



**VOL 9**

# **Mechazine**

**2022-23**

**BAJA - A JOURNEY OF  
INNOVATION AND  
COLLABORATION**

**THE FOLDABLE  
BOAT-  
A PATENTED  
PROJECT**

**CHAT WITH  
PAUL GEORGE**



**MECHAZINE VOLUME 9  
2022-23**



**DEPARTMENT OF MECHANICAL ENGINEERING**



**RSET**  
RAJAGIRI SCHOOL OF  
ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)

Cover Design:  
Sivasoorya C S  
S6 ME Beta



**THE DAY IN WHICH YOU HAVE NOT DONE ANY GOOD TO  
YOUR FELLOWMEN WILL NOT BE RECORDED IN YOUR  
BOOK OF LIFE**

~Saint Kuriakose Elias Chavara

# PRINCIPAL'S MESSAGE



**Prof (Dr.) P S Sreejith**  
Principal  
Rajagiri School of  
Engineering

I have great pleasure in conveying my best wishes to the Department of Mechanical Engineering for releasing the 2022-2023 issue of the MECHAZINE which brings the students and teachers on a common platform to share and display their ideas and creative talents. The efforts taken to bring about innovative content is appreciable. I also applaud the coordination and efforts behind the team to bring out this issue. I wish all the students and staff who have involved in bringing out the magazine for their greater success and career ahead.



# VICE PRINCIPAL'S MESSAGE

In the era of the fourth industrial revolution, the integration of Artificial Intelligence (AI) has become a prominent aspect for mechanical engineers, revolutionizing their roles and capabilities. Introducing AI-powered systems has brought about a paradigm shift, enabling mechanical engineers to harness the power of machine learning algorithms and data-driven insights. With AI, mechanical engineers can design and optimize complex systems with greater precision, efficiency, and adaptability. For mechanical engineers, AI opens up new horizons and career opportunities in cutting-edge fields such as nanotechnology, biomechatronics, myoelectric prostheses, 3D printing, and electric cars. Through the utilization of AI algorithms and intelligent automation, mechanical engineers can enhance their problem-solving abilities, enabling them to tackle intricate challenges and push the boundaries of innovation. The sky is no longer the limit; it's an invitation to explore limitless possibilities.

As we embark on this exciting journey, Our Department of mechanical engineering should embrace AI as a powerful ally in our pursuit of sustainability, environmental sensitivity, and humane intervention. By incorporating AI-driven technologies into our projects and research, we strive to create a better world for humanity, where efficiency, conservation, and ethical considerations go hand in hand. The energy and creativity infused into this departmental magazine, propelled by the capabilities of AI, will undoubtedly serve as a catalyst for progress and inspire the mechanical engineers of today and tomorrow.

Once again, congratulations to the Royal Mech's staff, faculty, students and the magazine's creators for their remarkable achievements. With AI as an integral part of our endeavors, let our flag soar higher, fueled by innovation, collaboration, and the determination to shape a brighter future.



**Fr (Dr.) Jaison Paul  
Mulerikkal CMI**  
Vice Principal  
Rajagiri School of  
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Technology

# MESSAGE FROM HOD



**Dr. Mathew Joseph**  
HoD  
Department of  
Mechanical Engineering  
RSET

Dear readers,

It is my pleasure to welcome you to the annual mechanical engineering magazine “Mechazine 2023”, where we showcase the incredible work of our department over the past year.

As Head of the Mechanical Engineering Department, I am proud of the achievements of our faculty, staff, and students. From groundbreaking research to innovative design projects, our community has continued to push the boundaries of what is possible in the field of mechanical engineering.

This past year has been particularly challenging, especially in overcoming the odds created due to the pandemic. Despite the reduced number of academic hours, our department has remained resilient and adapted to new ways of working and learning. Our faculty and staff have gone above and beyond to support our students, and I am immensely proud of how our students have risen to the challenge. Despite the obstacles encountered, our students and faculty have gone the extra mile, as evidenced by the impressive publication that is, Mechazine 2023.

The magazine features a combination of technical and creative contributions from the talented individuals in our department. As you read through the pages of this magazine, I hope you will be inspired by the creativity, ingenuity, and passion of our department.

It is noteworthy to mention the names of Mr. James Mathew and Mr. Jithin K. Francis, the faculty coordinators of the Mechanical Engineering Association-RealMechanica, who led the way in making this magazine a reality. I would like to extend my gratitude to every student who contributed to this magazine, from the writers and editors to the designers and photographers. Your hard work and dedication have brought this publication to life.

Thank you for taking the time to read this magazine, and I hope it gives you a glimpse into the exciting work happening in the Mechanical Engineering Department at our institution.

Sincerely,

Dr. Mathew Joseph  
Associate Professor and Head  
Department of Mechanical Engineering

# MESSAGE FROM FORMER HOD

My second tenure as HoD, Department of Mechanical Engineering during the period July 2020 to March 2023, has given me very proud experience and memories. I thank my colleagues and students in the department for their wholehearted support and cooperation rendered to me during this period. On this occasion, I express my deepest gratitude to the Management and Principal for giving me an opportunity to lead the Mechanical Engineering Department of this prestigious institution. From 2020 onwards the institution has become autonomous, which gives us the freedom to design and implement our own curriculum, thereby we can respond more quickly to industry demands and changing technologies. It provided greater flexibility, academic independence, higher quality of education, and stronger industry connections which are beneficial for both students and institution. The Board of Studies for the Mechanical Engineering Department was constituted in 2020 and regular meetings are held twice every year. It is comprised of all the faculty members from the department, university nominees, academic experts from eminent engineering institutions, and practicing mechanical engineers from the industry. The feedback from students, alumni and recruiters is also considered in framing the curriculum. A completely revised curriculum ensuring, high quality and emphasizing the development of skills that are highly valued by core Mechanical Engineering companies will be put into practice from the 2023 academic year onwards.

The B. Tech program in Mechanical Engineering got reaccredited by the National Board of Accreditation (NBA) in June 2022. This is a significant achievement and a testament to the hard work and dedication of staff and students in our department. This accreditation is a reflection of our commitment to providing the highest quality education to our students and to maintaining the highest standards of teaching and research. It is a recognition of our efforts to continuously improve and innovate in our programs and curricula. Mr. Celwin John of the 2017-21 batch secured the best outgoing student award for his outstanding performance in academics, co-curricular and extracurricular activities. The placement track record was very impressive during the period and many of our students got good placements in core Mechanical Engineering. The department is very proud to announce that Mr. Aadil Mohamed and Mr. Abhishek Menon of S8 Mechanical got campus placement in Plusdrei GmbH, Austria. The company is an innovative engineering consulting firm in the field of automotive development and automation technology. They will be joining the company in Austria in September 2023. Also, many of our students have secured admissions for advanced studies in engineering in top-ranked universities in the USA, UK and other European countries.

I extend my warmest welcome to Dr. Mathew Joseph as he takes charge of the Department of Mechanical Engineering. I am confident that he will bring new ideas and perspectives to the department and will continue to build on our successes. I request all staff and students to renew our commitment to excellence and continue to strive for even greater success. Together, we can continue to provide an exceptional education to our students and contribute to the development of our society and the world. Once again I express my heartfelt gratitude to everyone in the department for their support, hard work, and dedication. It has been an honor to work with such a wonderful team, and I will cherish the memories and experiences that we have shared together.

Wish you all the very best.



**Dr. Manoj G Tharian**  
Assoc. Professor  
Department of  
Mechanical Engineering  
RSET

## Mechazine 2022-23 - Exploring the Frontiers of Mechanical Engineering



**Mr. James Mathew**  
Asst. Professor  
Coordinator,  
Real Mechanics  
Department of  
Mechanical Engineering,  
RSET

# EDITORIAL NOTE

Welcome to the latest edition of Mechazine, the technical magazine prepared by the bright minds of the Department of Mechanical Engineering for the academic year 2022-23. As always, our team of passionate students has worked tirelessly to bring you a collection of insightful articles, captivating stories, and engaging interviews that highlight the latest advancements and experiences in the field of mechanical engineering.

This year, Mechazine goes beyond the boundaries of conventional knowledge and delves into the exciting frontiers of our discipline. We have meticulously curated a diverse range of articles that will broaden your horizons and inspire your imagination.

One of the highlights of this edition is the "Internship Chronicles" section, where students share their valuable experiences gained during internships at renowned companies. These stories not only provide a glimpse into the real-world applications of mechanical engineering but also offer practical insights and lessons learned that can guide future interns and aspiring engineers.

In our exclusive interview, we feature an accomplished alumnus who has ventured into the entrepreneurial world and successfully launched a startup in the 3D printer building. Join us as we delve into their journey, the challenges faced, and the valuable lessons they've acquired along the way. Their story serves as an inspiration for all young minds who dream of making a mark in the industry.

Furthermore, Mechazine proudly showcases the remarkable accomplishments of our student teams in the BAJA competition. The spirit of teamwork, innovation, and determination exhibited by our participants is truly commendable. Through their experiences and lessons learned, we hope to inspire future generations of students to take on similar challenges and push the boundaries of what is possible.

Additionally, we have meticulously researched and curated a series of articles that explore emerging trends and technologies in the field of mechanical engineering. From the latest developments in green manufacturing and topics like MEMS, synthetic fuel, turbofan engines and camber in vehicles, our articles aim to keep you informed about the rapidly evolving landscape of our discipline. We would like to extend our heartfelt gratitude to all the contributors, including faculty members, students, alumni and industry professionals, who have dedicated their time and expertise to make this edition of Mechazine a resounding success. Your unwavering commitment to excellence is the driving force behind our collective efforts.

Finally, we invite all readers to explore the diverse contents of Mechazine and engage with the ideas presented. It is our hope that this magazine will inspire curiosity, spark innovative thinking, and foster a strong sense of community among mechanical engineering enthusiasts.

We are excited to present Mechazine 2022-23 and we sincerely hope that you find it both informative and captivating. Your feedback is invaluable to us as we strive to improve with every edition. Together, let us embrace the ever-evolving landscape of mechanical engineering and pave the way for a brighter future.

Happy reading!  
Editorial Team  
Mechazine 2022-23



# FROM THE DESK OF FACULTY COORDINATOR

The world has always been inspired by great literature books. Just turn around any religious beliefs or any political ideology, all these are based on thoughts that have burnt the midnight oil and inked.

A person who loves to write is penned with great ideas. Now it is the turn of Mechanical Engineering Grad students to showcase their literature both techno and artistic ones at the beginning of this new semester. The new edition of Mechazine 2022-23 is ready to swipe the pages.

The department has seen a lot of evolution of MG University batches, then KTU and from next year with full autonomous batches. With pride, I scribble the editorial that all our alumni, current students and faculty have been emotionally and technically bonded with Mechazine from its inception since 2014.

Every year the quality of content and teamwork are its highlights. This year technical literature, patents and artistic works are the add-ons.

Planning the next edition of Mechazine of 2023-24 capping the nib.

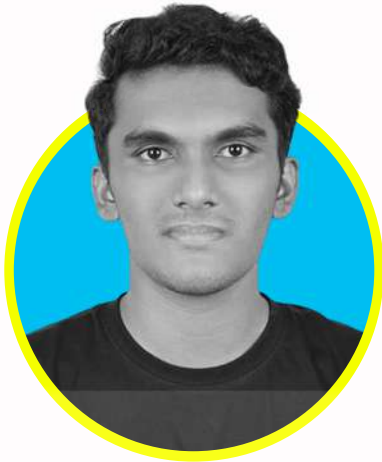
Sincerely,

Mr. Jithin K Francis  
Asst. Professor  
Coordinator, Real Mechanica  
Department of Mechanical Engineering



**Mr. Jithin K Francis**  
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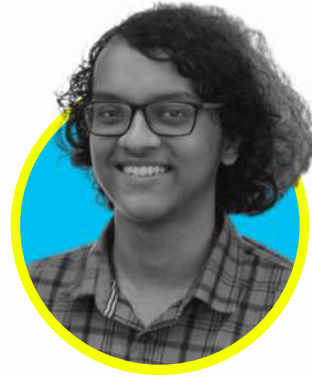
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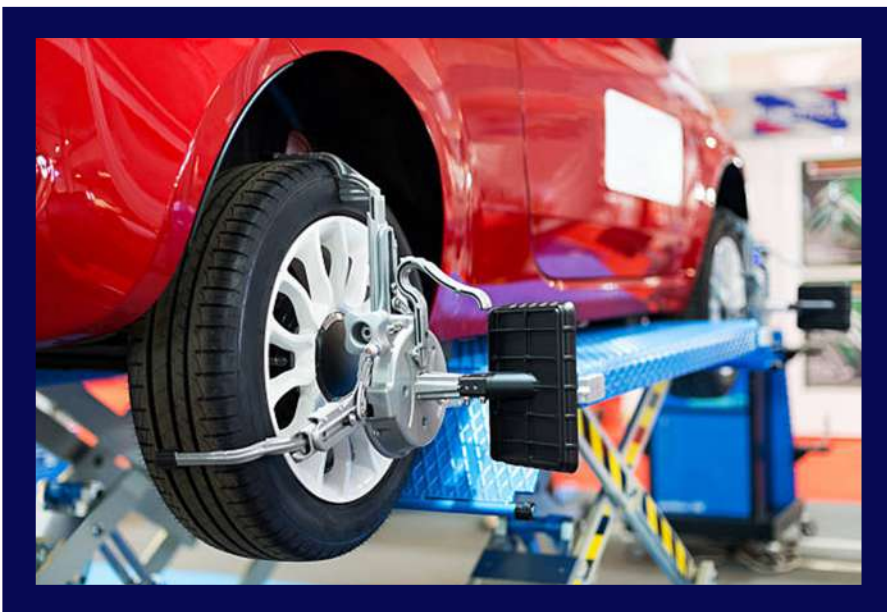
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# 737MAX: A PROBLEMATIC JOURNEY



Aswin  
S6 ME A

For all unfavorable reasons, the Boeing 737MAX has captured the attention of the general public in the last half a decade. With two major accidents in less than 2 years, the Boeing narrowbody has had to cross several hurdles to try to win back consumer confidence.

The 737 family is a family of narrowbody aircraft, which is the highest produced in commercial aviation history. Compared to its predecessor, the 737NG, the MAX features new engines, improved software in the cockpit, a new tail cone design, and a split-tip winglet. Boeing's CEO claimed that the MAX could have 4% more fuel efficiency than Airbus A320NEO, its direct rival.

Racking up almost 4000 orders before commercial release, the 737MAX-800, the first variant of the MAX series obtained certification from the US Federal Aviation Authority (FAA) in 2017.

The certification was relatively quick as the MAX was given the same type of certification as the previous 737s. Type certification based on the previous model is nothing new, the A320NEO also has done the same.

However, the 737 is designed to have very low ground clearance (to facilitate easy cargo loading/unloading). With the MAX, the clearance was raised a bit, just enough to squeeze in the new CFM-LEAP 1B engines.

This shifted the center of gravity of the aircraft, which was found to cause erratic pitching of the



aircraft during flight leading to the development of the Maneuvering Characteristics Augmentation System (MCAS) to control the movements.

## Questions asked

Realizing the severity of the aircraft's issues, aviation authorities across the world grounded the aircraft indefinitely, starting with the Chinese authorities. Interestingly, the Federal Aviation Authority (FAA) of the USA was last to act, on March 2019.

The FAA came under fire for its lapses during the certification of the aircraft. Boeing had lobbied the FAA to exempt it from certain safety features.

Following the crash, several committees of the US government investigated the lapses of the MAX. It was found that Boeing had hidden the MCAS feature from its flight manual, as they saw it only as an improved version of existing technology rather than a completely new one.





A multi-national Joint Authorities Technical Review (JATR) recommended more involvement from the FAA in regulating the certification process.

## Return to service

By early 2021, most aviation authorities had cleared the 737MAX back to service. By then, about 1000 orders were cancelled. Boeing replaced its CEO in the aftermath of the crashes. Boeing was brought to court on fraud charges and eventually paid \$2.5 billion in the settlement.

The FAA put out several prerequisites before the MAX's certification such as revised flight manuals, changes to some of its electrical wiring, additional redundant angle-of-attack sensors, and so on.

Even then, Boeing had not lost too much of its market. The A320NEO itself had a massive order backlog, and since switching aircraft required expensive pilot training for the airlines, Airbus showed no interest in eating into Boeing's loyal operators.

In light of this fiasco, the US Congress mandated all newly produced commercial aircraft to include EICAS safety features, which the MAX lacked. Surprisingly, the MAX, which lacked this rather expensive feature, was given an exemption,

paving way for the certification of the new 737MAX-700 and 1000 variants in the near future.

Today, the MAX order book stands at 5320, including a large order of 72 from India's Akasa Air. The MAX is certainly past its worst period. The continuous and intense investigations the MAX received can, as per the JATR report, make the "aircraft the safest out there".

Yet, Boeing's approach to cutting corners with costs is a case in point on the necessity of proper implementation of stringent safety standards in a critical industry.



# GREEN MANUFACTURING



Mahal Mani Ulahannan

S4 ME B

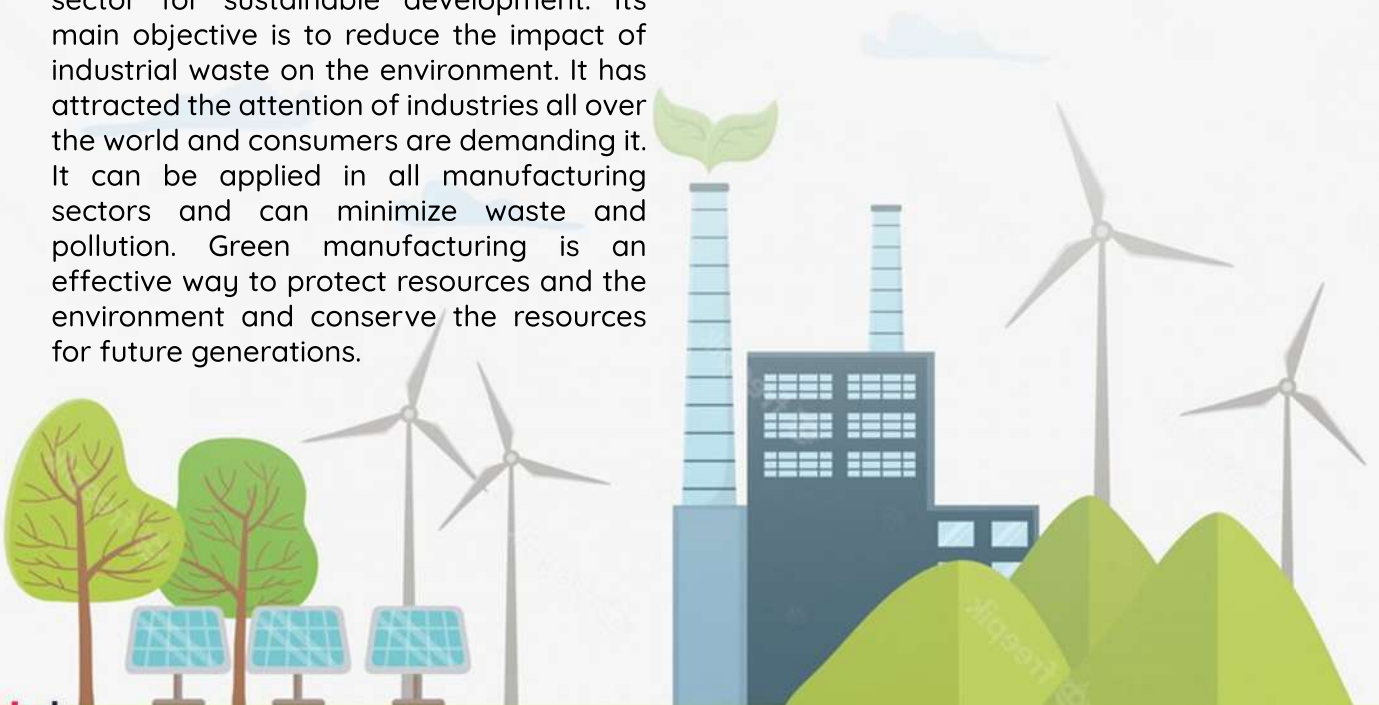
The manufacturing sector is one of the biggest contributors to the economy which provides job opportunities, better living standards, healthcare, and education. But due to these rapid technological advancements, there is a growing concern for environmental degradation caused by the manufacturing sector. Conventional mechanical processing techniques consume lots of energy and produce a lot of pollution and add to the deterioration of the global environment. Because of this, manufacturers are gradually transforming their manufacturing systems from traditional mass production to green manufacturing.

Green manufacturing is the embodiment of a strategy used by the manufacturing sector for sustainable development. Its main objective is to reduce the impact of industrial waste on the environment. It has attracted the attention of industries all over the world and consumers are demanding it. It can be applied in all manufacturing sectors and can minimize waste and pollution. Green manufacturing is an effective way to protect resources and the environment and conserve the resources for future generations.

Some of the exciting green technologies that can help the manufacturing sector contribute to a sustainable planet include:

**Renewable energy and storage**- Manufacturers need large amounts of energy on a continuous basis to run operations. To go green, manufacturers can explore adopting renewable energy such as solar power, wind energy, and energy from biomass. Some latest innovations include flow batteries that follow a liquid design and molten salt storage.

**Waste-to-energy solutions** - Manufacturing companies can tackle industrial waste by generating energy and other useful products from effluents. Some ground-breaking technologies are plasma gasification and the generation of electricity from wastewater.





### **AI for tracking carbon footprint** -

Manufacturing companies can leverage the power of artificial intelligence solutions to track emissions, understand their effect, derive insights and create solutions to become environmentally friendly.

**Green architecture** - It is a building infrastructure that is sustainable. This includes improving the energy efficiency of a building, reducing pollution in construction and renovation, and limiting disruption to the water cycle. Some examples include building infrastructure that is self-fueling and using fabric structures for construction.

The benefits of engaging in green initiatives include an improved corporate image, cost savings, maintaining competitive advantage, and increased employee morale. Other benefits include lower raw material costs, production efficiency gains, tax incentives, compliance with the regulations, and reduced impact on the environment. In spite of the solution that green manufacturing offers to the environmental problem, many companies are still skeptical about the business benefits. A major challenge is competing with companies overseas that do not live up to the same standards.

The rate at which green manufacturing systems are being implemented is not keeping pace with the global expansion of the manufacturing industry.

Engineering managers face challenges in ascertaining the costs of embarking on green manufacturing and assessing the performance of green manufacturing. It is hard to improve what cannot be measured. Green manufacturing has become a leading trend in the 21st-century manufacturing industry. It is an effective way to achieve sustainable manufacturing development. Green manufacturing will have a lot of benefits in the years to come. It is an important issue that manufacturing systems of the future must take into account. Going green isn't something you can do overnight, but it is something you can achieve, and it's possible to start making your first steps now.



# CAMBER IN VEHICLES



JUAN SEBASTIAN

S6 ME B

Have you ever wondered why the rear wheels of an autorickshaw have an inward or outward tilt? This tilt observed in the wheels of vehicles is known as camber.

Camber is used to change the contact area of wheels with the road which in turn affects the grip of the wheels. The angle made between the plane of the wheel with respect to an imaginary vertical axis is termed as camber angle. The camber is divided into two namely, positive camber and negative camber. Positive camber is defined when the wheels are inclined outward. Negative camber is defined when the wheels are inclined inward. Positive camber is usually observed in agricultural and off-road vehicles. They usually have a camber angle of  $1^{\circ}$ -  $2^{\circ}$ . Negative camber is observed in modern cars having a camber angle of  $0^{\circ}$ -  $2^{\circ}$ . Performance cars often tend to have more negative camber angles, as they exhibit better stability at high-speed corners. In the case of positive camber, when the load increases the wheel straightens which increases stability. This is

**CAMBER CAN EVEN GIVE YOUR CAR A UNIQUE LOOK!**

the reason why drivers insist on having a certain maximum number of people in their autorickshaws.

When positive camber takes corners, the outer wheels on the right-hand side tilt out when making a left turn. This causes losing more contact patches, and lower inner wheel contact patches and reduces stability, so it is mostly avoided.



Negative Camber



Positive Camber







Classic cars, off-road, and agricultural vehicles have positive camber, the absence of power steering which helps in reducing the steering wheel effort in the case of positive camber. When negative camber takes corners, the inner wheels on the left-hand side have less grip and the outer wheels on the right-hand side straighten resulting in improved surface contact and grip.

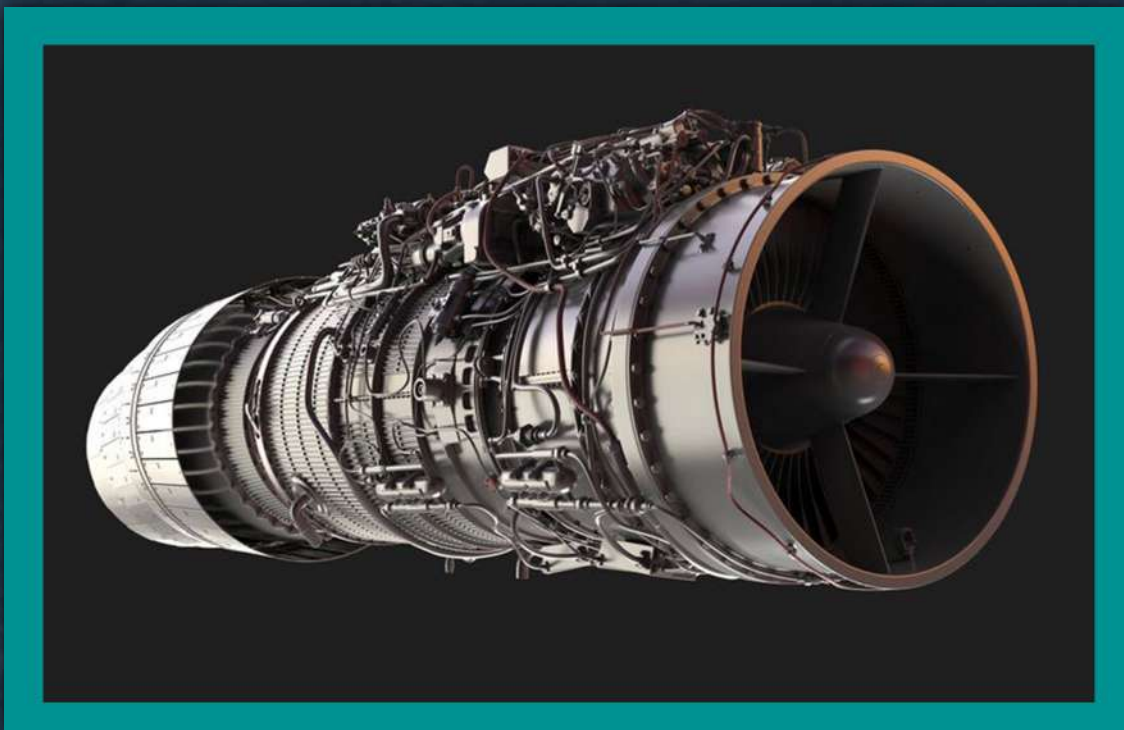
To ensure the performance of a particular camber, a Temperature Test can be conducted. In this test, the inner surface temperature and outer surface temperature of the wheels are noted.

When the inner surface temperature is more than the temperature on the other sides, then it is said to have a negative camber while the vice-versa is known as positive camber. When the temperature of the tyre is evenly distributed it is said to have an ideal camber angle.

# TURBOFAN ENGINES



Darsan Mathew  
S4 ME A



A turbofan engine is a jet engine variant that produces thrust using a combination of jet core efflux and bypass air which has been accelerated by a ducted fan that is driven by the jet core. Conventionally, turbojet engines were used which suck in air and compress or squeeze it causing the combustion of fuel. A turbofan is a more advanced type of turbojet engine. A turbofan has a large fan that sucks in a lot of air, but only part of it is used to fuel the engine's combustion, the rest exits

A modern turbofan engine works by ingestion, compression, combustion and expulsion of air. Turbofan engines work according to the bypass principle, where the air is ingested and separated into two parts behind the fan rotor. A small portion passes through the engine core while the other passes through the interior assemblies. The ambient air that flows into the engine is powerfully compressed by the compressors.



Then the air flows into the combustor where the air is mixed with the fuel and the mixture is combusted at a temperature of 1700 °C. This build-up of heat causes the gas to expand. The air-fuel mixture escapes the combustor at high energy to flow through the high- and low-pressure turbines causing the blades to rotate. The energy released drives the compressor and the fan. The geared turbofan also contains a special component called a reduction gearbox. It decouples the fan and the low-pressure turbine. This setup helps all the components to run at their optimum speed.

The gearbox technology has made the turbofan engine more economical and quieter compared to conventional engines. The turbofan technology has been adopted by most airlines due to its high thrust and good fuel efficiency.



# MICRO-ELECTRO MECHANICAL SYSTEMS

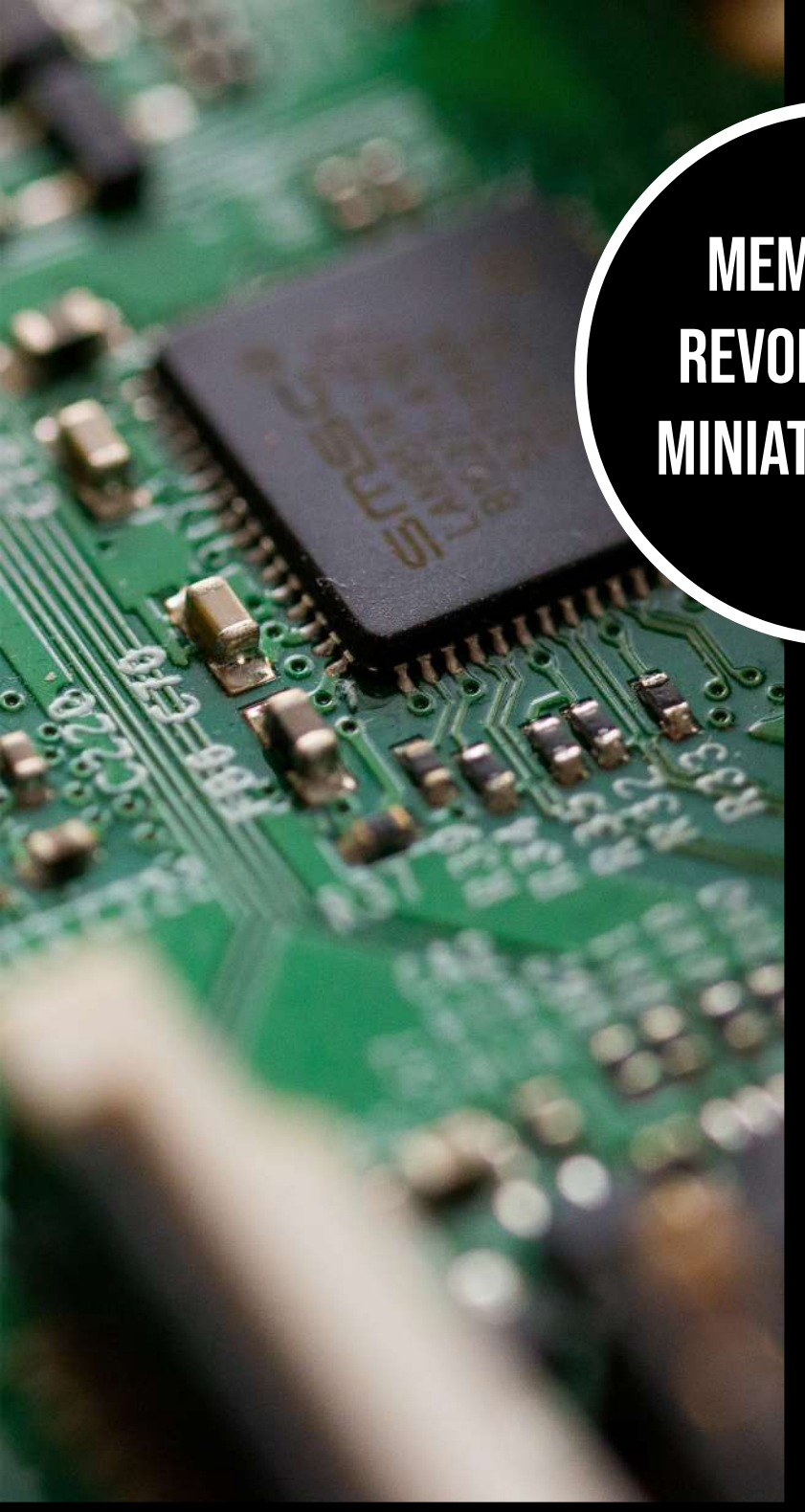


Kuruvila Riju  
S4 ME B

**M**icro-Electromechanical Systems (MEMS) is a technology that is used to make very small devices or systems that combine electrical and mechanical components. They are very small, and their size varies from a few micrometers to a few millimeters. They are fabricated using integrated circuit batch processing

techniques and they have the ability to control, sense, and function on a micro-scale and produce effects on a large scale. MEMS combines microelectronics with micromachining technology and has been widely used in contemporary consumer and industrial products. MEMS makes use of expertise from





## MEMS IS THE REVOLUTION TO MINIATURIZATION

equipment, electronic gadgets, and communication devices as well as in defense applications. Accelerometers for automobile airbags, printing heads for inkjet printers, computer disk drive read/write heads, projection display chips, some types of blood pressure sensors, optical switching devices, microvalves, and biosensors are only a few examples of systems that are manufactured in high commercial volumes using MEMS technology.

### WHAT ARE MEMS?

The word Micro-Electromechanical systems (MEMS) originated in the United States, and they are known as Microsystems Technology (MST) in Europe and as Micromachines in Japan. The electronic systems in the MEMS are made using integrated circuit technology. The alterations in silicon and other substrates are done by micromachining processes which in turn fabricate the micromechanical components. The basic design of MEMS consists of mechanical microstructures, microsensors, microelectronics, and microactuators. All these components are integrated into the same silicon chip. MEMS is not just about the small size of mechanical components, it is a manufacturing technology, a world view underlying the theories and methodologies for designing and creating complex mechanical devices and systems as well as their integrated electronics using

engineering, design, manufacturing, and various other technical areas which include mechanical engineering, fluid engineering, electrical engineering, material sciences, optics, integrated circuit fabrication technology, and chemical engineering. Moreover, MEMS plays a pivotal role in the manufacturing of automobiles, medical

batch fabrication techniques.

MEMS has a variety of advantages as a manufacturing technology. MEMS technology combines more than one branch of knowledge and finally materializes using micromachining techniques. MEMS, with its batch fabrication capabilities, enables the components and devices to be manufactured with high performance and reliability which also reduces the size, volume, weight, and cost. MEMS often can provide the basic needs of products that cannot be manufactured by other methods. The mentioned factors make MEMS technology more attractive than the integrated circuit microchip.

## APPLICATIONS

As technology emerges, MEMS products find various applications across industries nowadays. Examples of some established MEMS applications are:

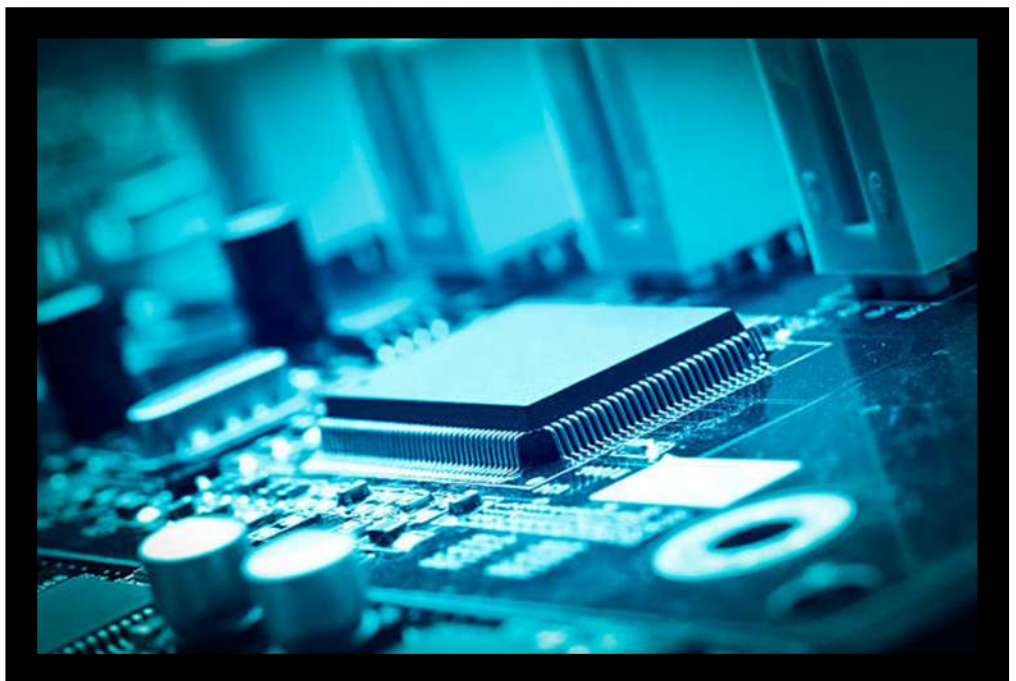
### AUTOMOTIVE AIRBAG SENSOR:

One of the first commercial devices using MEMS was the Automotive Airbag Sensor. Today they are used around the world in the form of a small chip that contains an intelligent sensor called the accelerometer sensor. The accelerometer measures the sudden deceleration in the vehicle on collision. This deceleration is sensed by a change in voltage. Hence a signal is sent by the electronic control unit and the airbag pops.

### MEDICAL PRESSURE SENSOR:

Medical Pressure Sensor is another successful application of MEMS which is used to measure blood pressure. These medical pressure sensors are connected to the patient's intravenous (IV) line and the blood pressure is monitored through the intravenous solution. These sensors monitor the blood pressure with a diaphragm and a saline-filled tube arrangement which needs to be connected to the artery with a needle.

Clearly, MEMS technology has the potential to establish a second technological revolution of miniaturization which may create an impact on the integrated circuit industry. The technology of the Micro-Electromechanical System is very powerful as it enables the miniaturization of sensors, actuators, and systems. Due to batch fabrication capabilities, the production cost of MEMS will reduce further. The reduction in the price and the rise in performance of the Micro-Electromechanical System will create a large impact in many industrial sectors across the globe.





# GROUND LEVEL EFFECT IN FORMULA 1

FORMULA 1



Vignesh R  
S6 ME B

Formula 1 is a sport in constant evolution, and therefore technology and innovation play an important role. In 2022 one of the greatest innovations of the 20th century returns back to the grid- the ground effect.

Ground effect was used in F1 between 1978 and 1982. The operation of this technology is linked to the so-called “Venturi effect,” which is based on Bernoulli’s principle. When a fluid (air in the case of F1 cars) is constantly passed through a funnel, the speed at which this fluid comes out of the thinner end is greater than that of the wider end. The pressure is reduced and makes the output speed higher. This effect thus creates a large downforce. This suction force thus created sticks the car to the ground making the car take the corner faster.

This innovation returns to bring better and close racing. The wake generated by the previous generation of cars was so dirty as it severely affected the downforce of the cars following and made close racing tough. The ground effect comes in as a solution, the wake isn’t as dirty and helps with closer racing as the airflow is through the floor rather than complicated geometry wings which disturb the airflow.

This innovation also has its drawbacks as it creates an unnecessary effect called the ‘porpoising effect’. Porpoising is an aerodynamic phenomenon that F1 cars have started to suffer from since the adoption of the ‘ground effect’ philosophy, where the air is sucked underneath a car to pull it down onto the track at high speed, rather than over the top of the car to push it down. The trouble is, the faster you go, the further a car wants to be sucked to the floor. If it gets too close it can cause the airflow to stop - or ‘stall’ - meaning the downforce created suddenly drops off a cliff. At that point, the car’s spring move upwards. This process repeats and thus repeated oscillations take place when the car goes down the straight.

In conclusion, the Ground effect was one of the most revolutionary innovations in F1 in the late 1970s and early 1980s. It introduced a new way of understanding cars’ aerodynamics, generating much more downforce and making them faster, although highly dangerous, and therefore was banned in 1983. The current generation of cars and improved safety in F1 allow its return back.

Let’s hope for more closer and action-packed racing in the future!





# SYNTHETIC FUEL



**Sajin Balagopal**  
S6 ME Beta

As fossil fuels are being pushed to their extinction, there is a race among countries to find better alternatives.

Up until recently, a carbon-neutral engine was the dream! Most automobile manufacturers have already begun shifting towards Electric cars and bikes. But what they hide is the fact that making an electric car is so difficult that it produces more carbon footprint than a combustible engine automobile used for half a decade.

As Industrialists began spewing out these hidden facts, scientists all over the world have begun searching for a better alternative. The answer was SYNTHETIC FUEL!!!

Synthetic, or carbon-neutral fuels capture CO<sub>2</sub> in the manufacturing process. In this way, this greenhouse gas becomes a raw material, from which gasoline, diesel, and substitute natural gas can be produced with the help of electricity

**Synthetic Fuel  
Could Make  
Gas-Powered  
Engines as Clean  
as EVs**

from renewable sources. I.e. the electricity produced from renewable resources can be used for a high temperature electrolysis which produces SYNGAS. This is usually done in order to maintain the neutrality of carbon in such fuels. Capturing the air and processing it into useful carbon dioxide can also help to reduce or limit the current emission levels of carbon. This is a major advantage considering towards creating a healthier planet.

One major advantage is that there is no need for new real estate for filling stations as current petrol ("GAS") stations can be continued for the purpose. One of the greatest phobias of people towards electric cars was "What if battery runs out during a travel?". With syngas distributed as the conventional fuel source, people need not consider such a drastic change to their vehicles.



It has been estimated that a hybrid engine running on synthetic fuel and electricity reduces the cost of ownership of a car compared to an electric car.

However, there is currently only one major brand of automobiles that has almost finished testing synthetic fuels by running their high-performance and utility vehicles with their in-house produced synthetic fuel.

“Porsche” (pronounced as “Por-sha”), has collaborated with two famous companies, namely Siemens and Mobil to produce their synthetic fuel. The first step is the electrolysis of water, splitting it into two components: hydrogen and oxygen gases. In partnership with Siemens Energy, Porsche simultaneously captures carbon dioxide directly from the air and combines it with the hydrogen produced

to synthesize methanol. The resulting synthetic methanol can then be used in Exxon-Mobil's methanol-to-gasoline (MTG) process. The result is that the fuel obtained meets the same high standards followed by all gasoline types currently.

If total conversion to synthetic fuel is truly possible, it can eradicate up to 85% of the carbon emissions in the world thereby reducing global warming. Since no new modifications are required for the engines, citizens can continue using their pre-existing cars on synthetic fuel. According to current testing, it has been stated by the company that they single handedly can produce 550 million liters of synthetic fuel within the next 5 years.

In addition, the Zuffenhausen-based automaker has tested its fuel in partnership with ExxonMobil during the 2021 and 2022 seasons of the Porsche Mobil 1 Super cup motorsports series, to subject the new fuel to the most demanding conditions, i.e., racing.

Porsche is capitalizing on a practical form of synthetic fuel, which could be available quickly if the tests are successful. Ask any car enthusiast, if they were to compare between a car that runs on fossils or a car that runs on pure electricity, though the electric car might be fast, nothing would give the satisfaction of driving a car that a fossil fuel car gives. The scarcity of lithium (the only current element to act as a battery) and the immense industrial expenditures of producing batteries for such vehicles really fall into question eventually, Is it better for the planet or worse?

With syngas the world has a chance to retain the mighty IC engines and also to retain the automotive passion that an IC engine gives.

“Siemens Energy  
and Porsche,  
with partners,  
advance  
climate-neutral  
e-fuel  
development”



**SIEMENS**  
ENERGY

# BAJA - A JOURNEY OF INNOVATION & COLLABORATION



**Noel Sabu**

S8 ME B

Being a part of Baja, the buggy car making organization in my college, has been an incredibly enriching experience. Not only did I learn a lot about mechanical engineering, but I also had the opportunity to interact with some of the brightest minds in the field and collaborate with them on a common goal. As a member of the Baja team, I was involved in every stage of the process of making a buggy car - from designing and testing to manufacturing and racing. This allowed me to gain a deep understanding of the various components of the car and how they work together to achieve maximum performance. But it was not just technical knowledge that I gained from my experience with Baja. I also had the chance to make some valuable connections with people from diverse backgrounds. I interacted closely with other team members who came from different cultures and different fields of study, from different states.

This not only broadened my perspective but also taught me the importance of effective communication and teamwork. What I appreciated the most about my time with Baja was the spirit of collaboration that was fostered among the team

aged to share their ideas and insights, and we worked together to find solutions to the challenges that we faced. This helped me develop my problem-solving skills and gave me a taste of what it means to be a part of a successful team.

Overall, my experience with Baja has been nothing short of transformative. I have gained technical knowledge, developed my interpersonal skills, and made some lifelong connections. It has been a journey of innovation and collabo-

portunity to have been a part of it.







# CHAT WITH PAUL GEORGE



*Interviewed by:*

**Joel Michael, S8 ME B**

Hey there! My name is Paul George, and I'm excited to be here as a guest on this Interview! I graduated from Rajagiri School of Engineering and Technology in 2018, with a degree in Mechanical Engineering, and I've been working in the field ever since.

For the past 5 years, I've been focused on my start-up called Sparx 3D. It's been a wild ride, but we've been able to build a successful 3D printer building and solutions establishment. It's been a dream of mine to start my own company, and I'm really proud of what we've accomplished so far.

**Since we are on the topic, How's Sparx 3D doing?**

Sparx 3D is going well, thanks for asking. Now that I think of it, it's been a challenging journey, but also incredibly rewarding. Initially, it was quite tough to get started, as is the case with any new business, but we've been able to build a great team and create innovative solutions for our clients. Recently, we've been getting some really interesting projects that has allowed us to showcase our expertise in the field.

We've been able to work with some fantastic clients who are pushing the boundaries of what's possible with 3D printing, and it's been really exciting to be a part of that.

Overall, I'm really pleased with how Sparx 3D is doing. We're still a relatively small company, but we're growing steadily and I believe we have a bright future ahead of us. We're always looking for new opportunities and ways to innovate, and I'm excited to see where our journey takes us.





## Your passion for 3D printing especially as a Keralite is quite inspiring, how did you get into the world of 3d printing?

That's a great question, and thank you for your kind words! My passion for 3D printing actually goes back to my time in school, when I was really into robotics. I was always fascinated by the idea of creating something from scratch and bringing it to life. When I was in school, I had a project that required a part that wasn't available to buy and could only be made through 3D printing. At the time, 3D printers were a rarity in India, and good ones were incredibly expensive. Like many technologies, India was a late adopter of 3D printing, and it was more of a hobby in the Western world. But when I was in college, the problem of the expensive and limited availability of 3D printers presented a challenge for my project. So, my team

and I decided to build our own 3D printer from scratch, and that was my first real foray into the world of 3D printing. The experience of building the printer was incredibly rewarding, and I fell in love with the process of designing, engineering and creating objects using 3D printing technology. I realized that there was a huge potential for 3D printing in our country, and I wanted to be a part of that.

So, after graduation, I decided to start my own company and focus on 3D printing solutions. It's been a wild ride so far, but I'm really proud of what we have accomplished with

Sparx 3D. I think there's still so much untapped potential in 3D printing, and I'm excited to see where the technology goes in the future.

## Let's talk about your project life, just like your hurdle in procuring parts, there must have been other phases where you might have been stuck. How do you overcome it?

Ah yes, hurdles in projects are a natural state to be in. In fact, I'd say it's inevitable in almost all projects, and that's certainly been the case with some of the projects I've worked on. When I'm stuck on a particular phase or aspect of a project, I usually start from scratch and try to approach the problem in a different way. Sometimes, that means going back to the drawing board and rethinking the entire design, and other times it's just a matter of making small tweaks and adjustments. It can also be really helpful to get another experienced person's perspective on the matter. Sometimes, when you've been working on a project for a long time, it can be hard to see things objectively, and having a fresh set of eyes can be incredibly valuable. Of course, it's important to keep in mind that most projects are time-bound, and you don't want to get stuck on a particular problem for too long. So, while it's important to take the time to find the right solution, it's also important to be mindful of the project timeline and keep moving forward.





General Purpose tools like ChatGPT are on the rage right now and have added good and bad influence for many. Baseline jobs like optimization and basic fresher jobs have been made redundant, especially in the computer science and IT sector. So, when looking at it from a mechanical perspective, will be a blessing or curse in the long run?

As a mechanical engineer, I think that tools like ChatGPT can be a real blessing. From my experience using GPT in my projects, I've seen huge potential. One area where I think ChatGPT can be particularly helpful is coding. Coding can often be a weak spot for mechanical engineers, and with ChatGPT we're able to quickly and easily generate code that would have taken us a lot longer to write manually. This not only saves us time, but it can also help us be more efficient and effective in our work.

Another way that ChatGPT can be useful for mechanical engineers is in validating someone else's code. When we're working with complex mechanical systems, it can be difficult to test all the different variables and make sure everything is working as it should. With ChatGPT, we can quickly generate code and test it against different scenarios to see how it performs. This can save us a lot of money and time in the long run.

Finally, I think that ChatGPT can be a great way to learn and explore new concepts in mechanical engineering. Mechanical engineering is a vast field, and it can be tough to have a sense of all the different domains and specialties. With ChatGPT, we

can quickly generate prompts and get a better understanding of different concepts and ideas without having to spend as much time on research and reading.

Overall, I think that tools like ChatGPT can be a really positive development for mechanical engineers, and I'm excited to see how they will continue to evolve and improve in the future.

Thank you for answering that question beautifully! Another question or let's say dilemma faced by our students is regarding whether to do higher studies right away after class or getting to a job for a while and then higher studies after college. What are your thoughts on the matter?

The question is quite a tricky one to answer, as it varies greatly depending on the individual's circumstances. I believe that inertia is a phenomenon that affects us as students, and we are not immune to it. From what I've seen, many people think that they will work for a while and then pursue higher studies, but they end up getting too comfortable in their job and drop their plans. I have a friend who graduated from CUSAT and wanted to pursue a Master's degree in electronics engineering, but he loved his work culture and environment so much that he lost interest in studying.



While it's not a bad thing that he found happiness in his job, it's important to consider the potential opportunities that higher education can provide, such as a higher-paying job.

Of course, this doesn't mean that everyone who gets a job after college won't pursue higher education. It's just that it can be tough to do so once the inertia sets in. So, if you have the mindset to study, it's best to go ahead and do so right after college. Don't wait too long, as it can be challenging to break the cycle of getting too comfortable in your job. Ultimately, the decision to pursue higher studies right after college or after working for a while depends on the individual's goals, circumstances, and mindset.

**Before we end this chat, my last question is- and you being a person who has a startup, I think you are the best to answer this question. So, what I mean to ask you is what should one pursue a dream job or a dream company?**

With regards to me, I would say Dream Job without skipping a heart-beat but as someone who has been in the industry for a while, I believe that pursuing both a dream job and a dream company are important, but it ultimately depends on one's personal priorities and goals.

If someone is more focused on the type of work they want to do, they may prioritize finding their dream job, even if it means working for a company that is not their first choice. A dream job can motivate you to work harder and achieve more in your career.



In my case, Research and Development is what ticks me and so I enjoy the work I do and feel fulfilled in my career. On the other hand, if someone is more focused on being part of a specific company or work culture, they may prioritize finding a job within that company, even if it is not their dream job and may not be as fulfilling as they had hoped but they are provided opportunities to build a network of contacts and potentially open doors for future career opportunities.

In the end, it is important to weigh both options and see which one aligns more with your personal goals and values. It is also important to remember that sometimes, one may need to compromise on certain aspects in order to achieve their overall goal, whether that be a dream job or a dream company.

# THE FOLDABLE BOAT- A PATENTED PROJECT

Our patented project “The Foldable Boat” (Indian Design Patent Registration), lovingly given the unofficial nickname “Arc One” was initially conceived as a design project in our third year, suggested by our guide, Mr. Vineeth Krishna P.

During our daily video call sessions with our guides Vineeth Sir and then assistant guide Harikrishnan Sir, holed up in our houses during the pandemic and the lockdown, we understood that this was more than just a final year B.Tech project, it was our way of putting all that we learned and will learn into something that could ultimately benefit the society. We aimed to make a foldable,

reusable, and easy-to-use boat that can be deployed at a moment’s notice by people stranded during floods for their rescue. With a solid idea, we went on to present our idea to the jury at CERD KTU to apply for funding which to our pleasant surprise, was approved.

During our fourth year, we started the fabrication of the model to finalize certain folding mechanisms along which we did the necessary testing and analysis of the design physically and using ANSYS.





It was around this time that our guides Vineeth Sir and Jithin P. N sir (who had replaced Harikrishnan sir just before our final year started) suggested that we apply for a patent. With the help of our guides, we got in touch with a patent attorney firm who guided us through the process and suggested that we go for either an Indian Design patent or its American counterpart. We chose the former and we started the process for the same immediately following which we put our efforts into completing the procedure for the application. We finished the application process through the attorneys and all we had to do was wait for the jury's verdict which was nerve-wracking, to say the least. It was beyond shocking and joyous when we received the patent! We are forever grateful to everyone involved in this project, especially our guides Vineeth Sir and Jithin P. N. Sir, the Department of Mechanical Engineering at RSET, our Patent Attorneys, and our institution RSET without which this would never have been possible.



If I may, my advice to my junior friends in college right now is to work diligently and honestly, to the best of your capacity by ensuring that you are honest to yourself and your greatest pillars, your guides and teachers. Your final year project and what you do with it will play a huge role in shaping your future. It certainly has mine. Finally, as Peter Parker once told Miles Morales, "It is all a leap of faith". Trust in the process, trust in your teachers, and trust God, and you will see that it will all bear fruit in due course, the same way our literal blood, sweat, and tears bore fruit to our beloved project, The Foldable Boat.



# TALK SESSION

The final year students of Mechanical engineering were fortunate enough to get an opportunity to attend a talk session by Dr Najeeb Kuzhiyil, hosted at RSET.

Dr. Najeeb who was a senior of Dr. Manoj G Tharian is currently a staff scientist at Exxon Mobil Corporation, USA. Being an expert in his domain with in- depth knowledge on fuels, lubrication and combustion owing to his experience and a PhD in Bio-renewable Resources from Iowa State University, USA as well as a Master's Degree in Combustion and Energy from University of Leeds, UK, Dr. Najeeb took time off his hectic schedule to deliver an educational, enlightening, and enthralling talk to students.

“A stupid question is one that was never asked?”, was the opening remark with which Dr. Najeeb began his session and this was the very theme with which the entire program was conducted, giving the students a platform to ask a multitude of questions of any kind. Surely, Dr Najeeb's multidisciplinary knowledge could tend to the curiosity of students, and the very same happened with students inquiring with him details and questions on his field of oil, lubrication as well as the path of higher education, how a person would be hired based on their performance in an interview, the methodology followed for the same, as well as tips and tricks to be followed for it. All of these were answered by him, of course, with excruciating detail, giving personal attention to each student in such a big talk session.

*Dr. Najeeb  
Kuzhiyil  
interacting with  
the students*

He then introduced us to the 5 pillars of engineering, inculcating within students the importance of responsible design, abstraction and creative thinking. He emphasized his point by asking the students to engage in more and more mini projects of their own wherein they would get an opportunity to apply their theoretical knowledge on a practical level, and this, according to him, was an indispensable step in the molding of a good





communication skills. He stressed time and time again on the importance of students to hone their soft skills, owing to their role in increasing the human resource potential of a person. All concepts discussed were put in a practical, real world scenario, by relating to and giving the students insights into the workflow at his company, Exxon was carried out.

He then talked about the book he published, “Spirit of Engineering”, that

ventured to explain the basic concepts of engineering by means of a story and a series of conversations between people. He was also kind enough to give away a few signed copies of the same, to be kept in the department library. Dr. Najeeb then continued to elaborate on the system of higher education and the requisite steps that a student should take to ensure a bright future. He also mentioned the educational venture that he has partnered



and opened up in Pune, offering guidance of the same kind to each student. He wanted to elaborate more to the students; however, time restrictions kept him from doing so. Even still, he was kind and humble enough to offer to carry out further talk sessions over the internet for all interested students. He was then presented a memento by Fr. (Dr) Joel George Pulloil CMI.

It was such a joyous and enjoyable experience for the students to have attended a talk session with such an eminent personality at the helm. It gave new perspectives on what kind of an engineer one wants to be, along with insights on how one can be better at it. Dr Najeeb Kuzhiyil delivered the students an excellent talk session and offered further guidance for the students for queries of any kind including

Being a man of his stature, he was extremely humble, passionate and kind to talk and offer help. Dr. Najeeb could not be thanked enough for this talk and the insights gathered from it and the students greatly appreciated the opportunity and look forward to meeting him again as well as attending talk sessions of such kind..





**Edwin Thomas**

S8 ME Alpha

## ASME FLAGSHIP EVENT

Recently, I had the opportunity to attend an EFX event conducted by ASME India in Bangalore. The event was graced by the presence of the honorable chairman of ISRO, Dr. S.Somnath. The event was a platform for various teams to showcase their skills and projects in the fields of engineering, design, and innovation. The event was bustling with enthusiastic participants and spectators. There were various competitions and exhibits arranged to display the talent of the participants. Our team participated in two events, IAM3D and HPVC, and it was an exciting experience for us. The IAM3D competition required participants to design and develop a 3D model of a product or a concept, while the HPVC competition was about designing and building a human-powered vehicle.



The event provided us with an opportunity to interact with other teams and learn from their experiences. We got to see some exceptional designs and ideas, which were truly inspiring. The participants were very passionate about their projects, and it was evident in their presentations. One of the highlights of the event was the keynote speech by Dr. S.Somnath. He spoke about the advancements in the field of space technology and the role of engineering in space exploration. He shared some interesting insights into the challenges faced by ISRO and the efforts that are taken by the organization to overcome them.

Overall, the event was a great success, and it provided us with a platform to showcase our talent and interact with other passionate engineers. We learned a lot from the event and were inspired by the innovation and creativity on display. We look forward to participating in similar events in the future and hope to continue learning and growing in our respective fields.



# TITAN ENGINEERING AND AUTOMATION LIMITED



**Alan Joji**  
S8 ME Alpha



Greetings from TEAL, This marks the first time a company has approached RSET and offered students a six-month internship period. Unfortunately, due to the pandemic, our batch missed out on the chance to undertake a proper internship due to the absence of a semester break.

I found myself desperate, pondering whether my theoretical knowledge would suffice for me to thrive in my chosen profession. However, the job offer from TEAL, an abbreviation for Titan Engineering and Automation Limited, arrived as a beacon of hope—an opportunity to gain practical experience and become a true professional.

TEAL is a fully owned subsidiary of TATA Industries and operates with two divisions: aerospace and automation. I was assigned to the automation division, which primarily focuses on providing automation solutions to manufacturing companies in the automotive, medical, and food processing sectors. Our business model follows a B2B approach, meaning we sell our products to other businesses involved in the production of FMCGs or other consumer durables. This distinguishes TEAL from its sister companies, like Tanishq, Titan watches, and eyewear, which cater directly to end customers.

An automation solution entails the utilization of technology and software to automate repetitive tasks and processes,

leading to enhanced efficiency, accuracy, and productivity across various industries and domains. This involves deploying automation tools and systems capable of executing tasks with minimal or no human intervention.

Automation solutions find application in a wide range of activities, including data entry, document processing, customer support, manufacturing processes, and supply chain management. These solutions often leverage technologies such as artificial intelligence (AI), machine learning (ML), robotics, and software automation to streamline operations and reduce manual effort.

Initially, I had concerns about the internship as it meant starting afresh in a new state, adapting to an unfamiliar language, making new friends, and more. However, upon joining TEAL, everything fell into place smoothly. The company's HR department was incredibly considerate, providing assistance during the onboarding process and arranging skill development classes for MS-Excel. They also conducted a personality development program called "Campus to Corporate."

After a few weeks, we underwent department orientations, during which we had the opportunity to visit various departments within the company and completed assigned tasks under the guidance of the senior management team. My first assignment took me to the quality





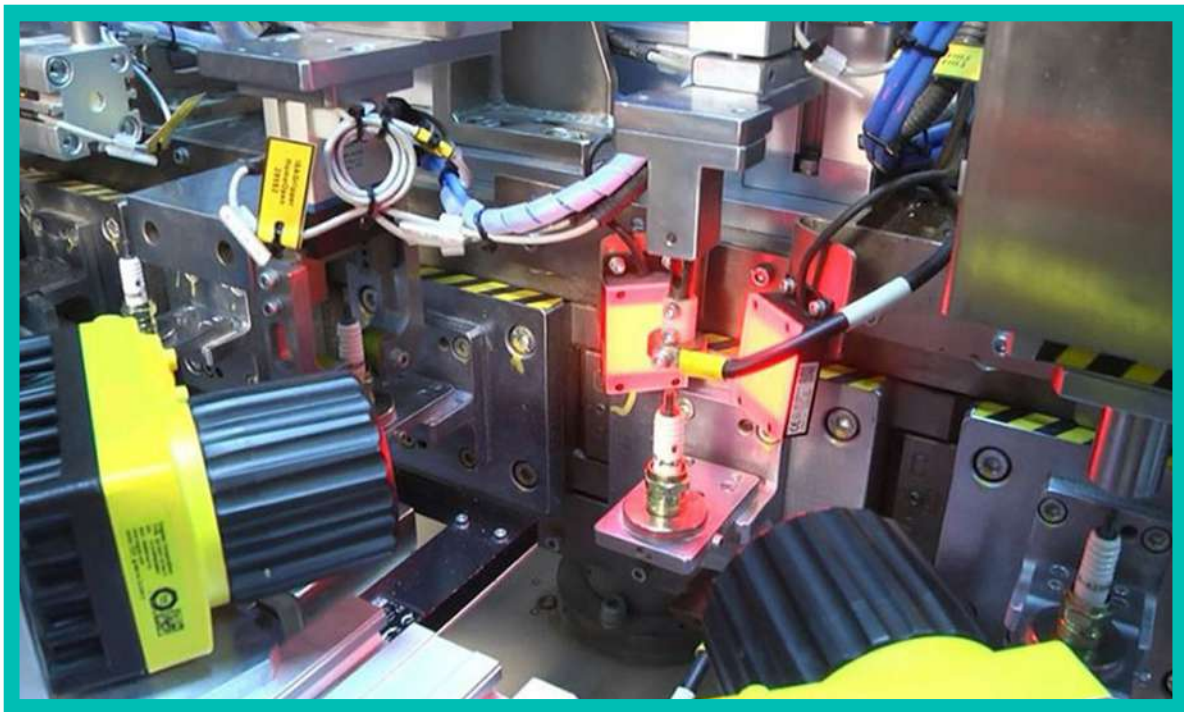
control department, where I familiarized myself with the inspection of parts used in assembly using metrology instruments. While I was already acquainted with some of the general instruments used in our lab and the company, such as vernier calipers, micrometers, sine bars, and Rockwell hardness testing machines, the company had an array of other precise measurement tools, including Coordinate Measuring Machines (CMM) and height masters.

During this period, we delved into topics like Geometric Dimensioning and Tolerancing (GD&T) and studied 2D sketches.

In the subsequent week, I joined the mechanical assembly department, where we assembled a four-pillar mechanism based on a provided 2D sketch. This mechanism is commonly used in pressing machines. Additionally, we gained insights into hydraulic and pneumatic systems, selection criteria, and the correct methodology for drawing hydraulic and pneumatic circuits.

We later moved on to the mechanical design department, where our tasks involved creating drawings of various types of fits, bearing arrangements, and presses. Finally, we explored the realm of technical sales to gain an understanding of the company's business domain.

Every day at TEAL, we have the opportunity to learn something new. We engage in engineering special-purpose machines (SPMs) and devise innovative solutions that break the mold. Over the years, the company has resolved countless issues that have hindered the productivity of several prominent manufacturers. Applying the concepts, we have learned throughout our academic journey, from the first to the last semester, keeps me deeply connected to this company and fuels my inner fire for continuous learning.



# SAE INDIA

Society of Automotive Engineers INDIA



RAUNAK ABRAHAM

S8 ME BETA

As a proud member of the SAE Club at Rajagiri School of Engineering and Technology, I can confidently say that exciting things are on the horizon for our team. This year, we are focusing on the Formula SAE competition, which challenges students to design, build, and race a single-seater race car. We are working hard to ensure that our team is well-prepared to compete at the highest level.

As the SAE lead, I have been working closely with my teammates to make sure that we are meeting our goals and deadlines. We have been conducting extensive research, testing different designs, and building our race car from scratch. It has been an incredible experience to see our ideas come to life and to work collaboratively with like-minded individuals.

In addition to our focus on the Formula SAE competition, the club has also participated in the BAJA SAE competition in the past. This year, we are exploring other exciting competitions and challenges to participate in. We are constantly on the lookout for new opportunities to apply our engineering knowledge and skills.

Beyond competitions, the club also offers various outreach events to promote STEM education. We are planning to organize workshops and events to inspire younger students to pursue careers in engineering. It's incredibly fulfilling to share our passion for engineering and to see the impact we can have on future generations.

Overall, the SAE Club at Rajagiri School of Engineering and Technology provides an amazing opportunity for students to gain practical engineering experience, develop leadership skills, and make lifelong connections with like-minded individuals. If you're interested in engineering and looking for a hands-on experience, I highly recommend joining the SAE Club. With exciting things on the horizon, there's no better time to get involved!



**Abhijith C S**  
**S8 ME A**

It was the first meeting after ISHRAE was launched in RSET. We were addressed by our faculty about ISHRAE and informed about how the chapter is planned. Then it was time for ISHRAE RSET to elect the representatives. I was initially hesitant towards taking up responsibilities, not because I loathe them, but because I was timid. However, I knew that if I need to advance as a person, I should come out of my comfort zone. This gave me the motivation to take up the presidential role in ISHRAE RSET. Thinking about this, now I feel that was one of the best decisions I have taken in my college life. The real motivation for me to write this article is to give out to a wider community about what I learned after coming out of my comfort zone. That single decision made me stronger in many areas of life. I

hanced presentation skills, leadership qualities,

People management, and more importantly how to stay calm amid chaos. ISHRAE not only improved me as a person but also gave me a wider opportunity of networking with people from different genres like engineers, technicians, sales officers, researchers, etc. One thing that was common for all these people was everybody was having something in their store for me. These networks often taught me something new, sometimes giving me wider insights.

**“Courage starts with showing up and letting ourselves be seen.”**

**Brene Brown**

The Indian Society of Heating, Refrigerating, and Air Conditioning Engineers (ISHRAE) was founded in 1981 in New Delhi by a group of eminent HVAC&R professionals. ISHRAE today has more than 10,000 HVAC&R professionals and 3,000 students as members with 44 chapters and subchapters across India with HQ in Delhi. ISHRAE RSET is one such student chapter under the Kochi sub-chapter. We had different programs to enhance the technical as well as cognitive abilities of students. Different technical events were conducted at the national level, and our members have participated and even won prizes. There are opportunities for the members to attend national-level conferences, the latest product expos, technical design competitions, quizzing events, etc.

The perks of being an ISHRAE member are not only limited to the aforesaid events but there are some exclusive benefits like sponsored industrial visits and project funding. Recently ISHRAE has started a dedicated job portal for its members. This is with the vision to bridge the gap between academia and industry so that the students



will be able to know what skills they would need to acquire to be industry ready. From a personal as well as professional point of view, I would strongly recommend interested students to join the community, reap the advantages and make a positive impact for yourself as well as to the community.

The transition from a student to a professional is not something that can be achieved in a single day. It is decided by how we respond to a situation. I would say making a mistake is highly appreciable, as now you know what not to do, and the next time when you are in a similar situation you would take a much better decision. Professional bodies in the campus are such places where we are growing unknowingly, learning from mistakes and correcting them as we go, which in turn develops us in many walks of life. From the experience of four beautiful college years, a key takeaway for me was never to let an

opportunity miss you because of the silly thought of what others think of me if I do so. This is a very common thought which reduces your momentum, if you can successfully overcome it, then you are all set to fly. Finally, I would like to end this writeup by giving you a hack. We always believe that we are very clever, but often we don't use that conscience, rather we go for emotional decisions. Many of the time emotional decision pull us back. Be brave enough not to fall for emotions, rather think wisely and be sure not to let an opportunity miss you.



# TEXTRON



**Sidharth T V**  
S8 ME Beta

As a recent graduate from the Mechanical department, I was excited to start my journey in the field I studied. I was fortunate enough to secure an internship at Textron, an American-based company that specializes in helicopters, jets, and specialized vehicles. I was placed in the Airframe Structures division of BELL Helicopters and given the role of Weights and Cost Estimation Engineer.

Weights and Cost Estimations deal with the estimation of weights and costs of parts that are in the model stage. To work on these tasks, it is important to know the basic mechanical operations, CATIA, and the different materials in which the parts are built. In the weights section, we measure the volume and density of the part and find the weight. The volume, and surface area are taken from CATIA. Sometimes it may require modeling some portion of the part for our measurement which has to be done by the engineer. In the cost section, we must have an entire idea of how a part can be built, the material to be used, the heat treatment process, the operations to be done, etc.

During my internship, I had the opportunity to work on a project where I was assigned to estimate the weight and cost of the parts and assemblies for a helicopter. I was also involved in studying different models of BELL Helicopters. The entire experience was a great learning opportunity for me, where I was able to apply my theoretical knowledge and learn new skills in a real-world context. To accomplish this task, I had to use CATIA, which is a leading 3D computer-aided design (CAD) software used by engineers and designers to model and design products.

Through this work, I was able to gain a great deal of knowledge about CATIA, including how different parts are modeled, such as sheet metals, composites, etc. I also gained an understanding of the importance of geometrical tolerances and how weights impact the structure and the cost of the parts.

In the cost estimation part, I had to work with the engineering and design teams to understand how a part can be built, the material to be used, the heat treatment process, the operations to be done, etc. It was important to have an understanding of the entire process from design to manufacturing, to ensure that the cost estimates were accurate. I had to use different software programs for costing and estimating the cost of different parts and assemblies.

Initially, it was a bit challenging to study all these operations and steps, but eventually, it became simple with time and hard work. It was always special to work in the field we studied, and I was able to apply much of the knowledge I gained through my studies to my work. The simple works and topics like GD & T were very useful in my work, and these parameters have a huge effect on helicopters or anything we build.

In conclusion, my work experience at Textron in the Airframe Structures division of BELL Helicopters has been an incredible learning opportunity. I was able to apply my theoretical knowledge and learn new skills in a real-world context. I believe that this experience will be beneficial in my future career as well.





# CLASS PHOTOS



S8 MECHANICAL ENGINEERING (ALPHA)



S8 MECHANICAL ENGINEERING (BETA)



S6 MECHANICAL ENGINEERING (ALPHA)



S6 MECHANICAL ENGINEERING (BETA)







S4 MECHANICAL ENGINEERING (ALPHA)



S4 MECHANICAL ENGINEERING (BETA)



# FACULTY



# TECHNICAL STAFF







We express our sincere gratitude to Mr. Tony Chacko for all his hardwork and dedication towards the department. His benevolence and charisma is admirable and his presence will be duly missed.

**BEST WISHES FOR ALL YOUR  
FUTURE ENDEAVORS!**

~Faculty and Students of  
Department of Mechanical  
Engineering



# PATENTED PROJECTS



**RSET**  
RAJAGHRI SCHOOL OF  
ENGINEERING & TECHNOLOGY  
(AUTONOMOUS)

*Congratulations*  
TO ALL INVENTORS  
**SOUTH AFRICAN DESIGN PATENT**  
Patent No. 2022/06077.

  
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**German Patent Granted**

*Congratulations*  
to all Inventors

  
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**Patent Number: 202023100910.7**



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