M.E.S.College of Engineering

Department of Computer Engineering

National conference on

"Recent Advances in Computer Engineering"

Brochures for the Years 2023

10th National Conference on
"RECENT ADVANCES IN COMPUTER ENGINEERING"
[RACE 2023]
In Association with
"CSI Pune Chapter"
on
27th and 28th April 2023

Organized by
Department of Computer Engineering,
Modern Education Society's College of Engineering, Pune
(Wadia College Campus) Accredited by NBA & NAAC with an 'A++' Grade
www.mescoepune.org, 02026163831
Email ID: race@mescoepune.org

Important Dates

Deadline of Paper Submission:	April 15, 2023
Intimation of Acceptance:	April 17, 2023
Submission of CRC Paper:	April 22, 2023
Last Date of Registration:	April 22, 2023

Registration Fees

- Industries-Rs.1000/
- Academic Institutions-Rs. 800/-
- PG,UG student, Research Scholars & Attendee -Rs. 800/

Mode of Conference :Hybrid

Chief Patrons
Dr. A. S. Chandak
(Trustee, ME Society, Pune.)
Prof.S.N.Sanap
(Trustee, ME Society, Pune.)

Patron
Dr. (Ms). M. P. Dale
(Principal, MES College of Engg., Pune.)

Convener
Dr. (Mrs.) Nuzhat F. Shaikh
(Head, Department. of Computer Engg.)

Organizing Secretary
Mrs. S. S. Raskar
(9850977032)

Coordinator
Mr. G. B. Aochar
(9665005163)
Mrs.N.S.Gore
(9960530968)

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Dr.(Mrs.) J. R. Pansare
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Dr.Durgesh Srivastava(Associate Professor&Head Acedamic Operation,CUIET,Chitkare University)

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Mr. H. G. Muknak

Modern Education Society's

College of Engineering

Accredited by NBA and NAAC with 'A++' Grade

19, Late Prin. V. K. Joag Path, Wadia College Campus, Pune-411001

Report

National Conference on
"Recent Advances in Computer Engineering"

In association with CSI

(RACE -2023)

On

27th & 28th April 2023

Organized by

Department of Computer Engineering

Venue: Modern Education Society's

College of Engineering, Wadia College Campus,

19, Late Prin. V. K. Joag Path, Pune–411001

About the Event

The 10th National Conference on "Recent Advances in Computer Engineering" [RACE-2023] is the premier forum for presentation of new advances and research results in the field of Computer Engineering. The conference will bring together researchers, engineers and scientists in the domain of interest from a variety of disciplines such as Computer, Informa on Technology, and Electronics & Telecommunication Engineering.

Topics of interest include but not limited to :

- Data Science & Big Data
- Internet of Things
- Software Engineering
- Networking & Cloud Computing
- Artificial Intelligence & Machine Learning
- Data Mining and Information Retrieval
- GPS & Applications
- Computer Networks
- Cyber Security & Network Security
- Information and Coding Techniques
- Biomedical Signal/Image Processing
- Image and Pattern Recognition
- Computer Vision, Biometrics
- Cryptography and Network Security
- Graphics, Animation & Virtual Reality
- Cloud Computing
- Fuzzy Systems/Neural Network

Outcomes of RACE 2023

Student will be able

1. To write technical articles.
2. To provide an excellent opportunity to the students to showcase their talent, research orientation and untapped potential.
3. To develop presentation and communication skills and to work in teams.

RACE Organizing Team

Convenor: Dr. N. F. Shaikh (HoD, Comp)

Organizing Secretary: Prof. S. S. Raskar

Coordinators: Mr. G. B. Aochar
                Mrs. N. S. Gore

RACE 2023 Details

No. of Registered groups   -62
No. of participated groups -62

Chief Guest Information:

Dr. Parikshit N. Mahalle
Professor, Dean, R&D & Head , AI&DS, VIIT, Pune

Session Chairs Information:

Sr.No.	Name of Session Chair	Institute
1	Dr. Kalyani Waghmare	Pune Institute of Computer Technology,Pune
2	Dr. Sandhya Arora	Cummins COE,Pune
3	Dr. Archana Ghotkar	Pune Institute of Computer Technology,Pune
4	Dr. Leena Deshpande	VIIT,Pune
5	Dr. Poonam Raskar	SKNCOE,Pune
6	Dr. Nilesh Sable	VIIT,Pune
7	Dr. Shabnam Shaikh	AISSMSCOE,Pune
8	Prof. B. F. More, Prof. P. M. Patil	MESCoE,Pune

Best Paper Information:

Session No.	Title of Paper	Name of Judge
session 1	Interruption free Contextual video advertisement using planar topography pf contiguous regions within a frame.	Dr.Kalyani waghmare
session 3	Browser Based IDE	Dr Sandhya Arora
session 4	Natural Language Processing based video summarization	Dr. Archana Ghotkar
session 5	Generating minutes of meeting using NLP	Dr.Leena Deshpande
session 6	NILL	Dr. Poonam Raskar
session 7	Image caption Generation using Deep	Dr. Nilesh Sable
session 8	Content Obfuscation of Copyrighted Branding or Trademarks in Images using Generative Adversarial Networks	Dr. Shabnam Shaikh
session 9	Analysis of Stretch in Nifty Options Using Technical Indicators	

RACE 2023 Brochure:

10th National Conference on
"RECENT ADVANCES IN COMPUTER ENGINEERING"
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Registration Fees
No registration fees
(Online Presentation)

Mode of Conference :Hybrid

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Organizing Committee

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About the College

Modern Education Society is established in 1932 with the motto "For the Spread of Light". M.E.S. College of Engineering established in 1999 and situated in the heart of Pune city, offers engineering degree courses in Mechanical, E&TC and Computer Engineering and is affiliated to Savitribai Phule Pune University, accredited by NBA and NAAC with 'A++' Grade. The college is developing fast with the vision "To Develop Motivated, Environment friendly, Self esteemed, Creative and Oriented Engineers" and the mission "To develop industry oriented manpower to accept the challenges of globalization by promoting value Education through motivated trained faculty by maintaining conducive environment for affordable cost by promoting industry institute interaction by involving Alumni".

About the Department

The Department of Computer Engineering has been taking consistent efforts since its inception in 1999 with highly qualified and energetic faculty for all round development of budding engineers for tomorrow's nation building. Department is accredited by N.B.A. for three years . The department has intake of 180 UG and 18 PG students. This is an exciting place to study and grow where thinkers become leaders and where there is thirst for knowledge. The interaction between the students and professors immensely enriches the educational experience. The department is well equipped with state-of-the-art infrastructure & advance laboratories. Many staff members have completed Ph. D. and a few are pursuing Ph.D. in various streams of Computer Engineering to strengthen Research & Development & to leverage research aptitude of students.

Best Paper Award

For each track best paper will be selected from the presented papers.

Paper Publication

All papers will be published in RACE 2023 Conference proceedings bearing ISSN:2347-3649.

Call for Paper

The 10th National Conference on "Recent Advances in Computer Engineering" [RACE-2023] is the premier forum for presentation of new advances and research results in the field of Computer Engineering. The conference will also spark innovative ideas, foster research relations or partnerships between the various institutions and build a strong research and development community. The conference will bring together researchers, engineers and scientists in their domain of interest from variety of disciplines such as Computer, Information Technology and Electronics & Telecommunication.

Topics of interest include but not limited to

- Mobile Communication and Networks
- Intelligent Communication Systems
- Wireless Sensor Networking
- GPS & Applications
- Information and Coding Techniques
- Signal Processing
- Biomedical Signal/Image Processing
- Image and Pattern Recognition
- Computer Vision, Biometrics
- Audio and Video Processing
- Video Surveillance and Scene Analysis
- Cryptography and Network Security
- Image and Video Security
- Graphics, Animation and Virtual reality
- Cloud Computing
- VLSI and Embedded Systems
- Fuzzy Systems/Neural Network
- Robotics and Automation
- IT/ITES Innovation idea

Paper Submission

Full Length Papers should be sent on:
race@mescoepune.org

Paper Format

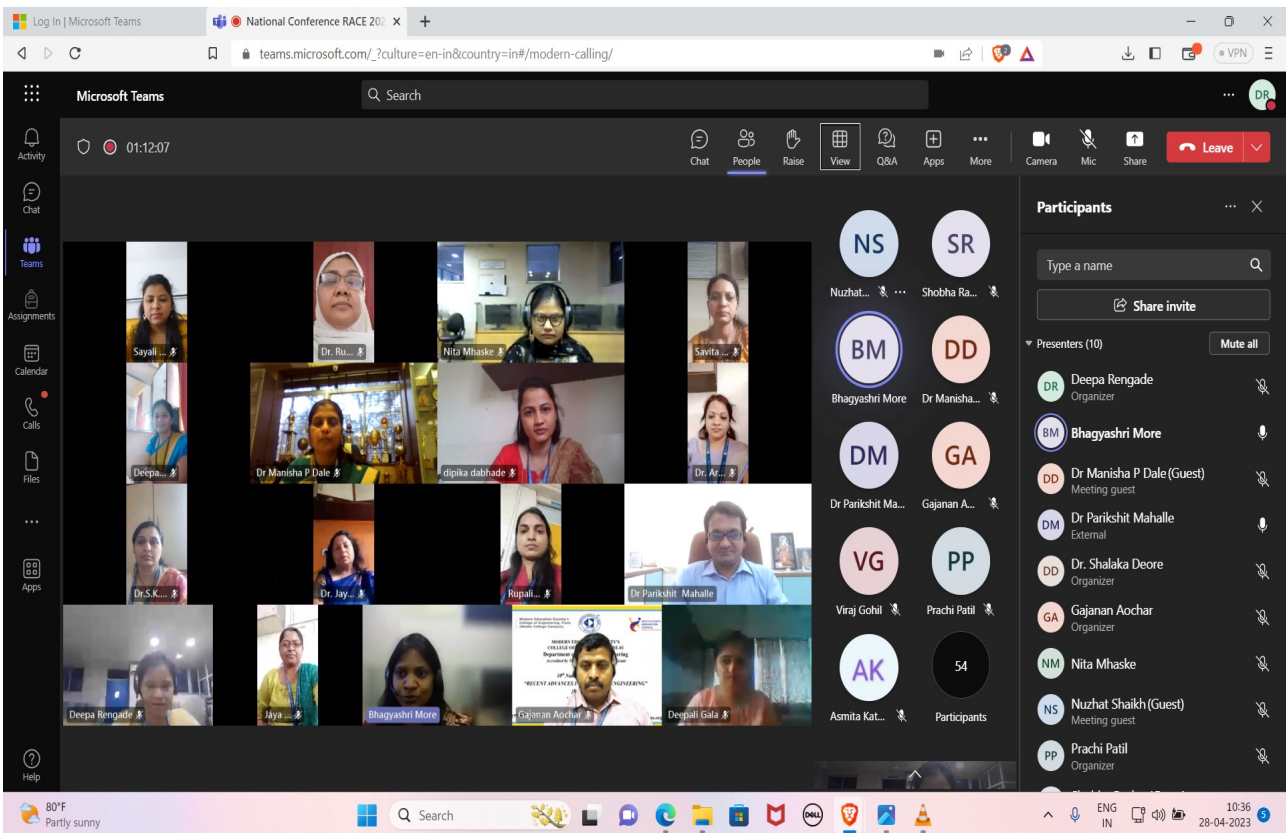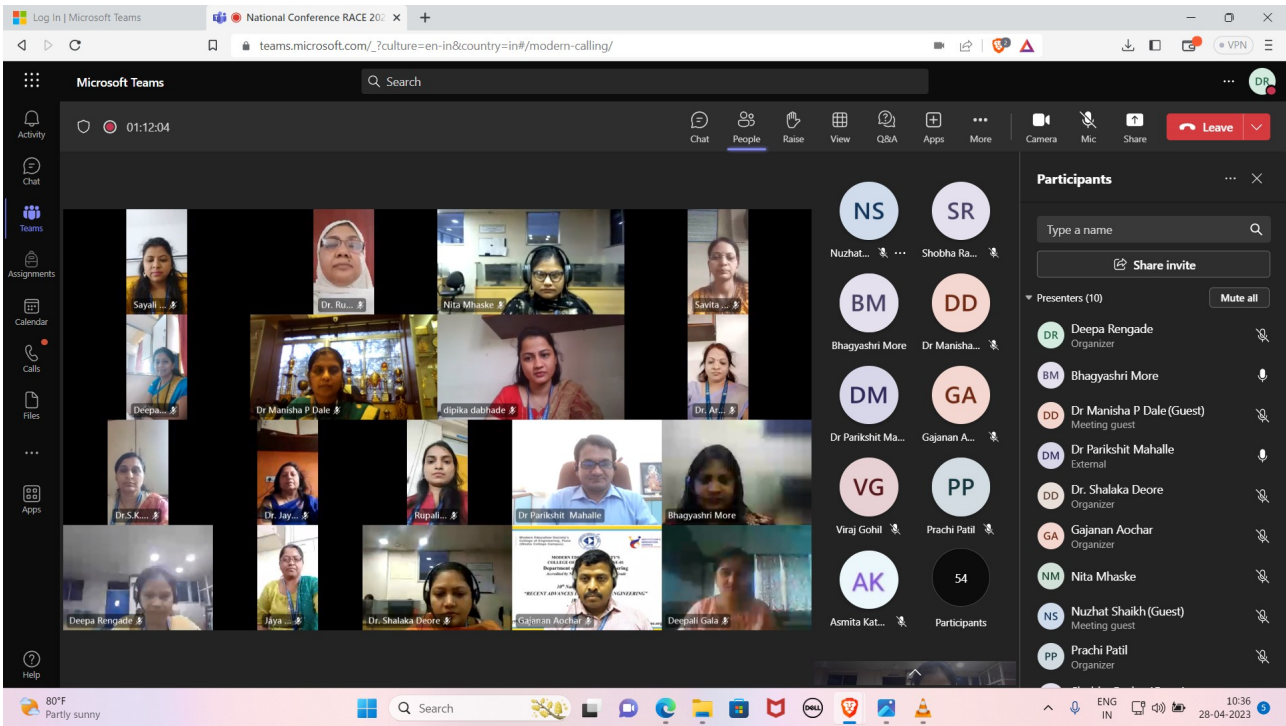All manuscripts should be strictly in MS-word/latex and limited to 6 pages. For template, visit
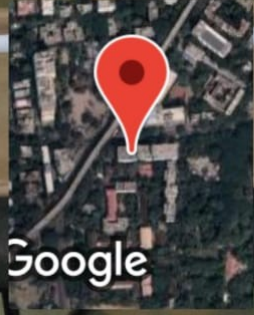http://mescoepune.org/race/

Photos:

[Online Inaguration – Cheif Guest Dr. Parikshit N. Mahalle]

[Session chairs with RACE committee members]

[Session chair]
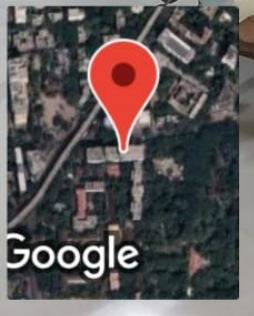
[Session Presentation]

[RACE 2023 Organizing Committee]

RACE Coordinator   **HOD**
Prof. S.S. Raskar   Dr.(Mrs.) N.F.Shaikh
Prof. G.B.Aochar
Prof. N.S.Gore

M.E.S. College of Engineering

Department of E&TC Engineering

National conference on

"Advancements in Communication, computing and ElectronicsTechnology"

Brochures for the Years 2023

9th National Conference On

Advancements in Communication, Computing and Electronics Technology

[28th & 29th April 2023]

ACCET 2023

Organised by

M. E. S. College of Engineering, Pune
(Accredited by NAAC with 'A++' Grade)
Electronics and Telecommunication Engineering Department (Accredited by NBA)

Wadia College Campus,19, Late Prin. V. K. Joag Path, Pune-411001. Ph. No. 020-26163831 Website: www.mescoepune.org Email ID: accet@mescoepune.org

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CONVENER

Dr. P. P. Mane (Head, Department of E&Tc Engg.)

COORDINATOR

Dr. M. M. Dhanvijay (Assistant Professor, E&TC Engg.)

Contact details - Dr. M. M. Dhanvijay
Ms. V. H. Kamble
(9881694722, 8806664807)
accet@mescoepune.org

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M.E.S. College of Engineering Pune-411001
Dept. of Electronics and Telecommunication Engineering IEEE Signal Processing Society
Sponsored
IETE Pune Centre Approved
9th National Conference on
Advancements in Communication, Computing
and Electronics Technology
ACCET on 28th and 29th April 2023 (2022-23)

BROCHURE

9th National Conference On

Advancements in Communication, Computing and Electronics Technology
[28th & 29th April 2023]

IETE Pune Center Knowledge Partner

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- *By promoting value Education through motivated trained faculty*
- *By maintaining conducive environment for affordable cost*
- *By promoting industry institute interaction by involving Alumni".*

ABOUT THE DEPARTMENT

The Department of Electronics and Telecommunication Engineering is established in 1999 and emerged as a leading source for providing up-to-date knowledge and technological developments in Electronics and Telecommunication Engineering. The department has technically rich and industry experienced faculty providing sound foundation of knowledge in Electronics and related areas. The Department has 25 dedicated faculty members including seven doctorate professors and ten perusing their PhD degree. State of the art computational and experimental facilities enable the department to undertake basic and applied research and provide support to R&D organizations. Department offers sponsorship for BE in-house projects. Various programs and activities like EBaja, MBaja, Roboclub, ETSA, Enthusiastic club etc. are conducted for uplifting students continuously throughout the year. The department organizes several Faculty Development Programs and workshops for technical upgradation of faculties. The graduating students are well placed in leading academic institutes, research organizations and industries.

The department has started **M.E. (Signal Processing)** course from 2013. To make students ready for industry requirements the department have started offering **3 Honors Program** from AY 2020-21 as follows **Data Science and Internet of Things and Artificial Intelligence & Machine Learning.**

CALL FOR PAPER

The National Conference on Advancements in Communication, Computing and Electronics Technology provides a platform that can facilitate researchers, academicians and students to discuss recent advances and trends in the fields of theoretical, experimental, applied Communication, Computing and Electronics Technology. The conference will also spark innovative ideas, foster research relations or partnerships between the various institutions and build strong research and development community.

Paper Format :

All manuscripts should be strictly in MS-word / LaTeX IEEE format and limited to 6 pages.

Paper Publication :

All papers will be published in ACCET 2023 conference proceedings.

Best Paper Award:

For each track best paper will be selected out of presented papers.

Mode of conference execution: Online (MS Teams Platform)

Conference Page : www.mescoepune.org/accet

REGISTRATION FEES

- **No registration charges for participants.**
- At the end of the workshop all participants have to fill the feedback form.

REGISTRATION FORM AND PAPER SUBMISSION LINK

https://forms.gle/n3vYCog9NZgdKzms6

Topics of interest for paper submission includes but not limited to:

- ✓ Embedded systems and VLSI
- ✓ Software Defined Network (SDN) and Internet of Things
- ✓ Wireless Communication and Antennas
- ✓ Wireless Sensor Network
- ✓ Biomedical signal processing and signal processing
- ✓ Human Bond Communication
- ✓ Image Processing and Pattern Recognition
- ✓ Robotics, Mechatronics, PLC's & Automation
- ✓ AI, Machine Learning and Deep Learning
- ✓ 5G networks and Mobile Communication
- ✓ Soft Computing and Cloud Computing
- ✓ Computer Vision
- ✓ Nano Technology and Nano Materials
- ✓ Renewable Energy Sources
- ✓ Mathematical Modeling and Optimization Techniques
- ✓ Augmented Reality
- ✓ Remote sensing image processing
- ✓ Semiconductor Material
- ✓ Blockchain Technology
- ✓ Computer Network Security and IoT Security
- ✓ Electric Vehicles

IMPORTANT DATES

- ✓ Paper Submission deadline (Soft copy): ~~10/04/2023~~ 22/04/2023
- ✓ Intimation of Review and Acceptance: ~~14/04/2023~~ 23/04/2023
- ✓ Final submission of full-length paper (Soft copy): ~~20/04/2023~~ 25/04/2023
- ✓ Dates of Conference: 28/04/2023 & 29/04/2023
- ✓ Participants should fill the online registration form before ~~10/04/2023~~ 22/04/2023
- ✓ Candidates will be confirmed only after the receipt of registration form. Confirmation will be communicated on ~~17/04/2023~~ 24/04/2023 via email and phone.

PERMISSION AND BUDGET DOC

Department of Electronics and Telecommunications Engineering
Budget:ACCET-2022-23
Registration Fees(in Rs)
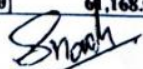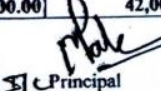
Sr.No.	Category	2017-18	2018-19	2020-21	2021-22	2022-23
1	Research Scholars & PG Students	1000/-	1000/-	0.00	0.00	0.00
2	Academic Person	1000/-	1000/-	0.00	0.00	0.00
3	Industry Delegate	1500/-	1200/-	0.00	0.00	0.00
4	Attendee	500/-	500/-	0.00	0.00	0.00

(in Rs)

Sr.No.	Category	Actual Expenditure in Yr. 2017 in rupees	Actual Expenditure in Yr. 2018 in rupees	Actual Expenditure for Yr. 2020 in rupees	Actual Expenditure for Yr. 2021-22 in rupees	Proposed Budget for Yr. 2022-23 in rupees
		Actual	Actual	Actual	Actual	Proposed
1	No. of Delegates	58	48	74	56 papers (online)	50
2	Conference kit	19,592.00	3,978.00	0.00	0.00	0.00
3	Printing of Journals/Proceedings	35,000.00	21,240.00	0.00	0.00	20,000.00
4	Certificates,Souvenir and Banners	8,062.00	7,722.00	0.00	5,000.00	(Souvenirs and Banners) 5,000
5	Honorarium for guests	20,000.00	15,000.00	27,000.00	(10 tracks x 2000 +2x3000)=26000	(10 tracks x 2000 +2x3000)=30000
6	Lunch & Refreshment for 2 days	50,940.00	50,960.00	0.00	0.00	8000.00 (Breakfast and tea)
7	Journal Publication				9000 (Turnitin plag check 150 per paper)	
8	Books + felicitation of Guest and stage arrangement+Mementos	8,234.00	7,905.00	0.00	0.00	0.00
9	Transportation/Lodging /Boarding/Travelling	3,894.00	561.00	0.00	0.00	0.00
10	Miscellaneous	3,691.00	1,802.00	0.00	2000	5000
11	Total Expenditure	1,49,413.00	1,09,168.00	27,000.00	42,000.00	68,000.00
12	Registration fees collection	58,000+5,000(sponsorship)	48,000.00	0.00	0.00	0.00
13	Funds from college	86,413.00	61,168.00	27,000.00	42,000.00	68,000.00

Coordinator
Dr. M. M. Dhanvijay

HoD
Dr. P. P. Mane

Registrar
Mr. S. Ingole

Principal
Dr. M. P. Dale

Portfolios of Organizing Committee

M.E.S. College of Engineering Pune-411001
9th National Conference on
Advancements in Communication, Computing and Electronics Technology
ACCET on 28th and 29th April 2023 (2022-23)
Portfolios of Organizing Committee

Dated: 12/01/2023

Sr. No	Portfolio/ Activity	Details		Committee members ACCET 2022-23
1.	Delegate Relation	1. Finalizing advisory Committee.	PNK	1. Dr. M. P. Dale 2. Dr. P. B. Chopade 3. Dr. P. P. Mane 4. Dr. P. N. Kota
		2. Suggesting Reviewers & session chairs.		
		3. Communication with delegates, online felicitation of session chair on the day of Conference.		
		4. Report submission	PNK	
2.	Reprography	1.Proceedings soft and hard copy Printing	PMB, MRathi, SST	1. Dr. K. S. Tiwari 2. Prof. P. M. Bagul 3. Prof. P. S. Tondewad 4. Prof. Mayuri Rathi 5. Prof. S. S. Taori 6. Students
		2.Brochures	PST	
		3. Flyers, Banner Report generation	PST	
		4. Online 'Unveiling of Proceeding' facilitation	KST	
		5.. Report submission	MRathi	
3.	Webpage Monitoring & Conference Alert	1.ACCET portal monitoring		1. Dr. K. S. Tiwari 2. Dr. M. M. Dhanvijay 3. Prof. Namrata Jangale 4. Mr. Dhebe
		2.Easy chair & Conference alert		
		3.Email Account management		
		4. Report submission	MMD	
4.	Conference Paper management	1. Plagiarism checking		1. Dr. K. S. Tiwari 2. Dr. R. S. Kadam 3. Prof. R. Jain 4. Prof. S. S. Taori 5. Prof. S. D. Ganage
		2. Sending Plagiarism report and collecting Copyright forms from authors.		
		3. Reviewer panel finalization and confirmation		
		4. Sending papers for reviewing		
		5. Collecting reviewers' reports.		

		6. List of papers selected for presentations and publications		
		7. Creating finalized paper folders.		
		8. Report generation	R. Jain	
5.	Publications	1. Searching good Journals.		1. Dr. P. B. Chopade 2. Dr. Rekha Kadam 3. Dr. M. M. Dhanvijay 4. All staff
		2. Communication with Journal editors.		
		3.Publication of selected papers		
		4. Report generation	RSK	
6.	Keynote Speakers, Invited Speakers, Tutorial Speakers	1. Communication with speakers		1.Dr. M. P. Dale 2. Dr. P. P. Mane 3. Dr. P. B. Chopade 4. Dr. P. N. Kota 5. Prof. A. S. Salunke
		2. Selecting cutting edge technology / E&TC topics		
		3. Facilitating speakers		
		4. Report generation	ASS	
7.	Inaugural / Valedictory, Vote of Thanks	1.Inauguration	KST	1. Dr. K. S. Tiwari 2. Prof. P. M. Bagul 3. Dr. M. M. Dhanvijay
		2. Vote of thanks	PMB	
		3. A short video of 10 minutes for publicity of our college highlighting college ambience, Mission vision of college and department, Dissemination of POs, PEOs , Achievements, Research work done, placement etc.		
		4. Report generation	PMB	
8.	Sponsorship	IETE etc, communication with sponsorers And Report generation	PNK	Dr. P. N. Kota
9.a	Certificates / Invitation Cards	Invitation and thanks giving cards 1. Advisory Committee. 2. Keynote Speakers 3. Reviewers & session chairs.	ASK, PSD	1. Prof. A. S. Kulkarni 2. Prof. Y. M. Ajgar 3. Prof. P. S. Deokate
		Certificates finalization, generation, and distribution of certificates i. Paper presenters ii. Reviewers iii. Guest speakers iii. Session chairs. iv. best papers	ASK, PSD	
9.b	Feedback Forms	To prepare the feedback forms,	YMA, PSD	

		i. distribution of feedback forms to paper presenters ii. distribution of feedback forms to all reviewers, session chairs. iii. distribution of feedback forms to all participants and collection of same.		
		Report generation	PSD	
10.	Invitation And publicity	Collection of addresses of colleges across the country, prepare the list, Send mails regarding call for papers, post the leaflets along with covering letter. Keep the record.		1. Prof. U. D. Dattasamjhe 2. Prof. R. Jain 3. Prof. S. D. Ganage
		Report generation	SDG	
11.	Accounts	To take the advance from the office. To distribute the funds as required by the individual committees, documentation and settle the account etc. Report generation		1. Prof. B. M. Narute 2. Mr. Dhebe
12.	Registration	1.Registration of participants, and 2. Registration Link Formation 3. WhatsAPP group formation 4. Downloading received papers, checking their registration, prior screening of quality work & paper coding. 5. Report generation	VHK	1. Prof. S. S. Pansare 2. Prof. V. H. Kamble
13.	Session Co-ordination	Allotment of papers as per areas	SND	1. Prof. S. N. Dharwadkar 2. Prof. U. V. Bomble 3. Prof. N. P. Jangale 4. Prof. P. S. Deokate 5. Mr. Shinde 6. Mr. Kate 7. Mr. Dhebe 8. Students Volunteer
		Schedule preparation of tracks and dissemination	UVB	
		Smooth coordination of sessions,	SND, UVB	
		Attendance of paper presenters with all details to be given to certificate committee	SND, NPJ	
		Teams creation and channel creation as per tracks	SND	

		Panel finalization (Session chairs both internal and External)	SND	
		Panel allocation and follow up.	SND, Internal session chairs of respective tracks	
		Photographs of session collection	UVB, Students	
		Feedback form circulation	UVB, Students	
		Result i.e. best paper declaration with all the details of each track.	UVB, SND	
		Report generation	UVB	
14.	Refreshment & Lunch	To prepare menu: for high tea on first day after inauguration, morning refreshment for 2nd day and afternoon tea, lunch for 1 day.		1. Dr. R. S. Kadam 2. Prof. A. S. Salunke 3. Mr. Shinde 4. Mr. Kate
15.	Student Research Forum (SRF)	To organize research paper writing guidance session for students. Report generation		1. Dr. M. P. Dale 2. Dr. K. S. Tiwari 3. Dr. P. P. Mane 4. Dr. P. N. Kota 5. Dr. P. B. Chopade 6. Dr. R. S. Kadam 7. Dr. M. M. Dhanvijay 8. All project guides
16.	Contact Person	To attend the queries of participants and provide information regarding the conference.		1. Dr. M. M. Dhanvijay 2. Prof. V. H. Kamble
17.	Report generation	Collection of all the reports and final report		1 Prof. S. S. Pansare 2. Dr. M. M. Dhanvijay 3. Prof. Mayuri Rathi

Co-ordinator
Dr. Mrinai M. Dhanvijay

HOD
Dr. P. P. Mane

Souvenir

SOUVENIR

9TH NATIONAL CONFERENCE ON

ADVANCEMENTS IN COMMUNICATION, COMPUTING, AND ELECTRONICS TECHNOLOGY

[ACCET 2023]

28TH & 29TH APRIL 2023

Chief Editor
Dr. M .P. Dale

Editors
Dr. P. P. Mane
Dr. M. M. Dhanvijay

Department of Electronics & Telecommunication
[IETE Pune Centre Approved]

Modern Education Society's College of Engineering, Pune
Accredited by NBA and NAAC with "A++" Grade
Pune -411001
www.mescoepune.org

Souvenir

Modern Education Society's College of Engineering, Pune
Department of Electronics & Telecommunication
IETE Pune Centre Approved
9th National Conference on
Advancements in Communication, Computing and
Electronics Technology
ACCET – 2023

Chief Editor
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Organized By
Department of Electronics and Telecommunication

Modern Education Society's
COLLEGE OF ENGINEERING
Accredited by NBA and NAAC with 'A++' Grade
19, Late Prin, V.K. Joag Path, Wadia College Campus,Pune-411001,India.
Ph. /Fax- 020-26163831, www.mescoepune.org

IOT- 5: Realtime Classroom Data Display.

Mrs. Shweta Suryanwanshi ,Vaishnavi Patil ,Shubhada Lokhande ,Rushikesh Bhosure,Gaurav Bhukte
Dr. DY Patil Institute of Engineering Management and Research,Akurdi Pune
Department of Electronics & Telecommunication

Abstract: A real-time system for the classroom that displays the timetable and monitors attendance This system includes various databases of lectures, teachers, and different timings. An Android application is created to upload the timetable, and it also provides the feature to set the templates that are going to be displayed on the LCD-G screen. The data from the application is stored in the cloud, which is then fetched by the raspberry pi according to the current time. It will check the template selected by the user and provide the needed data as input for the screen, which will be the output. A real-time system for classrooms that displays a timetable and monitors attendance This system includes various databases of lectures, teachers, and different timings. The Android application is created to upload the schedule, and it also provides the feature to set the templates that are going to be displayed on the LCD screen. The data from the application is sent to the cloud, which is then fetched by the raspberry pi according to the current time. Check the ill-check template selected by the user and provide the needed data as a Screen or the will been, been will be the output. It is useful in various educational organizations such as schools and colleges.

IOT- 6: Location and Recognition of Objects for Visually Impaired People

Gurveer Singh Dhillon, Yash Kotwal, Pratapsinh Pabale, Prof. Sunil S. Pansare
Dept of Electronics and Telecommunication
Modern Education Society' s College of Engineering

Abstract: This work based on "Detection and Identification of objects for blind people using Raspberry Pi" by S. Gayatri, K. Jayapriya, K. Jayaprakash and K. Lalitha [1] assists visually impaired persons with grocery shopping. The robot module (trolley) contains a Raspberry Pi, as well as an RFID reader. a headset. and motors. The person' speech (part where the person wants to go) is used as input, and this information is sent to the Raspberry Pi through Bluetooth. According to the specifications, the Raspberry will send a command to the driver IC, which will then drive the motors in the desired direction. All of the objects in the section will be RFID- tagged. The RFID scanner will detect (read) the tag whenever an item is picked and dropped into the cart. This will be relayed to Raspberry Pi, which will then send audio output (item name and price) to the person via headset. In addition, all things in the trolley are logged in the IOT and printed at the bill section. The Ultrasonic sensor is also used to detect obstacles for the blind individual to move forward. Disability refers to a person;s inability to fulfill their own desires without the help of others. One of an individual's limitations is visual impairment. Several solutions have been proposed to date to improve the quality of life for visually impaired and blind people. Purchasing groceries without the assistance of others is still a difficult task for them. The paper describes a device that helps them become aware of and purchase their products in the supermarket. RFID (radio frequency identification) reading technology is used. Based on the current time conditions, the audio orders will assist them in the grocery store. As a result, the existing grocery shop queueing system is eliminated. The device & final purpose is to eliminate other shopping aids for visually impaired persons and provide them with a convenient and complicated environment. When this technology is used, it makes purchasing easier for blind people, saves patron time, and increases business
sales. And the cost of an IoT product is compared to the cost of a market product.

Report

Modern Education Society's College of Engineering, Pune -01

Dept. of Electronics and Telecommunication Engineering
IEEE Signal Processing Society
Sponsored

IETE Pune Centre Approved9th
National Conference on

Advancements in Communication, Computing and Electronics Technology [ACCET]
[28th & 29th April 2023]

Date: 29/04/2023

Conference Report

Name of the Activity: ACCET- National Conference
Date of Activity: 28/04/2023 to 29/04/2023

Venue: Online on Microsoft Teams Platform.

Objective:

➢ To aware research scholars, students and faculty members about the recent developments in the field of Electronics Engineering, Communication Systems, Power System, Control Engineering, Machine vision etc.

➢ To meet with the personnel who have specialized in their respective fields so that both the students and the faculty members can gain knowledge from the research work carried out by them.

Target:
Faculty members, Research Scholars, Post-Graduate and Under-Graduate students of ECE and EE departments.

Inauguration of the ACCET-2023

About the conference:

In association with **IETE Pune Centre and "Knowledge Partner" ,** 9th National Conference on **'Advancements in Communication, Computing and Electronics Technology' [ACCET-2023]** was organized by the Department of E&TC Engineering on 28th & 29th April 2023. It is expected that researchers will bring new prospects for collaboration across disciplines and gain ideas facilitating novel concepts. The theme of this conference will motivate the researchers to adopt the outcome for implementation. The national Conference Conference on 'Advancements in Communication, Computing and Electronics Technology' [ACCET-2023] aims to bring together the researchers, scientists, engineers, and research scholar in areas of Engineering and Technology, and it provides them an international forum for the dissemination of originalresearch, new ideas and practical development experiences.The conference has the focus on the prime issues in the field of engineering and science.

There has been a huge response to the call-for-papers for the Conference ACCET-2023.

Around 51 numbers of full-length papers have been received from the researchers, academicians and industry persons of the leading organizations, institutes and industries from Maharashtra like Nashik, Mumbai and Pune region.

A committee of 18 reviewers put in their efforts to review received papers. Total 46 Paper were presented on the day of the conference. The observations and suggestions by the reviewers were helpful to the authors for further improvements in their papers.
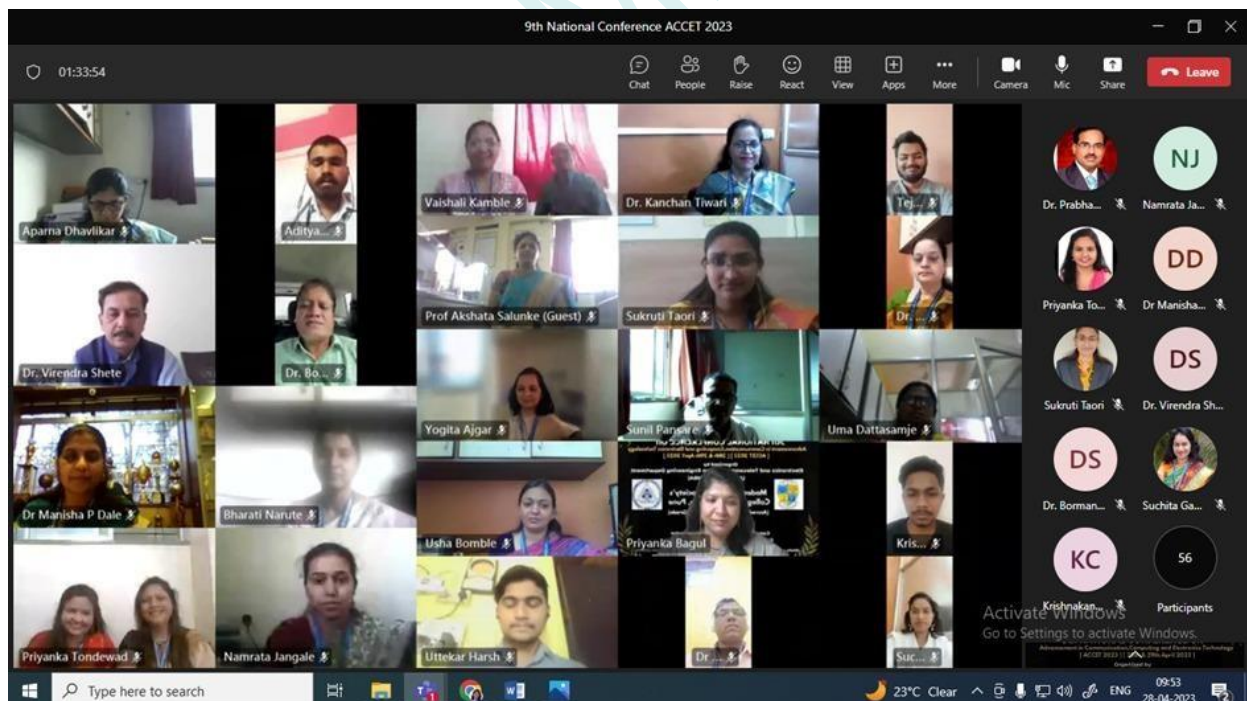
ACCET-2023 National Conference Group Photograph

Reviewers list for ACCET 2023

Internal Reviewers:

Sr. No.	Name of Reviewer	College
1.	Dr. P. P. Mane	M. E. S. College of Engineering, Pune
2.	Dr. M. P. Dale	M. E. S. College of Engineering, Pune
3.	Dr. P. B. Chopade	M. E. S. College of Engineering, Pune
4.	Dr. P. N. Kota	M. E. S. College of Engineering, Pune
5	Prof. B. M. Narute	M. E. S. College of Engineering, Pune
6.	Dr. K. S. Tiwari	M. E. S. College of Engineering, Pune
7.	Dr. R. S. Kadam	M. E. S. College of Engineering, Pune
8.	Prof. S. N. Dharwadkar	M. E. S. College of Engineering, Pune
9.	Prof A. S. Kulkarni	M. E. S. College of Engineering, Pune
10.	Dr. M. M. Dhanvijay	M. E. S. College of Engineering, Pune
11.	Dr. R. A. Khan	M. E. S. College of Engineering, Pune
12.	Dr. S. K. Wagh	M. E. S. College of Engineering, Pune
12.	Dr. J. R. Pansare	M. E. S. College of Engineering, Pune
13.	Dr. R. M. Wahul	M. E. S. College of Engineering, Pune
14.	Dr. Archana Kale	M. E. S. College of Engineering, Pune
15.	Dr. Shraddha Khonde	M. E. S. College of Engineering, Pune

External Reviewers:

Sr. No.	Name of Reviewer	College
1.	Dr. D. G. Ganage	Sinhgad College of Engineering, Wadgaon, Pune
2.	Dr. Yugendra D. Chincholkar	Sinhgad College of Engineering, Wadgaon, Pune
3.	Prof. R. U. Shekokar	Sinhgad College of Engineering, Wadgaon, Pune

The conference was approved by IETE Pune centre. Selected Papers will be published in Scopus / UGC listed Journal and author will bear the cost of publication.

In order to motivate the participants, we have announced the 'Best Paper Award' for the papers from each category. By and large these technical papers added a true value in current research and development trends in the field of Communication, Computing and Electronics Engineering.

ACCET-2023 Schedule

Day -1 : 28th April 2023
1. Reporting 8 am
2. Breakfast 8.15-8.30 am
3. Video scrolling at 8.45 am
4. Welcome note by Prof. Priyanka Bagul 9 am
5. Saraswati vandana
6. ACCET intro by coordinator
7. HOD's speech

8. Principal's Speech
9. Unveiling of souvenir (coordinated by Tiwari Madam)
10. Introduction of chief guest Dr. Bormane
11. Dr. Bormane sir's speech
12. Introduction of Guest of Honor Dr. V. V. Shete
13. Dr. V. V. Shete Sir's speech
14. Conclusion of Inaugural(by PPM) (9.45 am)
15. Detailed Introduction Keynote speaker Dr. Vandana Rohakale,
    Topic: "The insights of IoT, AIoT and 6G Wireless Communication"
16. Key note session 10-11 am
17. Tea break 11-11.15 am
18. Announcement of tracks (8 tentative) 11.15 am
19. Online Paper Presentation sessions by track coordinators 11.15 am onwards
    Sessions: S1,S2,S3,S4,S5,S6,S7,S8,S9

Day -2 : 29th April 2023
20. Introduction of Expert speaker Dr. Vibha Vyas 9 am to 10 am,
    Topic: **"Role of Signal processing and Machine Learning in Technical Domain"**
21. Valedictory function 10-11 am

Day1:

On the day of the conference, i.e. on Friday 28th April 2023, the Inaugural Function was arranged in online mode on Microsoft Teams at 9 am. Prof. M.M.Dhanvijay, the conference Co-ordinator, gave the introductory speech and greeted the dignitaries and the participants. The inaugural function was hosted by Prof.P.M.Bagul. The function was started with 'Saraswati Poojan' by singing Saraswati Vandana in the presence of the dignitaries.

Dr. P. P. Mane, HoD E&TC Department and conference Co-Ordinator, highlighted about the department and presented the key points about the conference in her welcome address. Also encouraged the participants with her motivating speech.

Dr. M.P.Dale, Principal, MESCOE highlighted the important activities of the college and gave her best wishes to ACCET-2023. She highlighted on the latest technologies and research areas . Also elaborated the significance of paper presentation and publication. Later the unveiling of the conference Souvenir was taken place.

The audience was addressed by Chief Guest, Dr Virendra Shete, Chairman, IETE Pune Centre, He highlighted the benefits of offline and online platforms for paper presentation and noted about to bring all researchers together, will get a good platform, exchange of ideas, and knowledge and thoughts will be there and it's a need of the hour.

Dr D. S. Bormane, Principal, AISSMS COE, Pune and Vice President, HQ New Delhi, Co-Chairman (BOA), IETE New Delhi, Ex-Chairman BOS(E&TC), SPPU, Pune. He mentioned about to keep update with latest technologies and explore the latest advancements in technologies. Also mentioned the importance of the conference and how the research can bedone with the use of the latest technologies.
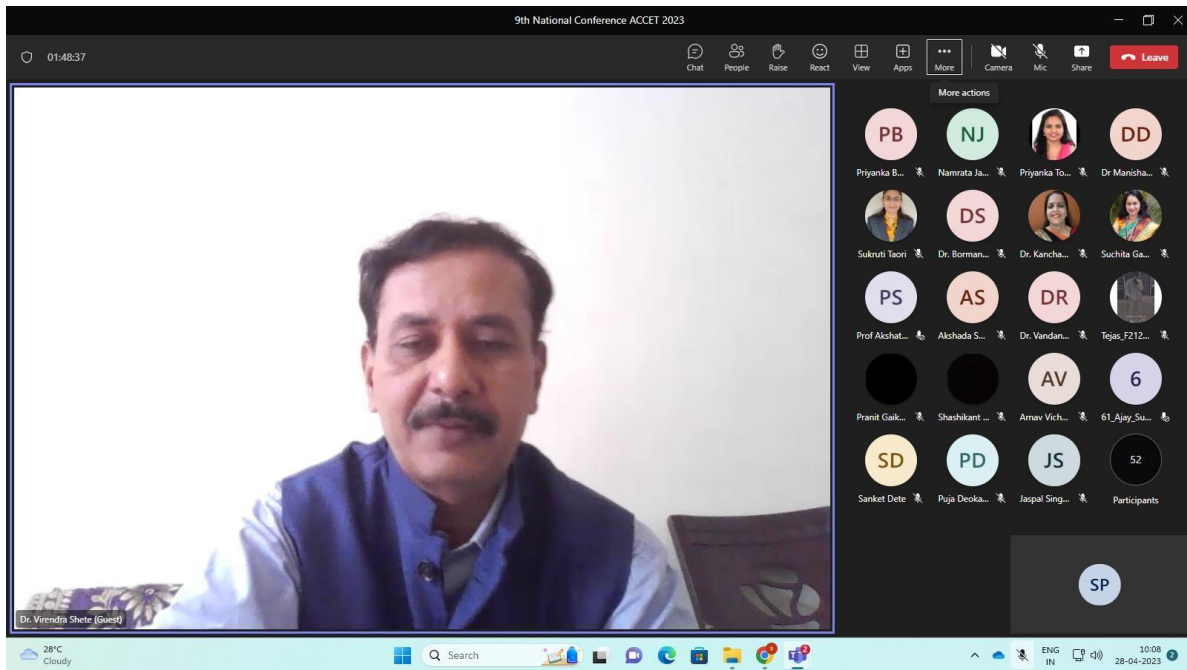
Dr Virendra Shete, while addressing the participants.

The function was also graced by the Guest of honour and the key-note speaker Dr.Vandana Rohokale, HoD, Professor at Sinhagad Institute of technology and Science, Narhe Pune.
Kenote Topic: The Insight of IoT, AIoT and 6G Wireless Communication.
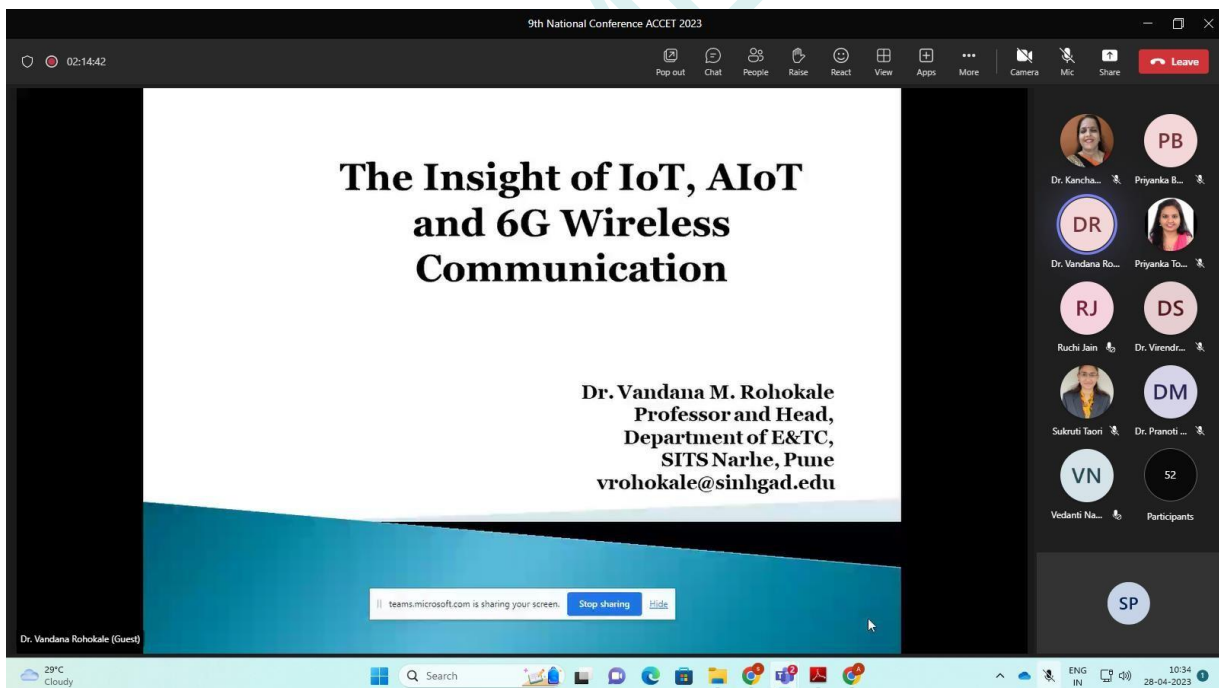
Dr.Vandana Rohokale , while presenting keynote speech.

The function was concluded with a vote of thanks by Prof. M.M.Dhanvijay.

In the second half, the paper presentation sessions were started in online mode on Microsoft Teams. Nine parallel sessions of paper presentation were conducted.

Session	Internal session chair	External session chair
S1	Dr.M.P.Dale, Prof.S.N.Dharwadkar	Dr.S.P.Methkar, COEP, Pune

S2	Dr.P.N.Kota, Prof.P.S.Tondewad	Dr.D.G.Bhalke
S3	Dr.R.S.Kadam, Dr.M.M.Dhanvijay	Dr.Mithra vyakateshan,DY PATIL
S4	Dr.P.B.Chopade, Prof.V.H.Kamble	Dr.D.K.Shedge,AISSMS IOIT, Pune
S5	Prof.B.M.Narute, Prof.U.D.Dattasamje	Dr.Sanddep Gaikwad
S6	Dr. K.S. Tiwari, Prof.A.V.Salunke	Dr.Vidya Deshmukh,Aissms,Pune
S7	Prof.A.S.Kulkarni, Prof.Y.M.Ajgar	Dr Varsha Harpale,PCCOE,Nigadi
S8	Dr.P.P.Mane, Prof.N.P.Jangale	Dr.Avinash Patil,AIT
S9	Prof.S.S.Pansare, Prof.U.V.Bomble	Dr.R.M.Wahul, MESCOE, Pune

Day2:

Keynote session started at 9:30 am with Welcome of the guest speaker by Prof. P.M.Bagul. The key note session on Topic: "Machine Learning and Neural Networks as applied to Distinguished Cases"
About the Speaker : Dr.Vibha Vyas, HoD, Electronics and Telecommunication Engineering, College of Engineering, Pune.

Keynote Speech by Dr.Vibha Vyas

After keynote Best Paper Awards based on technical contents and presentation skills, are given to the presenters from each session.

ACCET2023 Session-wise Best Paper

Session No.	Paper ID	Paper title	Author Name
Session-1	AIML-13	Classification of vehicles using deep learning	Vaishnavi Arun Gaykhe
Session-2	AIML-10	Smart Document Classification	Tanmay Magadum
Session-3	Comm-3	Energy Efficient Resource Allocation in Cognitive Radio	Prof. Sukruti S. Taori
session-4	IoT	Review report on Accident Prevention, Identification, and Alert System	Prajwal Rajkumar Ghogare
Session-5	SP-1	Real time speech quality enhancement: A case study for floating point DSP processor	Prof Santoshi Dhanapal Bhakte
Session-6	Emb-3	Design and Implementation of Reversible Vedic Multiplier on Artix-7 FPGA	Vinay Khochare, Sakshi Garad, Pranav Bhalerao and Dr. Kanchan Tiwari
Session-7	AIML-16	'Sumitra': A GPT-3 based Geriatric Care Robot	Vishvali Deo
Session-8	Robotics/EV/Automation-2	SLAM and ROS based Warehouse Robot System,	Aarti Thakur, Medha Patil, Shubham Thakur, Mrs. Priyanka Bagul
Session-9	IoT-3	Class Attendance Using ESP32	Madhur Bagwe, Harshawardhan Patil, Anuj Gadewar

Participants were given certificates for presenting their paper and 9 best paper awards and certificates were also given.

It gives us an immense pleasure to share with you that the papers of the conference ACCET 2023 will be considered for Publication in Journal after the peer review process.

Outcome:
- Students and research scholars were made aware about the recent trends in the field of electronics and electrical engineering.
- Students knew about the benefits of such conferences so that they may get an insight into the field of research which is an essential factor for the advancement of their career.

Scope for Improvement:
- Internationally renowned speakers may be called as resource persons.
- Paper presentation can be initiated through Web conferencing.
- More number of researchers & students may be given the opportunity to produce good-quality research papers.

ACCET-2023 Team

ACCET-2023 Team

Prof. M.M.Dhanvijay
Coordinator

National Conference (ACCET-2023)

Dr. P. P. Mane (Head, Department of E&Tc Engg.)
Convener

National Conference (ACCET-2023)

Session-2 (AIML)
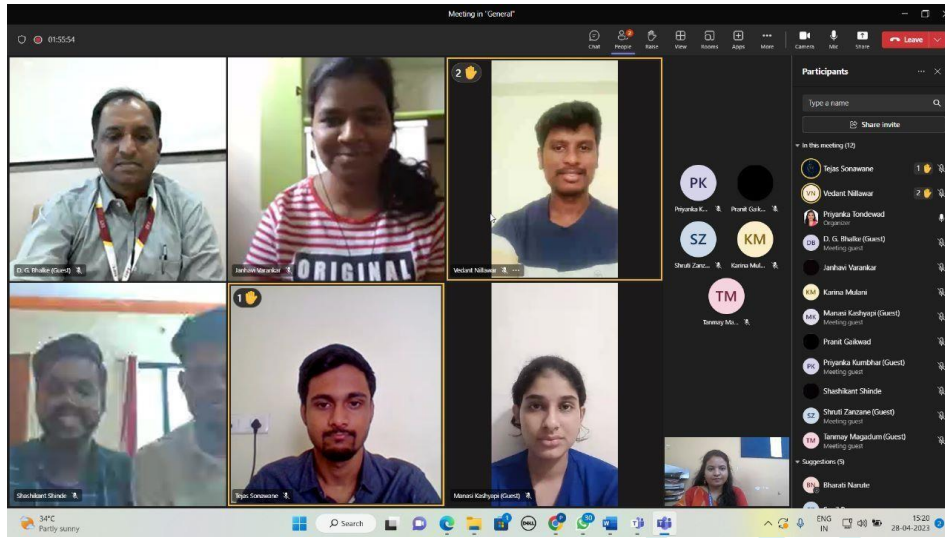
Session-6 (VLSI & Embedded Systems)
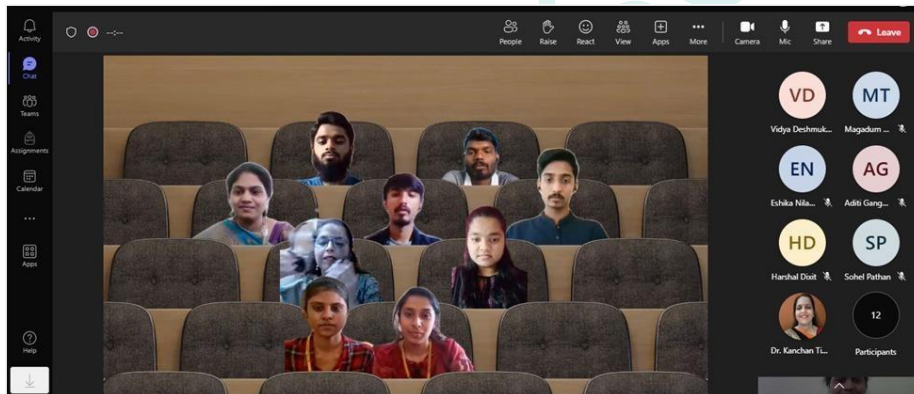
Session-7(AIML)
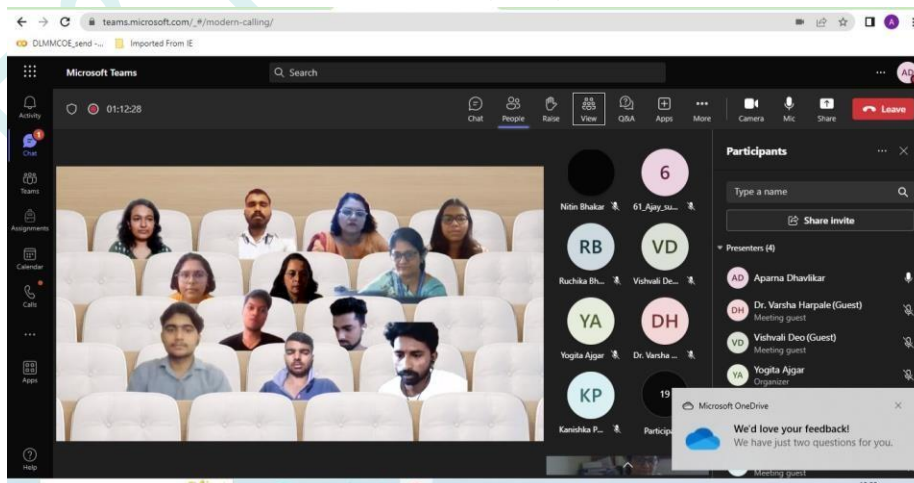
Session-8 (Robotics/EV/Automation)
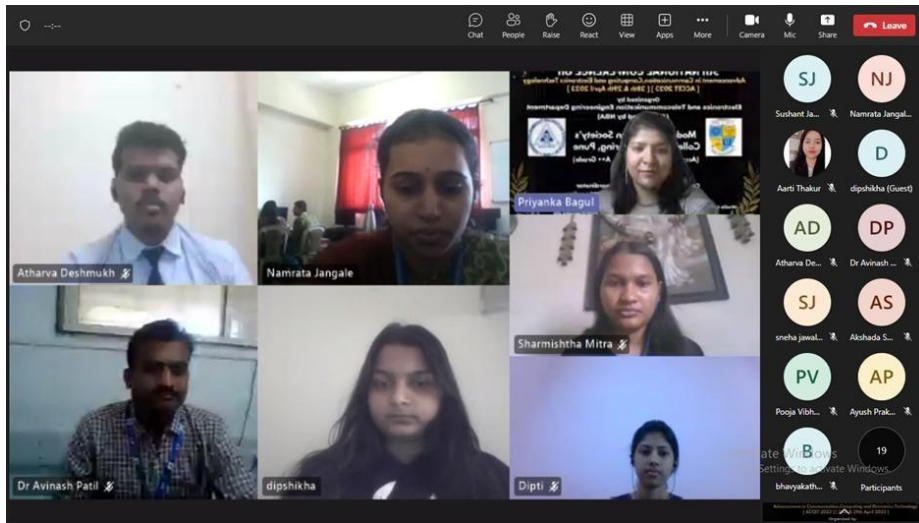
Session-9 (IoT)

Keynote Speakers

Dr. M. M. Dhanvijay
ACCET Coordiantor

Dr. P. P. Mane
HoD

M.E.S.College of Engineering

Department of Mechanical Engineering

National conference on

"Recent Developments in Mechanical Engineering"

Brochure for the Year 2023
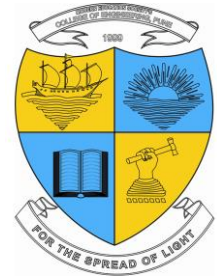
Souvenir of

10th National Conference on

Recent Developments in Mechanical Engineering, (RDME-2022)

September 15 -16, 2022

In Association with

AIP Publishing, USA

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- Mr. A. A. Patil
- Mrs. P. M. Magdum
- Mr. D. R. Salunke
- Mrs. A. A. Kulkarni
- Dr. Vinod Kumar Singh

Schedule of RDME 2022

Day 1, 15/09/2022

9.30 am to 12.30 pm	**Inauguration Ceremony** **Chief Guest: Mr. P. V. Deshpande**, GM, Power Systems Engineering, Engineering Research Centre Division, TATA Motors, Pune, India
1.00 pm to 2.30 pm	**Technical Session I**
2.30 pm to 4.30 pm	**Technical Session II**

Day 2, 16/09/2022

9.30 am to 11.00 am	**Keynote Session I** **Dr. Sachin Kore**, Associate Professor, School of Mechanical Sciences, Indian Institute of Technology, Goa, India
11.00 am to 12.30 pm	**Keynote Session II** **Dr. Vipul Patel,** Assistant Professor, Mechanical Engineering Department, SVNIT, Surat, Gujarat, India
1.00 pm to 2.30 pm	**Technical Session III**
2.30 pm to 4.30 pm	**Technical Session IV**

Message from Principal

"Innovation Distinguishes Between A Leader And A Follower". - Steve Jobs

"Education is the most powerful weapon which you can use to change the world" –
Nelson Mandela

Education is the first step for people to gain the knowledge, critical thinking, empowerment, and skills they need to make this world a better place.

The world is facing an unprecedented crisis where almost all countries are struggling. Such crises often push for revisiting existing norms and notions, and sometimes even provoking thought process for changing knowledge and power centres. The current pandemic situation has initiated changes in thinking patterns of various countries in terms of their power, resources, and innovation status. India too has shown up as one amongst a new world's leaders at various fronts while many developed countries have failed to manage the worst pandemic situation. India has always been a land of sages, Gurus, skills, art and culture. It has a proud history where

Message from Principal (cont..)

The *10th National Conference on Recent Developments in Engineering (RDME-2022)* aims to provide an outstanding opportunity for both academic and industrial communities alike to address new trends, challenges, and emerging technologies on topics relevant to today's technological advancements in the wide variety areas of Mechanical Engineering to foster communication among researchers and practitioners working in these areas with a common interest.

Industrialists are rethinking competitive advantage for the post-pandemic landscape, apply technology to predict demand patterns, customize orders and leverage asset availability. Looking forward to welcoming you to the first ever virtual conference *RDME-21*. While we regret that the COVID pandemic prevented us from holding the conference offline, we are excited about the opportunities of holding an innovative virtual conference

The success of this conference is a result of efforts of contributors and presenters who have shared with us the latest developments in their respective fields. Such an event is not possible without the hard work of the reviewers to whom I am deeply indebted for taking out time to provide professional opinions on the submissions.

I highly appreciate the efforts of the DR. Prof. V. N. Chougule, HoD, Mechanical Engineering, Coordinator Dr. B. D. Nandre and Dr. A. R. Patil & the conference organizing team who have coordinated and linked with the contributors, reviewers and many other concerned. The non-teaching staff cannot be forgotten, their dedicated support ensures that the conference is of high quality and makes the conference a thoroughly enjoyable gathering.

I wish 'RDME-2022' all the success!

Dr. S. S. Sarawade

Principal

Message from Vice Principal

Knowledge is not power; it is only potential. Applying that knowledge is power. Understanding why and when to apply that knowledge is wisdom!

- **Takeda Shingen**

It is undeniably a pleasure and proud privilege for me to know that the Department of Mechanical Engineering is organizing 10th National Conference on **'Recent Developments in Mechanical Engineering' [RDME-2022]** on 15th and 16th September 2022. This conference aims to provide a platform to researchers, professionals, academicians and above all to the students who have aptitude and attitude and can dream to make it big in their professional carrier in near future.

As I look forward, I can visualize that our college will grow in pursuit of higher standards of teaching & research. Already we have achieved academic excellence by obtaining accreditation certificate from NAAC with 'A' grade and NBA for all three department. I am sure that it will continue to maintain its excellence and character with great distinction.

I am sure the delegates will gain insight into why research is more important in the organization. They will be highly motivated to do what they do best. It will create a potential and research attitude in the minds of participants.

The success of this Conference is solely on the dedication and efforts of conference organizing team to make this a reality. I congratulate organizing team of RDME 2022 and eventually I express my special thanks and appreciation to all.

I wish 'RDME-2022' all the success!

Dr. Manisha P. Dale

Vice Principal

Message from Head of Department (Mechanical)

Welcome one and all to the 10th National conference on "Recent Developments in Mechanical Engineering" (RDME-2022). This time it was altogether a different exciting difference with hard working organizing committee members and our UG & PG students working with enthusiasm with had never seen before.

We are overwhelmed by marvelous response from UG and PG students from MESCoE as well as reputed organizations. All the published papers had gone through strict scrutiny for plagiarism as well as review from experienced reviewers from both teaching and industrial community.

We are extremely thankful to the Hon. Prof. Dr. A. S. Chandak, Trustee, M. E. Society, Dr. M. K. Sanap, Trustee, M. E. Society, and Principal Dr. S. S. Sarawade for giving an opportunity and guidance on regular basis. A special thanks to conference publication partner American Institute of Physics (AIP), USA for agreeing to publish our conference paper in their proceedings.

I am thankful and grateful to review committee, the authors and student volunteers for their timely support. Hope this will give chance to see the reflection of our progress and achievements.

Finally, I must personally congratulate and appreciate efforts from Dr. B. D. Nandre and Dr. A. R. Patil, coordinators of RDME 2022 and contributions from all teaching and non-teaching faculty members from Mechanical Engineering department.

We hope to meet many of you personally throughout the conference. Please take the time to enjoy both the conference and great heritage of Pune.

Dr. V. N. Chougule

Head of Department (Mechanical)

Message from Organizing Secretary

It gives me an immense pleasure and satisfaction to write a preface to the souvenir for the 10th National Conference on 'Recent Developments in Mechanical Engineering' (RDME-2022). This aim of this conference is to provide common platform to bring students, researcher, faculty and industry person from every corner of India and create medium for exchange of knowledge. Participant through this conference can share their work with experts and I am sure will get valuable feedback on their work to produce quality outcome. The organizing committee members are working with enthusiastic and hardworking as never before to make sure that participant will enjoy their time and have quality interaction with other participants.

This 10th conference is unique in many aspects as compared to other conference. This year, we have received total 185 abstract with 86 full length paper registration from every part of India. We have received registration from both private universities as well as central universities like IIT, NIT etc. This overwhelming participation has made this conference a vivid group of UG, PG, Research student, Faculties, and Industry persons. Another uniqueness of the conference is that it is being organized in association with American Institute of Physics, USA as publishing partner. The selected quality papers will be published in AIP Conference Proceeding with indexing and abstracting in Google Scholar, Scopus, and Web of science (CPCI).

We are deeply indebted to Trustee, M. E. Society and Hon. Principal for their constant support and encouragement throughout the bringing out this Souvenir and making this conference a big success. We are grateful to Head of Mechanical department for his continuous guidance during organization of this conference. We must thank to peer review committee members for their painstaking effort in rigorous review work and shaping the contents of the journal and souvenir. Finally, we are also thankful and grateful to the authors, organizing committee members, advisory board, and student volunteers for their kind cooperation.

Dr. B. D. Nandre, Dr. A. R. Patil
Organizing Secretaries, RDME 2022

About the Institute

Modern Education Society is established in 1932 with the motto "For the Spread of Light". M.E.S. College of Engineering established in 1999 and situated in the heart of Pune city, offers engineering degree courses in Mechanical, E&TC and Computer Engineering and is affiliated to Savitribai Phule Pune University, accredited by NBA and NAAC with „A" Grade.

- **UG COURSES:**

    Computer Engineering Intake - 180

    Electronics & Telecommunication Engineering Intake - 120

    Mechanical Engineering Intake – 120

    Automation and Robotics Engineering Intake -60

- **PG COURSES:**

    ME in Mechanical Engineering Design Intake - 24

    ME in Signal Processing Intake - 12

    ME in Computer Engineering Intake – 12

Vision of Institute:

To Groom - Motivated, Environment friendly, Self-esteemed, Creative and Oriented Engineers.

Mission of Institute:

To Develop Industry Oriented Manpower to accept the challenges of Globalization by,

- Promoting Value Education through motivated trained faculty
- Maintaining conducive environment for education at affordable cost,
- Promoting Industry Institute interaction,
- Involving alumni.

About the Department

The Department of Mechanical Engineering is striving hard since its inception in 1999 with highly qualified and energetic faculties for the all-round development of the budding engineers for the tomorrow's nation building. The department is accredited by NBA for three years (2018-2021). The department is well equipped with state-of-the-art facility in CAD/CAM, I C engine, Heat Transfer, Refrigeration and Air Conditioning, Fluid Mechanics and Fluid Machineries etc. We have center of excellence in emerging areas of mechanical engineering like 3D Printing lab (Under MODROB), NI Lab, Industrial Tribology Lab, Robotics Lab and Baker's MQC Lab which help student from institute and outside institute to conduct their research work. The leadership and team building qualities, environmental consciousness of our students are nurtured through membership and participation in various events organized by SAE India, Renewable Energy Club and MESA.

Vision of Department:

To groom Motivated, Environmentally friendly, Self-esteemed, Creative and Oriented Mechanical Engineers

Mission of Department:

- To Develop Industry Oriented Manpower to accept the challenges of Globalization by,
- Imparting mechanical engineering knowledge through trained faculty in conducive environment,
- Creating awareness about the needs of mechanical industries through alumni and industry-institute interactions
- Encouraging them to think innovatively and introduce them to various research activities
- Supporting them to groom in all aspects like communication, interpersonal skills.

Program Educational Objectives:

I. To prepare students with strong foundation in mathematical, scientific and engineering fundamentals that will enable them to have successful career in Mechanical and Interdisciplinary Industries

II. To prepare students for rapid technological change equipped with strong conceptual understanding of core and basic concepts of mechanical engineering

III. To enable students to develop their knowledge and skills across the range of disciplines.

IV. To prepare students for soft skills with good communication, ethical values and ability to work in a team

V. To prepare students to strengthen their knowledge and skills through self-learning abilities throughout their professional career as well as to pursue higher education.

Modern Education Society's College of Engineering, Pune

Program Outcomes (PO):

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

13. **PSO I:** Apply principles of machine design, manufacturing, thermal engineering and management to identify, formulate and solve real life problems in various fields of engineering

14. **PSO II:** Use modern modeling, simulation techniques and computational tools.

15. **PSO III:** Develop practical solutions for mechanical engineering problems/processes under professional and ethical constraints.

Center of Excellence Labs

3 D Printing Lab

Advance Manufacturing Lab

Robotics Lab
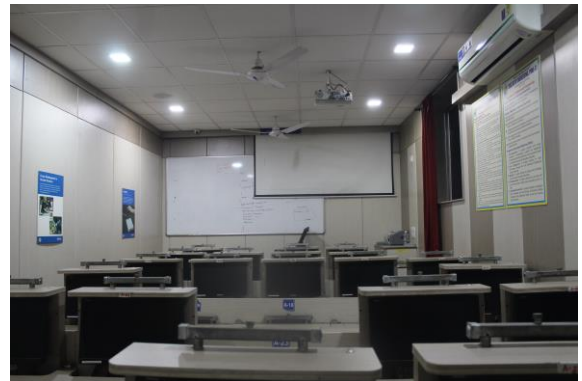
NI Lab

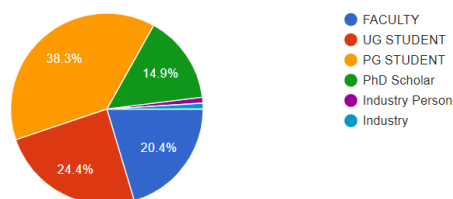**Industrial Tribology Lab**

Baker's MQC Lab

RDME 2022

10th National Conference on Recent Developments in Mechanical Engineering, 2022, Pune -01 [RDME 2022] has been successfully organized by Mechanical Engineering Department of Modern Education Society's College of Engineering, Pune 01 from 15-16 September 2022. The aim of RDME 2022 conference is to provide common platform to students, researcher, faculty, and industry person from every corner of nation and hence create a medium for exchange of knowledge and information related to recent developments in the domain of mechanical engineering. Participant through this conference can share their work with experts and will get valuable feedback on their work to produce quality outcome.

This 10th conference is unique in many aspects as it has received a total of 201 abstracts out of which 86 full-length papers were registered from every corner of India. We have received registration from both private universities as well as central universities and also from an international university. This overwhelming participation has made this conference it a vivid group of UG, PG, Research students, Faculties, and Industry persons. Paper received were selected for publication in AIP Proceeding based on their quality and technical novelty verified through the blind review process. We are thankful to the presenter and authors for their valuable contribution as well as the reviewers and session chair for their constructive comments on refining the paper. We look forward to meeting you all at future conferences.

Total Abstracts Received: 201

Full-Length Paper: 89

Category of Participants

Legend: FACULTY, UG STUDENT, PG STUDENT, PhD Scholar, Industry Person, Industry

Values: 38.3%, 14.9%, 20.4%, 24.4%

Scope of Registration

Legend: Advances in Thermal Engineering, Advances in Design Engineering, Advances in Manufacturing Engineering, Advances in Material Engineering, Allied

Values: 15.6%, 21.1%, 11.6%, 18.6%, 33.2%
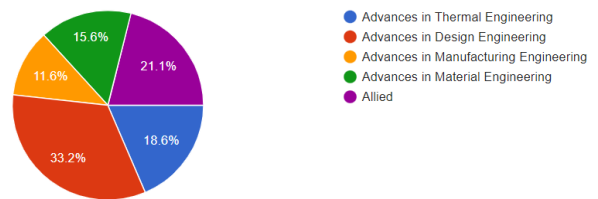
AIP Conference Proceeding

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AIP Publishing, USA

Day 1 : Inaguration Session

Welcome Address by Dr. A. R. Patil, organizing secretary, RDME 2022
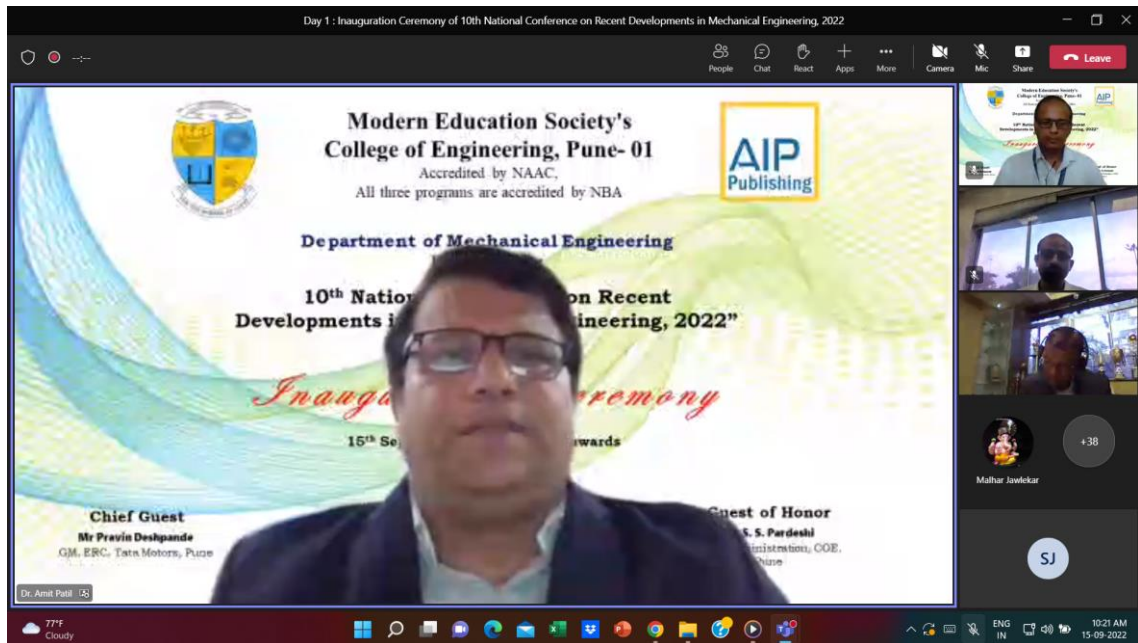
Introduction and Glimpse of RDME 2022 by Dr. V. N. Chougule, Convener and HoD, Mechanical

Modern Education Society's College of Engineering, Pune

Address by Dr. M. P. Dale, Vice Principal
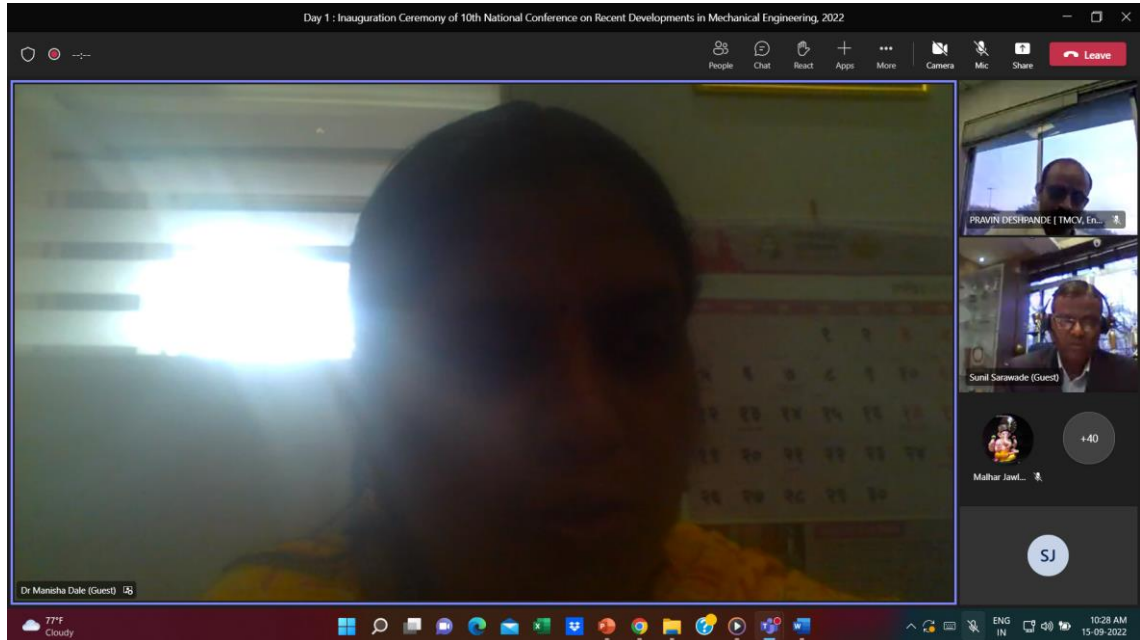
Address by Dr. S. S. Sarawade, Principal
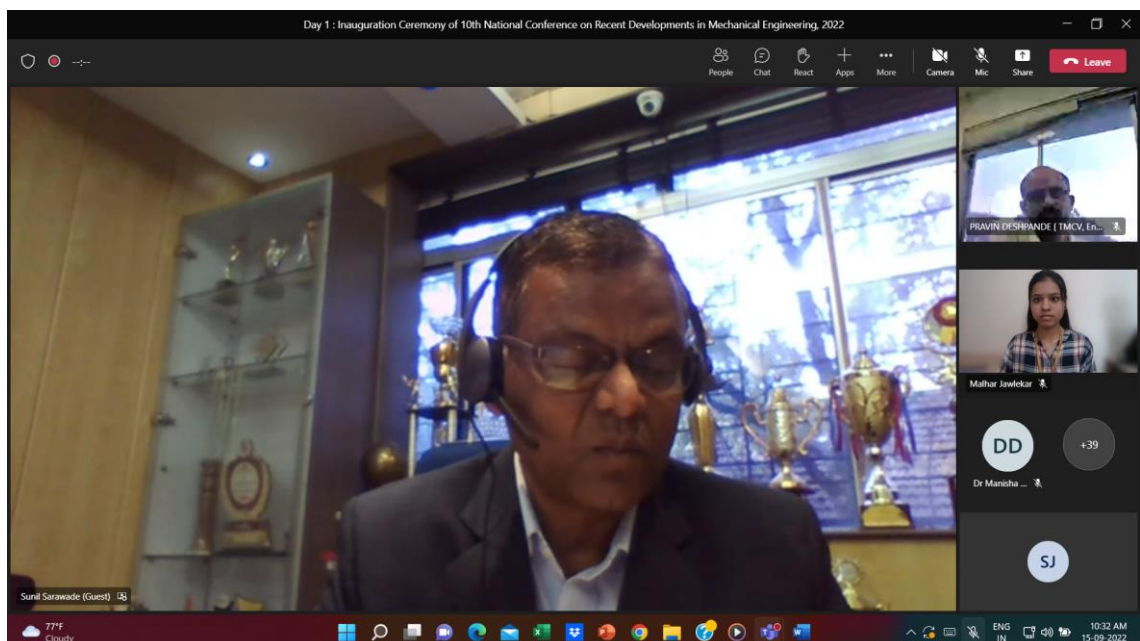
Virtual Unveiling of RDME 2022 Souvenir

Address by Dr. S. S. Paradeshi, Guest of Honor

Chairman, BoS (Mechanical & Automobile Engineering), SPPU & Dean, Administration, College of Engineering, Pune
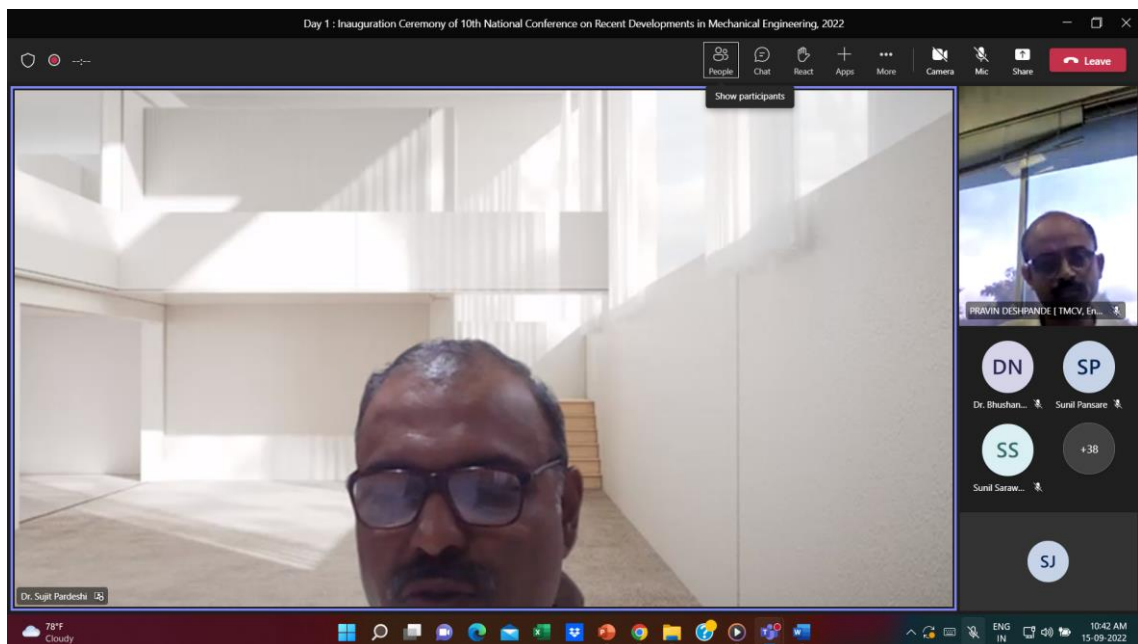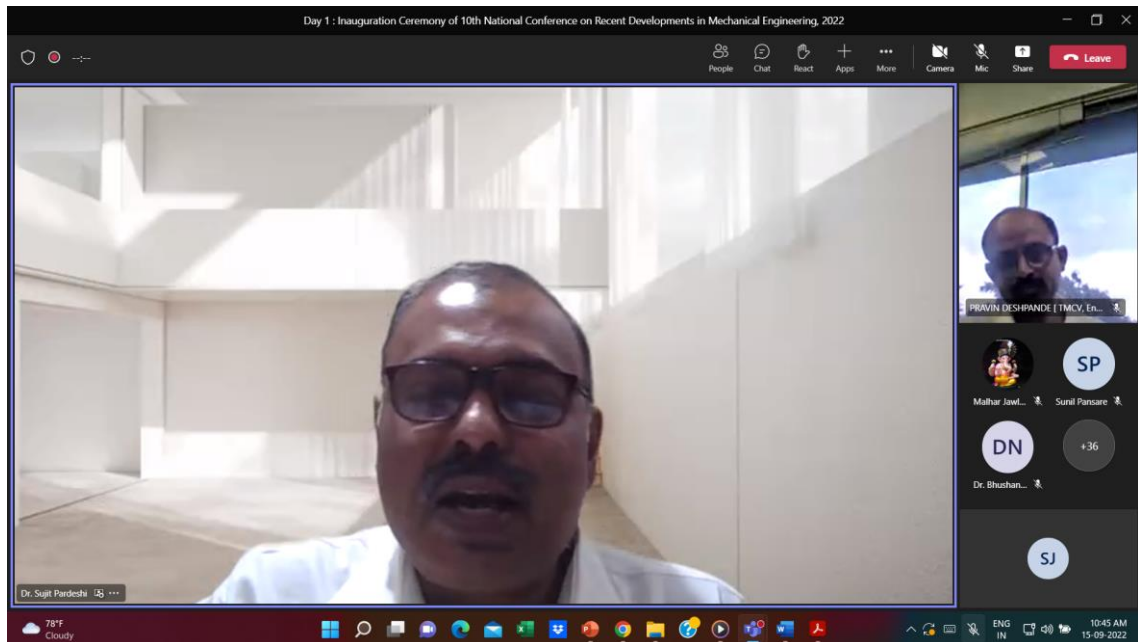
Keynote Address by Mr. Pravin V. Deshpande, Chief Guest,

General Manager, Engineering Research Center, TATA Motors, Pune

Group Photo Session of Inauguration Ceremony
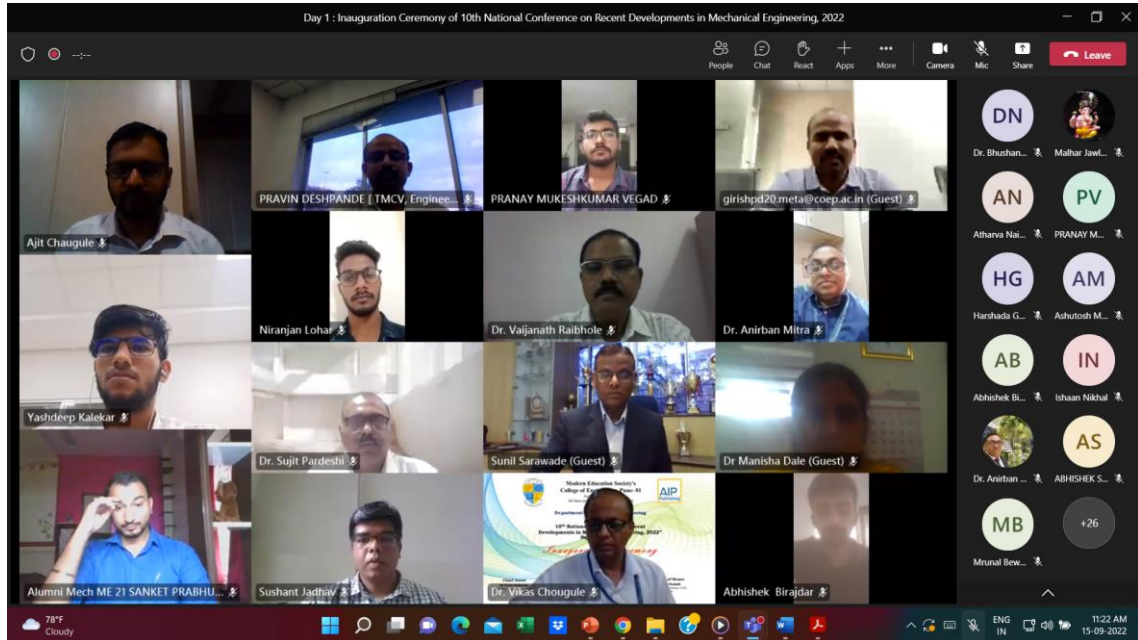
Vote of Thanks by Dr. B. D. Nandre, Organizing secretary, RDME 2022
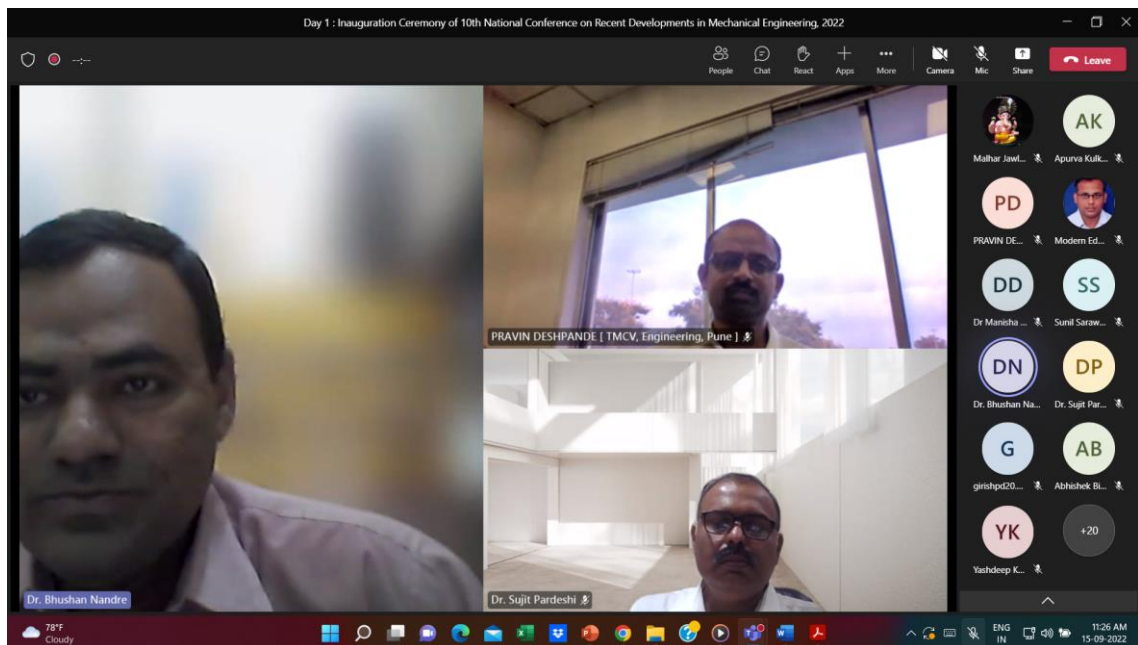
Day 2: Keynote Sessions

Keynote Session I : Dr. Sachin D. Kore,

Dean, School of Mechanical Sciences, Indian Institute of Technology, Goa, India

Keynote Session I : Group Photo

Keynote Session II : Dr. Vipul Patel,

Assistant Professor, Mechanical Engineering Department, SVNIT, Surat, Gujarat

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G H Raisoni College of Engineering and Management,Pune, India.
JSPM's Rajarshi Shahu College of engineering,Pune, India. | |

A-07 Energy generation from Hydrodynamic Waste

Bhagat A[1*], Jagtap Y[1], Waghmare V[1], Tarate N[1], Keripale S[1]

[1] PES's College of Engineering, Phaltan, Maharashtra, India

Abstract: The development of urban areas has rapidly increased the global energy demand of which renewable energy system can provide clean, reliable, secure, competitive energy to meet this demand. Today, not only do we need innovative energy generation techniques which are environment friendly but also cost effective and easy to install. Even a small amount of energy savings made contribute to saving the environment. Water supply is of vital importance for urban development, so the overall pressure in urban freshwater pipeline is usually very high to ensure consistent water supply throughout the urban area. The energy is obtained from the pipe water; where the turbine will rotate due to flow and pressure of water, and the rotating turbine is connected to a generator to generate electricity. In this study, an idea is proposed and studied to extract power from the high head water in the pipelines.

Keywords: Hydrodynamic, Turbine, Electricity, High Head.
* artibhagat77@gmail.com

A-09 Selection of Fluidic Flow Region of Interest in Medical Device using Proper Orthogonal Decomposition

Piyush Hota[1*], Cole Barnett[1], Brianna Clements[1], Abdulmajeed Alsubhi[2], Nihar Rameshbhai Thakkar[1], Leslie Thomas[3]

[1]School of Engineering of Matter, Transport and Energy Arizona State University, Tempe, USA
[2]School of Mathematical and Statistical Sciences Arizona State University Tempe, USA
[3]Division of Nephrology and Hypertension Mayo Clinic, AZ Phoenix, USA

Abstract—This work identifies an optimal spatial region of interest (ROIs) by means of image analysis of a temporal data set obtained by a novel medical device. The Proper Orthogonal Decomposition (POD) is an efficient detection method for this analysis because it is well-known for highlighting a region of interest effectively. Primary attention has been devoted to the highest absorbance and intensity regions displayed successfully by mode 1. Due to the running cost of the POD with the demand for more memory space to store the data, some techniques related to dimensionality reduction, such as averaging data, economy singular value decomposition (SVD) tool, and preconditioning techniques, were applied. Results indicated that the visually selected area differs from the one chosen through POD.

Keywords: POD, Fluidic Flow, Region of Interest, Singular, Value Decomposition, Absorbance, Intensity
piyuhota@gmail.com

A-10 SMART FIRE FIGHTING ROBOT

Amol Kawade[1*], Piyush Kawade[1], Akshaan Kaware[1], Akshat Kkulthe[1], Amruta Amune[1]

1 Department of Mechanical Engineering, Vishwakarma Institute of Technology, Pune

Abstract: Ever since the Industrial revolution, more and more factories and industries are being set up around the world. Be it manufacturing or iron-steel industry. There are many places in factories, industries, manufacturing plants, oil fields, etc where there is a risk of fire but they are unmanned. There may be fires in remote places like, in small gaps or in

narrow pipes where humans can't reach. The solution to these problems is our smart firefighting robot which can be controlled via mobile, and can even detect nearby fires and extinguish them. We aim to create a small smart firefighting robot that can be remotely controlled as well as act on its own by detecting nearby fire and extinguish it using on board water supply. The robot will use Arduino as well as NodeMCU so that it can be connected to Wi-Fi and controlled. The robot will also sound the buzzer whenever it detects fire, so that even if the fire can't be extinguished, people nearby can be alerted.

Keywords: Fire Safety, Internet of Things, Robotics.
amol.kawade20@vit.edu

A-11 Revised Heat Load Calculations for Air-Conditioned Three Tier Passenger Coaches of Indian Railways

LidiyaPriyadarsiniKorsapati[1*], Arijit Paul[1], Durgesh Kumar[1], SoumadeepSaha[1], AbhirupBhar[1]

[1]*Department of Mechanical Engineering Netaji Subhash Engineering College Kolkata, India*

Abstract: The present paper investigates the heat load characteristics of Air Conditioned (A.C) coaches installed with Roof Mounted A.C Packaged Units (RMPU) in the Indian Railways. It has been observed in the available official documents that the parameters considered for the heat load calculations for the estimation of RMPU capacity requirements were inadequate. For example, the list does not include body heat generated by the on-board passengers and radiation from various gadgets and utilities which also contributes to the heat load on the RMPU. In addition, the humidity levels or passenger comfort were also not among the parameters which in turn provide a quantitative guideline for temperature settings of AC coaches. The inadequacy in the considered data clearly led to inaccurate assessment of the performance of RMPU and energy consumption. This study aims to improve the accuracy in predicting the heat load on the RMPU by including more parameters that are contributing to the heat addiction such as the opening and closing of the door, heat transfer through the partition between the wash basin area and sleeping berths, radiation from electronic gadgets and heat addition due to utilities. The calculations are relevantly based on various air conditioning systems in other applications. The results of the present work can help lead to more efficient RMPU designs which in turn can inspire an improved approach towards the design of air conditioning systems of similar transportation modes and similar heating, ventilation, & air conditioning (HVAC) systems.

Keywords: RMPU, Air conditioning systems, Railway Coaches/bogies, Heat Load Calculations, Energy Conservation.

*lidiyapriyadarsinik@gmail.com

A-16 Albatross: Unmanned Self-Sustainable Glider for Forest Fire Detection

Chockalingam T[1*], SavarShirbhate[1], Jothika K[1], Prahlad[1], Nitteesh M[1], Raghuram R[1]

[1]*National Institute of Technology Trichy , India*

Abstract: Each year, between 60,000 and 80,000 forest fires occur, destroying between 3 and 10 million hectares. Therefore, it becomes vital that it is detected and prevented at their premature stage. This tragedy is mostly caused by rising global temperatures, lightning, as well as other human factors like land conversion for agriculture and poor forest management. Albatross is a self-sustaining glider with a wingspan of 2.8m, that will aid in early detection of forest fires, thereby limiting the scope of damage. It glides at an altitude of 240ft and transmits live feeds of the region it is covering to the base station for image processing, alerting the officials in charge with the exact GPS location if any fire/smoke is detected. The major advantage of this glider over other drones is that it is energy efficient. It can cruise for a longer period of time using the solar panels embedded on the wings and has an energy storage unit for powering it in the night. SOLIDWORKS and ANSYS software were used to analyze the stresses and displacements at every point on the wing to obtain an optimal aerodynamic design. A group of gliders deployed to monitor a forest of area 4000 km2 such as the Abujmarh forest in Chhattisgarh, is one such application of the project. This would be a cheap and effective solution for forest fire prevention compared to other existing methods such as ground based temperature sensors and satellite imaging.

Keywords: gilder, forest fire, airfoil, unmanned plane.
*107119035@nitt.edu

A-19 Tulsi Leaf Disease Detection using CNN

Prof. S.S. Patil[1*], Akhil Bhall[1], Amay Rajvaidya[1], Drishti Agarwal[1]
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Abstract: Since the start of the covid 19 epidemic, a wide range of medications have been produced and are currently being utilised to treat the disease. Tulsi, in addition to all of the chemical-based medications, is a herbal therapy that is particularly effective in the treatment of this ailment. Tulsi has been used to heal ailments and infections for millennia, particularly in India. Because we use tulsi for medicinal purposes, it's vital to monitor its health in order to reap the full benefits of its herbal properties. Plan diseases harm the health and growth of the plant. Disease detection in plants is crucial so that it can be treated before it spreads throughout the plant. To detect illnesses in tulsi leaves, we propose employing a model based on convolution neural networks. Image processing and CNN are widely employed. The prepared model extracts the image's key features and categorizes it into different disorders. The model has a 75 percent accuracy rate.

Keywords: Covid 19, Tulsi,
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A-20 Medicinal Plant Identification using Convolutional Neural Network

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Abstract: The world is filled with plants. They are a vital part of our ecosystem, providing food, shelter, and other services. Some objects have one use, while others have multiple uses. In this paper, we explore plants that have potential medical uses. Some of these plants have been used historically for medicinal purposes, while others may have new potential for treating health problems. Computer vision researchers have developed identification systems that help botanists pinpoint and unexplored plant genus more swiftly. Copious research has anchored on methods that magnify the utility of leaf databases for plant

predictive modelling, but this can lead to leaf features that change depending on the data and extraction methodology used. We use Convolutional Neural Networks (CNNs) to unsheathe useful counsel from raw data representations. This allows us to understand the underlying structure of the data more easily. In this, we have used Medicinal leaf dataset from Mendeley Data which consist of 1500 data out of which 1471 data were used to train and validate the model. We were able to pull off an accuracy of 99.10 %.

A-23 Design and Development of Dual Power Generation System using Wind and Concentrated Solar Power for Street Lights

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Abstract: The power demand in our country is increased because of high power consumption by factories and also due to less availability of non-renewable energy resources. So, it is a known fact that the application of hybrid renewable energy system to generate power at economic, quick, reliable answer to need for power. Considering the power generation from renewable energy sources this Solar-wind energy system can be considerably used for street lights. But the wind speed is varying both day and night time the produced electricity through horizontal axis wind turbine. To overcome this, issue the vertical axis Savonius Wind Turbine (SWT) with guide vanes has been introduced for producing electricity at low wind speed (cut in speed approximately 5m/s) by combining both SWT and solar photo-voltaic (PV), the hybrid design had been fabricated. The hybrid controller has been selected for the rated power output of the proposed system. In this study, the power generation through Vertical VASWT and PV hybrid system achieved for electricity generation. In this study the optimized design of VASWT has been selected and the different design calculations are performed by team.

A-25 Face Recognition Using Open CV and VGG 16 Transfer Learning

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Abstract: Large organizations have been successfully using facial recognition in security systems which were using Convolutional Neural Networks (CNNs). However, small organizations struggle to implement the same security measures like CNNs using smaller training databases and fewer computer resources. By applying transfer learning for facial recognition, which requires less retraining, The research paper provides a solution to resolve this problem. This can be demonstrated by adding a layer of a trained element with a minimal number of neurons in a network can be performed in tiny datasets, allowing for functional and legitimate authentication.

A-26 : Numerical solution of multi-term fractional order differential equations using modified Boubaker Polynomials

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Abstract: In this article, we have constructed operational matrix of fractional integration using modified Boubaker polynomialst of in the solution of multi-term fractional diffrential equations. Using the modified Boubaker polynomials , the given equation is converted in to a set of algebraic equations. Examples are given to explain the simplicity, computational and accuracy of the method.

Keywords: *Fractional differential equation , Gam-Schmidt Process , Modified Boubaker polynomials.*

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A-27 : Physicochemical studies of the industrial effluents and their impact on environmental biodiversity

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Abstract: In industrial effluents a wide variety of both inorganic and organic pollutants present in effluents from industries. In today's life of human beings are very fast, they do not have time to think about other issues about their environment. They grow plants in their house without knowing their exotic nature or which give more oxygen like Tulsi good for us, Kadamb more water store in soil in that place, good for us when we face dry water crises, some trees are take more water from soil. If the people want to celebrate are want to heal they go out garden or forest, need to plant the old times like holy plants for increases' the flora and fauna. Water samples were collected from different places located Korba and Janjgir - Champa. The parameter such as Odor Temperature, pH, TDS, DO, COD have been studied using standard protocol APHA. Pre sampling on spot testing have been done on the different site.

Keywords: *Temperature. pH, TDS, DO, COD etc*

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A-28 Diabetes Prediction and Drug Administration using Knowledge Engineering Approach

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Abstract: Knowledge Engineering (KE) has a place with all specialized, logical and social viewpoints associated with building, keeping up and utilizing information based frameworks. Machine learning when joined with Data mining procedures assumes a promising job in the subject of forecast. Information accessibility is enormous in medical services, as is the requirement to extract data from it for improved forecasting, conclusion, therapy, medication innovation, and, in general, social insurance. The study concentrated on the location and prediction of Type – II Diabetes, which is considered one among the world's fastest growing degenerative illnesses, in accordance with WHO in 2014. Diabetes type 2 is among the several common diseases with long-term consequences and a large number of medical complications.

Diabetes, if it is not treated and undetected, may result in a slew of issues. Early Diabetic detection is critical for timely treatment, which can prevent the disease from progressing to a more serious stage. The work consists of a way for identifying and predicting diabetic health conditions to be able deliver the prescribed drugs.

Keywords: Diabetes prediction, ANN, Classification.

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A-30 Graphene infusion in Inconel alloys and its implications on thermal conductivity

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Abstract: Inconel is a nickel-based refractory superalloy that is widely used in the aerospace industry because of its ability to withstand and perform in temperatures ranging from cryogenic to hundreds of degrees Celsius while maintaining its mechanical strength. It finds several applications in gas turbines, rocket engines, nuclear power plants, oil and gas extraction, and marine engineering due to its thermal capabilities and oxidation-resistant properties in a corrosive environment. In recent years, Inconel is also being used in many reusable rocket engines, but its lower thermal conductivity adversely affects heat conduction and hence cooling. We intend to increase the thermal conductivity of Inconel by infusing graphene and recording the variations in mechanical and thermal properties due to different concentrations of infused graphene. Initial trials involve powder metallurgy alloying techniques with ball milling, sintering, and reinforcement of graphene in Inconel in powder form. If an optimum composition that increases thermal conductivity while maintaining the mechanical strength of Inconel is achieved, then we plan to make this alloy 3D printable. In this paper, we are presenting the literature review done for our project in the form of a review paper.

Keywords: Inconel, Graphene, superalloy, Thermal conductivity.

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A-31 Current Design Scenario of an Orthodontic Hybrid Fixed Functional Appliance

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Abstract: As an individual, a long-lasting implication is of facial appearance. A non-positive effect has been related because of undesirable dental appearance on advancement of career, self-image, and peer-group acceptance. A considerable and large number of individuals around the world are facing orthodontic problems even though most of them being preventable. Developing countries on the other hand, like India are stressed to get free of many dental and medical diseases. The proper and effective implementation of precautionary health care programs is the major issue. One of them is Malocclusion. It is observed as most predominant oral disorders, next to dental caries and periodontal disease and ranks third among worldwide dental disease priorities. During last decades, in order to correct Class II malocclusion many techniques and appliances that minimizes the need for patient compliance have been introduced. Herbst is one of these appliances. But presently there is no innovative solution observed in current device. The current work presents a systematic review regarding the design of the Herbst device and the related limitations with the current design.

A-34 Modeling and analysis of vertical landing reusable launch vehicle with spring damper

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Abstract: Reusable launch vehicles, or RLVs, are now the focus of the aerospace sector. Many aerospace organizations such as SpaceX, NASA, ISRO regard the Reusable Launch Vehicle (RLV) to be a major development trend for space transportation. The landing legs in landing gear of the RLV serve to reduce landing impact, maintain vehicle stability, and deploy and retract the vehicle. Furthermore, in-space transportation, equipment volume, and mass are carefully limited. The dampers in the landing gear system is among the most important subsystems of the RLV because its failure may cause the mission's failure. The dampers are an important component of the landing gear system because they lessen landing impact on improving landing stability of the system. As a result, it's critical to examine the damper's performance at landing condition and how it affects the vehicle's landing reflexes during touchdown of the RLV system. Because RLVs come in a variety of sizes and are used to carry a variety of payloads, the cost can be reduced by using a spring damping system rather than a traditional damping system for lower payloads. The Falcon 9 RLV is made of Al 2198T8, which has a very good strength-to-weight ratio. The work's relevance and objective are to determine the influence of lighter and stronger materials on the damping qualities of landing gear, such as Ti10V2Fe3Al, Aluminium alloy 7075, Ti6Al4v, and Ti10Al2Fe3V alloy, as well as to provide design safety calculations for RLV. The work entails calculating design responses, modelling, and impact tests in Ansys for the materials chosen and comparing the results with those of conventionally used material Al 2198T8 and to find a better material among them.

A-36 Applications of Cohort Intelligence to Mechanical Engineering

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Abstract: Cohort Intelligence is a very powerful, self-supervised learning optimization technique developed by Dr. A. J. Kulkarni et. al. in 2013. It attempts to replicate the behavior of a cohort in which the candidates interact and compete with each other to improve their own behavior. In the past few years, it has been applied to a variety of engineering optimization problems (Constrained and unconstrained, Single and multi-objective). This paper reviews various applications of Cohort Intelligence in Mechanical Engineering Domain.

A-37 Structural and Magnetic studies on Vanadium doped Cobalt Ferrite synthesized by Co- Precipitation method

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Abstract: Vanadium ions doped Cobalt Ferrite VxCo1-xFe2O4 [x =0.0, 0.2, 0.4, 1.0] synthesized by Precipitation method. Prepared samples were sintered at 1123K. The influence of vanadium ion on structural and magnetic properties of VxCo1-xFe2O4 nanoferrite was reported. The structural parameters were determined by using Powder X-Ray Diffraction (XRD). The surface morphology and composition of the sample are evaluated by Scanning Electron Microscope (SEM) and Energy Dispersive X-ray Spectroscopy (EDX). The spinel formation has been investigated by Fourier Transform Infrared Spectroscopy (FTIR) and prominent absorption bands $\nu1$ and $\nu2$ correspond to the stretching vibration of tetrahedral and octahedral sites around 600 cm-1 and 400 cm-1. Themagnetic parameters such as Saturation magnetization (Ms), Coercive field (Hc), Magnetic Remanence (Mr), and Squareness ratio are determined by Vibrating Sample Magnetometer (VSM). The cubic spinel structure with average crystallite size ranges from 30nm to 44nm. It is found that lattice strain, X-ray density, and dislocation density varies non–linearly with an increase in V ions of Cobalt Ferrite. The magnetic parameters changes with an increase in the concentration of V ions. Minimum coercivity is obtained in x=1.

Keywords: Electron Microscope (SEM) and Energy Dispersive X-ray Spectroscopy (EDX).
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A-40 Study of Effective Powertrain Sizing for Electric Vehicles

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Abstract: Rapid growth of electric vehicles technology and its efficiency management techniques has led to dramatic rise in the necessity for effective sizing of powertrain components. The recent market need for this technology is the optimized powertrain design to encourage further evolvement. In present study, thorough calculations involved in the powertrain sizing through various assessments are emphasized. Forces, Power, Energy, Motor and Battery Pack calculations are derived along with discharge rate and battery usage time. Effective powertrain components capacitive size is calculated for an estimated vehicle performance which can eventually assist in the optimal vehicle design which helped in range extension.

Keywords: Powertrain, size, calculations, vehicle.
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A-44 Based on numerical research, static stress simulation, modal frequency analysis, experimental investigation, and practical analysis in national level competition, the Discover 100cc was converted to electric mobility.

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Abstract: Due to their age and dependability, internal combustion engines power the majority of the automobiles and trucks on the road today. Exhaust emissions are the primary source of environmental contamination. Due to advancements in electric motor design, high-density energy storage, easy access to electricity, the rapid development of renewable energy, and awareness of the environmental impact and CO2 emissions on the planet, the demand to switch from internal combustion engine (ICE) to EV has recently

increased in the 21st century. In this study, an electric mobility system will be added to a Discover 100cc motorcycle. a complete examination of the research on the objectives, issue statements, and future scope of work related to converting IC-powered two-wheelers to electric two-wheelers. Numerical analysis was covered in the discussion. We've discussed the strategy, the refit parts required for electric vehicle use, and the transition from gasoline to electric propulsion. On the stock Discover frame and the retrofitted Discover frame, the static stress modelling, the modal frequency analysis, the experimental investigation, and the practical study of the retrofitted Discover have all been covered. Our practical investigation showed that, in the Skill Innovation Employability Program E-Bike Challenge in the year 2021 at Chandigarh in cold temperatures of 2^0 to 4^0 C, our modified motorcycle placed second overall, received the best durability award, and placed second in the off-road category. We met every goal we set for the study that was taken into account for the Discover refit.

D-07 Aerodynamic Analysis on the effect of pintle geometry in the performance of Expansion Deflection Dual-Bell Nozzle

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Abstract: A rocket nozzle is a propelling nozzle used in a rocket engine to expand and accelerate combustion products to high supersonic velocities. There are various types of Altitude Compensating nozzles and many studies combine Expansion Deflection Nozzle (EDN) and Dual Bell Nozzle (DBN) to form Expansion-Deflection Dual Bell Nozzle (EDDBN) and have reported that compared to DBN, EDDBN has a larger mode transition pressure ratio. To determine how flow characteristics and altitude compensation performance vary and to identify the most effective configuration in altitude mode while maintaining a 100 nozzle pressure ratio, the pintel geometry of the EDDBN is changed in the current study. With the aid of appropriate two-dimensional axisymmetric Reynolds-averaged numerical simulations conducted with the aid of the commercial CFD programme ANSYS, qualitative and quantitative analyses have been carried out in the current work. Analysis is done on how the change in pintle shape affects the variations in the pressure and Mach number contours.

D-08 EFFECT OF DOUBLE AERODISK OVER A HEMISPHERICAL BLUNT BODY AT SUPERSONIC SPEED

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Abstract: The presence of doubleaerodisk location changes the shock wave patterns and shock position. The research shows that the hemispherical spike reduces drag more effectively than the sharp spike by adopting a blunt spike on top of the hemispherical. When interacting with the hemispherical top, the supersonic flow creates a detached blow shock which will be converted to oblique shock downstream with a small wave angle. For the computational study, the spike is taken of L/D=2 which is more than the critical length of the spike for freestream Mach 2.00. There are two hemispherical aero disks mounted on the spike. The one is on the tip of the aerospike and the other one is at the location of flow separation of the spike having the same diameter. The research suggests that there is approximately 16% more drag reduction due to the hemispherical disk mounted at the location of flow separation on the sharp spike. These computational studies the combined effect of both the hemispherical disk mounted on the aerospike beyond critical length (for free stream Mach 2.00) as mentioned above.

D-09 Performance Enhancement of PID Assisted Semi-Active Suspension System and Optimization Using Taguchi Method and Grey Relational Analysis

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Abstract: In this paper, optimization of quarter car suspension systems parameter when subjected to various road inputs or in other words let's say excitation is carried out through simulation manner. As semi active configuration of suspension system has been adopted in various suspension system application because of its adaptability over passive and semi active structure of suspension system, MR damper and PID based systems effective operating condition is main motto. Calculation of RMS values and settling time of semi active configuration of suspension system is essential as it provides behavioral idea of the ride stability and passenger ride comfort. Validation of PID values carried out by orthogonal array and Taguchi analysis gives optimum systems response. Lower RMS values and settling time follows conformity through GRG and Taguchi method making final selection of PID values after considering lower the better approach. This study will be helpful for finding out optimum PID values of semi active suspension system through proper validation proof and graphical representation. It also shows the usefulness of Taguchi's orthogonal array method adapting with grey relational method for various dependent factors as it makes system performance enhancement through optimization.

Keywords: *PID Controller, Orthogonal array, Taguchi analysis, Passive, Semi-Active.*
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D-18 Frequency response driven design and development of the battery package module for retrofitted electric car

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Abstract: The aim of this study is to design and develop an important component of what is needed for better future in Automobile sector, the Electric Car. As fossil fuel is depleting and IC-Engine pollutes too much, it becomes necessary to convert conventional (IC Engine) vehicle to purely electric vehicle. Retrofitting is a term associated with modification, where we implement newer technology in existing models to enhance utility and life. To do retrofitting of conventional vehicle, it is important to first do a feasibility study. The main component in any vehicle is the chassis, whose function is to take the overall load and distribute it on the frame and handle vibrations. When we remove an engine, the center of gravity changes and we need to compensate by introducing weight in the engine compartment. In this case, modular battery package compensates for the engine weight and restores equilibrium. The end product after retrofitting is highly cost effective. This paper presents design of modular battery package (MBP) for the Electric car leveraging frequency response analysis. In addition, package protecting the module from issues such as surrounding heat or inertial effect of battery self-weight is also addressed. The frequency response analysis of battery package module also points out different modes.

D-24 Design Study and Modification of Mechanical Structure to Assist Horizontal Farming

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Abstract: A pandal structure is used for creeper vegetables in south India. Bamboo and stone pillars are used to construct this pandal construction. During the rainy season, these two types of constructions are not strong enough to ensure high winds and water pressure. When compared to bamboo, the output of the stone pillar construction is 30 to 40% higher. Given India's large population, there is potential for increased output in creeper vegetables and fruits. Introduced a mechanical structure pandal for creeper vegetables and fruit plants in this research. For the mechanical structure, 2743.2 mm height (609.6 mm in ground + 1828.8 mm pandal + 304.8 mm top of pandal) steel square columns are used. This structure is built to withstand the elements while also increasing production. Force versus deflection simulation is used to build a robust design and understand the behavior of the structure under loading conditions. The study also supports the validation of a test using simulation findings for force versus deflection. The estimated deflection and those achieved through physical testing are in agreement. The current research has the benefit of assisting in the precise design of mechanical structure pandals during the product development stage.

D-25 Design & Development of an Automatic Karanji-Dumpling Making Machine

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Abstract: A sweet or namkeen stuffed dumpling is very popular across India and even among other Asian countries, though a variety knows them of names across different regions. In this research, we are explicitly referring to a famous Indian dumpling snack known as a Karanji. It is an Indian-origin dumpling made with suji or maida containing either a sweet or namkeen stuffing. With the rise in population and fast-paced nature of daily life, demand for packaged foods such as Ready-to-cook (RTC) and Ready-to-eat (RTE) food is also growing faster; hence manual production of Karanjis can not cope as it can get cumbersome as in case of bulk production facilities such as small or medium scale food factories, central kitchens, and fast food centers. With the automatic Karanji-making machines available in the market, the process is quite efficient but not very economical for medium- or small-scale enterprises. Also, these operators may not be able to handle the high-end technology machines; hence the end quality may be compromised. In this

research, we have developed a mechanical, semi-portable, efficient, simple, easy-to-operate, and most importantly, economical machine that tries to imitate the household karanji-making process with the help of a simple lever and cam-follower, a cutter rod, a stuffing dispenser, and mold frame with folding cum dispensing mechanism. The setup was analyzed analytically with input from significant experiments and was supported and validated numerically using FEA. As a result, there was no compromise in the quality of Karanji, but the process got economical.

Keywords: Dough, Roti, Chapati, Karanji, Dumpling, Convenience Foods, RTC, RTE, Automation,FEA.
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D-26 Numerical Modeling of Semi-Automatic Washing Machine Motion Model

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Abstract: Because of the uneven fabric distribution throughout the surface of the spin basket, the spin basket of semi-automatic washing machines deflect a lot with the correspondingly unbalanced load produced in the washer. Controlling the basket's vibration and motion with the appropriate imbalance is crucial for a sturdy construction. In this essay, suspension model numerical modelling and a physical model of a semi-automatic washing machine are discussed. They aid in anticipating the motion of the basket and the corresponding unbalance produced while washing. A customer-friendly eco-efficient design is highly valued in the current competitive environment and aids industry in gaining market share. This paper also discusses crucial semi-automatic suspension characteristics that can be optimized to lessen basket motion and vibration. This optimization can be carried out at an early stage of the product's design, which can cut down on design time and expense owing to problems found at a later stage. The model is easily adaptable to different structure of washing machine such Vertical axis and Horizontal axis washing machine.

Keywords: Semi-Automatic washing machine, Numerical model, Spin basket,
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D-27 DESIGN AND DEVELOPMENT OF GAUGE FIXTURE

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Abstract: A gauge is a device that is used to assess or judge something as well as to ascertain its precise measurements, capacity, and quantity. These purposes are served by a wide range of inspection gauges and equipment, from straightforward materials against which sizes can be measured to sophisticated apparatus. Standard gauges and limit gauges are the two main categories of gauges. Limit gauges will be used with our gauge fixture. We created a gauge fixture to address the issue with the inspection department because it was a time-consuming, multi-step process, so we chose to create only one gauge to complete all the

inspection processes at once. To make the gauge small and effective, sliders and limit gauges have been added. The gauge fixture is designed to be quick and accurate so that the entire inspection process can be completed with greater accuracy and less time. We are attempting to construct a gauge for a corporation using our engineering expertise that will shorten their inspection time, prevent delayed dispatches, and increase their work efficiency.

D-29 Unsteady flow simulation over Frontal cavity using DES at different Free stream Mach number

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Abstract: Frontal cavity consists of complex unsteadiness which causes bow shock instabilities when the body is moving at supersonic or hypersonic speed through a fluid. These complex unsteady flow fields are an important practical concern in aerospace applications. Understanding this flow field around the frontal cavity will help us to know more in depth about these instabilities to create effective control methods to avoid structural damage. The main objective of the present research is to analyze the bow shock instabilities at different Mach number around the frontal cavity at supersonic speed by using the numerical concept of Detached Eddy Simulations (DES) in two dimensional axisymmetric domain. Three different Mach numbers (2, 4 and 6) were considered in the present investigation to study the effect of Mach number on flow unsteadiness. It was observed that with increase in Mach number the frequency of most dominant mode (bow shock pulsation) increases significantly. In addition to that at low supersonic speed (Mach 2) additional low amplitude dominant modes were observed unlike the case of higher supersonic speed (Mach 4) and hypersonic speed (Mach 6).

D-31 Design and Development of automatic Clutch System for Manual Transmission

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Abstract: This paper focuses on the idea to eliminate the need for manual clutching by introducing a power drive which receives control signals from sensors mounted on the brake, tachometer and gear lever. A control unit determines the exact moment when the clutch is to be actuated based on the output from multiple sensors. The absence of manual clutching proves to be an ergonomic advantage to drivers. The compromise is not made on

fuel efficiency and the gear shifts as frequently as required. The touch sensor mounted on the head of the gear pedal relays a signal whenever the foot is placed over it, for shifting gears. A linkage between the brake and the clutch ensures that the clutch pedal is depressed when the brake lever gets pressed, but with a small delay time. A signal from the tachometer of the vehicle also ensures that the clutch actuates to disconnect the drive from the wheels whenever the speed of the engine drops below a certain minimum value. This ensures that the engine does not cease when the vehicle is brought to a halt, with the engine running. Similarly, multiple occurrences of these events are taken into consideration and the control action is determined for such situations. The actuator connected to the clutch would replace the pressing of clutch pedal manually, and deliver precisely the correct amount of force in the direction at the required time to simulate clutching.

Keywords: *Automatic Clutch Transmission, Easy to control, Fuel Efficient.*

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D-33 Design of a Multifunctional Composite 2U Structure for Space Application

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Abstract: Aluminum alloys are widely used to fabricate primary structures of CubeSats. sufficient study of CFRP primary structures has been carried out. Electrical Power system which consists of battery arrays usually occupy spacecraft's major internal volume. A CFRP structural/battery array configuration has been designed, allowing to integrate the electrical power system (battery) in the bus primary structure of a 2U CubeSat [7]. Previous study of the same concept has been carried out in 1U primary structure and the end results looked promising. So, goal of our research is to implement the same methodology in 2U CubeSat primary structure. Cellular structure method is being followed here, set of commercial LiPo batteries is being placed between two CFRP layers and spaced out with CFRP ribs. The low degree of integration allows us to employ comparatively cheap, commercial off-the-shelf components[7]. The paper will be covering design methodology, design advantages along with structural analyses.

Keywords: *CubeSat; CFRP; structural integration; structural battery.*

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D-35 OPTIMISED EASY BUMPER MOUNTED HOOD OPENING LEVER

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Abstract: This paper describes the design of bumper mounted hood opening lever. There are two hood opening lever, primary and secondary. The primary lever is located inside car cabin and the Secondary is located belowhood. Generally, while operating the hood opening lever which is just below the Hood; the operator faces some issues. Sometimes it's difficult

to locate the Lever, Sometimes the Hand or dress / Shirt gets dirty. When we studied the option available in existing cars ,we found scope to work on it. So, we optimized hood latch design and removed the secondary liver from underneath of hood. New mechanism will be easy to operate.

Keywords: *Hood Opening Lever, Bumper, Grill.*
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D-36 Design, Optimization and Analysis of Two Stage Reduction Gearbox

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Abstract: The aim of this study is to determine, verify and validate the vibration characteristics of the gearbox top over using both analytical and experimental techniques. And also to determine Heat and Stresses acting ANSYS software used to determine natural frequency response for gearbox casing. This analysis finds the natural frequency of casing. It was statically analyzed using Ansys. Static analysis is to find out the total amount of stresses and displacement of gearbox casing, Internal Gears and End cover. Dynamic analysis is to find out the Natural frequency of casing. Considering the results obtained from analysis, geometric model was modified and iterated until satisfactory results were achieved. This process helps in finding the optimized design for the gearbox casing in which it has the best performance without any failure and with minimum Loads acting on the casing.

Keywords: *Special Purpose Machine, Reduction Gearbox, Computer Aided Engineering (CAD), Ansys Software, Vibrations, Finite Element Analysis (FEA).*
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D-37 Experimental Setup for fault detection of Rolling contact bearing and prediction of RUL

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Abstract: Bearing plays a vital role in every rolling part of the mechanical machine. A sudden failure of it results in machine breakdown and cost huge production loss as well as a delayed production schedule. So, for every mechanical machine, it is very important to Predict the Remaining Useful Life of the bearing accurately. There are many methods under research for the prediction of the Remaining Useful Life of the bearing, but none of it is accurate as there is noise in the data which reduces the accuracy of the Remaining Useful Life prediction. Bearings failure occurs because of several failure modes, each of which gives a different failure behavior pattern. This research paper focuses on the experimental platform for testing bearing at different speeds and load conditions. The experimental setup gives accurate vibration signal data processed through Arduino and Matlab governed by a mathematical model for predicting the Remaining Useful Life of the rolling contact

bearing.

D-38 COMPARISON OF NUMERICAL ANALYSIS FOR PASSIVE AND ACTIVE SUSPENSION SYSTEM FOR 2DOF QUARTER VEHICLE MODEL

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Abstract: The Suspension System's principle goal is to improve passenger comfort by reducing vertical body acceleration and isolating the body regardless of road profile. The active suspension system is used to replace the traditional mechanical suspension system (passive suspension system) to improve safety, comfort and convenience. Using a PID controller, this research investigates the active suspension systems' responses over passive suspension. The analysis and simulation are carried out using a linear quarter-vehicle model. The vehicle model's responses were calculated using the MATLAB/Simulink platform. The use of PID controller with road disturbance as input used to compare passive and active suspension systems. The PID controller's performance is compared to that of a passive suspension system which gives better results in terms of improvement. The simulation results show that the PID controller improves vehicle ride comfort.

D-39 Experimental, Numerical and Analytical approach for Mechanical Properties of Al-SiC Composites

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Abstract: Because of the significant improvements in its mechanical qualities, such as its hardness, toughness, compressive strength, and tensile strength, the composite material has a significant amount of potential use in the modern industrial setting. Casting and powder metallurgy are the two methods used to create MMCs, despite the fact that the casting technique presents a number of technical problems. One of these challenges consists in achieving a homogenous distribution of reinforcement throughout the matrix. This has a direct impact on the characteristics and quality of the composite material. High strength, high stiffness, increased thermal stability, increased resistance to corrosion and wear, and increased fatigue life are some of the characteristics of aluminium alloy composite materials. Due to their one-of-a-kind capability of being designed into the materials to deliver the desired qualities, aluminium alloy materials were discovered to be the most viable solution. The purpose of this study is to construct a composite material by incorporating silicon carbide (SiC) into an aluminium matrix in the proportions of 3 percent, 6 percent, and 9 percent by mass. The stir casting method is used in the

preparation of the composite. A series of mechanical tests were carried out in order to ascertain the tensile strength, compression strength, impact strength, and hardness of the composites that were produced as a consequence. It has been suggested that this material be used for power transmission devices like gears that are exposed to constant loading in the future. The results of the impact and hardness tests were confirmed using the numerical approach, while the experimental findings of tensile and compression tests were validated using A finite element analysis in Ansys. The toughness and hardness of the material are both improved when the percentage of silicon carbide in the material is raised. Based on the findings, it can be deduced that composite materials, such as aluminum-silicon carbide, are one of the possibilities that may be explored when looking for a material to use for power transmission components.

Keywords: Silicon carbide, Aluminium, Ansys, MMC's, Tensile strength, Compression strength, Impact strength, Hardness, Power transmitting elements.
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D-41 Optimization in Design and analysis of vacuum chamber to degassing of silicone

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Abstract: Degassing is a highly effective process for removing trapped air from within mixed materials such as RTV Silicone Rubbers, Polyurethane Casting Resins, and Infusion Epoxies - all sorts of materials where air can become entrapped when the two parts of the material are mixed together. Vacuum degassing is the process of using vacuum to remove gases from compounds which become entrapped in the mixture when mixing the components. To assure a bubble-free mold when mixing resin and silicone rubbers and slower-setting harder resins, a vacuum chamber is required. Vacuum systems vacuum chamber are used to remove the air from high viscosity materials like silicone rubber before pouring. They are also ideal for vacuum degassing liquid plastics for making bubble free castings. Vacuum chambers work by removing air and gases from a vessel or chamber through a vacuum pump, creating a vacuum, which is defined as a space completely devoid of matter The analysis of this vacuum chamber is done to find out the stresses generated and displacement occurred during the operation, to limit the deflection of wall of vacuum chamber within the given limit to avoid failure after period of cycles. Solid Works software is used for designing and analysis purpose. Also different manufacturing processes involved in the manufacturing of this vacuum chamber are discussed briefly.

Keywords: Vacuum chamber, silicone.
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D-42 Design and Structural Analysis of Solar Panel under Wind Load using CFD

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Abstract: The wide range use of non-renewing energy sources in the current electricity generation has leading to the large amount of pollution to be emitted and that affecting to the global warming. As the result of pollution increasing widely has created the awareness impact on public for using those sources of energy which is renewable as like solar energy which led to the not producing harmful pollutants into the environment.

In our research study the structural integrity of photovoltaic solar panels will assess by making use of FEA as well as CFD technology. The key point of this analysis approach is allowing us to decide structural section as well as connection to the support of solar panel which basically loaded by the load of wind.

Keywords: Passive suspension system, Active suspension system, PID controller, Quarter-vehicle,model.

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D-43 DESIGN, ANALYSIS AND OPTIMIZATION OF FRONT AXLE USING DIFFERENT MATERIALS

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Abstract: An axle is a central shaft for a rotating wheel. On wheeled vehicles, the axle may be fixed to the wheels, rotating with them, or fixed to its surroundings, with the wheels rotating around the axle. The axles serve to transmit driving torque to the wheel, as well as to maintain the position of the wheels relative to each other and to the vehicle body. The axles in a system must also bear the weight of the vehicle plus any cargo. The front axle beam is one of the major parts of vehicle suspension system. It houses the steering assembly as well. About 35 to 40percent of the total vehicle weight is taken up by the front axle.Hence proper design of the front axle beam is extremely crucial. In present research work design of the front axle of heavy commercial vehicle were done.The approach in this project has been divided into two steps. In the first step, front axle was designed in Solid Work software later the model is imported into ANSYS for results. In the second step, the model is assigned with two different materials and the analysis results for both the materials are compared to conclude a suitable material for a Front axle manufacturing

Keywords: Front axle Beam.

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D-45 Study of stiffness for linear motion guide ways by theoretical and finite element analysis

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Abstract: Guide ways are of much importance for applications in Machine tools, Aerospace, Semi conductor, electronics, robotic industry and medical field. It exhibits features such as low frictional resistance, accuracy in position , repeatability, precision with speedy operation and great rigidity. In past decades and coming future the use of guide ways is predominant. With industries becoming inclined towards automation and robotics there needs to be much attention to be given for guide ways in the view of material, designing, assembling and performance parameters. The main objective of the paper discusses the theoretical approach of previous work and developing Finite element model for the guide ways. The outcomes of this research provides a comparison for two approaches and will be useful to establish stiffness for different sizes and arrangements of guide ways.

Keywords: Guide ways, Stiffness, Finite element Analysis, Deformation, Load.
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D-46 A METHOD TO REDUCE NUMBER OF SPOT WELD FOR A PASSENGER CAR WHEEL

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Abstract: Manufacturing of Wheel in automotive industries demands no flaw wheels. This component must not fail. However, process as well as material deficiency in varying ratios of influence has been counteracting factors in producing flawless wheel rims. The wheels are loaded in complex manner, understanding these loading conditions is important for efficient wheel design. The wheel must be durable enough to tolerate significant loads and harsh environment effects. In this project work the Optimization of Number of Spot welds on Automobile Wheel Rim using Finite Element Analysis will be done. Spot welded rim must pass certain tests like Weld Strength Test (WST), Radial Fatigue test, Cornering fatigue test. Finite Element Analysis Models will be developed for the tests mentioned. Experiments of three tests will be carried out. FEA results and Experimental results will be compared for best combinations of selected parameters.

Keywords: WST, FEA
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D-48 Experimental Study of Jute Fiber Composite at Different Ply Orientations

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Abstract: In the field of composites, various types of synthetic and natural fiber are used for reinforcement purposes, but the synthetic fiber is non-biodegradable and non-renewable material. In recent days as per environmental concerns, biodegradable and renewable materials are used in many industrial applications in the form of natural fiber composites. The strength of different natural fiber composites materials is the main objective as per their use in different applications. A composite is a combination of reinforcing and matrix material. Various types of natural fiber are available in the market, but as per cost concerns, jute fiber is low-cost material as compared to other natural fiber materials. In this study jute fiber materials are available in the form of jute woven mat is taken. Various jute fiber composite specimens will be made with help of epoxy resin by hand lay-up technique. Jute fiber composite with ply orientation as [900 /00 /900]s, [+450 /00 /-450]s, and [+600 /00 /-600]s will be prepared as per standard methods. Mechanical characterization such as tensile and flexural strength in different ply orientations is studied. From the result it is observed that tensile strength in [900 /00 /900]s is higher than [+450 /00 /-450]s, and [+600 /00 /-600]s and flexural strength in [+600 /00 /-600]s is higher than [+450 /00 /-450]s and [900 /00 /900]s. Composite materials are orthotropic the results also vary in longitudinal and transverse directions. From the result, it is observed the result in the longitudinal direction is higher than in transverse directions.

Keywords: *Jute fiber, hand lay-up technique, fiber composites materials.*
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D-52 Effect of Contact Area and Stress Concentration on Slurry Erosion Wear of AA6063 using Hertz contact theory and Numerical technique

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Abstract: The properties of the erodents, namely, size, shape, hardness, density, etc. have dominant effect on mass removal from the target surface in slurry erosion. The area of contact of the erodent particle is responsible for change in crater size and shape. This further leads to variation in the stress development at the target surface due to erodent impact. Therefore, it is necessary to investigate the effect of area of contact and stress concentration on the target surface due to different particles shapes. In view of this, in the present investigation AA6063 is selected as target material with impacting three natural erodents, namely, quartz, Sic and alumina. The area of contact of impacting particle with target material surface is calculated by using Hertz contact stress theory and further obtained using ANSYS software by simulating the same conditions. The results obtained by Hertz theory and ANSYS software are compared with the mass loss per particle determined experimentally.

Keywords: *Erosion wear; stress concentration; hertz contact theory; ANSYS explicit; AA 6063*
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D-53 Design and Analysis of Suspension System for Electric Car

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Abstract: The automotive industry paradigm is shifting from conventional vehicles with internal combustion engines into electric vehicles. Electric cars are projected to be manufactured in limited quantities during this transition era, necessitating new design and manufacturing procedures. Design of modern urban vehicles is very important according to their internal structures with low weight. This paper comprises of review on design simulation and analysis of suspension used in electric two-seater four-wheeler. First this suspension system can be designed analytically by engineering concepts. Then these systems are generated in CAD software for simulation and analysis purpose. The suspension system's functional goal is to produce relative motion between the sprung and unsprung masses. This is accomplished by the use of a spring to absorb the shocks and certain kinematic connections that hold them together with specific degrees of freedom. Furthermore, the system's kinematics are created and tuned for improved handling. This review paper is concerned with the design, construction and various types of suspension system.

Keywords: *Suspension, Electric-Vehicles, Software.*

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D-55 Simulation And Experimental Study On Acoustic Properties Of Carbon Fiber Composites

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Abstract: Recent advancement in controlling noise through absorption provides an opportunity to investigate fibrous materials like natural and synthetic. However there are still challenges for researchers to improve the acoustic properties of fibrous material. In this paper, we have tested different specimens, i.e. carbon fiber composite (synthetic) and jute fiber composite (natural) experimentally by using stand wave tube equipment. Ansys workbench is used to find out sound absorption coefficient to get analytical result. Carbon fiber composite is manufactured by using 3D printing method and jute fiber composite is manufactured manually with the help of jute fiber and epoxy resin as binder. It is observed that carbon fiber composite has good sound absorption properties (SAC- 0.870) as compared to natural i.e. jute fiber composite. (SAC - 0.618)

Keywords: *Carbon Fiber, jute fiber, stand wave tube, Ansys workbench, SAC*

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D-56 Design optimisation of wheel rim using Chopped Carbon Fibre Epoxy composite

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Abstract: In performance vehicles, the unsprung mass is said to have twice as important

role as the sprung mass towards the dynamic abilities of a car. And wheel rims are major contributors of unsprung mass in a vehicle. Reducing this mass directly improves the vehicle performance during acceleration, braking and cornering. Moreover, wheel rims being rolling elements, a lightweight wheel rim consequently alleviates the rolling inertia of the wheels, imparting agility and enhanced turn-in response to the vehicle. The aim of the project is to optimize the weight of the wheel rim using Chopped Carbon Fiber Composite (CCFC). Development of a Carbon Fiber Composite wheel rim will reduce the vehicle's unsprung mass substantially due to CCFC's high specific strength. Further the isotropic behavior of Chopped Carbon fibre composite provides additional leverage in designing the wheel rim over the use of conventional woven carbon composites. A finite element approach was adopted to study the macroscopic behavior of the CCFC wheel rim under worst case loading scenario. Thus, a material is modeled in ANSYS using the Mechanical properties of CCFC with isotropic behavior to optimize the topology of the wheel rimmfor maximum weight reduction. Thus an optimized wheel rim was designed using CCFC which is 42% lighter than an equivalent aluminum wheel rim.

Keywords: *Wheel Rim, Chopped carbon fiber, Tensile test, Compressive test, Flexural test, Volume-Fiber Ratio, Composites.*

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D-57 Review & Ergonomic Investigation of Footwear Storage Racks Used at Religious Places

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Abstract: India is a land of diversity. It is a country with a wide range of religious community. There are number of religious places where people visit frequently. People remove footwears before entering the religious places. Generally, these religious places run a system to keep the footwears for some duration till the people return from the religious place. The aim this research work was to study the system used for storage & retrieval of these footwears at religious places. Also review of the earlier research work donein case of footwear stands/racks is taken in this work. It was found that very less research work has been done on the footwear storage system used at religious places. An initial level Rapid Upper Limb Assessment (RULA) is done using the software tool provided by The Ergonomics Centre, of North Carolina & it is found that detailed investigation is needed in case of the present footwear storage racks used at these places & changes are required immediately otherwise the present system will lead to musculoskeletal disorders. Also the present systems are leading to unhygienic conditions.

Keywords: *ergonomics, footwear storage racks, Musculoskeletal disorders, religious places.*

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D-58 A REVIEW ON EXPERIMENTAL ANALYSIS OF SOUND ABSORBING MATERIALS

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Abstract— Noise has become one of the four major pollution types in the world. Constant exposure to noises can cause all kinds of health problems such as hearing loss, cardiovascular disease, and sleep disorder. Many Natural and Synthetic material have been developed and tested for acoustic applications. Sound-absorbing materials absorb most of the sound energy striking them, making them very useful for the control of noise. The sustainable materials for sound absorption are divided into three main categories Natural material, recycled material and Mixed/Composited material. The major uses of absorbing materials are to include the reduction of reverberant sound pressure levels. In this research we study the different sound absorbing materials with different and comparative study between the materials. The intensity of research and the development in manufacturing processes, we anticipate that the range of new sound- absorbing materials will expand quickly over the next few years.

Keywords— Composite materials, stand wave tube, Carbon fibre composite , Sound Absorbing Material, damping, Ansys Fluent software

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D-59 Computational analysis for optimal location of open sunroof for an SUV with Ahmed body profile

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Abstract: The sunroof has become a much sought-after feature in Sports Utility Vehicles (SUVs). However, opening the sunroof of the SUV modifies the streamlined profile of the SUV and adversely affects the aerodynamics both inside and outside of the vehicle. This leads to increased drag (or air resistance) on the SUV, and can also induce acoustic disturbances inside the cabin. Here, we propose to examine the aerodynamics of an SUV modeled with the simple profile of an Ahmed body, but with an open sunroof. The primary objective of this study is to examine the velocity field of air inside the cabin, and the drag on the SUV, when its sunroof is opened. Using the CFD package - ANSYS Fluent - this work assessesthe velocity contours and drag coefficient for three locations of the sunroof – above the driver, middle of the roof, and above the rear passengers. The results from this study can help the automotive industry in improving the aerodynamic designs for SUVs with sunroof.

Keywords: Open sunroof, Ahmed body, drag, acoustic disturbances, wind noise, SUV cabin.

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D-65 Modelling and simulation of Series Parallel Hybrid Electric Vehicle

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Abstract: This paper deals with the mathematical modelling, analysis, and simulation results of a series–parallel hybrid electric vehicle (SPHEV).There are four major types of components: electric motors, internal combustion engines, batteries, and support

components. The detailed models of four major types of components: electric motors, internal combustion engines, batteries, and support components that can be integrated to model and simulate drive trains having all electric, series hybrid, and parallel hybrid configurations is presented.

Keywords: Hybrid vehicles, MATLAB/SIMULINK, modelling, simulation.

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D-67 Synthesis of Anthropomorphic Fingers for Robotic Hands

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Abstract: This work aims to study and develop kinematic mechanisms for robotic fingers that can show anthropomorphic functions similar to human hand. Available mechanisms for finger mechanisms used in prosthetic hands and robotic hands are studied and their functional links and joints are noted. By observing and evaluating their kinematic chains, available kinematic chains and their link arrangement is noted. Using the theory of number synthesis, different link arrangements are found out and for these arrangements, different kinematic chains are drawn. For these kinematic chains, mechanisms are simulated in SAM software and hence 21 new working finger mechanisms for robotic hands or for prosthetic hands are developed.

Keywords: Anthropomorphic Robotic fingers, H. S. Yan's Creative Design Theory for Mechanical Devices, Number synthesis, Type synthesis, Particularization.

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MF-10 Minimization of defects in glove manufacturing using Total failure mode effects analysis flower pollination optimization

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Abstract: Productivity refers to a company's or economy's ability to convert resources into goods efficiently,allowing it to produce more with fewer resources. Daily productivity is a critical task because production increases the task of creating the demand for the product and the capacity to accept the order is also inessential. Total failure mode effects analysis (TFMEA) and flower pollination optimization approaches are suitable for identifying the failure and rectifying it to increase the performance of the production. The work is evaluated in a gloves manufacturing company; the process is monitored with TFMEA goal setting for the reduction of failures that occurred in the manufacturing process. The performance was compared before and after the implementation of the idea with optimization techniques basis, and there was a significant improvement in the performance. Glove manufacturing productivity improved as a result of the intervention, and superintendents reported having a better awareness of process concerns.

Keyword: TFMEA , Production Failure, optimization ,glove.
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MF-16 Fabrication of setup for TIG cladding and a review of different process parameters

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Abstract: Cladding is a type of coating technique where the material is coated onto the substrate, to protect it from external agents. There are different types of cladding techniques out of which Tungsten Inert Gas (TIG) cladding appears to be the most promising and economical method. TIG cladding takes advantage of the heat generated from TIG welding equipment to bind materials with the substrate. This article discusses the fabrication of a semi-automatic TIG cladding setup and a review of different TIG cladding process parameters. The review briefly discusses the parameters like cladding current, cladding speed, arc gap of the welding electrode, pre-cladding powder placement methods, gas flow rate and their influence on microstructure, hardness, wear, coefficient of friction etc. The effects of the cooling method post-cladding are also discussed. According to the findings, the most influencing parameters are cladding current and cladding speeds, whereas gas flow rate and arc gap have a smaller effect than the former.Based on the parameter study, Nano Titanium carbide (TiC) is clad over AISI 52100 alloy steel using the fabricated setup. Tribological and optical microscopic image study is done. Optical images showed the dissolution of TiC particles into the substrate and the coefficient of friction of the clad specimen is found to be lower than that of the base material.

Keyword: IG Cladding, Fabrication, Cladding current, Cladding speed, Arc Gap, Gas flow rate.
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MF-18 Review on Experimental Investigation of Resistance and Laser Spot Welding

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Abstract: In the automotive and aerospace industries, resistance spot welding is used to fuse two or more metals together. There are over 3000-4000 spot welds on the automobile body. This study reviews resistance and laser spot welding on both similar and different materials. The effects of input parameters like resistance spot welding and laser spot welding are very important for managing the quality of a weld joint. The best input parameters for mechanical attributes and failure modes are examined. The relation between welding parameters and joint strength is discussed. This work presents a finite element analysis of resistance spot welding and evaluates the hardness of the base metal, heat-affected zone, and fusion zone.

Keyword: *Resistance spot welding, Laser spot welding, Heat affected zone, Fusion zone, Microhardness, Finite element analysis, Tensile shear strength.*
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MF-21 A Review Study of Friction Stir Spot Welding and Laser Spot Welding Joints

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Abstract: The Friction Stir Spot Welding and Laser Spot Welding of different materials such as Aluminum Alloy, Dual-Phase Steel, low-carbon steel, and others are gaining popularity in the automotive and aerospace industries. Friction stir spot welding is a solid-state joining technique that depends on frictional heating and plastic deformation produced by the interaction of a non-consumable welding tool revolving around the workpiece. Laser spot welding is a non-contact method of joining materials that use a laser to create a single weld point. The study of friction stir spot welding and laser spot welding is reviewed in this paper. Both processes can be used to join materials that are similar or dissimilar. Using both techniques, the effect of input parameters on the microstructure, hardness, and tensile strength of several materials are studied.

Keyword: *Friction stir spot welding, laser spot welding, DP Steel, Strength, microstructure.*
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MF-22 Friction Stir Welding, Friction Stir Spot Welding, and Resistance Spot Welding Processes: A Review on Data Acquisition System

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Abstract: Welding is a procedure for combining metals that can be comparable or dissimilar, and it can be divided into three types: solid-state welding, resistance welding, and arc fusion welding. Although the welding processes and dynamics differ in each situation, a common physical phenomenon of temperature distribution as a function of the process is observed. In this paper, friction stir spot welding which is solid-state welding, and Resistance spot welding which is a resistance welding process are taken into consideration. This study examines the systems that are necessary to collect this information and monitor the operations. Though temperature sensing is the focus of this paper, the authors also looked at axial force, electric current, voltage, and linear displacement to draw some conclusions. Moreover, several writers collaborated on the FEM simulation of the processes by establishing a relationship with actual experimentation using some governing equations.

Keyword: *Friction stir spot welding, friction stir welding, Resistance spot welding, thermocouple, FEM.*
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MF-26 Friction Stir Welding Process Parameters Optimization Using Taguchi Based Grey Relation Analysis

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Abstract: This paper emphasis on optimizing friction stir welding process parameters during welding of AA6061-AA6063 along with reinforcement of copper particulate. Process parameters considered for the study includes spindle speed (1000 rpm, 1400 rpm and 2000 rpm) and welding speed (16 mm/min, 20 mm/min and 25 mm/min). Experiments are designed as per Taguchi L9 orthogonal array for friction welding of dissimilar aluminium alloy. Reponses considered in this study are viz, welding strength in terms of ultimate tensile strength and joint hardness. Multi-objective optimization was carried out using Grey Relation Analysis which further helped in identifying the setting of input parameter for obtaining the optimum values of ultimate tensile strength and hardness. Based on experimental results and Grey Relation Analysis, optimum welding joint strength (ultimate tensile strength) of 63.96 MPa and optimum joint hardness of 68.79 HV was obtained at spindle speed of 1000 rpm and welding speed of 20 mm/min. Copper reinforcement resulted in increased value of welding joint strength (ultimate tensile strength) and joint hardness.

Keyword: *Taguchi, Grey Relation Analysis, L9 Orthogonal Array, Friction Stir Welding*

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MF-27 Improvement of the Impact Properties of Waste Fishnet Fiber Loading on Glass Fiber Reinforced Plastic Composites

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Abstract: In this study, the reuse of multifilament discarded fishnet of mesh size 32 mm and glass fiber composites were incorporated with polyester matrix. The performance of impact resistance and Dynamic Mechanical Analysis (DMA) of these composites were evaluated in accordance with ASTM. The interactions of reinforcement fibers with matrix of various composites were revealed by using Scanning Electron Microscope (SEM). The results of the study suggest that waste multifilament fishnet were added to the glass fiber composites and the impact resistance increases due to the fishnet fiber content. However, the DMA reveals that the composites have better mechanical damping and significant amount of loss modulus. Hence, the reuse of waste fishnet into composites mitigates the problem of waste disposal.

Keyword: *Polymeric composites; DMA; SEM; Fishnet.*

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MF-29 Tribological behavior and cutting performance of Alumina-Zirconia ceramics insert under dry machining of Inconel 718

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Abstract: Modern ceramics have excellent mechanical properties at high temperatures, making them potential materials for cutting tools to machine heat-resistant superalloys. Although numerous attempts to date, the attributed brittleness of ceramic tools can lead to chipping or catastrophic failure, particularly during an intermittent process like turning process in which extreme thermo-mechanical transformation takes place. Earlier studies demonstrated that in machining Inconel 718 using ceramics, after exceeding a specific cutting speed where extreme levels of strain rates and temperatures exist, resulting in a significant transformation in chipping, and tool wear characteristics. Concerning this

evaluation, the current study intends to delve deeper into the phenomena of Alumina-Zirconia (Al_2O_3-ZrO_2) ceramic tool wear and analysis of tool-workpiece tribosystem in dry machining of Inconel 718. The SEM micrographs and EDS Spectrographs are used for tool face characterizations. Increasing cutting speed encourages the formation of chips; consequently, promoting so further causes a rise in cutting temperature leads to softening the workpiece material affects the surface quality. A quadratic mathematical model generated using RSM gives close confirmation with experiment results of surface roughness.

Keyword: Alumina-Zirconia (Al_2O_3-ZrO_2) ceramic tool, tool wear, surface roughness, RSM.

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MF-31 Mechatronics Around the world- A Glance

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Abstract: Ever Increasing performance standards for complex procedures, which include corporate apparatus and their steadily increasing technical importance, might require new procedures to be applied within the procedure of product advent. The important thing concept in the back of our planned approach is to combine one of a kind stages consisting of design, simulation and physical implementations in product or device advent. The distinctive characteristic of mechatronic structures is illustrated in this study by using intensive integration. The mechatronic model allows us to better understanding the additive's complex behavior and interactions. This affords enhanced opportunities for the dynamic movement performance of the entire device to be measured and optimized inside the early levels of the layout process. The developing effect of interactions among machine additives on achievable gadget dynamics and accuracy is every other consequence. In this study, a concept for mechatronics is proposed to satisfy these requirements with the help of multiple diagrams and various applications.

Keyword: Mechatronics, Mechanical, Electronics, Electrical, Intensive Integration, Applications of Mechatronics, Actuators, Additives.
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MF-32 Various approaches in manufacturing metal matrix composites

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Abstract: The matrix materials are a composition of two different characteristic materials. These are brought together using different manufacturing techniques. The technique that to be employed depends upon the solid or metallic phase of the base individuals in the composite. There are various approaches to manufacture like stir casting, centrifugal casting, squeeze casting and roll annealing. These techniques each add versatile character to final composite such different machinability characteristics, different microstructural arrangement and better additive induction into the material. These various aspects are discussed in this paper as a review.

Keyword: Composites, manufacturing, casting, characteristic features.
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MF-33 Finite Element Analysis of Friction Stir Process using ABAQUS®

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Abstract: In this paper, thermal analysis and thermomechanical process of friction stir process (FSP) are studied. ABAQUS/Explicit code used for a three-dimensional model and FE analysis. In this analysis friction between the material and tool pin is studied as a heat source. The FSP involves a Al 7075-T6 alloy for surface treatment. In the analysis, tool rotational speed, tool traverse speed, and tool tilt angle are the FSP parameters under study. The FE model is modelled in ABAQUS/Explicit environment with two step simulation where first step is penetration of tool and second step is FSP. The temperature profile is obtained at T1 location and verified with experimental results. It is observed that the experimental results and simulation results of thermal analysis are in close agreement. Further, the effect of these FSP parameters on tensile strength, microhardness, and grain size of Al alloy is studied experimentally. The microstructure variation due to process parameters is reflected in the stir zone (SZ) which are studied using optical and scanning electron microscope (SEM). It is observed that change in tool rotational speed affects grain size and, consequently, grain refinement. Compared to a base metal, the FSP specimen of Al 7075 alloy exhibits a change in diffraction peaks in XRD analysis.

Keyword: *AL 7075-T6, ABAQUS/Explicit, FSP, Temperature distribution, Mechanical properties*

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MT 08 Evaluation of Passivation in ASTM B117 Salt Spray Fog Test

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Abstract: Electroplated zinc fasteners have been used in the automotive industry for many years. To give the required appearance and corrosion resistance to the plated fasteners a passivation is applied. This study investigates various Industrial passivations applied on Zn coated Mild Steel. A thin layer of zinc was plated on mild steel bolts by electrodeposition using a commercial zinc bath, coated with different concentration of 3 commercial passivations and a top coat. The products were evaluated as per ASTM B117 Salt Spray Fog test to identify white rust formation. It was found the white rust is formed at 218hrs on passivation applied zinc coating.

Keywords: Passivation, corrosion, electrodeposition, white rust.
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MT 09 Evaluation of micro-hardness on the surface of heat treated electroless Ni-P-W coating.

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Abstract: In this study, Low phos- Electroless Ni-P-W coating was carried out by incorporating Sodium tungstate in different concentration in Ni-P bath solution of commercial low-phos electroless Nickel coating. Total 5 sample of Ni-P-W is prepared with different concentration and compared with commercial Ni-P coating. Micro-hardness hardness of the coating on surface was measured. For further improving the performance heat treatment at various temperature was carried out. For Ni-P coating there was 39.6% increase in hardness (before HT 751.8 HV and after HT 1049.66 HV) was observed when heat treated at 4000C. Whereas for Ni-P-W coating, the sample with 5g/L sodium tungsten had 56.33% increase in hardness (before HT 670.53 HV to after HT 1048.26 HV) when heat treated at 3500 C temperature. Study reveals, surface hardness was affected by adding Sodium tungstate and heat treatment because of formation of micro-crystallite alloy.

Keywords: Electroless, tungsten, micro-hardness, heat treatment.
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MT-10 Synthesis and Experimental study of Magneto-rheological (MR) fluid for damper

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Abstract: This study focuses on the development and characterization of magneto-rheological (MR) fluids prepared by immersing iron particles in carrier fluids. To overcome the problems of sedimentation, agglomeration, and corrosion of the MR fluid (MRF), iron particles are coated with natural gums such as guar and xanthan. Various MR fluid samples were prepared using combinations of carrier fluids (paraffin oil and synthetic oil), magnetic particles (carbonyl iron and atomized iron dust), and additives. The magnetic particles were characterized using scanning electron microscopy (SEM). Carbonyl iron has a fiber-like structure whereas atomized iron dust forms a granular structure. The MR fluid containing xanthan gum-coated iron particles showed improved

sedimentation properties. Furthermore, the magnetic field of the magnetic piston was tested by supplying power and it was observed that the magnetic flux density increased with an increase in the current in amperes. Sedimentation analysis of the prepared MR fluids was performed by visual inspection which showed that MRF 2 and MRF 1 improved the sedimentation rate more than the others. The rheological properties of the MR fluids were determined by measuring their yield stress with respect to applied magnetic flux density. Paraffin oil-based MR fluid mixed with xanthan gum-coated carbonyl iron (MRF 2) showed higher yield stress than other fluids. The higher value of yield strength will boost the damping force of the MR damper to effectively suppress vibrations in the system.

MT-12 Buckling Analysis of Fibre Reinforced Laminate with Capsule Shaped Cut Out for Different ply orientation

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Abstract: In the structural sectors of aviation, aerospace, and marine engineering, composite materials are widely used. It is a potential substitute for traditional metallic components due to its mechanical characteristics, which include low density, strength, and corrosion resistance. Specifically, fibre reinforced laminated plates are used as structural members in aerospace vehicles due to its high strength to weight ratio and they are mostly subjected to compressive loads which leads to buckling of plate structures. Also there are chances of some unavoidable holes for the transfer of pipelines which makes the laminates unstable. For a set of parallel gas pipes, capsule shaped cutouts are made on the plate. So the variation of buckling strength is studied under different parameters. The buckling strength of the plane laminates with different ply orientation is calculated by implementing MATLAB code using classical laminate plate theory (CLPT), the results obtained is validated with the recent literature. Then the variation of buckling strength of the plate with capsule shaped cut out under different parameters like ply orientation, aspect ratio and cutout orientation is studied for carbon epoxy and glass epoxy combination. The composite laminate is numerically simulated using ANSYS ACP(Pre), and buckling analysis is performed with the help of Eigen value buckling module. The variation of the buckling strength under the set of parameters is plotted. The buckling strength variation for the hybrid laminate for above mentioned parameter set up is also obtained. Among the various combinations, C/G/G/C combination of hybrid laminate shows maximum buckling strength and among the ply directions $[0/45]_2$ gives the best buckling strength.

MT-13 Magnetic Roller Sweeper

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Abstract: Usually engineering problems can be solved by constructing an appropriate module. The problems were faced by Rocket Engineering Pvt.Ltd. Thus, we identify the problem and find solution on it. The problem identify by us was "The ferrous material like Nut, Bolts wear spread on shop floor & more time is required to collect it". To improve material handling & reduce labor we developed the mechanism name as "Magnetic Roller

sweeper". this simple mechanism is simply made up of belt conveyor mechanism & strong magnet. Conveyor is used because it is easy to convey the bulky material within less effort. And Magnet is used because it has property to create magnetic field & attract the ferrous material This magnetic flux is invisible but is responsible for the most famous property of a magnet a force that pulls on other ferromagnetic materials, such as nuts.

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MT-14 Corrosion Detection Under Insulation by Profile Radiography Technique

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Abstract: Plain carbon steel pipes are being used in oil and gas field for the transportation. These are subjected to corrosion under insulation. In order to detect corrosion and measure the thickness loss, similar steel sample SA 106 Grade B was dipped in pH 4 buffer solution and allowed to corrode for the duration of 28 days. Profile radiography was used for the detection of corrosion under insulation. It was carried out with Gamma ray Ir-192 radioactive source. Thickness loss measured using radiography was validated using ultrasonic testing. It was found good agreement between radiography and ultrasonic testing. This reveals possibility of using Gamma ray radiography for corrosion under insulation detection.

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MT-16 Effect of Temperature on The Transition from Mild to Severe Reciprocating Wear Characteristics of A356-15% Sic_p Functionally Graded Composite

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Abstract: Modern technological applications demand engineering parts and structures that have specific property requirements and performance at certain locations. Functionally graded material can be used to serve such requirements, where the microstructure and percentage of composition can be varied with respect to the specific function at that region. The present study deals with the processing, microstructural characterization, and hardness evaluation of functionally graded A356-15 % SiC_p metal matrix composite. The A356-15% SiC_p Functionally Graded Metal Matrix Composite (FGMMC) is prepared by vertical centrifugal casting technique. Optical microscopy is used to evaluate the gradient distribution of the reinforced SiC_p and microstructure of prepared FGMMC. The variation in hardness values along the radial direction due to gradation of SiC_p is correlated with the microstructure variation. Wear behaviour of A356-15% SiC_p FGMMC test pins taken from outer SiC_p rich and inner alloy region is studied for a constant sliding distance of 350m and sliding velocity of 1m/s. The temperature induced wear transition of A356-15% SiC_p FGMMC is analyzed under different loading conditions of 60N, 75N, 90N and 105N for particle rich outer pin from room temperature to 350°C. The transition temperature for change in wear behaviour is found to be 200°C and the transition load noticed at 75N for the outer pin. Similarly, the inner pin was tested under loads of 45N and 60N for same temperature range. The wear debris collected and the stereo images of worn surface were clearly examined to study the temperature induced wear transition behavior. The outer pin show good wear resistance than inner pin till 60N load even at high temperature up to 350°C due to the SiC_p reinforcement.

MT-17 Effect of Grain Refinement on the Mechanical and Tribological Characteristics of A390 Alloy

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Abstract: Grain refining of Al-alloys are developed as a means to elevate the mechanical properties of the casted products. Among the most frequent industrial issues that necessitates component replacement is wear. Al-Si alloys are frequently used in engineering structures and parts due to its lightweight and resistant to corrosion. For the majority of aluminium alloys, the Al-5Ti-1B are frequently utilized as grain refiners. Al-Si hypereutectic alloys (A390) have coarse and brittle primary silicon which easily cracks limiting their use in components and hence grain refinement can be done to improve the mechanical characteristics. The current investigation's goal is to assess how well the A-390 alloy's grain refining works when Al-5Ti-1B is added at various weight percentages. A tilting furnace powered by diesel fuel is used in the experiment to prepare A390 alloy from Al-6061 alloy. This investigation looked at how mechanical characteristics are impacted by the grain refiner. Using a Pin-on disc tribometer, the impact of grain refiner on the wear behaviour of hypereutectic alloy has been studied. The consequences of Al-5Ti-1B on the wear behaviour of the A390 alloy is revealed by comparing the findings. After refining, the results indicate an improvement in mechanical and tribological properties.

Keywords: A390 alloy, Grain refinement, Tensile strength, Hardness, Wear resistance.
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MT-20 Effect of Sr modification on the Metallurgical, Mechanical and Tribological behavior of Al-(5-17) wt. % Si cast alloys

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Abstract: Al-Si alloys can be used for making intricate castings and thin as well as thick-wall castings. Apart from strength and corrosion resistance, tribological characteristics are also very important for automobile and aerospace application requirements. So, it is important to have an understanding of the mechanism of tribological behavior of these alloys. The effect of strontium modification on the wear behavior is studied for different Al-Si cast alloys (with 5,7,10,12, and 17 wt.% Si content) using two tribo-pairs. The wear test of Al-Si cast alloys was carried out using a pin -on-disc apparatus with two counter Disc (SS304 and EN31) under the same velocity, sliding distance, and at a constant load for comparison purposes. The hardness of the modified alloys has been observed to increase 5-11 % compared to unmodified alloys and a 70.4 % increase from unmodified Al-5Si (Hypoeutectic alloy) to modified Al-17Si (hyper eutectic alloy). The secondary dendrite arm spacing (SDAS) and eutectic silicon particle size of modified alloys were found to be lower than the corresponding unmodified alloys. The worst case of wear resistance was observed in unmodified Al-5Si (hypo eutectic alloy) and SS304 Tribo-pair and the best wear resistance was found in modified Al-17Si and EN31 Tribo-pair. The SEM analysis shows a combination of adhesive, abrasive, and delamination wear in hypoeutectic Al-Si alloy on SS304 and Oxidation wear was found predominantly along with abrasive wear track in modified hyper eutectic Al-Si alloy on EN31

Keywords: Hypoeutectic and Hypereutectic Al-Si alloys, Strontium Modification, Tribological behavior, Wear resistance, Tribo-pair, Pin on disc Tribometer, SDAS.

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MT-25 Characteristics of wear and corrosion behavior for Ti-X%Mo laser cladding on SS316L stainless steel in simulated body fluid

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Abstract - 316L stainless steel is used for biomedical implants. These biomaterials may cause the release of harmful metal ions in the human body leading to a carcinogenic effect. Therefore, corrosion resistance and wear resistance are an important attribute when choosing a biomaterial. In this research, a combination of Ti and Mo metal powder is used for laser cladding on SS316L, the cladded and uncladded layers were characterized using optical microscopy, scanning electron microscopy (SEM), X-ray diffractometry (XRD), Micro-hardness measurement (HV), Wear resistance test in simulated body fluids (SBF) likes Hank's balanced body salt (HBSS) solution and in dry conditions were evaluated by using a Pin-on disc test method. Also, biocompatibility and corrosion tests i.e., immersion test were done by using Ringer's solutions and HBBS solution.

The results show Ti-15%Mo alloy laser cladded on SS316L surface is more wear resistance and more microhardness from results it can be a suitable for biomaterials applications

Keywords: SS316L, Laser cladding, wear resistant, corrosion resistant, Ti-15%Mo

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MT-26 The shielding effectiveness of electromagnetic radiations by metal oxide composite of conducting and magnetic phases

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Abstract - Electromagnetic interference is a big hurdle in the smooth functioning of most of the electronic equipment's due to the exposure of electromagnetic radiations coming from the outer space or due to the noise produced by the internal subcomponents and various functioning units in a machine. At present, the available materials are used as casing and molds of either metals or conducting polymer composites which may create issues like corrosion, oxidation and instability at high temperature which degrades the performance of shielding properties. In our present research work, we report the notable results of shielding effectiveness of metal oxide composite materials to overcome the issues addressed above. The ferrite materials like $NiFe_2O_4$ and $MnFe_2O_4$, are synthesized by sol-gel route. The structural and investigation with XRD of ferrites revealed the spinel structure. The prepared ferrite particles are used as core which is coated by $In_2Zn_2O_5$ as a shell by sol-gel coating. The prepared core-shell composites are characterized by XRD, SEM, and EDS for the structural and morphological investigation. The electrical, magnetic properties and electromagnetic compatibility of composite powder was evaluated. The prepared core-shell particles are used to fabricate the composite film in poly vinyl alcohol which displayed the excellent shielding effectiveness of electromagnetic radiations in the X-band ranging between 8.2 to 12.4 GHz.

Keywords: Nickel ferrite, Manganese Iron Oxide, Composite, Electromagnetic interference shielding, Poly vinyl alcohol

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MT-27 Fabrication and Characterization of Hybrid Composite Al6082-T6/Sic/Chicken Bone Powder using Friction Stir Processing

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Abstract: A hybrid aluminum composite obtained with friction stir processing was investigated in this study. AA6082-T6 was reinforced with particles of SiC and chicken bone powder (CBP). The weight fraction of SiC was constant (5 weight percentage) and for chicken bone powder (4 weight percentage). There were three tool profiles used in this study that are square, taper, and hexagonal. These tool profiles have scroll shoulder profiles. The morphology of the obtained composite and particle distribution were investigated with an optical microscope and field effect scanning electron microscope. The changes in the mechanical properties in the produced hybrid composite include hardness, tensile strength, and elongation about the change in the rpm of the tool, tilt angle, and tool profile. XRD analysis was done on the obtained hybrid composite to determine the crystallographic structure. This study concludes that tensile strength increases when the hexagonal tool profile is used at 1500 pm. As hexagonal has six edges which helped attain the required heat to soften the material and obtain the homogeneous structure with negligible defects. The mechanical properties of the obtained hybrid composite showed improvement as compared to base material AA6082-T6.

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MT-36 Ideal Tensile Strength of Select Coolant Materials for Generation-IV Nuclear Reactors

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Abstract: The ideal tensile strengths of sodium, lead and bismuth are possible coolant materials for generation-IV nuclear reactors. To improve the accuracy, the known van der Waals equation of state has been generalized in two different ways. That is, the attractive term in the van der Waals equation of state has been modified by introducing new parameters. The generalized van der Waals equations of state are presented in the reduced form from which follows the law of corresponding states. The parameters of the generalized van der Waals equations of state have been determined though the vapor-liquid critical-point parameters. The ideal tensile strengths of sodium, lead and bismuth in the condensed state at 0K are found to be about -2.764GPa, -6.340GPa and -4.851GPa, respectively.

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MT-38 Effect Of Surface Roughness Using E Glass Composite Single Lap Joint On The Adhesive Bond Strength Using Graphene Oxide-Epoxy Resin Adhesive

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Abstract: The present study aims to improve bond strength of single lap joint of composite material comprises of E-glass fibers and Nano graphene oxide modified adhesive. Epoxy adhesive has been modified by dispersing 0.5wt% Graphene Oxide (GO) to investigate the possibility of enhancement in the fatigue strength and fracture

resistance of the single lap joint. Five different surface finishes were obtained on the E glass adherend. Tensile test of the lap joint was carried and was observed that for 3.316 μm, the maximum peak load of 6.095 KN was observed, which was an enhancement of 68% over the peak load observed for sample 1. Also an enhancement of 68 % was observed in tensile shear strength and yield stress compared to sample 1 with roughness value of 0.211μm. Fatigue Analysis of the specimen concluded that the maximum bond strength was observed in sample 3 with surface roughness 3.316 μm, which was an enhancement of 30% over fatigue cycles for sample 1. Similarly, a maximum enhancement of 68% in tensile strength was observed for sample 3 compared with sample 1.

Keywords: Cure/Hardening; resin-based composites; Epoxy Resin; Graphene Oxide; Optical Microscopy; Tensile Testing; Fatigue, Scanning Electron Microscopy; Surface Finish; delamination; surface treatment
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MT-39 Design and Optimization of Road Divider Cleaning Attachment

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Abstract: Nowadays, as there are more cars on the road, trafficking has expanded. Due to the exhaust tainted gas released from the vehicle after burning, this contra flexure contributes to air pollution that may be harmful to human health. Almost all roadways are cleaned considerably, heavily polluted dust in addition to pollution. Therefore, keeping the environment clean can ensure that the future clan can live their lives safely. It also exposes that traffic contributes to hilarious pollution due to exhaust, dirt, and dust from contaminated civil atmosphere. This mixture exerts as a thick layer and adheres to the road dividers and signals, which then need to be cleaned in order to get rid of the dust and layered filth. This project assists in creating a feasible design and testing it using FEM static structural solution for the planned auto cleaning hydraulic front brush cleaner, which is then followed by topology optimization. which is set up with degrees of freedom for height, cleaning direction (right and left side of the road dividers), automatic rotation of the front brush with hydraulic cleaning system (pressurised water spraying system), and linear actuation system for vertical placement.

Keywords*: Road divider cleans apparatus, Dust & Dirt thick layer, Hydraulic front brush cleaner, FEM static structural analysis & topology optimization.*
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TH-05 Thermal Energy Storage with Extended Surfaces and Phase Change Materials: A CFD Analysis

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Abstract: Latent Heat Thermal Energy Storage LHTES is crucial for closing the gap between energy supply and demand and increasing the efficiency of energy systems. In this study a Triplex Cylinder Thermal Energy Storage (TES) device is used. CFD analysis is performed on the system to find out the time required to store the heat energy lost by the HTF. Three Latent heat storing phase change materials (PCM) RT35, RT44, RT50 were studied for energy storage. To enhance the heat transfer inside the PCM, eight fins have been incorporated on external tubes and effects of fins on the rate of heat transfer is also investigated. Analysis is carried out for a charging time of 140 mins. Solidification and Melting model are used and analysis is performed using Ansys Fluent. Results indicated that the melting time is lowered by 42.8% in the triplex tube TES with fins. In terms of heat transfer rate, the RT35 phase change material performed best. The study showed correct selection of PCM, and design of system can provide best results while designing a TES.

Keyword: *Phase Change Materials, Melting, Extended Surfaces, Lateral Fin Surfaces, Latent Heat Thermal Energy Storage.*
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TH-06 Performance investigation on counter flow vortex tube

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Abstract: Vortex tube is a simple thermo fluidic device well known since 1930, for quick temperature separation into two different streams of hot and cold flows from single compressed fluid inlet. Various studies are being carried out worldwide on performance investigation on vortex tube using different configurations w.r.t. working substance, geometrical parameters, process parameters etc. Present paper discusses the outcome of experimental studies carried out on counter flow vortex tube. On the basis of process parameters, a prototype is made for test. Various sets of readings were taken for feed pressure range of 1 to 7 bar and air as working substance. Single nozzle inlet configuration tube was used for testing. Parameters such as mass flow rate, temperature, and pressure are plotted.

Keyword: *Temperature separation, Geometrical parameters, Working substances.*
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TH-07 Comparative Study of Boiler Dynamics

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Abstract: The present work aims to a comparative study of boiler dynamics of a water tube boiler and a fire tube boiler. A generalized mathematical model is proposed to analyze the boiler dynamics of both the water tube and fire tube boilers. The generalized boiler dynamics model uses mass and energy conservation equations for the natural circulation circuit, boiler drum below the level of water, and boiler drum above the water. The model is validated in different dynamic conditions like changing the steam consumption and rate of combustion. The model is used to compare the performance of these two designs of the boiler in fluctuating load conditions collected from actual run data.One of the crucial control parameters of the industrial process is

the boiler drum level, reflected mainly by the load and feed water indirectly. This paper proposes a comparative study with the help of a mathematical model to predict the water level and pressure fluctuations in the boiler drum. The data obtained from the plant is used to perform a comparative study between water tubes and hybrid boilers. The results have been compared and presented. The present work aims to a comparative study of boiler dynamics of a water tube boiler. A generalized mathematical model is proposed to analyse the boiler dynamics of the water tube boiler. The generalized boiler dynamics model uses mass and energy conservation equations for natural circulation circuit, boiler drum below water level, and boiler drum above water level. The model is validated in different dynamic conditions like changing the steam consumption and rate of combustion. The model is used to compare the performance of the boiler in fluctuating load conditions collected from actual run data.

Keyword: *Natural circulation, flow distribution, void fraction, shrink and swell, water tube boiler, hybrid boiler, plant data.*
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TH-08 Battery thermal management using Immersion cooling

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Abstract: Lithium-ion batteries have promising future in electric vehicles and storage of electricity. The two main issues with these batteries are the charging time and the heating problems. When we vary the charging and discharging rate of the battery, the temperature also increases/decreases respectively. Battery thermal management plays a crucial role in maintaining the life-cycle and performance of the battery. A battery thermal management system ensures thermal repeatability and prevents thermal runaway of battery. The paper presents the results derived from the experimentation undertaken with this purpose. An experiment was performed on Lithium- ion 18650 battery cells, which are charged with 2 C charging rate which are cooled with immersion cooling via dielectric fluid. The use of this BTMS ensures the thermal runaway is minimized and all the cells are cooled uniformly, which make sure that all the cells are working under desirable conditions. The simulation was verified with both analytically and experimentally.

Keyword: *Lithium-ion batteries, BTMS.*
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TH-09 Investigation of Charge Size Reduction in Condenser

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Abstract: Owing to its favorable environmental and   thermody- namic properties, for split-type air conditioners [5], R290 is one of the refrigerants that holds the most promise (STAC). But on the other hand, R290 is combustible. For safety reasons, it is important to upgrade the STAC design for lowering the refrigerant charge is necessary. To overcome this limitation, a novel falling film condensing technique is suggested. The novel condenser was tested after being set up on a STAC. Test results show that using a falling film condenser greatly reduces the refrigerant charge while still maintaining safety and energy efficiency standards.

Keyword: *Condensing Technology, Falling Film Con- denser, Refrigerant Charge.*
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TH-12 CFD Analysis of SuperSonic Exhaust in Scrampt Engine with Difference Divergent Angle

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Abstract: In this paper we are doing the project at modeling the supersonic flow inside the Scramjet engine using the mechanism Computation Fluid Dynamics ANSYS Fluent. Initially we design the model in the Catia V5 software and then we check and analysis the result of the design in ANSYS software .We studied and analysis the performance and efficiency of supersonic nozzle under different divergent angle that is [10,15,18 degree] by using axis symmetric in the two dimension model. Then we examine the exhaust of the scramjet engine by changing the angles in divergent of different direction. Finally we discuss which degree of the divergent shock wave is much more from the exhaust. These are generally used to work the more speed typically related through the rocket that is using the hydrogen as fuel.

Keyword: CFD, component, formatting, style, styling, insert (key words)
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TH 13 Evaluation of Intake Air Swirl Motion in Di-Diesel Engine Using Computational Fluid Dynamics

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*Abstract—*The The I.C Engine performances, strength and operation establishment be governed by on the creation of air fuel mixtures privileged in combustion chamber. Throughout the study, CFD model to investigation the consequence of the crown of piston to the fluid flow field in engine of 4-stroke DI engine. The study is directed on the consequence of the piston form to the flow of fluid characteristic. The fluid flow dynamics how sane act significant part for an air - fuel mixtures ground work become greater engine performances, efficiency & combustion in an appearances of swirl and spill movements. This parameters are signifies the flow of fluid behave our happened in CC that impacts the air stream to the cylinder through inlet stroke and improves significantly the air fuel to carry greater mixing through compression incline. This work we have a tendency to contain exclusively to the swirl movement of inducted air through the suction and compression strokes. The mathematical calculation has done in 4 Cylinders of 2.5 L of four stroke DI engine runs at varied open throttle conditions by victimization CFD code. The piston dishes square measure thought of for the engine speed of 2000 revolution per minute are compared to judge swirl flow created throughout inlet stroke and compression stroke. The output get from the mathematical study will utilized to inspect the sameness of the air-fuel mixtures construction for greater engine performances as well as combustion processes.

*Keywords—*CFD, DI, air motion, swirl motion, mesh, Wire frame.
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TH-21 CFD Analysis of anticorrosive heat exchanger: A Review

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Abstract: The shell and tube heat exchanger is basic heat exchanger in which hot water

is flowing inside one tube and cold water flow outside that tube. Computational fluid dynamics technique which is a computer based analysis is used to simulate the heat exchanger involving fluid flow, heat transfer. CFD is useful for analysis of heat exchanger in discrete elements to find the temperature gradients, pressure distribution and velocity vectors. The objective of the study is design shell and tube heat exchanger with different pattern of tubes using ANSYS programming tool.

Keyword: Heat Exchanger, Fin Thickness, CFD, Nano fluid, ANSYS.
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TH-23 Electro-osmosis fluidic transport in rectangular micro-channel

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Abstract: Lab on a chip and μ-total analysis system have wide application in the field of the biomedical in terms of point of care analysis, DNA/RNA analysis, drug discovery and drug transportation etc. Low sample consumption, instant diagnosis, low power consumption and portable are main benefit of these system in microfluidics. In microfluidics, micro pumping, mixing and micro-rector are main components. To transport fluid, micro pumps are used which operates using pressure driven, electroosmosis techniques. Bi-directional flow, pulse free flow, no requirement of moving parts and easy fabrication are major advantages of electroosmosis flow over pressure driven flow. Hence, electroosmosis based micro pumps have bright scope in the microfluidics area. Poisson equation, Navier–Stokes equation are solved to get electrical potential and velocity field respectively. Applied external potential and zeta potential due to electric double layer increase the electroosmosis velocity linearly. Effect of different parameter like, Specific charge density, channel height etc. on Velocity distribution and potential distribution is analysed.

Keyword: electroosmosis, drug discovery.
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TH-24 Experimental Study on Heat Transfer Enhancement and Pumping Loss in R407C Evaporator

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Abstract: An experimental study on heat transfer enhancement and pumping loss is done during evaporation of R407C in horizontal 2 m long copper tube Evaporator. Plain tube and plain tube with turbulent promoters are considered for investigation. Experimentation is carried on the plane tube and plane tube with twisted tapes with operating conditions: refrigerant mass flux, G-100 – 350 kg m^{-2} s^{-1}, heat Flux, q-1.4 – 9.1 kW m^{-2}, temperature range: -14 to 10.9 ^{0}C, pressure range (absolute): 3.5 -8 bar and vapor quality, x -0.05-0.95.Three twisted tapes are used as turbulent promoters of twist ratios 8, 10 and 12. Study reveal that heat transfer enhancement depends on geometry of twisted tape and operating conditions. Twisted tape with twist ratio, y = 12 shows maximum heat transfer at all operating conditions with 56.51% maximum average increase in heat transfer coefficient. With increasing operating conditions of heat flux, mass flux and pressure, pumping loss increases. Twisted tape with twist ratio, y = 12 is giving minimum percentage increase of pumping loss from 2.57% to 5.20% over plain tube.

Keyword: Heat transfer enhancement; investigation; pumping power; R407C; twisted tapes
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TH-28 Experimental investigation on the effect of low compression ratio and diethyl ether over the performance, and emission characteristics of a diesel engine

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Abstract: Study aims to analyze the characteristics of the diesel engine using repurpose used cooking oil (RUCO) biodiesel with diethyl ether/diesel blends. The lowered CR and ternary blends presented better emission and performance results, compared with diesel. At CR16, 27.27% CO emission was reduced using A0.8_B19.2 and A2.4_B17.6. At CR17, 42.86% and 45.24% HC emission was reduced using A1.6_B18.4 and A3.2_B16.8. At CR17, 11.39% and 10.13% CO_2 emission were reduced using A2.4_B17.6 and A3.2_B16.8. At CR16, 27.13% NOx emission was reduced using A1.6_B18.4. At CR15, 23.39% brake thermal efficiency (BTE) was increased using A2.4_B17.6. At CR15, 20% brake-specific fuel consumption (BSFC) was reduced using A2.4_B17.6. The lowered CR and high DEE concentration (2.4% and 3.2%) has enhanced the performance and reduced all emission gases using less BSFC, compared with diesel and remaining blends. The eco-friendly working conditions have been evaluated which are delivered less exhaust emission gases with better performance. These working conditions are A2.4_B17.6: CR17, CR16, and CR14; A3.2_B16.8: CR17, CR16, and CR15. The results of this paper confirm that, with no alteration in the engine, the ternary blends can be utilized as an alternative fuel for diesel.

Keyword: *low compression ratio; diethyl ether; emission; performance; eco-friendly working conditions; diesel engine*
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TH-30 Micromixing in a T-shaped microchannel using heterogenous zeta potential

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Abstract: Lab-on-a-chip devices are used to analyze biochemical fluid for many industrial applications. Micromixing is an essential part of these microanalysis devices. In this paper, heterogenous zeta potential is applied to the T-shaped microchannel and numerically investigated the mixing performance. Effect of various parameters such as zeta potential, applied electric field, and the number of the heterogenous surface pattern are investigated for mixing performance of microchannel. Results show that the mixing is enhanced when more heterogenous zeta potential patches are used inside the microchannel. The non-Newtonian nature of the fluid is also investigated using the power law model. Pseudoplastic fluids (n <1) have lower mixing performance compared to the dilatant fluid (n >1) due to higher velocity. Overall, the effect of various parameters on mixing performance is evaluated to design an efficient micromixer for getting rapid and homogenous mixing of sample fluids.

Keyword: *Heterogenous zeta potential, micromixing efficiency, microfluidics, electrokinetic, shear-dependent fluid.*
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TH-32 An Extensive Review on Effect of Use of different Vortex Generators on Thermal performance in various Applications

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Abstract— Developing economical, compacter, lighter and better performing heat transfer devices has always been an interesting subject for researchers and scientists. The environmental issue and the cost of fuel and energy encourage scientists and engineers to enhance the efficiency of the existing designs of heat transfer devices, which is obtained by modification of the tubes/channel or using various types of inserts to obtain higher heat transfer. Various types of inserts used in heat transfer devices are ribs, coiled wires, baffles, twisted tapes, fins, winglets, etc. In this review article, we have discussed effect of various types of inserts, and vortex generators on thermal as well as hydraulic performance. The comparison is represented for the type of winglet vortex generator mounted inside tube, channel; tube-fin arrangements.

Keywords— *Baffles; Fluid Flow; Thermal Performance, Vortex Generators, Winglets.*
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TH-33 Thermal management of LED street light: An experimental study of plate fin heat sink

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Abstract: Insufficient cooling systems can cause LED chips to overheat, leading to inconsistent light output and a shorter lifespan. Heat sinks are a form of heat exchanger used to cool electronic equipment due to their ease of construction, low cost, and effective heat dissipation. There are several engineering applications for finned surfaces, including the cooling of electronic equipment and other common industrial applications. Compared to the base plate, the finned surface has a greater heat transfer area but a lower flow rate. In the present work, the connection plate's temperature is measured with thermal imaging. With the aid of thermal imaging, an experimental test setup is built to examine the impact of plate fin heat sinks on heat transfer enhancement. Before conducting experimental analysis, the experimental test setup is evaluated against the theoretical correlations for heat transfer properties. The experimental trial results indicate that the heat transfer rate is greatly enhanced in the presence of plate fin heat sink in comparison to the junction plate without heat sink.

Keyword: *Emitting Diode (LED), plate fin heat sink, thermal imaging technique, Nusselt number.*
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TH-34 Simulation of Phase change Heat exchangers and Validation with CFD Analysis

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Abstract: Due to the depletion of fossil resources and environmental problems caused by global warming, energy generation has greater potential in future engineering. Prior to the application of realistic models, proper analysis is critical. It will provide accurate

findings while also reducing research effort, risk, and expense. Analytically, we investigated condensation and evaporation in a fin-tube heat exchanger using ANSYS FLUENT 2022. The experiment's working fluid is R22, while the second fluid is air. To understand its physical and mathematical behavior, the CFD findings have been validated with MATLAB Simulink. The refrigerant side heat transfer coefficient and the air-side heat transfer coefficient were studied, and the projected data were compared to the experimental data. Variation of heat transfer coefficients in airside and refrigerant side with mass flow rate and geometry parameters have been plotted and observed.

Keyword: Heat Exchanger, Condensation, Evaporation, CFD analysis.

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TH-36 Vertical pump inlet vortex velocity optimization by Taguchi method

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Abstract: Sump is important in the operation of the vertical pump. Pump operation is functionally meets the performance requirements in the test lab however performance varies at the installation site. The sump hydraulic design have major influence on the pump performance. Vortex free flow entry in the pump is desired. Pump sump geometry needs to be optimized for the proper hydraulic behavior. Above work optimized using the Taguchi design of experiments method for the sump flow behavior. Four factors are considered as pump center distance, Number of pumps installed, pump inlet velocity and sump entry velocity. For the above factor three levels are considered as low level, medium level and high level. Taguchi Orthogonal array L9 (3^4) is selected for the optimization of the hydraulic geometry. The response parameters obtained is tangential velocity responsible for the vortex generation in the pump inlet bell piece. Predicted formulae's are arrived with various regression analysis. As response parameters intensity is responsible for vortex generation hence needs to be minimized. Pump sump is optimized with the vortex velocity component.

Keyword: Taguchi optimization method, pump sump structure, orthogonal design, vortex velocity, vertical pump component.

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