Agnel Charities'

Fr. C. Rodrigues Institute of Technology, Vashi

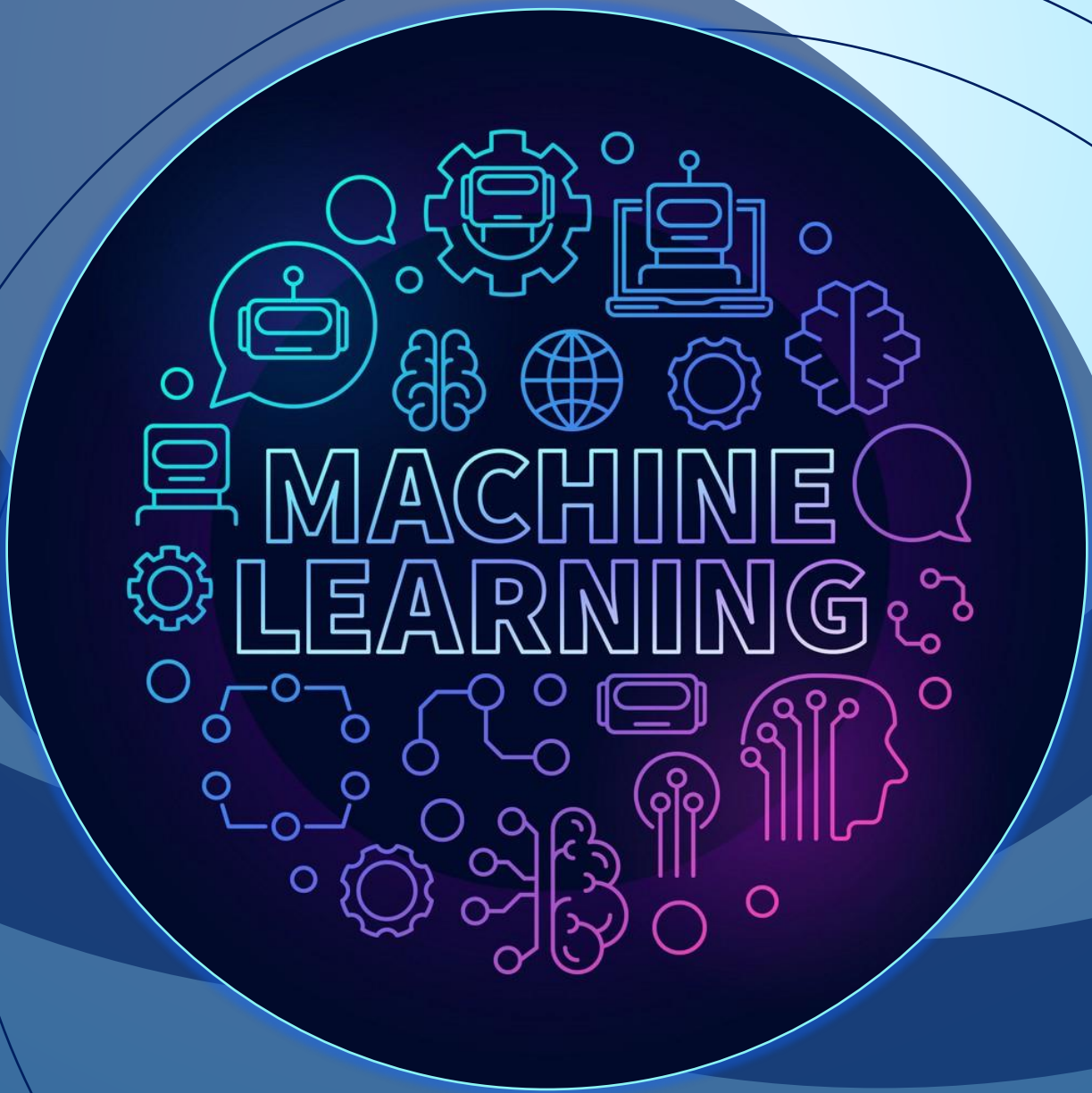
Department of Mechanical Engineering

MECHANICAL ENGINEERING STUDENTS' ASSOCIATION

Presents

URJA

2018-2019



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Fr. C. Rodrigues Institute of Technology, Vashi

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Machine Learning

FCRIT
MESA

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 center of all technical advancements. Due to the technological advancement in engineering field in general, the role of 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 area 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. In current situation mechanical engineers have wide scope in the field of 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 latest trends in industries and research. I would like to congratulate the magazine committee for their efforts.

- **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 as MESA is a collegiate organization which relates the activities under Mechanical Engineering Department. MESA is among the most active student bodies in the institute. Mentored by experienced 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 technological world by organizing various events. **SYNERGY** and **MESH** are the two events conducted every year as a part of activities under MESA. **SYNERGY** is conducted in the odd semester every year and **MESH** is conducted in the even semester during the college fest. Both these events provide a broader vision to the students regarding various technologies and developments happening in the professional field outside the college classrooms. In **February 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 on the 30th March 2019.

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 2018-19

MESA CO-ORDINATORS: PROF. SUVARNA RODE
PROF. DEEPAK DEVASAGYAM
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MACHINE LEARNING IN AEROSPACE ENGINEERING

Priyan Kamble (Mech VII), Shraddha Barbade (Mech VII), Aishwarya Harad (Mech VII)

I. INTRODUCTION

Intelligent systems are nature-inspired, mathematically sound, computationally intensive problem-solving tools and methodologies that have become extremely important for advancing the current trends in information technology. Artificially intelligent systems currently utilize computers to emulate various faculties of human intelligence and biological metaphors. It uses a combination of symbolic and sub-symbolic systems capable of evolving human cognitive skills and intelligence, not just systems capable of doing things humans do not do well. Intelligent systems are ideally suited for tasks such as search and optimization, pattern recognition and matching, planning, uncertainty management, control, and adaptation. In this paper, the intelligent system technologies and their application potential are highlighted via several examples.

Science has evolved with our efforts towards understanding and mimicking nature, through inventions and discoveries, hypotheses and proofs, success and failures. The evolution of computers marks the era of our success in building systems that can perform actions of a repetitive kind, those which are difficult or time consuming if done by humans. This has helped enhance our efforts towards studying and understanding the intelligence of biological systems and applying this knowledge towards building artificially intelligent systems.

II. ROLE OF INTELLIGENT SYSTEMS IN AEROSPACE ENGINEERING - MODELLING

Modeling could be thought of as a representation of available information. Intelligent systems provide two very important features for modeling: generalization and robustness. Generalization implies that the model could be used not only to represent just the data gathered but the knowledge the data represents. Robustness can be defined as the system's ability to perform within certain bounds of its nominal (without uncertainty) performance in the presence of bounded uncertainty. Several techniques such as neural networks, fuzzy logic, expert systems, etc. have been routinely used by aerospace engineers for modeling. Knowledge representation in general contains syntax and semantics. Syntax is the constitution of sentences and semantics is the interpretation of sentences. Examples of knowledge representation include:

•Mathematical Equations: (Eg: ARMA Model: Autoregressive moving average models are created using the least-square technique to represent linear relationship between inputs and outputs.)

•Rule-based systems: Reasoning is a process of arriving at a conclusion based on a collection of premises. Expert system-based reasoning is one of the popular rule-based inferencing system that is in use today. This consists of three parts: a knowledge base (a set of rules and known facts); acquired data (derived facts and data); and an inference engine (reasoning logic).

•Fuzzy Models: Given the choice of system input and output variables, their linguistic modifiers with the associated fuzzy membership functions, an appropriate implication function, aggregation function, and defuzzification operator, if so desired, a fuzzy model that represents the system can be specified by a set of rules, their structure, and the fuzzy membership function parameters. Fuzzy systems model qualitative and quantitative nonlinearity of systems. Attractive features include reduced design complexity, rapid prototyping, flexibility, simplicity, cost effectiveness, and inherent parallelism. These four types explain the popularity of fuzzy systems in diverse application areas such as control, prediction, evaluation, cognition, analysis, and information management.

•Neural Models: Artificial Neural Networks (ANNs) are brain-inspired connectionist models that consist of many similar linear and nonlinear computational elements connected in complex patterns. The simple computational elements, also known as neurons, when associated in complex patterns, have the ability to perform tasks such as memory recall, pattern recognition, and learning. The ability of neural networks to learn from repeated exposure to system characteristics has made them a popular choice for many applications in image processing, system identification and control, pattern recognition and classification, financial prediction, and signal processing.

•Tree structures: A tree structure is an algorithm for placing and locating objects in a database. The algorithm finds data by repeatedly making choices at decision points called nodes. A node can have branches (also called children) whose number can vary from two to several dozens. The structure is straightforward, but in terms of the number of nodes and children, a tree can be gigantic.

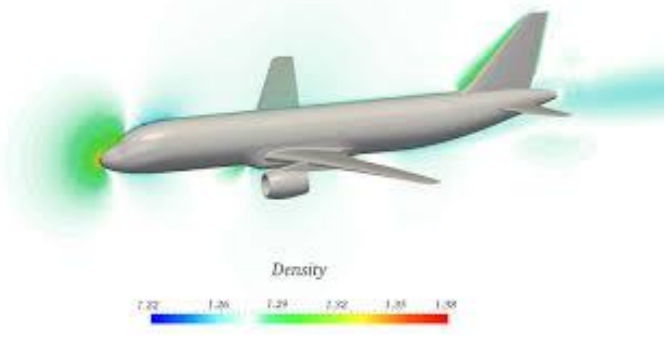

Fig 1.1: Simulation of Aircraft Design

III. ROLE OF INTELLIGENT SYSTEMS IN AEROSPACE ENGINEERING - DESIGN

One of the common objectives of aircraft engine control is to enhance engine performance under deteriorated conditions. To maximize engine performance efficiently under degraded conditions, a fault tolerant engine control scheme can be applied. The first step to implement the fault tolerant engine control architecture is developing an engine performance estimator. This application focuses on designing an engine performance estimator using a combination of a genetic algorithm (GA) and a radial basis function neural network (RBFNN) for the implementation. Generally, traditional engine performance estimators, such Kalman filter estimator, involves intensive computational procedures because of engines' physical complexity which requires a large number of measurements to be taken and processed. To overcome computational complexity, model estimation using neural networks has emerged. Neural network-based model estimation has been applied to areas such as optics, robotics, and system control. Attracted by the advantages of neural networks, the recent studies of fault tolerance have employed neural network architectures. The need for the design that involves selecting the best inputs is driven by the cost of sensors. In this case fewer the sensors better is the cost.

IV. ROLE OF INTELLIGENT SYSTEMS IN AEROSPACE ENGINEERING - CONTROL

Intelligent control applications focus on control problems that otherwise cannot be solved, or cannot be solved in a satisfactory way by traditional control techniques alone. Intelligent control as practiced today encompasses many fields from conventional control such as optimal control, robust control, stochastic control, linear control, and nonlinear control, as well as the more recent fuzzy, genetic, and neuro-control technologies.

V. FUTURE SCOPE

Intelligent systems provide a means by which complex problems can be addressed and, in many cases, solved to a satisfactory level. The benefits can be categorized as either immediate or in-the future. The immediate benefits are in applications of intelligent systems to areas where existing methodologies are marginally satisfactory and incorporating intelligent systems provide better efficiencies and solutions. For Example: inverse design, adaptive control, optimal search, etc. The future benefits are more exciting. Intelligent systems will help formulate and solve problems such as brain-like control and decision-making, human-machine collaborative work, instant speech recognition, thought control, human capability enhancement, advanced pattern recognition, real-time scheduling, automated design, intelligent maneuvering for unmanned aerial vehicles, and autonomous security search. On a cautious note, intelligent system researchers should examine closely the analytical framework of their innovations. Analytical framework along with standardization has been shown to be important for the ultimate ticket to real implementations in aircraft applications.

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AUTONOMOUS VEHICLES USING MACHINE LEARNING

Jayston Menezes (Mech V)

I. INTRODUCTION

To solve a problem on a computer, we need an algorithm. For example, one can devise an algorithm for sorting. The input is a set of numbers and the output is their ordered list. Every task has one most efficient algorithm i.e. least number of instructions or memory or both. But some problems are very specific and require a unique approach. For example, to differentiate junk email from legitimate emails. We know the input is an email and the output is a simple Yes or No. But we can't implement the idea as the factors for considering junk mail vary from person to person and with time. We may not be able to identify the process completely. But we can construct a good and useful model to solve the problem by leveraging Machine Learning. Machine Learning, which is a branch of Artificial Intelligence, optimizes a performance criterion using example data or past experience. It tries to replicate the way in which humans learn.

"Machine Intelligence is the last invention that humanity will ever need to make"

– Nick Bostrom

Machine Learning (ML) is mainly classified in two sections: Supervised Learning and Unsupervised Learning. In Supervised Learning, input is given by the user and data is interpreted and executed based on the input only, whereas in the latter, prediction model is used for both input and output data. Nowadays, ML is being increasingly applied to real world problems in various fields including medicine, manufacturing, education, security, etc. Machine Learning is also being applied in a big way in the automotive industry where it has brought about operational and business transformation.

II. APPLICATION OF ML IN AUTOMOTIVE INDUSTRY

Product Innovations: Self-driving cars, Driver Assist, Parking and lane-change assist, Smart Energy Systems, Cruise Control are revolutionizing the automotive industry. Autonomous cars are vehicles which are driven by digital technologies without any human intervention. They are capable of self-driving and navigating on roads by sensing the environment. They use LIDAR (Light Detection and Ranging), an optical technology that senses the shape and movement of objects around the car; combined with the digital GPS map of the area, to detect standing and moving objects in their perimeter.

Predictive Maintenance: Machine Learning analyses the data from sensors and is able to detect problems before they affect vehicle operations.

Vehicle Condition Monitoring: This value added service ensures that the vehicle is in tip-top shape.

Customized Marketing: ML models can predict the products customers want most and create personalized marketing campaigns.

Accurate Repair Estimates: ML solutions can help identify the damaged cars, evaluate the damage and estimate the cost with speed and accuracy.

Driver Monitoring: ML enables cars to do more than watch the road. It keeps an eye on the driver as well by observing eye gaze, eye openness and head position.

The most valuable aspect of ML in automotive applications is that it is constantly learning and adjusting the rules it uses to navigate the road. Each vehicle makes the information it learns available to the rest of the fleet. The result is a virtual neural network of self-driving vehicles that learn as they go. Automotive Leaders like Google and Tesla are spending heavily on R&D to harness the power of ML and Deep Learning. Elon Musk, the Chief Executive Officer of Tesla, claims that every Tesla car will be completely autonomous within two years. From October 2016, all Tesla vehicles are being built by Autopilot Hardware 2, with a sensor and computing package that the company claims to allow complete self-driving without human interference. The Google team has been working on driverless cars for years. Google also supports other car manufacturers with self-driving car technologies such as Toyota Prius, Audi TT and Lexus RX450h. Their own autonomous vehicle uses Bosch sensors and other equipment manufactured by LG and Continental companies.

III. ALGORITHMS & WORKING

Cars these days are equipped with a lot of sensors, actuators, and controllers. These end devices are driven by software sitting on various function-specific ECUs (Electronic Control Units). Machine learning software is also part of this set.

One of the main tasks of any machine learning algorithm in the self-driving car is a continuous rendering of the surrounding environment and the prediction of possible changes to those surroundings.

These tasks are mainly divided into four sub-tasks:

1. Object detection
2. Object Identification or recognition
3. Object classification
4. Object localization and prediction of movement

Machine learning algorithms can be loosely divided into four categories:

a. Regression Algorithms
The type of regression algorithms that can be used for self-driving cars are Bayesian regression, neural network regression, and decision forest regression, among others.

b. Pattern Recognition Algorithms (Classification)
The biggest challenge for any algorithm is to develop an image-based model for prediction and feature selection. In ADAS (Advanced Driver Assistance System), images (radar or camera) play a very important role in localization and actuation, The images obtained through sensors possess all types of environmental data; filtering of the images is required to recognize instances of an object category by ruling out the irrelevant data points which is done by Pattern recognition algorithms. Data reduction algorithms help in reducing the data set by detecting object edges and fitting line segments (polylines) and circular arcs to the edges. Line segments are aligned to edges up to a corner, then a new line segment is started. Circular arcs are fit to sequences of line segments that approximate an arc. The image features (line segments and circular arcs) are combined in various ways to form the features that are used for recognizing an object.

c. Clustering
Sometimes the images obtained by the system are not clear or it may miss the object and it is difficult to detect and locate objects. This type of algorithm is good at discovering structure from data points. Clustering methods are typically organized by modelling approaches such as centroid-based and hierarchical. All methods are concerned with using the inherent structures in the data to best organize the data into groups of maximum commonalities. The most commonly used type of algorithm is K-means, Multi-class Neural Network.

d. Decision Matrix Algorithms
This type of algorithm is good at systematically identifying, analyzing, and rating the performance of relationships between sets of values and information. Whether a car needs to take a left turn or it needs to brake depends on the level of confidence the algorithms have on the classification, recognition, and prediction of the next movement of objects. These algorithms are models composed of multiple decision models independently trained and whose predictions are combined in some way to make the overall prediction while reducing the possibility of errors in decision making.

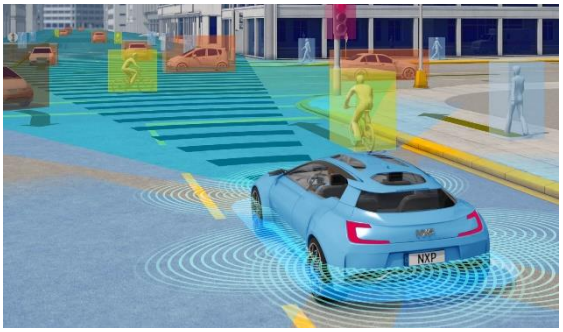

Fig 2.1: Autonomous Vehicle

IV. IMPACT OF ML

Without the need for a driver, cars could become mini leisure rooms. Driverless cars will obey every road rule and posted speed limit.

According to data from the University of Michigan's Transportation Research Institute's report, which compared collisions of self-driving cars with statistics involving human-driven ones, driverless vehicles get into more crashes, but those crashes are less serious than those caused by conventional vehicles. Also, driverless cars never hit bicyclists or pedestrians, something that human-driven vehicles often do.

V. CONCLUSION

Machine Learning and AI have ushered in a new era in car driving. As technology continues to advance at a rapid pace towards an AI-centric future, cars are transforming into intelligent units to provide the ultimate user experience.

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NEXT GENERATION SEQUENCING 2.0 – GENOMICS (MACHINE LEARNING)

Sarvesh R. Mandavkar (Mech III)

I. INTRODUCTION

With deep learning at the center of artificial intelligence (AI) and machine learning, it should come as no surprise that there are numerous applications of deep learning in biomedical data science. What is less appreciated is that some of the earliest applications of machine learning were precisely in this area and that the complexity of the problems raised by the life sciences have inspired over the years the development of novel machine learning methods. In one direction, machine learning helps the life sciences, both broadly, by providing powerful methods for analyzing biomedical data, and more narrowly, by providing simplified but useful computational models for neuroscience. In the other direction, it is our knowledge of the human brain that has provided the fundamental source of inspiration for AI and deep learning, while all areas of the life sciences have provided challenging problems that have inspired researchers to push the boundaries of machine learning methods.

II. REPRESENTATION OF REACTIONS

Being able to predict the outcome of chemical reactions, including biochemical reactions, is also a fundamental scientific problem with many applications. Machine learning methods have been developed and applied to this problem and can leverage the multiple representations available both for the reactants and for the reactions. In particular, SMIRKS strings are used to represent reactions, basically by using SMILES strings to represent the reactants and the products, with the important addition of atom numbering and atom mapping between the left- and right-hand sides of the reaction. Chemists view global reactions (e.g. Bromination of an alkene) as a sequence of elementary reactions. Thus, a reasonable strategy used in the work cited above is, given a set of reactants, to first identify the potential sources and sinks of electrons. A first deep learning approach is used to reduce and rank the list of possible sources and sinks.

Given two reactants, there may be 10 potential sources and 10 potential sinks, leading to 100 potential elementary reactions. Ranking these reactions is a machine learning problem that can be addressed by deep learning. Thus, a second-deep learning step uses a Siamese network to compare source–sink pairs and identify the most favorable ones. The process can be iterated in order to build multistep reactions. Another obvious machine learning approach for reactions is to use recursive networks, for instance, bidirectional LSTM networks, to operate at the level of SMIRKS sequences, either for elementary reactions or for global reactions.

Fig 3.1: Deep Learning in Genomics [1]

III. DEEP LEARNING IN GENOMICS AND TRANSCRIPTOMICS

This section looks at machine learning and its applications to DNA, RNA, gene, and genome sequences, as well as gene expression. First systematic applications of deep learning methods in this area were focused on the prediction of splice sites and coding regions. Some of this work has also led to interesting approaches for detecting error in databases.

Another relatively early and orthogonal application of deep learning to the genomic field was actually for the problem of base calling in early sequencers, a problem that still continues today with new technologies.

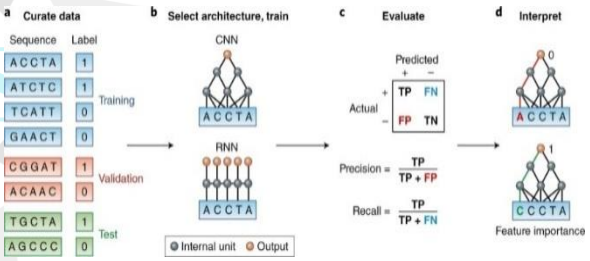

Fig.3.20: Primer on machine learning in genomics

Not surprisingly, current modern applications of machine learning in genomics are focusing on the analysis of actual DNA or RNA sequences and the inference of functional properties and phenotypic

Reference for gene expression regression, specifically consequences associated with mutations. For instance, CNNs are used in reference to predict sequence specificities of DNA- and RNA-binding proteins, and further refinements have used convolutional recurrent neural networks and LSTMs. A related cell-specific application using ChIP-seq (chromatin immunoprecipitation sequencing) data is developed in Reference , complemented by Reference, where convolutional recurrent neural networks in the form of convolutional bidirectional LSTMs are used to predict cell type–specific transcription factor binding using reference binding data from ChIP-seq and DNase-seq (DNase I hypersensitive sites sequencing) data. In Reference, CNNs are used to predict chromatin accessibility, histone modification, and transcription factor binding from raw DNA sequences, and the predictions are subsequently used to infer the functional effect of noncoding single nucleotide polymorphisms (SNPs) or

indels. This work has been complemented using features from annotated data, such as evolutionary scores or the distance to the nearest transcription start site, and extended using convolutional recurrent neural networks, including bidirectional LSTMs. Related work has also used CNNs to predict open chromatin regions from DNase-seq data with the goal of better understanding the regulatory code and assessing the functional effects of SNPs. Deep learning in the form of CNNs and recurrent neural networks, specifically bidirectional gated recurrent networks, has also been used to predict the methylation state of CpG dinucleotides at the single-cell level.

Finally, on the gene annotation and transcriptomic sides of things, one of the earliest applications of deep learning is Reference, where neural networks are used in an unsupervised manner to cluster gene expression patterns. More recently, deep auto encoders are used in Reference for gene ontology annotation predictions, and deep feedforward networks are used to predict patterns of alternative splicing using mouse RNA-seq (RNA sequencing) data and to predict splicing in human tissue and its relationship to disease. Feedforward neural networks are also used in for inferring the expression level of all the genes using the expression levels of only ~1,000 landmark genes. Finally, there have been recent applications of machine learning in circadian biology. Deep feedforward neural networks, trained primarily on synthetic data, have been used to identify which species (transcripts, proteins, or metabolites) are periodic in the corresponding time series, in particular, to identify circadian patterns of oscillations. In addition, compressive auto encoders with sine and cosine bottleneck units have been trained to infer time from single-time-point transcriptome experiments in the GEO (Gene Expression Omnibus) database.

IV. CONCLUSION

As should be obvious from this necessarily non exhaustive review, there have been plenty of deep learning applications to biomedical data over the past 35 years, and the pace is only increasing. As with any exponential growth phase, what remains ahead exceeds what has already been done, and one can expect these applications to continue to expand and yield important scientific, biomedical, and clinical breakthroughs. As in the case of biomedical imaging, one may predict that deep learning will become a commodity. In fact, in many cases, the technical problems have already been solved. The real challenges lie in the data and the various societal barriers to technological changes. While there is still plenty of room for applying deep learning methods to narrowly focused problems, it is clear that one important direction of research is to broaden their applicability toward general AI for biomedical data and beyond.

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SPEED DATA ANALYSIS

Ganesh Patil (Mech V), Spandan Bhattacharya (Mech V)

I. INTRODUCTION

Today's world is running with Automobile which have become important part of life. Automobile industries have revolutionised the current generation. But looking at another factor of the environmental harms, the emission coming out of the cars has to be look upon as it is the issue of global concern. So, we as human beings need to make an effective system to tackle this problem. Automobiles are majorly driven on fuel consumption and due to that fuel consumption environmental harm issues are raised so to maintain the fuel ratio in the engine. So, looking upon this machine learning concept comes into consideration. User can access the result at any time and system will give the message how much is your contribution for harming the environment and too can be major boost to automobile industry with new technology. So current below sectors have impacted a lot and will impact for this system too.

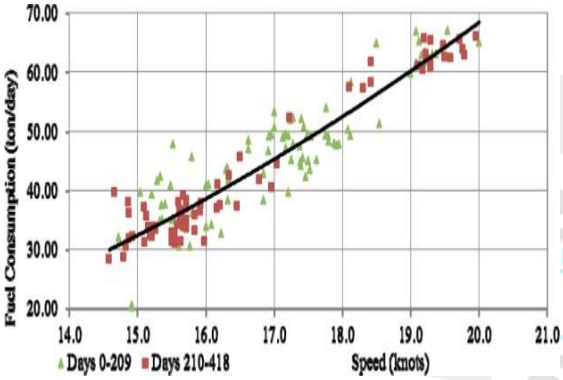

Fig 4.1: Data Analysis of Fuel Consumption

This is the data analysis of fuel consumption of certain area for certain speed. Fuel consumption has increased with respect to speed.

II. INTERNET OF THINGS (IOT)

So basically, system is all about implementing a sensor of front seat of the bicycle which will calculate the instantaneous speed of the car according to formula $V=\frac{2\pi r}{t}$ where v is velocity, r is distance from center where the apparatus is setup and t are time taken to intercept at sensor again during rotation. So, after the speed is calculated then data will be sent to microcontroller and then to the website where user can see its speed at any time user wants. Microcontroller will control the fuel amount by machine learning concept. Data uploading can be done by Node ESP8266 Wifi Module which is already been implemented and used too. So, this can make user connect with the driver.

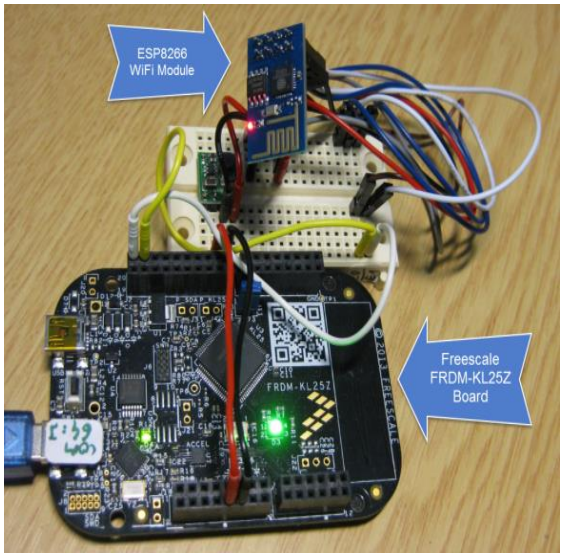

Fig 4.2: Node ESP8266 Wifi Module

III. COMPUTER SCIENCE

Data uploading on website and make it accessible to user at any time and at any point of world. This collaboration of two different sectors (Mechanical and Computer) have made huge impact for industrialization. After data is collected it is first added to database further then displayed on website and give idea about how user is doing fuel consumption. Making website efficient and avoiding technical glitches is an important task to be done.

IV. INFORMATION TECHNOLOGY

Data has to be managed properly so as to get proper data to correct user after which the device has to learn values about how to interact with user .As the value has been added in the database so to work with values and database handling has to be done .Automobile number has been increased, so handling the values of various users also becomes an important task in this project.

V. MACHINE LEARNING

Data values in the databases have to be taught to machine so that to interact with user. The values will tell the fuel mechanism to make the area of nozzle controllable as to make the fuel into the engine in certain amount which will reduce the fuel consumption and also protecting the environment. Analysis will be done according to below and then machine will learn the speed values. Based upon the variance analysis we will controlling the fuel flow, for example if the vehicle is continuously going at certain speed and then it suddenly stops then it is not required to control the fuel as the vehicle must have stopped but if the same speed goes on for more time say 2 minutes at high speed then fuel ration has to be maintained and the mechanism comes into action.

VI. ANALYSIS

At some particular speed some amount of fuel is emitted, so to control the amount of fuel emission, driving in safe limit has to be done.

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2. Mathematical model of the emissions of a selected vehicle https://www.degruyter.com/downloadpdf/j/mecdc.2014.12.issue-1/mecdc-2014-0003/mecdc-2014-0003.pdf

USE OF ARTIFICIAL NEURAL NETWORKS IN CONDITION MONITORING

Rishikesh Karmalkar (Mech VII)

I. INTRODUCTION

Artificial neural networks (ANN) or connectionist systems are computing systems that are inspired by, but not necessarily identical to, the biological neural network that constitute animal brains. Such systems "learn" to perform tasks by considering examples, generally without being programmed with any task-specific rules. For example, in image recognition, they might learn to identify images that contain cats by analyzing example images that have been manually labeled as "cat" or "no cat" and using the results to identify cats in other images. They do this without any prior knowledge about cats, for example, that they have fur, tails, whiskers and cat-like faces. Instead, they automatically generate identifying characteristics from the learning material that they process. An ANN is based on a collection of connected units or nodes called artificial neurons, which loosely model the neurons in a biological brain. Each connection, like the synapses in a biological brain, can transmit a signal from one artificial neuron to another. An artificial neuron that receives a signal can process it and then signal additional artificial neurons connected to it.

II. LEARNING

The Artificial Neural Networks ability to learn so quickly is what makes them so powerful and useful for a variety of tasks. Information flows through a neural network in two different ways. When the model is learning or operating normally patterns of information from the dataset are being fed into the network via the input neurons, which trigger the layers of hidden neurons, and these in turn arrive at the output neurons. This is called a feedforward network. Not all neurons “fire” all the time. Each neuron receives inputs from the neurons to its left, and the inputs are multiplied by the weights of the connections they travel along. Every neuron adds up all the inputs it receives in this way and if the sum is more than a certain threshold value, the neuron “fires” and triggers the neurons it’s connected. For an artificial neural network to learn, it has to learn what it has done wrong and is doing right, this is called feedback. Feedback is how we learn what is wrong and right and this is also what an artificial neural network needs for it to learn. This is where you start to see similarities to the human brain. If you are learning to play a game like tennis you learn that if you hit the ball too hard it will go out of the court and you will lose the point, or if you don’t hit the ball hard enough it won’t go over the net but if you hit it perfectly it will go onto the other side in the court and if could win a point, this is a classic example of feedback where you lose the point or potentially gain a point. This is how we learn what we are doing correct or wrong and this is what a neural network needs to learn.

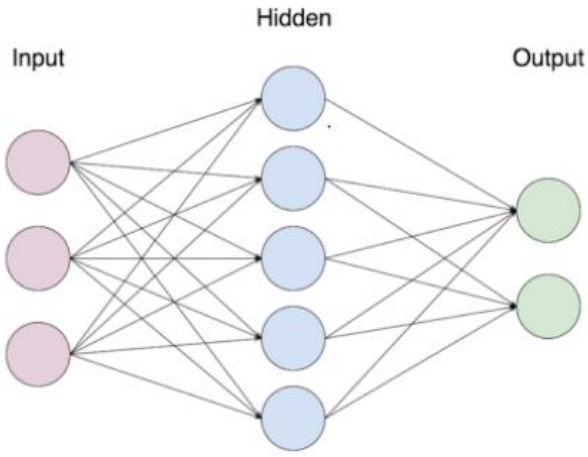

Fig 5.1: Generalized Architecture Diagram

Neural networks learn things in exactly the same way as the brain, typically by a feedback process called back-propagation (this is sometimes shortened to “backprop”). This is where you compare the output of the network with the output it was meant to produce, and using the difference between the outputs to modify the weights of the connections between the neurons in the network, working from the output units through the hidden neurons to the input neurons going backward. Over time, back-propagation causes the network to learn by making the gap between the output and the intended output smaller to the point where the two exactly match, so the neural network learns the correct output.

III. CONDITION MONITORING

Condition monitoring (CM) of machine is gaining importance in industry because of the need to increase reliability and decrease possible loss of production due to machine breakdowns. Bearing failure leads to failure of a machine. Hence, bearing fault detection and diagnosis is an integral part of the preventive maintenance procedure. The predictive maintenance by vibration analysis is the best tool used to monitor machine operating condition and predictive deterioration in order to reduce downtime and maintenance cost. Vibration analysis involves vibration measurement and its interpretation. First vibration signals are collected by vibration analyzer in time domain and frequency domain using in-built Fast Fourier Transform (FFT) analyzer and information obtained from the vibration signals can be used to predict machine failure, maximum utilization of available assets, to increase the life of machinery. Based on the frequency domain data we can manually find the defects which requires proficiency. But with the use of ANN it becomes much simpler to classify and identify faults.

IV. ARCHITECTURE OF ANN USED

A feed forward Multi-Layer Perceptron (MLP) neural network which consists of three layers is developed and used commonly. The input layer of six source nodes represents the normalized features extracted from the time domain. A hidden layer with five computation nodes is commonly used. The number of hidden nodes is optimized by minimization of Mean Square Error (MSE) between the actual network outputs and the corresponding target values. MSE is one of the many methods used for this purpose. The output layer with two nodes indicates the different working conditions (healthy and faulty) of the bearings which require to be identified by the neural network.

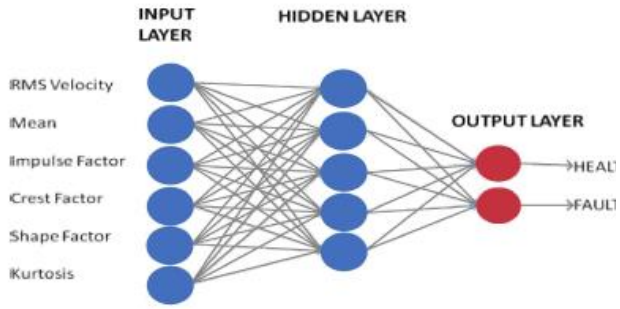

Fig 5.2: Architecture of ANN in Condition Monitoring

The training of Multi-Layer Perceptron network is achieved by modifying the connection weights and biases iteratively to optimize the performance criterion. The performance criterion is the minimization of the Mean Square Error (MSE) between the actual network output and the corresponding target values in the training set. The training algorithms for Multi-Layer Perceptron are based on Back Propagation (BP). The Back Propagation adapts a gradient descent approach by adjusting the ANN connection weights. The following techniques have to be applied to enhance the network performance and among them, the network which produces the lowest validation error during training should selected as the optimum network. Then, with respect to the minimum number of required frequencies for the minimum classification error, the best iteration of the loop or the optimum network should be selected and through this the most suitable frequencies among all of the initial frequencies will be obtained.

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1. "Journal Bearing Fault Detection Based on ANN" https://content.sciendo.com/view/journals/aoa/42/3/article-p401.xml .

2. "Models of ANN" https://en.wikipedia.org/wiki/Artificial_neural_network#Models.

STUDENTS' ACHIEVEMENTS

PRIZES WON IN VARIOUS COMPETITIONS

Sr. No	Name of the student	Name of the Event	Prize/ position/ Rank	Date
1	Shubhankar Das	XhibiTech 2019	3rd position	14/03/2019
2	Anurag Bhatkar	SAMVAAD2019	Runner-up	28/02/2019
3	Bhavik Panchal	XhibiTech 2019	3rd position	14/03/2019
4	Chantelle George	XhibiTech 2019	3rd position	14/03/2019
5	Shubhankar Das	AAKASH2019 symposium on Nascent Technologies in Aerospace Engineering & Avaiation	2nd position	30/03/2019
6	Chantelle George	AAKASH2019 symposium on Nascent Technologies in Aerospace Engineering & Avaiation	2nd position	30/03/2019

PAPER PUBLISHED IN CONFERENCE/JOURNAL

Sr. No	Name of the student	Name of the Conference/Journal	Date
1	Saumiya Shamughan Nair	Paper presented on "Optimization of Acoustic Wave For Process Equipment changing using Design of Equipment" in International conference ICNTE2019, organized by FCRIT Vashi.	4-5 January 2019
2	Vishnu Pillai	Paper presented on "Suppression of Thermo-Acoustic Instabilities Using Helhmoltz Resonator" in International conference ICNTE2019, organized by FCRIT Vashi.	4-5 January 2019
3	Hiren Prajapati	"Design And Development of Thin Wire Sensor for Transient Temperature Measurement" Elsevier, Measurements, 140, July 2019, 582-589	July 2019
4	Salmon Joy, Shaunak Phansalkar, Vishnu Pillai, Titus Thomas	"Suppression of Thermo-Acoustic Instabilities Using Helhmoltz Resonator", International Conference on Nascent Technologies in Engineering (ICNTE 2019), IEEE, 4- 5 Jan 2019.	4-5 January 2019
5	Avnish Dubey, Harshit Singh, Mayank Upasani	"Recent Progress in Renewable Energy Sources and Challenges to Meet Future Energy Demands in India", International Conference on Energy and Environmental Challenges (CE2C 2019), VNIT Nagpur, pp-46, 18-19 Jan 2019	2-4 May 2019
6	Slyden R., Terrence P. Sagar P., Brean B.	"Modeling and Analysis of Textured Surfaces on a single point cutting tool." International Conference of Nascent Technology & Engineering (ICNTE - 2019), 4 th & 5 th January 2019	4-5 January 2019
7	Libin K., Edwin W., Abrar U., Marshal M.	"Condition Monitoring Of Centrifugal Pumps Using Vibration Analysis And Artificial Neural Networks" CPIE 2019, 8-10 June 2019	8-10 June 2019
8	Syju A., Mohd. Ibrahim, Abhishek S., Krishnakumar M.	"Design and Analysis of Milling Attachment on Lathe Machine", International Conference on Production and Industrial Engineering (CPIE-2019), 8 – 10 June 2019, NIT, Jalandhar	8-10 June 2019
9	Kedar More, Akash Kadam, Franklin Fernandes, Gracewin Heber	"Design and Development of 3D scanner", International Conference on Production and Industrial Engineering (CPIE-2019), 8 – 10 June 2019, NIT, Jalandhar	8-10 June 2019
10	Ajith Nair, Shenon G., Jerome F., Poorva K.	"Design and development of Laser wall system" International Conference on Production and Industrial Engineering (CPIE-2019), 8 – 10 June 2019, NIT, Jalandhar	8-10 June 2019
11	Shreyas A., Agnel T., Leslie F., Rohan J.	"Incorporating additional power cycle in conventional four stroke SI engine to develop six stroke engine.", 1st International Conference on Applied Mechanical Engineering Research (ICAMER - 2019), NIT Warangal, 2-4 May 2019.	2-4 May 2019

WINNERS OF CALIBRE 2K19

EVENT NAME	STANDINGS	NAME OF THE MEMBERS	COLLEGE NAME	PRIZE
PROJECT POSTER COMPETITION	1	JOVAN MENEZES	FCRIT VASHI	10000/-
		BHAVIK PANCHAL		
		SHUBHANKAR DAS		
		CHANTELLE GEORGE		
		AKSHAY GEJAGE		
	2	POORVA KHARE	FCRIT VASHI	7000/-
		AJITH NAIR		
		SHENON GUNTAPALLY		
		JEROME FERNANDO		
	3	SONALI ADHIKARI	A.C. PATIL COLLEGE OF ENGINEERING	5000/-
		ROHIT GHAGARE		
		AVINASH SONAWANE		
		SHRUTIKA DHANADE		
TECHNICAL PAPER PRESENTATION	1	ROHAN GORE	BHARTI VIDYAPEETH COE	5000/-
	2	SYJU ALEXANDER	FCRIT VASHI	3000/-
		MOHAMED IBRAHIM SYED		
	3	BHAVIK PANCHAL	FCRIT VASHI	2000/-
		CHANTELLE GEORGE		
DRONE STRIKE	1	RAMAN VERMA	IIT BOMBAY	7500/-
	2	CHANDAN SUTHAR	LORDS UNIVERSAL COLLEGE	4500/-
CADDICT	1	PRASAD PATIL	DON BOSCO INSTITUTE OF TECHNOLOGY	4000/-
		JOEL NAZARETH		
QUIZOPHILE	1	DANIEL BASIL	FCRIT VASHI	4000/-
	2	HARSHIT SINGH		
BATTLE OF BRIDGES	1	VISHAL PATIL	FCRIT VASHI	3000/-
	2	MAYUR MHASKE		
	3	SHRADDHA BARBADE		

FACULTY ACHIEVEMENTS

Sr. No	Name of the Faculty	Particulars	Year
1	Dr. S. M. Khot	Chairman, Board of Studies, Mechanical Engineering, University of Mumbai	2018-19
2	Dr. S. M. Khot	Member on Governing Council of Thakur College of Engineering	2018-19
3	Dr. S. M. Khot	Member on Governing Council of Fr. Conceicao Rodrigues College of Engineering, Bandra	2018-19
4	Dr. Nilaj Deshmukh	Reviewer of Journal of Vibration and Control Journal of Aerospace Science and Technology	2018-19
5	Dr. Nilaj Deshmukh	Member on Governing Council of Amity University	2018-19
6	Dr. Nilaj Deshmukh	Awarded fellow member of The Institution of Engineers (India)	2018-19
7	Dr. Nilaj Deshmukh	Received Travel grant of Rs 77,434/- from SERB for attending Energy Systems Conference in UK	2018-19
8	Dr. Nitesh Yelve	Worked as Senior Research Associate at University of Hong Kong	2018-19
9	Dr. Nitesh Yelve	Reviewer of Journal of Vibration and Control	2018-19
10	Dr. Nitesh Yelve	Received Minor Research Grant of Rs 50,000/- from University of Mumbai	2018-19
11	Dr. Aqleem Siddiqui	Reviewer of Journal of Vibration and Control	2018-19
12	Mr. Prasad Bari	Selected for PhD programme in VJTI under QIP	2018-19
13	Mr. Praseed Kumar	Received Minor Research Grant of Rs 50,000/- from University of Mumbai	2018-19

PLACEMENT DATA

Sr. No.	Name of the student	Company name
1	Agnel Thomas Bessy	ISHRAE JOB JUNCTION
2	Blesson Biju George Mini	ISHRAE JOB JUNCTION
3	Chantelle George Teresa	Vyasaka
4	Coelho Ericsson Vency Rita	Vyasaka
5	Das Shubhankar Biswanath Supriya	TCS
6	Fernandes Franklin Edwin Mary Jasmine	TCS
7	Fernando Jerome Sahayam	TCS
8	Guthula Srikant Gangadharrao Laxmi	Sterling and Wilson
9	Johny Naveen Liji Johny	Burohappold
10	Kadam Akash Angad Nirmala	Sanmar
11	Louis Noel Antony Theresa	ISHRAE JOB JUNCTION
12	Panchal Bhavik Mukesh Harshida	ISHRAE JOB JUNCTION
13	Pereira Steven Simon Shobha	ISHRAE JOB JUNCTION
14	Phalak Aishwarya Mahesh Neeta	TCS
15	Rao Divya Aparna	Sterling and Wilson
16	Viegas Roy Joquim Concesao	ISHRAE JOB JUNCTION
17	Rundekar Mandar Navnath Anjani	Jacobs
18	Saha Abhishek	ISHRAE JOB JUNCTION
19	Shenoy Atul Vishwanath Pushpa	Jacobs
20	Theakadyil Austin Mathew Suja	ISHRAE JOB JUNCTION
21	Honagekar Neha Kiran	Cybermarine
22	Divate Durgesh Dashrath Padmavati	Godrej
23	More Shubham Pandurang Pratibha	Selec
24	Pawar Pradnya Nilkanth Savita	Jacobs
25	Leslie Fernandes	Technimont
26	Syju Alexander	Pradman engineering
27	Abhishek Saha	CN Water
28	Jesil Charles Rodrigues	CN Water
29	Abrar Upadhye	CN Water

LIST OF TOPPERS

Toppers in Semester VIII		
Rank	**Name**	**CGPI**
1	Simran Dalvi	9.68
2	Durgesh Divate	9.64
3	Jovan Menezes	9.44
	Pradnya Pawar	9.44
Toppers in Semester VI		
Rank	**Name**	**SGPI**
1	Deogire Aditi	10
	Yohann Lobo	10
2	D'Souza Johnal	9.64
3	Mawalankar Omkar	9.52
Toppers in Semester IV		
Rank	**Name**	**SGPI**
1	Kalamkar Vishwas	10.00
2	Devadiga Nitesh	9.81
3	Toraskar Tushar	9.69
	Abraham Vineet	9.69

SYNERGY 2018

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 to 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 2018 was the latest edition of our vibrant and vigorous industry-academia interaction. It was held on **27th September 2018** at the premises of our very own college Fr. C. Rodrigues Institute of Technology, Vashi. We were fortunate to have guest speakers from **Mahindra And Mahindra** to interact with students. **Mr. Sandeep Dorle (GM, Manufacturing Engineering) and Mr. Santosh Kumar Jena (Head, Plant Engineering Department)** 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 **Machine Design, cost optimization, business challenged** and opportunities in their field. It was followed by an open interaction where there was wholehearted involvement from the students.

DRONE WORKSHOP

MESA organized a Drone Workshop on **23rd and 24th February 2019** in collaboration with WeCan Education. The main objective was to provide students an exposure to the recent developments in mechatronics and increase their technical knowledge.

The workshop covered an introduction to UAVs, classification and application of Drones, dynamics of aerial system, sensors and stability which explained the various parts of drone and their functions. The workshop provided a Hands-on Assembly experience and Piloting sessions of the pluto drone from Drona Aviation. The workshop also taught Drone computing and coding along with introduction to embedded System and drone featured programs. **44 students** actively participated in the two-day workshop and diligently worked and learned the ways of future technologies.

MESH 2019

MESH aims to trends in research and development, research scholars or expert speakers from academia such as IIT, BARC etc. are invited to deliver the lectures. "**MESH 2019**" was organized on **2nd March 2019**, under the aegis of MESA. Speakers were invited to deliver the lecture for Mechanical Engineering students of semester II, semester IV, semester VI and semester VIII.

The guest speaker who graced the occasion esteemed presence:

1. Dr. K. P. KARUNAKARAN

   (Professor Mechanical Engineering Department, IIT Bombay, Mumbai). The topic of seminar was "Tail-Less Helicopter".

2. Dr. S. GOPALAKRISHNAN

   (Assistant Professor Mechanical Engineering Department, IIT Bombay, Mumbai). The topic of seminar was "Introduction to Computational Science".

3. Dr. SREEDHARA SHESHADRI

   (Professor Mechanical Engineering Department, IIT Bombay, Mumbai). The topic of the seminar was "Combustion in Gas Turbine Engine".

CALIBRE 2K19

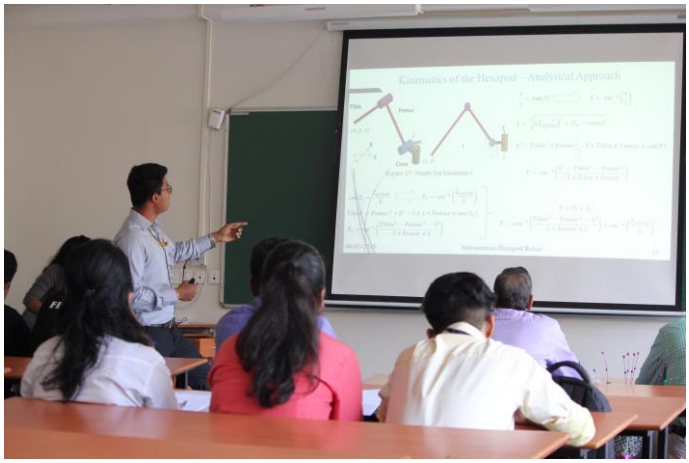
FCRIT Mechanical Engineering Students' Association with the Mechanical Department, conducted **'CALIBRE 2K19'**, a technical fest in association with "**Institution of Engineers India** (IEI)" Belapur local Centre, on **30th of March 2019**. It was conducted with a prime objective of allowing students from our own institute and various other engineering institutes to showcase their innovative ideas and collaborate with other engineering students, and to enable students to test and enhance their skills and knowledge in the field of mechanical engineering. The students also showcase their technical intellect through the unique and innovative physical models made by them. CALIBRE also provides them a platform to test and develop their projects and compete in this highly competitive engineering field.

On the **30th of March**, various exciting technical events were held which allowed more than **350** under graduate and diploma students from various engineering institutes to actively and enthusiastically participate. CALIBRE 2K19 included a variety of interesting and mind-boggling events like the "**National level Project Poster"** and "**Technical Paper Presentation"**, which were the highlights of the fest, "**Battle of Bridges", "Quizophile", "Caddict"** and our first and special addition for this year, "**Drone Strike"**. The participants as well as the audiences engaged with great interest and curiosity. All the participants entered the events with great enthusiasm and competitiveness for the National Level Project Poster Presentation Competition and a Technical Paper Presentation Competition. Based on the abstract of their project about **17 teams** for the TPP competition and about **35 teams** for National level Project Poster Competition were selected. The students got a chance to showcase their unique ideas and preparations. The teams presented their models and technical papers and were judged on the basis of their efficiency and innovativeness.

The fest ended with a prize distribution ceremony. All the winners were felicitated with certificates and prizes and all the participants were encouraged with a participation certificate.

This was a wholesome and complete event bringing together people of all different thoughts, perspectives and backgrounds under the banner of science. The MESA team, with the precious help of all the volunteers of second and third year under the guidance of the MESA coordinators and the Teaching and Non-Teaching staff of the mechanical department made this event a huge success. Their unparalleled efforts will certainly prove worth in making events like CALIBRE 2K19 possible and even better year after year.

GLIMPSES OF CALIBRE 2K19



TECHNICAL PAPER PRESENTATION

CADDICT

QUIZOPHILE

PROJECT POSTER COMPETITION

DRONE STRIKE

BATTLE OF BRIDGES

PRESIDENT'S NOTE

YOU MADE US
WHAT WE ARE TODAY

In the cluster of racing aspirants, where we were just the budding stars,
You inspired us to shine, no matter how novel and tiny we are.

You showed us the reality, and made us emerge in the crowd;
And to endure every task and role, being absolute and being proud.

You impelled us to speak out, when we were small and shy;
And made us face the eager world, and dream to soar beyond the sky.

You taught us how to plan; You taught us how to lead;
To work being one with the team, with no pride and no greed.

You made us do the things at first, which we were most afraid to try;
And crowned us with the courage, which no wealth can ever buy.

The belief you showed in us, with your every pat and praise,
That made us stand in every fall, we had in toughest days.

You sowed in us the spirit, to curb all aches in our way,
Our heart indeed is honoured to say,
YOU MADE US WHAT WE ARE TODAY.

"This is a kind and heart-whole acknowledgement to the MESA Team for all the inspiring and proud support we had from you. Only two years of being in MESA council, but the passion will remain alive for the lifetime. We are indeed taking with us, plentiful of life lessons as well as memories which will be there with us till there are rising days. Though signing off from MESA, but the love for it will always rest in our hearts. "

-Anmol Rane
President,
MESA 2018-19

ISHRAE COLLEGIATE CHAPTER

ISHRAE stands for Indian Society of Heating, Refrigeration and Air Conditioning Engineers. ISHRAE is an associate of ASHRAE, American Society of Heating, Refrigeration and Air Conditioning Engineers. In order to develop an interest of HVAC&R (Heating, Ventilation, Air Conditioning and Refrigeration), ISHRAE society started student chapter in engineering colleges having Mechanical, Electrical and EXTC engineering branch. The ISHRAE FCRIT student chapter was started on 22nd September 2007. Currently, Mr. Nilesh Varkute and Mr. Badal Kudachi are the faculty advisors for ISHRAE FCRIT chapter. ISHRAE organizes various events like Exhibitions, Quiz, Technical Paper Presentation, Industrial visit etc.

ISHRAE FCRIT chapter was reinstalled on 25th August, 2018. The ceremony was held in Fr. C. Rodrigues Institute of Technology, Vashi. Seven colleges from the Mumbai Chapter were participated in the installation ceremony of ISHRAE student chapter. The dignitaries Mr. Mihir Sanghvi (President elect), Mr. Sanjay Verma (Treasurer), Mr. Kunal Bhavsar (Student activity Chair), Saloni Shetty (subcommittee member) were some chief members amongst the ISHRAE council.

We organized an expert lecture on BEE star ratings, Modern trends in HVAC, possible developments in HVAC etc. to bridge the gap between industry and institution. Mr. Bhavesh Mehta (General manager from Reliance industries) was called for an expert talk through ISHRAE platform. Overall it was a great experience to enhance our insight about industrial applications. ISHRAE has also organized 'ISHRAE JOB JUNCTION (IJJ)' placement opportunity for final year students. IJJ was successfully conducted on 28th, 29th, 30th of January 2019 at LTCOE, Navi Mumbai. Total 49 Students were appeared for the online test from mechanical and electrical department. Those who cleared the online tests conducted in respective colleges were passed on for Personal interview / group discussions in IJJ. Seven students from our college were recruited in esteemed industries during that 3 days.

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 which 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 speaker from automobile sector. Prof. Girish Dalvi and Prof. Aqleem Siddiqui are the Faculty advisors for SAEINDIA. The Department has a SAE Collegiate Club of SAE, having more than 50 members.

SAE BAJA

Kaiser Racing, a team born of zealous interest and endless determination, consists of 25 students with the vision of building an ATV. The persistent efforts of these exuberant youngsters led to their success in SAE Baja 2019.

The competition is all about designing, fabricating and racing an ATV along with managing the cost of the vehicle and proving it to be an optimal choice if sold in the market. Six departments right from roll cage to management continuously worked towards this goal.

With the 13th rank in the design event and 14th rank in the endurance run, the first timers have aced the competition and the yearlong efforts of the team have paid off.

It was definitely a tough journey as the team had to start from scratch for the calculations and design of the vehicle. It was after referring numerous books, doing multiple iterations, many unsuccessful attempts at analyses, that the team could manage to come out with excellent results.

After one successful journey, the team is now gearing up for the second time. With various new and old members, the team registered itself for Baja 2020. They have secured an all India rank of 43rd at the virtual round held in Chitkara University.

The college has constantly supported the team by clearing their doubts and providing all the necessary facilities. With the same enthusiasm, the team is now looking forward to building their next ATV.

FACULTY PROFILE

Dr. S. M. Khot (Principal)	**Ph.D. (IIT Bombay)** – Aerospace Engineering **M. E. (Shivaji University) -** Mechanical Design Engineering Professor (Exp. - 30 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 - 19 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. - 30 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. - 17 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. - 21 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. - 20 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 - 12 years) Area of Research - Micromachining
Prof. Sanjay Rukhande	**Ph.D. Pursuing (VJTI, Mumbai)** **M. E. (SPCE Mumbai)** - Machine Design Assistant Professor (Exp. - 18 years) Area of Research - Design, Analysis, Finite Element Method, Surface and Coating
Prof. Shamim Pathan	**M. E. (Mumbai University)** - Machine Design Assistant Professor (Exp. - 11 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. - 12.5 years) Area of Research – CFD
Prof. Pallavi Khaire	**M. E. (Mumbai University)** - Machine Design Assistant Professor (Exp. – 10.5 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 - 11 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. - 11.5 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 - 8 years) Area of Research - Manufacturing, Production, Solar
Prof. Nilesh Varkute	**M. E. (Mumbai University) -** Thermal Engineering Assistant Professor (Exp. - 10 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. - 9 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 - 10.5 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 – 5 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 – 4 years) Area of Research – Propulsion, CFD, FEA, Combustion, Thermoacoustic
Prof. Mandar B. Kothavade	**M. E. (Mumbai University) -** Machine Design Assistant Professor (Exp. – Other – 6 months, Teaching – 1 years) Area of Research – Electromechanical & Robotics System, Mechanical Design Engineering, Damage Detection in Structural Members

NON-TEACHING STAFF	
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

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