



**KUMARAGURU**  
COLLEGE OF TECHNOLOGY



Department of Mechanical Engineering

Newsletter

# *MExpress*

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**Editors:**

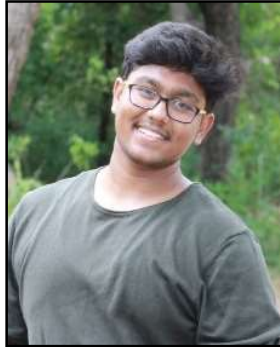
**Dr. C. Velmurugan**  
**Dr. B. N. Sreeharan**

**Associate Editors:**

**Mr. Nitheeshwar R K**  
**Mr. Praveen B**  
**Ms. Rushethra P N**

# Associate Editor's Folio

## THE FLYING SOLE OF PINEAPPLE



**Mr. Nitheeshwar R K**  
**19BME067**  
**II Year Mechanical - B**

Malaysian researchers have developed a method to transform the fibre found in normally discarded pineapple leaves to make a strong material that can be used to build the frames for unmanned aircraft, or drones.

The project, headed by Professor Mohamed Thariq Hameed Sultan at Malaysia's Putra University, has been trying to find sustainable uses for pineapple waste generated by farmers in Hulu Langat, an area of about 65 km (40 miles) from Kuala Lumpur.

"We are transforming the leaf of the pineapple into a fibre that can be used for aerospace application, basically inventing a drone," he told Reuters at a workshop.

Mohamed Thariq said drones made from the bio-composite material had a higher strength-to-weight ratio than those made from synthetic fibres, and were also cheaper, lighter, and easier to dispose of.

If the drone was damaged, the frame could be buried in the ground and would degrade within two weeks, he said.



The prototype drones have been able to fly to a height of about 1,000 metres (3,280 ft) and stay in the air for about 20 minutes, he added.

Ultimately, the research team hopes to create a larger drone to accommodate bigger payloads, including imagery sensors, for agricultural purposes and aerial inspections.



"Our role here is to help the industry, the farmers, to increase their yield and make their jobs much easier," said William Robert Alvisse of the Malaysian Unmanned Drones Activist Society, a non-governmental group helping to design the drone and advising on the project.

Before the project launched in 2017, pineapple stems were discarded after the once-in-a-year harvest period, but farmers hope the drones project will encourage more innovation to find uses for the waste and boost incomes.

"With the health issue, the economy problem due to COVID-19, the society is desperate and there is no alternative to increase income," says the pineapple farmers.

# Departmental Activities

## Programmes organized

A webinar on “Material Inspection” was organized by the department on 21.06.2021. Mr. R. Dhamodharan, NTC, Coimbatore was the resource person. **Dr. V. Muthukumaran**, Professor, **Dr. K. M. Senthilkumar**, Associate Professor and **Dr. S. Balaji**, Assistant Professor coordinated the webinar.



In association with Mechanical Engineering Association two events, ‘Aatral’ and ‘The Poet’ was organized by the department on 05-06-2021 and between 16-06-2021 and 22-06-2021 respectively. **Dr. V. R. Muruganatham**, Associate Professor and **Mr. M. A. Vinayagamoorthi**, Assistant Professor – II coordinated the events.



## Faculty as Resource Persons



**Dr. M. Balaji**, Associate Professor was the guest speaker at Sri Ramakrishna Polytechnic College and delivered a lecture on Recent Trends in Industrial Automation during 19.05.2021 and 21.05.2021.

**Dr. P. S. Samuel Ratna Kumar**, Assistant Professor was the guest speaker for a workshop on "Writing a Research paper" organized by an NGO -Young ones on 06-06-2021.



**Dr. K. M. Senthil Kumar**, Associate Professor was appointed as Anna University Nominee in the Board of Studies Meeting held at M. Kumarasamy College of Engineering on 02.06.2021.

## Departmental Activities



**Dr. S. Bhaskar**, Associate Professor was the resource person for 13 online sessions - (each session of 02 hours duration on the topic "Building systems for Outcome Based Accreditation" for Sakthi Polytechnic College – 638315, for around 75 of their faculty on 01.06.2021 – 05.06.2021 and from 07.06.2021 - 09.06.2021, 11.06.2021, 14.06.2021, 21.06.2021, 26.06.2021, 28.06.2021.

He was also the resource person for orientation program for 27 PGDDE students - 2021 batch of Schlumberger (Cameron) - Topic: Joy of learning - Organized by Sakthi Excellence Academy-Kumaraguru College of Technology on 23.06.2021

**Mr. B. Jeeva**, Assistant Professor was invited as Jury for Evaluating Innovative projects at Ideation Sprint conducted by KCT Forge on 19/06/2021 and he was also invited and designated as Program Advisor Board Member for Yuva Innovator Challenge 2021 organized by Yuva IncubatEd on 21/06/2021.



**Dr. S. Balasubramanian**, Associate Professor was the resource person for the webinar on "How to plan for start-up, legal and ethical steps" organised by IIC on 06-11-2021 and he was invited as interview panel member for PGDDE Programme KCT- Schellenberger on 14/6/2021&15/6/2021.

### Papers Presented



**Dr. M. Balaji**, Associate Professor presented a paper entitled "Supply Chain Management in Automotive Industry - A Review" in the International Conference on Recent Innovations in Science and Technology organized by Ernad Knowledge City technical campus, Malappuram, Kerala and ISET Research and Hexaind Technologies and Services on 19.06.2021 and 20.06.2021. He also presented a couple of more papers entitled "Balanced

Scorecard Approach in Deducing Supply Chain Performance" and "Augmenting Agility in Production Flow Through ANP" in the "International Conference on Sustainable Materials, Manufacturing and Renewable Technologies-2021", organized by Federal Institute of Science & Technology, Ernakulam conducted during 22.04.2021 and 23.04.2021

**Dr. B. N. Sreeharan**, Assistant Professor - II presented a paper entitled "Supply Chain Management in Automotive Industry - A Review" in the International Conference on Recent Innovations in Science and Technology organized by Ernad Knowledge City technical campus, Malappuram, Kerala and ISET Research and Hexaind Technologies and Services on 19.06.2021 and 20.06.2021.



# Departmental Activities



**Mr. R. S. Mohan Kumar**, Assistant Professor presented two papers entitled “Conceptual Development and Analysis of a Conveyor Belt Material and its supporting parts for Performance Improvement” and “Conceptual Design and Development of a 360-Degree Drilling Machine” in the International E-Conference on Recent Advancements in the Areas of Management, Social Sciences, Technology & Tourism organized by Indian Academicians and Researchers Association on 14.06.2021.

## Papers Submitted

Following faculty members submitted their papers in the various Scopus / Web of Science / SCI indexed journals.

Name of the Faculty	No. of Papers Submitted
<b>Dr. R. Manivel</b> , Professor	1
<b>Dr. S. Thirumurugaveerakumar</b> , Associate Professor	1

## Papers Published



**Dr. C. Velmurugan**, Professor & HoD published a paper entitled “Prediction of Dry Sliding Wear Response of AlMg1SiCu/Silicon Carbide/Molybdenum Disulphide Hybrid Composites Using Adaptive Neuro-Fuzzy Inference System (ANFIS) and Response Surface Methodology (RSM) in the Arabian Journal for Science and Engineering, <https://doi.org/10.1007/s13369-021-05820-3>, 4th June 2021.

Two papers entitled “Balanced Scorecard approach in deducing supply chain performance” and “Augmenting agility in production flow through ANP” / submitted by **Dr. M. Balaji**, Associate Professor were accepted for publication, and it is in press of Materials Today: Proceedings.



He also published another paper titled "A Comprehensive Analysis of The Ergonomics Factor Affecting the Working Environment by Implementing the Concept of Cognitive Ergonomics"



**Dr. A. P. Arun**, Assistant Professor – II published a paper entitled “Evaluation of gas sensor behaviour of Sm<sup>3+</sup> doped TiO<sub>2</sub> nanoparticles” in the Journal of Materials Science: Materials in Electronics/ 32, pages 16854–16865/ <https://doi.org/10.1007/s10854-021-06246-1>.

# Departmental Activities

## Papers Reviewed

**Dr. P. S. Samuel Ratna Kumar**, Assistant Professor, reviewed a couple of papers entitled "Effect of sintering mechanisms on the mechanical behaviour of SiC and Kaoline reinforced Hybrid Aluminium metal matrix composite fabricated through powder metallurgy technique" for the Silicon Journal and "The Morphological Effects of Hydrothermal Carbon on Mechanical, Tribological and Corrosion Properties of AlSi12 composite", for the Journal, Surface Topography: Metrology and Properties.



## Book Chapter Publication

**Mr. R. S. Mohan Kumar**, Assistant Professor and **Mr. A. P. Arun**, Assistant Professor - II published a book chapter "Critical Studies on Design and Analysis of Honeycomb Reinforced Epoxy Glass Fibre Bumper" in a book titled Current Approaches in Science and Technology Research, Vol. 8, Published by B P International, Guest House Road, Street no - 1/6, Hooghly, West Bengal, India Pages 145 – 155, Print ISBN: 978-93-91312-32-9, eBook ISBN: 978-93-91312-46-6



## Online Courses / Programmes attended / participated / completed



**Dr. V. Muthukumar**, Professor participated in an FDP on "Green Buildings & Built Environment" from 31-05-2021 to 04-06-2021.

**Dr. S. Sivakumar**, Assistant Professor-III participated in an FDP on (ATAL) Academy Online Elementary FDP on "Cutting Edge Technologies in Energy Storage System for E-Mobility" from 14.06.2021 to 18.06.2021. He also participated in another FDP on "Recent Trends in Electric Vehicle and Renewable Energy System" from 21.06.2021 to 25.06.2021.



**Mr. B. Jeeva**, Assistant Professor-I participated in an FDP on AICTE ATAL Sponsored Faculty Development Program on "Personal Effectiveness" organized by International Management Institute, Kolkata, from 07-06-2021 to 11.06.2021

# Departmental Activities



**Dr. V. R. Muruganatham**, Associate Professor participated in a Training Programme on "Lead Auditor Course" from 31.05.2021 to 04.06.2021.

**Dr. K. M. Senthilkumar**, Associate Professor participated in an FDP on "Green Buildings & Built Environment" from 31-05-2021 to 04-06-2021.



**Mr. R. S. Mohan Kumar**, Assistant Professor participated in an FDP "Design, Modeling and Simulation of Sustainable Building Energy Systems" from 07-06-2021 to 11-06-2021. He also participated in another Faculty Development Program on "Practical Metrology for Engineers" on 07-06-2021.

**Dr. P. S. Samuel Ratna Kumar**, Assistant Professor participated in a Webinar on "Visualizing Nanoscale Dynamics with the Cypher VRS1250 Video Rate AFM" on 16-06-2021.



**Mr. M. A. Vinayagamoorthi**, Assistant Professor participated in a Faculty Development Program on ""Practical Metrology for Engineers"" on 07-06-2021. He also participated in another faculty development program on "Technology Forecasting" on 11-06-2021. Further, he participated in a Faculty Development Lecture Series on "The future of Manufacturing - Additive Manufacturing" on 26-06-2021.

**Dr. S. Bhaskar**, Associate Professor participated in a Webinar on "Implementing NEP 2020 in technical institutions - Organised by VTU, Belagavi, Karnataka - Speaker - AICTE chairman Prof. Anil Sahasrabudhe" on 02-06-2021. Also, he participated in a PAC meeting on "Attended PAC meeting as external member for Aeronautical Engineering department of KCT" on 06-07-2021.



**Dr. R. Manivel**, Professor participated in a Webinar on "Quality initiatives organised by FDC, AICTE, New Delhi" on 18.06.2021.

**Mr. S. Sivakumar**, Assistant Professor - II participated in a couple of Webinars on "Identifying our strength and weakness" and "How to prepare yourself for industry" on 29.06.2021 and 25.06.2021, respectively.



## Departmental Activities

**Dr. B. N. Sreeharan**, Assistant Professor - II participated in a Webinar on "Data Science Approach for Mechanical Engineers" on 04-06-2021 and he participated in a Workshop on "Advanced Excel" on 06-06-2021. He also participated in a Webinar on "B.1.617 Variant and Psychosocial Support" on 11-06-2021. He got trained in "Excel" on 14-06-2021. Further, he participated in a Workshop on "Thesis documentation skills for Researchers using MS word, Excel and LaTeX editor" on 17.06.2021.



**Dr. T. Karuppusamy**, Assistant Professor - II participated in a Webinar on "The future of Manufacturing "Additive Manufacturing" on 26-06-2021.

**Dr. P. Sathyabalan**, Professor participated in a Workshop on "Examination Reforms" on 28.06.2021.



**Dr. M. Thirumalaimuthukumar**, Assistant Professor - II participated in a Workshop on "Examination Reforms" on 28-06-2021.

**Dr. S. Balasubramanian**, Associate Professor participated in a Webinar on "Orientation 2021- IIC/KCT" on 03-06-2021. He also participated in a Webinar on " IIC 3.0 Plan 2021- IIC/KCT" on 07-06-2021. Further, he participated in another Webinar on " Recent trends in Textile- organised by IEI" on 30.06.2021.



### Special Recognition



**Dr. V Muthukumar**, Professor and **Dr. K. M. Senthil Kumar** were Certified as "IGBC accredited Faculty" by The Indian Green Building Council.



**Mr. B. Jeeva**, Assistant Professor participated in a competition "CII National Energy Efficiency Circle", organized by Confederation of Indian Industry, Chandigarh from 16.06.2021 and 28.06.2021. He also participated in another "Young Entrepreneur Conclave" organized by InLustro Learning Pvt Ltd on 19.06.2021 and recognised as Excellence- Mentor by committee for mentoring the student team.





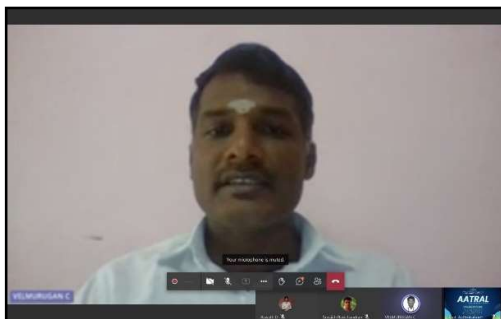
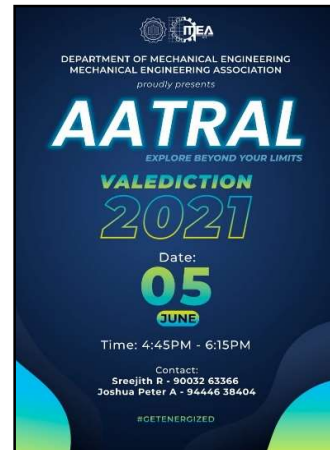
# Students Activities

## AATRAL '21

AATRAL '21 is the Valedictorian Ceremony of Mechanical Engineering Department, where the students and faculties of the Department were honoured with awards and certificates for the Academic Year 2020-2021. The awards were provided under different categories,

1. **Academics & Co-curricular**
2. **Extra-Curricular**
3. **Faculty Awards**
4. **PBL Awards.**

Head of the Department Dr. C Velmurugan, along with other faculty members and the students of Mechanical Engineering Department were present. The ceremony commenced by 4.50 PM.

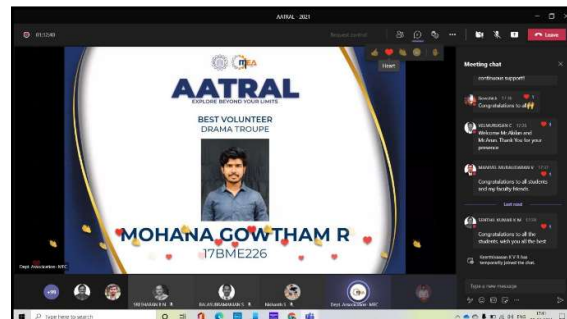


The evening was started with the Context Setting by Mr. Sreejith, where the clear idea of what will happen for an hour was established. Following that Mr. Aswath – President MEA, provided the welcome address and stated the main objective of the ceremony, honouring the students and faculties. Then Head of the Department Dr. C Velmurugan, addressed the gathering with his fruitful words. He congratulated all the winners. Then the Annual Report was submitted by Mr. Joshua Peter – Secretary, MEA. It included all the activities of MEA in

the past year and was presented with high clarity. Dr. Muruganatham and Mr. Vinayagamoorthi, Faculty coordinators of MEA addressed the gathering.

Then the main event of the day, award distribution started, coordinated by the MEA members. The winners were decided based on the results given by the Jury members. A presentation was made with the list of winners and was shared through teams during the award distribution time.

The faculties were presented with Memento of Honour for their selfless contributions they made during various events conducted over the past year. The winners of various categories shared their experience and feelings during the ceremony. The faculties also shared their pleasant words about the organization and the department and congratulated the winners.



The event ended with the Vote of Thanks proposed by Mr. Srivathsan – Joint Treasurer, MEA. He summarised the evening and thanked the HOD, faculty members, organizers and all the students attended the ceremony. The main objective of the event was achieved as all the winners and faculties were honoured. The awardees shared their experience which motivated all the attendees. The faculty members shared their words of appreciation and congratulated the students.

# Students Activities

## THE POET

We have our 1st Edition of an 'Article Writing Event', THE POET **Perspective of Engineer's Talent**. This event is to promote all the students to come with their creative writings which would be helpful for them to enhance their technical writing skills.

The poster features logos for IQAC, Institution & Department, and MEA. It is organized by the Department of MECHANICAL ENGINEERING. The event is titled 'THE POET PERSPECTIVE OF ENGINEER'S TALENT' and runs from 16th June to 22nd June, 2021, from 10:00 AM onwards, via MS Forms. The poster describes it as a talent search event for technical poets, encouraging students to showcase their writing skills. It lists four rules: no plagiarism, topic related to mechanical sciences, a word limit of two pages, and MS Word format. The submission date is on or before 22nd June, 2021, at 12:00 PM. A prize of 1K voucher is offered. Contact information for Mr. Nitheshwar R K and Mr. Aswin Baalaje R is provided.

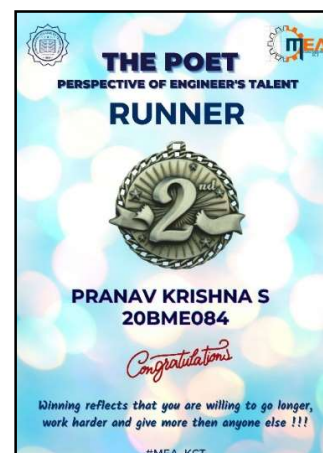
This event was conducted on **16th June 2021 to 22nd June 2021**.

**No of participants:** 11

**Faculty Coordinator:** Dr. V. R. Muruganatham and Mr. M. A. Vinayagamoorthi

**Judge:** Dr. B. N. Sreeharan

**Winner & Runner:** Mr. Nithesh S V (20BME080) & Mr. Pranav Krishna S (20BME084)



# Students Activities

## Webinar Series on Material Inspection (Series 1)

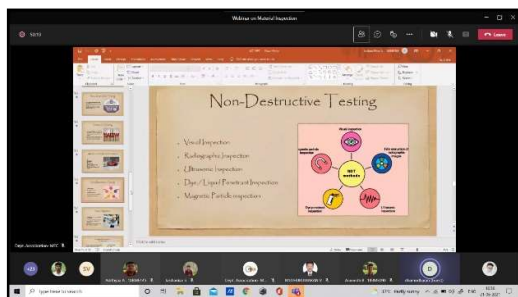
This is the webinar Series. So, on 21st of June we conducted the first webinar session on Material Inspection. This Webinar mainly focuses on the Material and Quality Inspection. This Webinar is organized by Joshua Peter A with the faculty coordination of Dr. Muthukumaran V, Dr. Balaji S, Dr. Senthilkumar K M.

The webinar started at 4 pm in the evening with the welcome address by Joshua Peter A, welcoming the faculties, students, and the Guest speaker. The guest speaker for the webinar Session is Mr. Dhamodharan R from NTC, Coimbatore.



Mr. Dhamodharan R lectured about the basics of Quality Inspection and Quality Assurance. Then he elaborately lectured about the Non-Destructive Testing and its types, working, principle, pros, and cons.

Followed by the lecture, we had a very interactive Question and Answer session for about 20 minutes. The guest speaker cleared all their doubts with great and effective answers. And he also gave some tips and information about the current situation of Non-Destructive Industry.



Then we concluded the session with Vote of Thanks given by Joshua Peter A. We also circulated the feedback forms to the participants, and we got many positive outputs. Overall, the session was very effective and useful to both the faculties and the students.

# Student Articles

## MECANUM WHEELS



**Nitheesh S V**  
**6405**  
**I Year Mechanical**

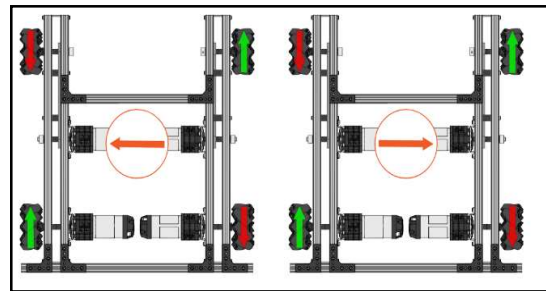
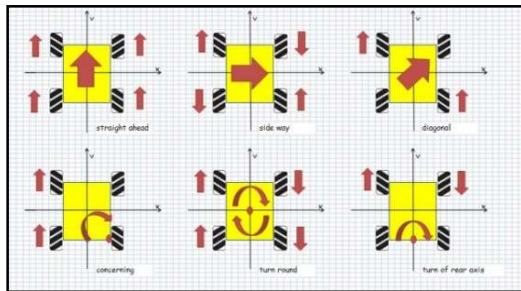
**INTRODUCTION:** Mecanum wheels, which are also called as “Ilon wheel” or “Sweedish wheel”, which is a unidirectional wheel design for a Land vehicle to move around any direction. It is named after its inventor “Bengt Erland Ilon” (1923-2008). He was the man who was an Engineer in Swedish company and he patented it in the US on 13th, November 1972.

**Mecanum wheels:** They are the conventional wheels which has a series of rollers attached to their circumference. They have an axis of rotation at 45° to the plane which is parallel to the axis of rotation of the wheel. It gives us the free motion by aligning itself accordingly based on the direction and speed of each wheel. It is the best suitable in tight spaces.



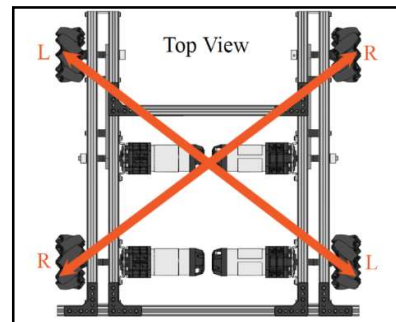
### CHARACTERISTICS:

These four mecanum wheels are connected to a motor for independent controls. If it is used in a robot, that robot can move forward, backward, spin like the regular wheels. That 45° alignment allows the robot to change the direction sideways even the wheels are spinning. It creates a communicative network with the robots.



### MECHANISM:

There are two vectors split up: One is “Forward/Backward”, and the other is “Left/Right”. Consider a case, if the wheels of one side is spinning in opposite direction, then the Forward/Backward” vectors get cancelled, by adding the other vector into function (i.e.) sideways movement. The rollers are positioned at an angle of 45° from axis of rotation, which transfers the force by the rotation of wheel independently by the motor of 45 degrees from the axis of rotation.

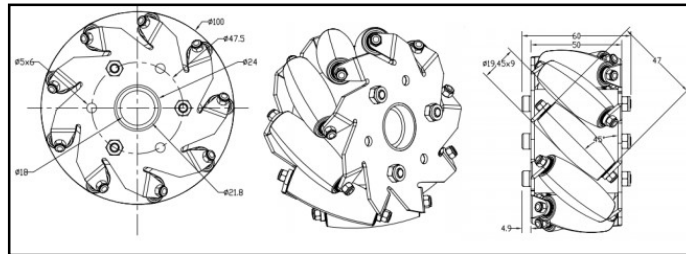


# Student Articles

When each wheel is given power independently, with different speed and direction, we get the "Omnidirectional motion". Four wheels (2 left, 2 right) to drive forward, sideways, and any other directions. Its orientation is made in such a way that, it forms 'X' shape when seen from above. A high friction while turning against the ground requires a High – torque engines, to upcome the friction.

## DESIGN:

It is a Tireless wheel, with a surrounding of rubberized external rollers, with each having an axis of rotation of 45° to wheel plane and at axis line. Each wheel are independent, non-steering wheels, and while spinning the propeller will generate the force which is perpendicular to the roller axle. Each wheel generates a thrust parallel to the diagonal of the frame. As a result, the total of these forces creates the Linear motion or rotation of the vehicle, which is very benefit for motion in minimal space itself.



## USES:

It is used in transporting the items around the ships. It is used in the wheel chairs, Robots, etc.,

## BENEFITS:

- Compact in size,
- High load carrying capacity,
- Adds omnidirectional capabilities.

## APPLICATIONS:

- Robotics
- Wheelchair
- Transfer vehicle

# Student Articles

## Carbon Pollution



**Mr. PRANAV KRISHNA S**  
**20BME103**  
**I Year Mechanical - B**

### INTRODUCTION

Co<sub>2</sub> holds 412 ppm in earth's atmosphere and growing constantly. The major reason for the raise of co<sub>2</sub> is the burning of fossil fuel in vehicles. India has the most polluted cities around the world. So, we must get awareness and need to start taking measures to decrease carbon pollution in India. Most popular way to Decrease carbon dioxide in atmosphere is planting trees. One tree can absorb 42 pounds of Co<sub>2</sub> every year. But unfortunately, 14.5 trillion pounds of carbon dioxide is produced every year. So whole flora and fauna can absorb only 25% of the carbon dioxide in the whole atmosphere. Another way of reducing carbon in the atmosphere is carbon capturing method. In recent days carbon ink has been developed by dycotec materials limited by capturing carbon using electrochemical cell. In recent times, carbon engineers found that ionic liquid can capture co<sub>2</sub>.

Rank	City	2018 AVG	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	2018 AVG	2019 AVG	2017 AVG
1	India, China	162.2	81.7	124.7	254.4	178.4	95.8	115.7	95.2	94	198.7	194.2	157.7	81.8	160.1	156	81.9
2	Ghazipur, India	146.8	146.8	107.8	128	85	241.5	88	85.7	85.4	141.1	140.5	78.1	116.8	150.2	146.2	141.8
3	Dalandshah, India	82.4	82.3	27.5	71.7	128.4	25.3	88	81.8	87.4	122.3	145	80	127.1	80.4		
4	Hawab, Andhra, India	89	138	97	122	104	161.1	82	37	94.3	18.3	148.5	126.7	112.2			
5	Delvad, India	89.5	187.7	127.5	81.4	89	25.8	88	81.5	77	181	117.1	178.8	125.5	81.4	178.8	
6	Noida, India	84.2	121.2	88.2	125.5	128	167	82.2	81.2	88.1	149	148.1	128.2	120.1	81.2	122.5	124
7	Gurgaon, India	86.5	178.7	88.1	85	148	158	84.5	80.8	87.8	107.8	108.4	188.8	172.8	81.5		
8	Kanpur, India	85.1	120.7	119	71.2	73.2	162.5	14.5	81.2	82.4	71.2	114.4	128.4	122.7	42.5	122	119.2
9	Ludhiana, India	80.7	188.8	88.8	75	77.8	118	81.8	81.8	80.8	120	124.8	117.5	181.8	80.8	112.1	78.7
10	Delhi, India	84.1	125.1	120.5	142	138	152.5	82	85.4	88.5	125	142.8	127.3	122.3	80.8	112.1	122.2
11	Haridwar, India	83.8	174.2	112	148	118	167	81.5	81.4	142	114	128.4	117.2	118.2	85	128.1	128
12	Mumbai, India	82.3	181.7	120.5	81.2	148	175.8	85.8	82.2	87	188	127.4	115.8	141.4			
13	Jaipur, India	81.8	182.7	121.7	127	142	84	81.8	88	88.8	128	145.5	122.8	118.8	80.4	128.8	128.8
14	Mumbai, India	81.1	178.8	78.5	127.4	118	87	80.1	81.5	88.5	127	124	115.7	117.7	81		
15	Kolkata, China	81	181.8	128.2	121.2	127	112	81.2	81.2	86.2	144	127	142	70.2	81.2	125.7	81.2
16	Manipur, Bengali...	80.7	181.8	128	128.5	118	88	81.5	81.5	77	141	124	118.8	127.8			
17	Agra, India	80.2	82.2	88.5	125.5	128	144	81.2	81.2	81.2	144	121.2	118.8	125.5	112	124.2	118.5

### IONIC LIQUID

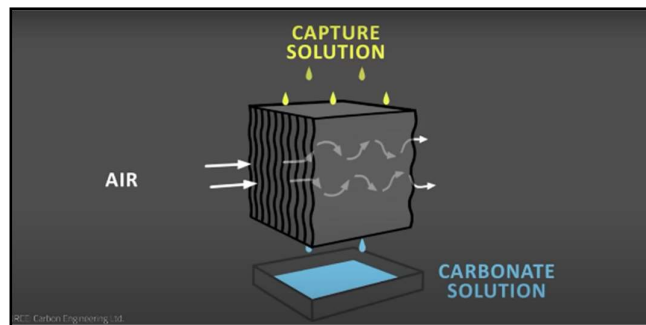
Ionic liquid is nothing but a salt in a liquid state. Dr. Kalb is an expert in ionic liquid, he has 20 years of experience in developing, producing and in chemical character of ionic liquid. He declares that ionic liquid is an electrolyte, and it can capture carbon.

# Student Articles

## IDEAS TO REDUCE CARBON POLLUTION:

Cars are the major reason for the 25% of carbon dioxide in the atmosphere and still increasing. So, we need to take steps to prevent and decrease the carbon emission from the vehicles. we can reduce carbon emission in vehicle by connecting a device with the muffler tip of the car. The device which can capture carbon from the vehicle.

## CARBON CAPTURING DEVICE:



This device consists of

- Connector – to connect the device with the muffler tip
- A small exhauster fan – ionic liquid need pressure to capture carbon dioxide.
- Ionic liquid chamber – to store carbonate solution.

This picture was made by carbon engineer used to capture huge carbon in industries. And my mini capture device is like it and smaller in size to connect with the vehicle.

## USES:

- You can capture carbon on your own and prevent polluting the environment.
- This can bring a drastic change in the carbon emission percentage of a single vehicle every year.
- And can the prevent from this drastic increase of the carbon emission percentage day by day.

# Student Articles

## THE MOST POWERFUL AIRCRAFT IN THE WORLD - THE TUPOLEV Tu-160



**Mr. SARAN K**  
**20BME103**  
**I Year Mechanical - C**



### INTRODUCTION:

The Tupolev Tu-160 (Russian: Туполев Ту-160 Белый лебедь, romanized: Belyj Lebed', lit. 'White Swan'; NATO reporting name: Blackjack) is a supersonic, variable-sweep wing heavy strategic bomber designed by the Tupolev Design Bureau in the Soviet Union in the 1970s. Entering service in 1987, the Tu-160 was the last strategic bomber designed for the Soviet Union. As of 2016, the Russian Air Force's Long Range Aviation branch has at least 16 aircraft in service.

### DESIGN:

The Tu-160 is a variable-geometry wing aircraft. The aircraft employs a fly-by-wire control system with a blended wing profile, and full-span slats are used on the leading edges, with double-slotted flaps on the trailing edges and cruciform tail. The Tu-160 has a crew of four (pilot, co-pilot, bombardier, and defensive systems operator) in K-36LM ejection seats. The Tu-160 is powered by four Kuznetsov NK-32 afterburning turbofan engines, the most powerful ever fitted to a combat aircraft.

### CHARACTERISTICS:

**Crew:** 4 (pilot, co-pilot, bombardier, defensive systems officer)

**Length:** 54.1 m (177 ft 6 in)

**Wingspan:** 55.7 m (182 ft 9 in) wings spread (20°) 35.6 m (117 ft) wings swept (65°)

**Height:** 13.1 m (43 ft 0 in)

**Wing area:** 400 m<sup>2</sup> (4,300 sq ft) wings spread 360 m<sup>2</sup> (3,875 sq ft) wings swept

**Empty weight:** 110,000 kg (242,508 lb.)

**Gross weight:** 267,600 kg (589,957 lb.)

**Max takeoff weight:** 275,000 kg (606,271 lb.)



# Student Articles

## Performance:

**Maximum speed:** 2,220 km/h (1,380 mph, 1,200 kn) at 12,200 m (40,026 ft)

**Maximum speed:** Mach 2.05

**Cruise speed:** 960 km/h (600 mph, 520 kn) / M0.9

**Range:** 12,300 km (7,600 mi, 6,600 nmi) practical range without in-flight refueling, Mach 0.77 and carrying 6 × Kh-55SM dropped at mid-range and 5% fuel reserves

**Combat range:** 2,000 km (1,200 mi, 1,100 nmi) at Mach 1.5; or 7,300 km (4,536 mi) at subsonic speeds

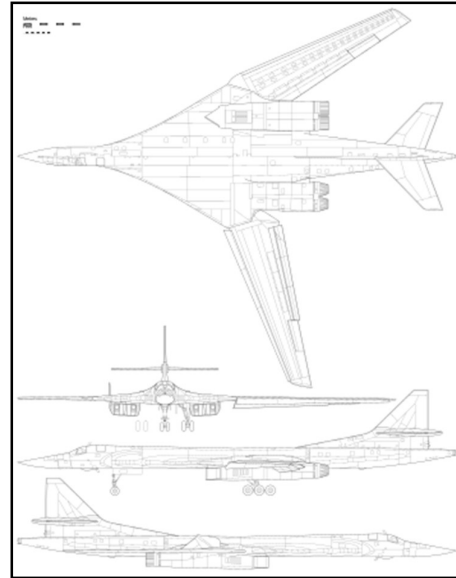
**Service ceiling:** 16,000 m (52,000 ft)

**Rate of climb:** 70 m/s (14,000 ft/min)

**Lift-to-drag:** 18.5–19, while supersonic it is above 6

**Wing loading:** 742 kg/m<sup>2</sup> (152 lb/sq ft) with wings fully swept

**Thrust/weight:** 0.37



## COCKPIT VIEW:

The Tu-160 is a variable-geometry wing aircraft, with sweep selectable from 20° to 65°. The aircraft employs a fly-by-wire control system with a blended wing profile, and full-span slats are used on the leading edges, with double-slotted flaps on the trailing edges. The variable geometry gives conventional takeoff and efficient subsonic cruise, while also permitting Mach 2 flight. [citation needed]

The Tu-160 is powered by four Kuznetsov NK-321 afterburning turbofan engines, the most powerful ever fitted to a combat aircraft. Unlike the American B-1B Lancer.



# Student Articles

## BATTERIES OF ELECTRIC VEHICLES



**Mr. Ashwin Baalaje R**  
**19BME069**  
**II Year Mechanical - B**

### Introduction:

Electric car batteries are one of the most important components in a car system. In BEV cars, batteries are the only "life". Because only electrical energy stored in the battery is the only source of energy driving the BEV car. Electric car batteries are different from SLI batteries (starting, lightning and ignition). SLI batteries are batteries that are usually installed in gasoline or diesel cars. This type of electric cars battery is designed as an energy storage system, capable of delivering power for long and sustainable periods.



**There are 5 types of electric vehicle batteries to be discussed in this article:**

- Lithium-Ion (Li-On)
- Nickel-Metal Hybrid (NiMH)
- Lead Acid (SLA)
- Ultracapacitor
- ZEBRA (Zero Emissions Batteries Research Activity)

### Characteristics of Electric Vehicle Battery:

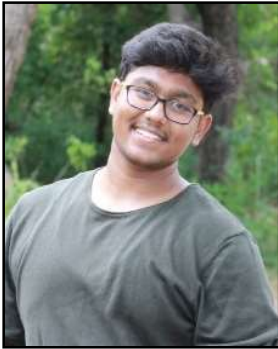
The types of electric car batteries are also depending on the car system. EVs do not use a single battery like a phone, they use instead a pack which is comprised of thousands of individual Li-ion cells working together. When the car's charging up, electricity is used to make chemical changes inside its batteries. When it is on the road, these changes are reversed to produce electricity.

The comparison of the first four types of electric car batteries can be seen as follows:

	Lithium Ion	Nickel-Metal	Lead-Acid	Ultracapacitors
Easy Access / Inexpensive	✓	✗	✓	✗
Energy Efficient	✓	✓	✓	✓
Temp. Performance	✓	✗	✗	✓
Weight	✓	✓	✓	✓
Life Cycle	✓	✗	✓	✗

# Student Articles

## THE SMART BATTLE TOYS FOR THE REAL TIME WAR



**Mr. Nitheeshwar R K**  
**19BME067**  
**II Year Mechanical - B**

Chennai-based start-up Torus Robotics Founded by SRM graduates Karthikeyan B, Vibhakar Senthil and Vignesh Kandasamy, Chennai-based start-up Torus Robotics has developed an AI-based unmanned ground vehicle (UGV) for the Indian Army. These vehicles can be operated like robots and can be used from a safe distance.

“The electric-powered vehicles are designed to detect, identify and dispose of Improvised Explosive Devices (IEDs). They can be operated from a safe distance of up to 1 km. The same ground vehicles can also be used to scout locations and collect information,” says Vignesh Kandasamy, co-founder, in an interview with The Better India.

He is one of the co-founders of the start-up along with Karthikeyan B and Vibhakar Senthil.

### Developing defence solutions in college

In 2012, Vignesh met Karthikeyan B and Vibhakar Senthil, the other founders of Torus Robotics, while they were all pursuing their B. Tech Mechatronics at SRM Institute of Science and Technology, Chennai. In their first year of college, they enrolled themselves in a robotics programme.

“In this course, we were required to identify existing problems and innovate solutions for them through robotics. Since the three of us shared a common interest towards the Indian Army, we began our research in the defence sector,” says Vignesh.

In the initial years of the course, the trio developed miniature robots that would help in surveillance and designed a single-seat solar-powered vehicle.



**The co-founders of Torus**

“Our projects were selected for several college-level competitions, of which we won a few,” says Vignesh, adding that this prompted them to start a company of their own after graduating in 2016.

However, the trio needed time to figure out what solution they would develop, alongside figuring out how to rope in private investors. So, to ensure the trio was upskilled to run a business, SRM University offered them a Master’s in Business Administration course with a full scholarship.

“Until 2018, we were doing the MBA, and, on the side, we were meeting experts who would give us an idea about the ground-level problem faced by the Indian Army,” says Vignesh.

### A solution to detect threats

By the end of 2018, the trio got in touch with experts at the Army Design Bureau, a government body. This organisation was set up to consider immediate requirements for the Army and have solutions designed through start-ups or private players.

# Student Articles

“With the organization’s help, we began understanding the problems faced by the Indian Army in detail. This included having to carry heavy loads up high altitudes, looking out for infiltrators, detecting IEDs and more. Soon, we also received a direct project from the Defence Research and Development Organisation (DRDO). It was to develop a solution that could scout locations and conduct surveillance for unidentified objects,” says Vignesh.

The team began developing the UGV early in 2019 and by the end of that year, officially registered their company, Torus Robotics, which is headquartered in Ambattur, Chennai.

One of the main challenges the team faced was procuring parts for building the vehicle. Most of them had to be imported from other countries. This was not only a time-consuming process but also an expensive one. To avoid extra costs, all the parts for their vehicle were manufactured individually in Chennai.

The device is an electric terrain vehicle with a robotic arm. This can pick up unidentified objects like suitcases or bags and analyse them for IEDs.



**Torus Robotics presenting their UGV at Aero India exhibition.**

“Once the final version was finished, the device was submitted to the DRDO to conduct further tests on its performance,” says Vignesh, adding that after passing all the necessary tests, the device was displayed at the annual Aero India exhibition held in February 2021.

At the event, the team signed an MoU with the Government of India to develop an upgraded version of the UGV, which will be deployed at India’s border. This terrain vehicle will be equipped to ease the burden on jawans by carrying heavy loads. The UGV will be designed to carry the equipment that 10 jawans are required to carry to higher altitudes.

As a part of expanding their business, the team is also developing batteries for electric vehicles.

# Student Articles

## CLEANING OF WATER



**Mr. Jayabalu S**  
**19BME219**  
**II Year Mechanical -A**

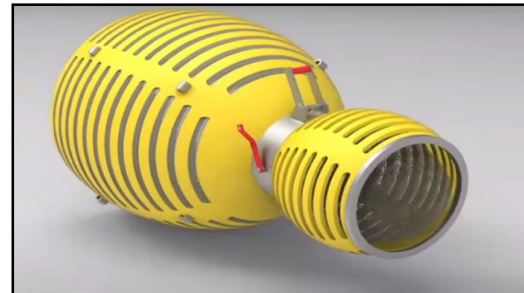
Chennai has two major rivers Cooum and Adyar. These rivers are much polluted. These wastes are mixed along with sea water. Plastics holds the major composition of adulteration. Every minute tons of plastic mixes with the sea. Per year, nearly 800 crore kilogram of plastics gets mixes with the sea water. Due to this more than 10 crores of sea animals die due to the choking of plastics. To stop this effect the students at HAGUE university of applied science in Netherlands found a solution by inspired by bio mimicry.



Carnivore's hunt and eat meat as their food. Some of the carnivores have unique technique to hunt, similarly, living organisms in the sea also hunts for their food. Some organism like Basking shark, Manta ray which is big in size eat small fish eggs and plankton in the sea. These organisms are big in size, but they feed on very small size living organisms like fish eggs and plankton. They use a unique scientific technique to hunt their food where they swim with their mouth open, many of small sea living organisms along with the sea water enters their mouth. During this their mouth act as filter and sends the water outside.



The mouth of this basking shark has a special arrangement called as gill rakers inside the mouth. They appear to be in the shape of slice as in the picture. A swirl will occur between the slices which creates low pressure in between these slices which sucks the water and pulled them out. The special arrangements in the gills will suck only the water, other items like eggs and small living organism goes straightly to the stomach.



The student has tested this special arrangement for the water filtration and found that the water bends 90 degree and flow through the mouth and exit. They then developed a water filter with this special mechanism. They placed these filters on specific areas, where the river water mixed with sea water. In normal position the plastic and small waste stuck in between teeth. It had a lever, where when the lever is operated the direction of teeth changes which helps in the easy removal of the stuck plastics in the teeth which can be later stored the net.



# Reviewer's Point

## LIVE WIRE – ONE



**Mr. Nitheesh S V**  
**6405**  
**1 Year Mechanical**

### LIVE WIRE:

It is a first electric motorcycle brand under Harley Davidson, which is going to launch their first electric motorcycle name as "ONE". Harley Davidson Live Wire is planning to develop in such a way that their technology could be used in present Harley Davidson bikes. They expect to be benefitted from the supply chains and get more clients from the brands.

### LIVE WIRE – ONE:

The modern designed motorcycle comes with a powerful 15.5 kWh battery pack, which yields a range of 235 kms per full charge. It gets a DC fast charging such that it can charge up to 80% in 40 minutes and full charge in one hour, while seeing on other side with AC supply, it takes nearly 12 to 13 hours for full charge.



The propelling electric motor of Harley Davidson Live Wire comes with an amazing power of 103 PS and with a wonderful peak torque of 116 Nm, such that it claims to hit the triple digit speed, from initial in just 3 seconds. The model code of the Livewire One is LW1, while internally it has been code-named the 'XB'.

### FEATURES:

The instrument cluster has a 2.3-inch TFT display with all LED lighting, and gets different sever super driving modes, such as Sport, Road, Rain, Range, and three custom setting option modes.

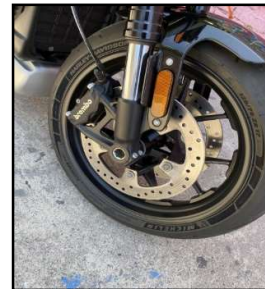
The rear comes with 'Showa Balance Free Rear Cushion-lite Mon shock' and in the front it gets a completely adjustable 43 mm Upside- down 'Showa Separate Function Big Piston fork' along two 300 mm front discs with 4 radially mounted piston calipers, and at the rear with a 260 mm disc with floating caliper.



# Reviewer's Point

## SAFETY:

It comes with all general and there are some highlighting features namely, Reflex Defensive Rider System (RDRS), Cornering Anti-lock Braking system (C-ABS), Cornering Traction Control System (C-TCS), Drag-Torque Slip Control System (DSCS).



## NEWS FROM MANUFACTURER:

This motorcycle is launched in the motive to become a 'Leader' in the battery powered 2-wheeler segment. They have scheduled to launch this motorcycle on 8th of July 2021. And it will be put for display the very next day onwards at "International Motorcycle Show".

Striking towards the pricing, at USA, it is going to launch around \$29,799. So, by comparing the price towards India's market, it comes around 20.5 lakhs.





# KUMARAGURU college of technology

COIMBATORE – 641 049

## Department of Mechanical Engineering

### INSTITUTE VISION:

The vision of the college is to become a technical university of International Standards through continuous improvement.

### INSTITUTE MISSION:

Kumaraguru College of Technology (KCT) is committed to providing quality Education and Training in Engineering and Technology to prepare students for life and work equipping them to contribute to the technological, economic, and social development of India. The College pursues excellence in providing training to develop a sense of professional responsibility, social and cultural awareness and set students on the path to leadership.

### DEPARTMENT VISION:

To emerge as a centre, that imparts quality higher education through the programme in the field of Mechanical Engineering and to meet the changing needs of the society.

### DEPARTMENT MISSION:

The department involves in sustained curricular and co-curricular activities with competent faculty through teaching and research that generates technically capable Mechanical Engineering professionals to serve the society with delight and gratification.

## B. E. MECHANICAL ENGINEERING


### PROGRAM EDUCATIONAL OUTCOMES (PEO's):

- PEO 1** : Graduates will take up career in manufacturing and design related disciplines.
- PEO 2** : Graduates will be involved in the execution of Mechanical Engineering projects.
- PEO 3** : Graduates will take up educational programme in mastering Mechanical sciences and management studies.

### PROGRAM OUTCOMES (PO's):

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.



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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. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
  6. **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.
  7. **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.
  8. **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.
  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.

#### **PROGRAM SPECIFIC OUTCOMES (PSO's):**

1. Apply the fundamentals of science and mathematics to solve complex problems in the field of design and thermal sciences.
2. Apply the concepts of production planning and industrial engineering techniques in the field of manufacturing engineering.

#### **M. E. INDUSTRIAL ENGINEERING**

#### **PROGRAM EDUCATIONAL OBJECTIVES (PEO's):**

- PEO 1 :** Graduates will be mid to higher level management / engineering professionals with responsibilities in engineering management, data analysis and business operations.
- PEO 2 :** Graduates will be engineering professionals, and technology leaders who would manage such functions as plant engineering, production, supply chain and quality management.
- PEO3 :** Graduates would function as educators or researchers in academic institutions.

### PROGRAM OUTCOMES (PO's):

- P01** : An ability to independently carry out research /investigation and development work to solve practical problems.
- P02** : An ability to write and present a substantial technical report/document.
- P03** : Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

### PROGRAM SPECIFIC OUTCOMES (PSO's):

- PSO1** : Graduates able to apply the engineering management and data management concepts in industrial engineering areas.
- PSO2** : Graduates able to apply industrial engineering skills and knowledge to manage the functions of production and supply chain management.

### M. E. CAD/CAM

### PROGRAM EDUCATIONAL OBJECTIVES (PEO's):

- PEO1** : Graduates excel in Professional career and/or higher education or/ research by continuously updating the knowledge and skill in the fields of Computer Aided Design and Manufacturing.
- PEO2** : Graduates can analyze the complex problems using advanced modelling and analysis tools and thereby solve problems related to product design and manufacturing area.
- PEO3** : Graduates work individually and in a team with effective communication skills and pursue lifelong learning.

### PROGRAM OUTCOMES (PO's):

- P01** : An ability to independently carry out research /investigation and development work to solve practical problems.
- P02** : An ability to write and present a substantial technical report/document.
- P03** : Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program

### PROGRAM SPECIFIC OUTCOMES (PSO's):

- PSO1** : Graduates will be able to apply the knowledge and skill in solving the real-time problems in the Computer Aided Design and Manufacturing field.
- PSO2** : Graduates will be able to analyse complex problems and provide solutions using advanced tools in product design and manufacturing area.