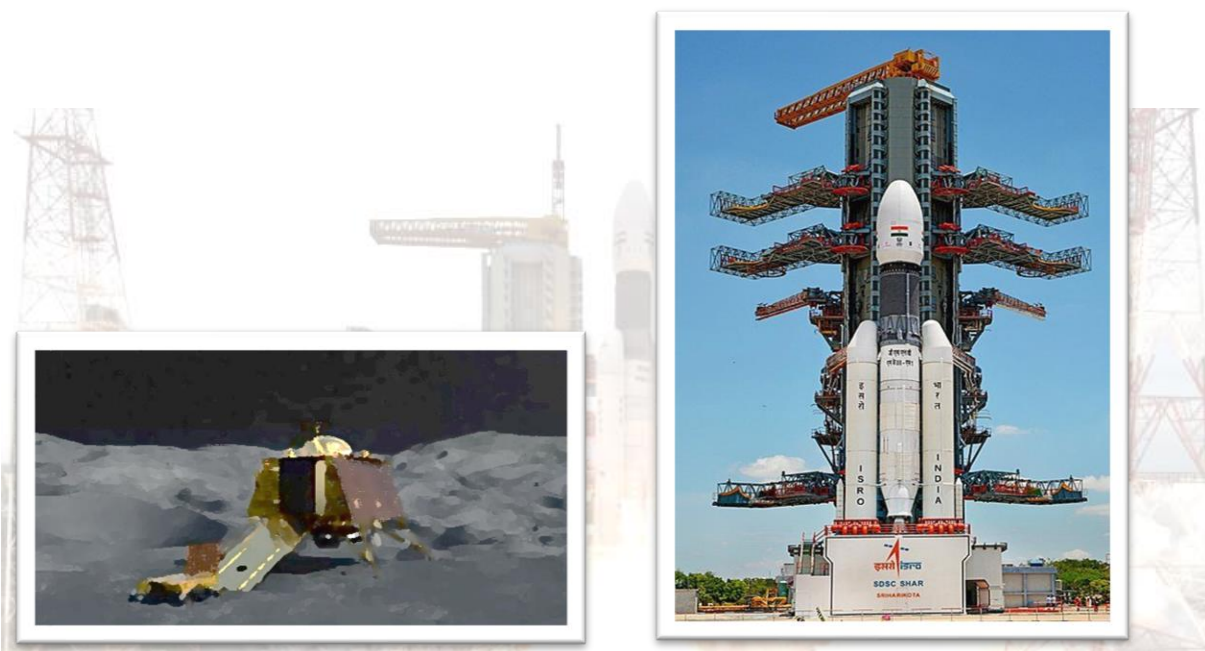


CHANDIGARH ENGINEERING COLLEGE CGC, LANDRAN, MOHALI

Building Careers. **Transforming lives.**



MECHNOTIMES

Department of Mechanical Engineering
NEWSLETTER

VOLUME-8

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(OCTOBER-DECEMBER 2023)

VISION OF CHANDIGARH ENGINEERING COLLEGE-CGC, LANDRAN

To become a leading institute of the country for providing quality technical education in a research-based environment for developing competent professionals and successful entrepreneurs.

MISSION OF CHANDIGARH ENGINEERING COLLEGE-CGC, LANDRAN

1. To provide state of the art infrastructure and engage proficient faculty for enhancing the teaching learning process to deliver quality education.
2. To give a conducive environment for utilising the research abilities to attain new learning for solving industrial problems and societal issues.
3. To collaborate with prominent industries for establishing advanced labs and using their expertise to give contemporary industry exposure to the student and faculty.
4. To cater opportunities for global exposure through association with foreign universities.
5. To extend choice-based career options for students in campus placements, entrepreneurship and higher studies through career development program.



DEPARTMENT OF MECHANICAL ENGINEERING

Vision of the Department

To emerge as centre of quality education for creating competent mechanical engineers catering to the ever-changing needs of industry and society.

Mission of the Department

M1: To provide quality education by constantly updating departmental resources and using effective teaching learning methodology.

M2: To promote research practices in the field of mechanical engineering in pursuit of academic excellence and for the benefit of society.

M3: To establish industrial collaborations for imparting contemporary knowledge to keep pace with the technological challenges in the interdisciplinary and core areas of mechanical engineering.

M4: To provide opportunities to the students for global exposure through international collaborations.

M5: To nurture students through pre-placement training programs to succeed in campus placements and to provide guidance for entrepreneurship and higher studies.



EDITOR'S COLUMN

A newsletter reflects the vision and mission of a department. It also showcases events, activities, and academic accomplishments. The field of mechanical engineering is a continuous pursuit to improve the world. By embracing innovation and sustainability, we can bring about positive change and make a lasting impact on society. While we are proud of our past achievements, we also look to the future with excitement. The possibilities for mechanical engineering are boundless, and we are committed to preparing the next generation of engineers to meet the demands of tomorrow. As readers and contributors to this publication, you are integral to this transformative journey, and we eagerly anticipate the exciting advancements that await us. We are delighted to share glimpses of the activities undertaken by our enthusiastic students under the guidance of their faculty as they navigate through this period. We trust that this culture of disseminating the newsletter will endure indefinitely and serve as a model for others to emulate.



AISHNA MAHAJAN

EDITOR-IN-CHIEF

MECHNOTIMES

FROM EDITORIAL'S BOARD

Welcome to our latest edition of Mechnotimes of Mechanical Department Newsletter of Chandigarh Engineering College-CGC, Landran for JULY-SEPTEMBER 2023. As we venture into the realm of engineering and technology, we are reminded of the vast opportunities and responsibilities that lie ahead. In this editorial, we underscore the significance of embracing innovation and sustainability to propel progress in the mechanical world. Innovation is the lifeblood of the engineering discipline. From the advent of the steam engine to the contemporary electric vehicle, innovation has moulded the way we live, work, and interact with the world. As budding mechanical engineers, we are at the forefront of this dynamic metamorphosis, constantly pushing the limits of what is achievable.

ANURAAG GILHOTRA (2102424), SEM V

SHRESTHA PRATAP SINGH (2237670), SEM III

SHIVANSH MUNJAL (2237669), SEM III



Industrial Visit to “Amber Enterprises India Limited”

On the 04th October 2023, the Department of Mechanical Engineering at Amber Enterprises India Limited Boilers Limited, The Industrial Visit, aimed to educate students on HVAC R&D unit operations. The event provided insights into the HVAC industry processes, emphasizing various testing procedures for air conditioners. Students gained practical knowledge, witnessing first-hand the technical aspects involved in the testing of air conditioning units. The visit successfully met its objective of enhancing students' understanding of HVAC operations, contributing to their academic and practical development.



Student Participation in SIH Grand Finale (Hardware Edition)

The students of Department of Mechanical Engineering, CEC- CGC, Landran, Mohali, showcased remarkable innovation at the Smart India Hackathon, Hardware edition, held in Coimbatore from December 19 to 23, 2023. The participating students

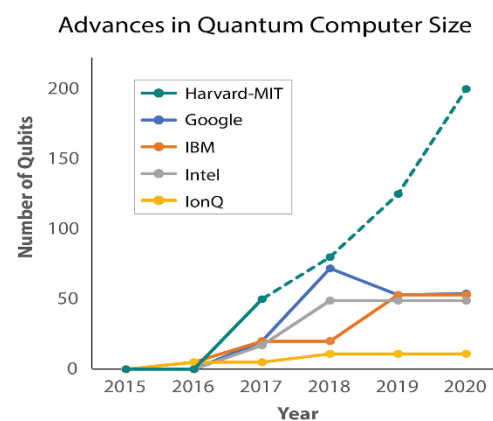


successfully addressed the Ministry of Home Affairs, GOI's problem statement: "Robotics Device for Borewell Rescue Operation." Their dedicated efforts resulted in the development of an effective robotic device tailored to this critical task. This participation not only demonstrated the students' commitment to solving real-world challenges but also highlighted the department's prowess in fostering creative solutions to address societal needs.



Quantum Computing: Unraveling the Future of Information Processing

In the ever-evolving landscape of technology, quantum computing stands out as a revolutionary paradigm poised to reshape the foundations of information processing. At its core, quantum computing leverages the principles of quantum mechanics, a branch of physics that governs the behaviour of particles at the smallest scales. Unlike classical computers that utilize bits as the fundamental unit of information, which can exist in a state of either 0 or 1, quantum computers employ quantum bits, or qubits. Qubits, however, possess a unique property known as superposition, enabling them to exist in a multitude of states simultaneously. This inherent duality exponentially increases the computational capacity of quantum computers, allowing them to tackle complex problems that were once deemed insurmountable for classical counterparts. One of the key attributes of quantum computing is entanglement, a phenomenon where the state of one qubit becomes intimately correlated with another, irrespective of the physical distance between them. This interconnectedness enables quantum computers to perform computations in parallel, unlocking unprecedented computational power. The potential applications of quantum computing are vast and transformative, spanning fields such as cryptography, optimization, and the simulation of quantum systems. In the realm of cryptography, for instance, quantum computers could render current encryption methods obsolete by swiftly factoring large numbers, posing both challenges and opportunities for cybersecurity.

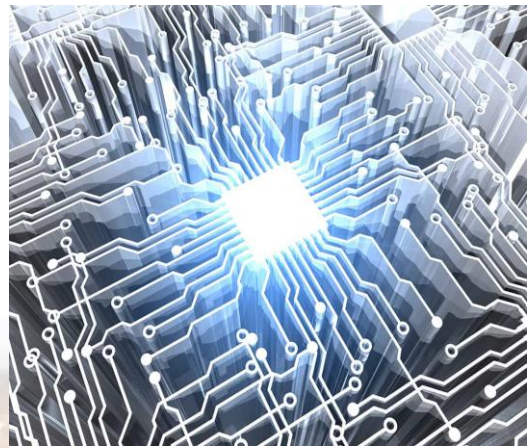


Despite the promise of quantum computing, the journey towards practical and scalable quantum computers is fraught with challenges. One major hurdle is the issue of maintaining coherence and minimizing errors in qubit computations. Quantum systems are highly susceptible to external disturbances, leading to a phenomenon known as decoherence, where the delicate quantum states degrade

over time. Overcoming this challenge requires the development of error correction techniques and the creation of more stable qubits. Researchers and engineers around the world are actively working on addressing these obstacles to unlock the full potential of quantum computing.

In recent years, significant strides have been made in the development of quantum hardware and algorithms. Companies such as IBM, Google, and Rigetti Computing have achieved notable milestones in creating increasingly stable and scalable qubits. Quantum supremacy, a term referring to the point at which a quantum computer outperforms the most advanced classical computers, has been experimentally demonstrated by some of these players. These achievements mark crucial steps towards practical quantum computing, fueling optimism about the transformative impact it could have on various industries.

Looking ahead, the future of quantum computing holds immense promise, yet challenges persist. The realization of fault-tolerant quantum computers capable of solving real-world problems efficiently remains an ongoing quest. As researchers delve deeper into the intricacies of quantum mechanics and quantum information science, the development of novel algorithms and hardware solutions is expected to accelerate. Quantum computing's journey from theoretical concept to practical application is a testament to human innovation and the persistent pursuit of pushing the boundaries of what is possible in the realm of information processing. The quantum revolution is undeniably underway, and as the field matures, its profound implications are set to unfold, unraveling new possibilities for computing in the decades to come.



Written by: Shrestha Pratap Singh (2237670), Sem III

Digital Twin Technology: Bridging The Physical And Virtual Realms

Digital twin technology, a transformative concept that has gained momentum in recent years, is reshaping how industries design, operate, and maintain physical assets. At its core, a digital twin is a virtual representation of a physical object or system, creating a dynamic and real-time connection between the physical and digital worlds. This innovative approach holds the potential to revolutionize various sectors, from manufacturing and healthcare to urban planning and beyond.

In essence, a digital twin serves as a mirror image of its physical counterpart, capturing and continuously updating data to reflect real-world conditions. This technology integrates the Internet of Things (IoT), artificial intelligence (AI), and data analytics to create a holistic and interactive model. The digital twin is not a static replica but a dynamic entity that evolves with the changes in its physical counterpart. This dynamic nature enables real-time monitoring, analysis, and optimization, offering unprecedented insights and control over physical assets.



One of the key applications of digital twin technology is in the realm of manufacturing. In the manufacturing process, a digital twin can replicate the entire production line, allowing for simulation, analysis, and optimization of

various scenarios. This enables manufacturers to identify potential bottlenecks, optimize efficiency, and minimize downtime. By providing a virtual testing ground, digital twins streamline the product development lifecycle, reducing costs and accelerating time-to-market. In healthcare, digital twins are making significant strides, particularly in personalized medicine. By creating digital replicas of individual patients, healthcare professionals can analyze and simulate the impact of different treatment options, leading to more tailored and effective healthcare interventions. This approach not only enhances patient outcomes but also contributes to the optimization of healthcare resources. Urban planning is another arena where digital twin technology is proving invaluable. Cities are complex ecosystems with numerous interconnected elements. Digital twins of urban environments facilitate comprehensive city planning by integrating data from various sources, including infrastructure, transportation, and environmental factors. City planners can simulate and assess the implications of proposed changes, fostering more sustainable and resilient urban development.



In conclusion, digital twin technology stands at the forefront of the digital transformation era, offering a bridge between the physical and virtual realms. Its applications span a multitude of industries, from optimizing manufacturing processes to revolutionizing healthcare and urban planning.

Written by: Anuraag Gilhotra (2102424), Sem V

Advanced Weather Routing: Navigating the Seas of Precision and Efficiency

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In the maritime industry, the science of weather forecasting has taken a giant leap forward with the advent of Advanced Weather Routing (AWR) technologies. A critical component for ship operators and marine logistics, AWR goes beyond traditional weather forecasting by incorporating real-time data, sophisticated algorithms, and predictive analytics. This cutting-edge approach is transforming how vessels navigate the seas, optimizing routes for efficiency, safety, and fuel conservation.

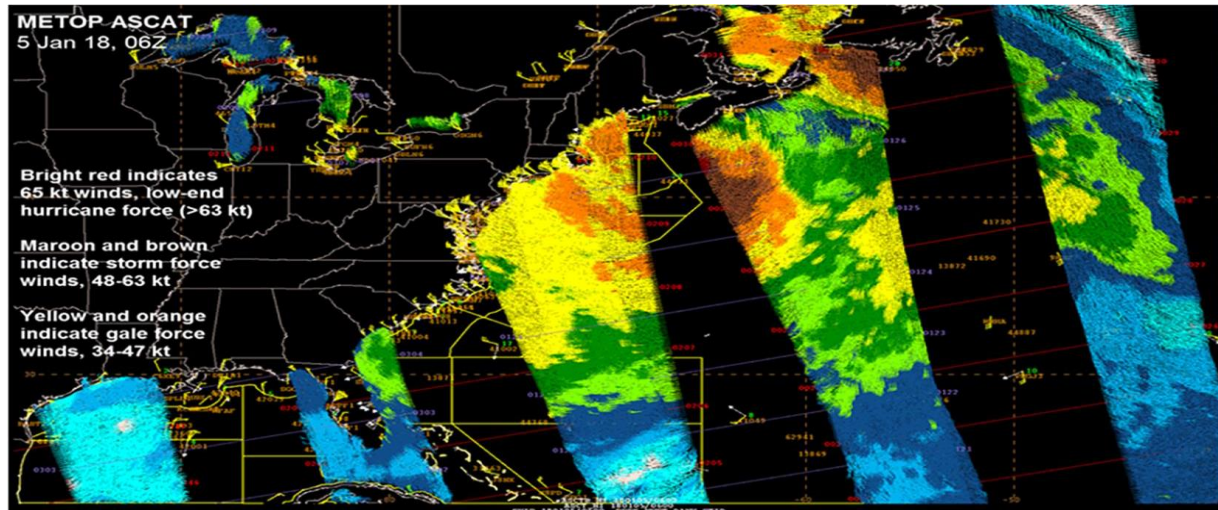
At its core, Advanced Weather Routing leverages a combination of meteorological data, satellite observations, and historical weather patterns to create highly accurate and dynamic models of current and future weather conditions. Unlike conventional routing methods that rely on static weather predictions, AWR systems continuously update and adjust routes in response to changing weather patterns, vessel performance data, and evolving environmental conditions.

The maritime industry has long been susceptible to the unpredictable nature of weather at sea. Advanced Weather Routing addresses this challenge by providing ship captains and operators with real-time insights into optimal routes that consider not only the shortest distance but also factors like wind speed, wave height, and currents. By avoiding adverse weather conditions and strategically utilizing favorable winds and currents, vessels can significantly enhance fuel efficiency, reduce operational costs, and improve overall safety.

Fuel efficiency is a paramount concern in the maritime sector due to both economic and environmental considerations. AWR plays a pivotal role in minimizing fuel consumption by enabling vessels to take advantage of favorable weather conditions for propulsion. By avoiding rough seas and adverse winds, ships can navigate more smoothly, reducing fuel consumption and emissions. This not only contributes to cost savings for ship operators but also aligns with the industry's growing focus on sustainability and environmental responsibility.

The implementation of Advanced Weather Routing is not limited to commercial shipping; it extends to various maritime sectors, including offshore energy operations and naval activities. Offshore platforms, for instance, benefit from

optimized routing to ensure safe operations amid challenging marine environments. Naval fleets utilize AWR to plan and execute missions more effectively, considering both strategic and tactical objectives while navigating through diverse weather conditions.



Despite the evident advantages, challenges remain in the widespread adoption of Advanced Weather Routing. The integration of AWR systems with existing vessel navigation and communication systems, along with the need for skilled personnel to interpret and act on the provided data, poses implementation hurdles. Moreover, data accuracy and reliability, particularly in remote or poorly monitored regions, require ongoing attention to ensure the effectiveness of AWR technologies.

Looking ahead, as technology continues to evolve, Advanced Weather Routing is expected to become more sophisticated and seamlessly integrated into maritime operations. The fusion of AWR with emerging technologies like artificial intelligence, machine learning, and improved satellite communications holds the promise of further enhancing predictive capabilities and route optimization. The maritime industry's embrace of Advanced Weather Routing reflects a commitment to operational excellence, safety, and sustainability, ultimately charting a course towards a more efficient and resilient maritime future.

Written by: Sachin Yadav (2102444), Sem V

Energy-Efficient Propulsion Systems: **Charting a Greener Course for Transportation**

In the ever-evolving landscape of transportation, the quest for energy efficiency has become a central focus, driven by environmental concerns, regulatory pressures, and the pursuit of sustainable practices. Energy-efficient propulsion systems stand at the forefront of this transformative journey, redefining how vehicles, aircraft, and even spacecraft harness and utilize energy. From electric and hybrid engines to innovative propulsion technologies, the pursuit of energy efficiency is reshaping the transportation industry, promising a more sustainable and environmentally conscious future.

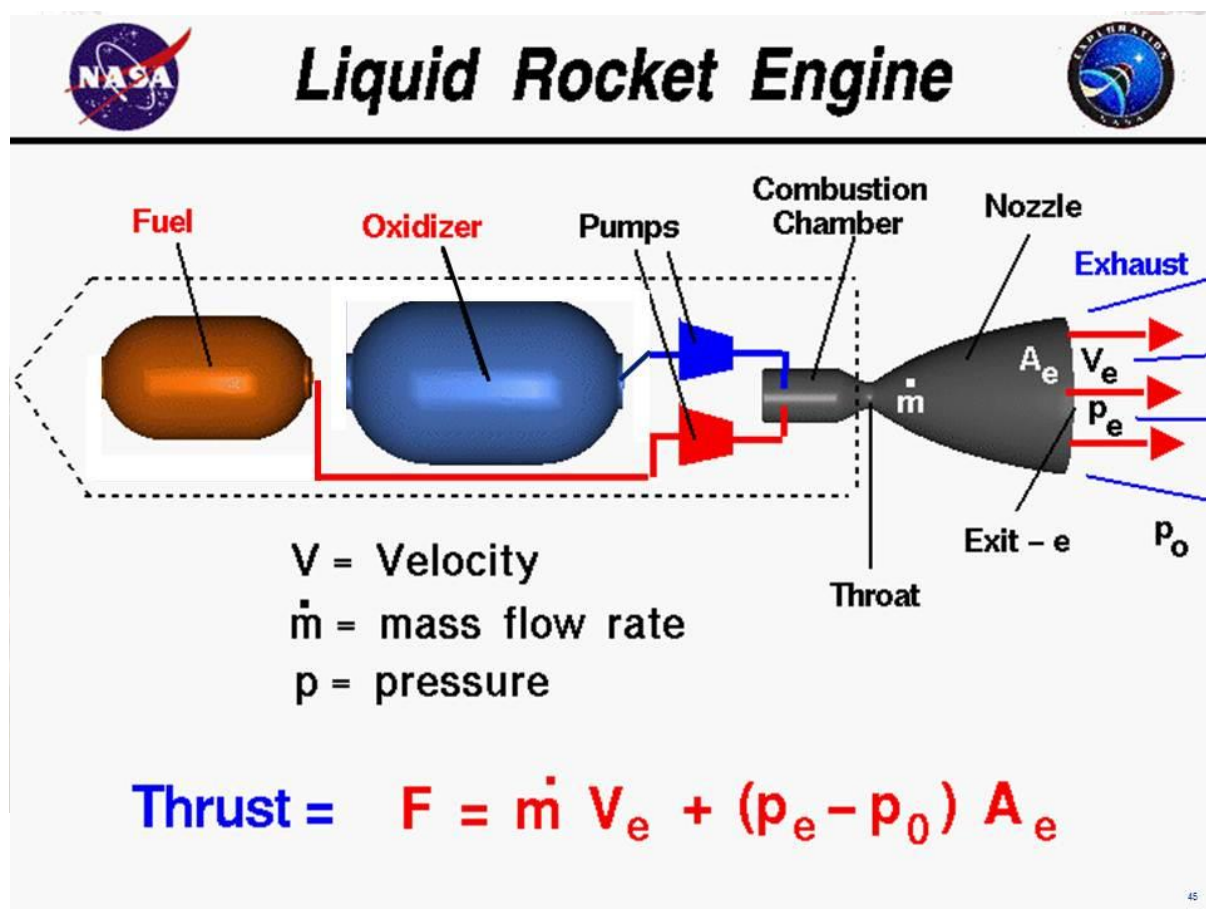
Electric propulsion systems have emerged as a game-changer in the automotive sector, challenging the dominance of traditional internal combustion engines. Electric vehicles (EVs) leverage electric motors powered by high-capacity batteries, eliminating the need for fossil fuels and significantly reducing greenhouse gas emissions. The development of advanced battery technologies, improvements in charging infrastructure, and the increasing range of electric vehicles have contributed to a paradigm shift in the automotive landscape. Governments and industries worldwide are investing heavily in the electrification of transport as a key strategy to mitigate climate change and reduce dependence on finite fossil fuel resources.

Hybrid propulsion systems represent another facet of the energy-efficient transportation revolution, offering a bridge between conventional and fully electric vehicles. Hybrid vehicles combine internal combustion engines with electric propulsion, allowing for improved fuel efficiency and reduced emissions. Through intelligent control systems, these vehicles seamlessly switch between electric and combustion modes, optimizing energy use based on driving conditions. Hybrid technologies are particularly relevant in sectors where all-electric solutions may face practical limitations, such as long-haul trucking and aviation.

In the aviation industry, energy-efficient propulsion systems are a focal point for reducing carbon footprints and enhancing operational efficiency. Modern aircraft are increasingly incorporating advanced turbofan engines, which feature high-

bypass ratios and improved fuel efficiency. Additionally, the exploration of electric and hybrid-electric propulsion for smaller aircraft and urban air mobility vehicles is underway, promising a greener and quieter future for air travel.

The maritime sector is also embracing energy-efficient propulsion systems to navigate the challenges of rising fuel costs and stringent environmental regulations. Innovative technologies, such as advanced hull designs, hybrid propulsion, and the use of alternative fuels, are transforming the efficiency of ships and reducing their environmental impact. Wind-assist technologies, such as sails and rotors, are making a comeback to harness renewable energy and enhance the efficiency of maritime transportation.

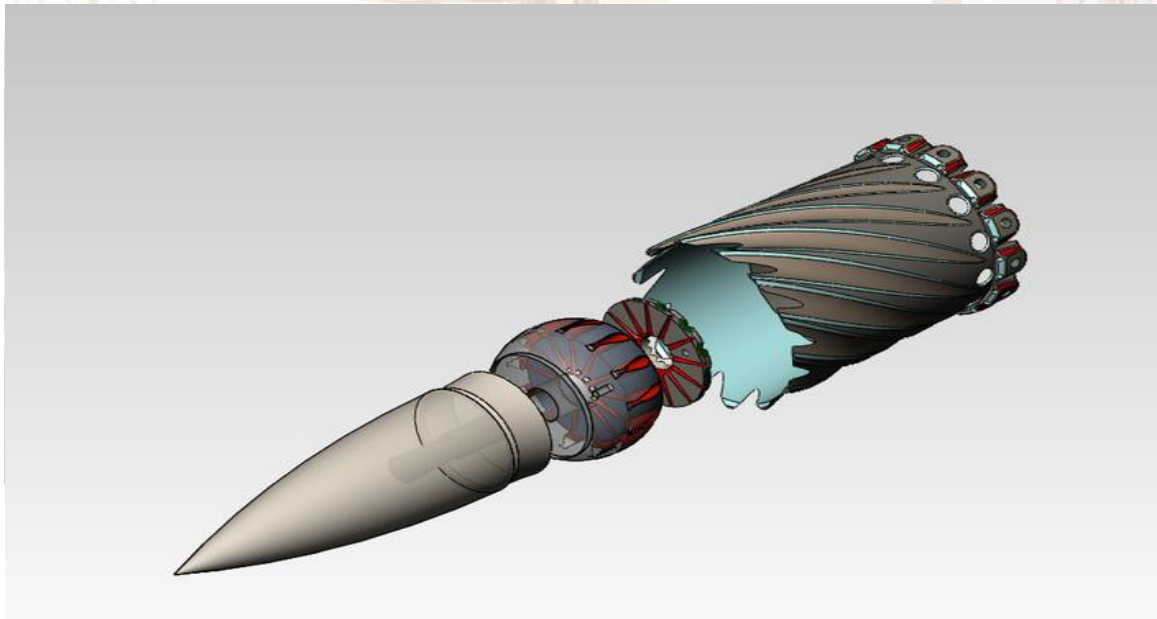


While the transition to energy-efficient propulsion systems is a positive step towards a more sustainable future, challenges persist. The infrastructure for electric vehicle charging, the development of high-energy-density batteries, and the standardization of alternative fuels are crucial aspects that require concerted efforts from governments, industries, and researchers. Moreover, the economic

viability of energy-efficient solutions and the willingness of consumers to adopt these technologies remain pivotal factors in their widespread acceptance.

As technology continues to advance, the integration of artificial intelligence, machine learning, and materials science is expected to further enhance the efficiency of propulsion systems. The convergence of these technologies holds the promise of creating smarter, more adaptive propulsion systems that continually optimize energy usage based on real-time data and operating conditions.

In conclusion, energy-efficient propulsion systems represent a transformative force in transportation, shaping a future where vehicles operate with minimal environmental impact. The collective efforts of industries, governments, and researchers to innovate and invest in these technologies underscore a commitment to sustainability and responsible stewardship of the planet's resources. As the journey towards energy-efficient transportation accelerates, the positive impacts on air quality, climate change mitigation, and resource conservation are poised to reshape the way we move and traverse the world.



Written By: Nikhil (2102438) SEM V