VAWT, HAWT*

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### [SMMET-17]

#### **Fabrication and Characterization of Aluminium Composites**

**Rajat Verma, Ashay Srivastava, Bittu Kumar Giri and Aditya Kumar Singh**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

#### **ABSTRACT**

This review paper represents the fabrication procedure of making aluminium composite material by use stir casting method. In this method we make this composite material by doing reinforcement process. Composite material is less in weight, high in strength, or also less costly. Composites have many different properties like high thermal conductivity, high tensile strength. Composite material is generally a mixture of two or more same or different metals. we can use composite metal in different mechanical sector, because of their multipurpose uses. In composite material we can easily find two metals properties in one metal. The new material may be preferred for many reasons. Composite materials are generally used for buildings, bridges, and structures such as boat hulls, swimming pool panels, race car bodies, shower stalls, bathtubs, storage tanks, imitation granite and culture marble sinks and countertops. The most advanced examples perform routinely on spacecraft and aircraft in demanding environments. Surface metal matrix composites (MMCs) are a group of modern engineered materials where the surface of the material is modified by dispersing secondary phase in the form of particles or fibre sand the core of the material experience no change in chemical composition and structure.

**Keywords:** *Fabrication, Composites, Aluminium, Stir casting, Reinforcement, strength, metal matrix composites*

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### [SMMET-18]

#### **Friction Stir Welding as Joining Process through Modified Conventional Milling Machine**

**Ritesh Upadhyay, Shashish Tanay, Sudhanshu Shekhar Pandey and Raj Mangal Singh, Saurabh Kumar Gupta**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

#### **ABSTRACT**

This paper represents the modification of vertical milling machine to friction stir welding machine. This paper reports on the reconfiguration of a milling machine to produce friction stir welds of aluminium and copper and friction stir processing of AA202 aluminium alloy. Friction stir welding tools were designed and manufactured from tool steel. The tools were inserted into the chuck of the milling machine. A backing plate was also specially designed and manufactured. The second one is a design of a manufacturing system around the part family, with the customized flexibility required for producing all parts of this part family, this reduces the system cost. The need and rationale for mild steel to protect the milling machine table and was placed on the bed with the use of T-nuts. The plates were secured firmly on the backing plate with the use of specially designed clamping fixtures. The varied welding speeds and the rotational speeds were achieved using the control system on the vertical milling.

**Keywords:** *Friction stir processing, Friction stir welding, milling machine, Reconfiguration*

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**[SMMET-19]**

**Design and Fabrication of Water Bottle Filling System**

**Anand Shekhar Nishad, Abhishek Kumar Saroj, Pradeep Kumar Singh and Chandan Kumar Bharti**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

This project discusses about the design and fabrication of water bottle filling system. Generally, the function of the machine is to fill the water automatically into bottles through a moving bottle plate. The field of automation has a notable impact in a wide range of industries beyond manufacturing. Automation plays an increasingly important role in the world economy. Filling is a task carried out by a machine that packages liquid products such as cold drinks or water. In past, humans were the main method for controlling a system. More recently, electricity has been used for control and electrical control is based on microcontrollers for various purposes like medicines, pharmaceutical plants, chemical plants etc. There microcontrollers control the complete working of the system. It is common to use microcontrollers to make simple logical control decision. The automation in bottle filling industry comes with increased electrical components. Essential requirements of each component in the system are important to be studied in order to understand how each part works in coordination with other parts in the system. This study includes design, fabrication, and control system for automated bottle filling system. A conveyor system with sensors and electromagnetic valve is fabricated for this purpose. The entire sequence of operation is controlled by Arduino microcontroller. In small industries bottle filling operation is done manually. The manual filling process has many shortcomings like spilling of water while filling it in bottle, equal quantity of water may not be filled, delay due to natural activities of human etc. This problem faced by small industries compels to design this system. This proposed system is meant for small industries. It aims to eliminate problem faced by small scale bottle filling system. With this system which operates automatically, every process can be smooth and the process of refilling can reduce worker cost and operation cost.

**Keywords:** *Wheel, Solar Plate, Buzzer, Power Distributor, Ir Sensor, Relay, Water Pump, DC Motor, LCD, Battery, Conveyor System*

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**[SMMET-20]**

**Power Generation Using Savonius Wind Turbine**

**Aarti Kalra, Arpit Shukla, Ayushman Mishra, Anzar Khan, Anirudh Yadav**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

The use of wind energy for energy generation is one of the oldest methods for harnessing renewable energy. Use of renewable energy is an essential ingredient of socio-economic development and economic growth. Renewable energy sources such as wind energy, tidal energy etc. is abundant and can help in reducing the dependency on fossil fuels. With increased concern for environment now days led to the research for more environment friendly sources of energy and with this considerations wind energy can be considered as a viable option in this regard. Different configurations of wind turbines such as horizontal axis wind turbine and vertical axis wind turbines are mainly used for energy extraction. Horizontal axis mainly used in large scale applications and thus its implementation is generally a concern due to huge installment setup and initial cost; whereas vertical axis wind turbines offer promising solution for smaller rural areas or medium sized residential spaces. Energy generation from wind turbines will surely be affected by geometry of blade it is using and its orientation in turbine. For effective use of turbine both parameters should be optimally set and determined. This review work focuses on various stages for design and development of optimized vertical axis wind turbine which will studies various parameters such as general wind energy scenario, different available energy extraction methods, design and aerodynamic performance analysis of vertical axis wind turbines. Project work will include Optimization of design parameters of vertical axis turbine blades considering different parameters such as geometry orientation in assembly.

**Keywords:** *Renewable energy, Environment friendly sources of energy, Economic growth*

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**[SMMET-21]**

**Design and Development of Ventilated Chair**

**Tarun Chaukiyal, Sachin Sharma, Akash Poswal and Naman Agarawal**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

The importance of having a comfort while long sitting during work will boost mood and the increase the efficiency for doing work. That is why the development of more comfortable seats or chair is a current issue in the furniture industry. Thermal comfort is vital aspect to be measured in the ergonomics assessment of user while sitting on chair or seats. Determining thermal comfort in chair is a complex task, because thermal comfort involves the interaction of many variables. In this research article the review is carried out on the thermal comfort of the air ventilated chair. Overall, in these study different parameters related with design comfort of the chair is also studied.

**Keywords:** *Chair, Ventilated, Thermal*

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**[SMMET-22]**

**Analysis of Floating Solar Tracking Power Plant**

**Siddhartha Guptar, Sharad Gupta Mayank Giri, Rishav Vats**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

A novel energy production system which has fascinated a wide consideration because of its several benefits that are called floating photovoltaic technology (FPVT). The FPVT system that helps to minimize the evaporation of water as well as an increase in energy production. For the research purposes, both electrical and mechanical structure requires studying of these systems for the development of FPVT power plants. From different points of views, numerous researches have been directed on FPVT systems that have evaluated these systems. The present research article give a logical investigation and up to date review that shows the different features and components of FPVT systems as an energy production system is offered. This articles reviewing the FPVT that gets the attention of the scientists who have the investigational stage and involuntary inspection of FPVT systems in addition to influence of implementing these systems on the water surface. This research also includes performance analysis of the dual axis solar tracking system using electronic controller. The main objective of this research is whether a static solar panel is better than solar tracker or not. In hardware part, four light dependent resistors (LDR) is used to detect the utmost light source from the sun. Two servo motors conjointly used to move the solar panel to maximum light source location perceived by the LDRs. The outcome of the solar tracker system has analyzed and compared with the fixed or static solar panel found better performance in terms of voltage, current and power. Therefore, the solar tracker is proved more practical for capturing the maximum sunlight supply for star harvesting applications. The result showed dual axis solar tracking system produced extra 10.53-watt power compared with fixed and single axis solar tracking system.

**Keywords:** *FPV: Floating Photovoltaic; FPVT: Floating Photovoltaic Technology; PV: Photovoltaic Solar tracking; single axis; dual axis; light Depending resistor (LDR); servo motor*

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[SMMET-23]

### **Experimental and Numerical Investigation on Spring back of 2-PLY AL/Cu Clad Sheet in V-bending**

**Gaurav Pratap Shahi, Rahul Kumar Yadav, Ajay Patwa and Radhemohan Tripathi**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

#### **ABSTRACT**

Today Clad sheet metals are seen to have their increasing popularity in various industrial applications like in automobile body parts, cookware manufacturer, aerospace applications etc. The clad sheets have enhanced mechanical properties over the individual component of the clad sheet. They tend to increase strength, ductility, thermal conductivity, surface properties and contribute to overall reduction of weight. This present study is confined to a roll bonded two-ply clad sheet consists of 0.6mm thickness of ASTM B307 copper and 1.4mm of aluminium 1050. Firstly tensile specimens were Wire Cut E.D.M in three different directions 0°, 45° and 90° with rolling direction(RD) as per ASTM-E8M standard. The tensile properties like UTS, yield strength, ductility and strain hardening of clad sheet and individual sheets are tested and compared. The drawability of the clad sheet is determined by performing anisotropy test in directions 0°, 45° and 90° with rolling direction (RD) . All these tests are performed on 50kN Universal testing machine. Springback behaviour of a two-ply clad sheet metal, comprising of layers of SS430 and SS304 sand-wiched with a layer of AA1050 is investigated in V-bending by using experimental and simulation techniques. Finite Element analysis is also carried out and the experimental results are found to be in good agreement with the FE results.

**Keywords:** *To Apply Cladsheet, cold roll bonding, Anastropic and tensile test at 0 degree 45 degree 90 degree*

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[SMMET-24]

### **Inbuilt Hydraulic Jack System in Automobiles**

**Panitra Pandey, Pulkit Sharma, Palash Sharad and Harsh Chaudhary**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

#### **ABSTRACT**

Hydraulic brakes are those brakes which are actuated by the hydraulic pressure or pressure of a fluid and are commonly and widely used in the automobiles. Pascal's law is the main principle behind working of hydraulics brakes system which states that "pressure at a point in a fluid is equal in all directions in space". According to this law when pressure is applied on a fluid it travels equally in all directions so that uniform braking action is applied on all wheels. This report contains detail study about construction.

**Keywords:** *Hydraulic cylinder incompressible Hydraulic, Oil, Pascal Law, Directional Control Valve*

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[SMMET-25]

### **Role of Artificial Intelligence to Prevent the Information Pollution**

**Malika Nagpal and Deepak Tiwari**

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#### **ABSTRACT**

Internet and social media have become a leading and widespread platform for the broadcast of real time information. Evolving from the time of writing letters to business officials and our loved ones, now social media has become a forum

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for debate, sharing our ideologies, knowledge proclamation and exchange of one's sentiments. It is the user base bridging the gap between different religions, mindsets and parts of a society involving all age groups. It is one of the greatest tools to create and share information and knowledge. But is this information which is being circulated worldwide, affecting the lives of trillions of individuals authenticated and verified or is it simply a click worthy. This paper focuses on putting forward a comprehensive view of how data is being manipulated and exploited for achieving malicious goals and how a single share taking a second of your time enforces a skewed and distorted perception about a person, company or event. Furthermore, a taxonomy is also offered to classify the hazardous information at various stages and this paper propose with the Artificial intelligence based various methods to terminate the spread of such information at various stages of its origin, dissemination and detection. It aims to make web a safe space for people to share information and for efficient decision making.

**Keywords:** *Internet; social media; information pollution; artificial intelligence; efficient decision making*

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### **[SMMET-26]**

#### **Two Wheel Drive Forklift**

**Sayash Sharma, Vikas Yadav, Abhilash Tiwari and Vikas Chaturvedi**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

#### **ABSTRACT**

Widespread use of the forklift truck had revolutionized warehousing practices before the middle of the 20th century, enabling warehouse operators to justify erecting sprawling ce floor buildings to replace the more compact multi-story structures used in the past. Many kinds of mobile equipment are used in warehouses today, but most are variants of the common forklift truck.

**Keywords:** *Lower Frame, Upper Frame, Fork, Carriage, Support rod, Axle shaft*

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### **[SMMET-27]**

#### **Design and Fabrication of Multipurpose Portable Ladder**

**Rishabh Srivastav, Sachin Dwivedi, Abhay Kumar, Gopal Baranwal, Amit Saraswat**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

#### **ABSTRACT**

The ladder is among the equipment that helps to carry out different work process in ease manner at various industrial as well as residential areas. This project is based on the design and fabrication of a a compact and foldable ladder that serves multiple purposes to overcome the limitations of current ladder design. The ladder so formed by the modifications proposed by us will not only perform the basic functions but also can be used for material handling purpose. Thus we propose to design and fabricate a light weight, compact and portable multipurpose ladder. .The ladder available in the local market are heavy, requires a lot of space, serves a single purpose and are not as stable as they should be. To design and fabricate this multi-purpose ladder, the existing product in market must be compared first to know the latest designs that have been created. The information about current design for multi-purpose ladder must be search or find from magazine, newspaper, catalogue or internet. From all the information, idea to design and fabrication can be created. Overall, this project can bring a motivation and experience, train to work under the pressure, apply knowledge that have been learned and soft skill ability like time management, planning the task, and negotiation skill to make sure this project goes smooth as plan and done at correct time.

**Keywords:** *Multipurpose, Ladder, Solid works, Simulation, Fabrication, Analytical Calculations.*

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**[SMMET-28]**

**Unmanned Ground Vehicle for Defence**

**Ashish kumar, Devesh singh, Ashish kumar, Abhay mani Tripathi**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

Experimental work was conducted to evaluate the effect of compression ratio, Injection pressure, Injection timing on performance and emission by using Tyre derived fuel blended with diesel in the ratio of B5, B10, B20 on compression ignition engine. The compression ratio is a factor that influence the performance characteristics of the compression ignition engine. This work is an experimental investigation of the influence of the compression ratio on break thermal efficiency, specific fuel consumption, Indicated power and Break power. Compression ratio of 16,17,18,19 and 20. And engine load of 0 kg to 10 Kg with increment of 2 Kg were utilize for diesel Engine. The Injection pressure varied as 200 bar, 225 bar, 250 bar. Similarly, Injection timing is one of the major parameter in the performance of compression Ignition engine. It varied as 24BTDC, 27BTDC, 30BTDC. Automobile emissions are one of the major problems in the environment. Engine emits the Carbon monoxide (Co), hydrocarbon (HC), Nitrogen oxide (NOx) and smoke density etc. NOx emissions leads to dangerous effect in the environment. NOx can travel long distance, causing a variety of health and environmental problem in location far from their emission source various method are used to reduce the NOx emission.

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**[SMMET-29]**

**Energy Generation Using Exhaust Heat**

**Milan Rana, Akash Rathore, Amit Kumar Yadav and Doodhnath Vishwakarma**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

A majority of thermal energy in the industry is dissipated as waste heat to the environment. This waste heat can be utilized further for power generation. The related problems of global warming and dwindling fossil fuel supplies has led to improving the efficiency of any industrial process being a priority. To use the wasted heat energy and convert it into electrical energy from the vehicle's exhaust, to reduce greenhouse effect from the environment and eliminate or reduce the size of alternator and to increase vehicle's efficiency.

**Keywords:** Heat energy, greenhouse effect, Increase Vehicle efficiency

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**[SMMET-30]**

**Design and Development of Underwater Welding Set Up**

**Gaurav Gaur, Rakesh Chauhan, Virendra Pal, Daya Shankar Yadav and Saurabh Kumar Singh**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

**ABSTRACT**

This paper enlightens about the use of varied, exaggerated & intensive manufacturing tool "welding" under the water, which was formerly just used in the atmospheric fabrication works only. By the advent of special waterproof electrodes, the engineers proved to the world that one can also perform all the welding operations in the presence & continuous water. It also laid to repair or sometimes to replace the underwater structures, offshore structures which may get fail soon at the

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deeper water level. It also encompassed the use of various underwater welding techniques & some other new technologies which are emerging up in the field of underwater welding like: Automation welding.

**Keywords:** *Underwater wet welding, improve efficiency of welding, testing of weld joint*

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### **[SMMET-31]**

## **Production of HHO gas & it's Utilization as Fuel in SI Engine**

**Rajneesh Kumar, Tushar Sinha, Yash Parashar and Vaibhav Gupta**

Department of Mechanical Engineering, RKGIT Ghaziabad UP, India

### **ABSTRACT**

The objective of this work was to construct a simple innovative HHO generation system and evaluate the effect of hydroxyl gas HHO gas addition, as an engine performance improver, into gasoline fuel on engine performance and emission HHO CELL was designed, fabricated and optimized for maximum HHO gas productivity per input power.

**Keywords:** *HHO generation system, gasoline engine, engine performance*

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### **[SMMET-32]**

## **Optimal Selection of Electric Motor & Battery for EV Drive Train**

**Prajwal Tripathi, Prakhar Dixit, Prince Kumar Tiwari, Rachit Bajpai, and Raj Kumar**

Department of Mechanical Engineering, Galgotias College of Engineering & Technology, Gr. Noida-201306, U.P-India

### **ABSTRACT**

Due to increased environmental awareness, electric vehicles are growing more popular over time. Electric automobile consists primarily of a motor and a battery subsystem components for electric propulsion as well as the energy source subsystem. In this paper the performance of two motors, the PM motor and the Induction motor and the battery (Li-ion, NiMH, Lead-acid, Ni-Cd) have been Simulate by electric vehicle applications using ADVISOR (Advanced Vehicle Simulator) software. The phenomena of decision-making for suitable electric motor and battery observable in all major aspects of electric vehicles performance characteristics such as grade ability and maximum speed, maximum acceleration, and SOC (state of charge).

**Keywords:** *Battery, Motor, SOC, EV, Energy, Power*

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[SMMET-33]

**A Multiple-Criteria Evaluation of Chiller Plants for Powering a Building Setup While Utilizing Industrial Waste Heat and Solar Energy**

**Bhupendra Kumar Bhatt<sup>1</sup>, Osama Khan<sup>2</sup>, Mohd Parvez<sup>1</sup> and S. Mojahid Ul Islam<sup>1</sup>**

<sup>1</sup>Al-Falah University Faridabad, India

<sup>2</sup>Jamia Millia Islamia University, New Delhi, India

**ABSTRACT**

The integration of a centralized chilled water cooled can enhance cost savings and emissions reductions in a building setup if properly utilized. However, it can be driven by different combinations of energy sources that perform differently in terms of economic, environmental, and technical criteria. As a result, a multi-criteria decision process is applied between various attributes of the chiller system to find the best among them to achieve due to different individual preferences. The proposed framework ensures that cost minimization and participant satisfaction are accounted for during the synthesis of a chilled water system in any building setup.

**Keywords:** *Absorption Chiller, TOPSIS, MCDM, Solar Energy*

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[SMMET-34]

**A Multi-Criteria Decision Method of Finding Best Performance among Various Nanofluids for a Flat-Plate Solar Collector**

**Amaan Ullah<sup>1</sup>, Osama Khan<sup>2</sup>, Mohd Parvez<sup>1</sup> and S. Mojahid Ul Islam<sup>1</sup>**

<sup>1</sup>Al-Falah University Faridabad, India

<sup>2</sup>Jamia Millia Islamia University, New Delhi, India

**ABSTRACT**

In the event of rapidly depleting conventional sources of energy such as fossil fuels and an urge for protecting environment from pollution, there is a thrust, across the globe, to produce cleaner and sustainable energy. Covalently functionalized carbon nano platelets and non-covalent functionalized metal oxides nanoparticles (surfactant-treated) have been used to synthesize water-based nanofluids in this paper. A flat-plate solar collector is installed, and its thermal performance is evaluated by using carbon and metal oxides based nanofluids, Performance of the PV panel may be affected when it gets heated due to high ambient temperature and other reasons. This paper proposes a mechanism for using the PV panel by circulating nanofluid around it. It also experimentally investigates the effect of critical input parameters such as heat flux intensities (597, 775, and 988 W/m<sup>2</sup>), mass flow rates (0.8, 1.2 and 1.6 kg/min), inlet fluid temperatures (30–50 °C) and the weight concentrations (0.025–0.2%) using the Taguchi's L16 orthogonal array (OA). Weighting factors are calculated using Triangular fuzzy numbers (TFN) for output responses and optimal setting of the input parameters is obtained using TOPSIS. The thermal efficiency of the flat-plate solar collector is measured for distilled water and compared with the weight concentration (0.025–0.2%) of functionalized carbon and metal oxide-based nanofluids.

**Keywords:** *Nanofluid, Solar energy, TOPSIS*

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[SMMET-35]

**A Comprehensive MCDM-Based Approach Using TOPSIS and AHP as an Auxiliary Tool for Pyrolysis Material Selection and its Application in Cogeneration Power Plant**

**Alok Goyal<sup>1</sup>, Osama Khan<sup>2</sup>, Mohd Parvez<sup>1</sup> and S. Mojahid Ul Islam<sup>1</sup>**

<sup>1</sup>Al-Falah University Faridabad, India

<sup>2</sup>Jamia Millia Islamia University, New Delhi, India

**ABSTRACT**

In the current period of energy development, it is complex to produce energy from agricultural wastes due to the involvement of multiple criteria such as social, economical and environmental factors. In this study, a hybrid multi-criteria decision-making (MCDM) model based on the weight obtained from analytical hierarchy process (AHP) has been utilized for ranking. Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) are proposed to evaluate the possibilities of utilizing locally available biomass. For this purpose, a number of criteria are defined from the viewpoint of yielding maximum energy. The proposed methods are having excellent agreement with each other, and they are exactly matched with the experimental results. This study consists of seven biomass alternatives with seven evaluation criteria. Out of seven selected biomass materials, sugarcane bagasse is ranked top. At the end of the study, the obtained biomasses from top ranked biomass material was analysed for physical, elemental and chemical compositions. This study gives new insights into decision-making, specifically thermochemical conversion process.

**Keywords:** Biomass, TOPSIS, Renewable Energy

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[SMMET-36]

**Topology Optimization for Weight Minimization of Automotive Brake Pedal**

**Prashant Kumar Srivastava<sup>a</sup>, Ibad Khan<sup>b</sup> and Mukesh Kumar<sup>c</sup>**

<sup>a</sup>Ambalika Institute of Management & Technology, Lucknow, India

<sup>b</sup>System Engineer, Tata Consultancy service

<sup>c</sup>Gautam Buddha University, Greater Noida, India

**ABSTRACT**

For a design engineer, light weight structure design is most preferable and desirable one, and it can be achieved through reducing the weight of the designed component without compromising the strength. In the present work, the topology optimization procedure is employed to an automotive component, brake pedal. Reduction of the weight of the automotive components results light weight vehicle and greater fuel efficiency. Finite Element study is performed on the initial design of brake pedal. Stress and deformation behaviours are studied along with Solid Isotropic Material with Penalization (SIMP) technique which is implemented through Finite Element Analysis solver package. Stress constrained Topology optimization is performed which results in a new optimized design. The proposed design suggests about 10% of weight reduction in an existing brake pedal having same strength as previous one without material removal.

**Keywords:** Weight Reduction, Finite Element Analysis, Topology Optimization Redesign

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[SMMET-37]

**A Taguchi Based Hybrid MCDM Approach for Experimental Investigation and Optimization of Sustainable Performance Characteristics of a Building Setup in Varying Climatic Conditions**

**Abdul Haq Siddiqui and Osama Khan**  
Jamia Millia Islamia University, New Delhi, India

**ABSTRACT**

Energy generated from renewable resources is of supreme importance for the significant and sustained growth for any nation. The majority of the power in developing and developed countries is generated from the conventional energy sources, such as, coal, petroleum, and natural gas in thermal power plants, which influence the environment a lot with exhaust behaviour. Due to diminishing fossil fuels funds, the future demand of energy will be fulfilled by the renewable energy in India. In this paper, a scientific tool ANFIS predicts temperature conditions for different climates and based on that the building operation is altered. The conditions are later ranked according these substitutes, to rank the different energy savings substitutes implemented there for 'green building' in a Multi Criteria Decision Making (MCDM) environment. Consequently, we will finally come into a conclusion, how the unbiasedness of the tools in solving MCDM problems for 'greening building' projects helps the decision makers of respective institutions, to invest their funding, in the right projects, viewing the rankings generated by the tools.

**Keywords:** *Multi-criteria decision, building utilities, ANFIS*

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[SMMET-38]

**Multi-Objective Optimization and Multi Criteria Decision Analysis of A System Based on Biomass Fueled Power Plant Using Entropy and Fuzzy AHP Method**

**Tauseef Hassan and Osama Khan**  
Jamia Millia Islamia University, New Delhi, India

**ABSTRACT**

A power generation system including various biomass fuels, gasifier, and high-temperature sodium heat pipes was modeled using the exergy and energy analysis. The one-objective optimization was performed using the interaction effect of parameters derived by ANOVA. The multi-objective optimization results indicated that the optimum power was achieved at relatively low exergy efficiencies and the optimum exergy efficiency was accompanied by low powers. A stepwise multi-objective optimization procedure was conducted and an optimum region was recognized. The performance of the system was assessed from energy, exergy, and environmental viewpoints for different biomasses including pine sawdust, groundnut shell, rice straw, rice husk, eucalyptus, sunflower shell, and sugarcane bagasse. Multi-criteria decision making (MCDM) analysis was implemented in order to select the biomass with the best performance. The cold gas efficiency, energy efficiency, exergy destruction rate, CO<sub>2</sub> emission, and fuel flow rate were selected as different criteria. The MCDM results revealed that eucalyptus had the best performance.

**Keywords:** *Multi-objective optimization, Multi-criteria decision analysis, Biomass, Nanofluids, AHP*

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[SMMET-39]

**Fabrication and Performance Analysis of Automatic Dual-axis Sun Tracking System using LDR Sensors**

**Surya Vikram Singh, Puneet Kr, Shobhit Singh Verma, Harishchandra Thakur, Mukesh Kumar.**

Department of Mechanical Engineering, Gautam Buddha University, Greater Noida, India

**ABSTRACT**

The use of solar energy is experiencing exponential growth as a viable technique for increasing renewable energy resources. As a result, it is essential that engineers recognize the technology involved in this domain. The focus of this research paper is to show how to design and implementation of a microcontroller-based solar panel tracking system. Because the solar array can stay oriented to the sun, solar tracking enables increased energy production. To validate the design, a functional system will be demonstrated. Problems and potential solutions will also be described.

**Keywords:** *Solar tracker, LDR, Microcontroller, Geared DC motor, Power gain.*

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[SMMET-40]

**Fabrication and Performance Analysis of Low Temperature Difference Stirling Engine**

**Ashwani Singh, Abhinandan Singh, Chandra Prakash, Manish Kumar Baitha,  
Harishchandra Thakur, Mukesh Kumar**

Department of Mechanical Engineering, Gautam Buddha University, Greater Noida

**ABSTRACT**

This century has started witnessing the phasing out of IC Engines for better and more effective options. A Stirling Engine is another step in this direction as it provides noise-free operations while having efficiency comparable to that of an IC Engine. This simple yet impactful device can find a plethora of applications in the near future and hence carries an immense research potential. Thus, in this paper, we intend to study, design and fabricate a small electrical output, low temperature difference, Stirling Engine for proving its efficiency. Problems and potential solutions will also be described.

**Keywords:** *Stirling Engine, Efficiency, Potential solutions*

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[SMMET-41]

**Effect of energy matrices on life cycle cost analysis of partly covered N-PVT-CPC active double slope solar distiller with helically coiled heat exchanger using CuO Nanoparticles**

**Dharamveer Singh<sup>1,2</sup>, Samsher<sup>2</sup>, Anil Kumar<sup>2</sup>**

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<sup>2</sup> Department of Mechanical Engineering, Delhi Technological University, Delhi-110042

**ABSTRACT**

At present, the application of nanotechnology for the production of pure water is increasing. It is a new approach in which nanoparticles are being optimized for active solar distiller units with the helically coiled heat exchanger of the effect of the payback period. Thermal modeling has been developed. The thermal exergy, cost of distillate, and productivity are 7.3%

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higher, 3.58% lower, and 3.45 % higher, respectively, for double slope N-PVT-CPC-DS-HE (system-A) to N-PVT-FPC-DS-HE (system-B). However, the efficiency of life cycle conversion and energy payback factor at 10% interest rate is 13.62% and 5.93% high, respectively, with nanoparticles. It is found that system-A performs better than system-B based on yield and production cost. The proposed system-A, an active double slope solar distiller unit, meets potable water requirements on a commercial basis, and power developed by 25% PVT can be used to drive the pump. Additional 97.6% excess electricity can be utilized for other supportive applications. The optimum mass flow rate achieved by proposed system-A is 0.02 kg/s from 0.03 kg/s of prior research system-B, i.e., it is decreased by about 33%, which reduces pump work.

**Keywords:** *energy matrices, energy payback factor, life cycle cost analysis, productivity, heat exchanger, CuO nanoparticles.*

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#### [SMMET-42]

### **Economic, Enviroeconomic and Exergoeconomic Analyses of N-PVT-CPC Collector Active Double Slope Solar Distiller with Helically Coiled Heat Exchanger Using CuO Nanoparticles**

**Dharamveer Singh<sup>1,2</sup>**

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#### **ABSTRACT**

In present scenario the nanofluid is being used to produce potable water. The active N-identical photovoltaic thermal (PVT) compound parabolic concentrator collector (CPC) double slope solar distiller with a helically coiled heat exchanger using water loaded CuO nanoparticles (proposed system) has been studied economically, environ-economically, and exergoeconomically. Mathematical modeling has been developed. Optimizing parameters thermal energy, thermal exergy, annual yield, economic, environ-economic, and exergoeconomic for the proposed system have been computed. Furthermore, based on annual as well life span the cost of distillate, is found to be 11.28% less, based on energy and exergy for life span of 15, 20 and 30 years the CO<sub>2</sub> mitigation per ton are found to be 90.67 tones and 5.57 tones, and carbon credit earned are found to be 453.36 \$ and 408.35 \$, productivity is found to be 12.72% high, exergoeconomic parameter (Rex) is found to be 3.99% high respectively. The results have been compared with active N-identical photovoltaic thermal (PVT) compound parabolic concentrator collector (CPC) double slope solar distiller with helically coiled heat exchanger using water loaded CuO, Al<sub>2</sub>O<sub>3</sub>, and TiO<sub>2</sub> nanoparticles (previous system).

**Keywords:** *Cost of distillate, CO<sub>2</sub> mitigation, Carbon credit earned, Enviroeconomic, Exergoeconomic*

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#### [SMMET-43]

### **Investigation of Turbulent Natural Convection Combined with Radiation in a Square Enclosure with a Partition**

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#### **ABSTRACT**

The present research work shows the results of numerical analysis of turbulent natural convection combined with radiation phenomenon inside a differentially heated partitioned square cavity. The horizontal walls are assumed to be adiabatic while

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the vertical walls are isothermal maintained at a higher and lower temperature and the partition placed parallel to these. The simulation is done for turbulent flow for the Rayleigh number ranging from 108 to 1011. Air is taken as the working medium. A finite volume-based solver is used to solve the governing equations. SST K- $\Omega$  is used as the turbulence model. Discrete Ordinate (DO) is used as the radiation model. The results are presented with the help of streamlines and temperature contours. The obtained Nusselt number values show a considerable effect of thermal radiation. From the present study it is observed that as the value of emissivity is varied from 0 to 1 the total Nusselt number increases to 259.334% and 292.217% for Ra 109 and 1010 respectively. Also, when the height of partition is increased from L/4 to L the Nusselt number decreases by an average of 24.255% for Ra 108 and for Ra 1011 the Nusselt number decreases by 28.3%. However, when the partition distance is increased from L/4 to 3L/4 from hot wall the average Nusselt number increases as 3.399% and 3.433% respectively for Rayleigh Number 108 and 109. These observations lead to the conclusion when the partition height is increased the overall Nusselt number decreases, while when the partition distance is increased from hot wall the rate of heat transfer increases leading to an increase in Nusselt number.

**Keywords:** *surface radiation, turbulent natural convection, partitioned enclosure, SST k- $\Omega$  model*

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#### [SMMET-44]

### **A study on the Fabrication of metal matrix composite fabricated by Friction Stir Additive Manufacturing (FSAM)**

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#### **ABSTRACT**

Metal additive manufacturing has a field of possibilities in the aerospace and automotive industries. The majority of these procedures are fusion-based, which has the disadvantage of solidification concerns and isn't suitable for all alloys. Friction stir additive manufacturing (FSAM) is a collection of cutting-edge techniques for stripe-by-stripe material additive manufacturing based on the friction stir welding idea. This method is recognized as a progress in the field of metal additive manufacturing because to the benefits of solid-state welding, which are inherent to these processes (MAM). The research highlights recent accomplishments in the mostly unknown field of friction stir additive manufacturing (FSAM), discusses the FSAM's key technologies, and emphasizes the advantages of FSAM over fusion-based alternatives. The future of Friction stir additive manufacturing technologies in the realm of industrial production is also discussed, as well as its potential. The study comes to a close by showcasing some of the most important academic publications on the subject.

**Keywords:** *Additive Manufacturing, Friction stir additive manufacturing, Solid state welding, Metal Matrix Composite, Friction Stir Processing.*

**[SMMET-45]**

**Thermal Analysis on Friction Stir Welding Tool with Different Materials by Using FEA Method**

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University Jaipur Rajasthan

**ABSTRACT**

For soft materials like aluminium alloys, friction stir welding (FSW) is a popular solid state joining process. The development of cost-effective and long-lasting tools that reliably create structurally robust welds is critical to the economic feasibility of the FSW technique for harder alloys such steels and titanium alloys. Tool performance, weld quality, and cost are all affected by material selection and design. This work reviews and critically examines several key elements of FSW tools, including tool material selection, geometry and load bearing ability, tool deterioration mechanisms, and process economics.

**Keywords:** *Friction stir welding, Tool material, Tool geometry, load bearing, FEM.*

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**[SMMET-46]**

**Parametric Analysis of Energy Saving in Building Walls by Applying Various Insulation Materials**

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**ABSTRACT**

The parameters which include Present worth Factor, the wall structure, thermal conductivity of insulation material, thickness of insulation and the heating /cooling load of building, affect the energy savings in buildings. This study focuses on parametric analysis of the energy savings for building walls by using insulations (Expended Polystyrene and Glass wool). The annual energy requirements of house have been obtained by heating Degree-Days (DD) concept. For economic analysis, the Life Cost method has been used to determine optimum insulation thickness. Results show that with an increase in Present worth Factor (PWF), energy saving increases. However energy saving decreases with increase in thermal conductivity of insulation materials. Initially, energy saving will increase with increase in insulation thickness, then it will be maximum and after that it will decrease with increase of insulation thickness. Maximum energy saving will occurs at optimum thickness. It means insulation should be provided on building wall at optimum thickness. Energy saving has higher value by using Expended Polystyrene (EPS) insulation as compared to Glass wool (GW).

**Keywords:** *Insulation material, Life cycle method, Energy saving, Building Wall, EPS*

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**[SMMET-47]**

**Experimental Analysis of Corrugated Plate Heat Exchanger by using CuO/Water Nanofluids at Different Concentration**

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**ABSTRACT**

Heat exchanger is a device used for transfer of heat from one medium to another. As we know nanofluids have the potential coolants, which have the better thermal and physical performance in heat exchanger .effects of water and CuO/water nanofluids as a coolant in the heat transfer coefficient ,rate of heat transfer, pumping loss and pumping power in the corrugated plate heat exchanger. With the enhancement of particles concentration 0.50 – 0.30% as compared to water, this experimental analysis analyzed the heat transfer coefficient of CuO/water nanofluids enhanced by 16 – 25%. And 20% of exergy loss reduced by using nanofluids as a coolant.

**Keywords:** *Plate heat exchanger, nanofluids, base fluid, convective heat transfer.*

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**[SMMET-48]**

**Weight Optimization of Chassis of an Automotive Vehicle Using ANSYS**

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**ABSTRACT**

The objective of this paper is to find out the most favorable material and immensely fitted cross-section for TATA 1109 TRUCK ladder chassis. This research aims to optimize the weight of the chassis. For this we have taken three materials like structural steel, carbon fiber and Aluminium silicon carbide metal matrix composite. The automotive chassis is the vehicle's base, providing strength and support to the numerous body sections such as suspension, engine, power train, and so on. Recent advancements in the realm of automobiles have expanded rapidly, particularly in the current context. Problem faced by modern days vehicle is the heavy weight. So here we try to decrease the weight of chassis frame by using various method and increase the strength, efficiency of chassis. Reducing the weight of chassis results in increase in performance of vehicle, reduce fuel consumption, less wear and tear of tire. The designing of the chassis is done on software SOLIDWORKS and further analysis is done on ANSYS19.2. The current chassis mass with traditional material is 1560 Kg which is made up of structural steel, whereas the chassis mass with Aluminium carbide metal matrix composite material is 523.45 Kg. According to the analysis, the chassis mass has been reduced by 66.44 percent, which would eventually hinder the vehicle's performance.

**Keywords:** *Tata1109chassis, optimize, performance Solid works, ansys19.2, AlSiC MMC, structural steel, carbon fiber.*

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**[SMMET-49]**

**Investigation of Mechanical and Tribological Behaviour of MMC fabricated through FSP**

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**ABSTRACT**

Nowadays, Metal Matrix Composites fabricated by friction Stir Processing are in high demand among the researchers and various industries over other fabrication techniques because the particle dispersion in case of Friction Stir Processing is superior and fine, it also shows the equalized grains through dynamic recrystallization in this work, AZ31 Magnesium alloy reinforced with Mos2 is successfully fabricated by friction Stir processing. AZ31 Magnesium Alloy has light weight and excellent weight to strength ratio for this reason it can be used in various application like Aerospace Industry, Ship building and automotive applications but it has limitation in wear resistance and AZ31 Alloy is reactive and can corrode easily in corrosive medium. The present work aims to investigate the mechanical and tribological behavior of AZ31/Mos2 Metal Matrix Composite and then compared the properties with the base alloy. Here the specimen AZ31 is reinforced with Mos2 and processed by FSP to improve the tribological behavior the pin on disk wear test is conducted to study the wear performance. To investigate the Brinell hardness number, the Brinell hardness test is conducted on the Brinell hardness tester machine. The corrosion behavior of MMC is also investigated by the immersion test conducted with 3.5% weight NaCl solution for 24 hours. All these properties are then compared with base Alloy

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**[SMMET-50]**

**Effect of Tool Geometry on Mechanical Properties and Microstructure of AA 6082-T6 using Friction Stir Processing**

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**ABSTRACT**

The machinability of Aluminum Alloy 6082 has the scope of enhancement by integrating Friction Stir Processing (FSP) with tool geometry, tool shape, and different tool material. In the current research, the role of tool pin shape has been studied by experimenting with various tool shapes (square, hexagonal and octagonal) with the aim of machinability improvement. In Friction Stir Processing (FSP) tool rotation speed is 930 rpm and tool traverse speed is 26mm/min. The specimens have undergone tensile testing, micro hardness, and microstructure testing using an optical microscope and scanning electron microscopy. The percentage elongation has been increased from 15 to 29% in the case of the octagonal pin shape tool similarly, the micro hardness (Vickers's) value is 54.6 is higher than the square and hexagonal pin shape tool. Among these tool pin shapes, the octagonal pin-shaped tool succeeded to prove the best-in-class machinability performance on Al-6082 T-6 alloy with FSP. It may unveil the newer scopes of FSP on Al-6082 for automotive components assembly and other similar applications.

**Keywords:** *Friction Stir Process, Micro hardness, Microstructure, Tool pin shape, Machinability*

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**[SMMET-51]**

**Spectroscopic Studies of CdS Nanomaterial with Neodymium ions**

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**ABSTRACT**

CdS nanomaterial with neodymium ions were successfully prepared by chemical precipitation method and characterized by using different techniques such as XRD, SEM, TEM, UV-VIS and NIR absorption and fluorescence spectroscopy. The XRD study revealed the spherical wurtzite structure without second phase. The TEM images confirmed the spherical morphology of the nanomaterial with size in the quantum dots range. From absorption spectra various parameters i.e. Slater – Condon ( $F_k$ ), Racah ( $E^k$ ), Lande' ( $\zeta_{4f}$ ) and Judd-Ofelt parameters have been computed for each nanomaterial specimen by using partial regression method taking into consideration all the absorption peaks observed. The laser parameters have also been computed with help of fluorescence spectra.

**Keywords:** CdS nanomaterial, XRD, TEM, Absorption and Fluorescence Spectra

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**[SMMET-53]**

**To Study the Effects of EI & WI On RC Structure in Various Seismic Zones and Soil Types**

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**ABSTRACT**

Nowadays, earthquakes are a phenomenon that has an impact on the structural safety and serviceability. The degree of damage caused by an earthquake to structures is determined by the type of building, the type of soil, the technology utilised for earthquake protection, and, last but not least, the location of the building. The effects of an earthquake are heavily dependent on the type of soil in which the foundation of a building is built, because an earthquake changes the motion of the ground, resulting in foundation failure. As a result, it is critical to research the behaviour of various soils during the construction of structures. A comparison of distinct seismic zones and wind loading on high-rise buildings at different soils is presented in this work. It calculates the critical design loading for multi-story buildings subjected to basic wind speeds of 50 m/s and seismic zones (II, III, IV, V). The response of a G+20 storeyed RC framed building to seismic loads is examined using Indian Standard code IS 1893(part1):2016 and wind loads using Indian Standard code IS 875(part3):1987. Earthquake-resistant buildings, particularly their main elements, need to be built with ductility in them. Such buildings have the ability to sway back-and-forth during an earthquake, and to withstand earthquake effect with some damage, without collapse. Ductility is the most important factors affecting the building performance. In this analysis, twelve RC frame structures are evaluated, three RC frame structures in each seismic zone with different types of soil, such as hard, medium, and soft soil. For beams and columns of the structure, the results of axial force, shear force, bending moment, deflection, displacement, and other factors are monitored, compared, and summarised.



[SMMET-54]

**Development of Electromagnetic Braking System Based on Electromagnetic Induction and Eddy Current**

**Anku Kumar, Hasibur Rahaman, Niraj Kumar**

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**ABSTRACT**

In this paper, electromagnetic braking system has been developed that ensures passengers, driver's and other road user's safety and comfort. Most of the conventional braking system like mechanical, hydraulic, pneumatic has certain limitations. In mechanical brake, erosion of the mechanical pads is carried out by frictional force and requires periodic replacement of the bearing. Fluid leakage in hydraulic and pneumatic could lead to brake failure and reduce the effectiveness of brake. Therefore, electromagnetic system is used to respond quickly, this braking system has also been more efficient. It works on electricity and does not release toxic chemicals in the surrounding like hydraulic brake hence it is eco-friendly. In investigation, it was found that electromagnetic brake has numerous preferences over other conventional brakes because electromagnetic brakes reduce wear and tear, provide improved heat dissipation, backlash free operation and less maintenance is required. Electromagnetic braking system uses eddy current phenomenon to slow or retard the motion. Experimental setup consists of aluminium disc, sprocket, chain, shaft, bearing, motor, electromagnets and switch. The motor is used to transmit the motion to shaft and disc via roller chain. Electromagnet is placed near disc, when power switch of electromagnets turned "ON", rotating disc intersect magnetic field lines hence emf is induced by faraday law of electromagnetic induction. This induced emf create swirl current also known as eddy current in the disc. This eddy current builds their own magnetic field in such a manner that opposes the magnetic field that created it. As a Result of this, slow down the motion of moving object. Now a day this type of advance braking system is already used in High-speed train, roller coaster. It is convenient to install because of its simplicity of construction. This technology is rapidly being to advance. Based on this work we are strongly advised an electromagnetic braking system in any vehicle in addition with regular brake.

**Keyword:** *Electromagnetic Brake, Eddy current, Aluminum Disc, Conventional Brake, Electromagnetic Induction.*

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[SMMET-55]

**Application of Symbolic Sequence Analysis to Characterize Cyclic Variations in a Gasoline Engine**

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**ABSTRACT**

Many systems show complex behavior like the presence of bifurcation and deterministic chaos in their dynamics. The nonlinear dynamics of such system may have patterns that are predictable for short duration but not for long duration. However, the patterns are often obscured by the noise. The characterization of such dynamics is not possible using conventional techniques like Fourier transformation. The present work discusses a technique which uses symbolic codes to extract information about such dynamic system. It involves the conversion of a time series data into a series of discretized symbols, i.e., a high-resolution signal to low-resolution signal. The raw data is partitioned into many bins, and each bin is allocated a symbol. The short string of consecutive symbols is grouped to form a sequence code. The length of the string in

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a sequence code is known as sequence length. The sensitivity of this method to characterize experimental time series is dependent upon the length of sequence code and number of bins into which data is partitioned. Since the method involves coarse-graining technique, it is not acted by noise. On a symbol sequence histogram (SSH), a stochastic signal or a signal having no temporal correlation are identified with relative frequencies of sequence code lying close to  $1/nL$  where  $n$  is number of bins and  $L$  is the sequence length. The deterministic patterns result in structured SSH with frequencies of such patterns showing spikes on SSH. The application of symbol sequence analysis is shown to be helpful in investigating the cyclic variability of a single cylinder gasoline engine. Cycle dynamics is found to be stochastic at high engine loads with low cyclic variability. The frequency of deterministic patterns with close coupling between consecutive cycles is determined to be high at low loads and lean mixtures with high cyclic variability. The work suggests that nature of cyclic variability ranges from completely stochastic to deterministic process superimposed on the stochastic process; with prior-cycle or deterministic effects more noticeable at low load and lean mixtures. The deterministic information in cycle dynamics can be used to design a predictive controller, which uses the knowledge of the current event, to predict the state of subsequent events.

**Keywords:** *Nonlinear dynamics, Symbolic Sequence Analysis, Deterministic Patterns, Cyclic Variability, Gasoline.*

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#### [SMMET-56]

### **Comparative Analysis PI And Sliding Mode Control For Transformer Less Grid Connected Inverter Using PV System**

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#### **ABSTRACT**

The continuous urge for improvement in our standard of living has increased the consumption of electrical energy by leaps and bounds. This hike in energy consumption, draining of fossil fuels and degrading global environment has led to invention of green power generation systems. Thus, the global demand for renewable resources has led to flourishing of photovoltaic (PV) market. The enabling technology in the PV systems is the inverter, which could be either: 1) with transformer isolated or 2) without transformer non-isolated (transformer-less inverter). Recently, single phase transformer less voltage source inverters (VSI) have been extensively used for distributed photovoltaic grid tied systems. The objective of this paper is to review a few notable topologies and propose a new topology for transformer-less photovoltaic inverter. The analysis and design of the proposed topology is verified by simulating it on PSIM. Furthermore, the simulation results are validated by testing a proof-of-concept laboratory hardware prototype rated at 250 W.

**Keywords:** *Photovoltaic (PV) systems, transformer-less, single phase inverter*

[SMMET-58]

**Environeconomic and Exergoeconomic Analysis of N-Identical Hybrid Double Slope Solar Distiller Unit Using Al<sub>2</sub>O<sub>3</sub> Nanoparticles**

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**ABSTRACT**

Present study represents the enviroeconomic and exergoeconomic analysis of a double slope solar desalination unit (DSDU) coupled with N-identical compound parabolic concentrator collector (N-CPC) with helically coiled heat exchanger using Al<sub>2</sub>O<sub>3</sub> nanoparticles. The analysis is observed for a yearly based for the atmospheric situation of New Delhi with the help of analytical program fed in MATLAB. The input data required for the mathematical calculation has been taken from Indian Metrological Department, Pune, India. The average value of annual energy output will be computed based on the energy outputs of summer and winter seasons followed by the evaluation of economic, enviroeconomic and exergoeconomic for the system and compared with previous system. Furthermore, based on annual as well as life of 15 and 20 years it is found 8.5% greater yield, annual exergy 7.31% greater, CO<sub>2</sub> mitigation/ton energy 3.9% and 2.85% less, annual productivity 5.17% greater, and exergoeconomic parameter 4% greater respectively. It will be concluded that the proposed system is better than other system based on energy enviroeconomic and exergoeconomic parameters.

**Keywords:** *Economic, Environ-economic, Exergoeconomic, productivity, Al<sub>2</sub>O<sub>3</sub> nanoparticles*

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[SMMET-59]

**Energy Matrices and Life Cycle Conversion Analysis of N-Identical Hybrid Double Slope Solar Distiller Unit Using Al<sub>2</sub>O<sub>3</sub> Nanoparticles**

**Dharamveer Singh<sup>1,2</sup>, Yagesh Kumar<sup>2</sup>, Ashok Kumar Yadav<sup>3</sup>, Mohd. Akram<sup>2</sup>**

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**ABSTRACT**

Present work shows the energy matrices analysis and life cycle conversion efficiency (LCCE) of a double slope solar desalination unit (DSDU) coupled with N-identical photovoltaic thermal compound parabolic concentrator collector (N-CPC) with a helically coiled heat exchanger using Al<sub>2</sub>O<sub>3</sub> nanoparticles. The analysis is annually based on the atmospheric situation of New Delhi with the help of analytical program fed in MATLAB. The input data required for the numerical computations have been taken from IMD, Pune, India. The average value of annual energy output will be computed based on the energy and exergy followed by the evaluation and found annual yield is 8.5%, energy payback time is 16.16%, energy payback factor is 13.91%, and life cycle cost conversion efficiency is 7.15% greater. Therefore it is obvious the proposed system is better on the basis of following parameters i.e. annual yield, energy matrices, energy payback time (EPT), energy payback factor (EPF), and Life cycle cost conversion efficiency (LCCE) than previous system. The proposed hybrid system can be met the future requirement of potable water as well as electricity.

**Keywords:** *Energy matrices, Energy payback time, Energy production factor, life cycle conversion efficiency, Al<sub>2</sub>O<sub>3</sub> nanoparticles*

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**[SMMET-60]**

**Border Security Robot Vehicle with YOLO V4**

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**ABSTRACT**

The objective of this project is to design and manufacture a prototype of Border security surveillance UGV with YOLO V4 algorithm. This versatile robot vehicle use a remote camera method to track active persons, burning, hazardous chemicals, metals, and obstructions in remote regions and transmit data to a central location. To offer instant reaction from sensors, the suggested system employs YOLOV4 and machine intelligence. While the robot is functioning, the vehicle is outfitted with sensors that may inform the user if an intruder enters the range and use intelligence system for further action. The car operates in a user-controllable mode in which all sensors, such as metal detectors, smoke detector, and ultrasonic sensors, are set to perform automatic actions and a gun surmounted on it. User sends the signal to robot vehicle using RF module and controls it manually. User could watch the surroundings using the built in camera and can give directions to change the path accordingly and can shoot the object the feel suspicious.

**Keywords-** *Surveillance, UGV, YOLO V4, Sensors, RF module, Metal detector, Ultrasonic sensor*

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**[SMMET-61]**

**Experimental Investigation on Solar-Fuel Cell Hybrid System Technology in Medium-Sized Electric Power Propelled Boat for Central East India**

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**ABSTRACT**

In the exploration of different alternative energy sources in the domain of electrical drive systems, solar energy plays the most significant role. The huge size solar PV panel with battery operation systems have efficiency limitation of about 12-18 percent. In addition, grid electric power is required to run the entire system. The research study focuses on hybrid electric boats using solar-fuel cell of sustainable design, construction, and system testing for water bodies present in central east India. The overview results show that the optimized hybrid solar power system can reduce CO<sub>2</sub> emissions and it saves 3.84 percent of electricity to the ship grid on an average of 5.4 kWh per square meter per day of solar radiation.

**Keywords:** *Solar Power, PV Module, Hybrid System, Electric Boat*

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[SMMET-63]

**Conical Optical Dielectric Resonator Antenna for Retinal Prosthesis Applications**

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**ABSTRACT**

Conical optical DRA (dielectric resonator antenna) has been designed and investigated at vision spectrum for possible applications to eye prosthesis. The comprehensive analysis has been carried out by developing mathematical formulations and simulated HFSS/CST results. Comparative study of microwave as well as optical cone DRA has been carried out. Simulated results along with theoretical concepts have been developed for both. Retinal prosthesis has requirements for study of cone DRA at vision frequency. Photon are received by retina using available arrays of cones and rods present in eye at two different locations i.e. central part and periphery of retina. Complete modeling of cone type DRA has been established in this article between 430THz to 750THz. The conical optical DRA is designed at 491.1 THz frequency with 4.25dBi gain.

**Keywords:** Retinal Prosthesis, Hankel functions, Bessel's functions, quantized fields, oscillation frequency, far field radiations, field operator and DRA.

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[SMMET-64]

**Soil Reinforced Using Natural Coir Fiber**

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**ABSTRACT**

Soil stabilization a general term for any physical, chemical, mechanical, biological or combined method of changing a natural soil to meet an engineering purpose. Soil stabilization is any process which improves the physical properties of soil, such as shear strength, bearing capacity and reduce the permeability and compressibility of soil etc. which can be done by use of controlled compaction or addition of suitable admixtures like waste stone powder, cement, lime, bitumen, fly ash, rice husk ash, waste tire cord, waste plastic fiber and coir fiber etc. Randomly distributed fiber reinforcement technique has successfully been used in a variety of applications such as slope stabilization, road subgrade and sub base etc. This is a relatively simple technique for ground improvement and has tremendous potential as a cost-effective solution to many geotechnical problems. In this study, the expansive soil is stabilized by use of Coconut coir fiber for improving soil property is advantageous because they are cheap, locally available and eco-friendly. In this study, the stabilizing effect of Coconut coir Fiber (Natural Fiber) on soil properties has been Experimental studied. Keeping this in view an experimental study is conducted on locally available i.e., expensive soil mixed with varying percentage of Coconut coir fiber. The aim of this study is to economically improve the geotechnical properties of expansive soil such that the composite effect of Coconut coir fiber (Natural Fiber) changes the brittle behaviors of the soil to ductile behaviors, decreases plasticity and increases hydraulic conductivity. Increase the strength of flexible pavement for efficiently withstand applied loads, reduce the thickness of pavement and improve the durability of pavement.

**Key Words:** Coir fibers, Expansive soil Plasticity characteristics, OMC, shear strength, C.B.R.value, bearing capacity

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**[SMMET-65]**

**Automated Multiple Hacksaw Cutting Machine**

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**ABSTRACT**

The significant and prominent manufacturing process that takes place in the industry is cutting. Cutting is an everyday manufacturing process that is used to attain work pieces of desired shape and size. This project is intended to automate the methods of cutting as much as possible. Therefore, this project is all about ideation, design and fabrication of an automated hacksaw machine that can cut four work pieces simultaneously, using four hacksaws and a motor. The model is intended to function by applying the principle of scotch yoke mechanism in order to convert the rotary motion of motor into reciprocating motion of the four hacksaws. The project also takes into consideration the aspects of heating of work piece and applies necessary and possible mechanism in order to control the same. The project is strictly carried out on the designs made using Solid works software. Conclusively, this project is completely focused to increase the productivity of cutting operations and reduce the human intervention in the process, along with other modifications in the system.

**Keywords:** *Hacksaw, Solid works Design, Scotch Yoke, Cooling Mechanism, Fabrication, Calculations*

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**[SMMET-66]**

**Effect of Fiber Loading on Mechanical and Thermal Characteristics of Natural Composites for Packaging Applications**

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**ABSTRACT**

The present article is growing global environmental awareness and new environmental regulations have encouraged research on new recyclable composites environment friendly. The recyclable composite must satisfy minimal mechanical properties to be widely used in furniture, automotive or construction industries. In order to produce a natural fiber composite that can be fabricated widely, in this paper, composite materials were fabricated using the Kondagogu gum (KG) resin as matrix and the natural coir fiber (CF) as reinforcement. The coir fibers are short and randomly distributed. Hand layup technique is used to produce the composite. To judge the usage of the composite in packaging applications, the mechanical properties of the bio based composite are identified by numerical homogenization and by experiments. To investigate the mechanical, thermal stability and morphology of untreated and treated coir fibre materials, material characterization such as tensile, flexural, impact, Fourier Transform Infrared spectroscopy (FT-IR), water absorption, Thermo gravimetric Analysis (TGA), and Scanning Electron Microscope (SEM) were studied. Enhancement of mechanical properties was observed with increasing the fiber content and fiber length up to 10wt. % and 8mm. The results reveal that treated 10% weight coir fiber composites are 6.08%, flexural strength and an impact of 16.54%, which is higher than untreated 10% fiber composites. In the water absorption test, the specimens are immersed in water for a few min. Treated 10% KGG/CF composites presented relatively smaller water absorption (WA) and thickness swelling (TS) compared with other composites, FTIR confirmed the rich cellulose content in functional groups of filler with peaks at 1076 cm<sup>-1</sup>, 1394 cm<sup>-1</sup>, 1635 cm<sup>-1</sup> and 2913 cm<sup>-1</sup>. Furthermore, the less weight is observed on treated composites in thermo gravimetric analysis and fractography analysis of composites is carried out using scanning electron microscopy to make possible structure–property co-relationship.

**Keywords:** *Natural resin, Physical, Thermal, FTIR, Mechanical, Natural fiber, Composites*

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[SMMET-67]

**Acrylic pulp as a replacement for Aramid and Asbestos fiber in Industrial Applications**

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**ABSTRACT**

This research is concerned with the use of acrylic and para-aramid pulp for use as reinforcement material in products such as seals and friction materials. The pulp comprises (a) irregularly shaped, acrylic fibrous structures, (b) irregularly shaped, para-aramid fibrous structures, and (c) water, whereby acrylic fibrils and stalks are substantially entangled with para-aramid fibrils and/or stalks. These acrylic pulps enhance physical and mechanical performance, provide better acoustical/frequency response, reduce the moisture adsorption, and improve the wet strength.

**Keywords:** Aramid, Asbestos fiber, Acrylic pulp

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[SMMET-68]

**Experimental Studies on Utilization of Biogas with Biodiesel/Diesel Blends in a CI Engine**

**Praveen Kumar Singh<sup>1</sup>, Dharamveer Singh<sup>1</sup>, Ashok Kumar Yadav<sup>2</sup>, Shakti Singh<sup>1</sup> and Kamal Diwakar Yadav<sup>1</sup>**

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**ABSTRACT**

The present study covers the utilization of a gaseous alternative fuel, raw biogas, in a diesel engine. Biogas alone cannot run a diesel engine, because gaseous fuel cannot burn by compression. It can be supplied to the CI engines in dual fuel mode by using an air-biogas mixer device. In this work, it is aimed to investigate the performance and emission characteristics of a biogas-biodiesel/diesel dual fuel mode diesel engine by employing a venturi gas mixer device for providing a homogeneous mixture. Experiments were carried out on a single cylinder, water cooled diesel engine. The diesel/biodiesel were injected by conventional injector setup and the biogas was inducted through the intake manifold with air at different flow rates of 1L/min, 2L/min and 3L/min and biodiesel in B10D90, B20D80 and B25D75 respectability. The performance and emission characteristics of the engine operated by dual-fuel mode were experimentally investigated, and compared to diesel.

**Keywords:** Alternative Fuel, Biogas, Biodiesel, Diesel Engine, Dual-fuel, Venturi Gas Mixer

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[SMMET-69]

**Tokenisation: An overview of NFT and its challenges**

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<sup>4</sup>Department of English, Kamla Nehru College, University of Delhi, India

**ABSTRACT**

Non-fungible tokens (NFTs) are blockchain-based tokens which have been rapidly evolving since its inception. These tokens are unique and cannot be further divided into smaller units. NFT is a breakthrough in the sense that it provides

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ownership to creators like never before. The ability of NFTs to assume ownership and ensure uniqueness in a variety of fields. It opens new prospects for creators as well as entrepreneurs and thus inspires the creation of new business models. The goal of this paper is to give a comprehensive analysis of the NFT ecosystem. It provides an overview of what NFT is, followed by protocols, standards, and characteristics. Furthermore, It covers the significant NFT use cases and major roadblocks in the mass adaptation.

**Keywords:** *Non-Fungible Tokens, ERC-721, ERC-1155, Crypto Kitties, Crypto Stamp*

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### [SMMET-70]

## **Innovations in Utilizing Solar Radiation in Corrosion Removal Maintenance Techniques towards Environment Protection and Enhanced Life of Steel Structures**

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### **ABSTRACT**

The various root causes of the failure occurred within the structure, the fortification on its failure, anatomy of the structural repair, the exclusive facts associated with innovative methods and protective treatment and lots of a lot of things are mentioned and presented during this project report. The target of building maintenance to form the building and their connected services are in the secure and guarded condition, to grant guarantee that the condition of building meets all legislative standards and requirement to perform the upkeep work indispensable to uphold the worth of physical assists of the building and additionally to accomplish the work essential to keep up the prevalence of the building maintenance. In a world today main problem is corrosion its losses economic and life. Corrosion can be prevented but not long time. Hence, we find out new treatment called as Sanjivani, and it is best for corrosion removal in current time comparatively other methods. Comparison analysis and test conducted result and equation and formula and whole procedure is given in our research paper. This is newly invented by us, still test going on it, it is future of maintenance repair and biggest assets war again corrosion. We have included various prevention measures and corrosion removal techniques used in industry and market currently and we have analysed it by our point of view and given diagrammatic representation of methodology inform of flow chart and various apparatus used its benefits over existing methods advantages and old principle required for our test equation and derived our results and conclusion using standard norms.

**Keywords:** *Maintenance planning and execution, service life, faulty mechanisms to avoid future problems, structural serviceability, material deterioration mechanism*

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### [SMMET-71]

## **An Immersive Approach towards Sustainable Farming Using IoT**

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### **ABSTRACT**

Despite the fact that the agricultural process is more data-driven, exact, and intelligent than ever before, the reality is that today's agriculture industry is more data-driven, precise, and intelligent than ever before, regardless of public

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perception. Virtually every industry has been altered by the rapid expansion of Internet-of-Things (IoT)-based technologies, including "smart agriculture," which has transitioned from statistical to quantitative methodologies. Such large advancements are upending conventional farming practises and offering new chances in the middle of numerous issues. A new paper looks at the promise of wireless sensors and the Internet of Things in agriculture, as well as the challenges that may occur when these technologies are integrated with traditional farming methods. Using Internet of Things (IoT) devices and communication protocols, wireless sensors utilised in agriculture applications are fully investigated. Sensors for soil preparation, crop status, irrigation, insect and pest detection, and other agricultural applications are on the list. From sowing to harvesting, packing, and transportation, this technique is explained. This article also discusses the use of unmanned aerial vehicles for agricultural monitoring and other useful purposes, such as crop yield optimization. When feasible, cutting-edge IoT-based agricultural ideas and systems are presented. Finally, we highlight present and future IoT trends in agriculture, as well as possible research challenges, based on this comprehensive analysis.

**Keywords:** - *Internet-of-Things (IoTs), smart agriculture, advanced agriculture practices, Sensors.*

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[SMMET-72]

### **Advanced Power Control Strategies and a Homogeneous Novel Concept of AC-DC Micro Grids**

**Shruti Ganvir, Pratik Ghutke**

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#### **ABSTRACT**

The simulation modelling and control of hybrid AC/DC micro grids are proposed in this article. The micro grid design eliminates multiple reverse switches from a Grids (AC or DC) and streamlines is independent grids. The electrical system's connections to variable regenerative AC and DC sources and loads. Digital use of power electronic converters to connect to the utility / grid has raised questions about device safety and protection. The proposed hybrid AC/DC micro-grid system's performance can be assessed in both grid-tied and autonomous modes. Microgrids are developed using photovoltaic systems, wind turbine generators, and batteries. The AC sub-grid is correctly coordinated with the DC sub-grid, and the control mechanism is applied for converters for sensitive power transfer. The system works in a MATLAB / SIMULINK environment.

**Keywords:** *Grid control, grid operation, hybrid micro grid, PV system, and wind power generation are all terms used to describe energy management.*

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[SMMET-73]

### **Implementation of Charge Pump Circuit in Transformer Less Inverter for Grid-Tied PV System using FUZZY**

**Shreya Jangale, Pratik Ghutke**

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#### **ABSTRACT**

We develop a single phase transformer-less photovoltaic inverter for grid-connected PV systems in this article. To eliminate leakage current, we're working on a new topology that combines the charge pump circuit concept. In this study, we use a Fuzzy Logic Controller to operate the system. It has been explored how the Fuzzy Logic Controller compares to

other controllers. The PV panel's negative polarity is directly linked to the grid's neutral, resulting in a steady common mode voltage and zero leakage current. During the negative cycle, the charge pump circuit generates the proposed inverter's negative output voltage. As a result, the injected current is controlled using the proportional resonant control approach. The proposed inverter has several advantages, including: the grid's neutral is directly connected to the PV panel's negative terminal, eliminating leakage current; compact size; low cost; the proposed inverter's used dc voltage is the same as a full-bridge inverter (unlike neutral point clamped (NPC), active NPC, and half-bridge inverters); flexible grounding configuration; reactive power flow capability; and high efficiency. We can test the concept of the proposed inverter and its actual application in grid-tied PV systems by using simulation results.

**Keywords:** *Grid-tied inverter, Charge Pump Circuit, Transformer Less Inverter, Leakage Current Elimination, Fuzzy Logic Control.*

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### [SMMET-75]

## **Modelling and Simulation of Hybrid Microgrid System with Renewable Energy Sources**

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### **ABSTRACT**

The novel hybrid renewable energy system consists of different sources such as the Photovoltaic (PV) system, Wind Energy system (PMSG), Fuel Cell, and the AC source are implemented as energy sources. The battery and Super Capacitor are used to store excess energy from all sources together which are connected to the DC micro grid. The rapid growth of industries and load consumption increases the energy demand that needs to fulfilling this energy demand can be obtained from various alternative sources has much importance. The DC micro grid simulated in the MATLAB Simulink, the observations and results authenticate that the power generation sources enhance the stability of power, reliability, and power efficiency in the micro grid. Therefore, the grid provides good quality of power to two different loads namely 48V DC output and 110V AC single-phase output. In this proposed system many individualized converters are used in the DC bus to deliver appropriate power in it.

**Keywords:** *MPPT, Organic solar cell, DC micro-grid, Solar PV system, Stability analysis*

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### [SMMET-76]

## **A Critical Review on Cold Flow Properties of Biodiesel and the Improvement Methods**

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### **ABSTRACT**

An increase in industrialization and population has been identified as critical to the need for energy in recent decades. Increasing demand for renewable energy is accompanied by higher pollution levels and increased fuel prices. Aside from global warming, researchers were urged to pursue sustainable fuels like biodiesel, a renewable and sustainable alternative to petroleum diesel. However, biodiesel suffers from poor cold flow properties (CFPs), such as a high pour point (PP), a

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high cloud point (CP), and a high cold filter plugging point (CFPP), which means it will crystallise at low temperatures, causing engine troubles and emissions. The purpose of this paper is to give a review of biodiesel's cold flow behaviour and how to improve it. CFPs were also discussed in relation to engine performance and pollutant emissions. On the basis of the improvement impact of CFPs, the type and load of cloud point/pour point/cold filter plugging point cold flow improvers were compared and selected.

**Key words:** Biodiesel, Cold flow properties, Cold flow plugging point, Cloud point, Pour point

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#### [SMMET-77]

### **A Review on the Study of Burr Formation During Cutting Sheet Metal Operation**

**Praveen Kumar<sup>1\*</sup>, Vaibhav Chandra<sup>1</sup>, Satyam Kumar<sup>1</sup>, Mohit Singh<sup>1</sup>, Pankaj Kumar Sharma<sup>2</sup>**

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#### **ABSTRACT**

In the automotive sector, a lot of defects occur when cutting sheet metal. One of them is the burr formation. Every cutting procedure usually results in the formation of a burr. Industrialists are continually looking for solutions to reduce burr formation. This document explains what precautions can be taken while shearing and cutting sheet metal. In order to reduce the burr side generating area, the Punch shear angle and cutting edge are critical. This research also explains how to extend the life of tool and how long we can create "burr-free" components. That also comprise some research into how tool life might be extended.

**Keywords:** Sheet metal, burr formation, punch shear angle, burr-free components

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#### [SMMET-78]

### **Sleep and Distraction Detection System**

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#### **ABSTRACT**

A Driver's drowsiness has become one of the major causes for most of the accidents caused across the globe. Almost 21% of the total fatal road accidents are due to the drowsiness of drivers. This issue can be resolved by monitoring the biomedical signals of the driver's face via capturing the facial images or the driving behavior of a driver. For this, the algorithm that is used is based on the continuous monitoring of Eye Aspect Ratio via Image Processing. EAR is calculated by measuring the Euclidean distance between the eye coordinates. The live video of a person driving is broken up into a sequence of frames and then the facial landmarks are detected via Dlib functions. The image processing library, "OPENCV" is used as the main image processing tool. The language that is being used in the backend is Python. The distance that is bare minimum close to the closed eyes is set as a threshold value. The number of blinks per second is displayed on the screen. After a certain amount of time if the eyes are in the same closed phase and the blink frequency

does not increase as it earlier was, then an audio alarm is produced in order to waken up the driver. This would change the driver's facial display which would in turn hinder the biomedical signals.

**Keywords:** *Eye Aspect Ratio, OPEN CV, Dlib, Python.*

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[SMMET-79]

### **INTERNET OF THINGS: Connecting Ultrasonic Sensor to Application in Order to Detect Accidents**

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#### **ABSTRACT**

According to the National Crime Records Bureau of India (NCRB), traffic accidents accounted for 52.8 % of the total unnatural deaths in India in 2015. The idea of this research is 'Internet of Things'. We are trying to connect an ultrasonic sensor which will be attached in a car to an application installed in car's tablet which will show maps but will have all the emergency numbers of the concerned person and at the time of accident, All the contacts would be notified and hospitals within a range of 10 kms would be sent a code to accept and send help.

**Keywords:** *ultrasonic sensor; accident detection; automated accident detection; internet of things; automated emergency help*

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[SMMET-80]

### **Effective Design of ATV Chassis towards Improved Safety and Weight Reduction**

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#### **ABSTRACT**

The point of this study is to manage planning and investigation of an ATV (All-Terrain Vehicle) undercarriage which is exceptionally intended for rough terrain driving. An ATV is planned to run on different territories like soil, Gravel, rocks, and so on so because of troublesome territory our fundamental zero in is on driver security and better ergonomics simultaneously. As the heap following up on the body is straightforwardly corresponding to the heaviness of the casing so we likewise thought to be the element of weight decrease as a vital area of concentration. Finite Element Analysis (FEA) is used to decide the greatest pressure and uprooting of the casing when a specific burden is applied on to it. The Impulse energy condition is considered for the powers which follow up on the body during any impact.

**Keywords:** *Sudden impacts from collisions, behaviour of engineering structures and components, experimental testing and analysing the chassis of vehicles, material-based property combinations, Finite Element Analysis.*

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**[SMMET-81]**

**Field Oriented Speed Control of Induction Motor Using Intelligent Controller**

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**ABSTRACT**

In this paper, an Intelligent control strategy based on projections is presented, which convert a three-phase time and speed subordinate structure into a time-invariant reference with only two coordinates (d and q). These projections resulting a control structure similar to that of a DC machine. Two constants are required as information references for field-oriented controlled machines: the torque component (aligned with the q co-ordinate) and the transition component (lined up with d co-ordinate). Because Field Orientated Control is based solely on projections, the control structure is capable of handling large electrical amounts quickly. This ensures that the control is precise in each working action (steady-state and transient) and free of the constrained data transmission scientific model. The traditional scheme problems are solved by the proposed FOC. The proposed FOC addresses the classical scheme problems by making it simple to obtain a constant reference (torque component and flux component of the stator current) and torque in direct torque control in the d-q frame, which is given by the product of rotor desired flux ( $\phi$ ) and stator current ( $I_{sq}$ ) in the quadrature axis. The proposed model is simulated using Intelligent controller on MATLAB software to control the rotor speed of an induction motor. Speed control lability has been found to be improved in the proposed model.

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**[SMMET-82]**

**A Study on Wear Analysis of Hot Extruded Nickel-Silicon Nitride Composites**

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**ABSTRACT**

This research investigates on the use of powder metallurgy in the manufacturing of reinforced composite materials (PM). It describes a novel way to optimising the mechanical characteristics of hybrid composites (Ni-Si<sub>3</sub>N<sub>4</sub>) generated by powder extrusion. The matrix material is nickel, and the reinforcing material is Si<sub>3</sub>N<sub>4</sub> powder. A three-dimensional mixer is used to combine matrix and reinforcing materials. The mixes are then cold pressed to make metal block samples. Following a sintering procedure, block samples are subjected to hot extrusion in an extrusion mould. This yields samples having a cross-sectional area of 30 mm. The wear resistance of the composite materials created is tested. Scanning electron microscopy is also used to analyse the microstructure.

**Keywords:** Nickel, Wear, Microstructure, Si<sub>3</sub>N<sub>4</sub>, MMC, Composite, Powder metallurgy.

[SMMET-83]

**Formulation of Semi-Active Suspension system and controls in Rail Vehicle**

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**ABSTRACT**

The research paper aims at studying the active suspension and different controls of rail vehicle semi-active suspensions along with their governing equations and formulations. The mathematical models of the quarter rail vehicle with a passenger seat, describing the vertical motion is presented in study for semi-active and passive suspensions. Two controllers, i.e., PID and LQR are taken for design consideration in order to improve the passenger comfort. This comfort index is further evaluated in terms of the passenger displacement and vibration. The study gives information that the semi-active suspension with a LQR controller yields the best results compared to PID controller.

**Keywords:** *Semiactive suspension; Passive suspension; linear quadratic regulator; PID; rail vehicle; comfort index*

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[SMMET-84]

**Enhancement of Photovoltaic Integrated Unified Power Quality Conditioner for Power Quality Improvement utilizing novel adaptive controllers**

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Nagpur, India

**ABSTRACT**

The design and development of three phase PV tied UPQC is presented to achieve the required power quality standard. The analysis on the performance of proposed system has been carried out in comparison with simple SRF controller and UVTG controller. Development of resonant controller for PV tied UPQC for making the system robust against grid disturbances has been discussed. Generation of accurate compensating signal for the inverters of PV-UPQC is highly important as various type of disturbances arise unexpectedly in the distribution system. Therefore utilization of conventional PI controllers by the controller of the system may not reach the expected solution. Therefore an advanced optimization algorithm is proposed by overcoming the demerits of conventional optimizations. The proposed JAYA (means victory) optimization algorithm is utilized to find the best controller gains. As the shunt and series inverter of PV-UPQC are employed for different control purpose, two different objective functions are designed for the algorithm. Performance of the system is analyzed for the proposed controller with JAYA optimization in comparison with conventional teaching learning based algorithm (TLBO), Particle swarm optimization algorithm. The proposed JAYA based controllers along with other conventional optimization methods are implemented in real-time for PV-UPQC system to validate the efficiency.

A new PV tied UPQC topology with an improved LCL filter at shunt inverter part is proposed, which provides better compensation to current quality issues. This chapter also proposes a novel model reference tracker (MRT) control law to improve power quality and elimination of current harmonics, voltage sag/swells and unbalance. It has feature to regulate tracking error between model reference signal and actual measured signal. Therefore, proposed model reference approach provides robustness and flexibility for various operating conditions.

**Keywords:** *Phase locked loop, PV-UPQC, current harmonics, voltage sags, and voltage swells*

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**[SMMET-85]**

**Performance & Emission Characteristics of a Multi Cylinder Spark Ignition Engine using Ethanol–Petrol Blended Fuels**

**Chandan Kumar<sup>1</sup>, Dharamveer Singh<sup>1</sup>, Ashok Kumar Yadav<sup>2</sup>, Rahul Nishad<sup>1</sup> and Kamal Diwakar Yadav<sup>1</sup>**

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**ABSTRACT**

The purpose of this study is to experimentally determine the optimal blend rate of ethanol-gasoline fuels in order to maximize brake thermal efficiency of a commercial SI engine. In this study, the engine performance, in term of brake torque and brake specific fuel consumption, has been investigated with variation of volumetric mixing ratio between 87.5-octane gasoline and 99.5%-purity ethanol (E0, E10, E20, E30, E40, and E50). The experiment has been conducted at different engine speeds and percentages of intake-throttle opening. The tests were performed at constant compression ratio. The experimental results indicated that the appropriate ethanol-gasoline mixing ratio can enhance engine torque output, especially at low engine speed. The brakes thermal efficiency is maximum when the engine operates with a speed of 2000-2500 rpm, using E40 and E50 fuels. This paper also provides a guideline for suitable ethanol-gasoline blend rate at certain engine load and speed.

**Keywords:** *Ethanol, Ethanol-gasoline blends, SI engine, Performance*

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**[SMMET-86]**

**To Design an Obstacle Avoiding Robot using Arduino**

**Meet Kumari<sup>1</sup>, Arvind<sup>2</sup>, Sanyam<sup>2</sup>, Karan Thakur<sup>2</sup>, Akansha Devrani<sup>2</sup>, Sahil Aggarwal<sup>2</sup>**

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<sup>2</sup>Department of Computer Science & Engineering, Chandigarh University, Mohali, India

**ABSTRACT**

The accident ratio is rapidly increasing and there is no fall in that because number of vehicles are increasing day by day so we are designing a system which can detect any object comes in its path and it will capable to avoid it. In this paper, a robotic vehicle is built; using an Arduino uno to detect any object comes in its path. An Arduino uno is used to communicate and send parameter to the other component of system. It is analyzed that the designed robot detects the presence of object using ultrasonic distance sensor which alert the path.

**Keywords:** *Arduino, motor shield, ultrasonic sensor, DC Motor, servo motor.*

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[SMMET-87]

**Design and Analysis of Substrate Integrated Waveguide**

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**ABSTRACT**

At microwave and higher frequencies, the need for highly efficient, low cost, high gain, easy to construct, and compact antennas for communication applications has increased. Although, Substrate Integrated Waveguides (SIW) technology is the emerging technology for radar and satellite applications. SIWs are widely employed as interconnection in antennas particularly leaky wave antennas, high speed circuits, directional couplers, and filters because they are having low loss properties of their typical metallic waveguides. A SIW with cylindrical slots is suggested in this work, as well as its integration with a tapered microstrip transmission line.

**Keywords:** *Substrate integrated waveguide (SIW), cylindrical slots, waveguide, vias.*

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[SMMET-88]

**ANN based Prediction of Performance & Emission Characteristics of a Diesel Engine Fuelled with Linseed Methyl Ester using Di-Ethyl Ether as Fuel Additives**

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**ABSTRACT**

This experimental study investigates the use of linseed methyl ester and di-ethyl ether (DEE) as an oxygenated additive in a diesel engine. This paper presents the effect of blending at D90BD10, D80BD20, D70BD30, D80BD10DEE10, and D70BD20DEE10 on performance and emission characteristics of a single cylinder diesel engine operated at a constant speed of 1500rpm. The results showed that on the addition of Linseed methyl ester in the diesel the performance parameters of engine such as Brake thermal efficiency slightly decreased, Exhaust gas temperature and Brake specific fuel consumption are increased compared to diesel for D90BD10, D80BD20 and D70BD30 blends and the emission parameters of engine such as Carbon monoxide, Carbon dioxide and Un-burnt hydrocarbons are reduced, but Nitrogen oxides increased as compared to diesel. For the D80BD10DEE10, D70BD20DEE10 blends brake thermal efficiency increase and decreases the break specific fuel consumption and exhaust gas temperature and Emission parameters of engine such as Carbon monoxide, Carbon dioxide, Un-burnt hydrocarbons and Smoke are increased, but Nitrogen oxides are decreased as compared to above blends.

**Keywords:** *Diesel Engine; Linseed Methyl Ester; Diethyl Ether (DEE); Engine Performance ANN.*

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[SMMET-89]

**Fault Prediction in Multiple Software's by a Novel Factor Analysis with Regression Technique**

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<sup>2</sup>Maharshi Dayanand University Rohtak Haryana, India

**ABSTRACT**

In order to detect problematic modules, software practitioners construct models by addressing the process of software fault prediction early in the software development life cycle (SDLC). For defect prediction, many statistical and machine learning approaches have been investigated in the past. We conducted an empirical investigation of object-oriented (OO) metrics in this paper. The idea of factor analysis and its sub-measures with regression are employed in this study to analyse fault-proneness skills. The authors used factor analysis to group the relevant predictors, such as the CK and OO metrics. We discovered important factors in five software datasets in this article. For assessing software fault-proneness, the models employ the factor analysis with regression approach. The estimated findings demonstrate factor analysis' potential and capability for grouping essential elements and identifying significant predictors using regression. The collected experimental findings demonstrate factor analysis using regression's capacity to forecast software sensitivity to, component grouping, and successful usage of idea researchers and software practitioners. However, the importance and applicability of factor analysis with regression in software defect prediction are currently restricted, and more research into these topics is needed to generalize the findings. Researchers are given future instructions in this study endeavour based on the data acquired.

**Keywords:** *Faults, Software, Factorization, Regression*

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[SMMET-90]

**Solarising India: Tapping the excellent potential by 2030**

**Gaurav Gadgeand, Yogesh Pahariya**

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**ABSTRACT**

Tremendous increase in population, agriculture development, urbanization, commercial and industrial development of the increases the energy demand-supply gap. Indian electricity generation system mainly depends upon the thermal power generation using Coal. Energy obtained from coal constitutes around 53.34% of total electricity generation capacity in India. Energy obtained from the fossil fuel leads to the pollution that affects the health of Country. Depletion in fossil fuel such as coal, lignite, natural gas motives the use of pollution free renewable power generation. This paper, presents the current scenario and future prospective of the solar power generation in India. It focuses on the challenges and opportunities of the solar sector in India.

**Keywords:** *Electricity Generation, Solar Power, Renewable Energy Sources, Solar Plant*

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**[SMMET-91]**

**A Review on Thermo radiative Photovoltaic Cells: Night-time Photovoltaic Cell**

**Nisha Mishra and Ashok Kumar Dewangan**

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**ABSTRACT**

Renewable energy has played an essential role over the past few decades. Solar energy possesses significant potential due to the abundance of solar power incidents on the earth. A continuous supply of solar power must need to be paired with storage devices, which leads to increase in cost of the cells. A large part of the solar energy gets wasted as solar cells can only convert part of the photon energy into electricity. Thus an alternative concept of thermo radiative cells has been proposed, which increases the efficiency of the conventional photovoltaic cells. Coupling of thermo radiative cells and photovoltaic cells leads to the development of new concept of solar cells which produce electricity during the day and throughout the night. In this perspective, we review on the need of thermo radiative photovoltaic cells, its theoretical modelling, material selections, and advance concept of radiative cooling. Later, we compare on the efficiencies of photovoltaic cells, thermo radiative cells, and thermo radiative photovoltaic cells.

**Keywords:** *Renewable Energy, Solar Energy, Photovoltaic Cells, Thermo radiative Photovoltaic Cells*

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**[SMMET-92]**

**Shape Memory Alloy Wheels for Mars Rovers**

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**ABSTRACT**

Scientists are exploring the different planets to find traces of lives over there. NASA has sent many rovers to Mars for exploration. We need efficient tires for carrying the vehicles from one place to another. Curiosity rover's wheel damage has worsened since the rover landed on Mars in Aug 2012. NASA has reported that the deterioration of the wheel is occurring more rapidly than expected. NASA Glenn engineer and Goodyear has invented Shape Memory Alloy to overcome the damage caused due to heavy terrain. In this report, comparative study has been done between the materials of the tires used in the past, the damage to the wheel, and the wheel's reinvention that led to the introduction of Shape Memory Alloy—directing towards the Shape Memory Alloy (SMA), its material properties and how the structure of wheels developed. Nitinol, a bizarre metal made of Nickel and Titanium known as a Shape Memory Alloy, can be trained to remember any shape. They adjust the deformation and always return to their original shape after rolling over the terrains. The SMA will be on the next Mars rover.

**Keywords:** *Shape Memory Alloy, Nitinol, tires, SMA, Smart Memory Alloy, defects.*

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**[SMMET-93]**

**MMAM of Al/Cu Alloy by SLM Process**

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**ABSTRACT**

This paper proposes a multi-material additive manufacturing technique that uses a selective laser manufacturing technique (SLM), also known as Laser Powder bed fusion (L-PBF), to fabricate a multi-material structure composed of metal (AlSi10Mg & UNS C14800). In this method, two dissimilar materials in the powder form are joined together with the help of SLM. The interfacial characteristic was analyzed with various techniques such as field emission scanning electron microscopy (FESEM), focused ion beam imaging (FIB), and electron dispersive spectroscopy (EDS). The aluminium chloride (Al<sub>2</sub>Cu) intermetallic compound forms in the interfacial bond between Al/Cu alloy. The flexural strength with 3 points bending test and tensile strength were carried out in which tensile strength was evaluated & flexural strength was assessed when copper (Cu) was at the root & when Al was at the root respectively. The formation of intermetallic compound (Al<sub>2</sub>Cu) translates the fracture mechanism from ductile to a brittle material at the interface. Further analysis suggested that the value of micro hardness varies along with the interface. At the interface, the micro hardness value is maximum due to the intermetallic compound.

**Keywords :** MMAM, SLM, FIB, AL/CU,

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**[SMMET-94]**

**A Broad Review on Springback During Bending Operations**

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**ABSTRACT**

Spring back is the most important element impacting the perfection of sheet metal components. Because of the spring back properties of sheet metal, designing forming dies is particularly complex. This is a critical issue since spring back is a common forming issue with metal forming process using high-strength steel sheets. Once a stress is released, the material's elastic recovery forces the metal to spring back into shape. There are several approach and method have been developed to forecast and mitigate the spring back in stamping such as finite element analysis. It's difficult to come up with analytical methods concerning spring back of shaped sheet metal. It is suggested that input variables and tool design provide for a significant dimension of both the spring back, as well as a large number of major flaws in metal forming processes. Spring back is affected by a variety of parameters, namely properties of materials and production conditions. This research paper studied that how estimating spring-back is critical for getting the right size and shape. Wrinkling and spring back tearing can all be eliminated by looking at these features, and a high-quality product can be achieved.

**Keywords:** Bending operations, Spring back, finite element analysis, anisotropy, punch radius, sheet thickness.

[SMMET-95]

**Modification in the Design and Development of Tractor Trails for Onion Harvester**

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**ABSTRACT**

India is an agriculture-based country where more than 50% population is directly or indirectly depends. For the last two decades, various researchers have worked upon precision agriculture technology for better yielding of crops and cultivation, and obtaining high-precision positioning solutions of tools is the basis for automatic harvesting or digging of crops/agriculture field. As harvesting is generally labor-intensive as well as a time-consuming task reducing such cost and issues involved like musculoskeletal disorders among agricultural workers and effectiveness of yield crop for the better solution it is suggested to incorporate latest technology and automation in this sector. Farm tools, implements, and equipment play a very important role in agricultural operations. Their availability makes the work much easier and faster. To do agricultural operations successfully, one must have a good working knowledge of the tools, implements, and equipment before using them. Such mechanization of farm processes will reduce the unit cost of production as a result of higher productivity. Few mechanized tools are available as harvesters for different types of crops. In the present paper, these proposed models are discussed taking into consideration of their advantages, comparison, and limitation. Further suggestions are provided for the design of a new digging tool taking into the account problems of existing harvesters for cash crops.

**Keywords:** Digging tool, design, harvesters, ergonomics, agriculture

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[SMMET-96]

**Recent Trends and Applications in Blockchain Technology: The Concept of Monitoring Over Crypto currency**

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**ABSTRACT**

Blockchain Technology is eminent in the modern era which is digitalizing the development of provinces. Contribution of the exploration is to provide adequate pilot age about secured and decentralized data exchange. Blockchain Technology is creating a bridge between economics and technology which is connecting the financial status to the decentralized server system in a reliable environment where the presence of central attribute gives anonymity and data integrity without the third-party organization in control of the transactions. Consensus Algorithm is helping to reach at the distributed ledger state and contributing to the digital currency with pioneering crypto currency platform named Bit coin. This research is focused upon the importance of this fine technology and will give away to discuss the national scenario for Blockchain Technology in the form of application. Immutability, Decentralization, and Transparency are playing important role in block chain. In this paper we have discussed about the few application of block chain with using bit coin. Crypto currency is the future currency and it is progressing at a fast pace. For the advantage of high growth in it, it is also subjected to various drawback of hacking and data leaks as its also digital. We are proposing the solution for the associating the each of the single crypto currency transaction as we as the crypto currency purchased with the digital user identify, using the concept of the blockchain.

**Keywords:** Blockchain, Cryptography, Bitcoin, Decentralization, MD5, SHA512, Transparency, Immutability, Applications.

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**[SMMET-97]**

**Design and Analysis of High Entropy Alloy Nozzle For Aerospace Applications**

**Rahul Kumar Vishwakarma and Dr. Ashok Dewangan**

National institute of technology, Delhi

**ABSTRACT**

Review on Designing and analysis High entropy alloy nozzles for aerospace applications is the main focus of this review. In this paper, fundamental theories and important methods for nozzle designs are briefly reviewed. The concept of HEAs are discussed, by comparing various properties with few other Titanium based alloys we have used Al<sub>20</sub>Be<sub>20</sub>Fe<sub>10</sub>Si<sub>15</sub>Ti<sub>35</sub> for our review paper. The light weight HEA will reduce weight from aero planes/rockets which is beneficial in saving fuel.

**Keywords:** *High Entropy Alloy, Aerospace, Nozzle, Light weight HEA*

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**[SMMET-98]**

**Importance of Environment Friendly E-Waste Collection and Recycling in India for Delhi Perspective**

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**ABSTRACT**

With advancement in usage of electronic devices and technology, there is a major issue rising at global level of how to dispose Waste Electrical and Electronic Equipment (WEEE) or commonly known as E-waste efficiently without harming environment. Since E waste are electronic and electric appliances which are at the end of life, it has two components-Toxic and Valuable. Toxic ones are hazardous for our physical and environment health and valuable ones can be extracted back from the generated waste and reused like precious metals.

Hence E-waste needs to be recycled before the amount of waste overpowers human population. Major outcomes of the accumulation of untreated E-waste are-(I) Soil pollution; (ii) water pollution and affected aquatic life. (iii) radiations emotive from the dead E-waste I'd harming for the environment. (iv) Leaving health impacts on humans like disfunction of thyroid, effect on reproductive health, lung function, nervous system (v) affecting health of underpaid workers who work for recycling of E-waste without proper precautions.

Future prospective of my study- For this E-waste recycling initiative to be successful, we have to approach in two ways, first is at personal level to make people aware of its adverse effects and urgency to work for it. Second, at government level since it holds the utmost power to make his initiative successful. Indian government has made initiatives like "E-waste management rules" in 2016, which needs better implementation. Indian government should do (I) Due to lack of formal collection centers, we need appropriate laws and regulations to increase collection rates. (ii) Formal recycling centers must adapt- BAT (best available technology) and BEP (best environment practices). (iii) Establishment of advanced technology with good capacity infrastructure for recycling. (iv) Government must encourage NGOs to work on E-waste recycling and assign certain agencies to mainly work in this field.

We can also consider these things for future that will ace E-wade recycling- inter-industry exchange at on site and off site, limiting raw materials to leave least possible waste after production on industries, increase shelf life of electronic equipment's so that it lasts up to 20 yrs. instead of 10 yrs., Implementation of Extended Producer Responsible (EPR).

**Keywords:** *electrical and electronic waste; environment; human health; best available technology; best environment practice*

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[SMMET-99]

**Automatic Solar Tracking Based Food Dehydrator**

**J. Ravi Kumar, G. Shreya Chandan, K. Aastha**

Department of EEE, GMR Institute of Technology, India

**ABSTRACT**

This paper presents about the solar dehydrator that is extremely useful for the farmers to save their crop. We also spotlight the environmental influence on solar energy that plays a prime role in the solar drying sector. Drying is an intricate process involving mass and heat transfer. In contemplation to improve the quality, the natural sun drying is incongruous and we must seek a substitute. Dehydrator is proposed to optimize the drying procedure and fasten the process. The application of solar tracking is used due to the responsiveness, reliability and stability. Solar tracking is used to make the best use of solar energy that is free to collect and convert this energy.

**Keywords:** *Solar dehydrator, solar tracking, solar energy, drying, environment*

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[SMMET-100]

**Smart Car Parking System (I.O.T)**

**Kavish Kumar, Priyanshu Yadav, Mudit Goyal, Krishna Gupta**

Computer Science & Engineering, Raj Kumar Goel Institute of Technology, Ghaziabad, India

**ABSTRACT**

Parking has recently become a major problem and has worsened, with increasing numbers of vehicles everywhere. In this paper we propose an IoT-based system for the visitor to monitor and prebook the parking area, manage and monitor vacant parking, providing a smart solution. It aims to use a smarter and better way to steer the parking lot which greatly reduces the difficulty in the normal parking management system. The system is able monitor condition of the entire parking space by inserting a sensor into slots. Properly detects location of area to park also sends the status to the central server controller. The Node MCU collects data from the sensors then uploads it on a place where the user can gain the information about the parking area anywhere using any search engine. The user can prebook a slot by entering a profile.

**Keywords:** *Ethernet, Node MCU, sensor.*

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[SMMET-103]

**Graphene and Perovskite Based Solar Cells - A Review**

**Neha Chhatwani and Ashok Dewangan**

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**ABSTRACT**

The area of graphene based solar cells is the focus of review. The properties of graphene materials are used in wide range of applications in today's world. The perovskite graphene based solar cells are known to have an excellent performance to surpass other third generation solar cells which is discussed in this article. The basic thermal and optical analysis of graphene perovskite materials can be simulated by using modeling techniques that take us towards the improvement of photovoltaic performance and stability of graphene solar cells. Moreover, Graphene have high tensile strength, it is used on the silicon, organic and flexible substrates. Graphene used as electron acceptor, in active layer and as an electrode

**Keywords:** *Graphene, Perovskite, Simulation, OPVs*

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**[SMMET-106]**

**A Comparative Study of the Effect of Lightweight Bricks and Conventional Bricks on Seismic Performance of RC Building**

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**ABSTRACT**

The purpose of this study is to compare the seismic analysis of RC buildings made of lightweight and standard bricks. The structure under consideration is a symmetrical G+11 building with an ordinary shear wall and an OMRF. The structure is modelled using the STAAD Pro. V8i software. A G+11 Building model with a plan dimension of 24 m x 24 m and a height of 36 m is studied in this project, which is located in Zone II, Zone III, Zone IV, and Zone V and has a medium soil condition. Time period of the structures in both directions is recovered from the software and as per IS Code 1893 (Part 1):2016. For all two types of material and all scenarios, many parameters such as lateral displacement of a building, maximum bending moment, maximum shear force for a building are analyzed, as well as weight estimates according to IS 1893(Part 1): 2016. The study's major goal is to examine several parameters such as shear force, bending moment, displacement, time period, Peak Storey Shear, and natural frequency.

**Keywords:** *Lightweight bricks, Conventional Brick, STAAD Pro. Software, Bending moment, Shear Force.*

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**[SMMET-107]**

**SEM and Mechanical Properties of APSed TBC**

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**ABSTRACT**

Thermal barrier coatings is a double layered system composing of top coat, atmospheric plasma spray is used to deposit 8YSZ (8 wt%Y<sub>2</sub>O<sub>3</sub>-ZrO<sub>2</sub>) ceramic coating on aluminium alloy and bond coat. TBC coatings are used for protecting aircraft turbine blades and nuclear power plant. Aluminium alloys have properties like corrosion resistance, heat and electrical conductance. The hardness, SEM and tensile tests are performed for TBC Specimen. The experimental result of Micro/Vickers Hardness shows that the hardness of TBC coated Specimen is 6.77% higher than the non-coated Specimen. The tensile strength of with heat treatment Specimen is 44% higher than the without heat treatment Specimen. SEM image of NiCrCoAlY coated Specimen that the aluminum alloy coated with NiCrCoAlY have more cracks and pores than the aluminum alloy coated with CoNiCrAlY

**Keywords:** *TBC Coating, Microstructure, Air plasma spraying, Tensile testing, Hardness*



**[SMMET-108]**

**A Smart Home Automation System**

**Meet Kumari<sup>1</sup>, Gaurav Kumar Saini<sup>2</sup>, Yogendra Narayan<sup>1</sup>, Shailendra Kumar Gupta<sup>3</sup>**

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<sup>3</sup>Department of Electrical Engineering, Chandigarh University, Mohali, India

**ABSTRACT**

Necessity is the mother of invention. Today's world is all about technology and people inventing new technologies to make their life easy. With the help of technology, we are able to design a product that is beneficial for society and give a great contribution in term of development. From last many year many new inventions have done and smart home is one of them. The concept of smart home is about the home which works automatically. The smart home has smart appliances such as air-conditioners, fans, bulbs, television, a security system, and doors. In this paper, an Arduino and Bluetooth module-based system has been designed. This system is fully programmed with an automated and easy to used automatic controller. The results show that the proposed system can be used to control household electrical appliances controlled by the user and reflects the temperature data output through PAN (personal area network) wireless connections between the Arduino board and android. This system is so useful for old age people who live alone in their house and cannot move so much due to health issues, a weakness so with the help of this system they can also operate their home appliances.

**Keywords:** Home Automation, Wireless, Android, Bluetooth, Smart Home, Security

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**[SMMET-109]**

**A Comprehensive Review on Green Manufacturing In Construction Sector for Climate Change**

**Bharti Motwani, Charuta Waghmare and K.S. Ansari**

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**ABSTRACT**

Resources and population are major environmental problems in this global world. With the growing industrialization and urbanization the demand for resources, energy is increasing. In a developing economy like INDIA the resources are scarce and the demand is increasing with the increase in population. Green manufacturing is the new shift towards sustainability which focuses on resources conservation, energy conservation, sustainable development, using cleaner technologies. The aim of green manufacturing is to reduce pollution and create overall less production waste. Construction sector is a huge sector of economy and it consumes a large amount of resources. The circular economy is the shift from linear economy towards circular which mainly focuses on the principle of 3R's (reduce, reuse, recycle). Sustainability is now the need of an hour. The CETP was established with the purpose to solve the problem of many small and medium scale industries which cannot establish their own treatment plant. The CETP's generate huge quantities of waste which is in the form of sewage sludge which is being disposed off which causes serious environmental problems. Utilization of this waste in construction activities reduces the problem of environmental concern reuse of waste. Environmental, social and economic are the three pillars of sustainability. LCA is used to evaluate product's sustainability during its entire life cycle.

**Keywords:** CETP, Circular economy, Green manufacturing, LCA, Sustainability

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**[SMMET-110]**

**Design and Analysis of Master Cylinder and Caliper using SOLIDWORKS and ANSYS**

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**ABSTRACT**

Safety is a very important aspect of the vehicle. Effective Braking system along with good suspension systems, good handling and safe cornering is very important for determining the performance of the vehicle. This work deals with the study of the existing braking components, like master cylinder and caliper, designing of new braking components using SOLIDWORKS, and to perform static structural analysis on ANSYS. The objective of the newer designs is to increase the braking power while maintaining the strength, without much increase in the weight. The analysis was done on master cylinder and caliper using ANSYS workbench. The standard dimensions of master cylinder are taken from MARUTI800, while that of caliper is taken from the Bajaj Pulsar. The results are plotted in tabular format.

**Keywords :** Solid works ,Hydraulic braking system, Master cylinder, ANSYS, Caliper

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**[SMMET-111]**

**Comparative Study of Carbonized Bagasse Ash and Uncarbonized Bagasse Powder as Reinforcement in Development of Composite Material**

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**ABSTRACT**

The purpose of this article, an effort was made to incorporate waste bagasse into the formulation of an aluminum-based composite by partially substituting ceramic particles for them. In the process of developing a composite, a comparative research of carbonized bagasse ash and uncarbonized bagasse powder was carried out in role of reinforcement. Microstructure investigation revealed that carbonized bagasse ash particles were properly distributed throughout the aluminium base metal matrix alloy, and that they also had the appropriate level of wettability. The reinforcement of carbonized bagasse ash particles in AA6063-based matrix material was found to have maximum tensile strength of 110 MPa and maximum hardness of 39 BHN when 3.75 weight percent of the particles were used. For an AA6063/ 3.75 weight percent carbonized bagasse ash metal matrix composite, minimum percent porosity was determined to be 5.83 and the minimum thermal expansion was found to be 45 mm<sup>3</sup>. As the percentage of reinforcement in bagasse reinforced composites is increased, density of the material, the amount of corrosion loss, and the cost all decrease continually. Composition AA6063 with 3.75 weight percent carbonized bagasse ash metal matrix composite was found to have satisfactory specific strength and corrosion loss.

**Keywords:** Recycled waste bagasse, Green House Gases, Environment pollution, Green Composite

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**[SMMET-112]**

**Effect of Casting Parameters on Tensile Strength of Chrome Containing Leather Waste Reinforced Aluminium Based Composite using RSM**

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**ABSTRACT**

The leather industry is a major source of pollution in our time. The leather industry's pollution also contains a wide variety of viruses. Many diseases are spread by these viruses, which enter the body through the mouth and nose. Leather industry waste that contains chrome is another sort of trash. CCLW also generates various types of pollution. CCLW using aluminium as reinforcing particle is the goal of this research project. Secondary reinforcement particle has been utilized in the composite material as Alumina. Stir casting parameters were optimized using Response surface methodology. Collagen preheat temperature of 177.36°C, weight percent of 1.43, stirring duration of 180 s, alumina preheat temperature of 300°C and alumina weight percent of 5 were determined to be best amalgamation of casting parameters. At optimal combination of characteristics, composite's tensile strength was determined to be 162.45 MPa. Based on the basic material, composite tensile strength increased by around 20.33 %.

**Keywords:** Collagen powder, Alumina particles, CCLW, Leather waste, Tensile strength

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**[SMMET-113]**

**Extraction of Chromium Oxide from CCLW to Develop the Aluminium Based Composite by FSP as Reinforcement along with Alumina**

**Shashi Prakash Dwivedi<sup>1</sup>, Anas Islam<sup>2</sup>, Vijay Kumar Dwivedi<sup>2</sup>**

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<sup>2</sup>Department of Mechanical Engineering, GLA University, Mathura, U.P. 281406, India

**ABSTRACT**

Chrome containing leather sometimes causes great harm to the environment as waste. However, the use of this waste can prevent environmental pollution. CCLW has been used in this investigation to extract collagen powder in the form of chromium. Particles made of ball-milled collagen powder were obtained after 100 hours of milling. Composite materials were created using the friction stir process (FSP). The microstructure of the composite produced in a single pass was found to be evenly distributed. Single tool pass composite generated by FSP demonstrated superior results in terms of hardness and tensile strength than composite developed in double and triple tool passes. With compared to the base aluminium alloy, tensile strength and hardness of composite material have increased by about 26.49% and 22.10%. Composites made in a single tool run were shown to be more resistant to corrosion and thermal conductivity.

**Keywords:** Ball-milling; FSP; Cr<sub>2</sub>O<sub>3</sub>; CCLW; Leather waste

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**[SMMET-114]**

**Experimental Investigation on Strength of RC Beam using Geopolymer Concrete and adopting Bubble Deck as a Green Technology**

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**ABSTRACT**

In construction, beams are a very important structural element that can withstand the load of the slab. Bubble beams are a method of removing virtually all concrete from the center of a beam that does not perform structural functions, dramatically reducing dead structural loads. A bubble beam is a beam in which the core is replaced by spherical balls of various sizes and shapes. Bubble Deck systems typically combine the benefits of factory-manufactured elements with on-site completion under controlled conditions. Some of the main benefits are reduced overall cost, reduced material consumption, improved structural efficiency, reduced construction time, and environmentally friendly technology. In this project, the ineffective concrete in the center of the beam will be replaced with a hollow sphere of high-density polyethylene and M30 grade concrete will be used to compare weight and bending strength.

**Keywords:** *Waste plastic and Polyethylene Hollow Sphere. Geopolymer Concrete*

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**[SMMET-115]**

**Grid-Connected Wind Photovoltaic Hybrid Power Systems with GRNN and RBFNSM**

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**ABSTRACT**

This work proposes a grid-connected wind-photovoltaic (PV) hybrid power system, as well as the system's steady-state model analysis and control method. PV power, wind power, and an intelligent power controller make up the system. The General Regression Neural Network (GRNN) algorithm was used to examine the performance of a PV generation system with non-linear characteristics. The turbine speed is calculated using a high-performance on-line training radial basis function network-sliding mode (RBFNSM) method to capture maximum power from the wind. The intelligent controller consists of an RBFNSM and a GRNN for maximum power point tracking (MPPT) control to achieve a fast and stable response for power control. The wind turbine pitch angle is regulated by RBFNSM, and the PV system is controlled by GRNN, with the output signal controlling the boost converters to achieve the MPPT. The simulation results show that using MPPT, the suggested hybrid generation system may achieve high efficiency.

**Keywords:** *Maximum power point tracking (MPPT), Photovoltaic (PV), Wind turbine, Hybrid power system, Radial basis function network system model (RBFNSM), General Regression Neural Network (GRNN).*

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**[SMMET-116]**

**Modeling and Simulation of Battery and SMES-based DVR for Grid-Connected Hybrid  
PV-Wind Power System with E Power Quality Features**

**Diksha Ratan Gadpayale, Prof. Sneha Tibude**

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**ABSTRACT**

The DVR-connected series will inject three-compensation compressors using injection in three stages converter or three injections in a single process variants in the main provision. The injection transformer increases the output voltage of the released VSI to the desired amount. The DVR circuit is also separated from the distribution grid by the converter. In DVR architecture, the power of the voltage source inverter (VSI) and the value of the connection filter connecting the injection transformer and the inverter are crucial. A new technology science for Dynamic Voltage Restorer (DVR) has been proposed in this research project. Under a variety of error conditions, the voltage source inverter (VSI) and low link filter values will improve harmonic compensation power, swell, and voltage sag mitigation. The updated RLC filter has the ability to filter out shifting harmonics. When the import value is low, the power of the dc supply capacity is limited. The current DVR topology is extremely capable, and it has the ability to increase electrical power efficiency. For a particular model, the frame structure of the RLC filter parameters was introduced. A new DVR with the proposed topology controlled Dynamic Voltage Restorer is modeled and replicated using MATLAB. With lower torque, the control scheme has greater control features than it does now. Imitation effects under temporary operation are good

**Keywords:** *component, Superconducting magnetic energy storage (SMES); Dynamic Voltage Restorer (DVR); Voltage Sag, swell and interruption; Pulse-width modulated (PWM)(key words)*

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**[SMMET-117]**

**Power Quality Improvement by Using Statcom Control Scheme in Wind Energy Generation  
Interface to Grid**

**Pratik Sunildatta Ramteke, Prof. Sneha Tibude**

Department of Electrical Engineering Abha Gaikwad Patil College of Engineering Nagpur, India

**ABSTRACT**

The renewable energy resources like wind, solar, hydro, biomass etc. are required for sustainable growth and social progress, it is essential to meet the energy need by utilizing the renewable energy resources. The necessity of integrated renewable energy like wind energy into the power system is to make it possible to minimize the environmental impacts. This project proposes the STATCOM control scheme for grid connected wind energy system for power quality enhancement. A bang-bang controller which is based on hysteresis current control scheme is developed for STATCOM. STATCOM is connected at a point of common coupling (PCC) to mitigate the power quality problems. The STATCOM control scheme applied for the grid connected wind energy generation system (WEGS) used for enhancement of power quality is simulated using MATLAB/SIMULINK in power system block set. This proposed scheme assures the enhancement of power quality in a generated output.

**Keywords-** *FACTS devices, Power quality issues, STATCOM, Wind turbine, Point of Common Coupling etc.*

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**[SMMET-118]**

**Integration of Blockchain with Internet of Things: Advantages and Challenges to Industry**

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**ABSTRACT**

IoT has made it possible for the internet not only to reach humans and computers but to all the things around us, IoT has helped us to make our life easy and comfortable but it is difficult to adopt IoT worldwide because it works on compact and unifies client-server model. Therefore, the incorporation of a decentralized path with IoT can be beneficial. Blockchain is a powerful decentralization system that can solve issues of security associated with a centralized system. In this paper, we discussed the integration of blockchain with IoT, its advantages and challenges that need to be addressed.

**Keywords:** *Internet of Things, blockchain, integrated applications, centralized to a decentralized system.*

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**[SMMET-120]**

**A Fuzzy Logic-based Controller for Improving Power Quality in Grid-Integrated Wind Power System for Non-Linear Loads**

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**ABSTRACT**

Global energy consumption has risen rapidly in recent decades, owing to an increase in the manufacturing of various industries, as well as the use of automated systems, and thus to the use of various appliances on both the sending and receiving ends of the power system. As a result, maintaining the quality of power is critical in terms of stability. Because of environmental concerns and the increased cost of fossil fuels, renewable energy sources have grown significantly. An integrated power grid is an electric power system created by combining several individual power grids. Control strategy plays an important role to get quality power. The FLC based control strategy is implemented in grid integration of wind energy conversion system. The proposed work is to optimise Fuzzy Logic controller for a grid-connected wind energy conversion system feeding a non-linear load. The suggested model consists of wind turbine, inverter, and alternating supply integration with the grid, which feeds non-linear loads. The inverter was switched using both the FLC and hysteresis band methods. The performance of the system under FLC and hysteresis band is compared, and it is observed that power quality issues such as total harmonic distortion (THD) have been significantly reduced by using FLC in comparison to hysteresis band, and FLC also improves the power factor, demonstrating reliable and efficient output.

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**[SMMET-121]**

**Experimental Investigation and Prediction Modelling of Slicing Speed and Surface Roughness during Wafer Slicing using WEDM**

**Anmol Singh Verma, Shankar Singh**

Department of Mechanical Engineering, Sant Longowal Institute of Engineering and Technology, India

**ABSTRACT**

This paper deals with the comparison of different kernel functions in support vector regression (SVR) for the prediction modelling of slicing speed and surface roughness. Support vector regression has been implemented in various engineering applications due to its ability to address both linear and non-linear problems. Considering the literature review, only a limited study is available on the implementation of SVR and the comparative analysis of different kernel functions. The primary purpose is to determine the best predictive kernel among the linear, polynomial, radial basis function (Rbf), and sigmoid kernel functions based on the experimental data. The face-centered central composite design was employed for planning and conducting experiments. The predictive performance of different kernel functions was evaluated and compared. Grid search was used for the hyper tuning of the kernel parameters. Support vector regression with radial basis function gives better results than other kernel functions, which concludes that support vector regression with radial basis function is well suited for the prediction of slicing speed and surface roughness. The radial basis function gives the R2 of 99.751% and 97.552% for slicing speed and surface roughness.

**Keywords:** *Wafering, Slicing speed, Surface roughness, Kernel function, Support vector regression*

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**[SMMET-122]**

**Biogas Generation Using Vegetable Waste and Food Left Over's**

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<sup>2</sup>Department of Civil Engineering, KDK College of Engineering, Nagpur

**ABSTRACT**

Energy consumption rate is rising tremendously. Hence, development of renewable and sustainable energy source is the need of the society. It is beneficial to generate renewable energy from materials that are readily and locally available. Hence, in the present paper, readily and locally available materials have been used for the production of biogas using anaerobic digestion. Anaerobic digestion is an important and useful method to generate renewable energy. In this paper, production of biogas from vegetable wastes and food left over's has been elaborated. Three digesters were fabricated, to observe the degradation rate of wastes. It includes two non-insulated and one thermally insulated digester. Thermally insulated digester was insulated using different insulating materials like saw dust, aluminum foil, plastic paper sheets and a binder material. Different waste materials were selected and various parameters like Total Solids, pH, Moisture content etc. of waste samples were determined. A comparative study of biogas potential of some selected kitchen wastes and vegetable waste has been carried out. To enhance the rate of energy production some substrates like Curd, Salt, Bread etc. were used. Flame test was used for confirmation of bio methane production. The prime object of this work is to generate energy from waste and to study the suitable parameters on which the digester should be operated. The degradation rate of the waste was found to be higher at temperature range of 370C to 400C. Thus, anaerobic digestion of kitchen waste produces biogas, a valuable energy resource, subjected to numerous conditions like temperature, substrates used and inoculum added for acceleration of the reaction.

**Keywords:** *Renewable Energy, Sustainable, Anaerobic Digestion, Biogas generation*

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**[SMMET-123]**

**Short term scheduling of Thermal-Hydro solar power generation system  
using Particle Swarm Optimization**

**Rajneesh Kr Kaushal**

Chandigarh University

**ABSTRACT**

Thermal-hydro-solar scheduling is the most difficult power system optimization issue in the modern day. The core mean of the arrangement of thermal-hydro-solar is to decide the most favorable power from thermal, hydro, and solar sources while meeting the various constraints of thermal, hydro, solar, and network. This paper describes the optimum hourly generation schedule plan in a thermal-hydro-solar power network utilizing Particle Swarm Optimization (PSO) approach. The conclusion of the simulation shows that the suggested PSO method seems to be able to minimize fuel costs, and emissions and has improved outcomes performance and strong integration than other approaches.

**Keywords:** *Economic, Emission, Energy, Thermal-hydro-solar scheduling, Cascaded reservoirs, PSO.*

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**[SMMET-124]**

**A Short Review on Mechanical Properties of different Kevlar Fibre Composites**

**Prayagraj Singh Deora<sup>1</sup>, Priya<sup>1</sup>, Ram Avtar Muhal<sup>1</sup>, Yash Verma<sup>1</sup>, Dhruv Upadhyay<sup>2</sup>, Chandramani Goswami<sup>1</sup>**

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<sup>2</sup>Industrial and Production Engineering Department, Dr BR Ambedkar National Institute of Technology, Jalandhar, India

**ABSTRACT**

Kevlar fibre composites are considered as suitable candidates for army applications including armor, armaments, and vehicle structures. A range of primary constituent materials for armor applications are examined and its individual response to ballistic impact, and comparison of performance and their characteristics with other constituent materials are studied in current review. This review shows non-destructive testing methods on fibre like boron, glass, Kevlar and carbon for fibre based reinforced composite. The main purpose of this work is to give overview of various method applied with numerical and experimental investigations at micro/meso/macroscale for high strength Kevlar and KERP composites.

**Keywords:** *Polymer-matrix composites; Armor materials; Mechanical properties; Kevlar Fiber Composites*

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**[SMMET-125]**

**A Comparative Analysis of the Thermodynamic Performance of Solar Air Heating System with  
Structural Modifications to the Absorber Surface**

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<sup>2</sup>Department of Mechanical Engineering, Kakatiya Institute of Technology and Science, Warangal, India

**ABSTRACT**

Energy and exergy analysis is a significant tool used to foresee the behavior of a solar air heater (SAH). In this investigation, the energy and exergy examination were performed tentatively on the novel flat plate SAHs (Type A, Type

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C) with trapezoidal and square shaped obstructions and conventional SAH (Type B) without obstructions on the absorber surface plate by utilizing the thermodynamic first and second laws. The examinations were assessed for 0.002kg/s and 0.00625kg/s air flow rates. The thermal efficiencies, the measure of energy gained by the SAH, and the irreversibility, exergy losses of the SAHs were determined through energy and exergy analysis. It is seen that in type C SAH the estimations of the first law of thermal efficiency differed somewhere in the range of 43.51% and 82.24%, and the exergy efficiency changes from 28.97% to 61.64% for an airflow rate of 0.00625kg/s. Moreover, it is tracked down that the type C SAH is essentially better compared to the other two SAHs. The biggest irreversibility is happening at the type B SAH (without obstructions), where collector performance is the lowest.

**Keywords:** *Energy analysis, Exergy analysis, Exergy losses, Irreversibility, Obstacles, Solar air heater (SAH)*

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### [SMMET-126]

## **A New Approach for Cuk Converter for Solar/Wind Hybrid Standalone System**

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### **ABSTRACT**

The non-conventional energy such as solar photovoltaic system and wind turbine are natural resources and provides sustainable green energy. In the current technology, this project could be effective to achieve good prediction accuracy in smart grid using different weather conditions. It also upgrades the socioeconomic condition of rural lives. In this paper basically The wind turbine and solar photovoltaic (PV) are combined. The wind turbine converts wind energy into electrical energy by generating AC output voltages whereas the solar PV array converts light energy into electrical energy by generating DC output voltage. The hybrid power generation is improving the power quality. the power generated is stored in batteries is modeled using MATLAB simulator. further, its performance is found satisfactory and effectiveness of the system.

**Keywords:** *Hybrid Energy System, Fuel cell, Solar Photo voltaic cell, Inverter, PIC Micro Controller, MOSFET devices.*

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### [SMMET-128]

## **An Experimental Investigation into Silicon Slicing Using WEDM and Prediction Modelling based on SVM-PSO**

**Anmol Singh Verma and Shankar Singh**

Sant Longowal Institute of Engineering and Technology

### **ABSTRACT**

In the semiconductor industry, it is very important to get the WEDM parameters right so that wafers can be made at a faster rate. This work investigates how the surface roughness and wafering speed are affected by different WEDM parameters, such as peak current, wire tension; wire feed rate and pulse on and off time during the machining of mono crystalline silicon. Wafers of a thickness of 250  $\mu\text{m}$  were sliced using the brass wire electrode. It was observed that increase in the peak current and pulse on time leads to an increase in wafering speed and surface roughness, whereas increase in pulse off time lead to decrease wafering speed and surface roughness. Furthermore, support vector machine (SVM), one of the supervised machine learning algorithm, is used in the current study to construct a prediction model to correlate the selected

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process parameters with the selected responses. The SVM hyper parameters were optimized using particle swarm optimization (PSO). A comparison was made between the obtained results and those of SVM, MRA, and BPNN. Model performance of the prediction models was evaluated using the R<sup>2</sup>, MAE, MSE, RSME and MAPE. The SVM-PSO model has outperformed and have resulted in small errors and stable model output, hence been recommended. The SVM-PSO model for wafering speed and surface roughness had high compensation performance (R<sup>2</sup> > 0.995, MAE < 0.01 mm/min, MSE < 0.002, MAPE < 1.3% RSME < 0.022) with strong generalizability and stability.

**Keywords:** *Slicing, WEDM, Wafering speed, Surface roughness, SVM-PSO*

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### [SMMET-129]

## **Investigation of Effect of CNC Milling Parameters on Cylindricity and Perpendicularity of Milled Circular Pockets Using CMM**

**Satyajit Chatterjee, Abhijit Saha and Goutam Kumar Bose**

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### **ABSTRACT**

CNC milling is widely used in the present manufacturing scenario to manufacture components with complex shapes and profiles with high geometrical accuracy. The main aim of the present work is to analyze the significance of milling parameters on cylindricity and perpendicularity of circular pockets in CNC milling operation while machining AISI 304H stainless steel. Spindle speed and feed rate have been considered as machining parameters.

The experimentation plan is implemented under Taguchi's L9 orthogonal array. The performance characteristics such as cylindricity and perpendicularity of the circular pockets were also measured using CMM. Mathematical models are developed using response surface methodology (RSM) to develop relationships between the input parameters and output response.

**Keywords:** *CNC Milling, Cylindricity, Perpendicularity, Taguchi's L9 Orthogonal Array, Response Surface Methodology*

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### [SMMET-131]

## **Waiterist Website Research & Design**

**Aditya Mishra, Palluck Srivastava, Shikha Agarwal**

Department of Information and Technology, Raj Kumar Goel Institute of Technology, Ghaziabad India

### **ABSTRACT**

This paper is about designing a website for, a mobile POS integrated with diner marketplace in which we have used various design techniques to build a website which is not beautiful or fancy looking, but a usable and impactful one. We have redesigned a professional website for a business to increase their audience interaction and retention when they visit the website. Moreover, they can find adequate amount of information on the platform in an well-structured manner without any hassles.

**Keywords:** *Re-designing, Audit, Wireframing, Mood Boarding.*

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**[SMMET-132]**

**Fuzzy System and dq0 Transformation for Protection of Power Transformer**

**Vijay Kumar Sahu, Yogesh Pahariya**  
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**ABSTRACT**

One of the most important element of the power system is the power transformer. This important as well as essential element should have a continuous monitoring and also effective protection. For the protection of the power transformer number of methods are present. One of the common method is the differential logic as it can easily distinguish between normal operation and internal fault conditions. Some operating conditions of the power transformer have a significant effect on differential logic operation which also impact on the stability of the power system. An algorithm has been proposed to enhance the performance of the protection of the power transformer by using dq0 transformation and fuzzy system. MATLAB software was used to model a power system and to test the algorithm.

**Keywords:** Energization, over-excitation, differential protection, dq0 transformation, fuzzy logic system.

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**[SMMET-136]**

**A Review on Enhancement of Quality of Biomass Briquettes**

**Shubham More and Madhuri Bhagat**  
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**ABSTRACT**

Solid waste is the problem that must be effectively and properly managed. Hence to manage solid waste the 3R's should always be kept in mind. To achieve this 3R's to the maximum the concept of briquetting is introduced to convert the Biomass into the useful products. These review consist of different parameter to enhance the quality of briquette production using various biomass the various factors such as calorific value, density, durability, moisture content, particle size etc are critically reviewed in this review paper

**Keywords:** Briquette, Biomass, Sustainable energy, Calorific value, Solid waste

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**[SMMET-137]**

**Development of Sawdust Reinforced Glass Fiber Epoxy-Based Composite and Evaluation of their Mechanical Properties**

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**ABSTRACT**

The intent of this research is to construct glass fibre epoxy/sawdust composite using leftover sawdust from the industry as reinforcement. Teak, Sal, and Rubber wood powders are used as reinforcing materials, while epoxy resin (LY556) is utilized as a matrix material for composite synthesis. The mechanical properties i.e. hardness is used as a response variable.

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Response surface approach is used to design the trials. In order to plan experiments and analysis of data a software design expert 11 was used. A quadratic regression model was developed for the forecasting of the outcome of process constraints on the hardness of the composite material. Confirmation experiments revealed that the built model performs effectively in the test environment. Flexible intensity, impact intensity, density, and compressive strength are among the mechanical and physical properties that are evaluated. The mechanical parameters of the composite at the optimal level of process parameter are determined to be: hardness of 21.45 BHN, tensile strength of 65.6 MPa, impact energy of 5.1 KJ/m<sup>2</sup>, and compressive strength of 38 MPa. The produced composite is found to have a density of 618 kg/m<sup>3</sup>.

**Keywords:** *Response surface technique, Sawdust, epoxy-based composite, hardness, and waste- industry*

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### [SMMET-139]

## **Adaptive Neuro Fuzzy Inference System (ANFIS) Control for Total Harmonic Distortions Reduction of Multi-Pulse STATCOM**

**Priti N. Nimbalkar, Pratik Ghutke, Prashant Thakre**

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### **ABSTRACT**

In this paper proposed ANFIS System is adapted for controllable mitigation of Total harmonic distortions of STATCOM with Multiple pulse technology. Integrated power electronics device, Gate turn Off (GTO) is used in switching mode with Voltage source convertor during application of nonlinear load conditions. The proportional and integrated Controller is replaced by a smart fuzzy logic controller offers a great support for harmonic mitigation by redefining the electrical magnitudes of voltage and current for satisfactory operating condition. Using ANFIS (Adaptive neuro fuzzy inference system) control system, better results are observed for the simulation system in MATLAB.

**Keywords:** *fuzzy logic controller (FLC), Flexible AC Transmission System (FACTS), Total Harmonic Distortions (THD), Gate Turn Off (GTO), Adaptive Fuzzy inference System (ANFIS)*

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### [SMMET-140]

## **Implementation of Green Technology for Sustainable Development and Capacity Building of a Low-income Village**

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<sup>b</sup>Technology Development Centre, CSIR – NEERI, Nagpur, Maharashtra, India

### **ABSTRACT**

The rampant withdrawal of ground water (wherever available at shallow depth) has immersed a new challenge in India. To ensure sustainable natural resource management through replenishment of aquifer using artificial ground water recharge technology & rejuvenation of water body. The present study investigates the characteristics of a sustainable development assessment methodology in context of water resource management as balancing the conservation and exploitation of ground water resources is very important to both emission reduction and sustainable development.

**Keywords:** *Sustainable development, Replenishment, Emission*

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**[SMMET-142]**

**Cyber Security in “Smart City” Extend Security and Privacy**

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Maharshi Dayanand University, Rohtak, Haryana (India)

**ABSTRACT**

Cyber security made up of only two words but it works broadly or worldwide with small and broad network over internet. Its definition is described that, provide a security and privacy to whole communication network. Vision of cyber to make disciplines that should be capable to resolve complex cyber security. Purpose of this paper is to make more secure network by using some real identity of user “Not virtual or email id” like eye lens or fingerprint which is connected to whole information of users. Technology is implementing rapidly day by day and with implementing technology, computer and internet’s usage are also increasing. Every business deal is working over internet Example: electronic payment, data sharing, business analytics, research work etc. All the business or company required security for enhancing the business so this is the responsibility of that system or way by which they use facility of internet. Cyber-crime happens with upcoming new small business, steal information and sale to the big business brand. Mostly bank’s users are suffering from cyber-crime by debit money from account without their permission. This paper is involved with implement of network security. All IOT devices are related to cyber security by which devices transmit data with privacy.

**Keywords:** *Smart City, Network Security, Smart device.*

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**[SMMET-143]**

**A Review on Building Fire Safety of Heating, Ventilation & Air-conditioning (HVAC)**

**Joydeep Chakraborty, Dinesh Chawla**

Manav Rachna International Institute of Research and Studies, Faridabad

**ABSTRACT**

In modern day, HVAC plays very important role in case of building services. Building Safety plays very important role & HVAC being one of the most integral part of building services has an important role to play. Fire hazard is one of the biggest safety threats to building safety. HVAC also plays very important role in propagation of fire in case of a building and so fire safety measures are very important for safety of HVAC system & subsequently for safety of the whole building. If proper precautionary measures are not taken for fire safety of HVAC, the fire will spread instantly throughout the building causing loss of precious human life. The present paper describes fire safety requirements of HVAC in case of a building & the gaps found with the practices.

**Keywords:** *Heating, Ventilation & Air Conditioning (HVAC), Air Handling Unit (AHU)*

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[SMMET-146]

**The Challenges in Machining of Ceramics- A Short Review**

**Darshan Sharma<sup>1</sup>, Monika Khurana<sup>2</sup>, Sanjay Manghnani<sup>1</sup>, R.S.Chhatrawat<sup>1</sup>, Chandramani Goswami<sup>1</sup>**

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**ABSTRACT**

Ceramics are also known as Ceramic Matrix Composites (CMCs) are the type of material that is like glass or crystalline and maybe both. The non-metallic and non-organic materials. They are formed with heat, chemically non-reactive and hard in nature. Due to the extensive applications and enhanced properties, ceramics like Alumina, ZrO<sub>2</sub>, SiC and Si<sub>3</sub>N<sub>4</sub> are widely used for military and defense purposes and also in aerospace industries. These materials have high compressive strength, fracture toughness, hardness and excellent refractoriness. Milling, turning, and drilling are some traditional techniques of machining but then have poor machining performance, require high cutting force and heating causes tool wear. The low shear strength and high brittleness are the main challenges for machining but these properties are much desired for the extreme environmental conditions. The conventional techniques cause surface damage, edge chipping and tool wear during machining whereas non-conventional methods like AJM and Laser machining have poor surface finishing but the highly excessive occurrence of pits and holes. So, the machining of ceramics faces the challenge of getting higher dimensional accuracy and minimum surface damage. This paper includes non-conventional machining like Ultrasonic impact grinding and Laser beam machining and their consequences were discussed. The non-conventional machining has an upper hand in the machining of ceramics compared to conventional machining, because of its higher rate of removing material and better surface finish. This work also suggests areas of research toward ceramic materials and machining over these materials which is the requirement of future technology.

**Keywords:** *Machining, Ceramics, Abrasive Jet Machining, Rotary Ultrasonic Machining, Laser beam Machining*









Department of Mechanical Engineering, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India organized 1<sup>st</sup> International Conference on Sustainable Materials, Manufacturing & Energy Technologies (SMMET-2022). The aim of the conference is to provide a multi-disciplinary platform to the research community where they can share their cutting-edge ideas and innovations related to the different areas of Materials Manufacturing and Energy Technologies. The conference provides an opportunity for research scholars, academicians and engineers from all over the world to share and discuss their latest research findings and recent developments in various areas of mechanical and energy technologies.

The first edition of this book includes the abstract of all presentations in 1<sup>st</sup> International Conference on Sustainable Materials, Manufacturing & Energy Technologies. This book thoroughly includes all the latest development in field of Mechanical Engineering.

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