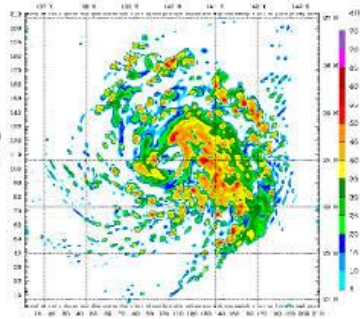


# **International Conference of Advance Research and Innovation (ICARI-2021)**

**30<sup>th</sup> January 2021**



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## Message from ICARI Desk

Dear Colleagues

ICARI-2021, is 8<sup>th</sup> International Conference in a row who is touching new height and shaping the carrier of all aspirants from Academia, Research, Industries and related and motivated minds with positive thoughts. 2020 was COVID-19 pandemic year, which effect globally in all sectors. ICARI regret for the suffering caused. In spite of this major hurdle new minds and aspirants are having enthusiasm showed a great interest. Life is the name of constant effort to fulfill dreams for future. Every second is an investment for big target and achievement.

It gives me immense pleasure that ICARI-2021 has been graced with the presence of Chairman Shri-Vishnu Saran, City Education and Welfare Society, Vice Chairman Shri- Puneet Agrawal Sir. Respected Director Sir Prof. (Dr.) MayankGarg and Dean Prof. (Dr.) DK Sharma encouraged, motivated and energized us with great enthusiasm. Till date our effort was recognized by various bodies like ISBN, DST, DRDO etc. by providing support as per time. We are thankful to all our sponsors till date.

ICARI-2021, got an overwhelming and very enthusiastic response from students, researchers and faculty and experts from reputed organizations. ICARI-2021 is thankful to Dr. APJ Abdul Kalam Technical University, Lucknow for providing us such a wonderful platform to share knowledge and wisdom. Papers from more than seven countries were received. Papers from respective authors were presented in .ppt form, from India and abroad. For full length, papers publication support was given by Journal of Engineering Research (Kuwait), FME Transactions (Serbia) and International Journal of Advance Research and Innovation.

I am highly thankful to for being our Chief Guest **Dr. Sanjay Mishra**Advisor/Scientist G, DST (Ministry of Science and Technology, Govt. of India),specialinvited guest **Prof. (Dr.) SK Varshney**, Advisor/Scientist G, DST (Ministry of Science and Technology, Govt. of India), **Prof. (Dr.) MK Pateiriya**(Scientist G/ Advisor, DST), **Prof. (Dr.) RK Pandey** (Professor, IIT Delhi), **Prof. (Dr.) HeeChang Lim** (Pusan National University, South Korea), **Shri Pradeep Chaturvedi** (FIE, Quality Council of India), **Prof. (Dr.) Rambir Singh (Scientist, DST)**,and **Dr. Rajeev Sharma**(Scientist F, DST)were our esteemed **Keynote Speakers** and **Guest of Honor**, who grace the occasion on 30<sup>th</sup> January 2021 with high experience, skill and knowledge. Prof. (Dr.) RC Singh and Prof. (Dr.) Nand Kumar was awarded for **Outstanding Contribution Recognition Award** for 2021.

Faculties from DTU like Prof. RS Misra, Prof. Amit Pal, Prof. RC Singh, Prof. Rajeev Chaudhary, Prof. Ranganathan M Singari, Prof. Nand Kumar, Parinita Sinha, Dr. Naushad A Ansari, Prof. Sourabh Agrawal, Dr. RoopLal, Dr. M Zunaid, Dr. Praveen Kumar, Prof. A Mandal, Scientist C-UGC, Faculties and students of MIET and DTU add the value in the successful complication of the event. Dr. Bharat from Rajdhani College Delhi University added the value. Researchers, academicians, Scientists, Engineers, Technocrats from premier institutes and universities gathered on this grand event to exchange ideas and innovations from all corners of India and abroad. We believe that ICARI-2021 will prove to be very beneficial, enriching and fruitful and also open new fronts and vistas for future research and innovation.

**Team ICARI-2021**

**E-Conference**  
**Call for Papers**  
**8<sup>th</sup> International Conference of Advance**  
**Mechanical Engineering Research and Innovation**  
**(ICARI-2021)**

**(ONLINE)**

On

**30<sup>th</sup> January 2021 (Saturday)**

**[www.ijari.org](http://www.ijari.org)**

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**Aim**

**8<sup>th</sup> International Conference of Advance Mechanical Engineering Research and Innovation (ICARI-2021)** is a premier international conference which aims at current challenges in science and technological advancements with research updates and innovations which is shaping the future of mankind. This conference welcomes all scientists, engineers, technocrats and researchers from all walks of society to share their knowledge and wisdom for exploring solution of current and future challenges. This platform provides an international forum for researchers to exchange of ideas in recent advances on various aspects of theories, analysis, experimentation and computational methods in science, technology and management etc.

**Area of Interest**

It is a **multi-disciplinary conference**, which includes all areas of Science and Technology used for material research including old material and new material performance in various field. Innovative original research papers on topics covered under following broad areas (but not limited to). Materials used in –

Applied Science, Social Science, Earth Science, Management Science, Pharmaceutical Science, Computer Science and Engineering, Electronics Engineering, Mechanical Engineering, Civil Engineering, Electrical Engineering, Industrial Engineering, Production Engineering, Automotive Engineering, Marine Engineering, Automation Engineering, Architecture and Building Materials, Bio-Mechanical Engineering, Chemical Science and Engineering, Material Engineering, Bio-Medical Engineering, Environmental Science and Engineering, Information Technology, Humanities, Commerce and Economics, Health

Science, Medical Science, Biotechnology, Physical Science and Education, Cyber physical system, Life Science, Micro Biology, Space Science, etc.

### Topics and Tracks:

**Track -01 -Current Scientific Approach and Techniques:** -Applied Science (Physics, Chemistry, Mathematics, Biology Science, Statistics, Humanities)

**Track -02- Processing and Manufacturing of accessories:** - Medical, Paramedical, Pharmacy, Biotechnology

**Track-03 - Advanced coding, modelling and simulation:** - Engineering (Electronics, Electrical, Computer & IT)

**Track-04 –Materials, mechanical and physical properties:** - Mechanical, Civil, Environmental, Industrial and Production Technology

**Track-05 –Inventory, economic and quality management:** - Management Science, Commerce and Economics

**Track -06 –Environmental issues and waste management Techniques:** -All Engineering streams

**Track -07 –Research and Innovation:** Space applications, automotive, rail and bio-medical applications, offshore and sub-sea applications, renewable energy, composite repair and industry needs.

Prospective authors may submit manuscript by E-mail address, as **doc file** attachments to:

**icari.2021@miet.ac.in**

Else-

**bhupendra.chauhan@miet.ac.in**

### Visa Letter

Letter of invitation can be provided (if necessary) on request, for VISA processing.

### Registration Desk

All participants must register before attending the conference. The appropriate registration fee includes conference kit, tea break and lunch break. Registration fee is nonrefundable. Registration fee is accepted through– Draft/Cash/ NEFT

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### **Exhibitors/ Sponsorships**

At ICARI-2021, you will meet with representative from industry, leading scientists, research professors, research scholars from all walks of science and technologies.

### **Guidelines for abstract**

Selection of papers presentation will be based on detailed abstract of up to 300 words and a maximum of five key words. Abstracts will be reviewed and only those abstracts approved by the reviewers will be selected. A soft copy of the abstract in Microsoft Word for Windows should reach the conference. The electronic copy should be mailed to –

[bhupendra.chauhan@miet.ac.in](mailto:bhupendra.chauhan@miet.ac.in)

or

[icari.2021@miet.ac.in](mailto:icari.2021@miet.ac.in)

### **Paper Presentation in Absentia**

Those who cannot come to Delhi but wish to present paper are also encouraged to send their abstract. Papers presented in absentia are eligible for publication in conference proceedings.

### **Important Dates**

<b>Submission of Abstract</b>	<b>15 January 2021</b>
<b>Paper Acceptance Notification</b>	<b>15 January 2021</b>
<b>Last Date for full paper</b>	<b>20 January 2021</b>

### **Reach the venue:**

ICARI 2021 will be held at Meerut Institute of Engineering and Technology, Meerut (UP), 250005, India. It is about 70 km from Delhi. The nearest airport is the Indira Gandhi International Airport which is about 100 km away. There are 2 main bus terminals, namely Bhainsali bus terminal and Sohrab Gate bus terminal from where Uttar Pradesh State Road Transport Corporation (UPSRTC) buses ply to cities all over the state and all nearby cities. Meerut lies on the Delhi–Saharanpur electrified railway line. Daily trains connect Meerut to Delhi and cities in other states of India. The conference is ready to provide travel support on request. For more detail please [visit-www.miet.ac.in](http://www.miet.ac.in)

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ICARI-AS-20-11-01

## Chemical and Mineralogical Analysis of Sri Lankan Roof Tile Clays towards the Advanced Industrial Uses

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**Abstract:** Sri Lankan roof tile industry is having a long history since the ancient period because of the abundances of different clay varieties in the country. Dankotuwa area is one of the much famous area for the roof tile manufacturing and a few of clay deposits. As the technological and industrial enhancements, there were expected to characterize the roof tile clay in Dankotuwa area based upon the investigation of their specific characters and disclosing of their advanced industrial uses. The collected representative clay samples were analyzed using X-ray fluorescence (XRF) spectrometer; X-ray diffraction (XRD) spectrometer and Fourier transform infrared (FT-IR) spectrometer. As the obtained results there were identified the presence of Fe, Zr, Ba, Ti and K as the major elements in the percents of 75.72%, 3.36%, 5.30%, 2.95% and 12.67%, presence of kaolinite, quartz, glauconite and muscovite as the as the mineralogy of such roof tile clay verity. As some special investigations, it was not identified any heavy metal nor radioactive element. When considering the overall chemical composition and mineralogy of roof tile clay in Dankotuwa area, it seems that the concerned clay will be useful in a series of advanced industrial applications such as the waste water treatment applications to remove some heavy metals, pathogens and toxic compounds from waste water because of the high adsorption capacities of kaolinite, glauconite and muscovite for those unnecessary compounds and some of catalytic activities in advanced chemical processes because of the ferrous mineralogy and non-hazardous chemical composition of this roof tile clay variety since it is neglected the impact of Ba<sup>2+</sup>.

**Keywords:** Roof tile clay, Chemical composition, Mineralogy, Specific compounds, Advanced industrial uses

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ICARI-AS-20-11-02

## Elementary Characterization of Sri Lankan Feldspar for Advanced Industrial Uses

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**Abstract:** Feldspar is a group of minerals that mainly consist with aluminosilicates with some trace elements such as Ca, Na and K and also feldspar is one of most abundant minerals in the earth crust. Usually the minerals which are belonging to the group of feldspar have been investigated as strong abrasive materials, raw materials for both ceramic and glass industries and gem stones. In the existing research, there were expected to investigate some common and distinctive properties of feldspar that available in Owala-Kaikawala area in Sri Lanka and disclosing of their applicability and development of further advanced industrial applications. The collected representative feldspar samples were analyzed using X-ray fluorescence (XRF) spectrometer and optical microscope. As the major outcomes of the existing analysis, there were observed ~50% of K, ~40% of Ca with trace amounts of Fe and Zn. According to the analysis of the microstructures of feldspar, it seems that colorless, white and pinkish white grains with the shapes of tabular and prismatic crystals. In the comparison of elemental compositions of such feldspar, it is possible to conclude that the presence of both alkaline feldspar (orthoclase) and plagioclase feldspar (oligoclase) because of the presence of K and Ca. Also this feldspar could be further developed as the refractory materials for heat transferring processes and ion exchanging materials in the water treatment applications because of the higher Ca content.

**Keywords:** Feldspar, Characterization, Mineralogy, Chemical composition, Advanced industrial uses.

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ICARI-AS-20-11-03

## An Economic Quantity Model for Sequential Convertible Items

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**Abstract:** An economic quantity model for sequential convertible items is developed for sequentially convertible items which deteriorate with respect to time. The initial form of item converts into another form of different nature of items. The conversion cost and times need to convert the items. The demand of items is different for different converted items also the deterioration rate are different. As an example, milk is converted into butter and butter after duration. Conversion of items needs conversion cost and conversion time.

**Keywords:** Inventory, Convertible item, Conversion cost, Conversion time, Deterioration, Optimal time.

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ICARI-AS-20-12-04

## Does the Balassa-Samuelson Hypothesis Hold for BRICS Countries? With a distinct study of the Indian economy

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**Abstract:** Among all the important objectives that a country wants to achieve from an economic perspective, that is, to reduce the current account deficit, to reduce inflation, to combat unemployment, to reduce the public/fiscal deficit debt burden. The main target which underlying all these desires is economic stability. For economic stability, the exchange rate plays an important role, due to little fluctuation in exchange rates, exports, imports, domestic interest rates, debts and employment level gets affected.

The primary objective of this analysis is to empirically analyse, with the aid of the Balassa-Samuelson (BS) effect, the long-run relationship between the relative productivity differential (Tradable and Non-tradable goods sector) and real exchange rate movements.

This study uses industry-wise disaggregation provided by KLEMS database to investigate whether the more segregation of industries into non-tradable and tradable goods sector matters for real exchange rate movements across countries.

This study uses two groups, BRICS countries and the Indian economy for the period of 1991-2018 and 1981-2018 respectively. This paper investigated the long-term correlation between the real exchange rate and the productivity differential, using the panel co integration tests suggested by Pedroni and Kao. Contrary to the findings available in the literature, the study does not find any evidence of BS effect for BRICS nations but finds the evidence of BS effect for India.

**Keywords:** Real Exchange Rate, Balassa-Samuelson hypothesis, BRICS, Panel unit-root, Stationary test and Co integration tests.

ICARI-AS-20-11-05

## A Review on Comparative Analysis on Different Sort of Physiological and Behavioral Biometric Framework

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**Abstract:** Biometrics as the investigation of seeing an individual ward on their physical or conduct characteristics, biometric have now been conveyed in diverse business, ordinary resident and national security applications. Customarily the usage of biometrics devices has improved our capacity to give approved entry to material foundations. Biometric is the usage of a person's novel physiological, lead, and morphological trademark to give valuable person distinguishing proof. Biometric structures that are starting at now available today break down fingerprints, engravings, iris and retina models, and face. Mechanisms that are similar to biometrics anyway are not named such are lead systems, for instance, voice, imprint and keystroke mechanisms. These days biometrics is in effect effectively executed in numerous fields like measurable, security, recognizable proof and approval frameworks.

**Keywords:** Biometrics, Fingerprint, Retina, Iris.



ICARI-AS-21-01-06

## The Malaysian Dilemma: Constructing a Sustainable Economy in the Post-COVID-19 Era

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**Abstract:** The COVID-19 outbreak has been articulated as a global public health emergency by the World Health Organization (WHO). The expeditiousness and the repercussion of COVID-19 to the worldwide economy is unprecedented. The crisis is totally unique and abysmal due to its reciprocal effect on the pandemic as it explicitly observes an inversion of capital inflows, creating competitive and comparative financial instability in the commercial and public sectors. The crisis can be evaded if local or international investors effectively evaluate Malaysia's primary macroeconomic and fundamental structural conditions. The essential drivers are innovation and capital, whereby the way to forestall future crisis is to democratize the economy. The authorities may have to accomplish more to secure economic activities recovery, as certain components of the economy, such as manufacturing will see a quicker turnaround in comparison to the tourism and travel industry. This may mean giving further financial assistance, particularly to the most unfortunate 40% of the populace. This pandemic has likewise underscored the requirement for Malaysia to set up a more grounded social security framework that is practical and less divided to improve the welfare system, both during the recuperation and beyond. Such a framework would ensure hedging towards evolving trends of employment and income derivation.

**Keywords:** Post COVID-19 Crisis; Structural Reforms; Macroeconomic Policies; Economic Drivers; Post Pandemic Employment Market; Malaysia

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ICARI-AS-21-01-07

## How does Inward FDI lead to trade performance in India? An empirical investigation through ARDL approach

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**Abstract:** This study examines Foreign Direct Investment and trade relationship in India. Time series data has been taken for the period 1991-2019. Stationary Test (ADF & PP) confirms that Export, Import, Exchange Rate, GDP and Gross Fixed Capital Formation (GFCF) are stationary at 1<sup>st</sup> difference I (1) whereas FDI is stationary at level I (0). Auto-regressive distributive lag bound-co-integration method confirms long run association between FDI and export. Coefficient of FDI indicates significant and negative relation establishes between FDI and Export but the coefficient between FDI and import represent no relation. In short run-FDI and export as well as FDI and import confirm significant relation. Negative coefficient indicate that there is a need of efficiency seeking and export oriented FDI but negative relations support that Foreign Direct investors prefer market seeking FDI and they focused more on domestic market opportunity of India. Stability (CUSUM) test suggests that there is no structure instability in the model.

**Key Words:** Foreign Direct Investment, Trade, Gross Fixed Capital Formation, Exchange Rate.

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ICARI-AS-21-01-08

## **Impacts of New Agricultural Technology Adoption on Socioeconomic Status of farmers, in western Wollega, Ethiopia**

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**Abstract:** This study aims to assess the impact of new agricultural technology adoption on the livelihoods of the farmers, in western wollega, Ethiopia. A random sample of 450 farmers was selected using multistage random sampling from the study area. Logistic regression models, test hypothesis: Z-test, t - test and Chi-square test methods of data analysis were used in this study. Comparisons were made between agricultural technology adopters and non-adopters using the Z- test. To assess the impact of adopting agricultural technology on the educational status of the family, the ratio of children in schools to the total number of school aged children in the family, expressed as percentage. The ability of the household to feed the family was also seen in terms of the frequency of feeding the children and the adult. The percentage of farmers having corrugated iron sheet roofed houses, the percentage of farmers having separate kitchens other than their living rooms for cooking and the percentage of farmers having separate structure for livestock other than the living room were used to assess the impact of agricultural technology adoption on the housing conditions of the farmers. It was found that technology adopters are better off than the non adopters in terms of sending children to elementary school, housing conditions and ability to finance their families' food requirements. After all analysis, it can be concluded that adoption of agricultural technology enables the farmer to send children to school, have improved housing conditions, and food secured than the non-adopters. Finally, the results were recommended as creating the awareness about the uses of education, business awareness and advising the producers and non-producers of agricultural technology adoption.

**Keywords:** Agricultural Technology, Farmers, Adoption, Western Wollega, Ethiopia and Education.

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ICARI-AS-21-01-09

## Use of Computer-Aided Instruction for Effective Teaching and Learning of Physics in Secondary Schools in Makurdi Local Government Area of Benue State

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**Abstract:** Computers today are widely used to do many computations in a fraction of time; it would take most humans to do. The study is therefore set-up to find out if the use of computer-aided instruction would improve students' performance in computer science in secondary schools. A quasi-experiment was carried out on forty (40) students from two (2) selected secondary schools in Makurdi Local Government Area of Benue State as sample. A pre-test-post-test method of data collection was adopted. Descriptive statistics was used. The pearson product moment correlation coefficient of internal consistency for conventional teacher oriented method and the computer aided instruction was 0.6231 which is an indication that difference exist between the two groups also from the test analysis and comparison, t-critical (t-crit) was greater than t-calculated (t-cal) i.e t-crit 1.73 > t-cal 0.18. Two hypothesis were tested at  $P < 0.05$  level of significance using t-test analysis. The result of the findings showed that, students who learnt via computer-aided instruction performed better than those who learnt via the conventional teacher oriented instructions or the chalk board method. Also, male students performed better than the female students using computer-aided instruction. It is recommended that, computer-aided instruction should be used in schools to teach various concepts in computer science.

**Keywords:** Computer-aided instruction, conventional, performance.

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ICARI-AS-21-01-10

## Analysis of Embedded Designs in Mechatronics Systems

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**Abstract:** As technology rises in almost every field, mechatronics systems are of no exception as embedded systems are incorporated as part of their design. This introduces mechatronics system to high computer intelligence manipulations and high task performance. However, the story is not always the same as engineers are unable to implement efficient embedded designs for mechatronics systems. Embedded mechatronic systems rely on many factors. Some include vibration, electrical and electromagnetic, mechanical and the intelligence of the software component. In addition, reducing the associated cost, size, and complexities for process innovation becomes highly significant. The project analysis efficient design techniques for embedded systems which includes design robustness, intelligent embedded system software, power consumption and memory optimization. Embedded systems have become ubiquitous and as a result optimization of the design and performance of programs that run on these systems have continued to remain as significant challenges to the computer systems research community.

**Keywords:** Mechatronics, Embedded Systems, Optimization.

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ICARI-AS-21-01-11

## Where Beta going – Case in Viet Nam Electrical and Computer Company Groups after Low Inflation Period 2015-2017

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**Abstract:** The Vietnam economy has obtained lots of achievements with GDP growth rate normally more than 5% after the financial crisis 2007-2011, until it reached a low inflation rate of 0.6% in 2015. Vietnam electrical and computer industries are growing fast and contributing much to the economic development and have been affected by inflation. High and increasing inflation might reduce values of bank and insurance contracts whereas low inflation under control may have positive impact on local economy. This paper measures the volatility of market risk in Viet Nam electrical and computer industries after this low inflation environment (2015-2017). The main reason is the necessary role of these financial companies and their system in Vietnam in the economic development and growth in recent years always go with risk potential and risk control policies. This research paper aims to figure out how much increase or decrease in the market risk of Vietnam electrical and computer firms during the post-low inflation environment 2015-2017. First, by using quantitative combined with comparative data analysis method, we find out the risk level measured by equity beta mean values in the electrical and computer industries are acceptable, as they are lower than ( $<$ ) 1.

Then, one of its major findings is the comparison between risk level of electrical industry during the post-low inflation period 2015-2017 compared to those in the hardware and software industries. In fact, the research findings show us market risk level of electrical industry; one kind of financial risks, under the impact of debt leverage has decreased much. Whereas risk fluctuation in hardware industry has increased. Finally, this paper provides some ideas that could provide companies and government more evidence in establishing their policies in governance. This is the complex task but the research results shows us warning that the market risk need to be controlled better during the post-low inflation period 2015-2017. And our conclusion part will recommend some policies and plans to deal with it.

**Keywords:** Risk management, asset beta, financial crisis, commercial electric industry, hardware industry, software industry, macro policy.

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ICARI-AS-21-01-12

## NGO'S Contribution in Central Government National Food Security Act: a Case Study of Delhi/NCR

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**Abstract:** National food security act is one of the largest and broadest scheme launched and running by Government of India to make country food secure. But due to large diversity in context of population and area of country central and state government together are unable to fulfill the requirement of scheme so government need the support of society. There are number of individuals and groups who are working with government in different schemes as cooperatives, Non Governmental Organization, self Help group, Nonprofit Organization, social welfare societies. So here we are focusing only on NGO working with government in National food security act 2013. In this paper we will study the contribution of NGOs in NFSA (National food security act) in Delhi/NCR region.

**Key words:** NGO, NFSA, Government.

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ICARI-AS-21-01-13

## Detection of Adulteration in Spices

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**Abstract:**Spices are dried part of a plant other than leaves commonly used for colouring or flavouring of food. Despite the fact, spices are also used as preservatives and have its medicinal importance too. Spices are grown all over the world. In production of spices India plays a major role. India is the world's largest producer, consumer and exporter of spices. 75 out of 109 varieties of spices are produced in India.

In middle ages, spices were considered as precious as gold because of its medicinal and preservative properties. Nowadays, spice adulteration has become a serious problem which is increasing the impurity of products thus making it imperfect to consume. Adulteration is regularly done because of consumer's behaviour as they want to buy stuffs at lowest possible price. Ground spices usually adulterated with artificial colours, starch, chalk powder, etc. These additives increase their weight and also enhance appearance. Adulteration is not only degenerating the quality of food but also affecting the health of individuals.

This study summarizes the detection of food adulterant in red chilli powder and turmeric powder through various physical and chemical methods. Branded and non- branded samples of above-mentioned spices were collected to study the level of adulteration and quality difference between them. Detection was carried out through chemical analysis and visual inspection. This study is done to aware public about food adulteration.

**Keywords:** Adulteration, Food, India, Products, Spices

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ICARI-AS-21-01-14

## Effects of Pandemic on Economic Development and Sustainable Development Goals (with special reference to novel corona virus)

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**Abstract** -The worldwide economy has reached a halt after the attack of the dangerous Corona virus. Since March 2020, Many countries have done lockdowns to protect the life of its citizens, which is the major step to accomplish the sustainable goals 2030 (SDG 2030). The nation is constantly putting forth attempts to battle and conquer this human and financial emergency. The present circumstance has unquestionably upset the way of the nations in accomplishing their Sustainable Goals for the next decade. Some countries have recovered well and are not losing the expectations. As to resuscitate the Indian economy and bring similar energy among the citizens The Prime Minister of India has announced bailout bundles. The virus has affected the social as well as the financial development of every country hence the effect of Corona virus on SDG 2030 and the world economy is the main focus of this paper plus some of measures to conquer it.

**Keywords:** Gross Domestic Product, Corona Virus, Sustainable Development, Socio-economic impacts

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ICARI-AS-21-01-15

## Role of Different Energy Sources in India's Energy Transition

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**Abstract:** Continuously reducing cost to renewable power is restructuring the global energy sector. With India planning to work on what will apparently be the largest renewable energy park in the world, the government is trying to reduce its dependence on its primary energy resource, coal. This paper discusses the status quo of the Indian energy scenario and its dependence on coal. It also covers further discussion on various challenges that are prevalent in the adoption of renewable sources in the Indian context.

**Keywords:** Energy, planning, renewable, Indian scenario.

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ICARI-AS-21-01-16

## Modernization of a City into Smart City - Ajmer

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**Abstract:** Smart City is a booming international concept. Smart cities concept reiterates to what we have already been doing so far as Planners and Architects. However, the smart cities concept today, especially in India, in its ideological sense of the term, has more to do with the efficiency and accuracy of our planning systems by the use of resources to get the most benefit, with minimum cost and damage. The conceptualization of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents.

The paper aims at understanding the approach for "Smart city" in context to the city Ajmer. The vision statement for Ajmer has been evolved after extensive citizen consultations, self-assessment of the city, and analysis based on the previously prepared city reports/ documents. The city's vision has been validated with the help of various stakeholders along with the mapping of desires of the citizens of Ajmer. The vision is based upon five core themes that have been derived from this process with an aim to develop Ajmer as a global, religious and heritage tourism destination with high quality living and sustainable smart citizen services.

**Keywords:** Smart city, Sustainability, Smart citizen, Smart buildings, Smart mobility, Smart economy, Smart

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ICARI-AS-21-01-17

## Indus Valley-A Smart Civilization: Review

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**Abstract:** Different civilizations in different era have struggled with concepts of smart growth and worked on different parameters. In today's context, the government is trying to impose "Smart" City development in light of resource crunch for future generations. This paper is intended to put in perspective, ancient Indian cities with measurable parameters of currently developing Smart city mission. Taking into account the current state of cities and need of evolution of smart cities in process, the current relevant Smart city parameters are broadly classified and interpolated to define the ancient city of that particular era.

**Keywords:** Smart City, Sustainable, Civilization.

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ICARI-AS-21-01-18

## Devastating Disease Cancer: A Theoretical Study and Recent Trends

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**Abstract:** Cancer is a lethal disease and the whole world is affected by this. Cancer is the second most dangerous and death leading disease all over the world. In the normal human body, cells can grow and after sometime a cell leads to death and another cell grows, by this procedure, particular cells and all types of cells remain constant but in Cancer disease, abnormal cells develop and divide uncontrollably and destroy the normal body cells and tissues mainly mutation is responsible for cancer. This research paper is trying to help in understanding all the important points about cancer disease. Cancer is the elementary unit of tumors; it leads to uncontrolled division of cells. Chronological growth of mutation in on cogenesis is responsible for the origin of cancer. Unbounded division of cells gives birth to the tumor, that is of two types, benign tumor and another is malignant tumor which is also known as cancer. There are many types of tumor antigens that are present in the human body and sometimes react against these antigens in the form of destroying tumors, NK cell activity and many other ways. This lethal sickness includes breast cancer, lung cancer, bladder cancer, kidney and renal pelvis cancer, thyroid cancer, melanoma of the skin, pancreatic cancer, and liver cancer. In all among Cancer pancreatic cancer is difficult to recognize and diagnose that's why it is rapidly killing cancer. The death rate is higher among men than women. According to IARC in the year of 2020, the graph of death increases by cancer, a total of 19.3 million cases appear and 10 million had to lose their lives. As reported by the National Cancer Institute there are some methods that are helping in the healing of carcinoma disease as- Hormone therapy, immunotherapy, radiotherapy, surgery, stem cell transplantation etc. This research paper outlines the current research and development to prevention and cure of cancer and explains all about cancer, and we try to give some little contribution to get rid of this dangerous disease.

**Keywords:** Cancer, Tumor, Tumor Antigens, Therapies, Recent Discoveries of Cancer.

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ICARI-AS-21-01-19

## Redefining the Ethics and Aesthetics of Concrete in Contemporary ISMS of Architecture

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**Abstract:** This research paper is a celebration of concrete. It's about millennial of evolutionary changes of the material - which is often questioned at being a material - still struggling to get itself defined; getting better, and perhaps new. The paper represents the developments and innovations in concrete; the material which has been at the core of contemporary discussions and experiments, leading to avant-garde horizons exhibiting its capabilities and possibilities. It aims to comprehend the imminent capabilities and dimensions of aesthetic morality of concrete in the contemporary architecture, spurred along its evolutionary process. It about knows the concrete and an attempt to provoke discussion and study of the material. Further, the objective is to establish a relation between the developments in concrete, and the developments in architectural languages and philosophies generating the so-called contemporary isms of architecture with redefined ethics and aesthetics of the material. The analysis contributes valuable sagacity into concrete's prolonged trajectory as an architectural material and is an insight of what the future for such an ancient material looks like. The overall vision is to anticipate what more is yet to come out from concrete.

**Keywords:** Architecture, concrete, aesthetics, material.

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ICARI-AS-21-01-20

## Oral Health Surveillance and Maintenance using Biologically Inspired and Programmable Nanobots

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**Abstract:** This study examined oral health surveillance/maintenance using biologically inspired and programmable nano-bots. Growing interest in the future of dental applications of nanotechnology has given rise to a new field called nano-dentistry. New treatment opportunities in dentistry include local anesthesia, dentition denaturalization, permanent cure of hypersensitivity, complete orthodontic realignment during a single office visit, covalently bonded diamond enamel, and continuous oral health maintenance with the help of mechanical dental nano-bots that destroy caries-causing bacteria and even repair blemishes on the teeth where decay has set in. This study explored viable high-tech and effective management options at the microscopic level, termed nanotechnology, with a view to proposing viable dental and periodontal health future directions.

**Keywords:** Biological Materials, Nano-bots, Dental Nanostructures, Minute Cellular Machines, Nano-therapeutics.

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ICARI-AS-21-01-21

## Learning to Read Scientifically: Developmental Dyslexia and the Challenges Ahead

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**Abstract:** Ability to read is an important skill for interpreting and comprehending the world around us. Developmental Dyslexia is a type of Specific Language Disability which hampers the reading process and affects millions of children across the world. Developmental Dyslexia is defined as a hereditary temporal processing defect associated with impaired magno-cellular neuronal development causing visual and auditory temporal processing deficits (John Stein, Brain Sci. 2018). A traditional learning environment with little flexibility could offer little scope for attention to specific needs of dyslexic learners who stand to gain better through alternative methods for reading, writing and learning. Research in the science of reading suggests a complex synergy of verbal, phonological, neurological and visual processing functions to ensure and enhance reading ability. Scientific evidence points to the fact that reading each word lights up specific brain areas that create the right pathways for creating the sound-word-symbol linkage and letter sequencing.

In this paper, the author explores the recent developments in reading science which can guide intervention strategies for improving the reading ability of dyslexic adults. The paper also suggests that with the growing evidence of neuro-plasticity (which is the ability of human brain to make new connections and develop capacity well into the adult age), there is high probability that dyslexic readers could be trained methodically to be at par with readers of their respective age groups and academic requirements.

**Keywords:** Neuro-plasticity, Reading Science, Developmental Dyslexia.

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ICARI-AS-21-01-22

## Evaluation of Green Tea Effect on Oral Bacteria, Streptococcus Mutans

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**Abstract:** Tea is a gift of China to the world. It is a popular beverage consumed by almost every person globally, after water. Green tea has not gone under oxidation process and found beneficial for human consumption because of its medicinal properties and presence of some nutrients and minerals required by human beings for a healthy life. Molecular component of green tea (Polyphenols, catechins, flavonoids and minerals) makes it suitable in ailments and some microbial infections. Oral cavity has the second largest and diverse micro-biota after gut, as numerous microorganisms such as bacteria, fungi and viruses exist in the mouth. Streptococcus mutans is facultative, anaerobic oral bacteria mainly responsible for tooth decay was selected for the present study because dental plaque and caries are common infections found in population. For experimental purpose 30 healthy individuals were randomly selected. Saliva of each individual was taken twice i.e. before and after green tea consumption. For identification and confirmation of S. mutans, biochemical tests have been done. The effect of green tea was observed by the growth and count of S. mutans on common (nutrient agar media) and special media (Mitis Salivary agar media). Plates were showing less count after green tea consumption as compared to the plates before consumption of green tea. On the basis of the results, it can be concluded that Green tea is the natural preventive and curative agents and is good to consume once in a day to reduce the count of Streptococcus mutans in mouth to maintain oral health.

**Keywords:** Green tea, Streptococcus mutans, polyphenol, medicinal properties, antibacterial.

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ICARI-AS-21-01-23

## Personality Correlates of Online Gaming Addiction: A Study on Indian Adolescents

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**Abstract:** Game is one of the greatest technology industries in the present times. Although the gaming industry is at boom but it has serious repercussions too on the mental health of adolescents and not much research is available. Thus, the present paper focuses on the personality correlates of online gaming addiction. For this, a sample of 100 students of UG and PG were taken from Central University of Haryana with the age group ranging from 18-28 years with the mean age of 23 years were administered with NEO-FFI (Costa and McCrae, 1995) and Internet Gaming Addiction test (IGD- 20) (Halley M Pontees, 2014). The obtained data were analyzed using descriptive statistics, Pearson's correlation and Principal component Factor analysis. The study suggests that certain personality factors such as neuroticism and agreeableness played a vital role in the acquisition and maintenance of online gaming addiction. Although studies on larger sample are required in order to generalize the results.

**Keywords:** Online game addiction, Personality, Adolescents.

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ICARI-CE-21-01-01

## Various Intensification methods for Adsorption-a review on studies and investigations

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**Abstract:** Adsorption is used for removal of pollutants and waste gases from liquid and gases effluent. Use of waste material for adsorption preparation makes this method more attractive. Regeneration of this adsorbent is very important aspect of the application of adsorption for various applications. Intensification of the adsorption bed includes reducing cycle time for pressure swing (PSA) and temperature swing (TSA) adsorption increasing thermal conductivity of the bed, optimizing various operating parameters. Regeneration of bed is an important aspect in adsorption desorption cycle as the low thermal conductivity of adsorbent is responsible for extended cycle time. To increase the conductivity, conducting materials in the form of composite fins can be used. This review aims to study of different intensification technique for adsorption desorption process.

**Keyword:** PSA, TSA, Regeneration, Intensification, Conductivity

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ICARI-CE-21-01-02

**Synthesis of microcrystalline cellulose from raw feed stock: Review**

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**Abstract:** Reduction of waste and cost are the most important aspects of research and development in chemical and allied fields. Solid waste treatment is gaining importance due to its effect on the groundwater quality and soil quality. Solid waste can be dealt with by three principles, reduce, recycle and reuse. Reduction of solid waste by dewatering, reuse solid waste and recycling of non-putrescible waste can reduce the solid waste treatment and disposal problem significantly. Many products like ethanol, acetic acid, microcrystalline cellulose, citric acid, peptic acids etc. can be derived from waste materials. The use of agricultural materials for synthesizing various products is increasing. Microcrystalline cellulose (MCC) is one such product useful in bakery, dairy and beverage industry. It has also found applications in pharmaceutical industry. This product can be derived lignocellulose biomass. Various treatment technologies can be use for pretreatment of biomass. Selection of raw material for MCC is based on factors such as raw material, composition, availability, toxicity, cost, byproduct generation, and socioeconomic aspects. Acid hydrolysis is used for converting cellulose to MCC. This review aims to study various raw materials and methods for obtaining MCC from low cost feed stock.

**Keywords:** Cellulose, hydrolysis, sustainability, waste, biomass, disposal.

ICARI-CE-21-01-03

**Removal of heavy metal ions with sugarcane bagasse, tea waste powder and pomegranate peels powder from synthetic solution**

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**Abstract:** Bio sorption is being an alternative to conventional methods for the removal of toxic heavy metals from industrial effluents. These conventional methods are expensive, hence the use of low cost, abundant environmentally friendly bio sorbents have to be used. The advanced development of the bio sorption processes requires further improvement in the direction of modelling, regeneration of bio sorbent material and of testing immobilized raw biomasses with basic industrial effluents. Adsorption behaviour of copper and lead from waste water has been investigated in this paper using various adsorbents like sugarcane bagasse, pomegranate peel and tea powder. Copper and lead are highly toxic metal ion and considered as a priority pollutant released from various chemical industries like electroplating mixing activities, smelting, battery manufacture etc. Effluents have been excessively released into the environment due to rapid industrialization and have created a global concern. Therefore they must be removed before discharge. In the present paper, the experimental results carried out in batch adsorption process using treated Bagasse, tea powder and pomegranate peel powder with synthetic samples prepared in laboratory were presented. The various parameters such as solution pH, initial copper concentration, temperature and adsorbent dosage on the adsorption of Cu were studied and presented. The maximum removal of Copper is above 93% that was observed at pH of 5 for Bagasse in 100ppm Copper solution. The maximum removal of copper is above 90% that was observed at pH of 6 for tea powder in 100ppm copper solution. The maximum removal of copper is above 88% that was observed at pH of 6 for pomegranate peel powder in 100ppm copper solution. The maximum removal of lead is 90% that was

observed at pH of 5 for pomegranate peel powder in 100ppm lead solution. The maximum removal of lead is 85% that was observed at pH of 5 for tea powder in 100ppm lead solution. The maximum removal of lead is 80% that was observed at pH of 5 for sugarcane bagasse in 100ppm lead solution.

**Keywords:** Harmful; Pollutants; Toxic; Sludge; Wastewater.

ICARI-CE-21-01-04

## A Review on Cellulose Based Material for Dye Removal

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**Abstract:** Cellulose is one of abundantly available biopolymer present in nature, which has its wide application for the removal of dyes by adsorption method. These cellulose-based materials have been used as an effective adsorbent, presenting high specific areas with contracted pore size distributions, easy modification, light weight, biodegradability, biocompatibility, high ductility etc. Cellulose and its derivatives have ability of modification in its structure. Modification of cellulose and its derivatives enhances its Hydrophilic/ hydrophobic nature, mechanical resistance, elasticity, adsorption may also increase its pollutant adsorption ability. This review paper presents the various research papers and articles published, which have research work related to cellulose and its derivatives as a successful adsorbent. This review paper reflects that cellulose and its derivative based materials are very effective in treatment of dye effluents via adsorption technique. These materials can be recycled and reused for many adsorption cycles.

**Keywords:** Cellulose, adsorption, dye, adsorbent.

ICARI-CE-21-01-05

## A review paper on strength and durability of high strength concrete including fly ash and silica fume

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**Abstract:** In our project work, we present the possibility to utilize the concrete to produce High Strength Concrete (HSC). For making the concrete mixes, Fresh Aggregate (FA) of 8-16mm fraction, Ordinary Portland Cement (OPC) of grade 53 with using other composite cement-like class F Fly Ash and Silica Fume will be used. The concrete sample specimens will be tested for mechanical properties and for some properties which are related to durability. We will test the concrete samples of M-55 after 14 days, 28 days and 52 days respectively. After 28 days compressive strength values of the High Strength Concrete sample cubes will be achieved upto 60MPa. Besides we will be obtained good values regarding these properties. For High Strength Concrete, Here we are using Fly Ash and Silica Fume in the cement for increasing the strength of concrete upto 60MPa.

**Keywords:** Compressive Strength, Fly Ash, High Strength Concrete, Silica Fume.

ICARI-CE-21-01-06

## Characterization of flexible pavements by using plastic waste: A review paper

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**Abstract:** In our project work, we present the application of scrap plastic substances as partial substitution of bitumen to enlarge an alter binder, for preparing bituminous concrete mix. To reproduce with the area situation, Marshall stability analysis was accomplish on the specimen prepared by imperfect substitute Most appropriate bitumen content with scrap (4%, 6%, 8%, 10%, 12%, 14% and 16%) and after that they are coated with recycled coarse aggregates of size 5-20 mm which enhance the properties of bituminous mix for the longer life and better pavements performance. Therefore, the utilization of scrap in bituminous concrete mix thus contributes to establishment of green roads and solves the issues of its safe dumping as well.

**Keywords:** Bituminous mix, Plastic waste, recycled coarse aggregate, Marshall Stability.

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ICARI-CS-21-01-01

## Twitter sentimental analysis through machine learning and Comparative Analysis of Different Models

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**Abstract-** In this paper, we are willing to adopt an approach that uses a Sentiment analyzer that incorporates Machine Learning. This paper also gives an examination of strategies of sentiment analysis in political sentiments by applying directed ML calculations. Hence we built up a program model for feeling and sentimental examination to deal with users and people sentiments. This paper provides details regarding the plan to analyze sentiments by extracting a tremendous number of tweets. Results classify clients' viewpoint through tweets into positive and negative, which is spoken to in a pie outline and html page

**Keywords:** Computationally, ML, positive, Sentiment analyzer.

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ICARI-CS-21-01-02

## Child Tracker: Web Port on Human Trafficking

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**Abstract** – To reach out to any missing person or his family from any corner of the world, nothing can be better than the Social Media. It can give a reference or a clue that can help in identifying the person who has been exploiting. That reference can be used by the police to find out that person. This paper throws a light on a crucial topic “Human Trafficking”. It is the worst crime ever and this act cannot be done by a single or two persons. There is a gang or the chain of people including a minimum of 6 to 7 persons and this chain needs to be broken. So, the goal is to stop this disgusting crime, we have come up with the idea of designing such a cloud based web portal that can help in reaching the sufferer in the minimum time with the use of social media integrating with our database. Dealers utilize an assortment of intentions to publicize the illegal sexual administrations of the youngsters and ladies they offer, including Internet arranged promotions, announcement sheets, and web-based media related with escort and massage services(EMS).[4] A picture gets viral on social media in a few seconds. So, we have used this idea to come up with the web portal for the protection of the trafficked persons.

**Keywords** – Human trafficking, UNICEF, cloud based web portal, EMS.

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ICARI-CS-21-01-03

## Information Technology in Hospital Management during an Epidemic and Pandemic

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**Abstract**— Hospitals assume a basic function inside the wellbeing framework in giving fundamental clinical consideration to the network, especially during a plague or a pandemic. Pandemic readiness arrangement is significant for guaranteeing wellbeing and other basic frameworks keep working during a pandemic, in this manner lessening the monetary and social cost[1].While data frameworks probably won't have the option to explain the emergency legitimately, we accept that we can give information that may be useful in the battle against pandemics. This work proposes a powerful arrangement on the plan, use and effect of data frameworks during pandemics. The speed at which pandemics has arisen and scattered, we accept that data frameworks analysts would now be able to assume an imperative job. Utilization of current data advances can help beat pandemic for the time being, and are additionally well-suited to inspect how best we can use innovation to recuperate over the long haul. It is frequently the social and authoritative parts of these innovations and their usage that will characterize achievement in pandemic fight, and it is these angles instead of the advancements themselves that are generally testing. Understanding the part of Machine Learning and AI in pandemic related practices is a basic case of this test.

**Keywords:** Epidemic, Pandemic, Artificial Intelligence, Machine Learning, Information Technology.

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ICARI-CS-21-01-04

## Key aspects of Autonomous driving software

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**Abstract:** In era of the automation, the autonomous car or the driverless car are often mentioned as a robotic car in simple language. The project implemented by providing the video picture for finding the path or lanes for driving a car using Anaconda environment and machine learning tools. This project is capable of sensing the environment, navigating and fulfilling the human transportation capabilities with none human input. It is an enormous step of advance technology. Our main objective in this project is to create and develop software that can automatically find the lanes of the road and then accordingly predict the steering angle required to make the turn. This project is implemented using OpenCV by python. The key aspects of Self-driving car works on the basis of angle movement without interruption of human and after that the results of actual angle and moved angle of cars are compared. In the proposed work we are using video lanes for better finding of lanes or paths to move to predetermined destination over roads.

**Keywords:** autonomous driving software, OpenCV, Machine learning

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ICARI-CS-21-01-05

## Advanced Hydroponics Fodder System with Temperature Control Using Arduino

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**Abstract:** In Hydroponics fodder system, fodder is produced using temperature sensor DS18B20 which controls the temperature underneath the roots. The code is uploaded using USB cable to Arduino UNO. Plants are grown without soil and pesticides or fertilizers. These plants will be grown in low cost and low maintenance devices. The plants grow and develop fully in 7-10 days. For making it conventional for traditional farmers, use of nutrient solution is not necessary; they can also use tap water. In a country like India, Wheat is the most chosen grain for traditional farming, so wheat could also be used to produce fodder. The fodder produced will look like green sheet of about 30 cm height compromising of seeds, plants, roots and stems. To produce 1 kg of good quality wheat fodder, about 2-3 litres of water is required, which yields of about 5-6 times on regular basis. The fodder which is produced using hydroponics is more digestive and nutrient rich while providing other dietary benefits to the cattle. In the view of cost, the cost of seed contributes about 87% of the total cost of hydroponics wheat fodder. A cow needs about 5-10 kg of supplement every day, so hydroponics wheat fodder will provide organic, fresh and nutritious fodder to the cattle without any chemical supplements. Feeding hydroponics fodder will increase the ability to digest the nutrients for the cattle which will result in increased production of milk as compared to conventional feeding methods. Hence, fodder produced using this system can be used by the farmers to feed their livestock in a cost effective manner.

**Keywords:**Hydroponics fodder system, temperature control, Arduino

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## Meeting Scheduler Application using Kotlin

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**Abstract:** Humans get excited at the thought of hosting or attending meetings, these meetings being a necessary and valuable part of any project/goal should be conducted with all the professionalism and sheer dedication. With everyone being packed by their schedule and work, and also with sometimes the participant's strength going in double digits, scheduling a meeting can be both hefty and tiring. Minutes, also known as minutes of the meeting (MOM), are the instant written record [6] of a meeting/convention. These minutes typically describe the events of the meeting and may include a list of participants, date, time, location, related responses or decisions for the issues and the goals, the meeting wants to achieve at the end. Note down concisely the matters, topics and agendas that are being dealt with and decided on during a meeting and to share the minutes of the meeting with everyone. That is a permanent record of the meeting for future purposes which can be both professional and legal. The minutes should contain mainly a record of what was done at the meeting. Note down in a concise way the matters that are being dealt with and decided on through a meeting and to fabricate the [4] minutes of the meeting to everyone. Users can be assigned duties. The date, time, place, list of attendees and anything else for the future meeting can also be planned. All official decision, reports given, and maybe the vote may also be included.

**Keywords:** Meeting, Agenda, record, Official decisions, date and time.

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## De-Anonymization For the Heterogeneous Social Networks

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**Abstract-** In this paper, we propose a Novel Heterogeneous De-anonymization Scheme (NHDS) aiming at de-anonymizing heterogeneous social networks. NHDS first leverages the network graph structure to significantly reduce the size of candidate set, then exploits user profile information to identify the correct mapping users with a high confidence. Performance evaluation on real-world social network datasets shows that NHDS significantly outperforms the prior schemes. Finally, we perform an empirical study on privacy leakage arising from cross-network aggregation based on four real-world social network datasets. Our findings show that 39.9 percent more information is disclosed through de-anonymization and the de-anonymized ratio is 84 percent. The detailed privacy leakage of user demographics and interests is also examined, which demonstrates the practicality of the identified privacy leakage issue.

**Keywords:** Social Network, anonymization, mapping, heterogeneous.

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ICARI-CS-21-01-08

## Short-term temperature and Rainfall prediction at local and global spatial scale: A review

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**Abstract**—Uncertainty in weather dynamics makes it important to build accurate weather prediction systems because it can save lives by better preparing people for an upcoming incidence. The aim of present research study is to present a comprehensive review of recent scientific works for short term temperature and rainfall prediction on both local and global spatial scale. The literature shows that some meteorological factors like Atmospheric pressure, precipitation, dew point temperature, solar radiation, vapor pressure, cloud cover, snowfall, humidity, wind velocity and wind direction are potential measures to predict future temperature and rainfall. We focused on recent applications of machine learning as well as deep learning models like Deep Echo State Network, recurrent neural network, convolutional recurrent neural network, and graph convolutional network, Autoencoders, Multi layer Perceptron and Long short term memory. Applications of multimodal learning, reservoir computing and multitask learning have shown noticeable enhancement in the prediction accuracy of other state of art the models. Fine capability of CNN to extract suitable patterns from numeric weather data is also reported. The time interval of data recording also affects the prediction accuracy greatly. More frequently recorded input data worked better than less frequently recorded data. The use of electromagnetic sensors instead of satellite and radar setups is reliable as well as cost effective for collecting data for prediction. Evaluation indices related to hit rate of rainfall and no rainfall, Caching rate, Overlooking rate and Swing-and-miss rate can be considered as statistical measures along with other statistical metrics in case of rainfall prediction.

**Keywords:** Deep Echo state network, weather prediction, multimodal learning, Deep Learning, multitask learning, reservoir computing.

ICARI-CS-21-01-09

## A Comparative Analysis of Machine Learning Techniques for Heart Disease Prediction

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**Abstract:** Heart diseases are of great public health concern worldwide. An early diagnosis of heart disease is critical for many health care providers to prevent their patients and save lives. Previous studies have proposed different machine learning techniques to predict heart diseases independently but unfortunately the literature still lacks a comparative analysis. This paper presents a comparative analysis of heart disease prediction that employs ten different classification models and optimizes them in order to correctly classify cases of heart disease. The classification algorithms are evaluated on UCI Machine Learning heart disease dataset. The dataset is multivariate in nature that contains 303 instances with 76 attributes but subsets of 14 attributes are used for experiments. Besides the classification performance and accuracy, the impact of different hyperparameters settings and their sensitivity analysis are also outlined. This comparative analysis reveals the strengths and weaknesses of all the ten approaches which form a solid base for further research, accurate prognosis and detection of heart disease.

**Keywords:** Heart Disease, Machine Learning, Classification, Prediction, Evaluation.

ICARI-CS-21-01-10

## Virtual Tour Guide using Enhanced Route Recommendation Algorithm

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**Abstract-** We realize that the most valuable thing in our human life is time and managing it effectively and living the most out of each and every moment is our greatest desire that's what today age of technology is has best to offer. In this context, the proposed work as a mobile application aims to provide an effective usage of time in a well-planned and systematic manner so as the traveler while travelling gets the best out of each and every place they visit. In order to accomplish that we propose an application-based system that shows the optimal route and a planner within the time provided.

**Key Words:** Android Studio, Google Maps API, Firebase, travel, Planning, Guide

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ICARI-CS-21-01-11

## Routing in Opportunistic Networks: Implementation and Research Challenges

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**Abstract:** Opportunistic Networks can be defined as Delay Tolerant Network, which are formed dynamically with participating nodes' help. Opportunistic Networks follows Store-Carry-Forward principle to deliver/route the data in the network. Routing in Opportunistic Network starts with the Seed Node (Source Node) which delivers the data with the help of Intermediate nodes. Intermediate nodes store the data while roaming in the network until it comes in contact with appropriate forwarding node (relay node) or destination node itself. An extensive literature survey is performed to analyse various routing protocols defined for Opportunistic Network. With mobility induced routing, establishing and maintaining the routing path is a major challenge. Further, Store-Carry-Forward routing paradigm imposes various challenges while implementing and executing the network. Due to the unavailability of the suitable relay node, data needs to be stored within the Node's Memory, imposes buffer storage issues at the node level. Also, uncontrolled flooding may impose link-level Congestion and treated as overhead to maintain the network. Another major challenge can be maintaining the energy level of the nodes in the network. Recently developed ONE (Opportunistic Network Environment) Simulator is used to simulate and emulate the environment required by Opportunistic Network. Along with the extensive literature survey of the protocols, few of the existing protocols viz. Direct Delivery, ProPHET, Epidemic and Spray & Wait Routing are implemented on using ONE Simulator to analyse their performance while in execution. Results are being compared, and the researchers' future direction is identified to address the open problems and challenges in Opportunistic Network.

**Keywords:** Network, Opportunistic, ONE Simulator, OppNets, Routing.

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ICARI-CS-21-01-12

## Face Recognition Attendance System

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**Abstract** In this work we have proposed a Live Automated Attendance Marking System for institutional purpose. It is quite difficult to maintain manual attendance properly for a large number of students and maintain records of every class with day to day activities is a challenging task as there might be some human errors like a proxy. Moreover, taking attendance consumes lot of time which can be utilized in making the concepts much clear. Some automated systems have been developed to get rid of issues such as accuracy and fake attendance. To solve these issues, highly automated face attendance system is required. In this system we are supposed to make an algorithm learn using different machine learning models, that will automatically recognize a student based on his different facial features, whenever, he appears in front of the web cam, and afterwards the record will be automatically updated based on the recognition and detection. Whenever the camera detects any face, our system will check the information related to it in the created database with the help of image-recognition technique. But there are multiple cases and different circumstances under which the user takes the picture thus, the image recognition algorithm should be an invariant in viewpoint and illuminations. Finally, the best match will be selected by computing the distance between the vectors of the captured image and the image present in the created database.

**Keywords:** Face recognition, automatic, attendance, web cam, image processing.

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ICARI-CS-21-01-13

## A study on the Enhancement and text recognition of an image

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**Abstract:** Image enhancement and text recognition of the image are the most important and challenging task now a days. The purpose of the image enhancement is to get the image which will be much better than the previous image. In the image enhancement there will be two tasks. First one is to enhance the image and second one is to flip the image. In flipping, the mirror image of the selected image will be produce, this is also more challenging task now a days. In this paper, one more task of text recognition from image is there in which we will extract all the text from the image (even from the corners). Many techniques have been proposed for all these tasks but in this paper there is a new approach of solving these entire tasks in a more efficient way. All these tasks are linked in such a way, so that any task can be performing – image enhancement, flipping and text recognition.

**Keywords:** Pytesseract, Flipping, Optical character recognition.

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ICARI-CS-21-01-14

## Criminal Face Detection System

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**Abstract:** Criminal record generally contains all the information both personal and criminal with the photograph of the person. In order to recognize Criminal, identification of some sort is required, designated by eyewitnesses. In most cases the resolution or/and quality of the recorded image sections is unsatisfactory and is difficult to recognize the face. Recognition can be achieved in various different ways like DNA, eyes, finger print, etc. One of the ways is face identification. In our proposed methodology, a database is created by storing both full and sliced images of the criminals along with all the personal and criminal details. Then one more database is created in order to identify the criminal; eyewitnesses with the help of a professional will try to build the criminal face using the stored slices stored in the database. Then with the help of the Amazon Rekognition, it predicts the criminal by matching the created image with the existing database, if the result is 70-80% of then that face is declared as a criminal.

**Keywords:** Criminal record, Eyewitness, DNA and Amazon Rekognition.

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ICARI-CS-21-01-15

## Intrusion Detection System

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**Abstract:** The need of intrusion system has become an integral part for the educational institutions where an unauthorized person enters. After we have come across this issue, we have developed an intrusion detection system by integrating live video stream with face recognition. This system distinguishes between the authorized and unauthorized persons. We have created a database storing the images of authorized peoples and we have also conducted some experiments with live stream video from the camera which effectively distinguishes the live feed. If an intruder is detected then an alarm starts blowing at the same time and with such an alarm, the intruders' captured image is sent to the authority with a mobile notification. Our system is different from any other face detection system as it feeds with live video stream and the system alert is generated.

**Keywords:** Intruder, Face Recognition, Live Video Stream.

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ICARI-EC-21-01-01

## Electroencephalography (EEG) Signals and Its Categorisation

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**Abstract:** Human brain consists of millions of neurons which are playing an important role for controlling behaviour of human body with respect to Electroencephalography (EEG) Signals and Its Categorizationinternal/external motor/sensory stimuli. These neurons will act as information carriers between human body and brain. Understanding cognitive behaviour of brain can be done by analyzing either signals or images from the brain. Human behaviour can be visualized in terms of motor and sensory states such as, eye movement, lip movement, remembrance, attention, hand clenching etc. These states are related with specific signal frequency which helps to understand functional behaviour of complex brain structure. Electroencephalography (EEG) is an efficient modality which helps to acquire brain signals corresponds to various states from the scalp surface area. These signals are generally categorized as delta, theta, alpha, beta and gamma based on signal frequencies ranges from 0.1 Hz to more than 100 Hz. This paper primarily focuses on EEG signals and its characterization with respect to various states of human body. It also deals with experimental setup used in EEG analysis.

**Keywords:** Electroencephalography, neurons, human brain, signal frequency.

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ICARI-EC-21-01-02

## Convolutional Neural Networks based Facial Expression Recognition

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**Abstract:** Facial Expression Recognition is the vast area of research due to its several useful applications. Many approaches have been done so far aiming high recognition rate. Convolutional Neural Networks (CNN) are known for their feature extraction and classifying neural network implementation and has been an influential technique in machine learning. Extracting features from the image is done by using several convolution-pool layers in the CNN architecture and classifier is implemented using deep neural network resulting in elevated accuracy on the widely used CK+ dataset. The model has also overcome the situation of overfitting using dropouts. This paper has shown that using CNN in the field of emotion detection using facial expression images is the remarkable approach as it gives the stable result and can be modified by tuning the hyperparameters of the architecture.

**Keywords:** Facial Expression Recognition, CNN, CK+

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ICARI-EC-21-01-03

## Forest Fire Detection Techniques: Conventional and Convolutional Neural Networks Approaches

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**Abstract:** Forest fire is a threat to earth's ecological balance. They cause significant damage to the earth's cover and produce severe climate changes and vice-versa. Thousands of forest fires every year cause disasters across the globe. Due to the development and construction, the risk of forest fires has increased. This is one of the issues in research interest and hence there are a number of solutions available that can be tested and many of them can even be implemented. The objective of this paper is to summarize all the technologies such as satellite imaging, wireless sensor network, convolution neural network approach, which are under use to detect forest fire with exhaustive surveys. There are lots of methods available for research and in the market. Each technique has its respective advantages and disadvantages. The paper is concluded with comparisons between the techniques.

**Key Words:** Forest fire detection, CNN, Satellite images, Wireless techniques.

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ICARI-EC-21-01-04

## Economical Automatic Sanitizing Machine

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**Abstract:** Health sector is one of the biggest and important sectors to work upon, this sector deals with the health condition of the people and tries to improve the life span. The main motive to develop this Machine is to help our health sectors and doctors to get the best out of this pandemic, while they are giving their best for the country. The idea is to develop a machine that will be used for sanitization purpose and disinfects the people economically and efficiently. Keep in mind that the health is most important factor to work upon. The device would be developed using 100% recycled and recyclable plastic, that can be used further and reduce the pollution also. Arduino programming will be done to measure the temperature and start the pumps. Use of the recycled materials will surely minimize the cost factor and make it economically and environmentally perfect choice.

**Keywords:** Automatic Sanitizer Machine, Sanitizer Machine, Disinfection, Hygiene Machine, Infection Control Machine

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ICARI-EE-21-01-01

## **An Implementation on Modeling and Analysis of Multi Stage with Multi Phase DC-DC Boost Converter**

Mukesh Kumar, Manoj Kumar Dewangan, Maheedhar Dubey

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**Abstract:** In this paper, a new version of the new Hybrid DC-DC Boost converter ready to draw power from two different DC sources for standard DC-bus feeds is presented. An important feature of the proposed converter is that both sources provide simultaneous power to a lower load than the reduced current rate. This feature is very attractive for DC grid applications. With the analysis of the time zone, steadystate performance is established and the transformational power correction parameters are obtained. In this paper, a powerful converter is introduced, with its operating principles based on charging pumps and converters of reinforcement series. In addition, although three switches are used, no separate gate driver is required instead of one bridge gate driver and one gate driver on the lower side. As such, the proposed converter is easy to analyze and easy to operate. In addition, additional test results are provided to confirm the effectiveness of the proposed converter.

**Keywords:** Boost Converter, High Voltage, DC-DC Converter.

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ICARI-EE-21-01-02

## **A Review on Modeling and Analysis of Multi Stage with Multi Phase DC-DC Boost Converter**

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**Abstract:** A new version of the new Hybrid Boost DC-DC ready to draw power from two different DC sources for standard DC-bus feeds is presented in this paper. An important feature of the proposed converter is that both sources provide simultaneous power to a lower load than the reduced current rate. This feature is very attractive for DC grid applications. With the analysis of the time zone, steadystate performance is established and the transformational power correction parameters are obtained. In this paper, a powerful converter is introduced, with its operating principles based on charging pumps and converters of reinforcement series. In addition, although three switches are used, no separate gate driver is required instead of one bridge gate driver and one gate driver on the lower side. As such, the proposed converter is easy to analyze and easy to operate. In addition, additional test results are provided to confirm the effectiveness of the proposed converter.

**Keywords:** Boost Converter, High Voltage, DC-DC Converter.

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ICARI-EE-21-01-03

## Harmonics Analysis of Output Voltage of Inverter for a Solar Based System

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**Abstract:** The paper represents the total harmonic Distortion (THD) in voltage output of an inverter and the Fourier series is analyzed for 120°, 150°, and 180° degree operation of inverter. As the voltage produced by a solar panel is DC, which is unidirectional in nature, whereas the household appliances operate on AC voltage, which is alternating in nature. Therefore, this DC Voltage is required to be converted in AC. This is done by using an Inverter. However, the voltage output of an inverter is not sinusoidal in nature and thus harmonics are generated. Harmonics are unwanted higher frequencies which superimpose on the fundamental wave and result in a distorted non sinusoidal wave. Fourier series is used to represent any periodic function as sum of sinusoids of increasing frequencies. The entire setup is developed in the MATLAB/SIMULINK. The Fourier analysis shows that in 150° degree mode of conduction, the frequency component is more prevalent. The power quality enhanced as the THD is least in 150° degree mode of conduction of inverter.

**Key words:** Fourier analysis, Total Harmonic Distortion, Simulink/Matlab, Inverter, Solar module.

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ICARI-EE-21-01-04

## Dams Gate Control Using Programmable Logic Controller (PLC) and SCADA

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**Abstract:** This paper is focused on the automation of gates of dam with using the current smart technologies of Programmable Logic Controller (PLC) and SCADA. A dam is an artificial reservoir made to collect a huge volume of water across a river or water body and use it for the purpose of generation of electricity, irrigation, water conservation and stream regulation. Due to uneven rainfall in India, it is not possible for some areas to get regular supply of water or due to their geographical conditions a huge amount of water runoff. So, water collected in the dam is very essential for these areas. Hence, it is necessary to make dams gates automatic for the wise use of available water resource, and increase efficiency of dams that would result in best commercial, agricultural and social benefits. A large number of dams in the world still uses manual system for the controlling of gates of dam, which employs humans for the desired operation, that may have the chances of human error resulting in improper regulation of the stream and also decreases the overall efficiency. To overcome these problems an Automation system is essential that comprises of PLC and SCADA to control the gates of dam by using a single system operation. The operations of dam gates are based on the feedback signals from the level sensors (Digital Input) and float sensor (Analog Input). The forward and reverse operation of dc motor of gates is achieved with the PLC. Ladder programming is used to implement the whole operations of this system. SCADA is used for remote monitoring for a number of dams from a central controlling station.

**Keywords:** Programmable Logic Controller, Supervisory Control and Data Acquisition, Float Sensor and Level Sensor, Ladder Logic, function block.

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ICARI-EE-21-01-05

## Load Flow Solutions of Radial Distribution System Using Backward Forward Sweep Method

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**Abstract:** In this paper the load flow of radial distribution system is proposed by backward forward sweep method. In power system the load flow is the primary work in power system before planning or expansion which provides the various parameters of the network as voltage sag or swell, maximum or minimum current through any branch, power loss etc. The load flow will be basic for the examination of circulation systems, to inquire about the issues related to arranging, diagram and the activity and control. A couple of arrangements like perfect conveyed age situation in dissemination systems and appropriation robotization systems oblige repeated load flow result. Various frameworks such Gauss-Seidel, Newton-Raphson are for the most part showed up for pass on the load flow of transmission systems. The use of these frameworks for appropriation systems may not be beneficial in light of the way that they will be commonly engaged around the general coincided topology of a typical transmission systems albeit most conveyance systems structure are likely in tree, radial or weakly mesh in nature. R/X proportion of appropriation systems is high regard to transmission framework, which cause the distribution systems to be seriously shaped for customary load flow procedures.

**Key words:** Radial Distribution System, Load Flow, Backward Forward Sweep Method.

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ICARI-EE-21-01-06

## Single Input Multiple Output Voltage-Mode Biquad filter Using Current Mirrors

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**Abstract-** A multiple input single output (MISO) voltage mode biquad filter using current mirrors has been introduced in this paper. The proposed filter employs four current mirrors and two grounded capacitors. The presented filter topology offers low pass filter (LPF), high pass filter (HPF) and band pass filter (BPF) simultaneously. Workability of the proposed filter has been confirmed with 0.18 $\mu$ m CMOS technology parameters. PSPICE simulation results have been provided to verify the functioning of the filter.

**Key words:** Biquad filter, current mirrors, voltage, CMOS technology.

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ICARI-EN-21-01-01

## Modeling of wastewater collection network using Arc GIS and SewerGEMS in Kabul, Afghanistan

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**Abstract:** One of Kabul city's most critical environmental challenges is the lack of a sewage collection, treatment, and disposal system. This has caused many health and environmental issues. This study was conducted to determine the feasibility of a decentralized wastewater collection system and model it in planned and unplanned areas by using Arc GIS and SewerGEMS software. For this study, the fifth district of Kabul city was selected as a study area divided into nine study zones. The network's geometric model was created in Arc GIS using Land-use and land-cover, Digital Elevation Model, and Satellite Imagery. Hydraulic analysis and design of the model have been done by SewerGEMS software. The hydraulic design of the model shows that creating and implementing a decentralized and regional sewer collection network is the best solution for the city. After analyses of hydraulic analysis and design findings and after reviewing and controlling the control parameters such as flow velocity, pipe diameter, slopes, and pipe profiles, it concluded that the hydraulic model had been successfully designed and created. Implementation of such a model is applicable to district scales in the city and looks at the appropriate solution for the issue. It can cover almost all of the planned areas of the city and also most of the unplanned area.

**Keywords:** Waste water, sewage, environment, hydraulic design.

ICARI-EN-21-01-02

## Environmental Impact of Pulp and Paper Industry

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**Abstract:** India is an immense nation with a normal of 700 mash and paper plants. It is one of the most elevated contaminating enterprises in India and is exceptionally water concentrated. Moderately enormous wastewater releases and went with arrival of high contamination load into the earth is the spin-off of high water utilization and contamination age during the time spent mash and paper make. Steps are been taken to save the assets, particularly water which is a vital piece of the mash and paper mechanical working. The need of cleaner creation programs has been felt as of late by the paper business by method of an asset and waste minimization idea. In India endeavors have been continuing for quite a long time to improve housekeeping, streamline process parameters, increment reuses and receive improved innovation. This paper targets featuring the procedure utilized during production, sources and kinds of waste created and treatment choices accessible for improving the nature of waste to be released.

**Keywords:** Pulp and paper industry, Cleaner creation, Primary and Secondary treatment.

## Numerical investigation of mixing quality in offset inlets 3-DT mixer with bend mixing channel

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**Abstract:** This paper aims the computational analysis on mixing quality of simple T-junction, offset inlets T-junction, and offset inlets T-junction with bend mixing channel by numerical simulation. CFD software package solves continuity (conservation of mass) equation, Navier-Stokes (conservation of momentum) equation, and the convection-diffusion (conservation of energy) equation. In this work, Reynolds number range is of 30 to 500. At higher Reynolds number, offset inlets T junction with bend structure gives higher mixing quality than offset inlets T-junction and simple T-junction due to chaotic advection mechanisms. The pressure drop in offset inlets T-junction is more than simple T-junction but slightly less than offset inlets T junction with bend structure. Chaotic advection based microchannel creates secondary flow due to which causes a high pressure drop in the microchannel.

**Keywords:** Fluent, Passive micromixer, Chaotic advection, Mixing quality, Simulation.

## Numerical Study of Microscale Passive Mixing in a 3-Dimensional Spiral Mixer Design

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**Abstract:** Mixing two or more fluids becomes arduous when the length scale is scaled down to the order of microns due to the absence of inertia and dominance of viscous forces in the flow field. Since micromixer is an essential integral part of the micro-total analysis system ( $\mu$ -TAS), micromixing enhancement has been a focus of research for several years. The present study presents a Computational Fluid dynamics (CFD) study to investigate the passive mixing performance of water (Newtonian fluid) in a proposed 3-dimensional spiral micromixer (TDSM) for a wide range of Reynolds number ( $2 \leq Re \leq 320$ ). To understand the mixing enhancement due to the spiral design, the mixing performance was compared performed with the results of a conventional straight channel T-micro-mixer (STM) keeping the axial length constant at 3000  $\mu\text{m}$  for both micro-mixers. TDSM shows promising results with complete mixing (97.5%) of fluids achieved at  $Re=320$  and minimum efficiency of 74.3 % observed at  $Re = 66$ . On the other hand, STM performs poorly with maximum mixing performance reaching merely 32 % at the highest Reynolds number considered ( $Re=320$ ). Thus, TDSM design is a significant choice to be effectively employed in various application of mechanical, biochemical, and biomedical applications. Additionally, pressure drop occurring in micro-channels is examined for both micro-mixers to realize the energy requirements.

**Keywords:** Micromixer, CFD, Spiral channel, water, Passive mixing.

ICARI-EN-21-01-01

## Finite Element Analysis of Charpy Impact Tests for Low and Medium Carbon Steel

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**Abstract:** Low and high carbon steels are used as structural materials subjected to impact loading application. This study has been done numerically for impact analysis of low and high carbon steel using standard and miniature specimens on Charpy Impact Testing. The finite element code ABAQUS/Explicit is used for the dynamic analysis of the Charpy impact test. The material properties, elastic and plastic properties, used for simulation, are considered from pieces of literature. The average energy absorbed by different steels specimens has been obtained. The ratio of energy absorbed by a standard specimen to a miniature specimen is obtained. The ratio is known as the scaling factor, which is used as a conversion factor for converting energy absorbed by miniature Charpy specimen to that of standard Charpy specimen.

**Keywords:** Low and high carbon steels, Finite Element Analysis, Charpy Impact Testing, ABAQUS/Explicit.

ICARI-ME-21-01-05

## Studying sustainability factors and managing supply chain under uncertainty during pandemics

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**Abstract:** Whenever any disaster or natural calamities occurs our whole system disrupts whether its environment, economy or social. In 2020 we all faced complex situations because of the outbreak of the deadly Corona Virus Disease COVID 19 because of which some losses jobs, some losses their lives, losses in production, manufacturing, and business. Most importantly because of this virus, lockdown in many countries took place due to which many manufacturing, production lines, logistics has been stopped by which supply and demand has been severely affected. With this the supply chain which is highly dependent on material, retailers, suppliers, customers have been heavily afflicted. Sustainable supply chain management means managing the supply chain activities with consideration for environmental, economic and social issues for enhancing the long-term economic goals of individual organization and its supply chains. Sustainability majorly depends upon three factors that is economic, environment and social. This paper provides the impacts of COVID -19 on these three factors and gives the framework to mitigate the impacts of disasters on supply chain by following step by step methodology. The proposed approach will definitely help supply chain's manager that supports the organisation to work without disruption during natural disasters.

**Keywords:** Sustainability, COVID-19, Supply Chain.

ICARI-ME-21-01-06

## Scope of Autonomous Vehicle in the Indian Smart City: An approach of adaptation

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**Abstract:** Increased use of the Internet of Things (IoT) is now helping smart cities to grow around the world. Smart cities are built to improve the quality of living and the growth of people around the world. Smart cities are well equipped with smart devices that gather data relating to the improvement of various systems in cities. A smart city has a lot of features like 24-hour power, a good traffic management system, good transport, etc. Smart transport infrastructure is a critical necessity for a smart city. AI optimized IoT is the future of the most innovative technology in the auto sector that can potentially be used in smart cities to transform the current transportation system into smart transportation.

This paper focuses on the introduction of driverless vehicles in smart cities in India. The step-by-step approach that can be extended to the implementation of driverless cars in Indian smart cities is properly addressed. The paper also addresses the major issues that can come along the way of driverless vehicles and their smart solution with the use of existing technologies and the benefits of this technology in the Indian economic aspect is also discussed. In India, many cities are best suited for the development into smart cities but in the current scenario, this requires an effective solution and major steps that should be taken for the development and handling of the present and future challenges.

**Keywords:** Autonomous vehicle, smart city, IoT, Artificial Intelligence.

ICARI-ME-21-01-07

## Design and Development of an Efficient Tri-Cycle

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**Abstract:** This report targets some improvement over existing design of paddle operated rickshaw and methodology for a new chassis design and structural rigidity analysis using software simulation (fusion360). The vehicle we have designed in this project is an improved model of existing conventional one. Improving the traditional design in terms of torque requirement and safety cum connivance of passengers is our goal. To improve and fix some of the design, structural and ergonomically flaws of this paddle operated three-wheeler vehicle, we have designed a whole new tubular chassis with a low-profile design to reduce the overall CG of the vehicle and cross members to enhance the structural rigidity. Then we have introduced rear axle wire powered mono disk brake, to improve stopping power without increasing the cost too much. We also have designed a 3 axle 4 sprocket system to deliver power from paddler to rear driving axle. By doing so we are trying to achieve a lower gear (sprocket) ratio with almost no chain de-railing. We have also included an optional gear system. For that we are using an already existing mechanism, Dog engagement gear (sprocket) system instead of conventional mountain bicycle type gear system to reduce cost and maintenance. Mathematical modeling of parts, assembly of the whole vehicle body and the analysis has been done in Autodesk Fusion360 software with academic license. Analysis was done through Finite Element Method using Fusion360.

**Keywords:** Three-wheeler paddle rickshaw design, chassis design, design improvement, sprocket ratios, Dog gear-engagement, CAD software, Autodesk Fusion360, CAD software.

## Energy Saving Analysis for Mud Wall Construction

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**Abstract:** In building construction, the energy saving is very important for coming day. Energy saving is closely related with conservation of energy. The consequences of conservation of energy related to efforts reduce to consumption of energy. A certain amount of energy may be saved, when critical thickness of insulation is used in building walls. The purpose of thermal insulation is to keep the indoor temperature constant due to variation of atmospheric temperature. The main aim of mud wall construction is to save considerable amount of energy by providing a more stable temperature and reduces the heat losses through outer boundary of walls. Mud is act as a thermal mass due to it absorbs sun heat during day hours and keep the building warm during night.

The energy saving by using mud insulation and straw material for the analysing the mud wall constructed room dimension (10 m x 8 m x 7 m) situated at Ghaziabad near Shalimar Garden has been selected. The studies are carried out for varied thickness of insulation mud dung slurry. In this study we found that mud wall insulation is most economic insulation. In this analysis, it is observed that 51 % of energy is conserved by the application of mud dung slurry insulation for mud wall construction. In our result, 0.068 m optimum thickness of mud wall construction has been calculated, when insulation is used.

**Keywords:** Energy, mud wall, material, heat.

ICARI-ME-21-01-09

## Effect of Waste Cooking Oil Biodiesel on CI Engine Piston

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**Abstract:** Increasing environmental pollution and the contribution of the transportation sector, also increases the pollution. Because of the increasing pollution strict emission norms are being enforced worldwide, making a challenge for the auto manufactures to improve the combustion performance of the CI engines which would in turn improve the emission from the vehicles. Diesel engines are the most common power train in the transportation sector including marine engines, power plants and used in farming. The most common mechanical assembly in an internal combustion engine, compressors and reciprocating machines are the piston-cylinder. When the air fuel mixture in the cylinder, improved it leads to the improvement in the combustion. But due to rise in the environmental pollution and decreasing fossil fuels, there are researches on biodiesel blend being used in internal compression engine. Biodiesels are a substitute of the conventional diesel fuels and are produced from non-edible oils. They show similar properties to conventional diesel and are renewable. Though biodiesel and diesel have similar properties and biodiesel could be used in the internal combustion engine. Recently the use of waste cooking oil as biodiesel has been an topic of interest for many researchers. Using waste cooking oil for the biodiesel, in turn reduces the waste. It is important to know the impact of the Waste cooking oil biodiesel on the piston and cylinder. The paper analyses the thermal effect of the waste cooking oil biodiesel on the piston and compare it with diesel fuel which in turn will help in calculating the life of the engine..

**Keywords:** Biodiesel, waste cooking oil Biodiesel, CI Engine, Piston, Cylinder, Thermal Analysis



## A Strategic View of Industry 4.0

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**Abstract:** In the last few years, The Fourth Industrial Revolution has drawn recognition all around the globe. Industry 4.0 is a very well-liked topic because it has influenced the manufacturing industry. Industry 4.0 comprises of smart system with autonomous and intelligent entities. Today's globalization is facing challenges to meet the continuously growing worldwide demand for capital and consumer goods. To overcome these challenges, Industries need to be equipped with cutting edge technologies and smart equipment to become smarter than ever before. Industry 4.0 is concentrated on making a Smart environment within the manufacturing ecosystem.

In this literature, there is an effort to systematically review the art of the Fourth Industrial Revolution wave. This literature discusses the strategic vision of Industry 4.0, this includes Evolution from Industry 1.0 to Industry 4.0, Vision of Industry 4.0, and Enabling technologies in which Internet of Things (IoT), Cyber-physical System (CPS), Radio Frequency Identification (RFID), Wireless Security Network (WSN), Cloud Computing are discussed in detail. Subsequently, Research Challenges, Directions, Research Trends, Areas to act upon to the achieve Industry 4.0 have been outlined.

**Keywords:** Internet of Things (IoT), Cyber-physical System (CPS), Radio Frequency Identification (RFID), Wireless Security Network (WSN), and Cloud Computing.

ICARI-ME-21-01-11

## A Study on GMAW Process for Dissimilar Metal Welding

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**Abstract:** Gas metal arc welding is widely used commercially applicable process for welding of similar or dissimilar metals. The dissimilar welding of metals is a difficult operation due to non-uniform material properties like thermal conductivity, weld ability, solubility and so on. However effective control of welding parameters may produce the sound dissimilar welds by minimizing inter metallic compounds in the transient zone. This paper addresses the effect on dissimilar weld joint properties such as metallurgical, mechanical and physical, of various welding parameters. This study also examines recent advancements in GMAW techniques specifically related to dissimilar metal.

**Keywords:** Gas metal arc welding, Mechanical properties, Metallurgical, Permanent joining dissimilar, Thermal conductivity

ICARI-ME-21-01-12

**Vertical Axis Wind Turbine (VAWT): Reduction of Drag Force by Using Valves**

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**Abstract:** The burning problems like pollution and global warming are increasing exponentially, day by day. This is a clear call of nature to Boycott conventional energy sources like coal, petrol, diesel, etc. to produce power for different uses. This is the high time now to rub our eyes and wake up from long sleep. The development of Revolutionary thoroughfares is required to produce energy so that the carbon emissions could be lower. In this research article, the author had tried to figure out the drag force experienced by the blades of wind-turbine and the reduction of the same by making the wind-turbine cups with a number of One-way valves. The data has been collected on the CAD-CAE software, that is SOLIDWORKS. The designs are also made on the same. In this, the vertical axis wind turbine is the same as a cup/cone type anemometer. The cups are made up of valves as a multi-cellular body. The valves are not embedded on that. The sizes of valves may vary as per the size of cups/cones. These valves are hexagonal and arranged like plant tissue. This design of the multi-cellular valves is very significant in reducing the drag force.

**Keyword:** VAWT, Drag type wind turbine, Multi-cellular wind turbine, vertical axis wind turbine.

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ICARI-ME-21-01-14

**An Experimental Investigation to Cool Exemplar Lithium-Ion Cell Using Oscillating Heat Pipe Using Blend of Methanol- Diethyl Ether**Kartik Drolia\*, SL Bhandarkar<sup>1</sup>, Mohammad Arshad<sup>1</sup>, Amit Pal<sup>2</sup>, Naveen Kumar Garg<sup>3</sup><sup>1</sup> Department of Automobile Technology, Pusa Institute of Technology, Pusa, New Delhi, India<sup>2</sup> Department of Mechanical Engineering, Delhi Technological University, Delhi-42, India<sup>3</sup> Department of Automobile Engineering, G B Pant Institute of Technology, Delhi-20, India**Email:** gargnk1973@gmail.com

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**Abstract:** Today's world has made electric vehicles an imminent need for the hour. Energy performance means that in contrast with internal combustion engine powered vehicles electric vehicles are more energy-efficient. Lithium-ion batteries have been constantly growing in their energy density (gravity energy density) and the cell price per kWh has fallen. Batteries with lithium molecule are seen as appealing to vehicles. Its temperature control system plays an extremely important role in its longevity and performance. Numerous studies of the oscillating heat pipe (OHP) have been performed in order to sustain battery cells under the perfect temperature variation by utilizing various boundaries such as filling proportions, working liquids, pipe diameter, and material of the heat pipe. This work explores the reduction in the operating temperature of such batteries by means of the OHP and the use of methanol-diethylether blends as working material in various mixing ratio(MR) proportions (1:0.25, 1:0.75 and 1:1) to obtain the best performance. The results were also compared with only methanol as working fluid.

**Keywords:** -Lithium ion battery, cooling; efficiency,

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## Effect of Pipe Parameters on the Ground Heat Exchanger Performance: a Review

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**Abstract:** Global warming has become the biggest concern of the current time. Energy consumption is directly related to global warming, as most of the power production systems generate lots of greenhouse gases (GHG). If energy consumption can be reduced, then we can reduce the overall emissions. Energy consumption in buildings is primarily for heating and cooling applications. Ground Heat Exchangers are one of the emerging technologies which can reduce the dependence on fossil fuels. Although many studies have been conducted to enhance the performance of the system, the importance and impact of pipe parameters are not highlighted. The various pipe parameters are highlighted in the current study, and their impact has been reviewed.

**Keywords:** Ground heat exchanger, GSHP, heat transfer, pipe parameter, renewable energy

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## Design and Fabrication of Hydraulic Braking System for Formula Student Vehicle

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**Abstract:**The following paper encompasses design of a hydraulic braking system with a pedal box. The system is designed for a single person formula student vehicle weighing 250kg. The objective of the system is to convert the kinetic energy into thermal energy allowing the vehicle to decelerate safely. The paper is divided into various categories namely; calculation and evaluation of the hydraulic system in order to select calipers and master cylinders, the design of the pedal box, the design of the rotors and manufacturing the components.

After the calculation it was found that the braking torque required for the vehicle to stop after considering load transfer is 150 Nm and 130Nm for front and rear tires respectively. Will wood master cylinder was selected which provided hydraulic pressure of 4.89Mpa to the front brake lines and 4.17Mpa to the rear brake lines. Vespa calipers were selected with two pistons which provided braking force of 8022.32 N at the front callipers and 6559.332 N at the rear callipers. Pedal box was designed with a brake pedal and two master cylinder mountings. It is designed for minimum mass and maximum strength.

**Keywords:** Hydraulic braking, Heat transfer, Automobile Braking, Formula Student

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## **Numerical Study of Impact Analysis on A Circular Plate with Flat and Semi-Sphere Nose-Shaped Cylindrical Bullets**

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**Abstract:-**The study presents the numerical simulation of impact analysis of a circular plate of AA5083 with flat and semi-sphere nose-shaped cylindrical bullets made with AA7075-T651 at different impact speeds. The ABAQUS/Explicit software was used for analysis. To reduce the calculation time, the model is analyzed as a two-dimensional axisymmetric model. During analysis, the numbers of elements were considered to the convergence of solution so that constant residual velocity is obtained. The Johnson-Cook constitutive and Johnson-Cook failures models were used for simulation. The residual velocities were obtained corresponding to different impact velocities. Different failure mechanisms were observed during different impact velocities and mentioned in the paper.

**Keywords:** AA5083, AA7075-T651, axisymmetric model, Johnson-Cook constitutive model, Johnson-Cook failures model, ABAQUS/Explicit.

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ICARI-ME-21-01-18

## **Numerical Simulation for Evaluation of Different Design Parameters of Low Carbon Steel Strip In Deep Drawing**

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**Abstract -**This paper presents the finite element simulation of drawing operation of low carbon steel strip blank using ABAQUS/Standard. The low carbon steel strip blank has been drawn into a cup shape during the forming process. The blank holder and dies have been used to hold the edge of the blank, and suitable pressure has been applied on it through punch to induce the required depth. The elastic and plastic properties substituted in the software are obtained with literature. The parameters, equivalent plastic strain, and reaction force on the punch have been obtained, and its variation with time is shown with different graphs. These parameters are used to predict failure of strip due to excessive plastic deformation and force required to hold blank between the holders and die.

**Keywords:** Drawing operation, low carbon steel, blank holders, punch, die.

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ICARI-ME-21-01-19

## The Effect of Oscillating Turbulent Inflow on the Shape of Downstream Turbulence

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**Abstract:**-Large Eddy Simulations(LES) has been widely applied and used in several decades to simulate a turbulent boundary layer in the numerical domain. In this study, we aimed to make a synthetic inflow generator(SIG) yielding an appropriate property of turbulent boundary layer in the inlet section and making quick development in the downstream of a three-dimensional domain. In order to achieve turbulent boundary layer quickly in a limited domain, the oscillating term was implemented in the well-defined boundary layer, which was expected to make faster convergence in the calculation. Cholesky decomposition was also applied to possess turbulent statistics such as the randomness and correlation of turbulent flow. In a result, the oscillating inflow did not show the faster convergence, but it indicated a possibility to improve statistical quantities in the downstream. In addition, regarding the mean flow characteristics were very close to the calculation without the oscillating flow. On the other hand, the turbulent statistics were improved depending on the oscillating magnitude.

**Keywords:** CFD, Boundary layer flow, Correlation, large eddy simulation, Cholesky decomposition

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## The Effect of Uniform and Non-Uniform Mesh on the Development of Turbulent Boundary Layer

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**Abstract:**-Uniform grids have been widely used with finite difference approaches for incompressible flow simulation. They retain conservation properties that stabilize the flow field and avoid odd-even decoupling in the pressure field. On a non-uniform mesh, however, the accuracy of finite difference schemes is degraded to the order of the mesh stretch, if all the conservation properties are to be upheld. A large eddy simulation of a turbulent channel flow is performed. The unsteady Navier-Stokes equations are solved numerically at a Reynolds number of  $Re_\tau=180$ , based on the mean centerline velocity and channel half-width, with about  $1.8 \times 10^6$  grid points ( $200 \times 96 \times 96$  in  $x, y, z$ ). A large number of turbulence statistics are computed and compared with the existing direct numerical simulation data at comparable Reynolds numbers. The realistic turbulent boundary layer is developed at  $x/d = 10$  from the inlet. The fully developed channel flow can be achieved at the number of timestep  $N = 1 \times 10^6$ .

**Keywords:**-Uniform, non-uniform, large eddy simulation, realistic turbulent boundary layer, Reynolds numbers.

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ICARI-ME-21-01-21

## **An Analysis of Customer's Purchase Intention towards the Green Products and its Effect on Manufacturing a Statistical Analysis**

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**Abstract:-**The main purpose of the study is to find the impact of consumer behavior on the production of green products. The research is based on the survey done in the Delhi NCR, India related to the production of auto components and their use in the vehicle. The manufacturing of the product of direct concern of the consumer is influenced by the purchase intention of the consumer. But, the products like auto-components which are used as a component of the vehicle or directly used as spare parts by the consumer are not a major concern. The consumers are not fully aware of the manufacturing processes, design, packaging materials, etc. In this situation, it is very difficult to find the impact of consumer behavior of production of such type of products which are not directly concerned with the use of the consumer. In this study, a questionnaire survey and statistical analysis are used to know the relationship between consumer behavior and the production of the green auto-components. Partial Least Square-Path Modeling approach is used for structural equation modeling to know the causal relationship among the various factors. The result shows that the perceived quality and cost of the product influencing consumer behavior and purchase intention towards green consumptions. Besides these two factors green initiatives, advertising and promotion, and social welfare also play a great role in influencing the consumer towards the use of green products.

**Keywords:** Partial Least Square Path Modeling, environmental sensitiveness, eco-consciousness, consumer behavior, purchase intention, perceived quality, brand loyalty, green product production.

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## Application of MCDM/MADM Approach Entropy-TOPSIS in Turning of AA6061

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**Abstract:**-In the present work, an experimental investigation has been conducted to optimize the cutting parameters during turning of AA6061-T6 in dry conditions. CVD made coated carbide inserts (WEDIA CNMG 120404, CNMG 120408) are used as cutting tools. Cutting speed (1000, 2000, 3000, 4000 RPM), feed (0.05, 0.1, 0.15, 0.2 mm/rev), depth of cut (0.5, 1, 1.5, 2 mm) and Nose radius (0.4, 0.8 mm) were considered as fixed parameters. A mixed level orthogonal array (L16) from taguchi has been adopted for the experiments. The multiple performances of Material Removal rate (MRR) and performance characteristics ( $R_a$  and  $R_z$ ) were optimized by a hybrid Entropy-TOPSIS approach. The results revealed that the nose radius has the most predominant effect on the multiple responses.

**Key words:** AA6061-T6, Material Removal Rate (MRR), Surface Roughness Characteristics ( $R_a$  and  $R_z$ ), Entropy-TOPSIS.

## A Review on Recycling of Composites & Additive Manufacturing of Composites Material

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**Abstract:**-Green energy & sustainable products are now-a-days are in global trends which reveal a general progression and also gives a energy efficient performance. This trending therefore requires a general shift from resilience on trending things such as steel and aluminum which are cheaper and more sustainable towards fiber reinforced composites. These sustainable alternative compounds are gaining a much significant application in fields like construction, medical, automotive, aviation and many other fields. The thing which is missing that needs to connect the link requires a complete cycle of sustainability to these compounds is end-of-life recycling. The major objectives of this paper is to highlight all the recycling technology available toward fiber reinforced composites and are much related to socio-economic & environmental implementations. This article basically covers the entire period from 1990s to till today in which it describe the environmental impact on fiber reinforced compounds that gains global relevance. As a result of study which reveals that the recovery of compounds such as carbon fiber, fiberglass, fossil fuels & gases develops from waste compounds can be achieved very efficiently and economically with minimum degradation of properties in fiber. Composites materials have been used as very common lightweight components in many industries as they offer very high performance. This also includes PMC polymer, MMC metal mix composites. Manufacturing the composites in additive manner offers an excellent opportunity in innovative & complex using of parts in composite materials. Efficiently manufacturing of these composite materials has become a major challenge. This reviewed paper focuses on both the polymer mix composites & metal mix composites.

**Keywords:** Lightweight components, fiberglass, fossil fuels, Green energy & sustainable products, energy efficient performance, fiber reinforced composites, PMC, MMC mix polymer.

ICARI-ME-20-12-25

## Computational Investigation and Optimization of Cooling System Used For Hub Motors

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**Abstract:-** The main aim of doing this project is to fix the strategy to provide the cooling for a hub motor so that there will be no effect on the copper windings of the motor while operating under variable load conditions. This work is carried out because of the fact that if the motor reaches the higher limits of its operating temperatures then the winding will get heated up and also there would be possibility of damage of the motor. So basically, we have proposed a fin attached casing from which the 30 numbers of fins are protrudes from the outer surface of hub motor and these fins are mounted in the open atmospheric condition considering the convectional heat transfer as low as possible based on the flow velocity of air and that is 5 W/m<sup>2</sup>K. Also, this value had been justified based on analytical approach followed in the study in order to find out the efficiency of the fins installed. We chose the casing material as stainless steel and fin material as aluminum because they have good thermal conductivity. The Computational investigation is carried out using ANSYS Module and the parameters i.e. Temperature distribution, Total heat flux and Directional heat flux were investigated based on the optimization technique followed based on two models that are a) Hub-Motor with Fin b) Hub-Motor without Fin. From the numerical investigation we achieved the Fin efficiency as 99%, followed by Heat dissipation from fin is 232.12 W and Fin effectiveness as 0.032 and hence results into an efficient model for the better cooling of the hub-motors of chosen dimension.

**Keywords:** Heat Transfer, Hub Motor Cooling, Fin Efficiency, Fin Performance

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## Heat Transfer Enhancement in Ground Heat Exchanger for Summer Season Using Nano-fluid: a CFD Approach

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**Abstract:-** As energy demand is increasing, there is continuous search for alternatives of heating and cooling systems which are energy efficient. Ground Heat Exchanger provides a sustainable solution to the energy crises. To improve the performance of Ground Heat Exchanger, a numerical study is being done with the novel spirally corrugated geometry and nanofluid a working fluid. Significant temperature drop has been observed in temperature drop i.e., 0.546°C for 1 m length of pipe.

**Keywords:** Ground Heat Exchanger, Spirally corrugated pipe, Heat Transfer, Nano-fluid. .

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ICARI-ME-20-12-27

**Designing and Analysis of Leaf Spring Suspension System Using Creo Parametric 2.0**

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**Abstract:-** This paper presents various aspects of Leaf Spring suspension system, its Analysis and Design. A suspension system isolates the vehicle from wheel and road vibration and absorbs most of the shock. In this paper a design as well as analysis has been done of a Leaf spring suspension system. For the research, designing has been done in Creo Parametric 2.0 software. Different design parameters have been reviewed and optimization of the major parameters is shown as given by research that affects suspension over Creo Parametric 2.0 Software. At last, the results have been displayed with various graphs.

**Keywords:** Leaf Spring, Suspension system, Strain energy.

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ICARI-ME-20-12-28

**Experimental and numerical studies of electrolyte concentration effect in electrochemical discharge based micro-drilling (ECDD)**

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**Abstract:** Electrochemical discharge based micro-drilling (ECDD) is a hybrid machining process that involves the thermal heating of the sparks and etching action of the electrolyte for material removal mechanism. The concentration of the electrolyte plays a vital role in determining the material removal rate (MRR) during the micro-hole drilling process since a higher depth is desired. Despite numerous experimental studies, the reporting of numerical studies concerning the effect of electrolyte concentration on MRR is still scarce. The present article focuses on the development of a finite element based thermal model for studying the MRR of glass material concerning electrolyte concentration. The model is validated using previously reported as well as present experimental studies. Predicted MRR is observed to be in fair agreement with the experimental MRR. Results revealed that the MRR improves with the increase in electrolyte concentration due to the increase in the imported heat flux over the work material. MRR improvement is the combined result of an increase in thermal energy as well as an increase in hydroxide (OH) ions that further enhances the chemical etching action. The present study successfully demonstrates the application of numerical aspects for analyzing the MRR in the ECDD process concerning electrolyte concentration.

**Keywords:** Finite element modeling, Spark radius, Material removal rate, Concentration, Glass.

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ICARI-ME-20-12-29

## Modelling and Performance Analysis of an Indirect Evaporative Cooler (IDEC) Unit

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**Abstract:-** Nowadays the usage of conventional air conditioners is becoming a problem for environmental aspects point of view due to the release of chlorofluorocarbons (CFCs) and ozone depletion. To overcome this problem, it is proposed to go with Indirect Evaporative Cooler (IDEC) because in this the refrigerant is replaced with water. This work deals with the simulation and performance of an Indirect Evaporative Cooler (IDEC) of flat plate size of 40 mm x 60 mm is analyzed by placing a countercurrent sensible plate heat exchanger. Computational techniques of CFD analysis have been carried out on IDEC flat plate heat exchanger and MATLAB program code has been written to validate the results. The effect of parameters such as the velocity of primary air stream and inlet water temperature is investigated on the performance of IDEC. Thermal effectiveness, Cooling Capacity and Thermal Conductance are the output parameters are analyzed and compared the results both from simulation and theoretical aspects of view. For the better performance of IDEC, some design of experiments is also executed with different volume flow rates and with different inlet temperatures of air at 40, 35, 30, and 25°C. After evaluation of the results, it has shown the output parameters of thermal effectiveness, cooling capacity, and thermal conductance have shown better values at a 175 m<sup>3</sup>/hr volume flow rate of air.

**Keywords:** Indirect Evaporative air Cooler (IDEC), Thermal Effectiveness, Cooling Capacity, Sensible Plate Heat Exchanger, Thermal Conductance

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ICARI-ME-20-12-30

## Study on Effectiveness of HSS and HSS-Cobalt Twisted Drills on Surface Roughness

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**Abstract:-** This paper focuses on the optimization of drilling parameters by using Taguchi method for achieving maximum Material Removal Rate (MRR) and minimum Surface Roughness ( $R_a$ ). The experiments were carried out on material EN8, medium carbon steel using HSS and HSS-Cobalt drills. Four cutting parameters such as Drill Type (HSS, HSS-Cobalt), Point Angle (90°, 118°, 135°), feed rate (90, 240, 450 mm/min), speed (900, 1200, 1500 RPM) were considered as the control factors. The signal-to-Noise (S/N) Ratios and the analysis of variance (ANOVA) have been employed to determine the effectiveness of parameters on the responses. The results revealed that feed rate was the most significant factor for material removal rate and Drill-type was for surface roughness. The models predicted for the responses were found to be best fit and accurate for the future predictions.

**Keywords:** EN 8 Steel, Material Removal Rate (MRR), Surface Roughness ( $R_a$ ), Taguchi Method, Analysis of Variance.

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ICARI-ME-20-12-31

## **Fault Diagnosis of Gearbox Based on Empirical Mode Decomposition and Artificial Neural Network**

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**Abstract:** Gears are essential elements in industries to transmit power and speed. However, owing to abrasion and other reasons, these gears are subjected to faults like wear and broken teeth. If these faults are not identified earlier, then this may lead to a considerable loss. Thus, the vibration-based condition monitoring of the gearbox is carried out to provide early warnings and to avoid unwanted breakdown. Vibration-based condition monitoring of gearbox refers to the use of non-destructive sensing and analysis of the measured signal for detecting the faults. In this work a novel fault identification method is proposed by combining the empirical mode decomposition (EMD) with Artificial Neural Network (ANN). Firstly, the EMD method is used to decompose a non-linear and non-stationary vibration signal into intrinsic mode functions (IMFs). Secondly, suitable IMFs are selected based on the correlation coefficient. Finally, the selected IMFs are added to get the final signal, and the statistical features are extracted from this signal. The obtained features are used as input to train the classifier. ANN is used as a classifier for fault classification. The proposed method is validated with an experimental case study. The result shows that the proposed EMD-ANN based fault identification method identifies the faults effectively.

**Keywords:** Artificial Neural Network, Empirical mode decomposition, Gear fault, intrinsic mode function

ICARI-ME-20-12-32

## **Numerical Analysis of Fluid Flow in a fluidized Bed Gasifier to estimate the Production of Potential Fuel for Automotive Application**

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**Abstract:** Ecological deficiency and energy demand are currently the dynamic issue for the universal sustainable growth. Meanwhile renewable technologies are neat and clean foundations of energy and optimal use of these resources limit ecological effects produce minimum secondary wastes and are bearable based on present and imminent economic and social needs. The two-dimensional fluidized bed gasifier has been designed and assumed for the combustion of the flow regime of the product gases (carbon dioxide, oxygen and carbon monoxide) which are obtained from LV coal and deciduous wood through combustion process by using ANSYS workbench. With internal diameter 0.1m, heights of 1.4m and fluidization velocity of 0.7155 m/s. The feed rates of 0.1 kg/h and 0.3 kg/h with airflow rate were fed into the gasifier. The injection of biomass discrete phase model (DPM) is used. The product gases after combustion of different biomass can be bring for the combined heat power (CHP) and electricity generation. The proximate and ultimate analysis of biomasses were obtained and calculated in order to generate stoichiometry and reaction mechanism using the coal calculator in the species transport code. Results of the study shows the optimum conditions to operate a Fluidized bed gasifier/combustor and effective handling of the product of combustion for limiting the wastage of these gases so that it can be used for other application moreover it will reduce the adverse effect it was offering to environment. But no particular attention was paid to char conversion.

**Keywords:** Discrete phase model, Coal Calculator, Stoichiometry, Species transport

## Smart Overview on Navigation System of Mobile Robot

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**Abstract:-** Future development of route analysis execution and planning of mobile robot in various conditions. The progress made in past decades in the field of navigational path analysis of mobile robot and techniques used to design the intelligent controller has been described. This paper presents past and recent developments in area of smart techniques used for navigation of mobile robots.

**Keyword:** smart mobile robot technique, navigation system, ultra modified.

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ICARI-ME-20-12-34

## Thermo-Electric Generators: Energy Utilization and Conversion Modules

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**Abstract:-** Thermo electric generator (TEG) a device which convert waste heat into electricity which can have a rapid rise in the coming years. Different types of TEG are being explored like wearable, flexible, liq. Metal, foam based and solar based. The main problem which is solved by TEG is the recirculation of waste heat into electricity rather than letting it polluting the environment which can be accomplished by increasing the surface area of heat sink, using of parallel plate heat exchanger, maintaining a proper temperature at the hot and cold side and by spacing and spreader thickness of TEG module. Different ways to fabricate thermoelectric material and overcome the enhancement of TEG device efficiency and power output are discussed. An experimental study has done on light duty truck and suggested that exhaust is the best place for the mounting of TEG rather the radiator. Numerical and Analytical Investigation are also being done using tools i.e. ANSYS-FLUENT and MATLAB on automobiles (4-wheelers and 2-wheelers) where the TEG is used as an energy conversion device to capture waste heat from the exhaust. A simulation study with basic comparison of practical and experimental data is also done which shows a matching result making TEG as a promising device.

**Keywords:** TEG, Waste heat Recovery, Energy Conservation, Energy Conversation

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ICARI-ME-20-12-35

## **Comparative Performance and Emission Analysis of CI engine run on Biodiesel Octanol blend**

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**Abstract:** In a times where the rapid depletion of fossil fuel with the problem of pollution leading to global warming, there is a need for an alternative fuel which will help in combat these issues. In this paper, we have considered Biodiesel made from Sunflower and Canola. These biodiesel is then blended with Octanol and run on a 4 stroke single cylinder CI engine. The performance and Emission parameters are then compared. The emissions are found to be reduced in both the cases, and significant similar result was found for the performance analysis. Hence, concluded that the burden of over dependency on fossil fuel could be counter by means of such blends of biodiesel with alcohol.

**Keywords:** Biodiesel, fossil fuel, canola oil, alcohol, emission, performance parameter, diesel engine.

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ICARI-ME-20-12-36

## **A Technical Review: Diesel Fuel and Environmental Regulations impact on Engine and Fuel**

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**Abstract :**The development of the Internal Combustion Engine began in the eighteenth century by 1892 Rudolf diesel had filed a patent for CI reciprocating engine, despite this by using coal dust as the primary fuel his original design did not work, Kerosene, as the first product refines from crude oil, was discovered in 1859 thirty three years earlier in Pennsylvania. Fuel change coupled with followed some mechanical design changes, he became successful to discover the prototype engine in 1895 by recognizing that the liquid petroleum product might be better engine fuel than coal dust. Today the grand success of diesel engines comes from their economy, efficiency, and reliability in the area of farming, manufacturing, power generation, transportation, and construction amid the variation from small low-speed direct-injection to the high-speed indirect engine. Hence, all focus is concentrated in this paper to review Diesel fuel and it's performance, refining, properties, and testing because the engine and fuel work together and comprises a system. Also, environmental regulations have a vital role and importance to the industry, this review also examines their impact on both Engine and Fuel.

**Keywords:** Fuel, Diesel engine, environment, performance.

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ICARI-ME-20-12-37

## **Analytical Approach to analyze the Influence of Foil Material and Its Thickness on Air Foil Bearing**

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**Abstract:** Air foil bearing (AFB) is one of the recent trends in the field of studies of bearing due to its capacity to operate at a very high and low temperature at an extremely high speed and oil free operation. It is more environmentally friendly and less complicated because of the minimum number of elements enmeshed for rotation of the shaft and no requirement of sealing and lubrication systems. Among the various structural design parameters of air foil bearing, top and bump foils are very much important as the generated pressure in the air film gets distributed by the top foil and this top foil is propped up by the corrugated compliant bump foil by providing damping and structural stiffness to the bearing assembly. So as to boost the load-bearing capability, the top foil and bump foil have to support more loads. Hence, it is very important to investigate the effects on air foil bearing with the variation of foil thickness and bump height-pitch ratio. In this present work, an attempt has been made to investigate the stress generated in the top and bump foils and unit stiffness of air foil bearing by varying the thicknesses of the top and bump foils. It has been observed that, with the variation of the foil material, thickness and ratio of bump's height and pitch, there have some significant effects on the stress generation, stiffness of the system and generation of air film clearance in between the top foil and revolving shaft.

**Keywords:** Rotor Bump Foil, Air foils bearing, Top foil, material, stiffness.

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ICARI-ME-20-12-38

## **A Review on Technological Advancements in Additive Manufacturing process**

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**Abstract:** Additive Manufacturing is an emerging technique used in manufacturing of complex products geometry which is used in different applications. This paper mainly focused on a review of various technological advancements in 3D printing materials from Polymer to Metals. Additive Manufacturing creates a new path in Aerospace, Defense & Automotive applications for manufacturing light weight, Consolidate Assemblies having complex internal geometries. Assessing performance in developing new aerospace products is essential. Challenges exist in developing new design methodologies to utilize AM-enabled products, while limiting costs as well as reducing the weight. This AM technologies also used for manufacturing dissimilar components with more accuracy. The objectives of this review paper are to provide an overview of recent AM developments.

**Keywords:** Additive Manufacturing Process, 3D Printing, Product Development, Aerospace Industry, Optimization, Cost Estimation, Weight Reduction, Polymer, Composites

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ICARI-ME-20-12-39

## Study and Uses of Thermoplastic Polymer Composites and Nano-composites in Additive Manufacturing, A Review.

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**Abstract:** The polymer and nano composites are an essential material to Additive manufacturing (AM) and their use is widespread and accounts for the largest quantity of 3D printed materials for the fabrication of equipment parts. There are materials formulation limited at present, and thus there is high interest in extending AM to high-performance engineering polymeric nano-composites. These materials are mostly used in 3D printing and needed to improve their performance and properties, which is key to growing the technological impact and marketability of Additive manufacturing. Recent applications of high-performance thermoplastic polymers are limited to adaptations from conventional plastics processing such as injection molding, thermoforming, extrusion, and others. Thermoplastic composites and nano material-based composites as well as polymer blends. The importance of these different composite materials to AM is discussed in this review. An overview of newer type's materials thermoplastic composites and nano composites are discussed. And AM techniques allowing higher filler loading for like liquid deposition modeling (LDM) sometimes known as direct ink writing (DIW) are also discussed.

**Keywords:** Additive Manufacturing, 3D Printing, Fused Deposition Modeling

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ICARI-ME-20-12-40

## Performance Evaluation of Solar Air Heater with Surface Mounted Obstacles Using Artificial Neural Network

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**Abstract:** The present paper describes an application of artificial neural networks (ANNs) to predict the thermal performance of a solar air heater using obstacles. A lab experiment on solar air heater is conducted in order to gather enough data for training and prediction. The output parameters with high correlation are measured when the Reynolds Number, Air flow rate and pitch between the obstacles is changed both in stream wise and crosswise. The three-layer back propagation (BP) network model which has one hidden layer is developed, and the node number in the input layer, hidden layer and output layer are 5, 6 and 2, respectively. This ANN model demonstrated a good statistical performance with the correlation coefficient in the range of 0.9957–0.9988, and the mean square error (MSE) values for the ANN training and predictions were very low relative to the experimental range. So this ANN model can be used to predict the thermal performance of the solar air heater using obstacles.

**Keywords:** Mean Square Value, Correlation Coefficient, BP Network, Solar Air Heater.

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## Designing an Automaton to Mimic the Wing Movement of Hummingbird

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**Abstract:** Hummingbirds are one of the most amusing creatures known to man. They are very tiny and produce a significant and unique humming sound by the rapid flapping of their wings such that the frequency is in the human hearing range: and hence justifying their name. These birds constitute the family Trochilidae. They are smallest in size; ranging around 7.5 – 13 cm. They are unlike any other birds. The motion of their wings during flight is more similar to that of an insect like a bee or a moth than that of any other bird, giving them the unique ability of hovering among all the birds. These birds move their wings such that their wingtips make an ‘infinity’ sign or a horizontally flipped digit eight. In this project, the authors have tried to imitate this motion using known mechanical methods by arranging and combining them in the most suitable way. Since this project only takes interest in the motion of the wings; this one has been deemed to be a static mechanical model describing the required motion of hovering. However, this project can further be expanded to but not limited to the orizing and constructing a life-like Micro Aerial Vehicle (MAV) or simply, a drone. The authors of this mechanism have used Chebyshev Lambda Mechanism along with gear trains and a belt drive for this model to achieve the required ‘infinity’ figure. Moreover, the authors have focused the model to imitate Rufous Hummingbird (Selasphorus rufus) species of hummingbird. For correct measurements of all the dynamics of the same, the authors have referenced all the required kinematical data from.

**Keywords:** Chebyshev Lambda Mechanism, Gear Train, Belt Drive, surveillance.

## Analysis and Optimization of chassis

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**Abstract:** In this paper, study of various Go-Karts has been summarized with its design and simulation for different impact tests like front, rear and side impact for multiple materials. This paper includes analysis of go-kart chassis done by some researchers and gives conclusion about different analysis done. Researchers used some software’s for design and analysis of go-kart chassis like CAD, SOLIDWORKS, ANSYS, and CATIA. The researchers also observed the collision test on go-kart chassis by applying suitable force. Some papers compared materials and design on chassis frame. They discuss on the fabrication using different manufacturing process of the go-kart chassis in the workshop. Some paper also focused on better flexibility of chassis and better driver ergonomics. They also did analysis and simulation on existing cars chassis and heavy vehicle chassis like bus. This paper tells us about designing and failure standard. The intention of the present examination aims to look for the ideal material for the chassis design by looking at the work done by various researchers. Analysis has been done on Carbon and Aluminium chassis. So, this paper presents a study and analysis on different material chassis with impacts on front, rear and side.

**Keywords:** chassis, analysis, design, go-kart, frame



ICARI-ME-21-01-43

## Renewable Energy and its Application in Madhya Pradesh: A Review

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**Abstract:** Renewable energy is high on India's development agenda. The National Solar Mission is one of the most important elements of the National Action Plan on Climate Change, and has set an ambitious target of providing 20 GW of grid-connected solar power by 2022. Madhya Pradesh has a rich natural resource base with enormous possibilities for renewable energy generation. In particular, the topographic conditions of the State favor the development of wind and solar energy, but small hydroelectric and biomass initiatives are also likely to be important. At present, renewable energy sources make up only 2.95% of the total installed capacity of the State.

**Key words:** Renewable energy, hydroelectric, biomass.

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ICARI-ME-21-01-44

## A Paradigm Shift in the Development of PVD and CVD Coated Tools: A Review

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**Abstract:** Coatings on cutting tool have become a major necessity for machining the material from traditional to the new upcoming difficult-to-cut materials in the manufacturing industries. In a production line's machining process of a part the one of the most important tools required are cutting tools. Except from performing the cutting action cutting tools, also helps in getting the required accuracy and surface finish of the part. To withstand high wear resistance and large machining time while producing large number of components with high accuracy, the cutting tools have to be strong enough. In today modern machining processes the CNC machine tools plays a vital role in improving the surface finish. This paper reviews the ways of improving the tool life by various coatings on the cutting tool. Further, the research community has developed many other ways for further process enrichment. This review article presents a comprehensive review of these recent developments in coatings process on the cutting tool, its variants and their methods. The future research possibilities are identified and presented as research potentials.

**Keywords:** CVD, PVD, Coated Tools, DLC, Review

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## Optimization of Design Conditions of Solar Air Heater

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**Abstract:** The present experimental work investigates the effect of the geometrical dispositions of the surface mounted obstacles on the system performance parameters like thermal efficiency and pressure drop. The input parameters that can affect the performance of the system are angle of inclination of obstacles from the vertical ( $\Theta = 30^\circ$  to  $90^\circ$ ), height of the obstacles ( $h = 22$  to  $37.5$  mm), their cross streamwise ( $L_y = 56$  to  $206$  mm) and streamwise disposition ( $L_x = 30$  to  $70$  mm), heat flux and mass flow rate ( $m = 0.01$  to  $0.02$  kg/s). In this experimental work, statistical modelling of the operating conditions is done by Taguchi technique to determine an optimum set of input parameters.

**Keywords:** Taguchi Method; Obstacles; Heat Flux; Signal Noise Ratio; Solar Air Heater

## Tribological performance of surface treated magnesium alloy and Babbitt alloy under dry and lubrication regimes

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**Abstract:** Mg-Al-Si, one of the magnesium alloy category, is well known for high temperature applications as it contains hard and brittle thermally stable  $Mg_2Si$  in-situ precipitate. However, the coarse and brittle characteristics of  $Mg_2Si$  have a detrimental effect on the properties which limits their widespread use. Friction Stir Processing (FSP) is a novel technique which has the capability in attaining the fine precipitates of FSP, thus enhancing the mechanical and wear behaviour. The fine in-situ precipitates of  $Mg_2Si$  and excellent ductility achieved after FSP treatment of Mg-Al-Si based cast AS21 magnesium alloy gave a novel idea to explore the Mg alloy in the bearing applications. Therefore in the present study, wear performance of FSP treated AS21A alloy and Tin based Babbitt alloy was investigated and compared at various load conditions. Wear investigations were performed on Pin-on-Disc apparatus in atmospheric conditions. It was found that FSP treated Mg alloy exhibited comparable wear performance concerning Babbitt alloy. The investigated alloy exhibited improved wear rate and coefficient of friction compared to Babbitt alloy. Further, fine  $Mg_2Si$  precipitates were found to be useful in the enhancement of wear behaviour. The prominent wear mechanisms found responsible for the wear of samples were abrasion, adhesion, delaminating, oxidation and plastic deformation. Finally, a sector shape pad of the investigated material was also fabricated using the multi-pass strategy of FSP for application in thrust bearings.

**Keywords:** Magnesium alloy; Friction Stir Processing;  $Mg_2Si$ ; Babbitt alloy; wear; friction



ICARI-ME-21-01-47

**Analysis of interdependencies of the factors affecting the service performance of an organization: An approach of Structural Equation Modeling.**

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**Abstract:** Nowadays, service organizations play an important role in the GDP of a country. The success of an organization is dependent on many factors. The main purpose of this study is to extract these factors and establish the relationship among these factors using Structural Equation Modelling. In depth analysis of literature is used to find the factors for determining the performance of service organizations. A questionnaire survey was conducted to gather the opinion of consumers, employees and executives of various service organizations such as banking, health care and telecommunications. The statistical analysis shows the correlation and dependency of one factor over another. This study may help the manager to improve the performance of the organization by prioritizing these factors based on their importance.

**Keywords:** Structural Equation Modeling, Service organization, performance measurement.

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ICARI-ME-21-01-48

**An Analysis of the interrelationships of the factors impacting an organization's service performance: An approach of Partial least squares structural equation modeling (PLS-SEM)**

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**Abstract:** Services have the greatest dominance in the lives of customers and form a major part of the global economy in the current scenario. The efficiency of an organization is based on several factors. The primary aim of this analysis is to extract these factors and use partial least square structural equation modeling to determine the relationship between these factors. The factors for assessing the success of service organizations are used to review in-depth literature. To obtain the opinions of customers, workers, and executives of different service organizations such as banking, health care, and telecommunications, a questionnaire survey was conducted. Partial least squares structural equation modeling shows the correlation and dependency of one factor over another. This paper finds the influences of these factors on the overall performance of service organizations and formulates and tests the hypothesis on the relationship among these factors. This study will enable the manager to enhance the organization's output by prioritizing these variables based on their significance.

**Keywords:** Service organization, performance measurement.

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ICARI-ME-21-01-64

**Use of Multi Criteria Decision making (MCDM) and heuristic technique in Flexible manufacturing Systems: A Review**

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**Abstract:** Due to increase in the highly competitive market, it has become necessary for manufacturing systems to have high flexibility and quick response times. Primarily Flexibility can include operations flexibility, Path Flexibility and Routing Flexibility. Flexible manufacturing Systems (FMS) meets the requirement of all said flexibility and suitable for mid variety and mid volume production system. Now day's industries which have conventional manufacturing system are willing to adopt FMS. Although this adds complexity in the system, but this is the need of current scenario where industry are rapidly moving towards automation. In FMS, Various decision like grouping of machines, machine tool selection, Part selection, loading – unloading, sequencing and scheduling are being taken by manager time to time to meet the demand of customers. It was found that various MCDM techniques are very helpful to take various decisions in FMS. Apart from MCDM, for optimization various heuristic techniques were also applied by researchers in decision making problems of FMS. This technique leads to better results. In this present paper, use of various MCDM and heuristic techniques are reviewed which can be applied in FMS. This paper also attempts to address various challenges in adopting FMS by industries.

**Keywords:** Flexible manufacturing, decision making, heuristic technique, machine, industries.

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ICARI-ME-21-01-50

**Recent Advancement in Modeling of Friction Stir Welding: A Review**

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**Abstract:** This survey presents the formulation endorsed for the simulation technique used for friction stir welding process. Friction stir welding (FSW) devised for the applications where the original metallurgical characteristics must be retained, which are widely accepted in various industries such as aerospace, automobile, railways, shipbuilding etc. to join similar or dissimilar metallic alloys. The heat induced between the tool shoulder and the work piece by dint of friction or generated by the stirring and forging process without reaching the melting point. Simulation technique used in solid state joining process requires and overall development of a set of governing equation for a fully coupled thermo mechanical model which can be adopted for friction stir welded joints. The modeling of the FSW technique required to know about the heat loss mechanism and adopted formulations. The numerical modeling depends on the material parameters and fine-tuning of some process. These parameters can be achieved based on experimental data. Numerical modeling and simulation technique is meant to indicate the validation of projected methodology with less effort and higher economic advantage and its capabilities to review a real process of friction stir welding.

**Keywords:** Friction stir welding, metal, alloy, economics, simulation.

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ICARI-ME-21-01-51

**Design and optimization of biodiesel production in different micro mixer-A Comparative Review**

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**Abstract:** Biodiesel is generally produced via transesterification process, from different feedstock. In transesterification process, triglycerides from oil or animal fats react with alcohol in the presence of acid, alkaline or enzymatic medium as catalyst, producing esters as biodiesel, and glycerol as byproduct. Micro scale mixers are currently used to achieve high mixing performance and therefore increase reaction yield. Smaller dimensions of the micro-mixer increase the contact between the mixing fluids and hence increase the mixing index. The Fluid flowing inside the micro-mixer are generally laminar flow (Low Reynolds No) due to smaller dimension of channels, so for increasing mixing indexes, different geometrical obstacles provided to create turbulence inside the fluid flow. These obstacles split the main fluid stream in sub-streams. The main objective of this paper to predict the simulated results for oil- ethanol fluid mixing performance (index) for the optimal geometry and compared with experimental results from previous results.

**Keywords:** Biodiesel, transesterification, micro mixer, laminar flow.

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ICARI-ME-21-01-52

**Numerical Study on Effect of Vent Locations on Natural Convection in an Enclosure –A Review**Anand Singh Yadav<sup>1</sup>, MdNazeem Khan<sup>1</sup>, HC Thakur<sup>1</sup> Department of Mechanical Engineering, Gautam Buddha University(GBU), G Noida-UP**Email:**anandyadav4068@gmail.com

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**Abstract:** Natural convection is most suitable method of air conditioning for electrical and electronic component. This is free and sufficient method for cooling of heating gadgets. It saves the energy consumption in device and eliminate the unwanted noise and vibration. Natural convection is a broad topic from the research point of view and extensive researches are carried out since a long time. Present research works investigate the 2-D numerical study on effect of vent location on natural convection in an enclosure with an internal heat source placed at centre of enclosure. Two different geometry of heat source are assumed, square and circular in shape. The domain of enclosure is filled with air. The important parameters that affect natural convection in an enclosure are geometrical aspect ratio and Rayleigh number. These two are taken in consideration as well. The aspect ratio (H/L) aims to vary between 1 to 3. Rayleigh number varies from  $10^3$  to  $10^5$ . In this proposed work mass flow rate driven through the vents and average Nusselt number over the heater surface determine the feasibility of all four configurations assumed.

**Keywords:** Aspect ratio, Natural convection, Rayleigh number, internal heat source

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ICARI-ME-21-01-53

**Solar Assisted Electric Vehicle to carry loads up to 100-120Kg**

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**Abstract:** The idea of this project is to design a solar car that aims to address the problems related to pollution and the shortage of fossil fuels. To make this study a cost-effective or affordable solar car with the low maintenance of the vehicle while ensuring the safety and control of the driver. A vehicle powered by solar energy is that which uses a type of renewable resource that can be acquired when sunlight incident on the solar panel placed on the surface of the vehicle. Solar cars depend on photovoltaic cells (PV cells) to convert sunlight into electricity. When the photons (sunrays) hit on the PV cells, they exhilarate electrons and allow them to flow, creating an electric current. The batteries we are using in this project are lead-acid batteries which are of 48V rating each of 12V, which gets charge through this current coming from the solar panels. The motor's rating is 48V 750W which gets activated through these batteries and with a great weight carrying capacity and running speed. This project focuses on making an affordable mini solar car that can easily run about 20-25km at one charge and used for traveling short distances or within a city. As, solar panels take more time to charge the batteries, according to a sunny or cloudy day, so an emergency backup direct electric supply charge option will be also available from the DC battery charger.

**Keywords:** Solar Car, Electric Vehicle, Solar Panel, Automation, Renewable Energy.

ICARI-ME-21-01-54

**Fly ash as a potential reinforcement material for better mechanical properties of Aluminum**

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**Abstract:** The remarkable strength and durability characteristics found in light-weight alloys-based Metal Matrix Composites (MMC) assisted in enhancing their widespread use in automobile, aircraft and marine sectors. The present study consists of utilizing conventional stir casting setup for fabricating Aluminum-based MMCs having fly ash as reinforcements. The fly ash was reinforced with aluminum matrix in proportions: 2, 4, and 6 % to get three different homogeneous samples of MMCs. The prepared samples were examined for microstructure and mechanical characterization. The MMCs samples exhibited successful incorporation and homogeneous dispersion of fly ash particles. The fly ash addition assisted in enhancing the hardness and decrease in strength of aluminum MMCs.

**Keyword:** Aluminum, stir casting, fly ash, metal matrix composites.

ICARI-ME-21-01-55

## Effect of Surface Textures on the Performance of Journal Bearing

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**Abstract:** Journal bearing tend to have more worn over time due to just a layer of oil separating the shaft and the bearing. Due to sudden load variation the shaft tends to rub against the bearing causing wear and low working life. This paper reports a review for the various textures on the shaft and bearing surface which positively affects the performance characteristics of the journal bearing and possibly helped to achieve more load capacity and life. Recent developments in microscopy have made it possible to create various textures on various surfaces. Using surfaces with controlled micro geometry may prove an effective approach to improving bearing performance. From the literature review it is revealed that contact characteristics such as minimum film thickness, maximum pressure, axial oil film flow, and friction torque may be improved through an appropriate surface texture geometry and appropriate textures distribution on the contact surface.

**Keywords:** journal bearing, surface texture, load carrying capacity, lubricant, pressure.

ICARI-ME-21-01-56

## Performance Parameters for Supply Chain management of Energy Resources in Indian Energy Security Context

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**Abstract:** Energy is considered as the primary requirement of all activities, due to which possession of energy resources is most important for the growth and development of any country for its present as well as future needs. Hydro, coal, geothermal, wind, bio based fuel, tidal and petroleum products are considered as the major sources of energy. According to the International Energy Agency, coal accounts for about 40% of India's total energy consumption, oil for about 24%, and natural gas for 6%. However solar energy is proving its significance for country's energy security due to its eco-friendly and availability but India is not self-independent in its technology and a long way has to pass through research and development in this sector. As per the expert's opinion, coal resources of India may be exploited in 40 years, if yearly production rate of coal continues with current rate i.e. 700 million tons. As per the ICRA's Rating Service, decrease in the supply of domestic coal enhances the fuel price and supply related risks and dependency on import increases to secure coal at competitive rates. The primary energy intake in India raised by 2.3% in 2019 and stand at third major after China and USA with 5.8% global share. In 2018, India's net imports was accounted nearly 205.3 million tons of crude oil, 26.3 MTOE of LNG and 141.7 MTOE coal, which is 373.3 MTOE as a whole of primary energy and 46.13% . As per the HSBC dependence on energy imports of India will become 53% of commercial energy intake in 2031-32 from about 25% in 2003-04. Further there is a need of Low-carbon growth to reduce emissions and to increase India's energy security at threat from increasing imports. As per the historical data, India remained the largest economy in the world for most of the two times from the 1st until 19th century. Annual average GDP growth of India has been calculated as 6% to 7% since 2000, further 2014 to 2018, India has achieved the tag of the world's fastest growing major economy from 2014 to 2018, above China.

Further, the population of India is above one billion, due to which demand of energy has been cumulative every day.

So the import of the petroleum product has been increasing. Coal India, which produces most of India's coal needs, is now planning long-term coal imports of "tens of millions of tons" Hence, we can say that energy security concerns of India have been rising. We emphasize that energy security for India has to be seen in the broader context as every country has its distinctive limitations and opportunities. An adequate supply chain is required so that each energy resources could impart its significance for energy security of the country. Easy availability, reduced cost and eco friendly or sustainability are the important parameters for today. In this work, proper application of supply chain management of energy resources was studied which makes various checks, reduces the losses and keep vigil on wastages, which results into reduction of import burden and help to monitor India's energy security. For this various research papers, articles and reports were studied.

**Keywords:** Supply chain management, Energy Resources, Energy Security.

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ICARI-ME-21-01-57

## Hydrogen Engine's superiority over the Diesel/Gasoline Engine-a critical review

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**Abstract:** With the continuous increase in demand for fuels and shortening of its supply has led to a surge in the pricing of fuels. One of the biggest public demands is for vehicle fuel. To curb this problem various research has been done on hybrid engines. This review paper studies those researches done on various aspects like performance, emission, combustion, and a few other aspects and provides with a conclusion on how hydrogen might be the scope of the future engine power source and the ratios and type of fuel that can be used in various styles of the combustion engine. The emission of various gases like carbon monoxide, carbon dioxide, NOx and smoke are affected by the addition of hydrogen as it leads to better combustion leading to less formation of soot particles. With the addition of Hydrogen, the brake thermal efficiency improved along with changes in specific fuel consumption with a general trend showing an improvement in the fuel consumption i.e. lower consumption of fuel along with lower exhaust emissions. There was a drop in cylindrical pressure with an increase in heat release rate. The combustion duration also reduces in some of the papers studied. The paper studied has both sparked and port injection type. This review provides a prospective opinion for the researchers studying the ways of enhancing the engine performance and emission characteristics by using hydrogen hybrid fuels and its blends.

**Keywords:** Hydrogen fuel, performance, emission

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## Application of DMAIC Tool of Six Sigma in Small Scale Industry

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**Abstract:** Different researches are conducted in studying the manufacturing process in different industries like Food Processing, Rolling mill, Grinding process, Distillation unit etc. The applications of 6 sigma has been successful in achieving increased output and better finished products apart from increasing profit margin but none of these researches were conducted in Indian textile industry and application of 6 sigma in improving overall productivity is yet to be implemented.

This research is intended to study manufacturing process of Indian textile company Dewan textile located in Meerut and apply 6 sigma tools to improve processes in various departments and also achieve good finished products apart from improving profit margin of company. For any company to have financial gains it is imperative to reduce defect rate and improve yield of product manufactured. Higher defect rates reduce Profit margins therefore companies strive to decrease defect rate of the product during manufacturing to maximum possible extent. This is accomplished by various inspection methods during production cycle and implementing changes as and where necessary. Yarn is manufactured in textile industry by going through number of processes carried out at various departments which raises defect rate to a huge extent. This project studies manufacturing processes involved in various departments of yarn manufacturing process and DMAIC tool of 6 sigma is implemented in winding department to reduce defect rates before finished product goes to customer. Final package is made in winding department from where end product is directly sent to customers and arise possibility of customer complaint.

**Keywords:** DMAIC, 6 sigma, Textile industry.

## Time-dependent Variation of Viscosity of Visco-elastic Magnetic Abrasive Medium

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**Abstract:** Variation of Viscosity of the Viscoelastic Magnetic Abrasive medium is one of the most important parameters that affect the Nano finishing of the surfaces. In the present research work, a Viscoelastic Magnetic abrasive medium has been prepared using Polymer, Gel, Carbonyl Iron particles, and Silicon Carbide abrasive particles, which is used for internal surface finishing of the Spline shafts made of mild steel. The sample prepared has been tested for its Viscosity under Modular Compact Rheometer [MCR 102] immediately within one hour of its preparation. Graphs for Viscosity vs Shear Strain and Shear stress vs. Shear Strain have been prepared. Viscosity obtained when tested within one hour of the preparation is 954.06 mPa-s. The same sample is tested after 30 days and the Viscosity of the Viscoelastic Magnetic Abrasive medium is found to be 5688 mPa-s. At higher Viscosity, the flow ability of the Viscoelastic Magnetic Abrasive Medium during the experimentation is found to be very less and also the abrasive particles could not be projected to the surface to be finished

**Keywords:** Viscosity, visco-elastic, magnetic abrasive, surface finish.



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## Study of Dry Sliding Wear behaviour of Al6351 T6 under Variable Wear Parameters

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**Abstract:** In this research work, the Wear behaviour of Al6351 T6 is studied under dry sliding conditions. Three process parameters; Normal load, time, and Frequency each having three levels are considered for experimentation under Linear Reciprocating Tribometer. Experimentation is performed on specimens having a surface roughness variation of 10%. Material for the test specimen and the Pin are made of the same material. The experiment is performed based on the Design of the experiments. Optimization for the Minimum wear is done based on Taguchi's Optimisation Technique and the results have been analyzed. Variation in wear for different periods is presented graphically and found that the wear does not increase linearly with the increase in the Normal load.

**Keywords:** Dry sliding behaviour, wear, time, frequency, roughness.

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## Fabrication of Rapid Compression Machine with Variable Compression Ratio -A Review

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**Abstract:** The Rapid compression machine (RCM) is an excellent tool to directly measure ignition delay (ID) of combustible mixtures at a high pressure. This paper highlights the method to assemble a RCM with adjustable stroke length and compression ratio. The assembled RCM consists of mainly three parts; driver cylinder assembly, piston assembly and receiver cylinder assembly. Driver cylinder assembly consists of piston cylinder with combustion chamber, multi-hole nozzle to inject the fuel, piezoelectric sensor, pressure gauge to measure the in-cylinder air pressure, electric heater to heat the compressed air, heated plate to ignite the fuel. Piston assembly is the middle portion of RCM acts as a connector of the Driver assembly and Receiver assembly. Receiver cylinder assembly also contains the piston cylinder and this piston is connected to another piston through the piston rod, which is fitted inside the driver cylinder and mainly consists of fuel injector, pressure gauge for measuring in-pressure cylinder and temperature sensor to measure heated air temperature, air heating coil. Receiver cylinder contains movable plates which are used to vary the movement of length along the axial direction to vary the clearance volume. The present RCM is based on the concept of combustion of charge (fuel + air) in both cylinders placed in opposite ends which is different from the concept used in the earlier RCMs. In the earlier RCMs the energy is created inside the driver cylinder by increasing the temperature and pressure with the help of the compressor and heater rather than by using the combustion process.

**Keywords:** Variable Compression Ratio, Rapid Compression Machine, Multi Hole Nozzle, Sensor

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## A Review of Selective Laser sintering process

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**Abstract:** Selective Laser Sintering (SLS) is a manufacturing Technique that falls under Additive Manufacturing where the Powders of the selective material are subjected to the Sintering process by a high energy beam of Laser. Different Complex shaped three dimensional objects could be manufactured using this technique. The binding among the particles of the powder is due to binding induced by chemical reactions, solid-state sintering, and either full or partial melting. In the present paper, a review of the development of the Selective Laser Sintering process since its beginning 1990s has been discussed. A brief discussion about the application of the Laser Sintering process, its advantages, limitations, and future developments has been discussed.

**Keywords:** Laser sintering, additive manufacturing, three dimensional object, partial melting.

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ICARI-ME-21-01-63

## Studying the Effect of texturing and coating on the tribological properties of SS-202

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**Abstract:** The objective of this paper is to study and observe the tribological characteristics of a internal combustion engine with the carbon coating using HVOF technique over the piston crown for thermal performance and wear resistance. Wear resistive and thermal barrier ceramic coating plays a vital role in the combustion and performance of diesel engines. Thermal spray coating is found very stable even in erosion, abrasion, and scratch and heavy load conditions. At elevated temperatures, it protects the solid lubricants entrapped in it and thus causes the layer to be stable and dynamic. The coatings are evaluated for erosive wear performance. Coatings are tested at different air pressure, temperature and impingement angle. With the predefined working parameters for the experimental working, such as the load applied, sliding velocity, and the track distance travelled over the course the of wear for different diameters of specimens used, the values of wear, coefficient of friction, and the variation in temperature throughout the experimental duration is measured. It is observed that the coating layer plays an important role in determining the relative contribution of the abrasive and adhesive interactions and, thereby, the resulting friction and wear behavior of the tribological system. This analysis allows us to systematically characterize the influence of controllable process variables. This study is helpful in the better understanding of the potential of Thermal spray coating on the surface, leading to the reduction in friction and enhanced wear resistance for IC engines piston-cylinder interface.

**Keywords:** Coating, HVOF, Texturing, Laser, Tribology, Optimization.

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**Double plate griddle for flatbread (Rotoduction)****Rajesh Kumar Verma**

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**Abstract:** This type of Roti Tawa has been made keeping in view the utility of the Indian people. This Roti Tawa is very simple and easy. Therefore, this Roti Tawa can be made very popular among us Indians. Bread, as we know, has a huge contribution in making dishes under the Indian tradition. To make it, one has to face various problems. In the future, the use of electric appliances is increasing, so all the cooking materials are being electrified, out of which there are many machines for making bread. But all types of machines are not able to solve problems well.

**Keywords:** Double plate griddle, dishes, bread.

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ICARI-ME-21-01-66

**Municipal Solid Waste Management using Machine Learning Techniques: a case study for Ghaziabad****Athar Hussain<sup>1</sup>, Deepesh Tiwari<sup>2</sup>, Sunil Kumar Tiwari<sup>1</sup>**<sup>1</sup>Department of Civil Engineering, NSUT west campus (Formerly CBP Government Engineering College, Jaffarpur), New Delhi-110073, India<sup>2</sup>Environmental Engineering Department, Delhi Technological University, Bwana Road, ShahbadDaulatpur, Delhi-110042, India**Email:** athariitr@gmail.com

**Abstract:** Solid Waste Management (SWM) is one of the most challenging issues owing to lack of authentic data on different elements of SWM, namely, storage, collection, transportation, separation, processing and disposal. The characterization of Municipal Solid Waste is mandatory aspect for the evaluation of its suitability for different waste processing techniques. The present study has been carried at Ghaziabad city of Delhi NCR and the study region was divided into five different zones as Mohan Nagar, Vijay Nagar, Kavi Nagar, City Zone and Vasundhara region. The collected samples of municipal solid waste from all the identified locations of the study area were characterized for biodegradables (organic wastes), paper, plastic, glass, ceramics, metals, inert materials, ash and debris. After characterization the biochemical methane potential has also been carried out by anaerobic digestion of organic fraction of collected samples. It has been inferred that anaerobic digestion of municipal solid waste is a best alternative technology for the management of solid waste. This is due to the fact that the gigantic burden of solid waste on the environment can be eradicated and reduced to a considerable extent. Moreover the biogas produced during the digestion process can be utilized as a source of energy as it possess a high calorific value and the produced sludge can be used a good manure as it contains high amount of nutrients in assimilative form. The obtained data has also been used to compute the methane generation rate constant (k) and biochemical methane potential (BMP) in anaerobic biodegradation of solid waste of Ghaziabad city. However in present study the maximum biogas production has been observed under mesophilic temperature conditions of  $30\pm 2^\circ\text{C}$  at a food to microorganism ratio of 0.75.

**Keywords:** solid waste management, machine learning, environment, anaerobic digestion.

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**A Study on separation of used domestic water by using aTDS sensors**Rajesh Kumar Verma<sup>1</sup>, Bhupendra Singh Chauhan<sup>1</sup>, Hee Chang LIM<sup>2</sup><sup>1</sup>Department of Mechanical Engineering, Meerut Institute of Engineering and Technology, Meerut (UP), India<sup>2</sup>School of Mechanical Engineering, Pusan National University, Busan, South Korea**Email:** rajeshkumarsaa@gmail.com

**Abstract:** The domestic water is exhausted after use without using any treatment plant. Thus, a huge water which is rarely available goes waste. Present study shows the concept of converting domestic waste water into useful form which goes to sewer line as waste. The case was done on a floor of flat system in Meerut Society flats. The water which was drained after use to outside the floor from kitchen, bathroom, washbasin and after washing the clothes and daily routine water fed to out drain using the sewer line. Here a TDS sensor was used to measure the particulate matter using parts per million (ppm). The water with TDS less than 300 ppm was sent to one tank and water with above 300 ppm was sent to another tank for re-treatment plant. It was observed that 30% recovered safely using this TDS sensor. This water can be used for auxiliary work like gardening, etc.

**Keywords:** Water, TDS, Sensor, domestic use.

ICARI-ME-21-01-68

**A review on Surface Laser Texturing and its effect on cutting performance of cutting tools**Jayesh Nagpal<sup>1</sup>, Roop Lal<sup>2</sup>, Ramakant Rana<sup>1,2</sup><sup>1</sup>Mechanical and Automation Engineering Department, Maharaja Agrasen Institute of Technology, Delhi<sup>2</sup>Department of Mechanical Engineering, Delhi Technological University, Delhi-42, India**Email:** 7ramakant@gmail.com

**Abstract:** In this paper, the process of laser surface texturing (LST) has been discussed, along with what parameters of laser effect the texturing process. Also discussed is, how does this process benefit the performance of the cutting processes like that of turning, drilling and milling. Various authors have conducted experiments using textured tools by varying the texture parameters and comparing their performance against conventional tools. Mostly, the texture parameters that were varied consists of – texture pattern, texture orientation with respect to cutting edge, texture density, order of texture, texture depth and texture behavior under different lubricating conditions – solid lubricants, partial lubrication and complete lubrication. How these parameters contribute to the performance enhancement of the cutting processes. Then the effects of these parameters on tools have been discussed in relation to how much these parameters correlate to each other in role of performance improvement. Then some failed studies have been discussed for reference to the limitations of the texturing processes. At the end some suggested further work have been mentioned that the various authors had in their publications with what benefit those studies could lead to in this field. Then the paper is concluded with collective summary and conclusion with various references and citations that have been mentioned in the paper.

**Keywords:** Review, Laser Texturing, Cutting tools, Tool life

ICARI-ME-21-01-69

## Study of Super alloy for the application in a Jet Engine

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**Abstract:** With the creation of Jet Engine technology, it demanded a material that could withstand at high temperatures. Conventional materials like Aluminium and steel can't be used as it is because the working temperature of the jet engine is higher than the melting point of the aluminum and steel. So this required a high-performance alloy to survive at extreme temperatures which are called Superalloy. Superalloys own attributes like fracture toughness, high strength, and creep resistance for high-temperature applications, which incidentally is vital for jet-engine. Moreover, at high temperature when most of the materials fail due to the oxidation and corrosion, super alloys not only doesn't fail due to oxidation and corrosion but also they can work at a high temperature nearly up to 1300°C. In this project, we will study the different types of super alloys along with their composition and applications, while evaluating their advantages and disadvantages.

**Key Words:** Super-alloy, Jet Engine, material, aluminium, high temperature

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## Characterization of the self-developed Environment-Friendly Diamond Coating on the Tungsten Carbide (WC) Tool Inserts

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**Abstract:** In the present work, the polycrystalline diamond films were deposited on the tungsten carbide (WC) tool inserts using the thermal Chemical Vapour Deposition (CVD) method. The sugarcane bagasse was used as a carbon precursor for the growth of polycrystalline diamond films. The tribological behaviour of as-developed polycrystalline diamond films on the tungsten carbide (WC) inserts was studied in this research work. X-ray diffraction (XRD), Raman spectroscopy and Field Emission Scanning Electron Microscope (Fe-SEM) were used to confirm the presence of diamond coating. The hardness tests were also performed for inspecting the microhardness induced by the developed coating. The average Vickers hardness values of un-coated WC inserts got increased by 51% after the coating process. Tribological test was performed on the developed samples using a pin-on-disc tribometer as per ASTM G-99 standards. Tests showed improvement in the wear resistance of the coated WC inserts as there was a decrease in the value of wear by 57.84 %. The value of the coefficient of friction (COF) also found to be decreased by 51.48%. The morphological study and tribological tests in this paper present the advantages of coating polycrystalline diamond films on tungsten carbide (WC) inserts for machining and high impact applications.

**Keywords:** Diamond, Tool, Characterization

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## Optimizing and analysing the Effect of various shapes of surface texturing on the tribological properties

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**Abstract:** The purpose this paper serves is one to analyze the significant effects of Negative laser texturing on the surface of the specimen used for the application as piston ring of an automobile engine, under lubricated conditions. The standing objective is to carry out experiments for the study of the tribological behavioural dynamics of the working on the interface of the textured specimen piston ring material and the sliding material, by reducing the percentage of the contact surface area of the pin by negative texturing. With the predefined working parameters for the experimental working, such as the load applied, sliding velocity, and the track distance travelled over the course the of wear for different diameters of specimens used; the values of wear, coefficient of friction, and the variation in temperature throughout the experimental duration was to be measured. The pin and disc interface, was provided with lubrication and hence, the experiment was run under flooded conditions. This experimental study is helpful in the better understanding of the potential of the negative texturing on the surface, leading to the reduction in friction and enhanced wear resistance for IC engines' piston-cylinder interface. Thus, providing a better, efficient and enhanced substitute to the automobile industry

**Keywords:** Texturing, Laser, Tribology, Optimization.

## Analysing the tribological and tensile properties of self-developed 3D Printed ABS and PLA Materials

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**Abstract:** Rapid prototyping today is observed into practice and is being recognized as a significant technology for design. It demonstrates the process of design situated between conceptual design and real-world construction. It is used to automatically construct physical models from computer-aided design data or is a group of technique used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer-aided design data. The three-dimensional printers allow designers to quickly create tangible prototypes of their designs rather than two-dimensional pictures. The 3D printer used works on fused deposition modelling (FDM) in which two materials are used to make 3D models out of the design made on CAD software. The two materials used are polylactic acid (PLA) and acrylonitrile butadiene styrene (ABS). The model of a pin will be formed using these two materials using various parameters. These parameters are—layer thickness, infill type, infill density and raster angle. In total, we will have then six parameters which include 3D printing parameters and the two materials. Using these five parameters, design of experiments will be created using the software Minitab. Various combinations will be created in the DOE with these six parameters. The pin will be then tested on the pin-on-disc machine which will help us to tell the wear rate and the coefficient of friction of the material through graphs. These graphs will help us decide the combination of parameters which have the most and the weak durability and thus can be used to create the parts we want to create for various industries. This way a comparative study of the tribological test between the two materials will be created.

**Keywords:** Tribology, tensile, material, 3 D printer.



## **Role of Corporate Governance in Financial Performance of Companies**

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**Abstract:** The study of Corporate Governance (CG) has assumed tremendous significance as its compliance has been made mandatory particularly after globalisation due to numerous Corporate Failures/mis-governance. The problems faced by companies like Enron, Polly Peck, BCCI, Satyam, Sahara, Saradha Chit Fund, Tata v/s Mistry have further stimulated the interests of governments, policy makers, investors and other stakeholders in Indian companies to investigate the role and significance of Corporate Governance for the benefit of all its stake holders. The present study is a modest attempt to investigate the relationship between corporate governance and financial performance of Indian companies. This study has examined the relationship in the Indian context on a sample of 50 companies derived from CMIE & NSE. The firm performance is measured by ROA and Tobin's Q and CG of companies is measured by various variables like Board's Ownership, Board Structure, Board Size, Audit Committee Independence and Dual positions held by CEOs of the Companies. Based on the results obtained from various empirical evidence shows that the CG elements, namely, board size and CEO duality do not impact firms' performance whereas managerial ownership revealed positive impact on firm performance (ROA). Audit committee independence and CEO duality have no impact whereas board size and managerial ownership revealed positive impact on firm performance (Tobin's Q).

**Keywords:** Financial performance, companies, corporate governance, audit committee.

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