

MECH TECH

DEPARTMENT OF MECHANICAL ENGINEERING
DEPARTMENT MAGAZINE

The Future of EVs: Exploring the Latest Advances in
Electric Vehicle Technologies

July 2022 Edition



AMBALIKA INSTITUTE
OF MANAGEMENT & TECHNOLOGY

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Chapter 1: Electric Vehicle Technologies and Trends

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The electric vehicle (EV) industry is growing rapidly, and the latest trends and technologies are transforming the way people move. As the world shifts towards cleaner, quieter transportation, electric vehicles and their associated technologies are becoming increasingly important. Here is a closer look at some of the latest electric vehicle technologies and trends.

Battery Technology

One of the most important electric vehicle technologies is battery technology. Electric vehicles are powered by batteries, and advances in battery technology are enabling longer ranges and faster charging times. Additionally, the development of more efficient and powerful batteries is allowing for more innovative electric vehicle designs.

Autonomous Driving

Autonomous driving is another technology that is transforming the electric vehicle industry. Autonomous vehicles are vehicles that are capable of sensing their environment and navigating without any human input. This technology is already being used by some automakers and is expected to become more prevalent in the coming years.

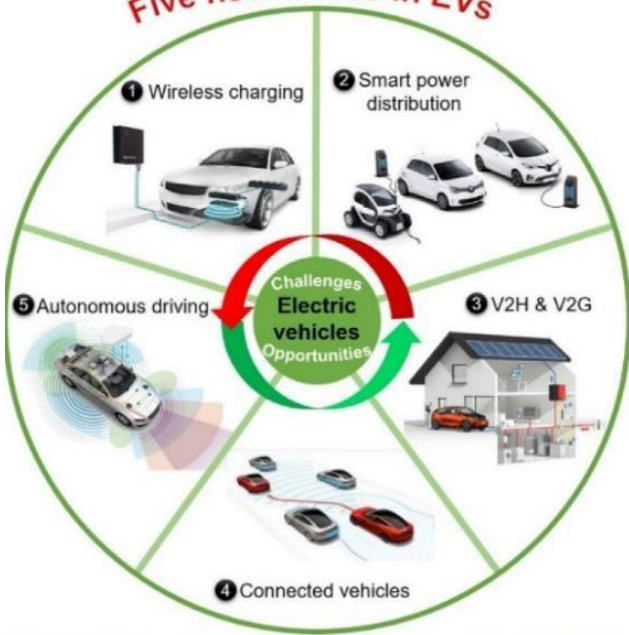
Connected Vehicles

Connected vehicles are becoming more popular as well. These vehicles are equipped with technology that allows them to communicate with other vehicles and the surrounding infrastructure. This communication can provide information about traffic, road closures, and more. Additionally, the data collected can be used to improve the performance of electric vehicles.

Electric Vehicle Charging Infrastructure

This infrastructure is essential for the widespread adoption of electric vehicles. In order to make electric vehicles more viable, charging stations must be installed in convenient locations. Additionally, the cost of charging must be lowered in order for electric vehicles to become more affordable.

Five new trends in EVs



The electric vehicle industry is growing rapidly, and the latest trends and technologies are transforming the way we move. From improved battery technology to connected vehicles and charging infrastructure, the industry is becoming more advanced. As these technologies continue to develop, electric vehicles will become more popular and will have a greater impact on the way we move.



Chapter 2: Battery Technologies for Electric Vehicles

Amit Prajapati (2003630400008), Aniket Prajapati (2003630400010)

The development of battery technology for electric vehicles is one of the most important aspects of the transition to a more sustainable future. As the demand for electric vehicles continues to grow, so does the need for advanced, efficient, and reliable battery technologies. In order to meet this demand, researchers and engineers are continuously exploring different battery technologies and developing new ones.

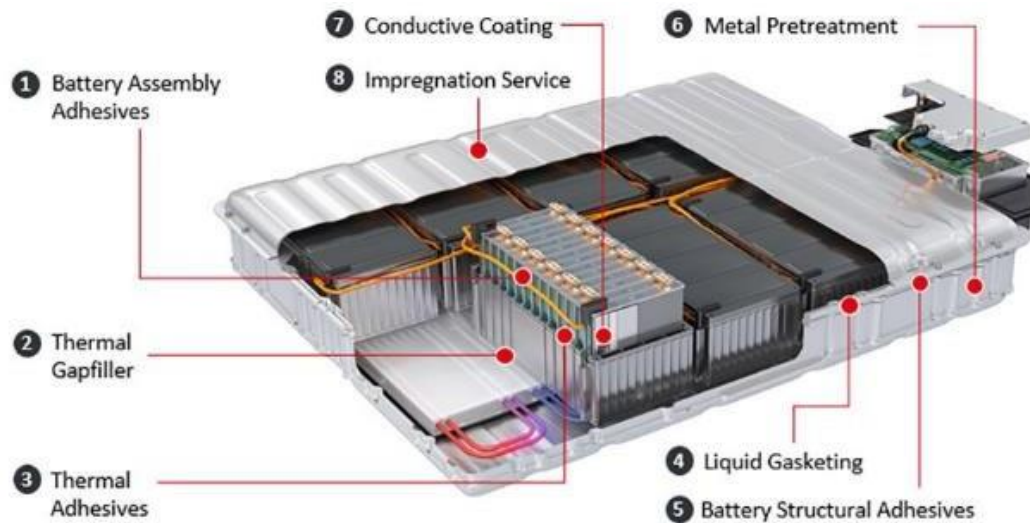
Lithium-ion batteries are currently the most widely used battery technology for electric vehicles. These batteries are lightweight, have a high energy density, and can be recharged quickly. There are a number of different types of lithium-ion batteries, and each has its own advantages and disadvantages. For example, lithium-cobalt oxide batteries are lightweight, have a high energy density, and can be recharged quickly, but they are also expensive and prone to overheating.

The next generation of battery technology for electric vehicles is expected to be solid-state batteries. These batteries are made from solid materials and are expected to be much smaller and lighter than lithium-ion batteries. They are also expected to have higher energy densities, be more durable, and be able to charge more quickly. Solid-state batteries are also expected to be much cheaper than lithium-ion batteries.

Another emerging battery technology for electric vehicles is the lithium-air battery. These batteries are expected to have a much higher energy density than lithium-ion and solid-state batteries, meaning that they can store more energy in a smaller package. They are also expected to be much cheaper than lithium-ion and solid-state batteries.

Finally, researchers are also exploring the potential of using supercapacitors in electric vehicles. Supercapacitors are able to store and release energy quickly and they can be recharged more quickly than lithium-ion and solid-state batteries.

Battery technology for electric vehicles is constantly evolving, and researchers and engineers are continually exploring different technologies in order to improve the efficiency and reliability of electric vehicles. As the demand for electric vehicles continues to grow, so does the need for advanced and efficient battery technologies.



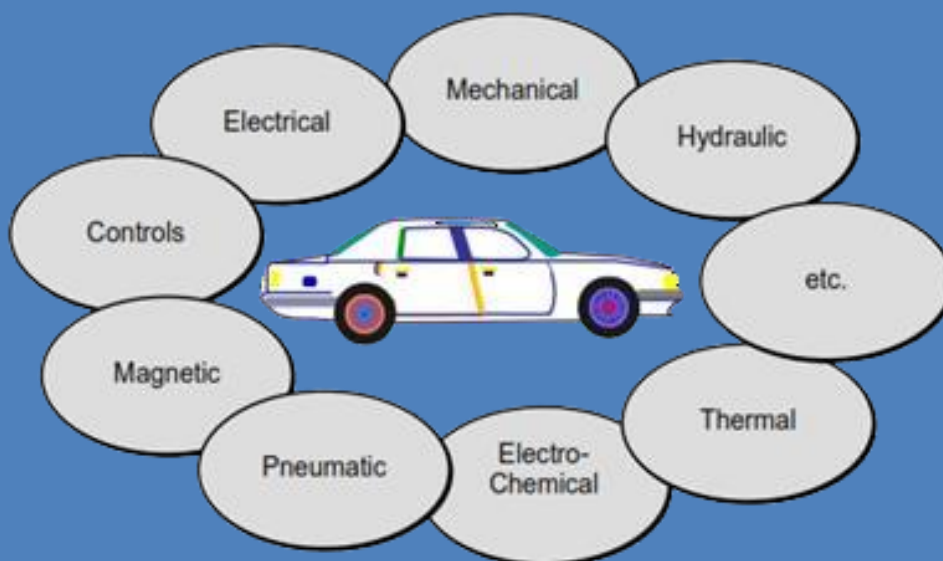
Chapter 3: Energy Efficiency in Electric Vehicles

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Electric vehicles (EVs) have been gaining in popularity in recent years, as they not only help to reduce vehicle emissions, but they also offer drivers a more efficient way to get around. As the technology continues to improve, drivers are seeing even greater energy efficiency benefits from their EVs. This article will discuss how EVs are becoming increasingly energy efficient and how drivers can benefit from this trend.

Electric vehicles are powered by an electric motor, which is significantly more efficient than an internal combustion engine. This is due to the fact that electric motors convert electricity into mechanical energy with minimal energy losses. In addition, electric motors are able to run at a consistent speed, which helps to reduce the amount of energy required to move the vehicle. This means that drivers can travel farther distances on the same amount of electricity, which can result in significant savings on fuel costs. The efficiency of electric vehicles is further increased by the use of regenerative braking. This technology captures the kinetic energy produced during braking and converts it into electricity, which can then be used to power the vehicle. By capturing this energy, drivers can increase their fuel efficiency by up to 20%. In addition to these energy efficiency benefits, electric vehicles also offer drivers other benefits, such as a quieter driving experience and less maintenance. EVs require less frequent maintenance than traditional vehicles, as they have fewer moving parts and require fewer fluids. This means that drivers can enjoy a quieter, smoother ride without having to worry about regular trips to the mechanic.

As the technology continues to improve, electric vehicles will become even more energy efficient. As the cost of electricity continues to decrease and the range of electric vehicles continues to increase, drivers will be able to enjoy even greater energy efficiency benefits. Drivers should keep an eye out for the latest developments in electric vehicle technology, as these advancements will help to make EVs an even more attractive option for those looking to reduce their environmental impact.





Chapter 4: Renewable Energy Sources for Electric Vehicles

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Electric vehicles are becoming increasingly popular, as they are more efficient and cost-effective than traditional gas-powered vehicles. The main challenge with electric vehicles is their reliance on fossil fuels, which are a finite resource. This is where renewable energy sources come in. Renewable energy sources such as solar, wind, and hydropower can provide the necessary electricity to power electric vehicles.

Solar power is one of the most accessible and cost-effective renewable energy sources. Solar panels can be installed on rooftops or other open spaces and used to generate electricity for electric vehicles. Solar panels convert sunlight into direct current (DC) electricity, which can be used to charge the battery of an electric vehicle. In addition, solar energy can be stored in batteries for later use.

Wind energy is also a viable option for powering electric vehicles. Wind turbines can be used to generate electricity from the kinetic energy of the wind. The electricity generated from wind turbines can be used to charge electric vehicle batteries. Wind energy is typically more expensive than other renewable energy sources, but it is becoming increasingly cost-effective as technology advances.

Hydropower is another renewable energy source that can be used to power electric vehicles. Hydropower works by converting the kinetic energy of flowing water into electricity. This electricity can be used to charge electric vehicle batteries. Hydropower is relatively inexpensive, but it is not always available due to access restrictions or environmental issues.

In addition to these sources of renewable energy, electric vehicles can also be powered by biomass. Biomass is organic material such as wood, crops, and animal waste, which can be burned to produce heat. This heat can be used to generate electricity, which can then be used to charge electric vehicle batteries.

Overall, renewable energy sources are becoming increasingly popular as a way to power electric vehicles. Solar, wind, hydropower, and biomass are all viable options for electric vehicle owners. Renewable energy is more sustainable than fossil fuels, and it can help reduce greenhouse gas emissions. Additionally, renewable energy sources are usually more cost-

effective and accessible than fossil fuels. As technology advances, renewable energy sources are becoming an increasingly viable option for powering electric vehicles.



Chapter 5: Autonomous Driving Technology for Electric Vehicles

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The development of autonomous driving technology for electric vehicles has revolutionized the automotive industry in recent years. Autonomous driving technology, also known as self-driving technology, is a type of Artificial Intelligence (AI) that enables a vehicle to drive itself without the intervention of a human driver. It has been used in a variety of applications, including in electric vehicles, to improve safety, reduce fuel consumption, and increase overall efficiency.

Autonomous driving technology for electric vehicles is based on a combination of sensors, cameras, and computer algorithms. The technology uses a range of sensors and cameras to detect objects in the vehicle's path, such as other vehicles, pedestrians, and animals. It then uses algorithms to interpret the data from these sensors and cameras to make decisions about when to accelerate, brake, and turn. In addition, the technology can also detect road signs, traffic lights, and other potential hazards.

The use of autonomous driving technology for electric vehicles has several benefits. One of the main advantages is improved safety. Since the technology can detect potential hazards and make decisions about when to brake or accelerate, it can help reduce the risk of collisions and other accidents. This can ultimately help save lives and reduce the cost of insurance premiums.

Another benefit of the technology is increased fuel efficiency. Autonomous driving technology can help reduce fuel consumption by optimizing the vehicle's speed and route. This can reduce the amount of fuel required to travel a certain distance, resulting in lower overall operating costs.

Finally, autonomous driving technology can help reduce traffic congestion. By optimizing the route and the speed of the vehicle, the technology can help reduce traffic jams and make the roads safer. This can help improve overall traffic flow and reduce the amount of time it takes to travel from one location to another.

Overall, autonomous driving technology is revolutionizing the automotive industry and has the potential to make roads safer, reduce fuel consumption, and reduce traffic congestion. In the future, autonomous driving technology is likely to become even more advanced and could potentially be used in a variety of industries, including transportation, logistics, and healthcare.



Chapter 6:Automotive Safety Systems for Electric Vehicles

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The rise of electric vehicles has revolutionized the automotive industry, and safety is a major concern for those considering making the switch to electric. Fortunately, electric vehicle safety systems are designed to reduce the risk of collisions and provide peace of mind to drivers.

One of the most important safety systems on electric vehicles is the regenerative braking system. This system captures the energy generated when the brakes are applied and converts it into electricity that can be stored in the car's battery. This helps to reduce the wear and tear on the brakes, and it also helps to extend the range of the vehicle.

Another important safety system is the battery management system. This system monitors the state of the battery and ensures it is operating within optimal parameters. It will alert the driver if the battery is low or if it needs to be recharged. It also helps to ensure that the battery remains safe and does not overheat or become damaged.

Autonomous emergency braking (AEB) is another important safety system on electric vehicles. This system uses a combination of sensors and cameras to detect potential obstacles and automatically apply the brakes if necessary. This helps to reduce the risk of a collision, and it can even help to avoid a collision altogether.

Finally, electric vehicles are typically equipped with a range of sensors that can detect potential hazards. These sensors can detect objects in the road ahead, such as animals, pedestrians, and other vehicles. They can also detect hazards on the side of the road, such as potholes and other obstacles. If a potential hazard is detected, the vehicle will alert the driver and take appropriate action to avoid it.

These are just some of the safety systems that are available on electric vehicles. As technology advances, even more advanced safety systems will become available, and electric vehicles will become an even safer way to get around.



Chapter 7: Electric Vehicle Charging Infrastructure



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With electric vehicles becoming increasingly popular, the need for a reliable electric vehicle charging infrastructure has become even more important. Charging infrastructure is essential for ensuring that electric vehicles are able to travel long distances and stay on the road. This is especially important in light of the current push to reduce greenhouse gas emissions and promote electric vehicle adoption.

The charging infrastructure consists of both public and private charging stations. Public charging stations are available for use by anyone driving an electric vehicle, and they are typically located at locations such as retail stores, malls, and other public spaces. Private charging stations are usually installed in the home or office, and are designed to be used exclusively by the owner of the electric vehicle.

In order to ensure that electric vehicles can be charged in a reliable and safe manner, there are several standards that must be met. The first is the SAE J1772 standard, which is an industry-standard for the connection of electric vehicles to charging stations. This standard is necessary to ensure the safety of both the vehicle and the charging station. The second is the IEC 61851-1 standard, which sets out the requirements for the installation of electric vehicle charging equipment. This standard ensures that the charging equipment is properly installed and can handle the power requirements of the vehicle.

In addition to these standards, there are also other measures that can be taken to ensure that electric vehicles can be charged safely and reliably. For example, many electric vehicle charging stations now offer smart technology that can identify the type of vehicle being charged and adjust the power output accordingly. This helps to prevent overcharging, which can lead to damage to the battery and other components.

Finally, electric vehicle charging infrastructure can be improved by the installation of charging stations in convenient locations. This means that drivers can easily access charging stations while they are driving, and it can reduce the amount of time they need to wait for their vehicle to charge. This can be especially beneficial in areas where electric vehicle adoption is still relatively low.

Overall, it is clear that electric vehicle charging infrastructure is essential for the success of electric vehicles. By ensuring that the necessary standards are met and that charging stations are installed in convenient locations, drivers can enjoy a reliable and safe electric vehicle charging experience.



Chapter 8 Design and Manufacturing of Electric

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Electric vehicles have been gaining in popularity in recent years due to their environmental benefits. The design and manufacturing of electric vehicles requires a significant amount of research and development in order to make them efficient, reliable and affordable. In this article, we will discuss the different aspects of the design and manufacturing of electric vehicles.

First, engineers must create the vehicle's powertrain. This consists of the electric motor, power electronics, battery pack, and the other components necessary to convert the stored energy from the battery into usable power. The motor must be powerful enough to propel the vehicle, yet efficient enough to conserve energy. The power electronics must be designed to convert AC power from the grid into DC power for the motor, as well as to control the amount of power delivered to the motor. The battery pack must be designed to store enough energy to power the vehicle, and must be able to withstand the demands of the electric motor.

Second, engineers must create the vehicle's chassis. This includes the frame, suspension, wheels, and other components necessary to provide a safe and comfortable ride. The frame must be designed to support the weight of the vehicle, including the battery pack. The suspension must be designed to absorb shocks and vibrations and to keep the tires in contact with the ground. The wheels must be designed to provide traction and to reduce rolling resistance.

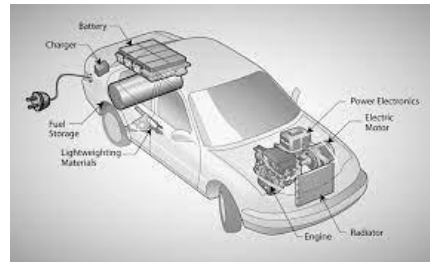
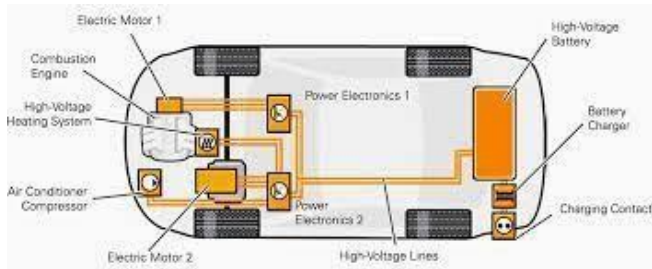
Third, engineers must design the vehicle's aerodynamics. This includes the shape of the body and the design of the air intakes, exhausts, and other components necessary to reduce drag and improve fuel efficiency. The shape of the body must be designed to reduce turbulence and to direct air flow around the vehicle. The air intakes and exhausts must be designed to control the flow of air, which can affect the performance of the powertrain.

Finally, engineers must create the vehicle's interior. This includes the dashboard, seats, and other components necessary to provide a comfortable and enjoyable ride. The dashboard must be designed to provide easy access to the vehicle's controls and to provide the driver with vital information such as speed and fuel levels. The seats must be designed to provide proper support and comfort while driving.

The design and manufacturing of electric vehicles is a complex process that requires a great deal of research and development.



It is important for engineers to consider all aspects of the vehicle's design, from the powertrain to the aerodynamics. By doing so, they can ensure that the vehicle is efficient, reliable, and affordable.



Chapter 9: Electric Motor Technologies for Electric Vehicles

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The electric motor is at the heart of any electric vehicle (EV). It is the part that converts electricity into motion, allowing the car to move. Electric motor technologies have advanced to make them increasingly more efficient and powerful. In this article, we will explore some of the most common electric motor technologies used in electric vehicles.

The first type of electric motor used in electric vehicles is the brushed DC motor. This is the most basic type of motor and is used in many small electric vehicles. It uses two sets of coils, one for the armature and one for the field, to create a magnetic field. As the current flows through the armature, the field magnets cause the armature to spin, generating a torque which can be used to move the vehicle.

Another common electric motor technology used in electric vehicles is the brushless DC motor. This type of motor uses permanent magnets instead of field coils to generate the magnetic field. This design is more efficient than the brushed DC motor and can generate more torque for a given size. This makes brushless DC motors ideal for higher-performance EVs.

The third type of electric motor technology used in electric vehicles is the switched reluctance motor. This motor uses two sets of coils, both of which are connected to a stator. As the current flows through the coils, it creates a magnetic field which causes the rotor to spin, generating a torque which can be used to move the vehicle. This type of motor is more efficient than the other two types, and can be used in higher-performance EVs.

Finally, the fourth type of electric motor technology used in electric vehicles is the induction motor. This is a type of asynchronous motor, which means that the rotor does not need to spin at the same speed as the stator. This makes the motor more efficient, and it can generate more torque for a given size. This makes induction motors ideal for higher-performance EVs.

Electric motor technologies have advanced significantly in recent years, making them more efficient and powerful. By understanding the different types of electric motor technologies used in electric vehicles, you can gain a better understanding of how they work and how they can be used in your own EV.



Chapter 10: Energy Storage and Management for Electric Vehicles

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The use of electric vehicles (EVs) is rapidly growing, driven by advances in technology, an increasing public focus on environmental issues, and the availability of incentives. As more people adopt EVs, efficient energy storage and management systems become increasingly important. Such systems enable efficient use of renewable energy sources and enable smoother integration of EVs into the power grid. This article will discuss the key components of energy storage and management systems for EVs and their importance in modern transportation.

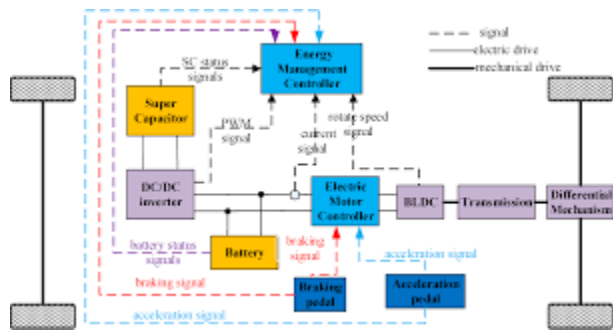
At the heart of energy storage and management systems for EVs is the battery. This is the component that stores the energy that powers the EV, and it is the key to achieving an efficient and reliable system. Most EV batteries are composed of one or more cells, each containing a certain amount of energy. The cells are connected together in a series or parallel configuration to make up the total energy capacity of the battery. Batteries are typically designed to last for several years, but their performance and lifespan can be improved through proper maintenance and use.

The second component of energy storage and management systems for EVs is a charging system. This system connects the battery to an energy source, such as a wall socket or a renewable energy source. This allows the battery to be recharged when needed, thereby extending its life. Charging systems can vary significantly, from simple wall sockets to more complex systems that use sophisticated algorithms to optimize charging times and efficiency.

The third component of energy storage and management systems for EVs is the power electronics. This includes the motor controllers, inverters, and other components that control the flow of power between the battery and the motor. Power electronics are essential for ensuring the efficient and reliable operation of the EV.

Finally, energy storage and management systems for EVs also include the software that controls the system. This software can be used to monitor the state of the battery, optimize charging times, and manage the flow of energy between the battery and the motor. It can also be used to provide feedback to the driver, indicating the current battery status, as well as the estimated range of the EV.

Energy storage and management systems for EVs are essential for efficient and reliable operation. They enable the use of renewable energy sources, allow for smoother integration of EVs into the power grid, and enable reliable and efficient operation of the EV. By understanding the key components of these systems, and how they work together, it is possible to ensure that EVs remain an efficient and reliable form of transportation.



Messages

Executive Director's Message



It gives me immense pleasure to introduce our Technical Magazine “MechTech” from Dept. of Mechanical Engg will be published quarterly. Our students are very innovative and ever eager to learn new concepts. Apart from teaching, our faculty members are deeply engaged in research work. Our faculty and students regularly present their research findings in various academic conferences. It will help the documentation culture of the institute. One of our greatest strength is our highly qualified and dedicated faculty members and staff. I congratulate the editorial team, faculty, staff members and students for their contribution in the maiden issue of “MechTech”. It is an attempt of the Technical Magazine to acquaint its readers with the Technological Updation in the field of Mechanical Engg.

Mr. Ambika. Mishra

Executive Director

Ambalika Group of institutes

Director's Message



I feel honored and grateful to start the fourth edition of our Technical Magazine “MechTech” from Dept. of Mechanical Engineeringg.. This magazine will serve to reinforce and allow an increased awareness in the field of Mechanical Engineeringg and an improve interaction among all of us. It will not only serve the objective of creating responsiveness but will give a platform to new ideas, progress and creativity. I do hope that it will

encourage faculty, students and others to contribute regularly in making our newsletter a success and may it acquire great heights in the years to come.

Dr. Alok Mishra

Director

Ambalika Institute Of Management & Technology

HOD 's Message



We are delighted to introduce our department and share with you all the exciting things happening in Mechanical Engineering. Our department is committed to providing students with an excellent educational experience that prepares them for successful careers in engineering. Our faculty members are dedicated to excellence in teaching, research, and service. Our students are engaged in innovative projects that are making a difference in the world.

Our department offers a wide range of courses, including design and analysis of mechanical systems, robotics, materials science, and energy conversion. We also have several research laboratories that are working on projects related to KUKA, Robotics, CNC and 3D printing. Our students have access to state-of-the-art facilities and equipment, including a 3D printer, and Automobile Lab.

We invite you to learn more about the Mechanical Engineering Department and the exciting opportunities available to our students. Thank you for your interest in our department!

Mr. Anup Kumar Singh

Head

*Department of Mechanical Engineering
Ambalika Institute Of Management & Technology*

Chief Editor 's Message



We are proud to present our latest issue of the Mechanical Engineering Technical Magazine. This issue is packed with cutting-edge research and development in the field. We hope that this magazine will help you stay up-to-date with the latest trends and advancements in mechanical engineering. We would like to thank our dedicated team of writers and editors who worked hard to make this magazine possible. We are also thankful for the generous support of our sponsors, who made this publication possible. We hope that you enjoy this issue of the Mechanical Engineering Technical Magazine and find it to be a valuable resource in your professional journey.

Madhur Prakash Srivastava,

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