



**KUMARAGURU**  
COLLEGE OF TECHNOLOGY



Department of Mechanical Engineering

Newsletter

# *MExpress*

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

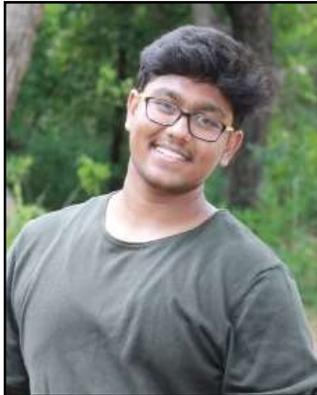
**Associate Editors:**

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

# Associate Editor's Folio

## THE CONCEPT 'GREEN'

Thane Engineers innovate composting unit That is 50% cheaper that runs on Solar Power From a ho use hold generating one kilo of wet garbage to a company generating 500 kilos, the user-friendly and low-cost solar-powered machines are for everyone.



**Mr. Nitheeshwar R K**  
**19BME067**  
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Did you know that composting can prevent up to 60 per cent of your household waste from ending up inside a landfill?

Whether done at the individual household or community level, the process of converting wet garbage into compost can be done in a bin (manually) or a unit that consumes electricity. However, the issue with an electric compost unit is that it not only increases the electricity bill but also leaves behind massive carbon footprints, which is ironic considering that composting is done to preserve the environment. To eliminate this problem, Rutvick Pedamkar and Sandip Patil from Maharashtra's Thane district have designed units that run on solar energy.

"An electric composter needs power for the drying, grinding, and cooling process, community composting unit uses around 1200 units per month, and the bill can come up to Rs 10,000. You are burning the environment and your pocket. Which is why we designed units with solar panels that produce electricity from the sun. Only the shredder machine provided with the system will require electricity, which won't be more than 2 units per day," Rutvick tells The Better India.

The duo has designed multiple variations of the unit to suit different requirements, and all you need is an area that measures a minimum of 6.6 sq. ft., to install one. From a household generating one kilo of wet garbage to a company generating 500 kilos, the user-friendly and low-cost machines are for everyone.

Further, the cost of the unit is 50 per cent less than the conventional ones. "Our 50-kilo capacity unit costs one lakh. Whereas another unit with the same capacity costs around four lakhs," says Rutvick.



there is not enough sunlight in your house, the solar panels can

A unit meant for a family cost anywhere between Rs 8,500 to 12,500. For a large unit that can complete community-level composting, the price depends on the capacity. Their biggest unit is priced at Rs 10 lakh that treats up to 500 kilos of wet garbage. The best part about these units is that if



# Associate Editor's Folio

be installed on the terrace. The smallest unit produces up to 200 watts of energy, whereas a 500-kilo system can generate two kilowatts. Another advantage of the system is that it is maintenance-free. "We have a 50-kilo unit that treats garbage of nearly 40 flats. We have appointed only one person who does the entire process in a hassle-free manner. It is very simple and easy-to-use. We use the freshly made compost in our gardens," Sushma, a committee member of the Samrudhi Housing Co-operative in Dadar, informs The Better India.

## How It All Started

It all started when Rutvick and Sandip, who met during their engineering course at Nagpur University, were on a trip to Ambarnath after their graduation. At the time, Rutvick was doing a sustainability course from Tata Institute of Social Sciences, and Sandip was working at a private firm dealing with waste management solutions.

"We were on our bike when we saw a mountain of garbage that was on fire at a dumping ground. That was the triggering for both of us. Mountains are symbols of beauty, not waste. We decided to put my knowledge on sustainability and his working experience to use and design low-cost composting units," informs Rutvick.

"The eye-opening incident pushed us to explore ways to treat garbage at source, and finally, we froze on the composting unit since it is more feasible to treat wet garbage than recycle the dry garbage," adds Sandip.

## Researching the Flaws

The duo worked hard for almost a year to develop a model that would be different from the conventional machines that are already there in the market. Parallely, they also carried out surveys in housing societies that had an electric composting unit to understand the requirements and flaws.

"High electricity bills and heavy maintenance were two common issues we found. So, we knew that our alternative had to be greener and cost-effective," shares Sandip.

They studied research papers and watched innumerable videos. Just when they were hitting a dead end, they came across the technology of solar dryers that could be integrated into a composting unit. Integrating technology was not an easy task. They went through multiple experiments and testing before cracking the formula. During this period, they faced several sorts of challenges and limitations—including swiftly depleting personal savings.

"We spent around a lakh for the first prototype only to realize that it had a very low capacity to store waste. We even ran out of waste, so we offered neighbouring buildings to treat wet garbage for free in return for their waste," shares Sandip.



# Associate Editor's Folio

Once their final prototype was ready, it was successfully tested in several buildings in Thane and Mumbai. In 2017, the duo registered their company 'Klimrus Sustainable Solution Pvt Ltd'.

So far, they have sold 70 units to individual households, housing societies, hostels, hotels, and companies including Pune-based Mondelez International, which manufactures the beloved Cadbury range of chocolates.



## Making Compost in Less Than 10 Days

Once contacted, a team from Klimrus Sustainable Solution will install the machine, shredder and solar panels and train you or a housekeeping staff on how to run the unit.

### Here is a 3-step process:

Deposit the wet garbage, including vegetable waste, peels, eggshells, coffee/tea powder, food waste, and so on in the shredder. It will shred the waste into tiny pieces

Transfer the pieces to a heated chamber for rotation. Here waste is adequately mixed with browns like dry leaves, cocopeat or sawdust to remove moisture and prevent foul odour. Keep the mix inside the chamber for two days. The mixture is heated to a temperature of 50-60 degree Celsius by the use of solar-powered heaters.

Transfer the newly made compost to a storage rack and keep it for 6-7 days for cooling.

"We have created two compartments inside the unit for a continuous cycle; If one is filled, you can continue the process in the other. The entire solar-run process takes around ten days. In a 100-kilo unit, you will have 30 kilos of nutrient-rich organic compost," says Rutwick.

In a country like India, which generates 62 million tonnes of waste every year, treating garbage at source is the first step to reduce this massive generation. Composting is an easy way you can start with, and green units developed by Sandip and Rutwick can effectively help curb the waste.



# Departmental Activities

## Programmes organized

A Seminar on "Robotics in Industry 4.0" was organized on 15-05-2021. Mr. Sriram Nagarajan, Partner, Roboram was the resource person. **Dr. S. Balasubramanian**, ASP and **Dr. S. Thirumurugaveerakumar**, ASP were the coordinator for this seminar.



Another Seminar on "Outreach program on Junior Skills 2021 Championship for CBSE School students" was organized on 23-05-2021. Dr. E Prakash / Associate Professor, Automobile Engineering and Mr. A. Naveen Sankar/Assistant Professor, Mechanical Engineering both from Bannari Amman Institute of Technology, were the resource persons. **Mr. B. Jeeva**, Assistant Professor and **Dr. V. R. Muruganatham**, ASP coordinated the event.



An event on "Aptitudes Stand a Chance" was conducted on 05-08-2021. **Dr. V. R. Muruganatham**, ASP & **Mr. M. A. Vinayagamoorthi**, AP (II) coordinated the event.



## Faculty as Resource Persons



**Dr. B. N. Sreeharan**, AP (II) was the resource person in a webinar on "Applications of Engineering Graphics in Computer Aided Engineering" organized by the Department of Aeronautical Engineering, Hindustan College of Engineering and Technology, Coimbatore on 25-05-2021.

## Departmental Activities



**Dr. P. S. Samuel Ratna Kumar**, AP (II) was the Guest speaker for a workshop on "Writing a Research paper" organized by an NGO -Young ones on 30.05.2021.

**Dr. T. Karuppusamy**, AP (II) delivered a Guest Lecture on Velocity and Acceleration analysis in Mechanism on 29-05-2021.



**Dr. S. Balasubramanian**, ASP was the resource Person in a webinar on "Instilling Creativity and Critical Thinking" at Nirmala College for Women, Coimbatore on 29-05-2021.

**Dr. V. Muthukumar**, Professor was a panel member for KCT LC selection on 14-05-2021.



**Dr. S. Bhaskar**, ASP was the resource person for Eleven online Session, each session 01 hour 30 minutes ) on "Workshop on Preparing for NBA" for Sakthi Polytechnic College, Sakthi Nagar -638315, Organized by Sakthi Polytechnic College for around 75 of their faculty.

Details are follows.

- 03.05.2021 – PEOs, five counts to prepare PEOs and Programs of Excellence
- 05.05.2021 – Analyzing POs with RBT levels and creating PSOs based on PEOs
- 07.05.2021 – Curriculum design
- 10.05.2021 – Basics of writing COs for theory courses
- 12.05.2021 – Writing COs with action verbs and learning statements
- 19.05.2021 – Basics of CO AND PO mapping
- 21.05.2021 – Assignment patterns to achieve PO5 to PO7
- 24.05.2021 – Domain independent POs and attainment strategies
- 26.05.2021 – Mapping COs with POs for theory courses with justification
- 28.05.2021 – Rubrics and COs for laboratory courses
- 31.05.2021 – Rubrics and COs for project as a course

He, also in the weekly forum 52 gave a speech on OBE for everyone on 15.05.2021.

## Departmental Activities



**Mr. B. Jeeva**, AP gave a speed in the "Weekly forum 52 on World skills and India skills Contest" on 15.05.2021.

**Dr. M. Thirumalaimuthukumar** was the resource person in a five-days online FDP organized by Department of Mechanical Engineering, Dr. N. G. P Institute of Technology on "Novel materials and manufacturing processes in Industrial applications" and delivered a lecture in Recent advancements in Additive Manufacturing process on 13.05.2021.



### Papers Presented

**Dr. V. Manivel Muralidaran**, AP (II) and **Dr. M. Balaji**, ASP presented a paper entitled "Comprehensive Analysis of Barriers in implementation of Lean Manufacturing in Indian industries" in the International Conference on Sustainable Development on Engineering Technology and Humanities 2021" organized by the Institution of Engineers, India on 22/05/2021.



### Papers Submitted

Following faculty members submitted their papers in the various Scopus / Web of Science / SCI indexed and, in the journals listed in annexure – 1.

Name of the Faculty	No. of Papers Submitted
Dr. C. Velmurugan, Professor & HoD	2
Mr. M. A. Vinayagamoorthi, AP (II)	1
Dr. V. Muthukumar, Professor	2
Dr. S. Balasubramanian, ASP	1
Dr. V. Manivel Muralidaran, AP (II)	1
Dr. R. Manivel, Professor	1
Mr. S. Sivakumar, AP (II)	1
Dr. S. Sivakumar, AP (III)	3
Dr. V. R. Muruganatham, ASP	1
Dr. K. Ulaganathan, AP (III)	3
Mr. P. D. Devan, AP	1
Dr. S. Thirumurugaveerakumar, ASP	1
Dr. K. K. Arun, AP (III)	1
Dr. K. M. Senthikumar, ASP	1
Mr. R. S. Mohan Kumar, AP	1
Dr. PR. Ayyappan, AP (SRG)	2

# Departmental Activities

## Papers Published



**Dr. P. S. Samuel Ratna Kumar**, AP published a paper entitled "Investigation of Multi-layered Coating on Tribological Property during Boring Process in Elsevier - Materials Today: Proceedings. He also published another paper entitled "Analysis of Low-Velocity Impact Response in AA 5083 Plate" in IOP Conference Series: Materials Science and Engineering, 1123, 012040 -

**Dr. S. Balasubramanian**, ASP published a paper entitled "Tribological characterization of friction stir welded dissimilar aluminum alloy AA6061 – AA5083 reinforced with CeO<sub>2</sub> and La<sub>2</sub>O<sub>3</sub> nanoparticles" in Industrial lubrication and Tribology Journal.



**Mr. B. Jeeva**, AP published a paper entitled "Experimental Investigation of Three Bladed Inclined Savonius Hydrokinetic Turbine by using Deflector Plate", IOP Conference Series: Materials Science and Engineering, 1146, 012009, 1-8.

**Dr. K. K. Arun**, AP (III) published a paper entitled "Analysis of Connecting Rod under Different Loading Condition Using Ansys Software, in the Journal Design Engineering"-ISSN: 0011-9342, Issue: 5 | Pages: 619-627.



## Papers Reviewed



**Dr. B. N. Sreeharan**, AP (II), reviewed a paper entitled "Effect of MIG welding process parameters on erosion and corrosion behaviour of ASTM A106 Grade-B pipe weldments", for the International Journal, Surface Review and Letters.

**Dr. P. S. Samuel Ratna Kumar**, AP, reviewed a paper entitled "Heat treatment T4 and T6 effects on tribological properties of sillimanite mineral reinforced LM30 aluminium alloy composites at elevated temperatures" for the Part J: Journal of Engineering Tribology. He also reviewed another paper entitled "Dynamic study on evolution mechanism of continuous innovation in prefabricated building enterprises", for the IOP: Conference series.



**Dr. S. Thirumurugaveerakumar**, ASP reviewed a paper entitled "Analysis and Mitigation of the Impacts of the Decarbonization of Transport through Electrification in Rwanda's Electric Power System" for the ASTESJ.

# Departmental Activities

## Book Publication

**Dr. V. R. Muruganatham**, ASP and **Mr. P. D. Devan**, AP published a book “Synergetic Concepts for Product and Process Innovation” for the Lambert, Republic of Moldova.



## Online Courses / Programmes attended / participated / completed



**Dr. P. S. Samuel Ratna Kumar**, AP participated in a six-day online FDP on “Recent Innovation in Design and Manufacturing” organized by Malla Reddy Engineering College, Telangana from 24.05.2021 to 29.05.2021.

He also participated in the following international webinars

- "Toolset, Skillset, Mindset: A Global Perspective" - by Autodesk on 06-05-2021
- "Ethical issues in peer review" on 11-05-2021
- "Surface Topography and Texture" by Kalasalingam Academy of Research and Education on 29.05.2021

**Dr. N. Sangeetha**, ASP (Sr), participated in a STTP on “Vibration Analysis & Measurements: from 03.05.2021 to 08-05-2021.



**Dr. B. N. Sreeharan**, AP (II) participated in a six-day online FDP on “Recent Innovation in Design and Manufacturing” organized by Malla Reddy Engineering College, Telangana from 24.05.2021 to 29.05.2021.

He also participated in the following programmes.

- Webinar titled Advancements in Friction Stir Spot Welding on Dissimilar Materials on 11.05.2021
- FDP titled Advance Excel for Educators on 12-05-2021
- Webinar titled Research Article Writing on 18-05-2021
- Quiz titled Advance MS Office on 21-05-2021
- Webinar titled CNC Machine Tools and Basic Programming on 21-05-2021
- Webinar titled Additive Manufacturing : Application, Challenges and Future Scope on 22.05.2021

## Departmental Activities



**Dr. R. Manivel**, Professor, participated in a Webinar titled Research Impact Metrics : Calculation and Context on 07-05-2021

**Dr. T. Karuppusamy**, AP (II) participated in the following Webinars titled CNC Machine Tools and Basic Programming on 21-05-2021, Foundation of computational fluid dynamics on 25-05-2021 and Potential Multifold of additive manufacturing in India with Business case study on 24.05.2021.



**Dr. K. M. Senthikumar**, ASP participated in a Webinar titled IEI Technical Webinar on 'Fastening Systems in Concrete Construction' on 14-05-2021

**Mr. M. A. Vinayagamoorthi**, AP (II) participated in a Webinar titled Product Demonstration of Gradescope on 27-05-2021.



**Mr. S. Sivakumar**, AP (II) participated in a Webinar titled Integration of Renewable energy into Indian Grid on 11-05-2021 and another Webinar titled Robotics in Industry 4.0 on 15-05-2021.

**Dr. S. Balasubramanian**, ASP, participated in a Webinar titled Passing the business baton to the next generation- Laghu Udyog Bharathi on 14-05-2021.



**Dr. V. Muthukumaran**, Professor, participated in a Webinar titled Robotics in Industry 4.0 on 15-05-2021 and another Webinar titled A Universal High-Speed Roughing Cycle for Milling on 26-05-2021

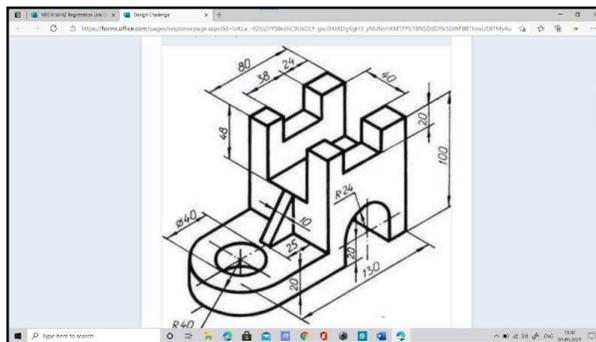
# Students Activities

## MECH WHIZ

MECH WHIZ is a series of competition, in which rounds will have a unique theme with a variety of components but share the same general framework.

This event includes three rounds, i.e.,

- Skip the maze
- Mech Spell spire
- Design challenge



MECH WHIZ was conducted on 30th April 2021 & 1st MAY 2021 through MS forms, G Forms and MS teams. Questions are selected from basic mechanical engineering tools and its applications. Each day comprises of 2 rounds and the participants should attend all the rounds. Day 1 comprises of the rounds, Skip the maze and Mech Spellspire. Day 2 comprises of JAM and Design Challenge.

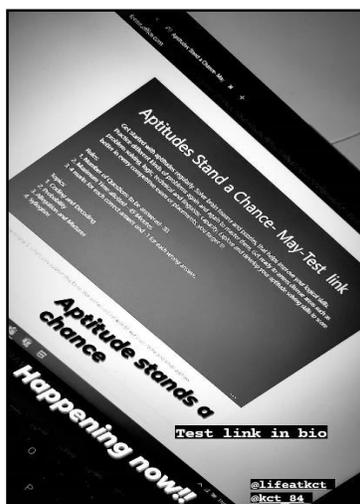
Winner was selected on basis of the Cumulative score of all rounds. This event was conducted successfully under the guidance of **Dr. V.R. Muruganatham**, ASP and **Mr. M. A. Vinayagamoorthi**, AP (II), Faculty Coordinators, MEA, coordinated by **Mr. Ashwinth** and **Mr. Aswin Baalaje R.** More than 40 registered for the event and 15 have participated and benefitted from the event

# Students Activities

## APTITUDES STAND A CHANCE

Aptitudes are natural talents, special abilities for doing, or learning to do, certain kinds of things easily and quickly. Every occupation, whether it is engineering, medicine, law, or management, uses certain aptitudes. Aptitude tests are one of the ways of predicting skills, knowledge, ability, and personality of a person.

The Mechanical Engineering Association had organized Aptitudes stand a Chance event, an Aptitude test on 8th May 2021 from 04:00 p. m. to 04:45 p. m. for the KCT Students. These events were very useful for KCT students. Every year the MEA Students organizes these events for the knowledge enhancement of the students.



**Number of participants registered in this event: 65**

**Event Organizer:** Mr. R. Suvanraj and Mr. K. Sudarshan

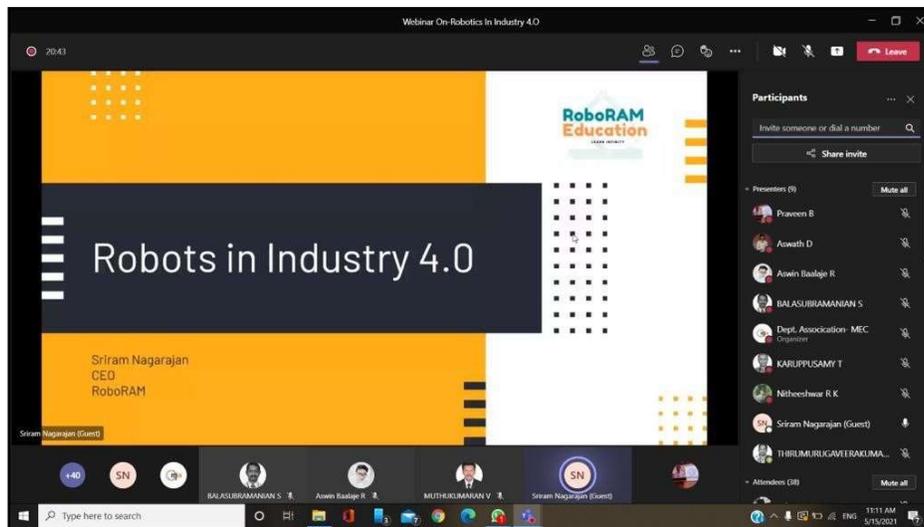
**Winner:** Ms. PU. Thivya – 20BCS105

**Runner:** Mr. M. Shakhieswaran – 20BME105

# Students Activities

## Webinar on Robotics in Industry 4.0:

There are an endless number of things to discover about robotics. A lot of it is just too fantastic for people to believe. Technology and Robotics are advancing, and it will reduce the need for workers in the future.



This webinar held on 15th May 2021 at 11:00 a.m. via MS Teams. The guest speaker gave wonderful insights about Robotics in Industry 4.0 to the students.

### GUEST SPEAKER:

Mr. Sriram Nagarajan, Co-Founder and Automation engineer, RoboRam. Mr. Sriram Nagarajan is now the new emerging young industrial Automation Entrepreneur who has a couple of industrial experience which inspired him to become the co-founder of RoboRam.

**TOTAL NUMBER OF PARTICIPANTS:** 47 Students

### FACULTY COORDINATOR:

**Dr. S. Balasubramanian**, ASP and **Dr. S. Thirumurugaveerakumar**, ASP

### STUDENT COORDINATOR:

**Mr. Manav R Samant** - 2nd Year & **Mr. R. Aswin Baalaje** - 2nd Year

# Students Activities

❖ **Mr. B. Ibrahim Basha** – (18BME095) of 3rd year mechanical engineering B section attended Computational Fluid Dynamics webinar on 25/05/2021 organized by Arasu Engineering College.

❖ **Mr. B. Ibrahim Basha** – (18BME095) of 3rd year mechanical engineering B section attended Electric Mobility - The Key to A Green Future webinar on 31/05/2021 organized by Nehru Institute of Engineering and Technology.



❖ **Mr. S. Harshit** – (18BME109) of 3rd year mechanical engineering B section attended Non-Destructive Testing webinar on 25/05/2021 organized by Arasu Engineering College.

❖ **Mr. E. Bhavesh Kishore** – (18BME104), **Mr. S. Harshit** – (18BME109) & **Mr. P. S. Pramod** – (18BME097) of 3rd year mechanical engineering B section attended Application of heat in Automotive & Mechanical Systems webinar on 22/05/2021 organized by Arasu Engineering College.

❖ **Mr. P. S. Pramod** – (18BME097), **Mr. E. Bhavesh Kishore** – (18BME104) & **Mr. S. Harshit** – (18BME109) of 3rd year mechanical engineering B section attended Additive Manufacturing Application, Challenges & Future Scope webinar on 22/05/2021 organized by Vignan Institute of Technology & Science.



❖ **Mr. K. T. Imayan** – (20BME045) of 3rd year mechanical engineering B section attended How to write a research paper webinar on 30/05/2021 organized by Yo Jazrix.

*Congratulations!*

# Students Articles

## PNEUMATIC TYRES

Generally, having the correct tires will surely boost the efficiency, productivity and reduces the downtime. Wondering whether there is such type of tire!! Yes, of course, they are the Pneumatic tires...

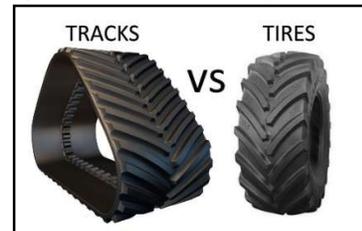


**Nitheesh S V**  
6405  
I Year Mech. - B

**Introduction:** Pneumatic tires are those which are commonly used in Bicycles, vehicles, etc. They are suitable for both outdoors and indoors and provide good protection for floors by reducing the impact. It is of two types, namely Solid Pneumatics and Air Pneumatics.

**Solid pneumatics:** They are made up of Solid rubber. Since the material used is purely rubber, these tires are more expensive than the air-filled. They are also known as "Puncture Proof". These solid types lack to offer a smooth ride, since it is mainly used in the purposes of terrain, rough roads, etc.

**Air pneumatics:** Air filled tires are filled with air, which is like the normally used tires. These types can be used indoors, but are recommended for outdoor usage, because they can withstand even in hard terrains such as Gravel, etc.



**Working:** Air-filled tyre works on the principle by containing the pressurized air, within an air-tight core. They contain reinforcement from a steel belting or any tough material. It must be ensured with the correct tire pressure. Mainly, if the tire pressure is correct, it greatly helps in giving a very easier transition in many different terrains. Similarly, solid tires are according to the name itself. It is really an amazing solution to get rid of Puncture. It helps in the areas where Screws, Nails, or any other sharp materials are present which cause puncture. Air pressure inside the tire is very much greater than the outside atmospheric pressure, so that they can bare and carry heavy loads easily without decrease in pressure. So, general thing is to maintain the correct tire pressure whenever it is required.

### Advantages:

- **Shock Absorption:** It greatly reduces the shock which will be caused over any bumps or rough areas. It also reduces the shake of the vehicle at any circumstances. These wheels help in transporting an expensive cargo in kind of terrains. They can work on rocky terrain, with a very good grip towards the surface and a good withstanding ability. It is very good tire which can adapt to uneven roads.
- **Reduce Noise Pollution:** The type of rubber used helps in the reduction of the noise caused when it is travelling on roads. So, overall performance gets increased by lowering the general volume levels.

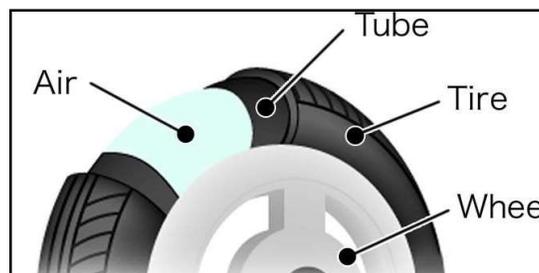
# Students Articles



- **Floor protection:** Since it is suitable for indoors and outdoors, there will raise a question, about the surface damage in indoors. The rubber used are of soft quality, which makes them best suitable for indoors, without any slips, scratches, etc.

## Disadvantages:

- **Force required:** To make the wheel to start its motion, it requires a greater amount of force and power to be delivered. So, it needs high initial torque, but at difficult situations, it manages to give a good amount of grip in turnings, slopes, etc.
- **Pressure monitoring:** It is very important to maintain the pressure of this tires, because if there is no sufficient pressure, it starts to lose the grip, and its power and performance. These cannot be driven flat. At the same time, high pressure is also dangerous. So, get used to maintain that with the correct pressure levels.



- **Why to use Pneumatic tires?**

The main purpose to use these tires is that they can handle many ranges of surfaces, uneven roads, rocky surfaces, any terrains. It can absorb what is underneath it. Gives a good comfort and smooth ride and reduces the shake of the vehicle.

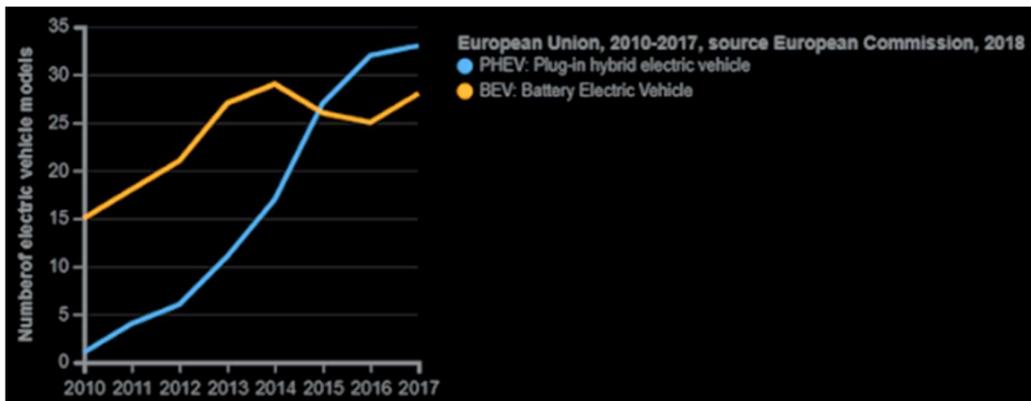
# Students Articles

## Perspective of an E-Vehicles



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

An electric vehicle (EV) uses one or more electric motors or traction motors for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery, solar panels, fuel cells or an electric generator to convert fuel to electricity. EVs include, but are not limited to, road and rail vehicles, surface and underwater vessels, electric aircraft, and electric spacecraft. EVs first came into existence in the mid-19th century, when electricity was among the preferred methods for motor vehicle propulsion, providing a level of comfort and ease of operation that could not be achieved by the gasoline cars of the time.



During the last few decades, environmental impact of the petroleum-based transportation infrastructure, along with the fear of peak oil, has led to renewed interest in an electric transportation infrastructure. EVs differ from fossil fuel-powered vehicles in that the electricity they consume can be generated from a wide range of sources, including fossil fuels, nuclear power, and renewable sources such as tidal power, solar power, hydropower, and wind power or any combination of those.

### DIFFERENCE BETWEEN NORMAL AND ELECTRIC VEHICLES:

#### LITHIUM-ION BATTERY:

Most electric vehicles use lithium-ion batteries (Li-Ions or LIBs). Lithium-ion batteries have higher energy density, longer life span and higher power density than most other practical batteries. Complicating factors include safety, durability, thermal breakdown, and cost. Li-ion batteries should be used within safe temperature and voltage ranges to operate safely and efficiently.

# Students Articles

## EFFICIENCY:

EVs convert over 59-62% of grid energy to the wheels. Conventional gasoline vehicles convert only some 17%–21%.

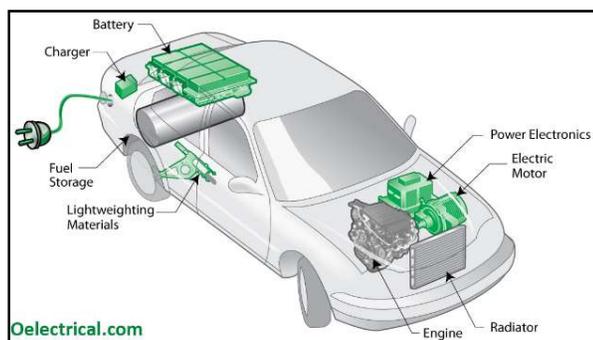
## ADVANTAGES AND DISADVANTAGES:

EVs release no tailpipe air pollutants; however, EVs are charged with electricity that is generated by means that have health and environmental impacts, and the air emissions associated with manufacturing an electric vehicle can be greater than those of manufacturing a conventional vehicle. Overall, the air emissions from producing and operating an EV can be less than or greater than those of producing and operating a conventional vehicle, depending on the regional electricity grid mix, timing of EV charging, driving patterns, climate, the set of air emissions under consideration, and the specific electric and conventional vehicle designs being compared.

Fuel Vehicle Parts	Electric Vehicle Parts	Functions
Fuel tank	Battery	Stores energy to make the vehicle run
Fuel Pump	Charger	Puts energy/fuel into the vehicle to make it run
Fuel Engine	Electric Motor	Makes the vehicle move
Carburetor	Controller	Controls starts, stops, speed, acceleration
Alternator	DC / DC Converter	Provides power to accessories such as radio, lights, air conditioner
	DC / AC Converter	Converts DC to AC Power to make the motor run

## WORKING:

All-electric vehicles (EVs) have an electric motor instead of an internal combustion engine. The vehicle uses a large traction battery pack to power the electric motor and must be plugged into a charging station or wall outlet to charge. Because it runs on electricity, the vehicle emits no exhaust from a tailpipe and does not contain the typical liquid fuel components, such as a fuel pump, fuel line, or fuel tank. All-electric vehicles (EVs) use a battery pack to store the electrical energy that powers the motor. EVs are sometimes referred to as battery electric vehicles (BEVs). EV batteries are charged by plugging the vehicle into an electric power source. Although electricity production may contribute to air pollution, the U.S. Environmental Protection Agency categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or emissions.



# Students Articles

## THE FUTURE ADOPTION - ELECTRIC VEHICLES



**Mr. Suvan Raj R**  
**19BME100**  
**II Year Mech. - B**

**Introduction:** Plug-in electric vehicles (also known as electric cars or EVs) are connected, fun, and practical. They can reduce emissions and even save you money. Fuelling with electricity offers some advantages not available in conventional internal combustion engine vehicles. Because electric motors react quickly, EVs are very responsive and have very good torque. EVs are often more digitally connected.

**Recharging Fuels:** With many of the EV charging stations, providing the option to control charging from a smartphone app. Just like a smartphone, you can plug in your EV when you get home and have it ready for you to use the next morning. Since the electric grid is available almost anywhere, there are a variety of

options for charging: at home, at work or on the road. By charging often, you may never need to go to a gas station again! But EVs provide more than just individual benefits. Our reliance on petroleum makes us vulnerable to price spikes and supply disruptions. EVs help reduce this threat because almost all U.S. electricity is produced from domestic sources, including coal, nuclear, natural gas, and renewable sources.



**Emission less EV:** EVs can also reduce the emissions that contribute to climate change and smog, improving public health and reducing ecological damage. Charging your EV on renewable energy such as solar or wind minimizes these emissions even more. See the difference in emissions between a conventional vehicle and an EV using the calculator on the right. Learn more about how EVs reduce pollution and their lifecycle emissions.



**End-of-life management:** Electric vehicles run on lithium-ion or Li-ion batteries that store energy and can be recharged. The batteries used in these vehicles – from two-wheelers to commercial vehicles and public transport buses – are largely the same. However, their composition and size change from vehicle to vehicle, depending on the power necessary to run them. Batteries are stacked together in cells and modules to make a battery pack. These batteries are chiefly made up of lithium, cobalt, nickel, iron, copper and aluminum. The life of an EV battery ranges between six and eight years and needs replacement when its capacity starts falling below 80%, entrepreneurs and professionals working in the field of battery assembly told IndiaSpend. The life of a battery also depends on the frequency of the EV use, they added.

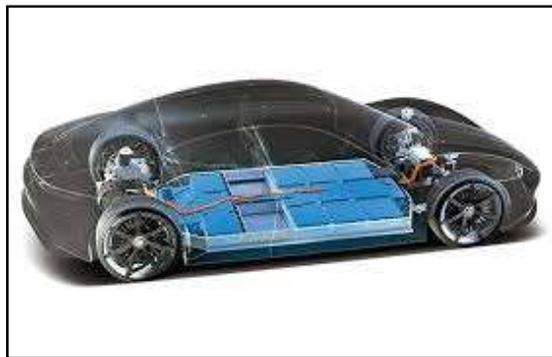
# Students Articles

**How Does an Electric Vehicle Work?** An electric vehicle works on a basic principle of science: conversion of energy. Electrical energy is converted into mechanical energy. There is a motor used in the electrical system to carry on this duty of conversion. Motors can be of various types. The motor is to an electric vehicle what engine is to the IC vehicle. Let us have a look at different types of motors used in EVs.

Parameters	Lithium-ion	Nickel-metal	Lead-acid	Ultracapacitors
Low Cost	✓	✗	✓	✗
Energy efficient	✓	✓	✓	✓
Temp. Performance	✓	✗	✗	✓
Low Weight	✓	✓	✓	✓
Life Cycle	✓	✗	✓	✗

**Types of Electric Motors:** There are various types of motors that are used in electric vehicles nowadays:

**DC Series Motor:** It was a widely used motor back in the 1990s. This motor can produce high initial torque. The easy speed control and sudden load increase bearing capacity make these motors a good choice. But the high maintenance due to the brushes and commutators is a major drawback in the DC series motor which are also known as Brushed DC Motors. These motors are still in use by the Indian railways.



**Brushless DC Motor (BLDC):** These motors are the technically advanced versions of DC series motors. They do not use brushes and commutators. Instead, permanent magnets are used. BLDCs have high starting torque, high efficiency, and low maintenance. BLDCs are widely used these days either as the hub motor or belt driven.

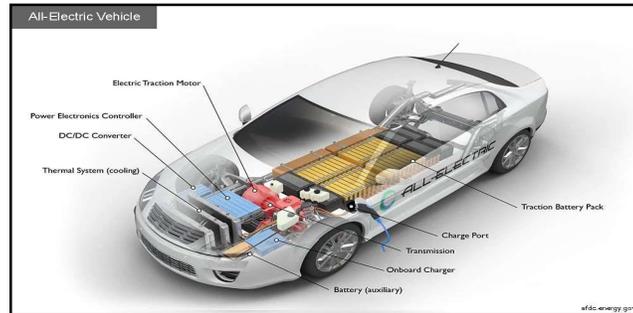
**Permanent Magnet Synchronous Motor:** It is very similar in construction to the BLDCs. But the major difference is in the back emf. PMSM has a sinusoidal back emf whereas BLDC has trapezoidal one. They have a high-power rating and can be used in high-performance applications such as sports cars, buses etc. For e.g., Nissan Leaf uses a PMSM for propulsion.

**Three Phase Induction Motor:** Unlike the DC motors, induction motors do not have a high starting torque. It is cheap as compared to the other available options. But do not go with the price. It still has very high efficiency and can withstand rugged environmental conditions. Tesla Model S uses this type of motor. Even Tata and TVS are planning to use induction motors in their electric vehicles. Indian Railways have also started using induction motors over DC motors.

**Types of electric vehicles:** There are two main types of electric vehicles (EVs), defined by the degree that electricity is used as their energy source.

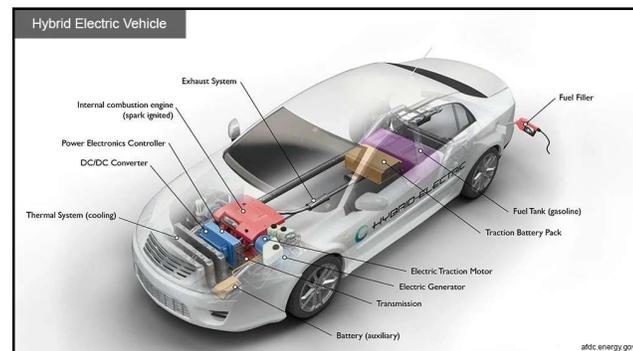
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**1. Battery Electric Vehicles (BEVs):** BEVs are fully electric vehicles, meaning they are only powered by electricity and do not have a petrol engine. BEVs are quiet, cost-efficient to run and eco-friendly, but are more expensive to buy than a comparable petrol fuelled car. However, when the total cost of ownership over the time you are likely to own the car is considered, EVs compare quite favourably, and may even cost less overall.



**2) Plug-in Hybrid Electric Vehicles (PHEVs):** This type of EV is powered by both petrol and electricity. The amount of driving that can be done in 'electric' mode depends on the capacity of the battery. The advantage of PHEVs over BEVs is that if you cannot get to a charging point, you can keep driving using fuel alone. The downsides are that the car needs two systems – fuel and electric – so maintenance costs can be higher than for a BEV. Also, once your relatively small battery runs flat, you lose the financial and environmental benefits of an EV until you recharge.

**Conclusion:** The broad-scale adoption of the electric vehicle could bring significant changes for society in terms of not only the technologies we use for personal transportation, but also moving our economies away from petroleum and lessening the environmental footprint of transportation. This article investigates the role of standards, related training, and certification for the electric vehicle.



It is argued that the potential for the electric vehicle will be stunted without adequate attention being paid to standards, not only in terms of the speed of its uptake and smoothness of this transition, but also in terms of maintaining compatibility between jurisdictions, safety of the public, and helping to ensure environmental sustainability. We highlight a few areas where new or adaptations of current standards, training and certification may be needed, notably in terms of batteries and charging infrastructures, electricity distribution and accounting for the environmental characteristics of this electricity, and different aspects of vehicle-to-grid and smart grid technologies.

Self-balancing scooters in India could soon become a reality if this prototype is put into production. Indian electric mobility start-up Liger Mobility has developed a self-balancing electric scooter with voice commands. A video by Electric Vehicle that showcases the scooter's capabilities has surfaced on the internet and it is interesting.

# Students Articles

## REGENERATIVE BRAKING SYSTEM



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

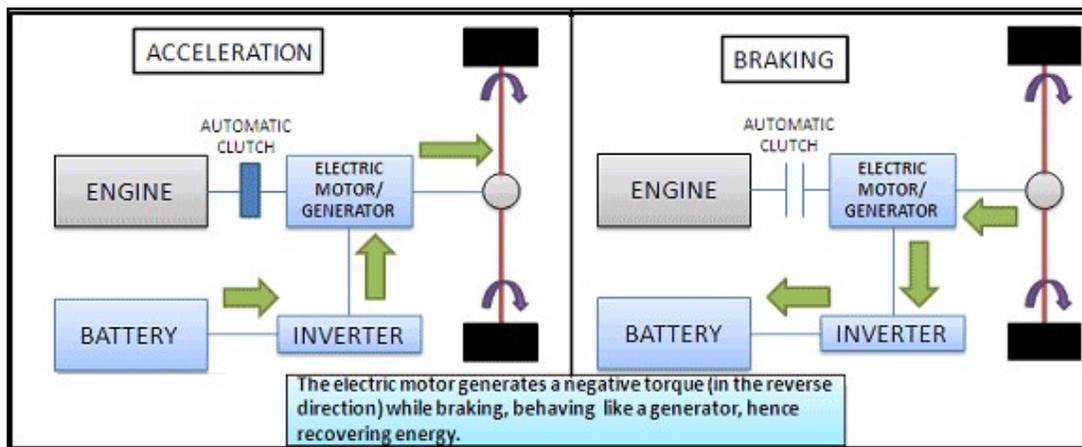
### Evolution of Brakes:

In 1800s, inventors have been working on different ways to get automobiles to stop safely. While brakes have become more evolved over the years, the mission to protect drivers, pedestrians, and other road users has always remains the same. The idea of a brake that could take the kinetic energy it absorbs and turn it into potential energy for later use has been around since the late 1800s. When normal brakes are applied, the pressure of hydraulic fluid squeezes metallic brake pads tightly against the rotors, and the resulting friction slows the car. This friction results in heating of brakes, heated brakes do not work well and there is a loss of energy. This primary problem leads to the idea of RBS technology.

In 1967, the American Motor Car Company (AMC) created an electrical energy regeneration brake for their concept electric car, the AMC Amitron. Toyota was the first car manufacturer to commercialize RBS technology in their Prius series hybrid cars.

### RBS Technology:

This system collects kinetic energy during deceleration, stores in the battery so it can be used as electricity to power the electric motor. Therefore conventional hybrids do not need to be plugged in the charges, they use regenerative braking to recharge their batteries as they're being driven. The vehicles which contain the RBS technology, not only as this technology along with, normal or conventional brake systems are also present.



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## Mechanism:

With an electrified vehicle, the electric motor drives the wheels, either in conjunction with the gasoline engine as in a hybrid, or on its own in a battery-electric vehicle. As you drive forward, the motor runs in that direction, supplying electric power to the wheels.

But when you decelerate by taking your foot off the throttle, the electric motor stops supplying power so the vehicle will slow down. When the motor stops, it immediately disengages, and then starts running backwards. The transmission is still in Drive, so it does not reverse the wheels; instead, it acts like a generator. It captures the kinetic energy from the wheels as they slow down and converts it into electricity. It is then stored in the battery, to be sent back to the electric motor when it is needed to drive the vehicle's wheels.

## One pedal Driving:

It is also referred to as "one-pedal" driving. With practice, drivers may be able to get through heavy traffic by only using the throttle, accelerating enough to move ahead as needed, and then letting off the pedal and letting the regenerative braking make the stop.

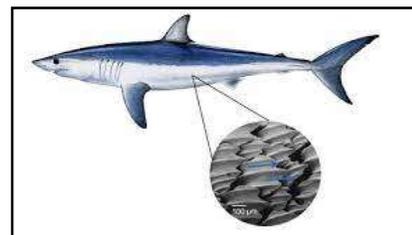
But a regenerative system is not enough to stop a vehicle in every situation, especially when driving at higher speeds, and therefore every hybrid or battery-powered vehicle also has conventional hydraulic brakes. The good news is that because the regenerative system is also slowing the vehicle down, the brakes do not have to work as hard. Drivers usually find their hybrids or EVs require new brakes far less often than regular vehicles do.

## THE SHIELD OF CAPTAIN AMERICA



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

Before eating food, we should wash our hand for at least 10 seconds. Because we touch many things like books, pen, desk, doorknob, etc., many microorganisms like bacteria and virus are present in these things.

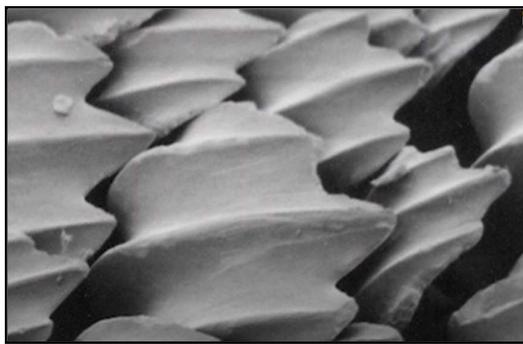
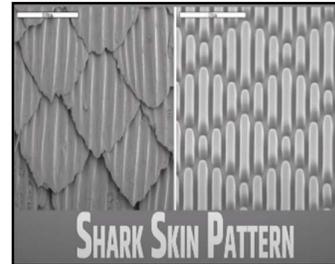


These may cause many infections and disease to us. These problems occur mainly in the hospitals, many people with infections and disease are visiting there to consult the doctors. There are many chances to grow this type of microorganism even when we use disinfectants. Scientists found solution for this issue by biomimicry.

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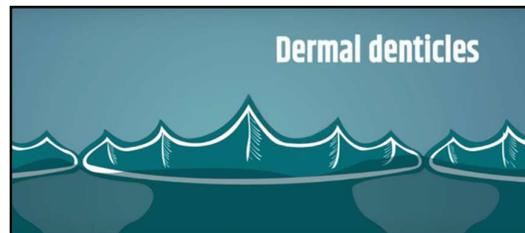
Humans require suitable place and temperature to live. Similarly, microorganism also requires suitable place and temperature i.e., like door handles because, we cannot clean that handle regularly at a short span of time.

For this scientist found the solution by Anti-microbial property which is present in shark's skin. Shark's skin has millions of v-shaped nano scales. They are called as dermal denticles.



And it is not comfortable to stay or live in this type of structure for micro-organisms, because they must bend and stretch themselves and stay here. It is like if you sit in a broken chair. So, the possibilities are less for these bacteria to grow on the shark skin. So, this structure is copied and used to make door knobs in hospitals, door handle, handles on the top of bus and train for passenger support and staircase. It prevents the growth of bacteria like staphylococcus, E-Coli, etc., which reduces the rate of infection spread in hospital and public crowded areas.

By using the pattern of this shark's skin, a company named "Sharklet" produces this pattern artificially by using plastic. By using this we can prevent the grow of algae on the bottom of ships.

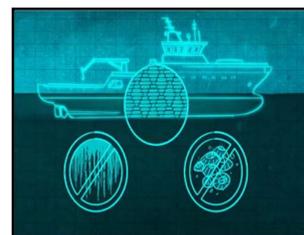


## Do you know?

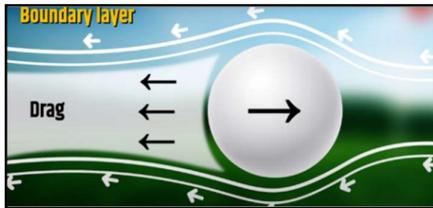
In 2008 Olympic 25 world records were made on swimming category. From these 23 world records are made by the swimmers were use a particular type of swimsuit. 98% of medal winners in swimming wear this type of swimsuit.



A company named "speedo" created a swimsuit by using this dermal denticles pattern, because this kind of pattern helps the shark to swim faster. For example, as in golf ball, if the golf ball surface was smooth and plain it forms a layer called boundary layer when it travels on air. This layer separates at one-point, low pressure will form in this point that region is called wake region.

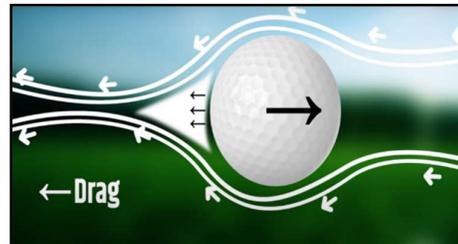


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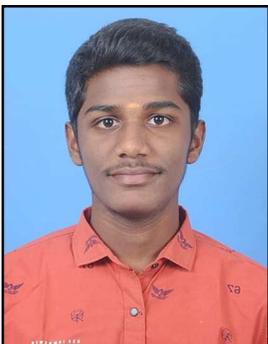


Due to this low pressure in this wake region suction will be created. It opposes the ball force, and this is called drag force. If we reduce the wake region, drag force will be reduced simultaneously in this situation. For this reason, in golf ball small circular grooves called dimples were created.

Now, this ball will the capacity to travel faster in air, the dimples in golf ball reduces the drag force & separation of boundary layer by vortex formation which in turn reduces the wake region which helps the ball to travel faster in the air.



## OLA



**Nitheesh S V**  
6405

**I Year Mech - B**

**OLA:** Ola was founded in Dec 2010 by Bhavish Aggarwal and Ankit Bhati with a mission to build mobility for a billion people. First, they started by giving the provision of cabs and the people can easily book their ride using their mobile from any place. So, at present they are in the way forward of developing an OLA scooter, which is an electric vehicle, to build comfort for the people.



**Specifications:** Ola scooter is purely electric, and it is claimed to give an average range of about 150 km per charge. It comes with an AC brushless motor of power 6000 W which is an automatic transmission and has a torque of about 50 Nm. The starting type is in two ways, either with remote start or with push start button. It comes with front and rear disc brakes, with a diameter of 200 mm and 180 mm respectively and 12-inch tubeless tyres. It has Telescopic Single shock Head stock at the front and Horizontally mounted Shock Absorber at the rear.



**Features:** It has the charging port and charging point which is offered from the company at few locations. Coming to the instrument cluster, with a beautiful 7-inch touchscreen with a digital console, clock, speedometer, tripmeter. Mobiles can be connected using Wi-Fi and through Bluetooth. It has a massive 50L boot space.



# Students Articles

Additionally, this system has an in-built app diagnostic, speakers, Android OS, charging control, Internet connectivity, Navigation, Music, Phone control, and very highlightingly, we can locate our scooter using our phone.



**OLA company words:** The company has announced that, the first initial batches of scooters will be manufactured and exported from Netherlands. It is currently being in talks with the state governments for the set-up of E-Scooter manufacturing plant with sufficient charging stations. The expected launching price is about One Lakh. The launch date is expected to be in October 2021.



**Charging plants:** They say that it will be initially set up at the city centers, business parks, malls, and other peak areas. They claim that, surely it has the capacity to charge a scooter to 50 percent in nearly 18 minutes, which would be sufficient to cover a range of around 70km. Portable home charger will be provided along with the scooter. Olympics. After that, this suit was banned in the competition. But using this we can increase the efficiency of car, ships and planes which helps in the reduction of the fuel consumption. By using this technology Lufthansa airline reduces 1% of fuel consumption. This 1% saves 900 ton of jet fuel which is equal to 94 million dollars.





# 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.

- 
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.
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  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.