Agnel Charities'
Fr. C. Rodrigues Institute of Technology, Vashi
Department of Mechanical Engineering and

MECHANICAL ENGINEERING STUDENTS' ASSOCIATION

Presents

URJA

2019-2020

INDUSTRY 4.0

A step towards smarter future....

Agnel Charities'
Fr. C. Rodrigues Institute of Technology, Vashi

Department of Mechanical Engineering

Mechanical Engineering Students' Association

Presents

URJA

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Industry 4.0

INSTITUTE PROFILE

F.C.R.I.T. was established in **1994** and is a part of the Agnel Technical Education Complex at Vashi, which itself was established in 1984. The institute is named after late **Rev. Fr. Conceicao Rodrigues**. F.C.R.I.T. persistently seeks and adopts innovative methods to improve the quality of education on a consistent basis. The campus has a cosmopolitan atmosphere with students from all corners of the country. Experienced and learned teachers are strongly encouraged to nurture the students. The global standards set at F.C.R.I.T. in the field of teaching spurs the students in relentless pursuit of excellence. In fact, it has become a way of life for all at the institute. The highly motivated youngsters on the campus are a constant source of pride.

F.C.R.I.T. has, within a short span of time, established itself as a leading engineering college in Mumbai University. Though its reputation rests mainly on the high quality, value-based technical education that it imparts, it has to its credit a verdant, well-maintained Campus and extensive facilities. Its location in the vicinity of the holy places of various religious denominations underscores its secular credentials and its philosophy of **"Vasudhaiva Kuttumbakam"**.

Institute Vision

To evolve and flourish as a progressive centre for modern technical education, stirring creativity in every student leading to self-sustainable professionals, through holistic development; nurtured by strength and legitimate pride of Indian values and ethics.

Institute Mission

I. To provide industry-oriented quality education.

II. To provide holistic environment for overall personal development.

III. To foster relationship with other institute of repute, alumni and industry.

Vision of Department

To provide a vibrant academic, research and industrial environment for creating self-sustainable professionals and responsible citizens.

Mission of Department

- To provide state-of-the-art infrastructure and quality education.
- To generate opportunities for students to provide Industrial Exposure.
- To imbibe team spirit and entrepreneurial skills.

Program Educational Objectives (PEO)

Graduates will...

- Be able to use effectively engineering knowledge and modern tools in the field of core Mechanical Engineering.
- Have interdisciplinary competence in areas like Mechatronics and CAD/CAM/CAE.
- Be able to demonstrate adequate competency and creativity to take up corporate challenges.
- Be able to pursue higher studies and entrepreneurship.

Program Specific Outcomes (PSO)

Graduates will be able to...

- Apply knowledge in the domain of Design, Thermal and Manufacturing sciences to solve Engineering Problems.
- Use appropriate tools and techniques to solve problems in the field of Mechanical Vibration and CAD/CAM/CAE.

PRINCIPAL'S MESSAGE

I intently believe that you should have an all-round development of your personality, having ambitions and aims untrammeled and hard work, enthusiasm, resilience laced with knowledge and intellect which will take you to any extent you desire. Make it a habit to read newspapers daily and ensure the optimum use of library. In today's world, professional approach towards things is necessary. Understanding the basics, relating them to real world situations and then building them into bigger things will help you to become a better engineer. Time management is another asset in the fervent stride for success. Endeavour to be a better human being while foraying in the competitive life, realizing your dreams, honesty and integrity should be your second names. The college life provides the opportunity to develop one's personality to the fullest extent. The college magazine not only harnesses the skill of writing in the students but also inculcates the pleasure of reading among them.

- Dr. S. M. Khot

HOD'S MESSAGE

Mechanical Engineering is considered to be an evergreen branch and consists of Thermal, Design, and Manufacturing as three different domains. It is one of the broadest engineering disciplines, offering students a wide range of career options and always remains at the centre of all technological advancements. Due to the technological advancement in the engineering field in general, the role of a mechanical engineer is changing rapidly. To meet the ever-changing requirement of the industry and sustain in today's scenario, Mechanical Engineers must have knowledge and skills in multiple domains and multidisciplinary areas to cater to the needs of allied industries. There is a need for Mechanical Engineering students to cultivate ideas that allow them to be absorbed in these emerging fields. At present, we all are going through a pandemic situation and the next two years will be very challenging. Each individual can identify the right field for their career and try to the develop required skills. In this situation, students can develop their career in the field of Electrical Vehicle, Biomedical, Logistics, Automation, Renewable Energy, etc.

I am glad that Mechanical Engineering Students Association (MESA) is doing excellent work. Every year MESA organizes events such as Synergy, MESH, Industrial Visit, Poster Presentation, URJA (annual magazine) and CALIBRE (National Level Project Competition). These events help students to get acquainted with the latest trends in industries and research. I would like to congratulate the magazine committee for selecting the right theme for Urja Magazine and publishing it.

- Dr. Nilaj N. Deshmukh

COORDINATOR'S MESSAGE

MESA is a collegiate organization which stands for Mechanical Engineering Students Association. The objective of MESA is to create opportunities for students to enhance their knowledge about the latest developments in the technological world, by organizing various events. The MESA council of F.C.R.I.T., Vashi has ensured a continuous flow of ideas and knowledge by conducting seminars every year. These seminars give the students a sneak peak in the outside world. SYNERGY and MESH are the two events conducted every year under the aegis of MESA. In SYNERGY, one industry is identified during the year and is invited to the campus for interaction. The aim is to bridge the gap between industry and institute and provide an opportunity for staff and students to directly interact with them. During MESH, a seminar lecture series is organized in which expert speakers from industry and academia such as BARC, IIT etc. are invited to deliver lecture in their area of expertise. A project poster presentation is also organized wherein the final year students display their projects and present posters of their respective projects. Students display their projects and present posters of their respective projects. Students of lower semesters get an opportunity to have a glimpse of the type of project being carried by final year students. Apart from these activities, MESA also publishes an annual magazine on various technological topics. The published articles are related to researches and inventions that many are unaware of and might be interested in.

MESA continuously works for the overall development of the personality of the student other than their academic responsibilities. MESA provides wings and sky to the mind which are planning to fly high and believe in wellness in work.

- **MESA Coordinator**

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ABOUT MESA

MECHANICAL ENGINEERING STUDENTS' ASSOCIATION popularly called MESA is a collegiate organization that relates the activities under the Mechanical Engineering Department. MESA is among the most active student bodies in the institute. Mentored by experienced and proficient faculty members of the Mechanical Engineering department, students take upon many initiatives that prepare them to face the challenges of the future. MESA aims to create opportunities for the students to enhance their knowledge about the latest developments in the ever-evolving technological world by organizing various events. SYNERGY is one of the many esteemed events conducted every year as a part of activities under MESA. SYNERGY is conducted in the odd semester every year these events provide a broader vision to the students regarding various technologies and developments happening in the professional field outside the college classrooms.

"Students Day " was organized on 15th October 2019, under the aegis of MESA.
Speakers were invited to deliver lectures for Mechanical Engineering students. The Institution of Engineers (India), Belapur had taken the initiative to inculcate creative thinking and an innovative mindset amongst the students. It was an enlightening experience.

In 2019, MESA conducted a two-day Drone workshop. MESA has organized a technical fest called CALIBRE twice in a row in March 2018 and 2019. CALIBRE 2K19 was organized in association with "The Institution of Engineers (India), Belapur Local Centre" with huge success

Functions of MESA:

- Promoting the interests of students in various technical areas pertaining to mechanical engineering.
- To promote interaction between academia and industry by organising industrial visits, special lectures and intellectual talks.
- Interacting with other technical societies, within and outside the institute to promote flow of knowledge and interest.
- To allow students to learn and focus on the cutting-edge technology by presenting it to the students in interesting manner through seminars and workshops.

MESA COUNCIL 2019-20

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(President)

Shreya Hamine
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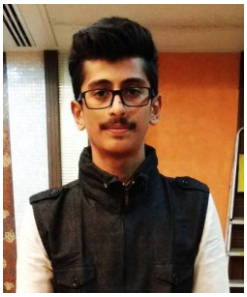

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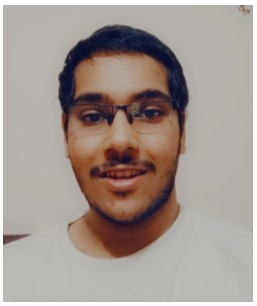

Sarthak Bharade

Prajwal Umaranikar

AEROSPACE 4.0

Danalie Mascarenhas (Mech V)

I. INTRODUCTION

Industry 4.0 is the creation of a digital manufacturing enterprise that is not only interconnected, but also communicates, analyzes, and uses the information to drive further intelligent action back into the physical world. It drives the act of designing, manufacturing, distribution, and performance in an ongoing cycle known as the physical-to-digital-to-physical (PDP) loop. This cycle allows for real-time access to data and intelligence, which is primarily driven by the continuous and cyclical flow of information and actions between the physical and digital worlds.

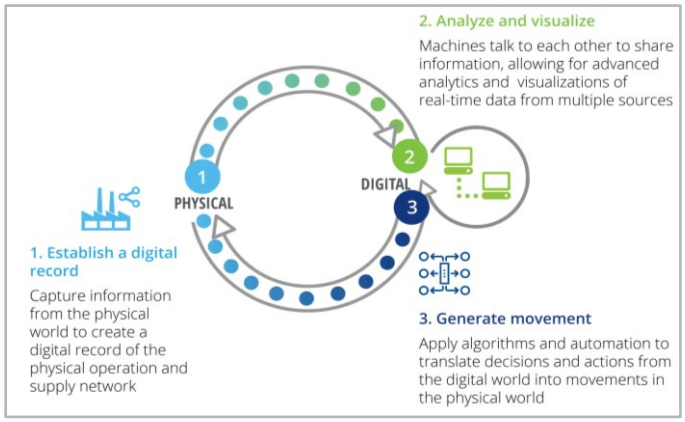

Fig.1.1 Source: The Deloitte Center for Integrated Research

The Aerospace Industry as we know is characterized by its competitive environment. The key to successfully compete in this scenario is to continuously strive towards higher levels of productivity. At present, the industry is organized into a system where production units order the various components of the assembly from different manufacturers, generating an entire web of sub-contractors. To get ahead of the increase in production, the airplane industry has gotten into the habit of constituting buffer stocks. This is anything but sustainable, as the slightest change in situation can put the factory into technical unemployment if the stocks can no longer be disposed of.

It thus is imperative to design a new mode of organization of the means of production, through new digital technologies, software, and materials. This would make use of Big Data, virtual reality, additive manufacturing, etc. in order to make factories engage in 'intelligent production'.

Industry 4.0 could thereby facilitate the stepping up of production pace, by increasing the operational effectiveness and flexibility of the entire production chain.

IV. EXISTING SOLUTIONS

The Aerospace Industry has been slower to adapt to automated processes over manual ones. This is primarily because production is characterized by relatively small volumes, large components, and accessibility problems during assembly, all factors that bar change. Nevertheless, the need to limit quality costs and cycle times, exclude human factors as a source of error as far as possible, and become more efficient are key drivers. Major aerospace original equipment manufacturers (OEMs) are beginning to embrace intelligent software and digital networking, with advanced assembly tools making a significant contribution.

Advanced Analytics, which is the autonomous or semi-autonomous examination of data using sophisticated techniques and tools, finds its application in the aerospace industry with the monitoring of real-time aircraft health; identifying system failures in advance, and making intelligent scheduling and forecasting models. Advanced Robotics has allowed for more efficient production, with fewer errors and quality issues. Additive Manufacturing has also found applications in the industry, enabling prototyping, tooling, and functional end-use parts manufacturing.

Artificial Intelligence has been applied to robotics to automatically program tasks in industrial settings, and enable predictive maintenance. A system of interrelated computing devices, mechanical and digital machines, that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction has been set up in the aviation industry, enabling companies to monitor aircraft health, and optimize engine performance by the use of data collected by sensors. Digital Reality is incorporated in the industry, replacing assembly manuals with smart-glass displays which substantially reduce wiring production time.

Blockchain has allowed for greater transparency of information between different parties, which improves just-in-time logistics and reduces erroneous orders and improves inventory turnover.

V. EMERGING SOLUTIONS

As the market impact of Aerospace 4.0 technologies plays out, barriers to entry are lowering and industry lines are blurring. Competition is emerging from new entrants into the market, who are moving beyond creating traditional physical products to using data gleaned from customers and product functioning to create new revenue streams. In the long run, companies that are adept at leveraging multiple advanced technologies could scale up, outperform, and outcompete their industry counterparts. Advanced Analytics can be leveraged to create large-scale digitization of plane maintenance data, enabling a process to be fundamentally reconfigured and eliminating the need for

manual processes. Further, computer vision technologies and Artificial Intelligence (AI) can be used to augment advanced safety features; replacing human co-pilots in autonomous aircraft. Virtual Reality (VR) can be used to optimize and design factories; an entire factory can thus be simulated, in order to train workers more safely & efficiently. Advanced Robotics can be used to simplify simulations of aircraft performance, avoiding time-consuming analysis and tests of algorithms, software and hardware. Material costs and demand fluctuations can be managed by analyzing big data, enabling integrated smart connected assets and operations. Additive Manufacturing can allow for combining new types of novel material to improve aerospace parts and accessories. Blockchain can be leveraged in order to improve tracking in supply chains and procurement by the use of a shared database with suppliers and partners; improving validation of supplier performance and reputation, and time-stamping to improve supply chain security.

I. CONCLUSION

The impact Industry 4.0 technologies can have on Aerospace companies varies depending on a company's size, where it is in the supply chain, what its role in the supply chain is, and, most importantly, its business focus. Being able to completely leverage innovative, game-changing technologies could be a matter of survival in the increasingly "disrupt or be disrupted" industry. Using Industry 4.0 technologies to make assets smarter and more self-aware can help companies improve utilization and efficiency. The free flow of digital information eliminates the manual transfer of data and the costly errors that go with it. Industry 4.0 in the aerospace industry thus allows for exploring significant potential value across a variety of dimensions, from cutting costs and restructuring supply chains, to expediting time to delivery and making devices and products connected across the board.

REFERENCES

1. Industry 4.0 in the aerospace and defense industry | Deloitte Insights
2. Accelerating industry 4.0 transformation - Aerospace Manufacturing and Design
3. Advances of Industry 4.0 Concepts on Aircraft Construction: An Overview of Trends- *Gustavo Franco Barbosa and Rafael Vidal Aroca*
4. Industry 4.0 in Aeronautics: IoT applications- *Vincent Bonneau and Bertrand Copigneaux*

RIDING THE WAVE OF DIGITAL

Samantha Dias (Mech V)

I. INTRODUCTION

Alongside robotics and intelligent systems, additive manufacturing, or 3D printing, is a key technology driving Industry 4.0. Additive manufacturing works by using digital 3D models to create parts with a 3D printer layer by layer, With the recent increase in the need for customization of parts and tools based on users' requirements 3D printing is revolutionizing low-volume manufacturing and will eventually change our way of all production. On deliberation of 3D printing, chances are good that consumer-based 3D printers are imagined that allow hobbyists and inventors to bring their visions to life, or to print replacement parts at will. That's certainly one of the strong faces of this technology.

II. ADDITIVE MANUFACTRING

Within the context of Industry 4.0, 3D printing is emerging as a valuable digital manufacturing technology. Once solely a rapid prototyping technology, today Additive Manufacturing (AM) offers a huge scope of possibilities for manufacturing from tooling to mass customization across virtually all industries. It enables parts to be stored as design files in virtual inventories, so that they can be produced on-demand and closer to the point of need a model known as distributed manufacturing. Such a decentralised approach to manufacturing can reduce transportation distances, and hence costs, as well as simplify inventory management by storing digital files instead of physical parts. Japanese inventor Hideo Kodama in 1981 pioneered 3D printing through the additive process. He created a product that used ultraviolet lights to harden polymers and create solid objects. This is a stepping stone to Stereolithography (SLA). Fused Deposition Modelling (FDM), developed by Scott Crump, is the most common form of 3D printing today. It is known as the "desktop 3D printers" because it is the most commonly used form of the technology. The Desktop FDM Printer melt plastic filaments and lay it down onto the print platform through a nozzle (like a high-precision, computer-controlled glue gun). The printer moves the extrusion head, laying down melted material at precise locations, where it cools and solidifies (like a very precise hot-glue gun). When a layer is finished, the build platform moves down and the process repeats until the part is complete. The available materials also vary by process. Plastics are by far the most common, but metals can also be 3D printed. The produced parts can also have a wide range of specific physical properties, ranging from optically clear to rubber-like objects.
Depending on the size of the part and the type of printer, a print usually takes about 4 to 18 hours to complete. 3D printed parts are rarely ready-to-use out of the machine. They often require some post-processing to achieve the desired level of surface finish. These steps take additional time and (usually manual) effort.

III. ELECTRICAL VEHICLES

As the world enters a new era of connected vehicles, the number of electronic devices, like sensors and antennae within the vehicle, is increasing. With this increase comes a greater need for designing and producing smaller, more complex electronics. 3D printing for electronics is creating new ways of producing smart components to network vehicles and gather automotive data. Let's take sensors as an example. To enable vehicles to gather environmental and car performance data, you'll need sensors with wireless capabilities, customized form factors and even non-planar geometries. Traditionally, such sensors are fabricated separately from the vehicle and need first to be assembled and then shipped to the manufacturer to be finally installed into a component. The advancements in AM systems for electronics unlock the opportunity to embed these sensors directly into mechanical components and the structure of vehicles. This approach can lead to higher reliability and longer lifetime compared to conventionally assembled sensors. Furthermore, electronic 3D printing can reduce the costs and development time for creating these sensors.

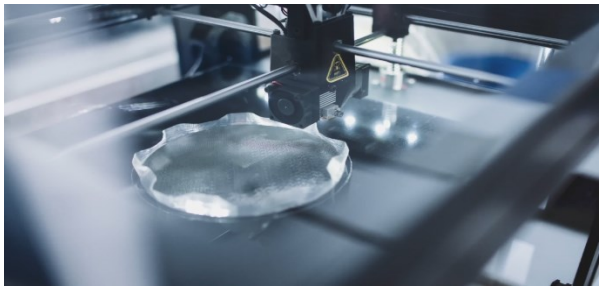

Fig.2.1 3D Printing of a Gear

IV. AEROSPACE INDUSTRY

The Aerospace Industry is at the forefront in the manufacturing industry. 3D printing is allowing for richer mechanisms to be built more simply. Using this technology rather than traditional methods is yielding products that are faster, lighter (better weight to thrust ratio), less wasteful (more fuel efficient) and more financially viable. American General Electric (GE) Aviation has stated that from 2016, its new Leap aircraft engine will include nineteen 3D-printed fuel nozzles, designed to last five times longer than traditionally made components. The average lifespan of an aircraft ranges between 20 and 30 years, making Maintenance, Repair and Overhaul (MRO) an important function in the industry. Metal 3D printing technologies like Direct Energy Deposition (DED) are commonly used to repair aerospace and military equipment. Turbine blades and other high-end equipment can also be restored and repaired by adding material to worn-out surfaces.

V. FIELD

The Medical Field is another industry greatly impacted by 3D Manufacturing. The technology has enabled a more patient-centred approach in medicine by offering customization of prosthetics and dentistry, and by enabling bio-printing, where scientists print human-sized bones, cartilage and muscle. For things like prosthetics and orthotics where almost every object needs to be built based on individual needs, this will significantly reduce the turnaround time. Imagine every dentist having a 3D printer in their office for making orthotics, and every individual joint replacement being designed for that patient's needs.

The Medical Field is another industry greatly impacted by 3D Manufacturing. The technology has enabled a more patient-centred approach in medicine by offering customization of prosthetics and dentistry, and by enabling bio-printing, where scientists print human-sized bones, cartilage and muscle. For things like prosthetics and orthotics where almost every object needs to be built based on individual needs, this will significantly reduce the turnaround time. Imagine every dentist having a 3D printer in their office for making orthotics, and every individual joint replacement being designed for that patient's needs. Even during the pandemic, many smaller industries have come out with their own 3D printed masks, as there is a huge market for it at the current time.

REFERENCES

1. https://www.hindawi.com/journals/jhe/2019/5340616/.
2. History of 3D Printing By Brooke Hahn
3. Blogs by Michael Longo, Global Advisory Automotive Sector, EY
4. GM (2000), “Digital Manufacturing @ General Motors”, Automotive Manufacturing Solutions.
5. https://amfg.ai/industrial-applications-of-3d-printing-the-ultimate-guide/
6. 3D PLM (2002), Dassault Systems, http://www.3ds.com/
7. www.ey.com/3Dprinting/ Global3DP@ey.com
8. https://amfg.ai/2019/03/28/industry-4-0-7-real-world-examples-of-digital-manufacturing-in-action/

AFFORDABLE SOLUTIONS FOR INDUSTRY 4.0

Adithya Basker (Mech III-A)

I. INTRODUCTION

Since the invention of computers & coding languages, there have always been attempts to convert the conventional mechanical & industrial processes into fully automated ones. These attempts have led to the industrial revolutions and currently, we are witnessing the 4th generation of this revolution, Industry 4.0 where peer to peer communication between the various machinery and servers is the main aim. Many of the industries like TESLA, Audi etc., have succeeded in implementing Industry 4.0 in their factories and warehouses. But as the advances of the technology increases, the cost also shoots up which makes the Industry 4.0 unadaptable in developing nations like India, Turkey etc.

II. AFFORDABLE SOLUTIONS

In India, Industry 4.0 has been adopted only by some renowned companies and that too not completely. The main reason is cost and complexity. But there are cost-effective solutions to this issue and that is, the use of development boards like Arduino and Raspberry Pi. The various abilities of these boards like flexible programming, customizable signal types (analogue/ digital) and easy adaptation can offer many benefits to the industry and its production. For instance, a small workshop or the shop floor of a factory can be automated simply by using Arduino boards and their shields which are readily available according to one's needs and spending in thousands rather than having to spend lakhs.

But there are concerns regarding the use of such boards for industrial applications. Three of the major concerns are as follows:

- Robustness
- Safety
- Industrial Standard Communication protocols

III. OVERCOMING THE MAJOR CONCERNS

The availability of shields, libraries, new protocols etc. for the development boards has helped to overcome the major concerns as mentioned above.

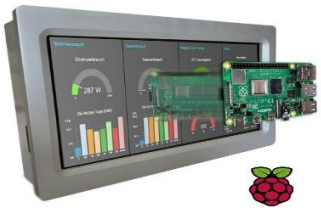

Fig.3.1 Panel PC based on Raspberry Pi

The availability of various shields (shields are boards designed to serve specific purposes and are placed over the mainboard like Arduino for use) like Industrial Arduino PLC and Industrial Panel PC on Raspberry Pi have proved their ability of extra robustness required to meet the current industrial needs.

When it comes to Industries, safety is one major concern that everyone has in mind. And when it's about the use of cheap DIY application development boards in industrial application, the concern grows further. These development boards can prove their efficiency provided they are coded by keeping the safety measures in mind. And this entirely depends on the project management, their method of implementation etc. which is then converted into lines of code and fed to the machine or robot's processing unit.

There has been the development of various protocol languages and libraries like MODBUS (developed by Modicon) which helps these boards to have Industrial standard communication protocols among its other working elements thus making peer to peer communication and cloud storage of data possible which is the main feature of Industry 4.0.

Fig.3.2 Industrial Arduino PLC

IV. CONCLUSION

Though the development boards may not be that efficient for large scale production companies like TESLA due to the complexity in the processes, it will very much be useful to implement the idea of industry 4.0 in medium and small-scale production lines & companies. Development boards usage would help in cutting the cost of automation in industries from lakhs to some 25 to 30 thousand. Changes in functionality or processing method (a type of input signal and output signals) can be made easily as these development boards read simple coding languages like C++ and Python. The main success of Industry 4.0 revolution lies in the implementation of it in each and every class of industry and making it affordable even for a small car workshop. There are attempts going on currently to make development boards more efficient for complex work processes and it may come into use anytime in the near future.

V. REFERENCES

1. "https://www.rs-online.com/designspark/raspberry-pi-and-arduino-in-industrial-environments

2. https://www.industrialshields.com/industrial-automation-solutions-based-on-arduino-plc-raspberry-pi-202011-home

EVOLUTION OF INDUSTRY 4.0

Ammar Naeemuddin Khan (Mech III-A)

a. INTRODUCTION

Starting off with an introduction, Industry 4.0 is not just a new phase but an industrial revolution that will be focusing on automation, machine learning, interconnectivity, robotics and real time data. It is also referred to as smart manufacturing, smart digital technology and big data to create a more holistic and better environment and better-connected ecosystem for companies that focuses on manufacturing and supply chain management. In today's era the common challenge faced by the companies are the need for connectedness and access to real time insights across their partners, customers and products.

b. PRODUCTION INDUSTRY

Manufacturers are using digital technologies to streamline complex processes to increase productivity and profitability. Streamlining is usually done to make things better and uncomplicated. The first step to streamline your method is to review and analyze past performance so that you understand where time and resources have previously been spent. By doing so, you will be able to prioritize the areas that need the most attention. You can invest in technologies to improve procedures; you can have hardware and software that are integrated to monitor and control the operation of the various industrial processes that are applicable to your business with easy accessibility.

Many changes in the manufacturing industry have come from consumer demand. Consumers want things faster and better, personalized and unique, and newer than last year or even last quarter. Therefore, manufacturers have had to find a way to keep up not only with the demand for products but also with finding skilled workers to make these products. Now there are many Internet of Things (IoT) software dealing with the production and planning such as MaintainX, it helps users track maintenance and control daily operations such as safety inspections, quality inspections, and operating checklists. Computerized Maintenance Management System (CMMS), a computerized maintenance management information system which is a software package that maintains a computer database of information about an organization's maintenance operations. The information is used to help workers do their jobs more effectively such as finding out which machines require maintenance and which storerooms contain the spare parts they need. NetSuite is an American cloud computing company that provides software and services to manage business finances, operations, and customer relations. Its software and services were tailored for small, medium-sized, and large businesses with modules such as Enterprise resource planning (ERP), Enterprise resource planning (ERP) system track business resource cash, raw materials, production capacity, and the status of business commitments, purchase orders, and payroll. The applications that make up the system share data across various departments like manufacturing, purchasing, sales, and accounting. ERP facilitates information flow between all business functions and manages connections to outside stakeholders.

Industrial sector performance is critical to achieving the ambitious goal of making India a five trillion economy. Directly, the sector contributes close to 30 percent of the total Gross Value Added (GVA). According to the Economic Survey, the growth of Eight Core Industries stood flat during the current financial year. The estimated growth for 2019-20 is 2.5% as compared to 6.9% last year. During the corresponding period of the previous year, these industries grew at 5.1%. While fertilizers, steel, and electricity have seen an expansion in their production, production of coal, crude oil, natural gas, and refinery products have contracted during the current financial year. Also, according to the World Bank's Doing Business 2020 Report, India has improved to 63rd position (from 77th last year) among the 190 countries and has improved its rank in 7 out of 10 indicators which span the life-cycle of a business.

c. AUTOMOTIVE INDUSTRY

The most emerging sector currently in the scenario of the automotive industry is the Electric vehicles industry. The electric vehicles industry is at a nascent stage in India. It is less than 1% of the total vehicle sales but it has the potential to grow to more than 5% in a few years. At present, there are more than 5 lac electric two-wheelers and a few thousand electric cars on Indian roads. According to a report launched by the financial services firm Avendus Capital, Electric vehicles in India could represent Rs 500 billion opportunities by 2025. Overviewing the situation, Dr. Pawan Goenka quoted "In terms of EV connectivity, Norway has 22 %, China has 2 % and India has only .02 %. For us to talk about full connectivity by 2030 is perhaps too ambitious but 20 % by 2030 is a realistic target." In 2013, the Government of India launched the National Electric Mobility Mission Plan (NEMMP) 2020. The plan aims to achieve national fuel security by promoting hybrid and electric vehicles in the country. The Maharashtra Government is focusing on increasing EV use in the state by proposing to exempt EV's from road tax and providing a 15% subsidy to the first lakh EV's registered in the state. To improve suitable infrastructure, the government proposed to provide a maximum subsidy of Rs. 1 million (~$15,549) per charging station to the first 250 stations that will set up in Maharashtra.

EVs use power-electronics extensively. India had an early start in its power-electronics industry. However, the industry has not kept pace with new developments that have seen the digitization of power-electronics over the last decade. India would need a new power-electronics industry that can help develop and produce high-efficiency sub-systems for EV industries. A special thrust is needed to promote such industries.

With emergence of technologies in various industrial sectors, the automotive sector has also adapting robotics in most of the aspects, such as Cobots, generally known as collaborative robots they are driving new efficiencies across the industry, in applications including machine loading, inspection, and assembly in the production of powertrain, electronics, and interiors. Cobots can work side-by-side with human workers, improving their output and consistency and allowing them to support more in-line processes in a single work space. While traditional automation requires an all-or-nothing approach, cobots allow automotive manufacturers to automate specific tasks and see fast return on investment. They have seen a 40% growth in production since the deployment of cobots in the manufacturing plant. The manufacturer is now able to run 24x7, thanks to cobots enabling a third 8-hour shift, thereby increasing the productivity. Recently this year Mitsubishi Electric has launched a series of collaborative robots called MELFA ASSISTA in India. MELFA ASSISTA can work together with humans, keeping safety features such as collision detection a priority and complying strictly with the international safety and robotic standards ISO 10218-1 and ISO/TS 15066. After a successful global launch, the collaborative robots are ready to serve the Indian market and take a lead in Indian manufacturing. Mitsubishi Electric Factory Automation &Industrial Division, located in Pune, is excited to serve its customers with the advancements in productivity, faster automation, along with flexibility and safety.

Fig.4.1 Collaborative Robots in Automotive industry

REFERENCES

1. https://www.smev.in/ev-industry
2. http://www.eai.in/blog/2018/12/highlights-of-maharashtra-ev-policy-2018.html
3. https://niti.gov.in/writereaddata/files/document_publication/EV_report.pdf
4. https://www.manufacturingtodayindia.com/products-suppliers/8059-mitsubishi-electric-introduces-co

AEROSPACE - PATH TO THE FUTURE

Cleon Dias (Mech V)

I. INTRODUCTION

The effects of Industry 4.0 in many industries have already been seen, with improvements to existing value propositions emerging, or entirely new ones being developed. In aviation, digital technology has already fundamentally changed the airline industry landscape, the question of how Industry 4.0 technologies can be applied upstream in the mature, highly regulated aerospace manufacturing sector remains. Commercial aviation is one of six broad segments in the aerospace market. After the dreadful downturn that commercial aviation is facing due to COVID-19, relative growth in other sectors may be seen, particularly in electric and unmanned aviation. Since these segments are less mature than commercial aviation, there is an opportunity for digital technology in manufacturing to be implemented and proven more rapidly.

II. SUPPLY CHAIN TECHNOLOGY

One example of how supply chain technology can support aerospace manufacturers and distributors during periods of change, can be seen in how state-of-the-art Enterprise Resource Planning (ERP) solutions improve supply chain visibility. Moving scheduling, visual advanced planning and traceability to a smart, Industry 4.0 ready system is vital in managing the compliance processes. Having the right technology in place makes this process easier. Traceability is especially challenging because problems can occur at any point along your supply chain, from R&D through materials handling to assembly and shipping. Being able to schedule quickly and accurately will reduce downtime and enable manufacturers to maximize order fulfilment and resource utilization, collect data from the shopfloor and track employees, equipment and orders in real-time.

Fig.5.1 Digitalization of Supply chain

In uncertain times, the ability to act and react quickly is invaluable. This will lead to a reduction in loss and will drive continuous improvement. In addition to this, an Industry 4.0 compliant ERP system would be able to monitor how your supply chain and your own production line is tracking against the regulations that are required. To make a real difference here, these solutions need to be a secure platform that minimises manual processes and allows for efficient monitoring and documentation of complex information flows.

III. ADDITIVE MANUFACTURING

Although not a new process, additive manufacturing (AM) – sometimes known as 3D printing – is another area which promises to drive significant change into the aviation industry. 3D printing offers significant advantages over traditional subtractive manufacturing: it can help to produce more complex, potentially lighter, shapes; it can deliver prototype parts or tooling in a matter of hours to be quickly adapted, and it means supply chains can be slimmed down, and less waste material produced.

Production of interior components is clearly an area where Asset Liability Management (ALM) techniques has grown. A cabin update can create gaps between new and old components. Previously plastic spacer panels would be produced via injection molding – a relatively complex and costly process for the small number required. However, thanks to 3D printing, Airbus has enabled small-batch manufacturing that is quicker and produces components

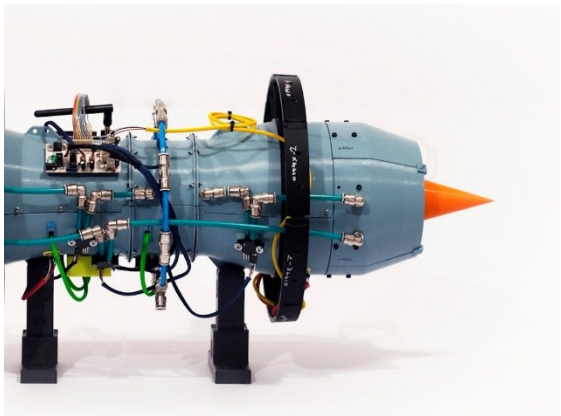

Fig.5.2 3-D printed jet engine

that are around 15% lighter than earlier versions. Similarly, manufacturer Automatic Terminal Recognition (ATR) is using 3D printing to produce low quantities of cabin parts for out-of-production variants of its turboprop airliner family.

"By 2021 engine manufacturer GE Aviation estimates it will be producing 100,000 individual components via 3D printing."

IV.SMART AUTOMATION

Aerospace manufacturing is a specialized and complex process, but smart automation is simplifying things. For example, when it comes to robotics, some end-of-arm-tooling effectors are IoT connected for real-time data collection and optimization. Additionally, scanners are being used to identify the part material and robots use this information to select the specified bolt size and apply the appropriate level of torque for that specific material. Designers and manufacturers have, and will continue, to push the envelope on load capacities for robotic equipment

and end effectors in order to effectively handle the largest aircraft components. Smart technologies and sensors allow manufacturers to collect real-time information to determine the status of operations at any given moment – and react and adjust operations accordingly. These smart technologies also extend into predictive maintenance programs where companies can monitor equipment real-time to improve responsiveness and achieve fewer unplanned outages. Innovations within Artificial Intelligence (AI) continue to be implemented, allowing automation solutions to perform increasingly complicated jobs in shorter periods of time.

Fig.5.3: Robotics in Aerospace Industry

V. BLOCKCHAIN TECHNOLOGY

In the growing aviation industry, the blockchain platform providers, like Hyperledger Fabric, Accenture PLC, Microsoft, and Loyal Corporation, among others, along with aviation industry players, like airports and airlines, are investing in developing and incorporating this technology into the aviation industry. Currently, defence growth is slower, in comparison with the aerospace segment, with a lot of investments in R&D for protection against cyber warfare, tracing defence-related shipments and contracts, and creating secure government portals and efficient battlefield messaging services, among others applications. The blockchain technology in the aerospace and defence market is anticipated to register a CAGR of over 35% during the forecast period. Due to the presence of large and complex supply chains in the aerospace and defence industry, blockchain technology can help in maintaining a well-connected and transparent supply chain. This is one of the major driving factors for the use of blockchain technology in the aerospace and defence industry.

REFERENCES

1. https://www.airbus.com/innovation.html
2. https://www.aero-mag.com/keeping-aerospace-flying-with-low-cost-industry-4-0/
3. https://www.pwc.com/gx/en/industries/aerospace-defence/publications/blockchain-in-aerospace.html
4. https://www.google.co.in/url?sa=i&url=https%3A%2F%2Fblog.aiag.org%2Faiags-annual-supply-chain-summit-is-just-one-week-away&psig=AOvVaw0DeE_3HEFJa_auU9JkgikQ&ust=1606891264926000&source=images&cd=vfe&ved=0CAIQjRxqFwoTCPjzzMeWrO0CFQAAAAAdAAAAABAD
5. https://images.ctfassets.net/q2hzfkp3j57e/311417ea0467735a0126b7f663495927f4c83ec8/2887fe4afb356b70554b6ee57476624a/xp1-core-side-1.jpg?w=1600&h=1200&fm=jpg&q=82
6. https://roboticsandautomationnews.com/wp-content/uploads/2017/06/boeing-1-small.jpg

IoT – SOLAR POWERED BASED SMART IRRIGATION SYSTEM

Akshata Patil (Mech V)

I. INTRODUCTION

Agriculture is the backbone of the Indian economy on which more than 50% of the population is dependent and structures the main source of income. To achieve the overall demand, cost effective solar powered smart irrigation system can be an innovative approach. The Internet of things (IoT) technology is evolving, distributed solar energy resources can be operated, monitored, and controlled remotely. This system consists of solar powered water pump along with controlled water using a moisture sensor. To be more precise, this system dispenses an exact amount of water required depending on the soil moisture, hence minimizing the wastage of water. A network of sensor nodes is used to collect the humidity and temperature of the soil which is transmitted to a remote station. This data is analyzed and monitored to remotely control the amount of water dispensed. The sensing system is based on feedback control mechanism and can be customized according to the type of crop being cultivated. The automated drip irrigation system will help reduce usage of grid power, problems associated with wastage of water in farming and as a result increase food crop production.

II. SYSTEM DESIGN

The design of an IoT based solar energy system for smart irrigation is essential for regions around the world, which face water scarcity and power shortage. The system has two modules namely: Pumping Module and Automatic Irrigation Module. It consists of a Pump which draws energy from the solar panel.

The main reason of using a solar pump is that a diesel pump of 3HP pump which works for, say 3 hours a day, may be able to pump the same amount of water in a day as a solar pump of 2HP working for 7 hours using the sunlight available.

Measuring soil moisture is an important step in deciding the duration of the irrigation. The sensor model can be made of two electrodes measuring the resistance of the soil. The amount of the current flow increases with the moisture in the soil. The microcontroller is programmed in such a way that if the moisture level is less than the desired value at a time prior to the irrigation then the solenoid valve will be turned ON, and if not, a feedback SMS will be sent to the farmer specifying “Incomplete irrigation”.

The proposed system utilizes a single board system-on a-chip controller (the controller hereafter), which has built-in Wi-Fi connectivity, and connections to a solar cell to provide the required operating power. The controller reads the field soil moisture, humidity, and temperature sensors, and outputs appropriate actuation command signals to operate irrigation pumps. The controller also monitors the underground water level, which is essential to prevent the pump motors from burning due to the level in the water well.

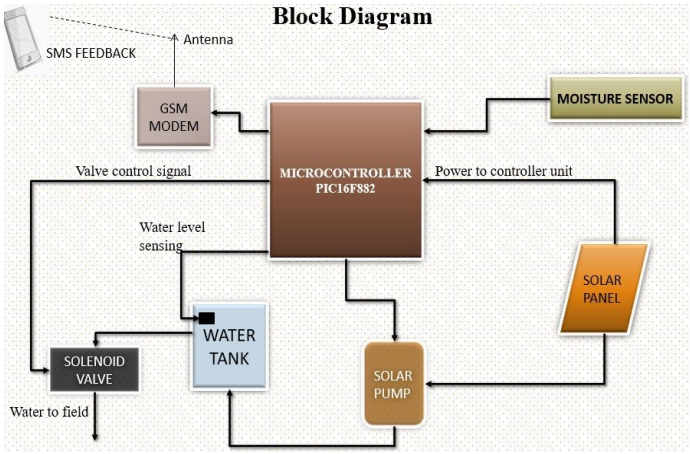

Fig.6.1: Smart irrigation system process chart

III. CASE STUDY: UTTAR PRADESH

Within India, the state of Uttar Pradesh provides a good case study to explore the challenges of this system and its potential more deeply within India, and to offer broader insights to other energy nations. A survey conducted in 2014 reveals that Uttar Pradesh suffers from the lowest yield per hectare despite having the highest area under cultivation among other states. One of the reasons identified for this was inadequate irrigation facilities coupled with improper water management.

For this case study, sugarcane crop in an irrigated area of 1 hectare is considered. Depending upon the specifications required, the overall cost of the system comes to Rs1.27 Lacs. This includes a Government subsidy of 30% from the Ministry of New and Renewable Energy (MNRE).

IV. TRIPLE BOTTOM LINE APPROACH

The Solar Powered smart irrigation system takes into consideration the triple bottom line approach i.e. people, planet, and profit.

This system is beneficial for farmers having more irrigation cycles per year and those that are deprived of electricity supply. It enables farmers to improve their prosperity & income by 48.5%. The system provides economic benefits by reducing the irrigation cost by 32.3%. and increasing the agricultural output by Rs 2,000 Crore per annum thereby resulting in an increased GDP of the country. Moreover, the system results in remarkable reduction in Green House Gases

(GHG) emissions due to replacement of electric/diesel pumps by solar pumps. Therefore, it is environment friendly. Secondly, it contributes towards water conservation and prevention of ground water table depletion.

Furthermore, these benefits can be linked to SDG i.e. Sustainable Development Goals led by the UN. This system if deployed to a larger extent can contribute towards SDGs like No Poverty, Zero Hunger, Decent work and Economic Growth, Affordable Energy and Climate Action.

REFERENCES

1. https://www.ijiert.org/admin/papers/1424429798_Volume%202%20Issue%202.pdf

2. https://shaktifoundation.in/wp-content/uploads/2014/02/feasibility-analysis-for-solar-High-Res-1.pdf

STUDENTS' ACHIEVEMENTS

PRIZES WON IN VARIOUS COMPETITIONS

Sr. No	**Name of the student**	**Name of the Event**	**Prize/position /Rank**	**Date**
1	Bhavik Panchal	Project Poster competition CALIBRE2019, FCRIT Vashi	1st position	30/03/2019
2	Bhavik Panchal	Technical Paper Presentation CALIBRE2019, FCRIT Vashi	3rd position	30/03/2019

FACULTY ACHIEVEMENTS

r. No	Name of the Faculty	Particulars	Year
1	Dr. S. M. Khot	Chairman, Board of Studies, Mechanical Engineering, University of Mumbai	2019-20
2	Dr. S. M. Khot	Member on Governing Council of K. J. Somaiya College of Engineering	2019-20
3	Dr. S. M. Khot	Member on Governing Council of Thakur College of Engineering	2019-20
4	Dr. S. M. Khot	Member on Governing Council of Fr. Conceicao Rodrigues College of Engineering, Bandra	2019-20
5	Dr. Nilaj Deshmukh	Received Minor Research Grant of Rs 40000/- from University of Mumbai	2019-20
6	Dr. Aqleem Siddiqui	Received Minor Research Grant of Rs 50000/- from University of Mumbai	2019-20
7	Dr. Aqleem Siddiqui	Completed PhD from University of Mumbai	2019-20
8	Nilesh Sonu Varkute	Received Minor Research Grant of Rs 40,000/- from University of Mumbai	2019-20
9	Suvarna Rode	Received Minor Research Grant of Rs 40,000/- from University of Mumbai	2019-20
10	Prasad Bari	Prasad Bari Received Minor Research Grant of Rs 60000/- from University of Mumbai	2019-20
11	Prasad Bari	Admitted to Ph.D. Program in VJTI	2019-20
12	Shamim Pathan	Admitted to Ph.D. Program in IIT Bombay	2019-20
13	Pallavi Khaire	Admitted to Ph.D. Program in VJTI	2019-20

PLACEMENT DATA

Sr. No.	Name of the student	Company name
1	Aditi Deogire	Technip India Ltd
2	Anmol Rane	Thyssenkrupp Industrial Solution
3	Deepak Bhole	Godrej
4	Edwin Johnson	Cactus
5	Febin Thomas	Godrej
6	Harshit Singh	TCS Ninja
7	Kalvin Anthony	Godrej
8	Keyur Sangwai	Selec Control
9	Manali Dukhande	Infosys
10	Mayank Upasani	TCS Ninja
11	Mayur Mhaske	TCS Ninja
12	Mohammed Talha Anjum	Godrej
13	Nimish Thube	Thyssenkrupp Industrial Solution
14	Omkar Malavankar	Burns & MC Doneell Engg Pvt Ltd
15	Opel Rodrigues	Thyssenkrupp Industrial Solution
16	Pawan Narang	Square Yards
17	Priyan Kamble	Thyssenkrupp Industrial Solution
18	Rishikesh Karmalkar	Thyssenkrupp Industrial Solution
19	Sebestian Dsouza	Godrej
20	Vishal Patil	Godrej
21	Vishal Yadav	Godrej
22	Yohann Lobo	Godrej
23	Noel Sabu	Godrej
24	Ashish Shanbhag	Freight Wings Pvt Ltd
25	Georgin John	Freight Wings Pvt Ltd
26	Aniket Pathak	Square Yards
27	Glen Rebello	Square Yards
28	Antony Camillus	Seven Island Shipping
29	Vipin Varghese	Cyber Marine
30	Allen George	Cyber Marine
31	Shraddha Barbade	Cyber Marine

LIST OF TOPPERS

Toppers in Semester VIII		
Rank	**No. of Students**	**CGPI**
1	30 students	10
2	4 students	9.96
3	5 students	9.93
Toppers in Semester VI		
Rank	**Name**	**CGPI**
1	Agarawal Hemant Rajendra	10
	Ghadi Ashay Jaywant	10
	Gunjal Rishikesh Gulabrao	10
	Khot Harsh Siddheshwar	10
	Koli Chris Samson	10
	Marlyn Binu Tini	10
	Tajir Asim Parvez	10
	Vaz Emmanuel Aldrin	10
	Abraham Vineet	10
	Devadiga Nitesh Shankar	10
	Kalamkar Vishwas Shivaji	10
	Patil Preeti Manik	10
	Shah Meet Nitin	10
	Toraskar Tushar Maruti	10
2	Choudhari Akhilesh Jeetendra	9.96
	Kavitkar Shubham Suryankant	9.96
3	Hamine Shreya Mukund	9.84
	Khetkar Kedhar Ajit	9.84
	Singh Ankit Ajay	9.84
	Wavekar Aditya Rajendra	9.84

LIST OF TOPPERS

Toppers in Semester IV		
Rank	**Name**	**SGPI**
1	Dixit Shubham Vishnu	10
	Kabra Dhruv Abhay	10
	Patil Akshata Ashok	10
	Raina Nitin Sanjay	10
	Shirsat Tejas Surendar	10
	Sonawane Tejas Bhiku	10
	Patil Monali Prashant	10
2	Shelar Rahul Vasant	9.64
3	Patil Ruchita Mahadeo	9.52

SYNERGY 2019

SYNERGY is organized with the aim of bridging the gap between the industry and the institute and facilitates an effective interaction between them. This event provides an opportunity for the students as well as the faculty members to know more about the emerging technologies and methodologies adopted by the industry. Also, the industry in turn, gets to know the institute closely, thereby providing an opportunity to identify the value addition required to create high class professionals from the institute.

Synergy 2019 was the latest edition of our vibrant and vigorous industry-academia interaction. It was held on **3rd August 2019** at the premises of our very own college Fr. C. Rodrigues Institute of Technology, Vashi. We were fortunate to have guest speakers from ACG Pam Pharmaceutical Pvt. Ltd. to interact with students. **Mr. Vinay Shevade (Operation Head, Masters in Management Sciences and diploma in materials management)** and **Mr. Vinay Chansikar (Mechanical Engineering graduate)** were the keynote speakers who graced us with their presence and shared their valuable knowledge and experience with students. The speaker dealt with technical aspects of and opportunities in their field. It was followed by an open interaction where there was wholehearted involvement from the students.

STUDENTS DAY

On the account of Dr. APJ Abdul Kalam's birthday, celebrated as Student's Day, The Institution of Engineers (India), Belapur had taken the initiative to inculcate creative thinking and innovative mindset amongst the students of F.C.R.I.T, Vashi. "Students Day" was organized on 15thOctober 2019, under the aegis of MESA. Speakers were invited to deliver lectures for Mechanical Engineering Students of Semester I, Semester III, Semester V and Semester VII.

The guests who graced the occasion with their esteemed presence are:

1. **Dr. S C Nimkar**

Hon. Secretary The Institution of Engineers (India), Belapur, Lecturer at Bharati Vidyapeeth Institute of Technology.

2. **Mr. Keshav Varkhedkar**

(City & Industrial Development Corporation (CIDCO), Navi Mumbai (joined as Executive Engineer and now holds the position of Chief Engineer)). The topic of the seminar "Supply Chain Management''.

3. **Mr. Karunesh Kumar**

(Certified Corporate Trainer and Design Coach). The topic of the seminar "Significance Design Thinking".

MESH 2020

MESH aims at the latest trends in research and development, wherein research scholars and expert speakers from academia such as IIT, BARC, etc. are invited to deliver lectures.

"MESH 2020" was organized on 27th March 2020, under the aegis of MESA. Speakers were invited to deliver lectures for Mechanical Engineering Students of Semester II, Semester IV, Semester VI, and Semester VIII.

The guest speaker who graced the occasion with their esteemed presence are:
1. **Seema Negi**
(Master's degree in Material Science and Engineering from IIT Gandhinagar and currently pursuing a Ph.D. from IIT Bombay) delivered a seminar on "Electron Beam Additive Manufacturing".

2.**Dr. S. D. Sharma**
(Professor from Aerospace engineering department IIT Bombay, Mumbai) delivered seminar on "Two-Dimensional Base Flows: 3-D Control Mechanism".

3. **Mr. Athul Nambolan**
(Dual Degree (B. Tech + M. Tech) student at Rapid Manufacturing Lab IIT Bombay, Mumbai) delivered a seminar on "Challenges in Path Planning for Electron Beam Additive Manufacturing".

PRESIDENT'S NOTE

Two Years ago, our memorable journey began with MESA as junior members of the committee standing next to our experienced members of the team learning new skills every day, fighting all the odds & accomplishing our goals and above all working on ourselves to become a good leaders in order to maintain the legacy of MESA.

A year passed and we saw a dawn of new responsibilities and opportunities. MESA has been an excellent platform to render our ideas and test our skills. Each one of us had our own ideas, dreams and determination about events which motivated us and kept us going but as they say, "It's always easier said than done". SYNERGY & MESH were the minor battles which helped us to untie many knots as a team. We made good progress and learned many things after organizing these events but our most interesting and challenging tasks were yet to arrive.

We, a team of 21 members with support and guidance of our respected coordinators turned our attention towards preparation of CALIBRE 2020. We began to push our limits, each one of us trying to come up with unique ideas for events, revising the rules of the existing events & thinking of something out of the box so that CALIBRE 2020 can provide a new learning experience to it's participants. Moving forward we had to get approvals for events, brochures, flyers, posters and the next part was to get sponsorship for our events. Everything was at stake we needed funds to proceed as we had planned. After an extensive expedition which lasted for more than a month, we managed to pull it off and reach our goal. With these funds we were all set to head for our promotions, by then the date of CALIBRE (26th March) were announced. We were done with the promotions by 12th march and started with the preparation of the final events but as we all are aware the entire globe was hit by one of the worst pandemics COVID-19 and the entire nation was under lockdown. At that very moment we were worried and were waiting for things to get under control, but unfortunately that didn't happen. I feel, It's the journey that matters not the destination and it's the journey that teaches you a lot. Throughout our sail, we were put onto many tests which helped to discover our strengths and to overcome our weaknesses and in the long run, this is what helped us grow better.

Do you think that I will end this note without acknowledging my torchbearers? Well, that is simply impossible. Dear Suvarna Ma'am and Kamlesh Sir, what we are today is because of you. Furthermore, the knowledge that you imparted to us is one of the most valuable things in our lives. This knowledge that you gave us will be our weapon for life ahead. I would like to express my gratitude to HOD sir, my amazing committee members & to all those who have been a part of MESA 19-20.

I am leaving here today with a wealth of knowledge that I will always treasure. Working here has been a fantastic learning experience, and I am thankful for the skills I've acquired. I feel as if being here with you all each day has made me a more complete and well-rounded person.

ANKIT SINGH
President
MESA 2019-20

ISHRAE COLLEGIATE CHAPTER

The Indian Society of Heating Refrigeration and Air Conditioning Engineers (ISHRAE) was founded to promote the HVAC industry in India. The student chapter aims to provide the student members with industry exposure and get them more involved in HVAC. The ISHRAE student chapter of FCRIT was started with the goal of getting new opportunities for students in the field of HVAC specifically and provide a stable career in the same. The FCRIT chapter was initiated on 22nd September 2007. Mr. Nilesh Varkute and Mr. Badal Kudachi are the faculty advisors of FCRIT chapter. ISHRAE organizes various events like Exhibitions, Quizzes, Technical Paper Presentations, Industrial visits, Job Junctions, etc.

The ISHRAE FCRIT chapter for the year 2019-20 was reinstalled on 23rd August 2019. The ceremony was held at Annasaheb Vartak Hall, Dadar. Many colleges from the Mumbai Chapter participated in the installation ceremony of ISHRAE student chapter. The dignitaries Mr. Mihir Sanghvi, Mr. Sanjay Verma, Mr. R. N. Joshi and Mr. Kunal Bhavsar were some of the chief members amongst the ISHRAE council that attended the ceremony. The Inauguration of the ISHRAE Students Technical League (ISTL) was also done along with the installation. All 16 colleges from the Mumbai chapter participated in the league.

The preparation for the league started with an expert interaction at the ISHRAE Mumbai chapter office, Andheri. The teams were introduced to the competition here, were given basic guidelines and had interactions with experts from the industry. This was followed by a seminar on heat load calculations at Lokmanya Tilak College of Engineering, Koparkhairane. The seminar gave students insight on heat load calculations which was a great boost for the teams for ISTL. The college team then went on to compete in the finals and successfully bagged the 4th place amongst other colleges in the Mumbai Chapter.

Apart from this the students participated in the ‘Aquest’ quiz competition too, where the students were able to reach till the quarter finals successfully. There was active participation from students in all these activities which only enriched their experiences.

SAEINDIA COLLEGIATE CHAPTER

SAEINDIA is an affiliate society of SAE International registered in India as an Indian non-profit engineering and scientific society dedicated to the advancement of mobility industry in India. The founding principle of the SAE International is to unite scientific and technical staff to perform free academic discussions, to dedicate themselves to the cause of prospering the science and technology for automotive vehicles and to make contributions to speed up the modernization of automotive industry. SAEINDIA is a professional engineering society whose membership represents practically every engineering and scientific discipline. Its members combine their specialized abilities to further advance the research, development, design, manufacture and utilization of vehicles that operate on land, water, air and space.

The Club actively organizes events various such as TORQUE- Intercollege event of Nitro Racing and SPARK- Seminar by a speaker from automobile sector. Prof. Girish Dalvi and Dr. Aqleem Siddiqui are the Faculty advisors for SAEINDIA. The Department has a SAE Collegiate Club of SAE, having more than 50 members.

SAEINDIA BAJA

Team Kaiser Racing, the SAE BAJA team of our college, consisting of 25 automobile enthusiasts, designed and fabricated an ATV for the national level competition held at Chitkara University, Chandigarh. The team was led by Captain Ruturaj Chavan and Vice-captain Melvin Joseph and guided by faculty advisors Dr. Aqleem Siddiqui, Prof. Girish Dalvi, and Mr. Sandeep Arote. The competition is a measure of how well a vehicle is designed, modelled and constructed in all respects. The overall participation and innovation by students is a proof that mechanically and aerodynamically sound buggies are just the beginning of FCRIT's contribution to the automobile sector.

After the stunning debut made last year, the team made sure the alterations with respect to design improvement were implemented and the car stood tall and roared well before the event. The inauguration ceremony was conducted on the first day of ETAMAX and thus began the journey.

The journey from the inauguration to the event wasn't a cakewalk, the team faced challenges befalling it with sleepless nights and tiring days. The path was narrow and curvy but the team drifted through each turn with a firm mindset.

The Baja event commenced not just with bursting crackers but also clouds. The rain seemed to be an uninvited guest. This sudden outburst wasn't A pleasant surprise to many. With 24 hours of continuous rain and thunderstorms, the competition seemed to have taken a turn, it was a challenge to many of the teams. The track seemed to have drowned in puddles and with them, drowned many more dreams. It is said, when the going gets tough, the tough get going. And so, the rugged monster, built by the team seemed to have conquered its obstacles and completed the event.

The team saw many unfortunate sights during the journey, but nothing seemed unconquerable. The sleepless night and uneaten meals proved to have been a promising sacrifice.

SAEINDIA AERO CLUB

A team of 7 members aspiring to fly high, set a spark for the foundation of Aero Club in 2019. Later, additional members joined the club as support team members. The team registered for their first event SAE Aero Design Challenge in August, 2019 and started with the journey.

Being the pioneering team of the club, it was a tough journey for the team as they had to start from scratch for each and every design parameter. With the help of online courses, reference books on aerodynamics and through multiple iterations of their plan, the team gave birth to its prototype, the White Lady, and consequently their final RC plane, Garuda.

The event is all about designing and fabricating a highly stable heavy lifting RC aircraft falling under the given constraints. All the efforts put in by each and every member of the team paid off, as they secured an impressive 5th place in the technical presentation round and 16th for the report submission, a feat commendable for their first competing year.

With a successful run for the year 2019-20, the team now aims to keep the legacy up and running with new members added to the team and continue participating in SAE ADC and other similar events. Plans for the next round are already set in motion and they are working hard to secure better rankings, even amid the current situation. The college has constantly supported the team by clearing their doubts and providing all the necessary facilities.

FACULTY PROFILE

Dr. S. M. Khot (Principal)	**Ph.D. (IIT Bombay)** – Aerospace Engineering **M. E. (Shivaji University) -** Mechanical Design Engineering Professor (Exp. - 31 years) Area of Research - Mechanical Vibration Dynamics and Control, Active Vibration Control, Smart Structures
Dr. Nilaj Deshmukh HOD and Dean (Faculty)	**Ph.D. (IIT Bombay)** – Aerospace Engineering **M. Tech. (VJTI, Mumbai) -** Automobile Engineering Associate Professor (Exp. - Industrial 2 years, Teaching - 20 years) Area of Research - Virtual instrumentation, Combustion, Combustion Instabilities, Measurement Techniques, Noise Analysis, Aerodynamics
Prof. T. Mathewlal	**M. S. (BITS, Pilani)** **B. Tech. (Mechanical) -** Systems Associate Professor (Exp. - 31 years) Area of Research - Engineering Mechanics and Thermal Engineering
Dr. Nitesh P. Yelve Dean (PG Studies)	**Postdoctoral Fellowship (City University of Hong Kong)** **Ph.D. (IIT Bombay)** - Aerospace structures **M. Tech. (VJTI Mumbai) -** Machine Design Associate Professor (Exp. - 18 years) Area of Research – Structural Health Monitoring, Active vibration control, Structural Dynamics, Design of Experiments Using Statistical Methods, Composite Materials
Prof. N. G. Kshirsagar	**M. Tech. (VJTI Mumbai)** - Machine Design Assistant Professor (Exp. - 22 years) Area of Research – Design, MEMS, Synthesis of Mechanism

Dr. Aqleem Siddiqui	**Ph.D. (Mumbai University)** **M. E. (Mumbai University)** - Machine Design Assistant Professor (Exp. - 21 years) Area of Research - Active Vibration Control, Automobile Engineering, Design
Prof. Prasad Bari	**Ph.D. Pursuing (VJTI, Mumbai)** **M. Tech. (VJTI, Mumbai)** - Production Engineering Assistant Professor (Exp. – Industrial - 5 years, Teaching - 13 years) Area of Research - Micromachining
Prof. Sanjay Rukhande	**Ph.D. Pursuing (VJTI, Mumbai)** **M. E. (SPCE Mumbai)** - Machine Design Assistant Professor (Exp. – 19 years) Area of Research - Design, Analysis, Finite Element Method, Surface and Coating
Prof. Shamim Pathan	**Ph.D. Pursuing (IIT, Bombay)** **M. E. (Mumbai University)** - Machine Design Assistant Professor (Exp. - 12 years) Area of Research - Vibration Measurement, Condition Monitoring and Fault Diagnosis
Prof. Bipin Mashilkar	**M. E. (Mumbai University) -** CAD/CAM and Robotics Assistant Professor (Exp. - 13.5 years) Area of Research – CFD
Prof. Pallavi Khaire	**Ph.D. Pursuing (VJTI, Mumbai)** **M. E. (Mumbai University)** - Machine Design Assistant Professor (Exp. – 11.5 years) Area of Research - Mechanical Vibration, Machine Design and Condition Monitoring
Prof. Praseed Kumar	**M. E. (Mumbai University)** - Machine Design Assistant Professor (Exp. – Industrial - 8 years, Teaching - 12 years) Area of Research - Active Vibration and Control, Control Systems, Smart Materials and Measurement

Prof. Kamlesh Sasane	**M. E. (Mumbai University)** - Machine Design Assistant Professor (Exp. - 12.5 years) Area of Research - Design Analysis, Mechanical Vibrations, Automobile and Mechanical Materials
Prof. Deepak Devasagayam	**M. E. (Old Dominion University, US)** - Mechanical Engineering Assistant Professor (Exp. – Industrial - 5 years, Teaching – 9 years) Area of Research - Manufacturing, Production, Solar
Prof. Nilesh Varkute	**M. E. (Mumbai University) -** Thermal Engineering Assistant Professor (Exp. - 11 years) Area of Research - Computational Fluid Dynamics, Heat Transfer, Renewable Energy and Energy Management
Prof. Girish Dalvi	**M. S. (Politecnico Di Milano, Italy)** - Mechanical Systems Design Assistant Professor (Exp. - 10 years) Area of Research - Vibration Measurement and Analysis, Virtual Instrumentation and Mechatronics
Prof. Suvarna Rode	**M.E. (Mumbai University)** - Machine Design Assistant Professor (Exp. – Industrial - 3.5 years, Teaching - 11.5 years) Area of Research - CAD/CAM, Smart Material and Structures
Prof. Badal Kudachi	**M. Tech. (VTU, RC, Mysore)** - Thermal Power Engineering Assistant Professor (Exp. – Industrial - 6 months, Teaching – 6 years) Area of Research – Renewable, Thermal Barrier Coating, CFD and Energy Storage
Prof. Mohammad Afzal Alam Ansari	**M. Tech. (IIT Bombay) -** Aerospace Propulsion Assistant Professor (Exp. – Industrial - 6 months, Teaching – 6 years) Area of Research – Propulsion, CFD, FEA, Combustion, Thermoacoustic
Prof. Shoumik P. Kulkarni	**M. Tech. (WCE) –** Mechanical Design Engineering

	Assistant Professor (Exp. – Teaching – 3 years) Area of Research – Mechanical Vibrations, Vibro-Acoustics
NON- TEACHING STAFF	
NAME	**DESIGNATION**
Mr. Sayaji Atole	Lab Assistant
Mr. Sandeep Arote	Lab Assistant
Mr. Pankaj Wavhal	Lab Assistant
Mr. Pravin Patil	Lab Assistant
Mr. Narayan G.	Lab Assistant
Mr. Sanjay Junonikar	Lab Assistant
Mr. Rego Menezes	Lab Attendant