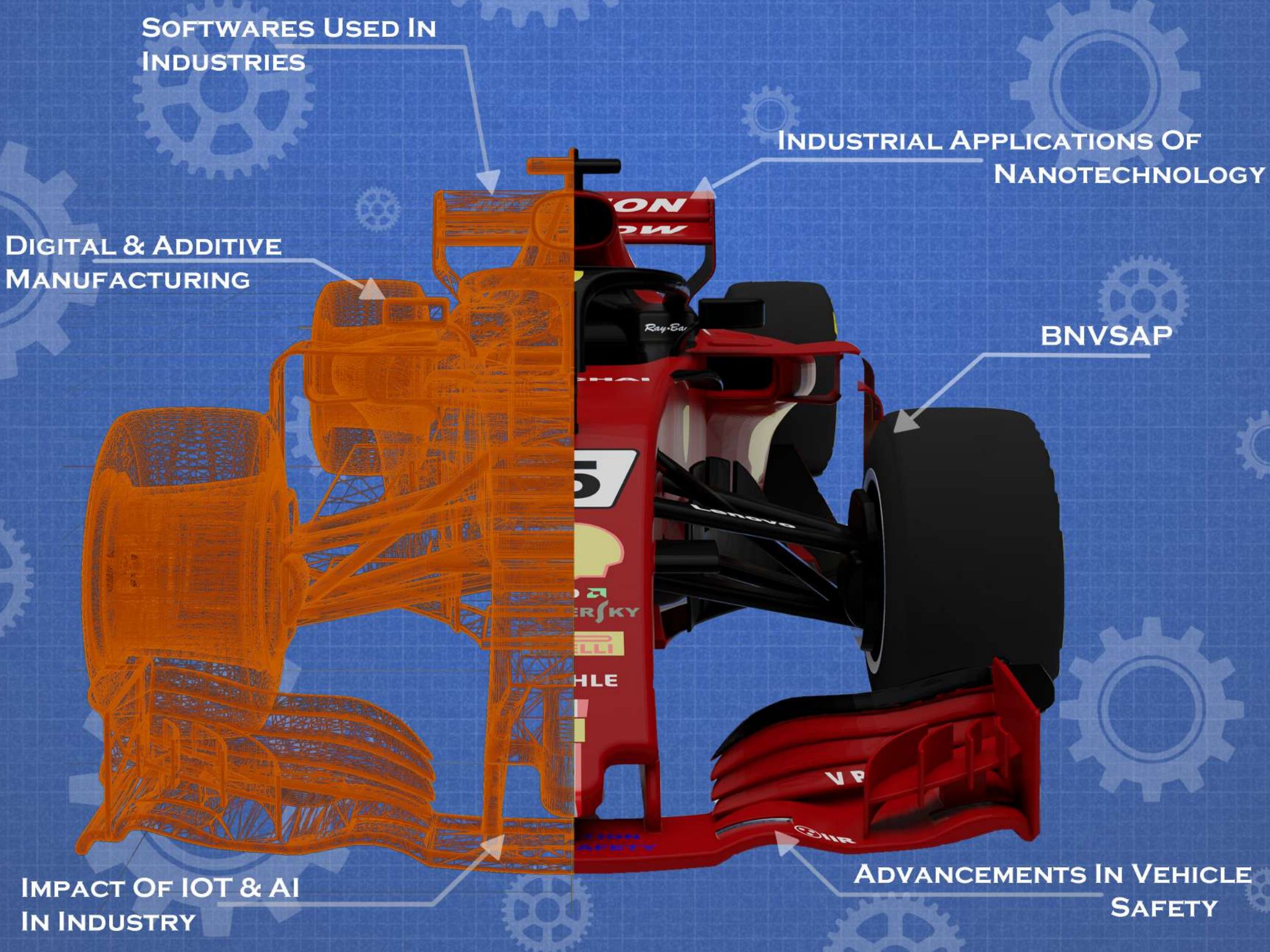
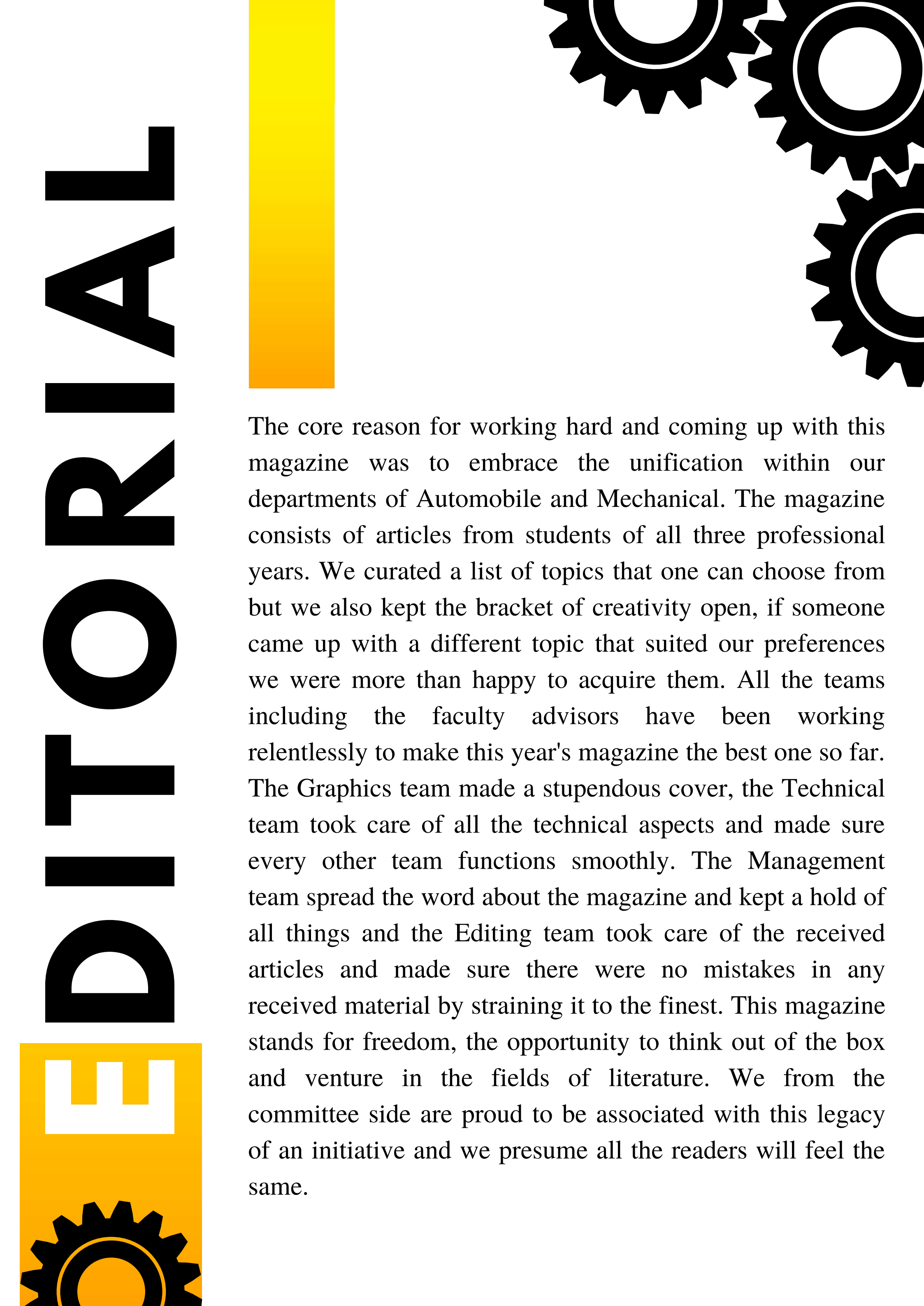


PCE JOURNAL OF MECHANICAL & AUTOMOBILE ENGINEERING



TRIAL R O T I D



The core reason for working hard and coming up with this magazine was to embrace the unification within our departments of Automobile and Mechanical. The magazine consists of articles from students of all three professional years. We curated a list of topics that one can choose from but we also kept the bracket of creativity open, if someone came up with a different topic that suited our preferences we were more than happy to acquire them. All the teams including the faculty advisors have been working relentlessly to make this year's magazine the best one so far. The Graphics team made a stupendous cover, the Technical team took care of all the technical aspects and made sure every other team functions smoothly. The Management team spread the word about the magazine and kept a hold of all things and the Editing team took care of the received articles and made sure there were no mistakes in any received material by straining it to the finest. This magazine stands for freedom, the opportunity to think out of the box and venture in the fields of literature. We from the committee side are proud to be associated with this legacy of an initiative and we presume all the readers will feel the same.



It gives me great pleasure to present the June 2021 Edition of the “Journal of Mechanical & Automobile Engineering.” In the true sense of the term, it provides a strong desire to express one's opinion and is a venue for students to showcase their abilities.

Pillai College of Engineering has always been committed to developing professional engineers who are environmentally conscious and responsible citizens. Our students display a professional attitude by diligently, keeping themselves updated with the latest technological advancements and innovations, not only in India, but also in and around the globe. Our college has embarked on a progressive endeavour to dispense high-quality education, hands-on training and collaboration with businesses and social organisations.

The Journal is not only informative, but it is also educational with unique, interesting and enriching technical articles, that bring value and quality to it. A word of advice to those who have contributed to the magazine: ‘Keep writing articles; it is a skill that can be honed over time.’

I would like to congratulate the co-ordinators, student members, and editorial board for their insightful contributions and amazing accomplishment.

Best wishes for all your future endeavours.

- Dr. Sandeep Joshi
Principal, Pillai College of Engineering



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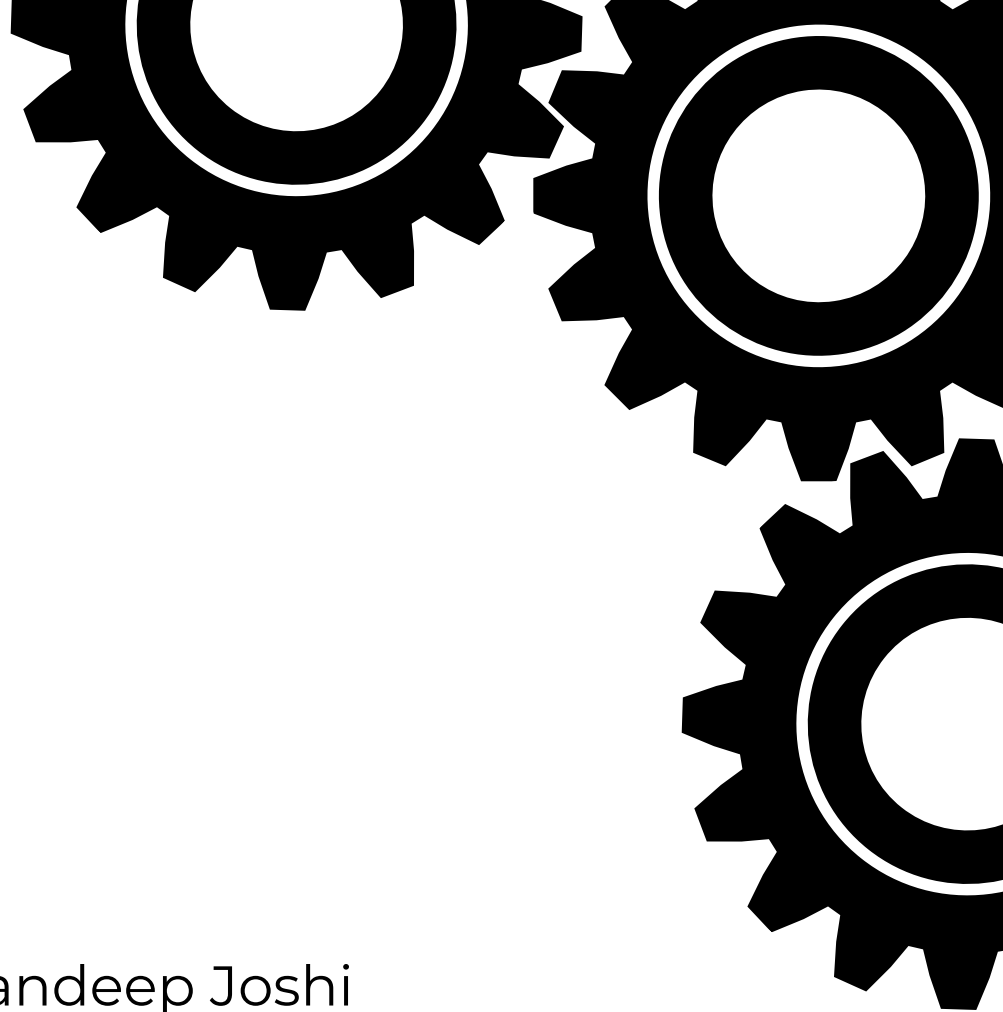
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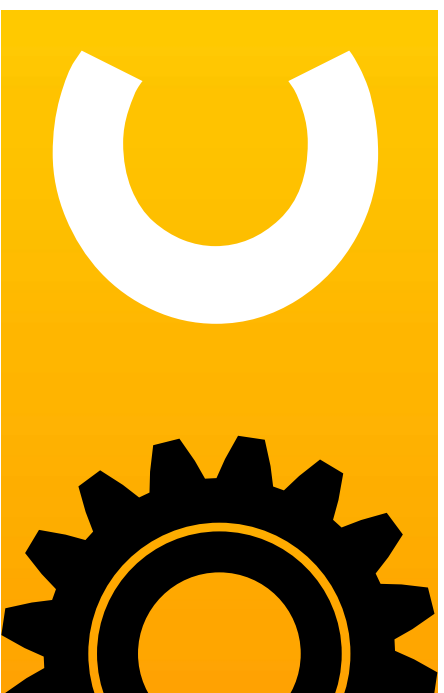
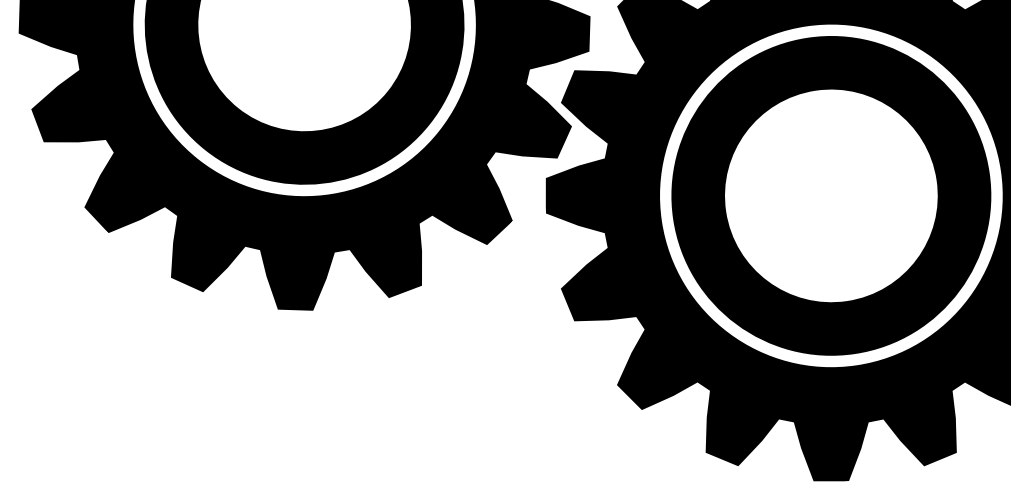
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E -WASTE MANAGEMENT AND ITS INFLUENCE

Mr. Hari K Menon, Mr. Ninad More and Mr.Thrayesh Namboodiri

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In today's novel world, one of the biggest problems that we face on a day-to-day basis is the elephantine task of waste management. It is estimated that 2.01 Billion tonnes of waste are generated globally, annually, i.e., an average of 0.74 kilograms of waste generated per person per day. And at least 33 percent of that is not managed in an environmentally safe manner, which does not aid our fight for a cleaner planet. Out of the 2.01 billion tonnes, India produces 277.1 million tonnes of solid waste every year. This number is estimated to hit 387.8 million tonnes by 2030.

E-Waste, constituting waste generated from household appliances, broken electrical or electronic goods, use and throw batteries, etc, takes up 53.7 Million tonnes of the 2.01 Billion tonnes of waste generated. India generates 10,14,961 tonnes of E-Waste according to the figures obtained for 2019. Some of the equipment forming E-Waste contains toxic substances such as mercury, beryllium, lead, cadmium, etc, which poses a significant threat to human, animal and plant lives as well as the surrounding environment.

It is necessary to review the public health risks and strategies to combat this growing menace.

In this article, we'll answer some of the questions that may arise in one's mind such as What e-waste is? How can we manage it? And What are some of the benefits of recycling E-Waste?.

1. Sources of E-Waste: -

The sources of E-Waste can be traced back to the following categories:

- Temperature exchange equipment: this includes refrigerators, freezers, air conditioning systems, etc.
- Screen Monitors: Items like televisions, laptops, computers are placed in this category
- Lamps: Fluorescent lamps, high intensity discharge lamps, LEDs etc. These cannot be fixed and need to be replaced.
- Smaller Equipment: These are equipment such as vacuum cleaners, calculators, video cameras, etc.
- Larger Equipment: Scraped washing machines, electric stoves, copying equipment and their replaced parts make a decent amount of waste.
- Small Communication equipment: Mobile Phones, GPS', etc, form this category and the waste produced by these equipment are increasing day by day.



II. Benefits and drawbacks of Recycling: -

Now that we know what the sources of E-Waste are, let us take a look at what we can do about it, and what steps are being taken and have been undertaken. It is evident that recycling and salvaging some useful material from the waste is the solution.

Many people are unaware of the useful things that can be recovered by recycling the electronic goods, and instead they simply dispose of them. A mobile phone for example has 25% Copper and other components, 10% other metals and 3% Iron, according to a study by the World Economic Forum. In 2016, the estimated value of recoverable materials in global e-waste was \$64.6 billion, but only 20 percent of it was properly recycled to enable recovery of the valuable materials. The rest of it is dumped into landfills and many toxic chemicals can leach from the waste and contaminate the area nearby.

There are several materials in an electronic body which can be recycled and used to make new goods, such as copper and gold. GCL GROUP which is an international recycling and trading group specializing in all aspects of the electronic wastes and metals recovery recovers more than 400 kg of gold, 450 tons of copper, 2000 kg of silver in a year from the electronic waste collected. A start-up in New Zealand MINT Innovation has developed a low-cost biotech process for recovering valuable materials. The metals which will be recovered will then be sold back to jewellers and manufacturers. Gold from the components can be melted and reused as an ornament.

Recycling of E-Waste can also increase employment opportunities, as there will be more e-waste recycling facilities and also lower landfill space.

Proper or formal e-waste recycling usually involves disassembling the electronics, separating and categorizing the contents by material and cleaning them. Items are then shredded mechanically for further sorting. Companies must adhere to health and safety rules and use pollution-control technologies that reduce the health and environmental hazards of handling e-waste.

Usually, they do not wear protective equipment and lack any awareness that they are handling dangerous materials. Research has found that inhaling toxic chemicals and direct contact with hazardous e-waste materials result in increases in spontaneous abortions, stillbirths, premature births, reduced birth weights, mutations, malformations and many other health risks. In addition to its health hazards, informal recycling can pose security risks, because while formal recyclers in the developed countries usually require wiping the devices clean of data, informal recycling does not.

III. Alternative Solutions: -

With an increasing amount of E-Waste being generated every day, recycling alone cannot reduce the effects that large amounts of E-Waste tends to create. A solution to this can be designing better products. Products that last longer have multiple applications, and give good results will decrease the amount of electronic equipment required for a specific purpose and in turn will reduce the amount of waste generated.

Another solution can be to make products fixable by the consumers themselves with fewer tools and knowhow required. We the citizens, along with assistance of the government and city administration can also help. By just being responsible we can reduce waste generated along with its toxic effects.



We should not dump small gadgets and electronic equipment such as batteries, into our garbage bins. They should be properly disposed of, separated from the daily waste and if possible recycled. The path for this has to be paved by the government and city administration. Providing more convenient recycling options is also an important step towards this. Such as kiosks in which recyclable objects can be put, which will be sorted and automatically sent to its recycling units. This is being implemented currently in many countries of the world. Indian government is also planning to set up three electronic waste parks for dismantling and recycling used products. Officials are preparing a plan on how the parks are to be built following directions from the principal scientific advisor to the Centre.

IV. Conclusion: -

E-Waste management is a great challenge for governments developing countries such as India. This is becoming a huge public health issue and is exponentially increasing by the day. The aim of writing this article was not just to educate the readers about E-waste, its management and its influences, but also to urge the citizens to willingly take part in working together towards a better and cleaner future, with the goal of a circular economy, one that aims to keep products and all their materials in circulation at their highest value at all times.

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Formula One Turbo Hybrid Era

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Since the dawn of motorsport Formula One has been the most prestigious and expensive motorsport. The Pinnacle of Motorsport. Motorsport from its beginning never has been an environmentally sound sport. The carbon footprint of modern Formula One is 2,56,000 tonnes per year, which is equivalent to 30,000 houses in the UK per year. To reduce this gigantic carbon footprint of a Formula One car, the association opted for a new powertrain in 2014 which was 50% more efficient than the powerful V-10 engines. Then, F1 boss, Bernie Ecclestone announced the switch from 2.6 litres V-8 engines to 1.6 litres V-6 hybrid engines with a lower rev limit of 15,000 rpm and the turbocharger.

Each car is fitted with a 1.6 litre of a turbocharged gasoline engine which produces 700 horsepower combined with an electric motor which adds another 200 horsepower. The previously used motor-generator unit which was optional KERS (Kinetic Energy Recovery System) was improved and renamed to MGU-K (Magnetic Generator Unit-Kinetic), the other motor-generator unit MGU-H (Magnetic Generator Unit-Heat). The biggest achiever in this hybrid era is Mercedes-AMG Petronas winning all the last 7 constructors and drivers championship with the most powerful engine (870 hp).

MGU-K harvests the thermal energy produced by the kinetic energy while braking, with MGU-K this lost kinetic energy, can be recovered and stored as electric energy in the battery, which can be

used later to power the motor during acceleration at long straights thus increasing the overall pace of the car. Maximum revolutions are limited to 50,000 rpm and its output to 120 kW. The amount of energy allowed to store is 2MJ (0.56 kWh) per lap, Modern F1 cars need to brake around 16.7 sec per lap to achieve this maximum charge.

Engineers tirelessly monitor the balance between energy harvest, energy deployment, and fuel burn in the garage and pit wall. Although the modern Formula One engines are complicated and fast overtaking has been reduced a lot compared to the V-8 era.



MGU-H captures the thermal energy generated from the exhaust gases from the engine, this thermal energy is also used to generate electric energy which is stored in the battery. Current regulations allow the electricity generated in MGU-H to be directly fed in MGU-K. Modern F1 cars heavily rely on the power generated by these electric units. MGU-H solves the problem of turbo lag by using a motor to power the compressor.

The energy flow of these units is controlled by the ERS (Energy Recovery System). It determines how the two MGU's perform under rapidly changing environments and ever so changing driving conditions. IT includes AC/DC and DC/AC converters. Drivers can harvest energy whilst braking which is indicated by a red light at the rear of the car and deploy this energy whenever they need an extra boost of horsepower. A total of 4MJ is available to the drivers from the ERS system for a given lap. This translates to about an additional 160HP for 33 seconds per lap.

These technical innovations in motorsport allow the development of road cars. One example of such is Mercedes-AMG One which is inspired by the MGU system used in Formula One.



Future of Formula One engines- As Formula One vows towards reducing its carbon footprint furthermore and going carbon neutral by 2030 and also having sustainable races by 2025. In 2020, the FIA (Fédération Internationale de l'Automobile) announced that it had developed a 100% sustainable fuel and the testing process by engine manufacturers has already begun and is intended to be used by 2026. For now, the combustion engines would be the heart of Modern Formula One cars, although from 2020 MGU-K would be even more powerful raising its rev limit by 3000 rpm and the complex MGU-H would be abandoned to attract more Engine Manufacturers, A further proposal to allow use for four-wheel drive cars are also made with front axle driven by an MGU-K unit.

A statement issued by the FIA states: "The definition of the objectives for the next generation of an F1 car and Power Unit is of the utmost importance to the FIA and Formula 1, and together with teams and Power Unit manufacturers, there is strong alignment on the overall goals – particularly the need to reduce cost and reach carbon neutrality." Formula One is indeed aimed towards using more Electric technologies in the future.

Usually, they do not wear protective equipment and lack any awareness that they are handling dangerous materials. Research has found that inhaling toxic chemicals and direct contact with hazardous e-waste materials result in increases in spontaneous abortions, stillbirths, premature births, reduced birth weights, mutations, malformations and many other health risks. In addition to its health hazards, informal recycling can pose security risks, because while formal recyclers in the developed countries usually require wiping the devices clean of data, informal recycling does not.

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**PILLAI COLLEGE OF
ENGINEERING**

Industrial Applications of Nanotechnology

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Since its introduction to the world by renowned physicist Richard Feynman in 1959, nanotechnology has always been a threat that disrupted all other technologies in the market. It has been one of the major sources which have driven technologies and businesses in this century and is known to have the potential for discoveries of even higher performing materials, intelligent systems, and new production methods with significant impact for all aspects of society. The wide range of applications has truly been one of a kind and has encouraged a great amount of research and investment. Consumer goods, including cosmetics, sports, textiles, and coatings.

There are many applications of Nanotechnology which are unfamiliar to a majority of people but various researchers are making ground breaking discoveries in order to use Nanotechnology in whereabouts beyond imagination and it has shown considerable potential for the same.

- Construction, including cement, steel, wood, glass, coating, and fire protection.
- Military, including biological sensors, uniforms, communications equipment, medical systems, and weapons.
- Energy, including solar cells, hydrogen fuel cells and nanographene batteries.
- Health, including nanobiotechnology and nanomedicine.

Some other industries are aerospace and automotive, catalysis, foods and nanoelectronics. As the development of nanotechnology would progress, the ever-growing list of industries would keep on increasing at a tremendous pace.

I. Nanobiotechnology: -

Nanobiotechnology can simply be defined as the application of nanotechnologies, the manipulation of materials on an atomic or molecular scale, in biological fields. While biotechnology deals with metabolic and other physiological processes of biological subjects, including microorganisms, nanobiotechnology can play a crucial role in researching, developing, and implementing many useful tools in the study of life and improving the current devices and methodologies in the biology domain. It has the potential to not only advance medical science, thereby improving health care practices around the world, but also contribute significantly to other fields such as engineering, physics, and chemistry.



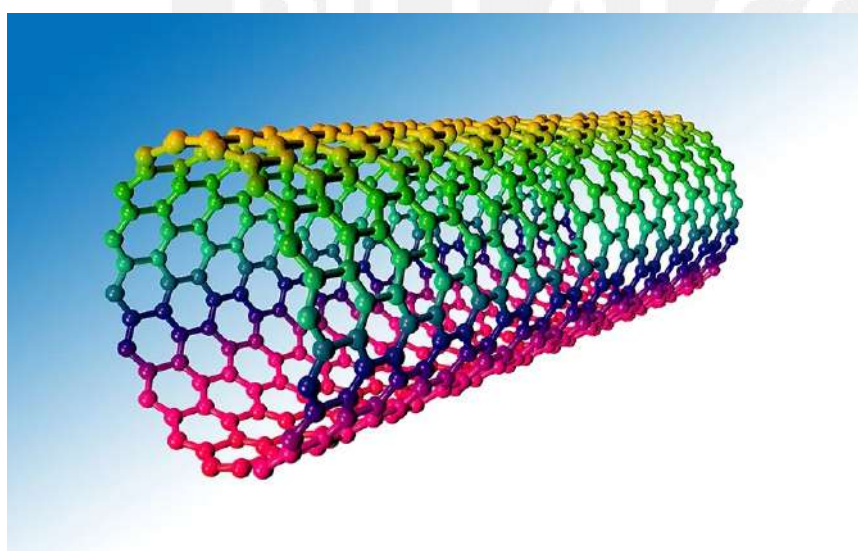
Nanobiotechnology is best known to be helping the advancement of modern medicine. It can treat symptoms, generate cures and can even regenerate biological tissues. The United States has been active in the research and development of nano biotech. The patients in the US have received whole cultured bladders with the help

of especially skilled doctors who use nanobiology techniques in their practice. Nano biotech in animal studies demonstrated that an offspring can be produced by growing a uterus outside the body and then placing it in the body to produce an offspring.

Another example of current nanobiotechnological research involves nanospheres coated with fluorescent polymers, where researchers are seeking to design polymers, whose fluorescence is quenched when they encounter specific molecules. Different polymers would detect different metabolites. This technology might someday lead to particles which could be introduced into the human body to track down metabolites associated with tumours and other health problems. A future application of this technology can allow people to have new limbs without having to resort to prosthesis.

II. Carbon Nanotubes: -

Carbon Nanotubes often abbreviated as CNTs are cylindrical shaped molecules consisting of layers of Carbon sheets which are rolled up in its structure made up of sp^2 bonded graphene. This material is well known for its outstanding thermal conductivity, excellent tensile strength, and lightweight characteristics.



These nanotubes can be either single walled (SWCNT) or Multi-walled (MWCNT) with multiple rolled sheets linked in a concentric manner. With increased wear resistance, breaking strength, its antistatic properties along with its weight reduction capabilities, these are being planned to be used in future Aircrafts and Space shuttle missions, making it a trending material for

the researchers and they consider it the most efficient alternative for several other conventionally used materials in widespread applications making it ideal to be used for biosensors, hydrogen storage cells, electronic devices, and for other electrical shielding applications.

These can be even used in synthetics as additives and are also being used to spun into fibres. Currently methods such as Chemical Vapor Deposition (CVD) and Laser ablation of graphite are being used for producing CNTs and has also held its place tight for several experiments in future in the field of technology as catalyst, Transistors, Sensors, Nano inks, electrodes, displays, Optoelectronic and photonic applications Nano filtration methods and in Nano biotechnology.

III. Nanoelectronics: -



Nanoelectronics is a term upon which the world of science has put its spotlight on. It refers to the use of technology to scale and produce electrical components which are only up to a few nanometres in size covering a diverse set of devices and materials. Its physical and mechanical properties are a result of inter atomic interactions and quantum effects like tunnelling and atomic disorders. However, manufacturing such small scaled complex electronics is indeed challenging. From a journey which started in 1947 when the first transistors were built which was over a centimetre in size, due to the enormous technical advancements, the world is now witnessing the smallest working transistor today which is about 7 nanometres long i.e., over

1.4 million times smaller than the very first one. In the past couple of decades, nanoelectronics have also played a vital role in the evolution of data storage solutions and in the study and exploitation in the electron spin and the magnetic moment associated known as Spintronics. It has great contributions in Quantum Computing technology. Optoelectronic devices like nanofibers that use light as its source have proved its eligibility in future research subjects being the most energy efficient methods used in data transmission and textiles.

Displays are a part of our lives which have changed the ways we humans interact with the world. The advancement in nanotech displays is responsible for the remarkable evolution from Monochrome LCD panels to the magnificent Quantum UHD OLED 8K display panels on the walls of our living rooms these days. In contrast to regular LEDs that were used, the emissive electroluminescent layer of an OLED consists of a thin film of organic compounds and are thinner than comparable LEDs. These also introduced printable and flexible, even rollable displays of all sizes. All these nanotechnologies that we see today are results of the demand of mankind to incorporate and attain the maximum efficiency which can be harnessed even from the smallest piece of hardware used. This shows us how it leads the way towards making our lives better and easier day by day. As Bill Gates once said, "The advance of technology is based on making it fit in so that you don't really even notice it, so it's part of everyday life."

IV. Nano Medicine: -



Nanomedicine is looked upon as a pathway to enable curing and treating incurable diseases known to mankind, the medicines are not only meant to cure the disease but also help regenerate the damaged cells to heal them internally and avoid further casualties, for real breakthroughs in healthcare. Nanomedicine is also a point of preference as it reduces the cost and makes it more affordable, making medicines cost effective is one of the crucial factors for venturing the fields of nanotechnology in medicine.

Nanomedicine can also help detect diseases at an early stage so the treatment can begin before it gets too late, for example diseases like cancer. Besides Cancer, nanomedicines are being used to treat 100s of other diseases which are under trial, major diseases such as cardiovascular, neurodegenerative, musculoskeletal, and inflammatory are covered as well. There are many diseases mankind is still fighting against which leaves a brutal impact on the patient as well as the society they live in complex illnesses like cancer, certain cardiovascular diseases and potentially incurable diseases like Alzheimer's and Parkinson's disease as well as different kinds of serious inflammatory or infectious diseases (e.g., HIV).



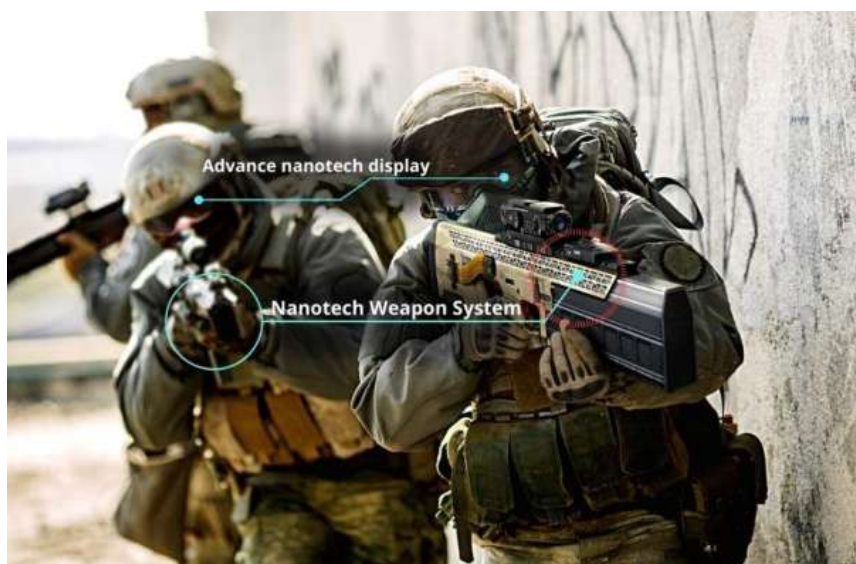
Nanotechnology is not only limited to the pharmaceutical industry it can also be used for disease monitoring, going through surgery and chemotherapy as well. As any medical device or drugs, nanomedicines are strictly regulated and must follow thorough characterization, toxicity assessment and multi-stage clinical trials evaluating for their benefit/risk ratio before benefiting patients with their full potential. The working of nanomedicines depends on the

working of nanomedicines depends on the development of novel nanocarriers and technologies for drug delivery. Cancer nanomedicine development has traditionally focused on improving the delivery and efficiency of cytotoxic agents into tumours.

Nanomedicine differs from other types of medicine, here includes the development and application of materials and technologies with nanometre length scales to function smoothly. Nanoparticles (NPs) are termed as the primary component in the making of nanomedicines. However, no standardized nomenclature exists in the literature; therefore, terms such as engineered nanomaterials, non biological complex drugs (NBCDs), nanomedical / nanomedicines, etc. Certain nanomaterials can replicate the abilities of some globular biological macromolecules. Examples are lipid micelles, different polymeric nanostructures, protein constructs, ribonucleic acid (RNA) NPs (RNPs), carbon dots (C-dots), nano diamonds (NDs), carbon nanotubes (CNTs), graphene, etc.

Nano medicine cannot be brought about in the market in the current times as the scientists working on them still have to discover various aspects, they hold within them. Nano technology can be dangerous as every other body type will respond to the medicine in a different way. There are several tests which are carried on to find out as much as possible about these medicines before introducing it to the vast medicinal market worldwide.

V. Nanotechnology in Warfare: -



Correspondent to various uses of nanotechnology, its applications are to be seen in modern combat equipment and warfare systems as well. There are two possible ways nanotechnology can be used in defence, one of them would be miniaturisation of existing equipment to allow it to be not only smaller, but light in weight to make it easy to handle and also design new materials to invent new artilleries. Research of nanotechnology for warfare is mostly practiced secretly as every country wants to keep its defence advancement as anonymous as possible to avoid war and maintain peace amongst their borders but at the same time stay well prepared for any Global crisis. ISN (Institute for Soldier Nanotechnologies) issued this statement in 2018 “our aim is pursuing a long-range vision for how technology can make soldiers less vulnerable to enemy and environmental threats.

The goal is to create a 21st century battle suit that combines high-tech capabilities with light weight and comfort features.” The main intention is to make a suitable battle suit which is required to remain lightweight and comfortable while stopping bullets, protecting against toxins, monitoring vital signs, and administering first aid where possible. The suit is meant to have a good communication facility as well, such as coded messages transmitted by means of flashing lights specially coated polymer threads woven into the suit can allow silent communication between soldiers.

The goal is to create a 21st century battle suit that combines high-tech capabilities with light weight and comfort features.” The main intention is to make a suitable battle suit which is required to remain lightweight and comfortable while stopping bullets, protecting against toxins, monitoring vital signs, and administering first aid where possible. The suit is meant to have a good communication facility as well, such as coded messages transmitted by means of flashing lights specially coated polymer threads woven into the suit can allow silent communication between soldiers.

The system can be calibrated with different wavelengths so the soldiers can communicate with each other and also with the commanding team. The suit can also help magnify the strength of the soldier wearing the suit by 10 times, this can be achieved by polymer molecular muscle ribbons present in the suit. The suit will enhance the protection quotient of the soldiers as well, currently Kevlar is used as a shielding agent to protect soldiers from bullet impact, combining it with nanotechnology agents it can magnify it by 5 times and protection from chemical and biological agents is being provided for with the use of special molecules called dendrimers. The lethal chemicals stick to dendrimers and protect the soldiers from any harm.

Besides working on a battle suit nanotechnology has also been tested to make advanced weaponry termed as “Smart Weapons”. Beside laser weapons there are other sectors of armoury as well which is benefitting rapidly of nanotechnology. There are certain scientists who are designing a Harry Potter's invisibility cloak, which attracts a vast majority of army personnel's, or what is called 'nano air vehicles' – they have created a prototype called 'The Hummingbird' developed by the US DARPA which can be further miniaturized so compact that it looks like a small insect-like combat vehicle.

The use of nanotechnology thus enables existing weapon technologies - such as stealth, precision-guided munitions and UAVs - to evolve and upgrade into an ultimate form of defence magicians. It will provide soldiers with many new skills such as the ultimate protection of invisibility in combat missions or intelligence, surveillance, and reconnaissance activities. Using those 'smart weapons' can help in retaining civilians' casualties and only kill the enemy guilds. But at the same time, the ability to kill someone without facing that individual and without giving him or her any chance of survival may test where our human conscience stands.

Nanotechnology is not a difficult technology to acquire. Indeed, many less developed states and emerging economies such as Mexico, Thailand, India, and Iran are investing heavily on nanotechnology industries. China is rising as one of the leading states in nanotechnological developments. Nanotechnology may end up being the game changed in the entire artillery and defence industry to bring about changes and introduce new reforms. There are various possibilities with Nanotechnology, from modern battle suits to advanced weapons it can give in many fruitful changes, provided its been used with utmost care and precision. Nanotechnology is like a transistor - it does not do any good nor harm, but the application of nanotechnology and their integration into a larger system produce novel functions and effects.

VI. Conclusion: -

There soon would be a time in which a world without nanotechnology would be similar to imagining today's world without semiconductor, or the internet, or to some extent even electricity. That would be the scope of nanotechnology in the future - which is even having an impact on the present-day research orientation and academics. Nanotechnology is not only going to be disruptive but also would extend the limits of humans and the extent of their reach and development. On one side, where nanotechnology can be extremely useful in the fields of medicine, it could also have a side to warfare. Thus, the development of nanotechnology would be having strong merits as well as demerits. Only time will decide on which side of it would humans incline, but the current applications have eased many traditional practices all over the world.

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IMPACT OF ELECTRIC VEHICLES ON MOTORSPORTS

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I. Abstract :-

In this article we will be looking into Electric Vehicles and their effect in Motorsports as well as the Automobile Industry. Electric Vehicles (EV) and electric Motorsports are emerging as they have the biggest perk we need right now, being nature friendly. We will deeply study how Formula E is giving a neck-to-neck competition to F1 racing by being more greener and efficient. EV being a futuristic, ecologically sound and viable option, it brings its own problems which are discussed in detail. Even the giants like BMW, DS Automobiles, Jaguar, Mercedes, Nissan and many other big companies of the Automobile World have shown faith in EV. You will read how electric racing revolutionized motorsports by being the most futuristic racing championship.



II. Introduction To Electric Vehicles And Electric Motorsports: -

An electric vehicle operates with an electric motor and batteries as a power source, instead of an Internal-Combustion Engine. Electric vehicles (EVs) first appeared in the mid-nineteenth century, when electricity was one of the most common methods of vehicle propulsion.

Chemical energy is contained in a battery in an Electric Vehicle. It is possible to convert chemical energy to free electrons (electrical energy) with a conversion efficiency of more than 90%. This means they have higher efficiency as compared to the IC Engine vehicles which can only convert Fuel Energy Work by 25-40% Only.

Moving on to electric Motorsports, also known as electric motor racing, is a form of motorsport that involves the competition of electric-powered vehicles. Electric vehicles are growing more, not only due to their zero exhaust emissions - but they are also gaining popularity in motorsports. On September 13, 2014, the 2014 Beijing EPrix kicked off the electric street racing movement. Lucas Di Grassi (Audi Sport ABT) etched his name in Formula E history by becoming the first race winner.



III. What Is Formula E? :-

Electricity or technology are the two names that come up when you are talking about something futuristic. If you are thinking about the futuristic avatar of motorsports, is electric vehicles gonna be your answer? With the sixth season on the way and the second year of running the Gen 2 car on city-center circuits, the future of motorsports is being built by Formula E.

Formula E is more than just a racing series – it also acts as the testbed for EV technology. It's the one and only racing series backed by the FIA in which cars run totally on electric battery power. EV cars is where the automotive industry is leaning towards, which makes Formula E the most futuristic racing series today. There are 12 teams taking part in the Formula E championship with two drivers each. Formula E has gained the trust and has been able to attract the big guns of the motor world, like Audi, BMW, DS Automobile, Jaguar, Mercedes, Nissan, and Porsche



V. Formula E vs. Formula 1: -

Formula E only visits densely populated cities that are actively fighting climate change and reducing air pollution, as opposed to F1 which hosts the Grand Prix in 21 different countries (compared to 12 countries that hosted an E-Prix last season). Although modern Formula 1 cars use a V6 turbo-hybrid powertrain (which combines an internal combustion engine with two electric motors), a Formula E car uses a fully electric powertrain that generates an incredible 250kW of peak power!



The first comparison people make is speed, and while Formula E cars accelerate at a similar pace as F1 cars, their top speed is about 280km/h, which is approximately 70km/h slower. Unlike Formula One, which has three days of testing, qualifying, and racing, Formula E has only one day of official track sessions, with the exception of a 30-minute shakedown session on Friday evening. There's a lot of racing activity to take in there!

VI. The Emergence of Electric Motorsports: -

Zero emissions championships, Formula E, Extreme E (XE), and Moto E have been emerging since 2014. To inspire the younger crowd, a racing competition was started by FSAE (Formula Society of Automotive Engineers) known as the Formula Student. Student teams of different universities over the globe participate in this competition and showcase their cars and race with it. Formula E has a unique racing format compared to other traditional motorsport races. Races are held on city circuits, this draws the urban audience, and are inspired by the growing popularity of esports. In XE, electric SUVs race in an off-roading championship! This motorsport began this year in 2021 itself. XE is committed to being net zero to protect the environment. Formula E has been carbon neutral since its launch by investing in certified projects to reduce emissions and XE is determined to do the same. Carbon being neutral is still minute if we compared it to the carbon footprint of road transport, but the bigger accomplishments will be related to influencing perceptions of zero emission vehicles (ZEVs) and highlighting environmental and social issues. Lastly Moto E started in 2019 is a part of Moto GP but it features electric motorcycles powered by renewable energy.

VII. Why Electric Revolution Will Bring Problems Of Its Own: -

There is an issue with the electric vehicle supply chain. Cobalt is a key component in lithium-ion batteries used in electric vehicles, and it has been related to child labour allegations.

The extraction of nickel, which is used in batteries, is extremely hazardous. The components used to make batteries are finite and in short supply. As a result, it is difficult to electrify all modes of transportation in the world using existing battery technology. Meanwhile, there is no environmentally friendly way to recycle lithium-ion batteries. Environmental concerns and land use disputes related to lithium mining in countries like Tibet and Bolivia are also major issues. According to a new study from the MIT Energy Initiative, EVs would never hit the same sticker price as today's consumer electronics if they rely on lithium-ion batteries, the energy storage technology that drives most of them. In reality, only eliminating the disparity in lifetime costs between vehicle types, which includes the higher fuel and maintenance costs of regular cars and trucks, is likely to take another decade.

VIII. Conclusion: -

With the electric revolution, the Automotive industry as we know it is coming to a logical epilogue. Although it is widely accepted that gasoline-guzzling automobiles have no place as a mode of transportation in a sustainable society, when we join the competitive world of motorsports, opinions diverge. As Formula 1 is looking at sustainable fuel alternatives to run their V6 Internal combustion engines which are loud and grab a lot of attention from fans, the future of Motorsports remains unclear, but EV Technology surely poses a strong side to consider. As the future holds a great stage for the Electric world, it will surely face a lot of challenges, be it financial, economical, ecological or commercial, EVs will find a way to rule the roads in future.

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A Review on KeyShot 3D

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I. Introduction: -

KeyShot is the only stand-alone, real-time ray tracing and global illumination program which is used to create 3D renderings, animations, and interactive visuals. KeyShot supports more 3D file formats than the other rendering software, importing over 25 different file types. KeyShot brings you real-time 3D rendering that displays results instantly and reduces the time to create realistic product visuals. KeyShot is trusted by brands around the world for its speed, ease of use, scientifically accurate materials, and advanced material editing capabilities. It helps to convey your idea clearly and makes your job faster. KeyShot is designed to make 3D rendering and animation easy. It allows you to apply materials and lighting fast and provides accurate materials appearances and real-world lighting, and a strong interface that gives advanced capabilities and the ability to see all your changes in real-time. So, what is KeyShot? And what does it help you do?



II. User Interface: -

KeyShot is very easy to learn and use to achieve photographic results quickly through a simple, workflow-based interface with all the advanced capabilities for the highly experienced 3D render professional.

With its interactive approach to rendering, KeyShot is very easy to learn and use. Anyone involved with 3D data can achieve photographic results too quickly in a minute of opening the application. Despite the seemingly simple interface, KeyShot provides the deepness of functionality to satisfy the needs of the most advanced user. And due to a well-designed and up-to-date user interface, even advanced tools are also easy to learn and use.

KeyShot Animation is the quickest way to create animated visuals of your 3D models. Quickly animate models, parts, cameras, and more, etc without complex toolsets. KeyShot Animation allows you to build, light, and adjust your animation in real-time, as you create it.

III. Fast Ideation Process: -



KeyShot is used by professionals in design agencies, creative studios, and many of the Fortune 500 companies around the world. KeyShot brings visual speed and agility to the entire product development process, with its wide 3D file format support for a fluid workflow from concept to final product. KeyShot, is the only rendering application that is truly integrated throughout the entire development process. Through its unmatched import pipeline, KeyShot can import almost any file format.

Due to KeyShot's extensive partnership network, users of many CAD and 3D modeling applications can transfer data directly from their application into KeyShot while maintaining a link to their modeling session. By using KeyShot's unique LiveLinking technology any changes made to the model can be transferred to the running KeyShot session and update the scene without any loss of work and efforts.

Whether you are using KeyShot during early concept presentations and design reviews or for final presentations, sales and marketing, or technical documentation, KeyShot allows you to start the work as soon as you have 3D data, and by the time you have the final product, you'll be finished creating the most accurate and amazing visuals possible.

IV. The Realism: -

KeyShot materials go beyond its physical appearance providing scientifically accurate properties for the high-quality visuals effects. Use a preset, an exclusive partner material, or create your own. KeyShot materials are almost scientifically accurate. Rather than having materials that are "physically based" like many other rendering applications, KeyShot materials reflect a physically accurate and easy-to-understand representation of materials and their properties. Each material can be tweaked in its way, colored, and textured showing all the changes in real-time to give you the perfect materials for your scene. You can even match measured materials using Cie-Lab colors and Gloss values or use digital representations from material providers such as Axalta Coating Systems, Mold-Tech, and Sørensen leather.



For material color, you can also define your own using various color spaces, or use industry-standard color libraries such as PANTONE and RAL. Materials can also be shared through KeyShot Cloud, allowing you to tap into one of the largest online resources for rendering assets.

V. Powerful: -

KeyShot gives you the power and also the choice to utilize either CPU or NVIDIA GPUs for rendering and the capability to scale linearly for unmatched performance. Keyshot has all the power to use all CPU cores provided or utilize the real-time ray tracing capabilities of the NVIDIA RTX graphics cards. Whether you use Windows and Mac, It will work on nearly any desktop or laptop right out of the box. KeyShot is one of the few applications where you can switch from CPU mode to GPU mode with one click. You can choose to take 100% advantage of all physical and virtual CPU cores in your computer or utilize 100% of all the GPU power available, scaling linearly in performance without ever tapering off when more CPUs or GPUs are added.

VI. Lights and Shadows: -

KeyShot also provides advanced lighting capabilities that create the most accurate lighting for simple studio shots or the more complex interior lighting. KeyShot's real-time render engine contains the most advanced lighting algorithms, It is completely changing what is possible for visualizing interior spaces. In the same way that it changed the speed at which products can be rendered, this lighting algorithm provides the fastest and most accurate method for rendering complex interior lighting. Scenes containing hundreds of lightings and illuminations through small windows can be rendered interactively without compromising quality or accuracy, and it all happens very accurately in KeyShot without even users having to adjust its complex parameters such as the number of photos needed to render a given scene.



- <https://www.creativebloq.com>
- <https://www.design8.eu>
- <https://www.keyshot.com>
- <https://www.easyrender.com>

VII. Instant Results: -

KeyShot is the real-time rendering to the core. Not a mode. Not an afterthought. See everything as it happens simultaneously. Every change from material and lighting to cameras and animation is seen quickly and instantly as you work. KeyShot is the first rendering application that allows you to work in a full ray traced environment from the start. Through the combination of progressive global illumination, multi-core photon mapping, adaptive material sampling, and a dynamic lighting core, KeyShot delivers an interactive experience that results in photographic images instantly. Every change you make – material, lighting, geometry – is instantly updated and allows you to evaluate the result within a very few seconds. No switching back and forth between render modes, no endless waiting to see what the final rendering is going to look like. Just sit back and let the final image resolve in front of your eyes.



VIII. Reference: -

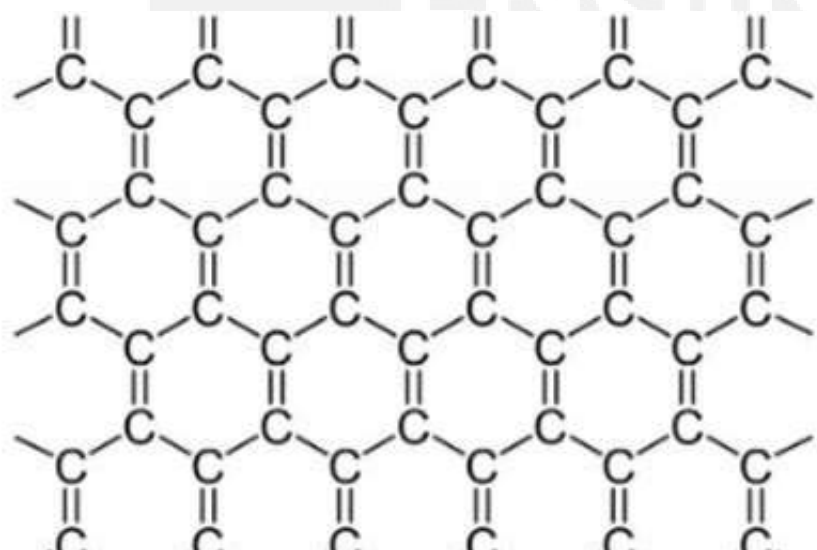
A Review on Super Materials - Graphene

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I. What Is Graphene: -

Graphene is an allotrope of carbon consisting of a single layer of atoms arranged in a two-dimensional honeycomb lattice. The name is a portmanteau of "graphite" and the suffix -ene, reflecting the fact that the graphite allotrope of carbon consists of stacked graphene layers. Each atom in a graphene sheet is connected to its three nearest neighbors by a σ -bond, and contributes one electron to a conduction band that extends over the whole sheet. This is the same type bonding seen in carbon nanotubes and polycyclic aromatic hydrocarbons, and (partially) in fullerenes and glassy carbon. These conduction bands make graphene a semimetal with unusual electronic properties. Graphene conducts heat and electricity very efficiently along its plane. The material strongly absorbs light of all visible wavelengths, which accounts for the black color of graphite; yet a single graphene sheet is nearly transparent because of its extreme thinness. The best conductor of heat at room temperature and also the best conductor of electricity.

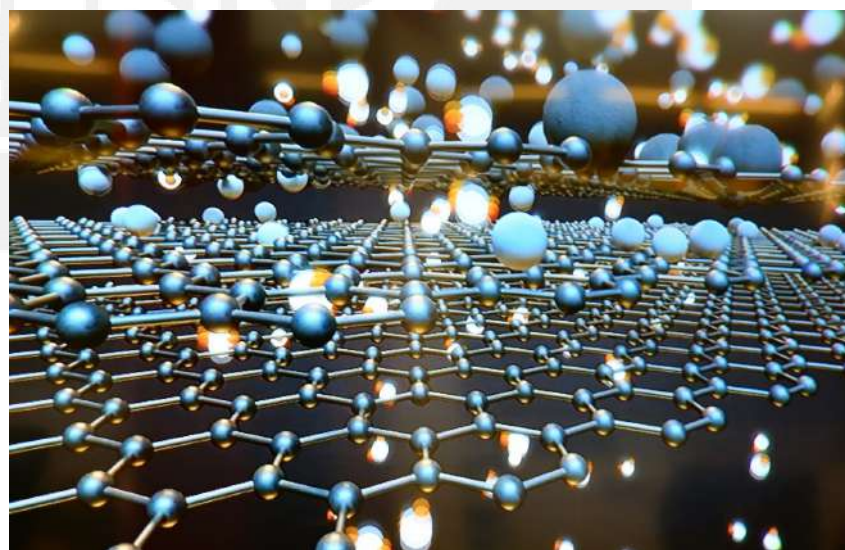


Graphene is the thinnest compound known to man at one atom thick, the lightest material known (with 1 square meter weighing around 0.77 milligrams), one of the strongest compound

discovered (between 100-300 times stronger than steel with a tensile strength of 130 GPa and a Young's modulus of 1 TPa - 150,000,000 psi).

II. How Graphene Is Made: -

Take a pencil and some sticky tape. Stick the tape to the graphite, peel it away, and you'll get a layer of graphite made up of multiple layers of carbon atoms. Repeat the process very carefully, over and over again, and you'll (hopefully) end up with carbon so thin that it'll contain just one layer of atoms. That's your graphene! This rather crude method goes by the technical name of **mechanical exfoliation**. An alternative method involves loading up a super-precise atomic force microscope with a piece of graphite and then rubbing it very precisely on something so that single layers of graphene flake off, a bit like graphite from a pencil lead only one layer at a time. Techniques like this are fiddly and intricate and explain why graphene is currently the most expensive material on the planet!



These methods are fine for making tiny test samples of graphene in a laboratory, but there's no way we could make graphene like this on the kind of industrial scale on which it's likely to be required. So how do you make lots of graphene?

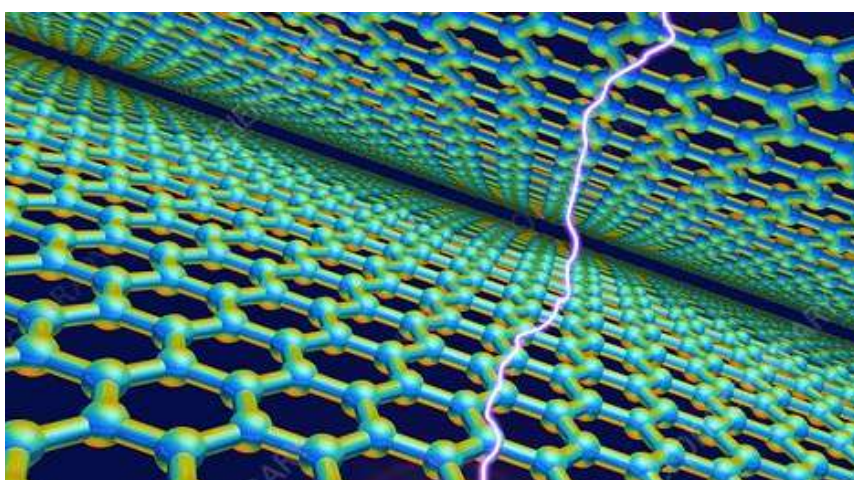
One approach is to put an organic (carbon-based) gas such as methane into a closed container with something like a piece of copper in the bottom, then monkey with the temperature and pressure until a layer of graphene is formed on it. Because the graphene is formed by depositing layers of a chemical from a gas (vapor), this method is called chemical vapor deposition (CVD). Another approach involves growing crystals of graphene starting from a carbon-rich solid, such as sugar. Recently, scientists have been experimenting with another promising technique, known as "flash joule heating," to convert more or less any carbon-containing material into graphene. While not yet ready for prime time, it could prove a significant way of producing graphene in the future.

III. Properties of Graphene: -

In terms of how far along we are to understanding the true properties of graphene, this is just the tip of the iceberg. Before graphene is heavily integrated into the areas in which we believe it will excel at, we need to spend a lot more time understanding just what makes it such an amazing material.

IV. Electronic properties: -

One of the reasons nanotechnology researchers working towards molecular electronics are so excited about graphene is its electronic properties – it is one of the best electrical conductors on Earth. The unique atomic arrangement of the carbon atoms in graphene allows its electrons to easily travel at extremely high velocity without the significant chance of scattering, saving precious energy typically lost in other conductors.



Scientists have found that graphene remains capable of conducting electricity even at the limit of nominally zero carrier concentration because the electrons don't seem to slow down or localize. The electrons moving around carbon atoms interact with the periodic potential of graphene's honeycomb lattice, which gives rise to new quasiparticles that have lost their mass, or rest mass (so-called massless Dirac fermions). That means that graphene never stops conducting. It was also found that they travel far faster than electrons in other semiconductors.

V. Mechanical Properties: -

- Stiffness: -

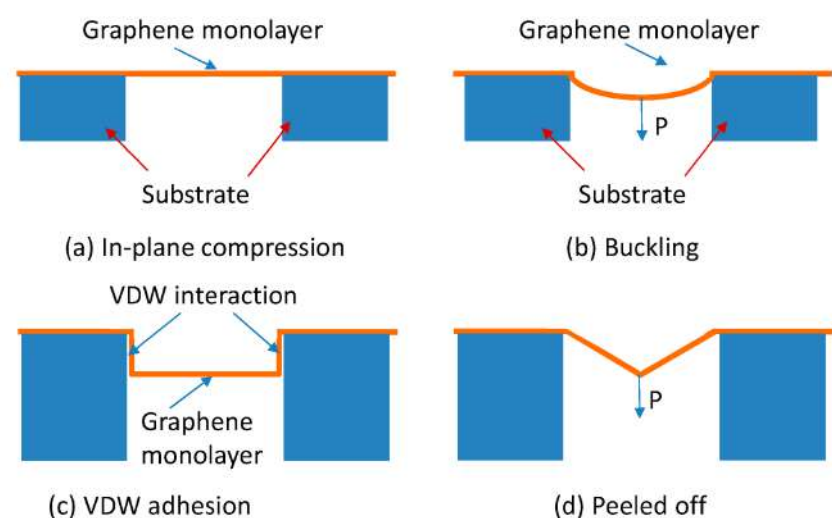
The breaking force obtained experimentally and from simulation was almost identical and the experimental value of the second order elastic stiffness was equal to $340 \pm 50 \text{ N m}^{-1}$. This value corresponds to a Young's modulus of $1.0 \pm 0.1 \text{ TPa}$, assuming an effective thickness of 0.335 nm .

- Strength: -

Defect-free, monolayer graphene is considered to be the strongest material ever tested with a strength of 42 N m^{-1} , which equates to an intrinsic strength of 130 GPa .

- Toughness: -

Fracture toughness, which is a property very relevant to engineering applications, is one of the most important mechanical properties of graphene and was measured as a critical stress intensity factor of $4.0 \pm 0.6 \text{ MPa}$.



VI. The Applications of, and uses for Graphene : -

- Mechanical strength: -

Graphene is one of the world's strongest materials, and can be used to enhance the strength of other materials. Such graphene-enhanced composite materials can find uses in aerospace, building materials, mobile devices, and many other applications.

- Energy Storage: -

Since graphene is the world's thinnest material, it also has an extremely high surface-area to volume ratio. This makes graphene a very promising material for use in batteries and supercapacitors. Graphene may enable batteries and supercapacitors (and even fuel-cells) that can store more energy - and charge faster, too.

- Coatings, sensors, electronics and more: -

Graphene has a lot of promise for additional applications: anti-corrosion coatings and paints, efficient and precise sensors, faster and efficient electronics, flexible displays, efficient solar panels, faster DNA sequencing, drug delivery, and more.

- Radiation shielding: -

Graphene appears to be a most effective material for electromagnetic interference (EMI) shielding. Experiments suggest the feasibility of manufacturing an ultrathin, transparent, weightless, and flexible EMI shield by a single or a few atomic layers of graphene.

- Thermal management: -

It conducts heat better than any other known material; Graphene set a new record as the most efficient filler for thermal interface materials.

- Cloaking: -

The concept of plasmonic cloaking is based on the use of a thin metamaterial cover to suppress the scattering from a passive object. Research shows that even a single layer of atoms, with the exciting conductivity properties of graphene, may achieve this functionality in planar and

cylindrical geometries. This makes a single layer of graphene the thinnest possible invisibility cloak.

- Lubrication: -

Over the last decade, various solid lubricant materials, micro/nano patterns, and surface treatment processes have been developed for efficient operation and extended lifetime in MEMS/NEMS applications, and for various fabrication processes such as nanoimprint lithography and transfer printing. One of the important considerations in applying a solid lubricant at the micro- and nanoscale is the thickness of the lubricant and the compatibility of the lubricant deposition process with the target product. Graphene, with its atomically thin and strong structural with low surface energy, is a good candidate for these applications.

- Water Purification: -

A relatively new method of purifying brackish water is capacitive de-ionization (CDI) technology. The advantages of CDI are that it has no secondary pollution, is cost-effective and energy efficient. Researchers have developed a CDI application that uses graphene-like nanoflakes as electrodes for capacitive deionization. They found that the graphene electrodes resulted in a better CDI performance than the conventionally used activated carbon materials.

Bharat New Vehicle Safety Assessment Program

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I. Introduction:-

The Automotive industry is dynamic. Every day, some new technology gets invented. Factors like increasing urbanization and shift towards electric vehicles are disrupting the changing dynamics of the market. But there is one factor which has recently attracted a lot of attention towards it. That factor is reducing the rising number of road fatalities in accidents by implementing higher safety standards, i.e., ensuring the vehicle is safe enough to protect its occupants. Indian Automotive industry closely follows the European Standards. That's why when European norms were updated, India also announced stricter emission norms; shifting from Bharat Stage IV (BSIV) to Bharat Stage VI (BSVI). The Government of India has also passed the Motor Vehicles Amendment Bill that aims to offer better laws and rules regarding driver behaviour and provision of better safety on roads. Apart from road safety, authorities are taking action to improve cars' quality by ensuring that they feature proper safety aids and crash safety features.



II. Need of BNVSAP: -

The number of car fatalities in India are increasing with the numbers being around three to four times that of the European countries. The car accidents are tragic and sudden.

They can happen to anyone. Even Skilled drivers can get caught into accidents. So, just like the Bharat Stage Emission norms, India required a standardized car crash test safety program. Also, most of the cars that were sent from India to Global NCAP used to fail miserably. Most people, being unaware of this, used to blame the drivers for the accident. People were not knowing that the unstable structure of the car is also equally responsible.

III. The Development of BNVSAP: -

To change the situation, Indian Government decided to implement its own safety system called Bharat New Vehicle Safety Assessment Program or BNVSAP. It was a relatively new car assessment program and not fully implemented at that time. After its implementation, it is mandatory for the vehicles to pass through the tests in order to be sold in India. The program is still being implemented in phases as per the plans drawn by National Automotive Testing and R&D Infrastructure Project (NATRiP). It is the 10th 'New Car Assessment Program' in the world. This program was expected to start in mid-2014, but got postponed to start from 2017 due to delay in setting up laboratories and other facilities. Within two years of implementation (i.e., in 2019), multiple active and passive safety features were made mandatory by BNVSAP such as airbags, rear parking sensors, seat belt reminders, ABS, etc. This is done to ensure the Indian cars to be as safe as the cars sold in European countries. The National Automotive Testing and R&D Infrastructure Project (NATRiP) and Automotive Research Association of India (ARAI) are taking the necessary steps required in order to enhance safety features of automobiles in the country.

They are planning to do so by establishing superior level car testing centres in different parts of the nation. Crash test facilities are also being set up and are regularly updated. As a result of this continuous effort, cars like the Tata Nexon, Tata Altroz and Mahindra XUV300 scored five-star ratings from Global NCAP and showed the world that Indian Cars can also be safe.

IV. Regulations for BNVSAP: -

The BNVSAP rates new cars with star rating according to how they fare against crash tests conducted by Heavy Industry Ministries of India and funded by The Government of India. The mandatory features list it gives is what the manufacturers must provide in their cars at least. It performs various tests to ensure that the vehicle is checked properly. The program performs tests in four phases in testing labs. The new cars rolling out will have to go through three impact tests at 56 kmph and also pass the pedestrian tests. The car manufacturers will be asked to show the test results of new cars so that consumers are aware of safety features and make a safe decision.

V. Types of Tests Performed in BNVSAP: -

- Frontal offset testing (At 56 kmph): -

The Frontal impact tests include hitting the car on the test block and checking the results. It generally involves impact of the frontal crash on various body parts including Head, Neck, Chest, Abdomen, Knee, Femur, Pelvis, Lower Leg, Foot and Ankle.

- Side impact testing: -

According to EURO NCAP testing, a deformable barrier is mounted on a trolley and is driven into the side of a stationary test vehicle at right angles. A side impact dummy is put in the driver's seat and child dummies are placed in child restraint systems in the rear.

- Pedestrian Protection Testing: -

There are five types of pedestrian protection tests from which head impact, upper leg impact and lower leg impact are done as standard and

- Rear Impact Testing: -

This type of testing mainly involves whiplash tests which are designed to promote better seat and head restraint design. This is done in order to prevent or reduce head injuries sustained due to whiplash as effectively as possible.

- Child Dummy Dynamic Crash Testing: -

These tests include assessment of Child Occupant Protection covering three aspects; protection offered by child restraint systems, if the vehicle can accommodate child restraints of various sizes and designs and the provisions available in car for safe transport of children.

Bonus points will be awarded to the car based on the provided safety features like ABS (Anti-lock Braking System), Seat belt reminders, Child lock, ESC (Electronic Stability Control), etc.



Difference Between Global NCAP and BNVSAP: -

The BNVSAP is different from the Global New Car Assessment Program (Global NCAP) in terms of average testing speed. The Average testing speed for BNVSAP is 56 kmph whereas at GNCAP, the average speed for the car to be tested is 64 kmph. This can result in failure of the car at Global NCAP even if it passes the BNVSAP tests.

VI. Conclusion: -

The BNVSAP is different from the Global New Car Assessment Program (Global NCAP) in terms of average testing speed. The Average testing speed for BNVSAP is 56 kmph whereas at GNCAP, the average speed for the car to be tested is 64 kmph. This can result in failure of the car at Global NCAP even if it passes the BNVSAP tests.

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PILLAI COLLEGE OF
ENGINEERING

HYPERMESH

Mr. Sheel Valia

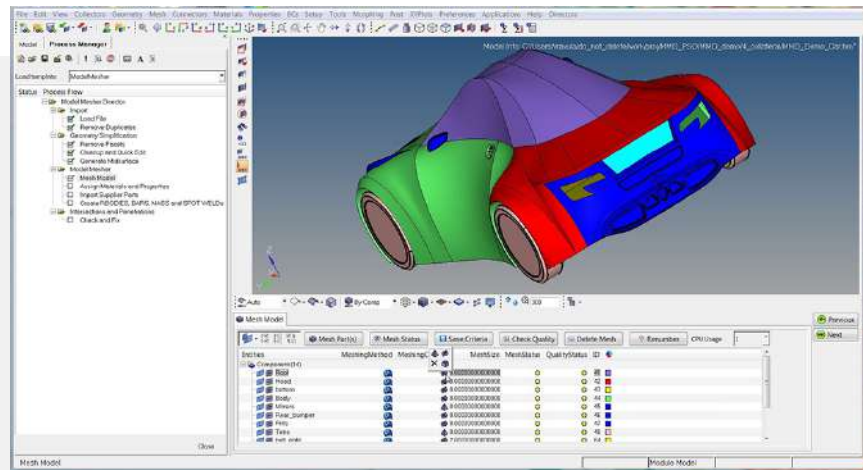
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I. What Is Hypermesh: -

HyperMesh is a solver neutral environment with the broadest set of direct interfaces to commercial CAD and CAE systems and a rich suite of easy-to-use tools to build and edit CAE models. The advanced geometry and meshing capabilities provide an environment for rapid model generation. The ability to generate high quality mesh quickly is one of HyperMesh's core competencies. With automatic and semi-automatic shell, tetra, and hexa meshing capabilities, HyperMesh simplifies the modeling process of complex geometries. HyperMesh has advanced model assembly tools capable of supporting complex sub-system generation and assembly, in addition, modeling of laminate composites is supported by advanced creation, editing and visualization tools. Design change is made possible via mesh morphing and geometry dimensioning. A flexible set of morphing tools allows users to modify mesh without re-meshing to automate the investigation new design proposals. It also has an extensive API which allows for advanced levels customization.

II. Benefits: -

- A Powerful FEA Modeling Solution for the Enterprise
- High-speed and High-quality Meshing
- Increased End-user Efficiency with Automated Model Assembly and Batch Meshing
- Interactive Feature and Volume-based Morphing for Geometric Shape Changes and Design Variable Definition
- Close the Loop Between CAD and FEA



III. Capabilities: -

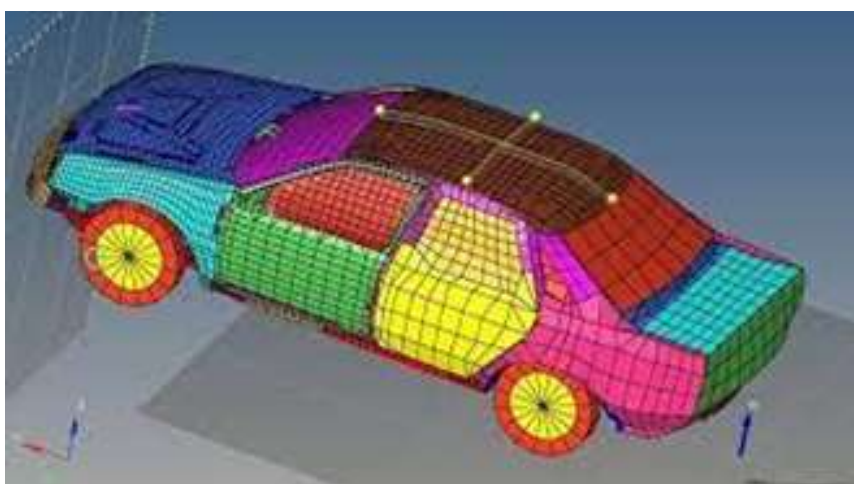
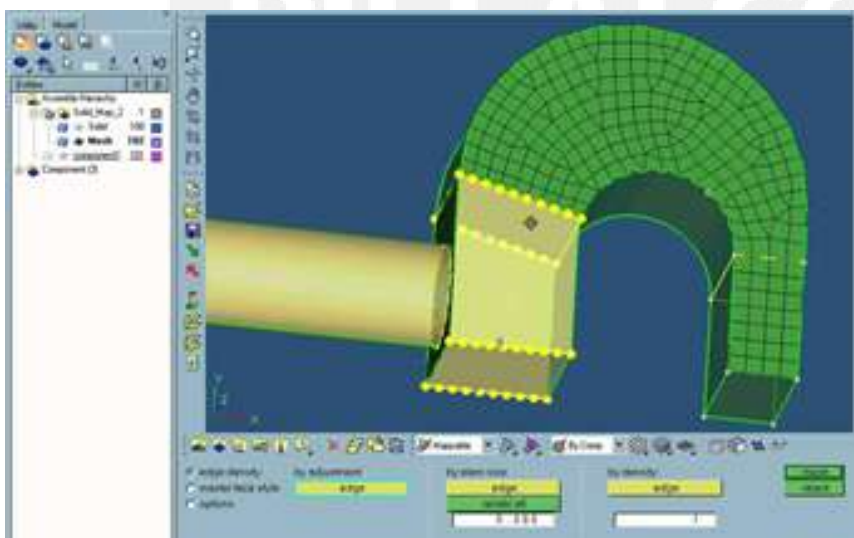
- Best in Class Meshing
- High Fidelity Meshing
- Surface meshing, Solid map hexa meshing, Tetra meshing, CFD meshing, SPH meshing
- Mesh Morphing
- Batch Meshing
- CAD Interoperability
- Connectors
- Composites
- CAE Solver Interfacing
- Customize HyperMesh to Fit Your Environment

HyperMesh is used by thousands of customers worldwide to generate and manage their models, it supports a wide variety of CAD and solver interfaces, making it a perfect solution for a majority of verticals and domains. HyperMesh is one of commercial off-the-shelf software (A ready-made software to perform particular task) for Finite Element Analysis The entire process of FEA can be classified into three groups 1. Preprocessing 2. Solving 3. Post processing Pre-processing - Making our geometry model ready for solving. In this phase we will clean up our geometry, we will discretize our model, we will apply boundary conditions and loads.

Solving - In this Phase the computer will solve PDE equations for each and every element which we had in our geometry. Post Processing - In this Phase we will extract the results that we need and we will validate our result. Hypermesh is only a pre-processor tool in which you can discretize your model to run for the solvers. Hypermesh is from Altair Engineering and this company also provide few other softwares for solving and post processing.

IV. Difference between ANSYS and HyperMesh: -

Usually, Hypermesh is used for explicit analysis (crash, impact, and bomb blast). For that mesh should be good enough for solving. So, most of the companies use Hypermesh for preprocessing and the they setup run in LSDYNA for solving. Nowadays many jobs are there for Hypermesh. But you will get saturated soon, because you will not learn new things because you get to do mesh. Ansys is a industry leading simulation tool. Where you will get to do simulations for different problems and you will learn lot of things and no saturation point. The gold comes unlimited as you dig deep into it. It you have earn the job. Sound knowledge to be there in respective core subjects, common sense surely required, potential to drive yourself in learning new things. If you talk about industries. We could say both.



V. Processes involved in HyperMesh: -

1. GEOMETRY AND MESHING

- Geometry Cleanup
- Mesh Quality
- Quality Index
- Check for Free Element Edges
- Check Element Nodals

2. MATERIALS AND PROPERTIES

- Assign properties to Elements
- Material and Property Browser
- Loads, Constraints, and Loadsteps
- Subcase

3. ANALYSIS AND DEBUGGING

- Analysis
- Debugging

4. POSTPROCESSING

- Visualization

VI. Conclusion: -

Hypermesh is thus a very handy software for analyzing, modelling, meshing and simulating environments which are can cause damage, harm or are nearly impossible to visualize or/and re create for future safety purposes.

This software is used widely for following purposes

- Estimate the crash force a vehicle can sustain during an accident.
- To analyze and re-create EMD environments.
- Life of any component and load bearing capacity.

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Advancements in Freight and Passenger Transportation

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I. Introduction: -

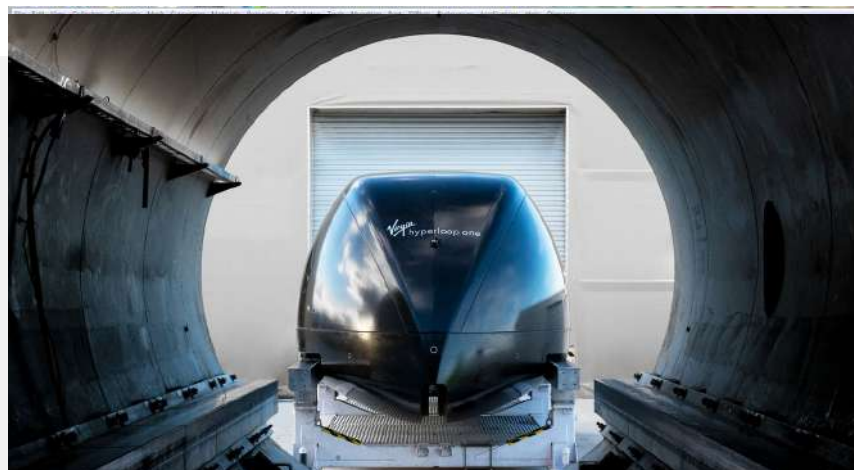
As we know, man is a social animal. He cannot stay alone. He always needs to socialize. And to socialize, he must travel from one location to another. Other than daily commute and leisurely trips, he might have some important business to attend or migrate from one place to another. For that, he will surely require a mode of transport such as train, bus or aeroplane if he is travelling too far. The whole transportation industry is based on this single fact.

The Passenger transport is divided in two types i.e., Public and Private transport. Public services like buses and taxis operate on a scheduled basis on fixed routes, whereas private transport includes vehicles that provide services as and when the person desires and decides to travel. The Freight transport is a key factor in the value chain in manufacturing. For this transport, all modes of transport can be used. The mode of transport is generally decided by the nature of the cargo to be transported.

II. Importance of Transportation: -

In recent years, this industry has been growing pretty fast. People travel as a part of their daily commute or job which may be near their house or in some other city. Travel industry also helps Tourism industry to grow with it. Other reasons for travelling include pleasure, relaxation, exploration, avoiding stress, etc. This is possible due to the huge network of land, air and sea modes of transport. If the transport mediums are absent, all the aforementioned activities will stop and will result in huge loss for all the countries.

III. Developments in Transportation: -



There have been many developments in the transportation segment in fields of planning, materials and designing, traffic engineering and actual modes of transportation itself. Let us see developments in each category one by one:-

- Transportation Planning

The Recent Developments in transportation planning include the prediction of future trips by Discrete Choice Modelling; on the basis of which the transportation infrastructure is developed. It also includes an individual's decision-making process about travelling from one place to another place.

- Materials and Designing

There are two subcategories in this field – Pavement Material & Design and Highway Geometric design. In the field of Pavement Material and Design, recent advancements include identification of new materials in order to replace the Bitumen and Concrete which are currently used extravagantly in pavement construction. Till now, there isn't any material that comes closer to Bitumen or Asphalt in terms of versatility. But some experiments have shown that by adding other materials or compounds, better derivatives of both materials can be obtained. Considering Highway Geometric design, the advancements are

in the field of road geometry inclusive of new forms of highways, intersections and interchanges like flyovers and freeways to make sure traffic flows easily.

- Traffic Engineering

Traffic Engineering uses engineering techniques to ensure that movement of people and goods on roads is safe as well as efficient. It deals with the functional part of transportation with exception of infrastructure provision. The developments in this field include strategies and methods to tackle congestion of traffic; e.g., Vehicle to Vehicle Interaction, Dynamic Traffic Assignment, etc.

IV. Further Advancements: -

As long as people and goods are being transported from one place to another, there will always be new inventions in the field. These inventions mostly focus on comfort and safety of people and contents being transferred. They also now focus on automation of various factors while still keeping comfort and safety factors at core. Some of the recent advancements in Passenger and Freight Transportation are: -

1. Intelligent Transportation: - The Rise of Mobility-as-a-Service (MaaS) has shown the necessity to make travel smoother and hassle-free. There have been trends in the transportation industry which have been combined and are aimed at less to no stoppages/ checkpoints that result in one step forward to integrated travel and transportation. The platform used for this will include everything from route search to payment. The Public transport will feature CCTV cameras, GPS devices, Wi-Fi Devices and smart systems such as traveller information system, electronic payment and smart ticketing system and automated passenger counter system. The intercity and intracity transport will be managed by buses and metros which get this system.

2. Electric Hybrid Vehicles: - The craze for electric vehicles is increasing day by day. Many car companies launch their versions of the vehicles.

The trend is now getting into Vans, Buses and Trains in the form of Electric-Hybrid powertrains. Considering the growing demand for public transport and required reduction in CO2 emissions to reduce pollution, the Battery Electric Bus (BEB) and buses that use alternate fuels are implemented in some countries.

3. Truck Platooning: - The Truck platooning is a system/technology that is used to connect two or more trucks in a group with the aid of connectivity technologies, AI and systems like Adaptive Cruise Control and Lane Keep Assist. The trucks in the group automatically keep a set close distance. The truck heading the group acts as the leader while the vehicles behind adapt and react to changes in its movement, requiring little or no driver action.

4. Address Delivery and Usage of Drones: -

The growing E-commerce is leading to demand for address deliveries, so bigger businesses are adding a fleet of small vehicles in order to capture a piece of market. While optimizing this last-mile delivery system, some companies have already started deliveries using drones. This type of delivery increases cost-effectiveness of business. In the current crisis of COVID-19, this contactless address delivery has been the most popular and effective medium of delivering goods.

5. Lightweight Materials: - The requirement of high performance with excellent efficiency is putting automobile manufacturers under pressure. As even 10 percent weight reduction can improve fuel economy by 6 percent or better, the companies are forced to find new materials to reduce the overall weight of the vehicle. Thus, the companies are looking forward to replacing the traditional cast iron and steel by magnesium-aluminium alloys and carbon fiber.

V. Further Scope: -

Though many developments are being done in the field of transportation, there is still scope to further enhance the systems and invent something new. The technologies to look forward to in future are: -

1. Autonomous Vehicles (Inclusive of Trucks, Buses and other heavy vehicles)
2. All-Electric Trucks and Buses
3. Hyperloop - A pneumatic tube that will use a series of linear induction motors and compressors to propel vehicles at superfast speeds. The first hyperloop is going to connect Los Angeles and San Francisco, enabling passengers to reach 350 miles in more than half an hour. Is expected to revolutionize the way in which people look at travel.
4. Enhanced Drones with increased efficiency and more load-carrying capacity
5. Hypersonic Air Travel and many more....

Improvements like these will surely make the travel experience better and reduce the overall travel time required. With Artificial Intelligence added in the equation, it remains to be seen how these technologies make a 'path' towards better transportation future.

VI. Conclusion: -

Transport is an integral of human life. We have seen how the transport industry has evolved and what scope the industry has to progress in future. Further improvements in existing technologies will surely make the whole experience better. With Artificial Intelligence added in the equation, it remains to be seen how these technologies carve a 'path' towards better transportation future.

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“CAN FINAL YEAR PROJECT BECOME THE GOLDEN KEY FOR PRE-EMINENT CAREER?”

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I. What Is Final Year Project :-

- Final Year Projects: -

To begin with a query why final year projects are keys for the tutee to ameliorate their vocation? Obviously, the academic projects of the students only have the potential to show a right track to them for their career. Normally, there are many domains for academic projects in both hardware and software disciplines. Nowadays, there are many ingenious domains for scholastic projects in both hardware areas as well as the software area. In the same way, if you wish to complete virtuoso projects and you did not have any intention about your project, it is desirable to cede your project to the pre-eminent project centre.

- Importance: -

Usually, when you apply for a job interview in MNC's the fundamental thing they favour in you is your educational project. Hence it is more crucial for your profession. So, pick your final year project in your fascinated area. If you are a superior programmer and you are engrossed in coding, choose the software projects. Likewise, if you intend to do activities in kit equipment, it is ideal to pick hardware project domains and wireless communication projects. From the day of your graduation to job joining, your final year project plays a notable character.

- Benefits: -

Usually, your final year project is the premier escort to your career path. Here are some benefits of final year projects:

- A virtuous final year project amplifies your percentage of your degree of 90 to 95%. In the same way, superior marks in your project work allure and redirect the interviewer's attention to you.
- Moreover, projects that are research-based and industry oriented tremendously enlarge weightage to your resume. This amplifies your job prospects. This esteems you in the way that the industry professional always hunts for an employee with superior project circumstance.
- Furthermore, it helps to enhance your entrance for higher education in the United States, United Kingdom, Australia, or in your preferred IIT's.

II. A Step by Step Guide to Executing Your Final Year Project: -

1. Choosing Your Project Topic

Deciding upon the area of your exploration is the most strenuous part of undertaking a final year project. Generally, most students are simply impressed by the sheer amount of alternatives available. At this beginning phase, it is quite habitual to find students consulting each and every professor, for guidance. Execute a thorough research prior to coming to the conclusion and never back away from taking guidance.

2. Literature Survey

Conducting a rigorous literature review is more than indispensable here. It encapsulates, appraises, compares and contrasts, and draws a correlation between various research articles, and other pertinent sources that may be connected to your project topic.

3. Developing Your Project Proposal

Your project proposal will decide whether it will get approved or not since it will silhouette what your project intends to accomplish and how feasible it is. It should include the specific goals as well as the anticipated outcomes of the proposed project. The proposal should be proficient of convincing the connoisseur that the project is worth the time, money and endeavour required to complete the work.

4. Planning Your Project

After approval of your proposal, you have to assemble extensive master plans as to how to proceed about it since they are the substructure of a proposed research. The road map should cover every aspect of your research and what it requires. You must make an diary to procure the required hardware/software. Prepare your cost approximation and make plans to manage them.

5. Implementation

This is the body of your project where your real time implementation takes place. Often, students are shaken up during this juncture. Assure that you execute plans wisely so that your project is well constructed. Concentrate on every attribute and try to keep down the mistakes and be optimistic in what you do.

6. Testing

This can be worked with the assistance of some test cases to scrutinize whether your project is yielding the results as per your presumptions. If the outputs are not what you desired, do not stress out. You can review the implementation of your project and try again.

7. Reiterating

It is mandatory that you develop some test cases to execute on your project. Keep redoing the experiment with various inputs so that the outputs can be compared and an inference can be drawn. This helps in determining the efficiency of your research.

8. Drawing Your Conclusions and Identify Future Work if Any

After implementation, examination and corrections, it is time to wind up the project. This stage is censorious and determines whether the project is a success or a failure. Failure to do so will result in your project not being taken seriously. Draw the necessary conclusions as per the results and obtain a summary of the executed procedure.

9. Presenting and Defending Your Work Orally

A vocal presentation is superior to just scrutinizing your results to the connoisseurs. You should be well-versed with your project and proficient in communicating your word clearly so that the panel acquires a clear design of what you are trying to present. It is inevitable that the connoisseurs would raise questions about your project. Engage them in a pacific yet brawny discussion so that your comprehension and adroitness in the field are highlighted.

10. Preparing Your Final Version of the Report

This is the concluding step to publish your paper. Go through your entire project from the beginning before preparing your final report.

III. Conclusion: -

Consider all the opportunities available to you and put your best efforts into the project. This can seem a bit difficult but the final product will leave you satisfied. Ask for help whenever you need. With appropriate planning your project will be truly successful. All the Best !!!

IV. References: -

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- <http://blog.engrip.com/2017/02/20/a-step-by-step-guide-to-executing-your-final-year-project/>

Automobile and Mechanical Student Bodies of PCE

1) SAEINDIA Collegiate Club of PCE



SAE stand for Society of Automotive Engineers. SAE International is a U.S.-based, globally active professional association and standards developing organization for engineering professionals in various industries. SAEINDIA is a strategic alliance partner of SAE International registered in India as an Indian non-profit engineering and scientific society dedicated to the advancement of the mobility industry in India.

SAEINDIA Collegiate Club of PCE is a student run club of Pillai College of Engineering, it provides practical exposure to a professional engineering society as well as focal point for campus engineering programs and projects.

The purpose of an SAEINDIA Collegiate Club is to increase the benefits of SAEINDIA student membership through special activities that includes affiliation with the sections.

Benefits of being a SAE Member: -

- Free Subscription to Online Magazines
- Discounts on Registrations for Major SAEINDIA Meetings and Exhibits
- Discounts on SAE Technical Papers and Books including The Handbook.
- Discounts on SAEINDIA Top-Tech Training Programs
- Contacts and Networking with Industry Professionals
- Free IACET (International Association for Continuing Education and Training) accredited Courses from SAE Learning Center

2) AESA-MESA



AESA-MESA is the Automobile and Mechanical Engineering Student Association of Pillai College of Engineering.

AESA-MESA organizes several events for the mechanical and automobile students giving them the opportunity to enhance their soft skills while also keeping them interested in the extra-curricular activities. The committee organizes designing competitions such as AutoCAD and SolidWorks keeping the competitive mentality in the students active. Through such competitions, the students get to brush up their designing skills which helps them in their curriculum as well as their careers.

The committee also arranges technical and motivational seminars/webinars and lectures by experts in their respective fields for the students.

Being a member of committees like AESA-MESA help the students widens their scope as engineering students as they learn about things outside of the curriculum while developing soft skills along the way. It helps the students bridge the gap between the faculty members and themselves. The various activities help the students to look beyond their respective departments and ultimately help them become better engineers.

3) ISHRAE PCE Chapter



Indian society of heating refrigerating, and air conditioning engineers widely known as ISHRAE is the Premiere Technical Society working exclusively for HVAC & R community providing immense opportunities to the fellow aspirants seeking interest in this field.

Pillai College of Engineering got affiliated with ISHRAE in the year 2009 and became part of ISHRAE Thane Chapter in the year 2013.

Being an ISHRAE member you can interact with industry officials via various platforms offered by ISHRAE. You can participate in various national level competitions and enclose the HVAC knowledge and talent to the world. There is a great scope to showcase and improve your passions and skills through various college level events hosted by ISHRAE. Public speaking, Presentation skills are always welcome. Job Junction will always help you to find a right job in HVAC industry. Also, several seminars and webinars will regularly be arranged to guide and direct you in real world.

The major activities carried out by ISHRAE PCE Chapter are:

- K12 – A Social Activity for primary and secondary schools
- Industrial Visits
- ISHRAE Job Junction
- Aquest – A National level HVAC quiz competition hosted by ISHRAE.
- Also, there are number of other activities like Poster design Competition, ISPG Project grant for final year projects, NSDC, etc.