Volume 4 Issue 03 -July to Sep, 2021

Dr.M.G.R.
Educational and Research Institute
(DEEMED TO BE UNIVERSITY)
(An ISO Certified Institution)
University with Graded Autonomy Status
Maduravoyal , Chennai - 600 095

FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF MECHANICAL ENGINEERING

MEXPRESS

VOL. 4 ISSUE 3- 2021

HOD-DESK

MESSAGE

by,
Dr.K.RAJAN
HOD / Mech

Greetings!!

I am glad that Dr.MGR University has provided us an opportunity and vision to support the release of Newsletter series through all the quarters of each academic year. It's a forum to connect with all stakeholders.

I am very happy that the department is releasing the News letter for the period July 2021-to Sept 2021. Wishing for many more series and happy reading.

MESSAGE

by,
Dr.K.R.VIJAYAKUMAR,
Deputy HOD/Mech.

The Newsletter is a platform exhibiting the activities of the department besides bring out the creative literary and artistic talents of our faculties and student community I congratulate the team behind and wish them all the success. Wishing, the Newsletter series, would bring the desired results sooner than expected and pave the way for new ideas to surface.

MESSAGE

by,
Dr.A.MANOJ BABU,
Deputy HOD/Mech.

The Newsletter is a mirror that reflects the activities of the department. Students from all walks of life find their voices heard in this space that welcomes and encourages diversity of thoughts and perspectives with open arm. Pleased to see that our department is releasing its third quarter Newsletter for 2021. I wish the purpose is realized and achieved.

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MESSAGE

It gives us immense pleasure to be an integral part of this news letter, a communication method suited to the needs of the time which would carry messages to all concerned about important events, happenings and achievements. This certainly should play an effective role in creating a sense of belongingness amongst faculty team, alumni and students. Life can't have rewinds rather only flashbacks. Talented alumni will likely have a wealth of experience and skills to share with current students via talks and newsletters. We consider that our endeavors will be successful only when ,after reading these articles you get motivated to contribute more in future issues.

EDITORIAL BOARD

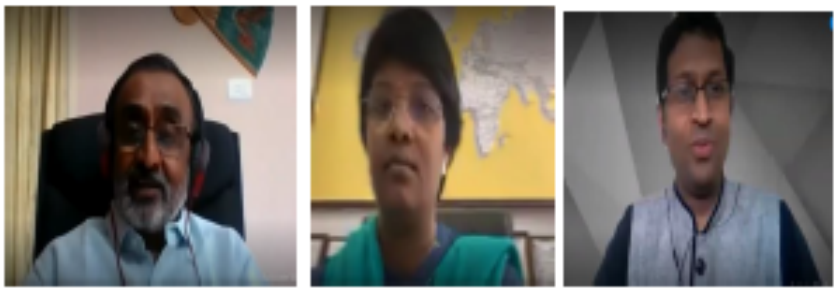
VOL. 4 ISSUE 3- 2021

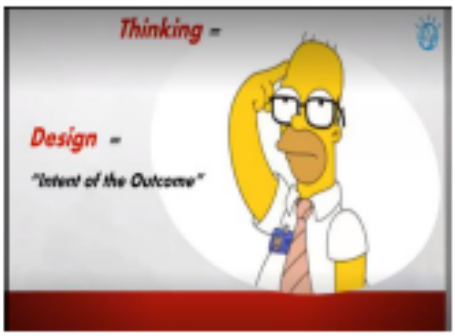
ACTION CORNER

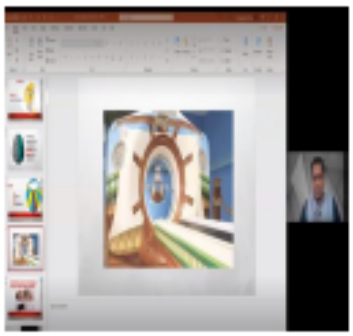
SNIPPETS FROM PALS

1. PALS INDUSTRY SPEAKS -DIGITAL on 20th August 2021
2. PALS AWARE WEBINAR SESSION II ON MARKETTING CHANNELS AND KEY METRICES - 21.08.2021
   (PALS AWARE WEBINAR SESSION I ON OVERVIEW OF THE LEAN BUSINESS CANVAS MODEL - 14.08.2021
   PALS AWARE WEBINAR SESSION III ON REVENUE STREAMS AND COST - 28 08.2021)
3. PALS ANALYZE BATCH 2 - 21st SEPTEMBER 2021- 2.30PM to 4.30PM

1.PALS INDUSTRY SPEAKS -DIGITAL on 20th August 2021

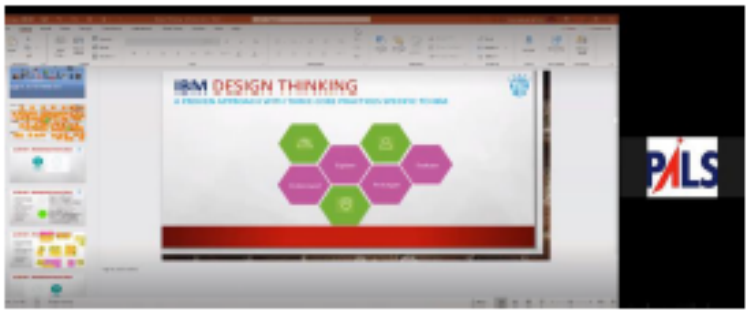



Thinking –
Design –
"Intent of the Outcome"




THE ESSENCE OF DT - BUSINESS CANVASS


Quotes
Expectations & Reactions
Actions
Values


IBM DESIGN THINKING
PALS

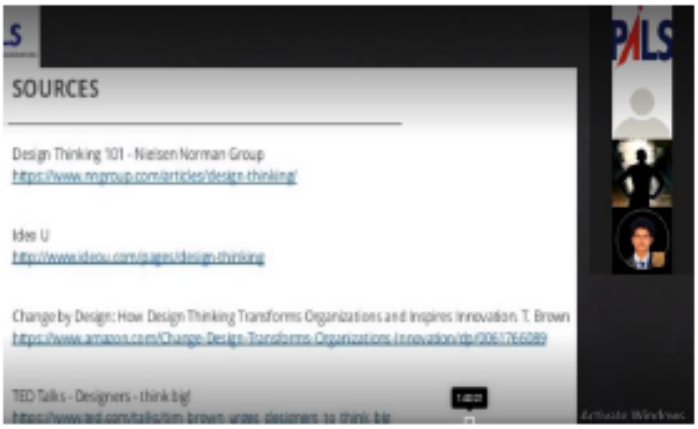

WHAT IS NLP ?
• Psychological approach
• Analyzing individual's emotions
• Programming their mind

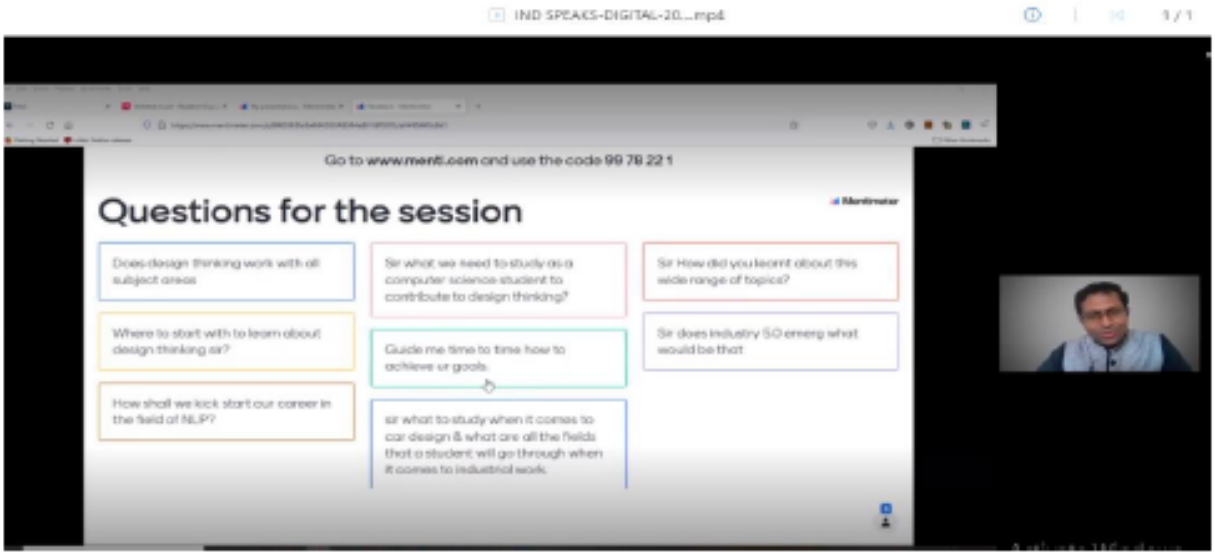

BEFORE...
Things Broken accidentally
Emotion : ANGER


AFTER....
Things Broken accidentally
Thinking What's the mistake behind it?


New from Previous Revolutions.
BIG DATA


Industry 4.0 in a Nutshell:
Internet Of Things (IOT)
Big Data & Analytics
Cloud Computing





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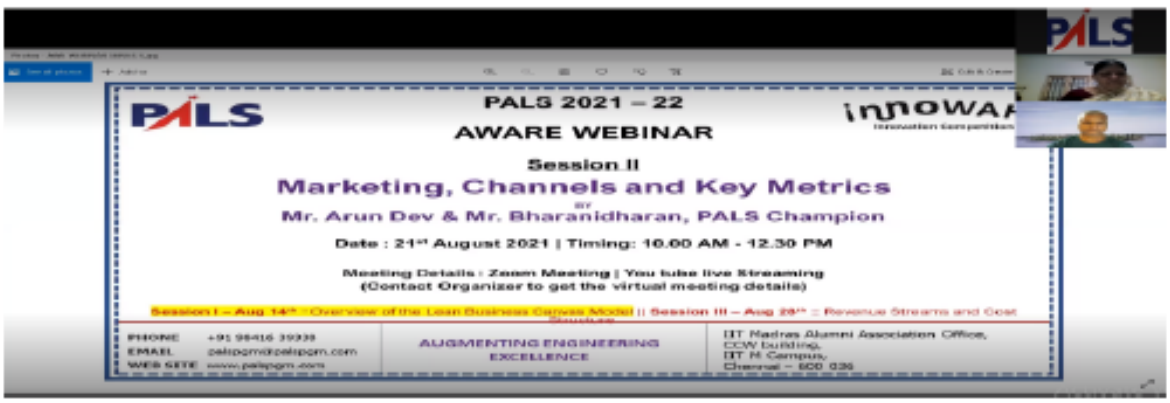
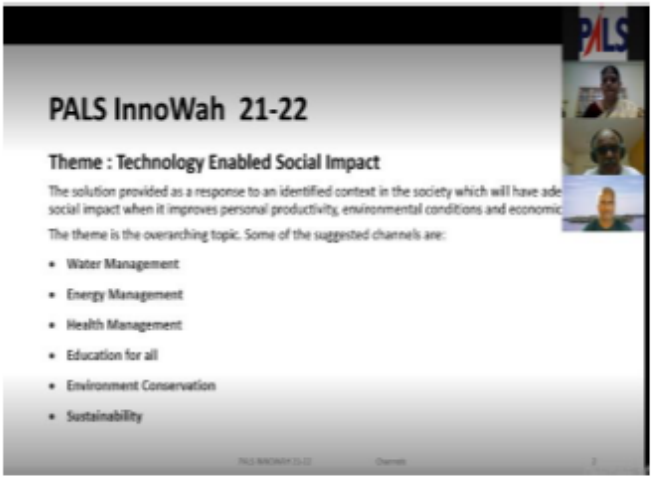
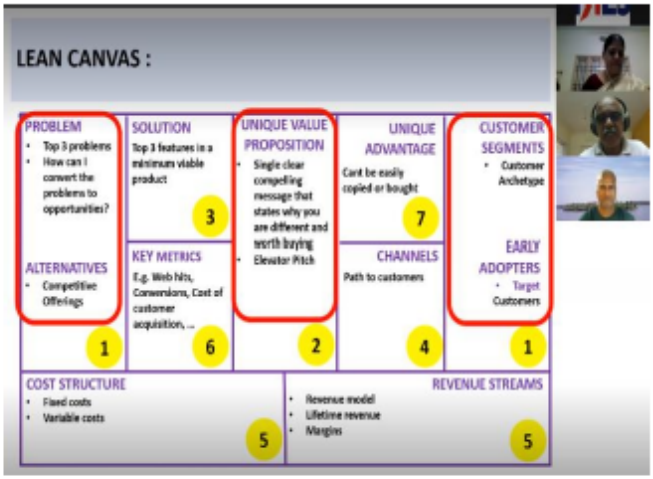
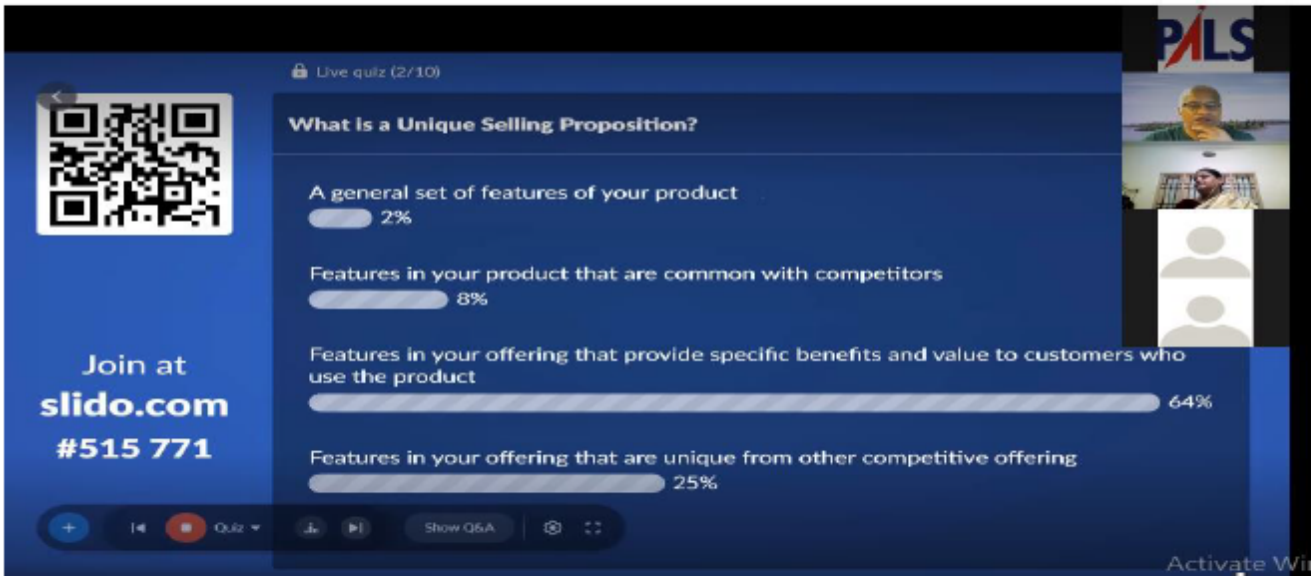






How is Lean Business different

	Traditional Business	Lean
Strategy	Business plan Implementation driven	Business model = that is hypothesis driven
New Product	**New product development** follows a "product management" approach	**Customer development** Test the hypothesis
Engineering	Most often the **product is fully specified before building it.** " Waterfall" development	**Agile development.** Build the product iteratively and incrementally
Organisation	Organised by departments . Hire for experience and ability to execute	Customer and agile development teams Hire for learning , nimbleness and speed
Financial reporting	Financial reporting is about P&L, Balance sheet and cash flow	Measure metrics that matter –customer acquisition, lifetime customer value , churn
Speed	Operated on milestones with complete data	Rapid speed , operated with good enough data
Failure	Exception !!. Fix by firing executives	**Failure is expected** . Fix by iterating and pivoting



YouTube
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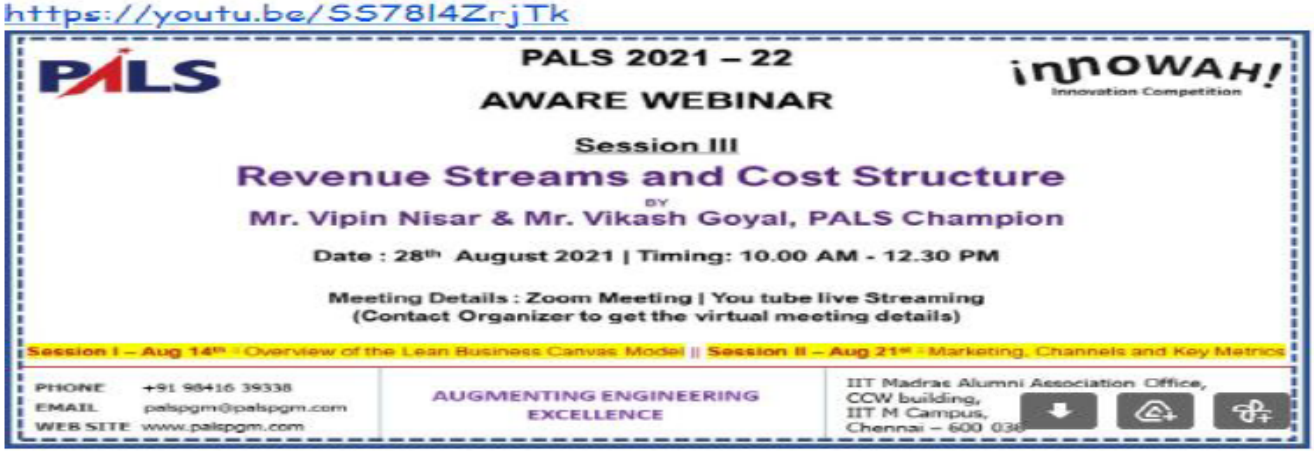

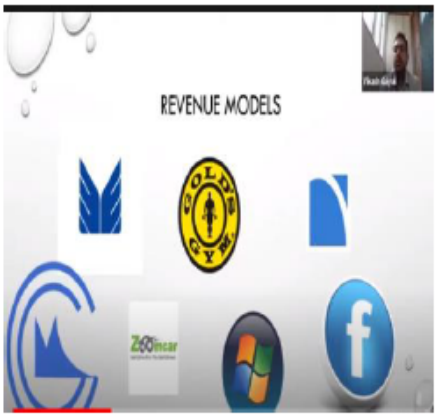

3. PALS ANALYZE BATCH 2 - 21st SEPTEMBER 2021- 2.30PM to 4.30PM

PROBLEM

How can the injury to the head due to the impact on the wiper spindle end be eliminated?

TEAM MEMBERS

JAISON JONATHAN JOEL EDWIN

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 2

SOLUTION PROVIDED :

LOWERING BELOW BONNET

- Pushing the wiper spindle the wiper spindle can be a solution
- Here the whole wiper system is pushed inside the hood and a depression is made between the bonnet and the windshield where the spindle is located
- In this approach the spindle is completely hidden from frontal impact or placed almost flat as the bonnet
- Companies have already started implementing this approach

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CHANGING WIPER LOCATION

- Since the impact of the head most occurs around the central axis of the bonnet / windshield, displacing the spindles to the opposite corners can be useful
- This can be done by extending the wiper link

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HYDROPHOBIC NANO COATINGS

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ARTICLES CORNER

25 TECHNOLOGY TRENDS WILL DEFINE THE NEXT DECADE

by,
Dr.Ethiraj.,
Dean Engineering & Technology

1. Artificial intelligence (AI) and machine learning. The increasing ability of machines to learn and act intelligently will absolutely transform our world. It is also the driving force behind many of the other trends on this list.
2. The Internet of Things (IoT). This refers to the ever-growing number of "smart" devices and objects that are connected to the internet. Such devices are constantly gathering and transmitting data, further fueling the growth in Big Data and AI.
3. Wearables and augmented humans. What started with fitness trackers has now exploded into a whole industry of wearable technology designed to improve human performance and help us live healthier, safer, more efficient lives. In the future, we may even see humans merge with technology to create "augmented humans" or "transhumans."
4. Big Data and augmented analytics. Big Data refers to the exponential growth in the amount of data being created in our world. Thanks to augmented analytics (highly advanced data analytics, often fueled by AI techniques), we can now make sense of and work with enormously complex and varied streams of data.
5. Intelligent spaces and smart places. Closely linked to the IoT, this trend is seeing physical spaces – like homes, offices, and even whole cities – becoming increasingly connected and smart.
6. Blockchains and distributed ledgers. This super-secure method of storing, authenticating, and protecting data could revolutionize many aspects of business – particularly when it comes to facilitating trusted transactions.

7. Cloud and edge computing. Cloud computing – where data is stored on other computers and accessed via the internet – has helped to open up data and analytics to the masses. Edge computing – where data is processed on smart devices (like phones) – will take this to the next level.
8. Digitally extended realities. Encompassing virtual reality, augmented reality, and mixed reality, this trend highlights the move towards creating more immersive digital experiences.
9. Digital twins. A digital twin is a digital copy of an actual physical object, product, process, or ecosystem. This innovative technology allows us to try out alterations and adjustments that would be too expensive or risky to try out on the real physical object.
10. Natural language processing. This technology, which allows machines to understand human language, has dramatically changed how humans interact with machines, in particular giving rise to...
11. Voice interfaces and chatbots. Alexa, Siri, chatbots – many of us are now quite used to communicate with machines by simply speaking or typing our request. In the future, more and more businesses will choose to interact with their customers via voice interfaces and chatbots.
12. Computer vision and facial recognition. Machines can talk, so why shouldn't they "see" as well? This technology allows machines to visually interpret the world around them, with facial recognition being a prime example. Although we will no doubt see greater regulatory control over the use of facial recognition, this technology isn't going anywhere.
13. Robots and cobots. Today's robots are more intelligent than ever, learning to respond to their environment and perform tasks without human intervention. In certain industries, the future of work is likely to involve humans working seamlessly with robot colleagues – hence the term "cobot," or "collaborative robot."
14. Autonomous vehicles. The 2020s will be the decade in which autonomous vehicles of all kinds – cars, taxis, trucks, and even ships – become truly autonomous and commercially viable.
15. 5G. The fifth generation of cellular network technology will give us faster, smarter, more stable wireless networking, thereby driving advances in many other trends (e.g., more connected devices and richer streams of data).
16. Genomics and gene editing. Advances in computing and analytics have driven incredible leaps in our understanding of the human genome. Now, we're progressing to altering the genetic structure of living organisms (for example, "correcting" DNA mutations that can lead to cancer).

17. Machine co-creativity and augmented design. Thanks to AI, machines can do many things – including creating artwork and designs. As a result, we can expect creative and design processes to shift towards greater collaboration with machines.
18. Digital platforms. Facebook, Uber, and Airbnb are all household-name examples of digital platforms – networks that facilitate connections and exchanges between people. This trend is turning established business models on their head, leading many traditional businesses to transition to or incorporate a platform-based model.
19. Drones and unmanned aerial vehicles. These aircraft, which are piloted either remotely or autonomously, have changed the face of military operations. But the impact doesn't stop there – search and rescue missions, firefighting, law enforcement, and transportation will all be transformed by drone technology. Get ready for passenger drones (drone taxis), too!
20. Cybersecurity and resilience. As businesses face unprecedented new threats, the ability to avoid and mitigate cybersecurity threats will be critical to success over the next decade.
21. Quantum computing. Quantum computers – unimaginably fast computers capable of solving seemingly unsolvable problems – will make our current state-of-the-art technology look like something out of the Stone Age. As yet, work in quantum computing is largely restricted to labs, but we could see the first commercially available quantum computer this decade.
22. Robotic process automation. This technology is used to automate structured and repetitive business processes, freeing up human workers to concentrate on more complex, value-adding work. This is part of a wider shift towards automation that will impact every industry.
23. Mass personalization and micro-moments. Mass-personalization is, as you might expect, the ability to offer highly personalized products or services on a mass scale. Meanwhile, the term "micro-moments" essentially means responding to customer needs at the exact right moment. Both are made possible by technologies like AI, Big Data, and analytics.
24. 3D and 4D printing and additive manufacturing. Although this may seem low-tech compared to some of the other trends, 3D and 4D printing will have very wide applications – and will be particularly transformative when combined with trends like mass-personalization.
25. Nanotechnology and materials science. Our increasing ability to understand materials and control matter on a tiny scale is giving rise to exciting new materials and products, such as bendable displays.

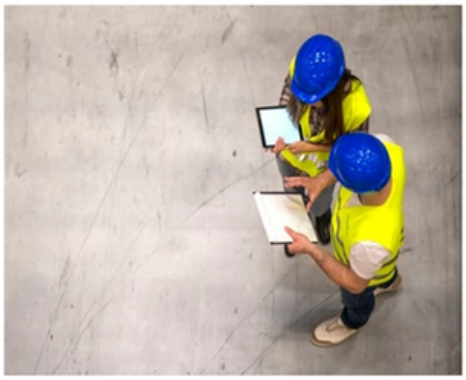
CROSS-DISCIPLINARY SKILLS ALL ENGINEERS NEED

by,
. Mr. Andrew Nallayan,
Asst. Professor/ Mech Engineering.

Engineering is a fast-growing and in-demand field requiring complex expertise and interdisciplinary knowledge across different areas of science and technology, whether it's mechanical, civil, electrical, or chemical engineering.
Rapid developments in technology and the advent of the Fourth Industrial Revolution have seen a huge revival in the way in which engineering works in industry. Projects require an integration of knowledge and skills from a wide range of engineering disciplines with distinctions between them blurring massively.
If you're hoping to pursue a career in the industry, there are a few key cross-disciplinary skills employers are looking out for.

Automation and data

It's becoming increasingly evident that we should no longer expect automation and robotics to be just a domain for electronic and mechanical engineers.
Every aspect of life, let alone any engineering that supports it, is being affected in some way by the developments in making machine elements being able to act 'smart'. From intelligent buildings for civil engineers to advanced process control to chemical engineers, to robotic operation of processes in a food factory, understanding the design and operation of automated systems and how to make them 'smart' is a core skill for any engineer.
This 'smartness' given to automated systems comes from the ability to capture and analyze data in order for us to 'tell' the automated system how to 'experience its surroundings' and as a result - how to 'behave' making data analytics a core theme across all areas of engineering.



Software literacy

Software is the great enabler when it comes to solving the often complex problems of engineering design. The most popular computer programs of today are critical knowledge for any engineer – from Computer-Aided Design (programs like AutoCAD, and CATIA), to Systems Design (programs such as MatLAB, and SimProcess), Process Simulation (programs such as ANSYS, and Flow3D) to the ability to program one's own analysis using programs such as C++, VBA, and Python.

Gold standards are a critical resource for any civil, mechanical, chemical, and agronomical engineers – there's no engineering discipline where competent software use is not a critical skill.

Strategic planning

It's essential for engineers across every discipline to familiarize themselves with standard management methodologies and know how and when to prioritize resources. The best engineers will also be mindful of risks and plan accordingly, while conducting regular reviews of all processes.

Whatever engineering project it is, it will only be successful if the engineers are able to deploy resources timely and effectively to serve the strategic objectives that underpin the rationale of that project to whoever commissioned it.

Quality systems

Engineers need to be meticulous and have an impeccable eye for detail when it comes to quality control and quality assurance.

Modern industry and regulatory agencies throughout the world demand verifiable, robust, consistent and effective quality systems in operation to ensure not only the quality promised to clients and consumers but also safety, for the company's own workers, the product or service users, and furthermore, the environment and society in general.

Every engineer, regardless of their area of work, must have core skills in deploying effective quality systems, risk assessments, environmental impacts, to develop and implement proper Standard Operating Procedures that ensure quality and safety everywhere.

It's not just about knowing what skills you need – but also knowing why you need them

The borders between [engineering] disciplines are wearing out, and it's more common to find that as the professional activity of an engineer graduated in a given discipline progresses, it increasingly requires an understanding of issues from other disciplines

"For instance, almost all engineers, civil, mechanical or chemical, would need to understand instrumentation, automation and control - electronic engineers need to understand fluids and heat when working for biomedical applications, and so on."

It's important to recognize there are transparent and definitive links between the differing types of engineering - which is why first-year engineering students should learn the fundamentals of all foundation disciplines of engineering before committing to a specific program later on in their degree.

It's only when they go into their second year they're able to specialize, and in their fourth year they should be capable of choosing, either a career or could possibly go to pursue master's degree. During this journey they should undertake serious efforts to skill them up by doing internship programs.

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AUTOMATIC WATER TANK CLEANING MACHINE

BY,
MARTIN MANOJ.,
2ND YEAR/ROBOTICS & AUTOMATION DEPT.

Abstract :

Aim of this project is to develop a mechanical system for cleaning domestic cylindrical water tank. The mechanical system includes two main mechanisms which are rack and pinion gear mechanism and reciprocating four bar linkage mechanism. The rack and pinion arrangement is used to move whole mechanical system up and down for cleaning the cylindrical tank. The rack is fixed on the motor and the four-bar mechanism is attached to the motor shaft. PVC brushes are attached to the ends of the four-bar linkage. Four bar linkage is made in such a way that it can be adjusted according to inside diameter of the tank. When the motor is started the linkage rotates and with the help of brushes, cleaning of wall and base of tank takes place. The purpose of this project is to reduce the human efforts and to avoid the chemical influence on health of person entering the tank for cleaning.

Key Words: Cylindrical water tank, four bar linkage, motor shaft, rack and pinion, PVC brush.

Necessity of Cleaning Water Tank Every day we use the tank water for brushing and bathing, for cleaning and moping, for washing clothes and in other household chores. With the passage of time, sediments, scale and algae get deposited on the walls, ceiling and floor of the water tank. This deposition contaminates the water and makes is unfit for use. With time algae and bacteria grow and breed in this water infect it and could make us fall sick eventually. Hence water tank cleaning is very important.

Methods of water tank cleaning

Manual scrubbing in which wall and floor of tank are scrubbed to remove dirt, sediments, fungus and stains, but this method is more tedious and time consuming.

The water tank can also be cleaned by using chemicals to remove the dirt and sediments. The chemicals used may affect the human health.Pressurized water can be sprayed on the walls of the tank which will remove the dirt from the tank surface. These methods are time consuming and require more efforts for cleaning.

Alternate Method

All methods of cleaning water tank as discussed above are time consuming and require more human efforts. So alternate method is required for cleaning purpose which will overcome the drawbacks of all other methods. Therefore we are developing water tank cleaning equipment which requires less time and human efforts for cleaning.

MAIN COMPONENTS

Gear Motor

Gear motor is used to produce high torque with low speed. motor used has specifications as single phase 220V, 15A which produces power of 0.35 HP and frequency of 50 Hz and the shaft speed is 75 rpm.

Four Bar Linkage

A plane linkage consisting of four links pinned tail to head in a closed loop with lower or closed joints. It is a plane mechanism consisting of four links that form rotating kinematic pairs. The four bar linkage is arranged in such a way that it adjusts the inner diameter of the tank.

Rack and Pinion

A rack and pinion is a type of linear actuator that comprises a pair of gears which converts rotational motion into linear motion. A circular gear called “the pinion” engages teeth on a linear “gear” bar called “the rack”. Rotational motion applied to the pinion causes the rack to move relative to pinion. Thus the motor attached to the rack is moved in vertical direction along the guide way with the help of handle attached to the pinion.

Shaft

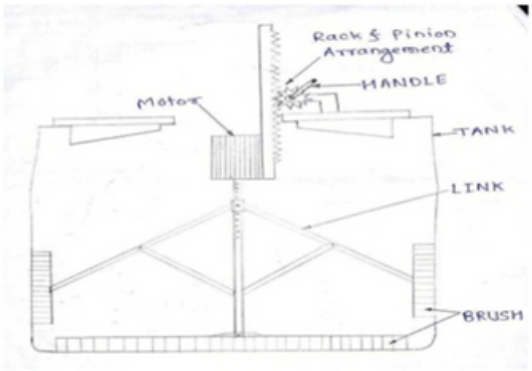
Shaft made up of mild steel of diameter 15mm is used to transmit rotary motion from motor to the four bar linkage. Holes provided on the shaft, adjust the four bar linkage according to the diameter of the tank.

Brush

The brushes are made up of Poly Vinyl Chloride (PVC) polymer. Brushes attached to the ends of four bar linkage revolve due to rotation of motor shaft to clean the inner surface of the tank.

METHODOLOGY

Firstly whole water is removed from the tank. Detergent is then sprayed on the inner wall of the tank for easy removal of dirt. The whole system is inserted in retracted position into the tank. The four bar linkage is then adjusted according to the tank diameter in such a way that brush at end of the shaft touches the bottom of tank. Now the motor is switched ON. The four bar linkage starts rotating along with the shaft. This causes scrubbing of inner wall of tank by the brush attached to the ends of linkage. For cleaning upper portion of the tank the whole mechanism is reciprocated along the guide ways with the help of handle connected to the rack and pinion arrangement. In this way the tank gets cleaned within minimum time.



CONCLUSION

The water tank cleaner was used to clean the water tanks by using rotating brushes. This method was more effective and safe than the conventional methods. This method is capable to clean water tanks within less time and human efforts.

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THE DIAMOND OF INDIA

BY,
JERALD.,
2 ND YEAR /MECH DEPT.

HISTORY

The Kohinoor is one of the oldest and most famous diamonds in the world. The history of the Kohinoor goes back in the history to more than 5000 years ago. The current name of the diamond, Koh-I-Noor is in Persian and means "Mountain of Light". Kohinoor diamond once the largest known diamond in the world. The origin of Kohinoor was in Golconda in the state of Andhra Pradesh in India...it changed hand in many rulers of India to Persian ruler and many bitter war was fought for it...the legend also says that its brings a bad luck or misfortune if it worn or kept by male in contrast it brings good luck to female owners

In 1849, after the conquest of the Punjab by the British forces, the properties of the Sikh Empire were confiscated. The Koh-I-Noor was transfer to the treasury of the British East India Company in Lahore. The Properties of Sikh empire were taken as war compensations. Even one line of the Treaty of Lahore was dedicated to the fate of the Koh-I-Noor

Cutting of Kohinoor diamond when the Koh-I-Noor diamond arrived in the hands of the British royal family it weighed 186 carats (37 grams). Prince Albert carefully searched for a diamond cutter with a very good reputation and headed to Netherlands where he gave the mission to cut the diamond to a certain Mr. Cantor who began the difficult task of cutting it. Mr. Cantor worked 38 days on the diamond. The diamond was cut into an oval shape and the weight was reduced to its current form and weigh of 108.93 carats. According to witnesses Prince Albert was satisfied of the cutting work as the diamond did not shine as much as before.

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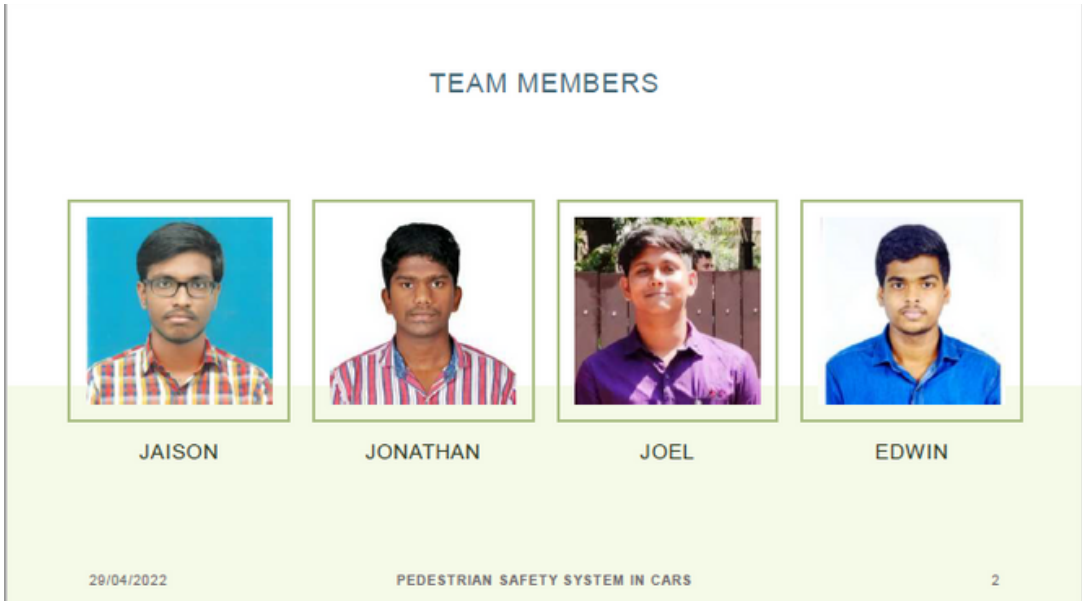
PEDESTRIAN SAFETY SYSTEM IN CARS

BY,
MGR TEAM
2 ND YEAR, MECH/ DEPT.



PROBLEM

How can the injury to the head due to the impact on the wiper spindle end be eliminated?

INTRODUCTIO N

India tops the world in road crash deaths and injuries. It has 1 per cent of the world's vehicles but accounts for 11% of all road crash deaths, witnessing 53 road crashes every hour; killing 1 person every 4 minutes.
With major fatalities being caused due to head injuries which are caused due to impact with bonnet, it can be worsened by the piercing damage due to the windshield's wiper spindles.

PROBLEM

PRIMARY GOAL

Reduce and eliminate damage due to wiper spindles.

CONSTRAINTS

- ❑ Absolute additional cost - ₹10 / wiper
- ❑ Present wiper blade shall be fitted without any special requirement
- ❑ Wiper spindle dimensions shall not increase
- ❑ New design should be interchangeable with present design

PEDESTRIAN SAFETY SYSTEM IN CARS 5

RUBBER

RUBBER
Fitted rubber cap cover over the spindle

PLASTIC
Detachable layer cover over the edge of windshield

LOWERING BELOW BONNET
Pushing the spindle below the bonnet

CHANGING WIPER LOCATION
To the corners of the windshield

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 6

WIPER PARTS

SPINDLE
Only product specifically dedicated to the agricultural market

WIPER BLADE
Only product specifically dedicated to the agricultural market

WIPER LINK
Only product specifically dedicated to the agricultural market

WIPER ARM
Only product specifically dedicated to the agricultural market

MOTOR
Designed with the help and input of agricultural experts in the field

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WORKING

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 8

RUBBER

- Protective rubber caps over each wiper spindle can reduce significant damage and can eliminate piercing skull injuries
- The rubber cap can be implemented in two ways, either
  - fitted on the spindle directly and rotate along with it, or
  - attached to the base portion of the spindle using suction force or adherents and has gap at the portion for the angle of oscillation of wiper arm (static attachment)
- Dome shape can be used to increase the impact area, reducing the amount of blunt force to the head.
- Materials: Ethylene Propylene Diene Monomer (EPDM), Neoprene, Silicone rubber

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PLASTIC

- Detachable plastic extension over the bottom of the windshield.
- Covers the wiper spindle completely.
- Therefore preventing the direct contact of head to the spindle during an accident.

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 10

LOWERING BELOW BONNET

- Pushing the wiper spindle the wiper spindle can be a solution
- Here the whole wiper system is pushed inside the hood and a depression is made between the bonnet and the windshield where the spindle is located
- In this approach the spindle is completely hidden from frontal impact or placed almost flat as the bonnet
- Companies have already started implementing this approach

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 11

LOWERING BELOW BONNET

NISSAN ALTIMA

MARUTI SUZUKI X-CROSSE

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 12

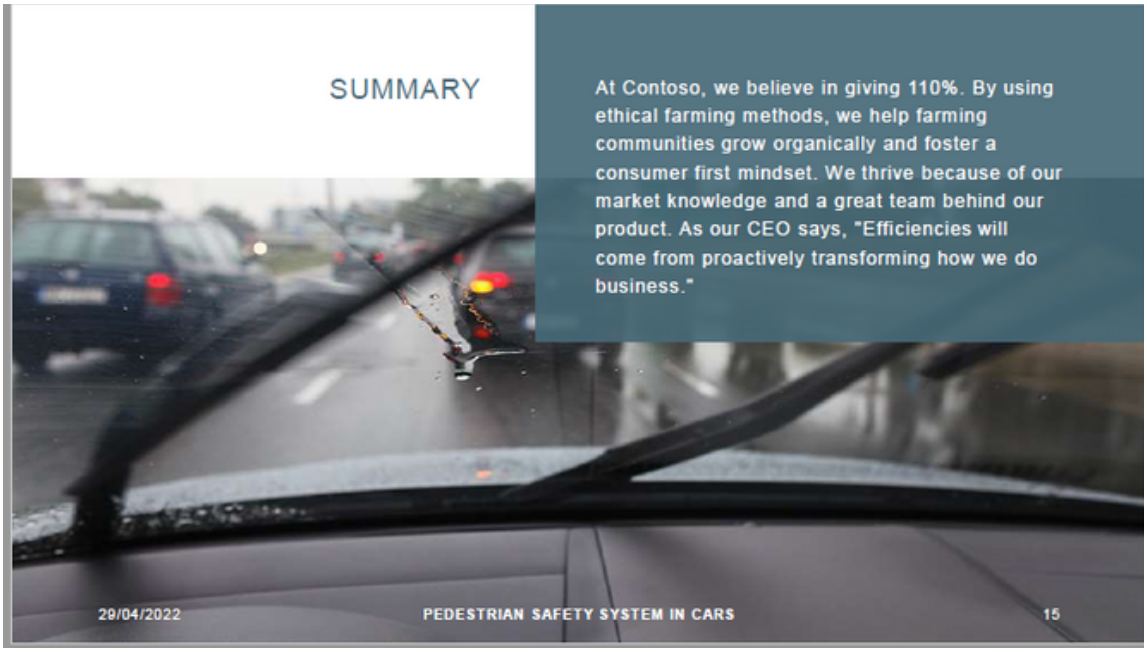
CHANGING WIPER LOCATION

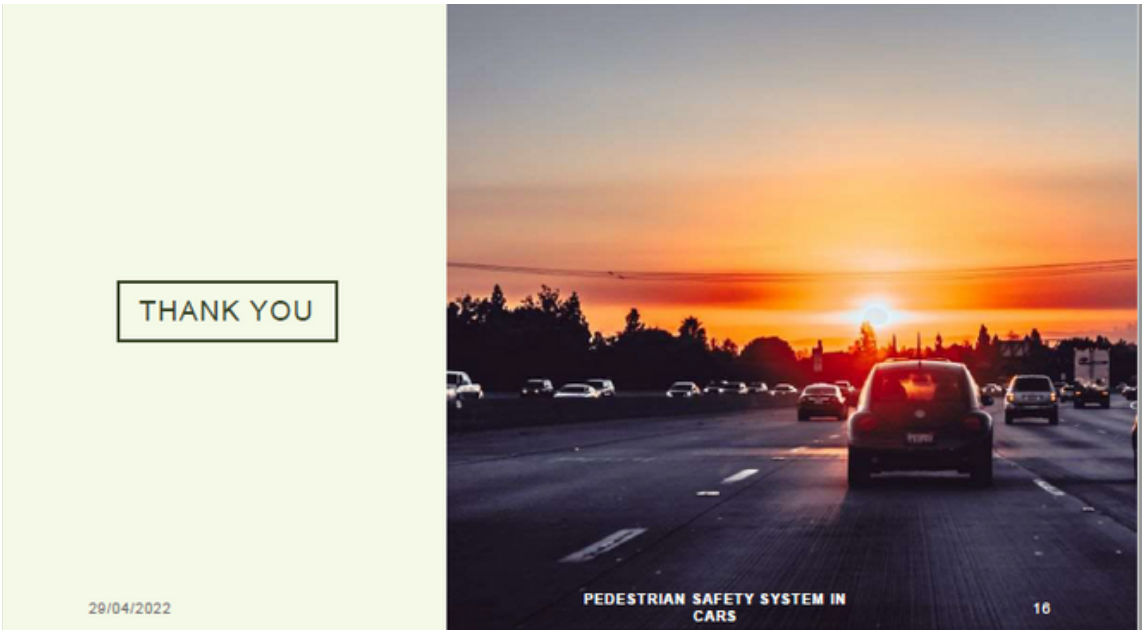
- Since the impact of the head most occurs around the central axis of the bonnet / windshield, displacing the spindles to the opposite corners can be useful
- This can be done by extending the wiper link

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 13

HYDROPHOBIC NANO COATINGS

29/04/2022 PEDESTRIAN SAFETY SYSTEM IN CARS 14


SUMMARY
At Contoso, we believe in giving 110%. By using ethical farming methods, we help farming communities grow organically and foster a consumer first mindset. We thrive because of our market knowledge and a great team behind our product. As our CEO says, "Efficiencies will come from proactively transforming how we do business."
29/04/2022
PEDESTRIAN SAFETY SYSTEM IN CARS
15

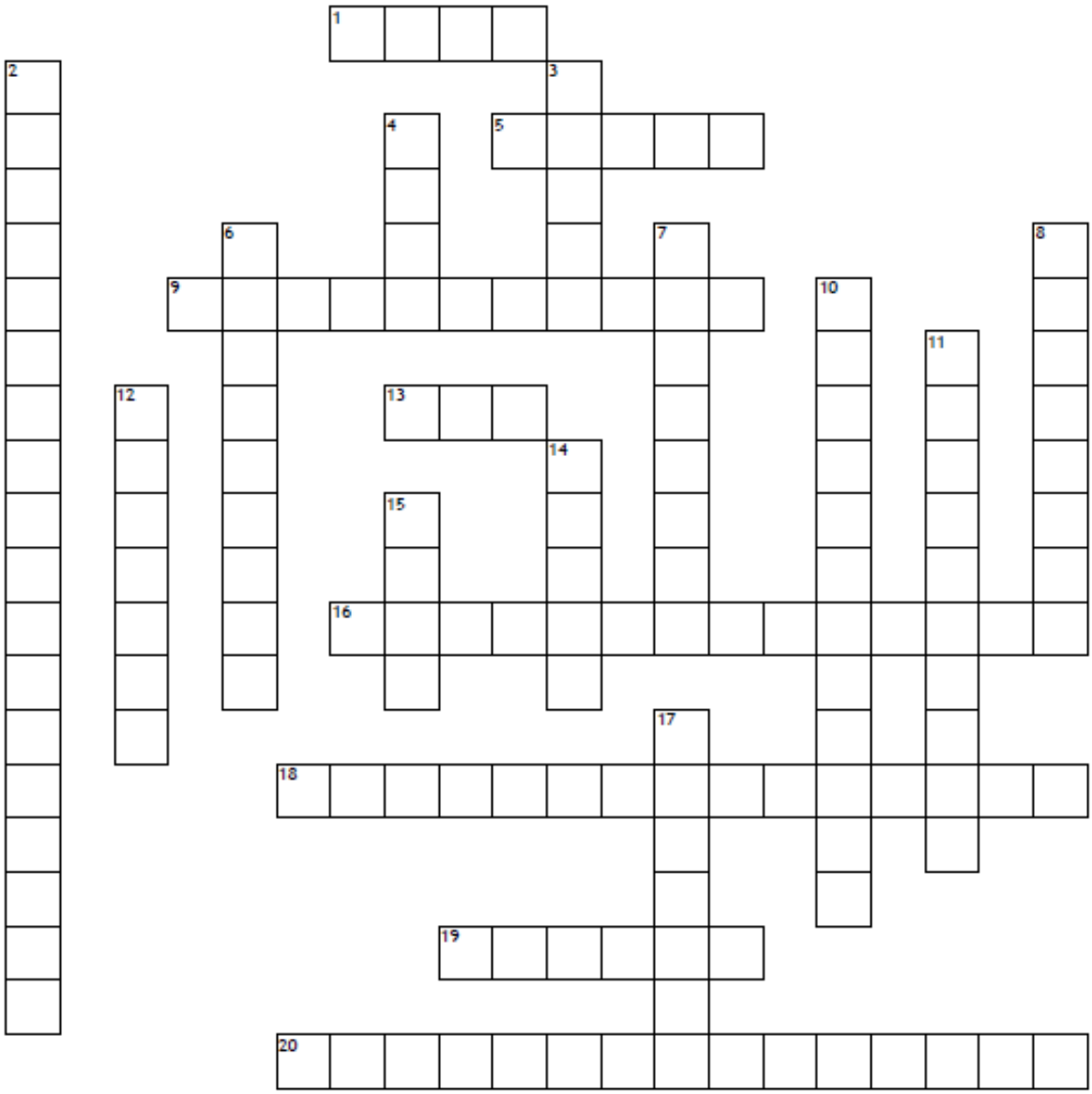

THANK YOU
29/04/2022
PEDESTRIAN SAFETY SYSTEM IN CARS
16

VOL. 4 ISSUE 3 - 2021

PUZZLE AUTOMOTIVE

BY,
JOEL.,
2 ND YEAR /AUTO DEPT.

Automotive



PUZZLE HINT

ACROSS

1. THE HINGED COVER OVER THE ENGINE OF MOTOR VEHICLES THAT ALLOWS ACCESS TO THE ENGINE COMPARTMENT
5. A CAR IS THE VEHICLE'S MAIN STORAGE COMPARTMENT.
9. A GAUGE THAT MEASURES AND DISPLAYS THE SPEED OF A VEHICLE.
13. A VISCOUS LIQUID DERIVED FROM PETROLEUM, ESPECIALLY FOR USE AS A FUEL OR LUBRICANT.
16. A SENIOR ENGINEER IS SOMEBODY WHO CAN LEAD SMALL TEAMS, KNOWS WHAT THEY ARE DOING
18. THE MANAGEMENT, DEVELOPMENT, OPERATION AND MAINTENANCE OF IT SYSTEMS
19. A MECHANISM FOR CONNECTING AND DISCONNECTING A VEHICLE ENGINE FROM ITS TRANSMISSION SYSTEM.
20. THE ENGINEERING DISCIPLINE THAT APPLIES CONTROL THEORY TO DESIGN SYSTEMS WITH DESIRED BEHAVIORS.

DOWN

2. SOMEONE WHO HELP DESIGN CARS 3. A DEVICE FOR SLOWING OR STOPPING A MOVING VEHICLE, TYPICALLY BY APPLYING PRESSURE TO THE WHEELS.
4. JOIN TOGETHER BY HEATING THE SURFACES TO THE POINT OF MELTING USING A BLOWTORCH
6. A DEVICE FOR FIRING THE EXPLOSIVE MIXTURE IN AN INTERNAL COMBUSTION ENGINE.
7. WHEEL DRIVE CARS AND TRUCKS, THE ENGINE TURNS A DRIVESHAFT PRODUCING POWER TO THE REAR OF THE VEHICLE
8. AN ENGINE-COOLING DEVICE IN A MOTOR VEHICLE
10. THE MECHANISM BY WHICH POWER IS TRANSMITTED FROM AN ENGINE TO THE WHEELS OF A MOTOR VEHICLE.
11. SOMEONE WHO PROVIDES GUIDANCE, INSTRUCTION, DIRECTION TO A GROUP
12. A PART OF A MACHINE THAT BEARS FRICTION, ESPECIALLY BETWEEN A ROTATING PART AND ITS HOUSING.
14. A MACHINE, ESPECIALLY ONE POWERED BY ELECTRICITY OR INTERNAL COMBUSTION, THAT SUPPLIES MOTIVE POWER FOR A VEHICLE OR FOR SOME OTHER DEVICE WITH MOVING PARTS.
15. MATERIAL SUCH AS COAL, GAS, OR OIL THAT IS BURNED TO PRODUCE HEAT OR POWER.
17. A THING USED FOR TRANSPORTING PEOPLE OR GOODS, ESPECIALLY ON LAND

PUZZLE
ROBOTICS & AUTOMATION

BY,
MEESAM ABBAS J .,
2 ND YEAR /ROBOTICS DEPT.

Robotics and Automation

R R D J P R M E D K A E Q S C I T O B O R X E V
K W P E Z H B A X A T K W S R Q G Q T D X K H D
U X R G N G A I R P L S T E T O M E R A M R D M
B M O M O W Q P O G Q C A G U E C M M B P E L S
H I J P Q I S F R F O E I V F H M J J N J T I S
W G E Y K R W B Y O E R D W N M K U Z D X U U Y
E Q C C G E D B Z E D K P O X A R P S P S P B W
E H T P F S B N I T J R L W F T O W O W P M N E
Z N V Q X J M M R D O O N K U H H G C J F O U S
X G M M W Y I I B W G B K N C E Y U Z J F C F R
N W O W A H Q N L Y M Q O K V M Z Q S R A E G O
H X F R I F E K V I P H O R D A M S U B Z Z E T
P P R U G F O E N G T R Q I H T A C L W C W B C
I W A K U K N R L Q S A P O B I W E X A P K A E
L G B T B K A H X S A S R Z A C S Q E N K V T N
O T T U X C E Z U F R M G Y X S A V V Y Y R T N
R F C O W W S Q W K U O Q E C N E I C S P Q E O
V F P R U N D E R W A T E R Q Y V H H J L I R C
H M T F P Z N L N P Z O Z E L H B A G F A C Y A
D C Z E A U N P N I Z R L K J O O C C Y U G T O
R D K R T U W A F G N G N I R E E N I G N E Z U
Z G E X Q J E D U C A T I O N A L F L J C A R N
M I N D U S T R I A L M B F K T D J F J H Z E G
P L B O A G C F N H Q M R V Q J S E N S O R D J

underwater	military	educational	industrial	launch
engineering	mathematics	science	stem	cables
computer	technology	gears	program	wires
remote	fun build	connectors	robot	wheels
vex robotics	motor	sensor	battery	project

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ACHIEVER'S CORNER

DR.J.JAYASEELAN
PROF / MECH

DRDO Dare-to- Dream 2.0 - winner award in individual category for the year 2021

Prize: 1st Cash Reward: 5 Lakhs

An innovation contest 'Dare to Dream 2.0' has been launched by the Defence Research and Development Organisation (DRDO). The contest was launched on the 5th death anniversary of former President and noted scientist Dr APJ Abdul Kalam. 'Dare to Dream 2.0' has been launched as an open challenge to promote the innovators and startups of the country. The contest has been launched for emerging technologies to encourage the individuals & startups for innovation in defence and aerospace technologies in the country. After due evaluation, an expert committee will decide the winners of the contest. The winners would be awarded with prize money of up to Rs 10 lakh for startup and Rs five lakh to individual category.

Out of 1363 participants 7 were declared as winner. Dr. J. Jayaseelan, Asso. Professor from Mechanical engineering dept is a winner for his innovation on " Design of Robotic Machining System for Rocket Propellant". On 4th October 2021 he received the award from Defence Minister Shri. Rajnath Singh. Project team: Dr. J. Jayaseelan,
Dr. K.R. Vijayakumar

•Challenge Area- Development of robotic arm for scooping / machining of cured solid propellant (Shore 'A' hardness⩾ 70)

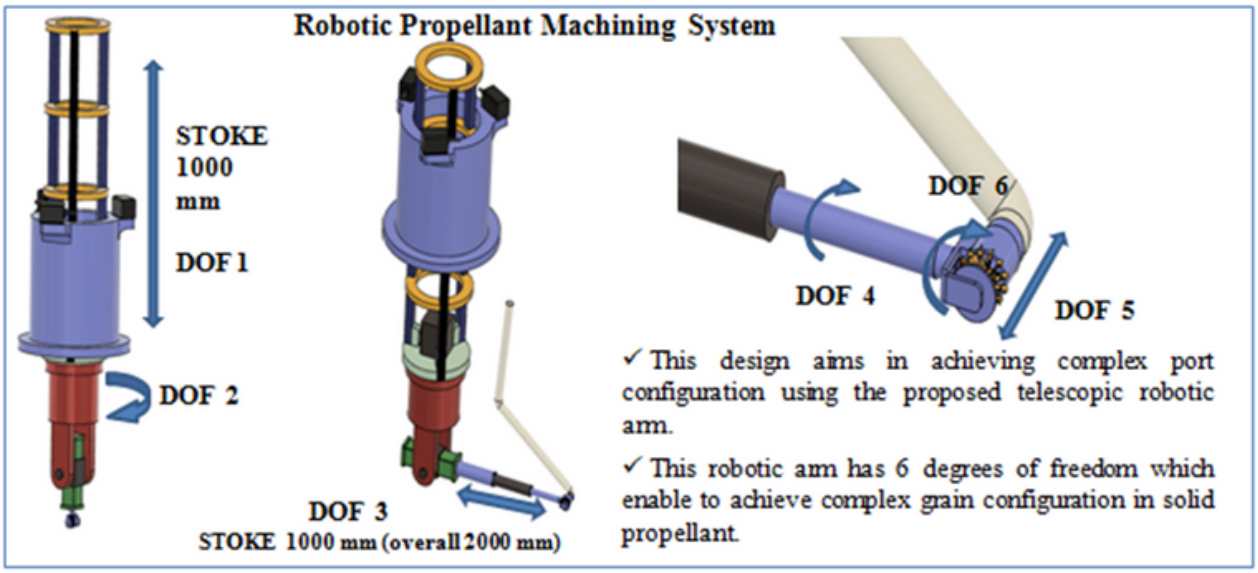
•Name of the Innovation: Design of Robotic Propellant Machining System

•Citation- The technology development for machining intricate special profiles on cured solid propellant cast inside rocket motors is a challenging task for which ARI has expertise. This technology covers design, development and testing of Machining System integrated with Robotic telescopic arm to achieve 6 DOF. The Scooping cutter geometry and material, specially designed with vacuum chip removal ducting will ensure safe machining.

Problem statement:

Solid rocket propulsion is the most widely used propulsion technology used in defence and space. Ever increasing performance requirements for propulsion systems is pushing the boundaries. The modern propulsion design no longer relies on conventional grain geometries which poses special considerations during processing of solid propellants. As opposed to the conventional grain geometries, wherein minimal post cure machining (of the cast propellant grain) is involved, the high-performance solid grain geometries demand additional steps in the process. The grains are cast in semi-finished geometry which is then cured and then machined in the next step to achieve the final geometry/dimensions. The machining process demands for special tooling and machining facilities in order to execute the process with adequate accuracy and safety.

Solution:



A way of configuring the interior of a solid rocket motor with circumferential radial slots is to machine the slots into the propellant by utilizing a rotatable mounted cutter. By adjusting the radial and axial location of the cutter with each rotation, the cutter slowly forms the radial, circumferential slot within the propellant by successively paring out machined particles of propellant. The machined out particle produced by the cutter, either by scooping or using rotating cutter, is particularly difficult to remove. Removal of the machined propellant particle is accomplished by vacuuming the machined propellant from the slot and from the interior of the rocket motor.

Expected Benefits and Technology Advancements:

The development of this robotic arm system shall ensure defect free grain geometry, achievement of accurate dimensions and intricate geometry. This will enable a significant advancement in the propellant processing technology with added capabilities of developing propellant grain geometries which are otherwise difficult as on date. The capability shall come with assured safety and high levels of repeatability and absolute flexibility in terms of shape, dimensions and geometrical features.

M.RAHUL (2018-2022)

JOURNEY IN MGR

Life Menu in MGR

Written by Rahul. M [MECH / IV Year]

The journey of life of Mechanical department met several Star students where we are going to see on of such student named RAHUL. M. Let's get to see each Semesters by order.

5th SEMESTER: During this Semester, in the month of May he Participation in International Webinar Organized from UK based on Artificial Intelligence in Autonomous Mobile Robotics; next on line was the Participation in another International Webinar from UK based on Microelectronics; the third was the Participation in an International Webinar based on Microfluidic Technology and Optical Diagnostics for Bio-microfluidics; in June he completed a Designing Course in Catia; in August he became as a partner in a start-up named Brain Buds as Head of Design and Manufacturing; finally he got promoted as Student Secretary of Mechanical Department.

In the *6th SEMESTER:* during the month of January where he completed another Designing Course in Creo; during February he earned Guinness World Records, World Book of Records, Asia Book of Records, India Book of Records and Assist Book of Records by Participating on various tasks such as Educating Government School Students, Assembling of 100 FEMTO Satellites, Ground Station Management for the Launch, Documentation, Student Coordinator of our University in the Great event named Launch of 100 FEMTO Satellites by Space Zone India (SZI), Abdul Kalam International Foundation (AKIF), Martin Groups in Rameshwaram;

NEWS FROM AROUND THE CAMPUS:

Using the University Effectively

in the same month he received an Appreciation from our University President, Er. A. C. S. Arun Kumar sir for being in Team of Launch of 100 FEMTO Satellites and also Received a Reward Amount of Rs. 5000; again in that month he Won in IIT Pals Analyze Competition Organized by IIT Pals; next on the month of March he earned another Guinness Book of Records for Participating and Completing the Learning of Python and Developing a Face Recognition by using Python under 43 minutes Organized by IIT Madras under the name GUVI; in June he Completed with 100% Score in Six Sigma Yellow Belt by MSME; in the same month he was an Organizer in an International Webinar on Transcending Opportunities for Engineering Graduates by Mechanical Department of Dr. M. G. R. Educational and Research Institute;

during the month of July he Organized another International Webinar on COWINWEWIN [Taking Care of Ourselves during Covid] by our University; in the same month he Won the First Place in a Technical Paper Presentation on the Topic Pulsed Plasma Thrusters.

Its time for *7th SEMESTER:* Let's begin with the month August where he and his team Started a Satellite Club for Our University and he became the Secretary of that Club; in the same month he Participated in a Global Annual Mentor Conference organized by Foreignadmits; during September he and his team Organized a Plantation Campaign for the Birthday of our University Chancellor Dr. A. C. Shanmugam, sir;

During October he Participated in IIT Pals Analyze; in the same month he was an Organizer in a Faculty Development Program; during November he and his team visited ATAL Tunnel under YUVAK Scheme by AICTE; in the same month he is Currently pursuing New Gen IEDC 4th Call for Start-up and Last but not the Least he is a Semester wise Mechanical Department and Subjects Topper with CGPA of 9.80and GPA as 9.83 and 9.82 as of 5th and 6th Semester respectively.

He personally advice his younger generations to perceive your passion and work on based on what your mind say and be punctual (which in turn paves the way for your success). I [RAHUL. M] whole heartedly thank my supportive staffs and lovable friends and I dedicate my success to those friends (Mr. Mano Balaji. G, Mr.Sankara Narayanan. N, Ms. Swetha. D, and Ms.Kumudha. K).

"Courage doesn't always roar. Sometimes courage is the quiet voice at the end of the day saying 'I will try again tomorrow."

WHAT'S INSIDE

LAUNCH OF 100 FEMTOSATELLITES

The FEMTO refers to the size of 10^-9. In regards tosatellites it's 4x4x4 cm cube. These type of 4x4x4 cmsatellites were made in the quantity of 150 for which100 will be used for launch and the rest 50 are forbackup. These were launched on two scientific heliumballoons. The first balloon consists of 32 satellites andthe second balloon was carrying the rest 68 satellites.First balloon carried sensor based satellites while thesecond balloon carried organic based satellites. These

scientific helium balloons launched from coast ofRameshwaram on 7th February, 2021 IST 10.00 am. Thefirst balloon travelled around 182 kms on air from TVTower, Rameshwaram to Kovilpattu, Tuticorin. Thesecond balloon travelled and landed near Sri Lankan -Indian Coastal boarder. Both were retrived safely andthose data were recorded and published foragricultural purposes to the Government of India.

MY JOURNEY WITH FRIENDLY ADVICE

The small step in this great event begin with my Great staffs from my department. But all these happened because of our beloved President of Dr. M. G. R. Educational and Research Institute,Er. A. C. S. Arun Kumar, sir. My department staffs especially Joint Registrar, Dr. M. Ganesan sir,Deputy Head of Mechanical Department, Dr. K. R.Vijaya Kumar, sir Assistant Professor, Mr. W.Andrew Nallayan, sir suggested and added me in that great event. A special note to Joint Registrar,Dr. L. Ramesh, sir for carrying the students of our University into it. The registration was successfully completed with some registration amount which was offered by our beloved President of our University. This event was a collaboration of Space Zone India (SZI), Abdul Kalam International Foundation (AKIF) and Martin Groups. The total of 30 students were participated in this event from our University and other 970 students comprising of various schools and colleges (Government and Private).

A total of 10 members were solely involved in educating Government school students in our University on 21st and 22nd January, 2021. A team of truly dedicated 5 members were selected by CEO of SZI, Dr. Anand Megalingam (Project Head)to work on Ground station in Rameshwaram from 1st to 7th February, 2021 that includes myself too.I was the student head of our University and managed all the tasks right from scratch regarding Ground stations works, Pre-Launch tests, Analyzing of weather and other components, Assembling of 100 FEMTO satellites,so on and so forth. On the Big Day, 7th February,2021, all the satellites were launched successfully and received safely and the data were recorded and published. This event paved way for us to receive GUINESS WORLD RECORDS, WORLD BOOK OF RECORDS, ASIA BOOK OF RECORDS, INDIA BOOK OF RECORDS and ASSIST BOOK OF RECORDS.

My experience cum friendly advice to all my juniors and fellow mates is that be Punctual. Punctuality paves the way for all the success.

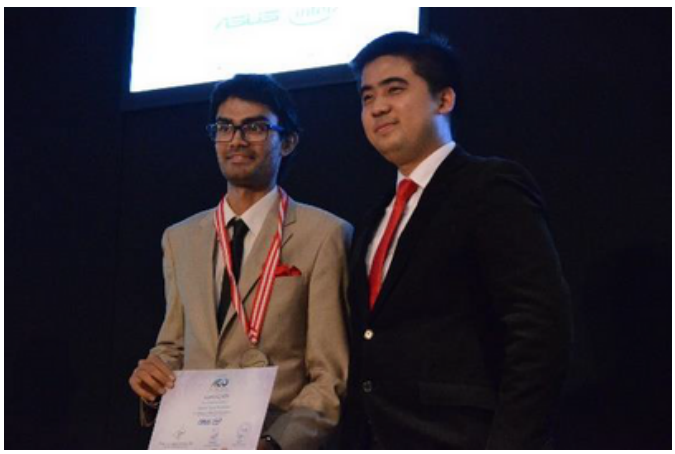
VOL. 4 ISSUE 3 - 2021

ALUMNI CORNER

LIGHT UPON LIGHT

USAMA TARIQ RASHEED (2013-2017)

In June 2013 I started my engineering studies at Dr. MGR E&RI University, during this time I learnt several life changing principles - how to be honest with what I can promise myself to achieve, when is it the right time to decide what I must do, where do I expect myself to be in future, what are the essential knowledge deficiencies which will hinder to charter my path and to know how to upskill those grey-areas. I answered these critical questions in 2013 viz. first and second semester. Entering the main campus in II-year was like enlightening my vision horizontally, I remember networking with all departments and identifying peers and seniors who were like-minded to learn and grow from them. The professors like Dr. N. Ethiraj, Prof. Andrew Nallayan and Prof. Ashok Kumar were highly magnetic and charismatic to me and my friend (Shubham Mourya). We both friends hooked on to them to help us connect with seniors who had done excellently at academic level and were pursuing high-profile jobs at many industries. In the same year, I identified my inclination towards intensive research, Prof. Andrew guided me through writing my first journal, setting the format, reading several backing researches on the same subject, drawing references and searching for suppliers to procure materials for prototyping the samples with different recipes. In short in industrial terminology, I was given an eagle-eye view of supply chain management, procurement, production principles, operations and planning ahead of dates for presenting journals at the conferences. These were the richest experiences which bestowed my journey as light upon light.



Mr. Rex Remitio, Anchor, CNN Awarding Title for "Best Live Report" at Asian English Olympics (AEO) hosted by Binus University, Jakarta, Indonesia.

2016-17 was the academic year which reaped professional accountability in my career, helping me realize the work I had done was valuable to few industries like the automobile body parts which are made of polymer composites, consumer goods and industrial plastic packaging which today is in lime light for finding innovative solutions which can reduce the carbon footprint on the environment. Hence, I applied for positions to all these industries and found myself amidst the most important converters in the Kingdom of Saudi Arabia, Al Sharq Plastic Industries Co Ltd a group company of Takween Advanced Industries which is supplier to all Fast Moving Consumer Goods (FMCGs), Food and Beverage (F&B) and other industries. Today, I head the eastern provinces of the Kingdom of Saudi Arabia in business development and sales for packing materials. Almost five years after graduating from Dr. MGR E&RI University, I am so pleased and humbled by the beginnings in 2013 - I will always be in gratitude for Dr. MGR E&RI University President, Er. Arun Kumar for his undying support, appreciation and acknowledgement on multiple occasions during 2013-17 of my career.

Institute of Engineering and Technology (IET), United Kingdom - hosted IET Scholarships with dignitaries from Google India at Chennai, TN. Secured 2nd Position all over India with Scholarship

The common image portrayed of an average engineer is one where his versatility in many ways goes from being at sky-high levels to somewhere into the other galaxies. The ability to present ideas in the field of engineering conceptualism, science and technology has always been crucial. Hence, I have shed more light on myself for becoming a scientifically thought provoking presenter.

There are very less inspirations that utilize the imaginations of an engineer, or even take them to a proper channelized prosecution of thought ability. Therefore, I have been maneuvering onto these principles since the first year of my Mechanical Engineering to master the skills of presentation on any given engineering topic for any given scenario.

The extent of which may be seen in the tabulation-

Sl. No.	Title	Year
1	*Won the 1st Position in the Oratorical Competition held to celebrate National Youth Day by Youth Association for Cultural Excellence YACE'13 of Dr.M.G.R Educational and Research Institute, University*	2013
2	*Won the 1st place in the Elocution Competition held to celebrate National Youth Day by Youth Association for Cultural Excellence YACE'13 of Dr.M.G.R Educational and Research Institute, University*	2013
3	*Runner-up of South Asia Pacific Region Finale at IIT-Delhi Institute of Engineering and Technology (IET), United Kingdom* Link- https://www.youtube.com/watch?v=2kG9wH_66mE	2014
4	*Recognized by National Aeronautical and Space Administration (NASA) for receiving a Boarding Pass of Orion's Flight Test acknowledging his name to be written on the surface of planet Mars in addition to the essay written during Xth Standard (2010)*	2014
5	*Student Ambassador of Tamil Nadu Book of Records for Swachh Bharat Campaign at Puducherry*	2014
6	*Research Scholar at International Community of Electrical Research and Development (ICERD)*	2014
7	*Implant Trainee at Integral Coach Factory (ICF), Chennai by Ministry of Railways 2014*	2014
8	*Awarded the Special Mention for representing Uttar Pradesh (NORTH) in the Youth Parliament in the VIT Technical United Conference in association with The Institution of Engineering and Technology, United Kingdom*	2014
9	*Stood Second in the BIO ZONE'14 for proposing an Industrial Development Plan at Dr. M.G.R Educational and Research Institute, University*	2014
10	*Certificate of Appreciation by IEEE MGR STUDENT CHAPTER for participating in the National Level Robotics Championship titled "MICROBOTS 2014" conducted by M/s Robominds Technologies LLP at Dr. M.G.R Educational and Research Institute, University*	2014
11	*Secured 2nd Position in Quiz at the Glittercrazzy'14 in association with the Literary Seminary of Dr. M.G.R Educational and Research Institute, University*	2014
12	*The Entrepreneur Cell, IIT-Bombay as the College Representative*	2014-15
13	*Journal Published in the American Eurasian Journal for Scientific Information, TAME'15 National Conference on Technological Advances in Mechanical Engineering in association with International Organization of Scientific Research and Development (IOSRD) at Vel Tech University-Chennai.* http://www.aensiweb.net/AENSIWEB/jasr/jasr/2015/September/105-110.pdf	2015
14	*Stood second at Information and Communication Technology Academy of Tamil Nadu (ICTACT) Youth Talk Marathon'15*	2015

15	***Winner of Idea India Speech Competition*** received an Award From ***Dr. K. Rosaiah His Excellency Governor of Tamil Nadu*** held by ***India Reigns Magazine*** in association with ***Dr. A.P.J. Abdul Kalam Students Federation of India*** on the ***15th Oct'15***	2015
16	Secured ***1st Position*** in ***Debate*** held as a part of ***Glittercrazzy'15*** in association with the ***Literary Seminary*** of ***Dr.M.G.R Educational and Research Institute, University***	2015
17	***Won the Consolation Place in the Intra – University Essay Writing Competition*** held to celebrate ***National Youth Day*** by ***Youth Association for Cultural Excellence YACE'15*** of ***Dr.M.G.R Educational and Research Institute, University***	2015
18	***Won*** the ***Runner in Debate*** held as a part of ***LITFEST'15*** in association with the ***Literary Seminary*** of ***Dr.M.G.R Educational and Research Institute, University***	2015
19	Secured ***2nd Place*** in the ***Regional Finale – Chennai of ICTACT YOUTH TALK 2015*** organized by ICT Academy of Tamil Nadu	2015
20	Presented a paper at the ***3rd National Conference on Recent Trends in "Clean Technology for Sustainable Environment (CTSE)"*** organized by the ***Department of Chemical Engineering, SSN College of Engineering***, Chennai	2015
21	Secured ***1st Prize*** in the Event ***Battle of Words*** held as a part of ***AAKRITI'15*** conducted by the department of ***Civil Engineering*** of ***Dr.M.G.R Educational and Research Institute University.***	2015
22	Won the title of ***Best Live Reporter*** at ***Asian English Olympics'16*** held by ***BINUS University*** in Jakarta, Indonesia.	2016
23	Presented a paper at ***International Conference on Mechanical, Materials and Manufacturing Systems (ICMMMS)*** held by Sri Sairam Engineering College entitled as ***"Effect of Glass Spheres and Stacking Functionalization on Properties of E Glass / Cyanate Modified Epoxy Laminate"*** http://www.indjst.org/index.php/indjst/article/viewFile/108436/77208	2016
24	Presented a paper on Alternative Fuel at the 2nd International Conference on Frontiers in Automobile and Mechanical Engineering (FAME) held at Sathyabama University in association with Combat Vehicles Research and Development Establishment (CVRDE), DRDO http://iopscience.iop.org/article/10.1088/1757-899X/197/1/012013	2016
25	Presented a paper on Composite Materials at the 2nd International Conference on Frontiers in Automobile and Mechanical Engineering (FAME) held at Sathyabama University in association with Combat Vehicles Research and Development Establishment (CVRDE), DRDO http://iopscience.iop.org/article/10.1088/1757-899X/197/1/012002/meta	2016
26	Presented "A Holistic Solution for Cashew Cultivating Farmers" Based on the Research, Runner-up at the Southern Indian Regional Scholarship Finale held by the Institution of Engineering and Technology (IET), United Kingdom.	2016
26	Secured 3rd place in Regional Finale – Chennai at ICTACT Youth Talk 2016	2016
27	Won "Special Mention" while presenting a technical talk at the Indian Space Research Organization (ISRO).	2016
28.	First Prize in Lingua France (Debate), in Tahshashila at Chennai Institute of Technology	2017
29.	Presented a paper on Composite Materials at a National Conference on Recent Advancement in Mechanical Science and Technology held in St. Peter's University.	2017
30.	Received two scholarships from Institution of Engineering and Technology followed by two from the President, Er. A.C.S Arun Kumar, total worth combined 1,70,000/- INR	2014-17
31.	Dr. M.G.R. Educational and Research Institute University, Chennai Best Outgoing Student 18th April, 2017	2017

Left- Deputy Defense Director of India, IES Aman Rajput, host of South-Asia Pacific, Present around the World Competition by Institution of Engineering and Technology (IET), UK at IIT-Delhi

The President Er. Arun Kumar appreciates and acknowledges along with the dignitaries for winning the South Regional Finale on the 26th July, 2014
Felicitated by the President Er. A.C.S Arun Kumar OF Dr. M.G.R Educational and Research Institute, University.

Receiving an Award from Dr. K. Rosaiah His Excellency Governor of Tamil Nadu on the 15th September, 2015

Winner of South Zone Finale Present around the World Competition by Institution of Engineering and Technology (IET), UK at Dr. M.G.R. Educational and Research Institute, University.

Second Place holder at ICTACT Youth Talk at Chennai Institute of Technology

Felicitated by the President Thiru. Er. A.C.S Arun Kumar OF Dr. M.G.R Educational and Research Institute, University.

Mr. USAMA TARIQ RASHEED receives The Best Live Report Award at the Asian English Olympics 2016, appreciated and acknowledged by The President Er. Arun Kumar and the dignitaries of the University.

Runner Up at IET Scholarship Regional Finale on 28th July 2016

Stood third at the ICTACT Youth Talk 2016 on 28th August 2016

Appreciated and felicitated by the President, Er. Arun Kumar for the keen efforts
Stood third

Dr. M.G.R. Educational and Research Institute University, Chennai Best Outgoing Student
18th April, 2017

The values and principles instilled in me at the Dr. MGR E&RI University are an invaluable motif. The Mechanical Engineering Department headed by Dr. M. Ganesan at my time will remain a pinnacle of zeal and zest - a temple of the engineering values built, demonstrated and bestowed in me as light upon light.

Sincerely,

Usama Tariq Rasheed,
Class of 2013-17,
Department of Mechanical Engineering,
Dr. MGR Educational & Research Institute, University.
Contact- usamatariqr@gmail.com, +91-9940661863
https://in.linkedin.com/in/usamatariqrasheed

PUBLICATIONS

STAFF PUBLICATIONS
JULY-SEPTEMBER 2021

JULY - SEPTEMBER 2021

TITTLE OF THE PAPER	NAME OF THE AUTHOR	JOURNAL/ CONFERENCE	MONTH -YEAR OF PUBLICATION
A review of Additive Manufacturing for Synthetic Bone Crafts and Dental Implants	N. Ethiraj, T. Sivabalan,	Journal of Manufacturing Technology Research 13(1-2):29-52	July - 2021
Experimental and Finite Element Analysis of Single Stage Single Point Incremental Forming	N. Ethiraj,	International Journal of Engineering DOI:10.5829/ije.2021. 34.10a.07	August - 2021
Experimental investigation on the usage of processed oil as a source to fuel the diesel engine	K.Rajan	Biomass Conversion and Biorefinery DOI:10.1007/s13399-021-01789-z	August - 2021

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