Aspire

Achievements in Sports, Projects, Industry, Research and Education

Monthly Newsletter

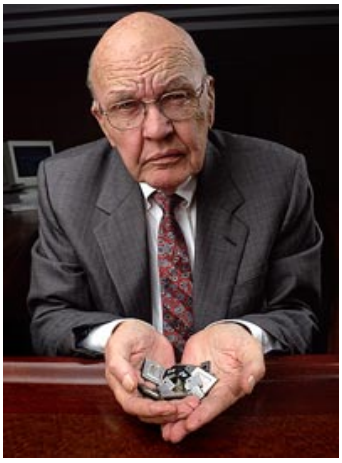
Department of Mechanical Engineering

February 2021

Sri Sivasubramaniya Nadar College of Engineering

Rajiv Gandhi Salai, Kalavakkam, Chennai, INDIA

INVENTOR OF THE HYBRID INTEGRATED CIRCUIT



Jack St. Clair Kilby was an American electrical engineer who took part (along with Robert Noyce) in the realization of the first integrated circuit while working at Texas Instruments (TI) in 1958. He was awarded the Nobel Prize in Physics on December 10, 2000. Kilby was also the co-inventor of the handheld calculator and the thermal printer, for which he had the patents.

Kilby was born in 1923 in Jefferson City, Missouri, to Hubert and Vina Freitag Kilby. It was Kilby's father's job as a manager of a local power company that brought the family from Jefferson City to Kansas. Kilby grew up and attended school in Great Bend, Kansas, graduating from the Great Bend High School. While Kilby was in high school, a devastating ice storm knocked down most of the poles that carried the telephone and electric power lines. Subsequently, his father worked with amateur radio operators to communicate with the areas where customers had lost their power and phone services. His dad's goal was to do whatever it took to run his business and to help people, but Kilby was fascinated by the subject of amateur radio. It sparked his interest in electronics, and that's when he decided that this field was something he wanted to pursue.

After high school, Kilby studied electrical engineering at the University of Illinois. Most of his classes were in electrical power, but because of his childhood interest in electronics, he also took some vacuum tube engineering physics classes. Kilby graduated in 1947, just one year before Bell Labs announced the invention of the transistor. It meant that his vacuum tube classes were about to become obsolete, but it offered great opportunities to put his physics studies to good use. After graduating, Kilby went to work at Centralab in Milwaukee, Wisconsin. He later went on to earn his Master of Science in electrical engineering from the University of Wisconsin–Madison in 1950 while working at Centralab.

In mid-1958, Kilby moved to Dallas, Texas, as a newly employed engineer at Texas Instruments (TI). He did not yet have the right to summer vacation. Hence, he spent his summer working on the problem in circuit design that was commonly called the "tyranny of numbers," and he finally came to the conclusion that the manufacturing of circuit components en masse in a single piece of semiconductor material could provide a solution. On September 12, he presented his findings to the company's management. He showed them a piece of germanium with an oscilloscope attached, pressed a switch, and the oscilloscope showed a continuous sine wave, proving that his integrated circuit worked, and thus that he had solved the problem. U.S. Patent 3,138,743 for "Miniaturized Electronic Circuits," the first integrated circuit, was filed on February 6, 1959. Along with Robert Noyce (who independently made a similar circuit a few months later), Kilby is generally credited as the co-inventor of the integrated circuit. Source: https://www.nobelprize.org/prizes/physics/2000/kilby/biographical/

Campus Update

Invente 5.0, SSN's Annual National Level Technical Symposium:

Invente 5.0 was conducted online via zoom on the 22nd of January, 9 AM with over 600 participants attending virtually. Dr. Srimathy Kesan, Founder and CEO of Space Kidz India attended as chief guest. The event began with the singing of the Tamil Thai Valthu. Post which, Anam Sathvik Reddy greeted the gathering, and gave an introduction of the history of Invente, along with the challenges brought by the Pandemic. He thanked SSN institutions for their support in conducting the symposium online.

This was followed by an address by the principal of SSNCE, Dr. V. E. Annamalai as he recounted the achievements of the college. Dr. Srimathy Kesan also addressed the gathering and gave an inspiring speech about students being the innovators of the future and how anyone, no matter age or distinction is capable of adding value to society by creativity and determination. Space Kidz India, her organization, creates young scientists amongst college and high school students and is the first organization to have launched satellites, designed by them in space.

Read More:
https://drive.google.com/file/d/1q-xvfHpNuVQ5Fu55zdVA-DlOc-AjkelQ/view?usp=sharing

Department Update

Placement Update

Happy to state that one girl student S. Nagalakshmi from our Final Mech got placed in TITAN (Titan Engineering & Automation Ltd. in short TEAL) with a CTC of 5 LPA for the GET role. Another girl student R. Mahalakshmi has been waitlisted. I join with you all in congratulating both the students with special wishes to Mahalakshmi (Placement Coord.) for moving ahead from the waitlist to a confirmed offer,

Just to share: Thus far, Our dept. has earned a "great brand" among the visiting industries and the students have also earned a "great name". Indeed that makes the stakeholders' expectations grow high every year on year when it comes to SSN Mech. That in turn encourages us all in preparing our students for a Brighter Tomorrow with a difference!! I hope you all agree with me !!. Both the students have already two jobs on hand (CTS/TCS) !!Karan R.J, final Mech got placed in MRF for R&D Role with a CTC 4.81 LPA.

MRF already had given one GET offer to Arvind Kumar R. Later they considered one more for the R&D role. Now, two from the 2021 batch will be in MRF !!

List of Companies and Students got placed till Jan 2021

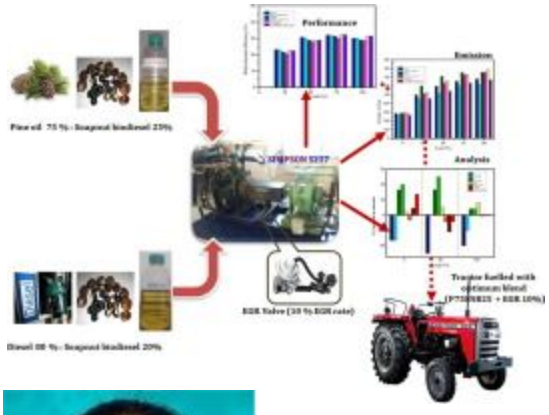
And here the list of companies, the placement process of which is either half-way through or yet to commence as regards our dept.

1. L&T Construction - waiting for interview results
2. Royal Enfield - waiting for test results
3. Freshworks - waiting for test results
4. Accenture - waiting for interview results
5. Infosoff - a process not yet started
6. Hitachi ABB - a process not yet started
7. HCL - process not yet started
8. Tata Chemicals - a process not yet started

Dr. N. Lakshmi Narasimhan

Publication in Fuel, Elsevier with 5.128 Impact Factor

V. Venkatesan, N. Nallusamy and P. Nagapandiselvi, Performance and emission analysis on the effect of exhaust gas recirculation in a tractor diesel engine using pine oil and soapnut oil methyl ester, Fuel, Vol. 290 -120077, 2021.



The combustion of biofuel in compression ignition engines produces lower carbon monoxide and unburnt hydrocarbon emissions compared to diesel fuel but higher NOx emissions. Because of reducing NOx emission, the exhaust gas recirculation (EGR) technique was used in the present investigation to study its effect on engine performance and emission characteristics of a twin-cylinder off-road vehicle diesel engine (Simpson S217-tractor). The blends of pine oil - soapnut oil methyl ester (P75SNB25), diesel - soapnut oil methyl ester (SNB20) were prepared on a volume basis and used in the test engine with a fixed rate of 10% EGR under various loads. The soapnut oil was extracted from the soapnut

seeds and trans-esterified in two stages using methanol and catalysts. The high viscosity of soapnut oil methyl ester is compensated by blending it with low viscous pine oil. The experiments were conducted in a four-stroke, twin-cylinder tractor diesel engine to study the performance and emission characteristics of the prepared biofuel blends.

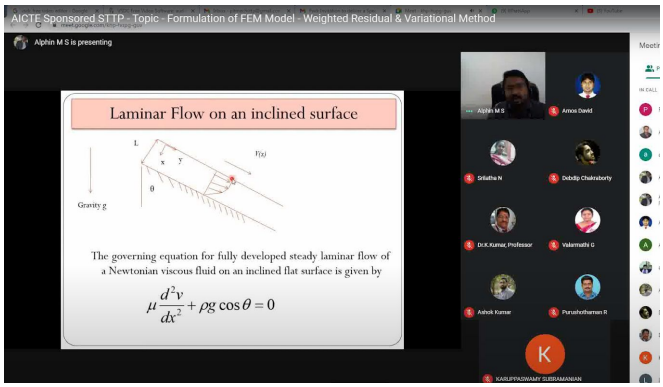
Publication in SCI listed Journal

M. Rajesh, K. Rajkumar & V. E Annamalai Abrasive water jet machining on Ti metal interleaved basalt-flax fiber laminate materials and Manufacturing Processes 36:3, 329-340, 2021.

Machining of high strength and shock-absorbent Metal Fiber Laminate (MFL) becomes inevitable to attain the geometric shape and size, as to validate the functionality in various impact protection environments. A class of titanium metal laminate alternatively interleaved with high strength basalt and shock absorbing flax fibers have been machined with an abrasive water jet method. Machining experiment trials with WJP-water jet pressure, TS-traverse speed, SOD-stand-off distance, and AMFR-abrasive flow rate and parametric optimization on quality factors of surface roughness (Ra) and kerf ratio (KR) were done using a Central Composite Design (CCD)-Response Surface Methodology (RSM). Experimental investigation reveals that the surface roughness and kerf ratio significantly decreased by 27.59% and 9.16% as water jet pressure was increased to peak value. Similarly, the abrasive mass flow rate raised to its higher value, the Ra and KR slightly decreased by a margin of 6.5% and 2.5%. However, a reverse effect on surface roughness and kerf ratio was observed as an increase of SOD and TS. Surface topology analysis reveals that the material removal mechanism of the Ti sheet is shear plastic deformation with plowing marks, that of basalt fiber is a brittle fracture with micro-chipping, and that of flax fiber is bulk machining.

Resource Person for Faculty Development Program

Dr. M Selvaraj delivered an Expert talk given in AICTE - Sponsored STTP program on "Fundamentals of Finite Element Analysis and its Applications in Engineering", organized by the Department of Mechanical Engineering, Panimalar Institute of Technology, Chennai



Dr. M S Alphin delivered a guest lecture in Finite Element Formulation in AICTE - Sponsored STTP program on "Fundamentals of Finite Element Analysis and its Applications in Engineering", organized by the Department of Mechanical Engineering, Panimalar Institute of Technology, Chennai. (19 Jan 2021).

Dr. K. Rajkumar, ASP/Mech delivered a guest lecture on “Machining of smart alloy and its applications” at the department of MECH, Sri Venkateswara College of Technology, Chennai on 30.01.2021

Dr. N. Nallusamy, Prof/Mech, delivered a guest lecture on the topic "Heat Exchangers" at AICTE sponsored FDP on "Thermodynamics & its Applications" organized by College of Engineering, JNTU, Ananthapuramu, AP state on 22-01-2021.

Funded Research Project Submitted

Dr. R. Rajeswari, Assoc. Prof/ Mech Project Title: Online monitoring and control of the powder mix and ultrasonic vibration EDM by pulse train analysis to improve process performance using thresholding approach, PI: Dr. R. Rajeswari/ASP/Mech, Total Budgett (INR): 30,00,000. Funding Agency: SERB-POWER (Promoting Opportunities For Women in Exploratory Research) Grant - 2021.

Dr. N. Lakshmi Narasimhan, Assoc. Prof/ Mech, Project Title: Studies on The Thermal Management/Fire Suppression Capabilities of Ampcool Dielectric Coolant (Produced by Engineered Fluids, USA) Employed For Cooling High Power Lithium-Ion Battery Modules, PI: Dr. N. Lakshmi Narasimhan/ASP/MECH, Total Budget: 141459 (USD), Funding Agency: Engineered Fluids, USA.

MOU:

An MoU was signed between RoboRAM and Sri Sivasubramaniya Nadar College of Engineering on 14.12.2020. This MoU promotes interactions at various levels more specifically in the areas of Robotics, Industrial Automation, and IoT. Dr. N. Lakshmi Narasimhan, ASP/Mech coordinated the MoU process.

An MoU was signed between WhiteBlue Cloud Services and Sri Sivasubramaniya Nadar College of Engineering on 23.12.2020. This MoU promotes interactions at various levels more specifically in the areas of Cloud Computing and IoT. Dr. N. Lakshmi Narasimhan, ASP/Mech coordinated the MoU process.

Faculty Writeup

Dr. M. Suresh shares on the courses completed

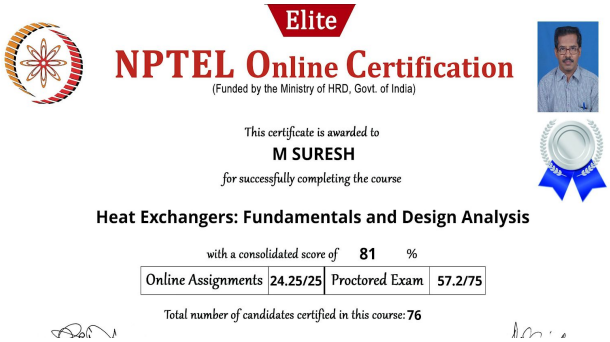
I have passed two NPTEL exams:

1. Steam and gas power systems [91%]

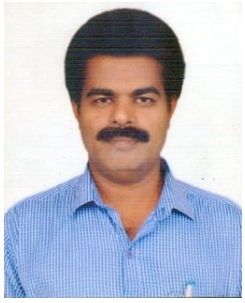
   - Type of certificate: Elite + Gold

2. Heat exchangers: Fundamentals and Design analysis [81%]

   - Type of certificate: Elite + Silver



Mr. NAGARAJAN S, Lab Instructor writes...



Completed Alison – Courses

1. Manufacturing Processes - Material Removal
2. Manufacturing Processes - Heat Treatment and Surface Properties
3. Manufacturing Processes - Casting
4. Manufacturing Processes - Metalworking

National & International Webinars Attended

1. Attended the Virtual Faculty Development Programme **"The New Teaching Paradigm"** by PG and Research, Department of English, Marudhar Kesari Jain College for Women, Vaniyambadi, on 04/01/2021.
2. Attended the National Webinar **"Impact of COVID-19 on pharmaceutical Education and Research"** by the Society of Pharmaceutical Sciences and Research (SPSR), Panchkula, Haryana, India, on 08/01/2021.

3. Attended the Webinar **"Introduction to Non-Destructive Testing (NDT) Techniques"** Departments of Mechanical and Automobile Engineering, Arasu Engineering College, Kumbakonam, Tamil Nadu, on 12-01-2021.
4. Attended the Webinar **"Basic Disaster Training Programme'' by** Harish Chandra Mathur State Institute of Public Administration (HCMSIPA), Rajasthan, from 12/01/2021 to 14/01/2021.
5. Attended the International Webinar**" Crisis of Security Challengers: A Global Concern"** by Tuljaram Chaturchand College of Arts, Science and Commerce, Pune, India from 15-01-2021 To 16-01-2021
6. Attended the Webinar **"Nanotechnology and Medical Science: Challenges Ahead"** by the Society of Pharmaceutical Sciences and Research (SPSR), Panchkula, Haryana, India, on 16/01/2021.
7. Attended the International Webinar**" The Impact of Robotics and AI"** by Institution Of Mechanical Engineers, 1 Birdcage Walk, Westminster, London, UK, on 19/01/2021.
8. Attended the Guest Lecture **"Role of Computational Mechanics in Manufacturing Processes"** by Department of Mechanical Engineering and Automobile Engineering, Arasu Engineering College, Kumbakonam, Tami Nadu on 20/01/2021.

The national level of Quizzes Participated

1. Participated and got certificates from "12 Nos. of National level of Quizzes" in various topics like World Environment, GK, Covid-19 Awareness, etc., during January 2021.

Report on NPTEL Courses Registered by Students

We, in our Department, are very happy to note that 116 students have completed NPTEL courses during the period September-December, 2020. It should be noted that this is a big improvement over the 65 students, who registered during January-April,2020. Our NPTEL monitoring team from the Department is headed by our HOD, Dr.Nallusamy, and comprising Dr.Ananthapadmanaban, Dr.S.Sureshkumar, Dr. K.S. Jayakumar and Dr.A.S.Ramana has been monitoring the completed courses and has submitted the list of completed courses to the Controller of Examinations.


Elite

NPTEL Online Certification

(Funded by the Ministry of HRD, Govt. of India)

This certificate is awarded to

SRICHARAN S

for successfully completing the course

Functional and Conceptual Design

with a consolidated score of 73 %

Online Assignments 19.75/25 | Proctored Exam 53.57/75

Total number of candidates certified in this course: 101

Prof. Devendra Jalihal

Sep-Dec 2020

(12 week course)

Prof. Andrew Thangaraj

The committee has also listed the courses that are allowed for the semester January, 2021-April 2021. The information has been sent to the students before the start of the courses, and we expect a perfect response this semester too. A special feature of this semester is that a

value-added course offered by Dr. Manoj Gupta, Professor, National University of Singapore is being offered. It will be considered as a 1 credit course and will also be included in place of 8th-semester course work. The course deals with Composite Materials.

- Dr. D. Ananthapadmanaban

Orientation towards Multidisciplinary projects

-Dr. Satheesh Kumar Gopal

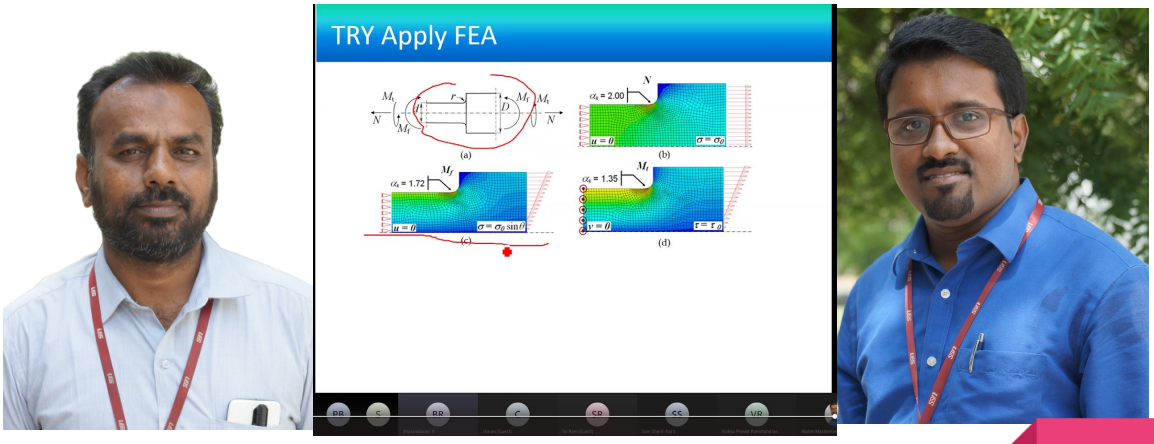
In continuation to the orientation program designed for the 1st year students of KCG College of Engineering, the next three topics were covered on:

S.No.	Mode	Topic & Explanation	Date	Support
1.	Lecture	Introduction to practical aspects of robots	26.12.2020	
2.	Live Demo	Using a microcontroller for controlling sensors and actuators	09.01.2021	Mr. Arun, Research Scholar
3.	Live Demo	Building a simple tracking robot	23.01.2021	Mr. Aditya Bucha, 4th year
4.	Lecture	Figuring out Project ideas and Path to patenting	30.01.2021	

Provision to incubate at our institute (SSNCE) was also highlighted in the last session. On the whole, the program was beneficial for me to consolidate the concepts in providing the right direction for the first year students of engineering. More projects, patents, publications, and eventually incubations are the visible research output expected from this venture. Would like to thank my scholar and student for helping me in the demo and also the management for providing the much essential freedom to perform.

One Day Hands-on E-Learning Workshop on ABAQUS /CAE

Conducted by Dr. M Nalla Mohamed and Dr. M S Alphin on 30 Jan 2021



Other Monthly Activities and Publications

Achyuth Ramachandran, Final Year Mech, Article titled "Python inspired Artificial Neural Networks Modeling in Drilling of Glass-Hemp-Flax Fiber Composites" accepted for publication in FME Transactions, Jan 2021

Dr. K.S.Vijay Sekar attended the online DC meeting for Mr. Prem Sankar, a Ph.D. scholar registered in the Dept of Mechanical Engineering, Hindustan University, Padur on December 22, 2020.

Dr. K.S.Vijay Sekar attended a DC meeting for Mr. Joel C, a Ph.D. scholar registered in the Dept. of Mechanical Engineering, Hindustan University Padur on December 19, 2020.

Dr. B. Anand Ronald completed a Coursera online Course on "Introduction to Augmented Reality and AR Core" an Online non-credit course authorized by Google AR and VR.

Dr. K. Jayakumar, Dr. D. Ananthapadmanaban, and Dr. K. Jayakumar, Associate Professors organized a national level one-day online workshop on "Recent Trends in Manufacturing Engineering" on 29th December 2020.

Mr.Subramani R, Completed Protecting the World: Introducing Corrosion Science and Engineering in Coursera

Mr. Krishnasamy M and Mr. Arumugam K completed “Getting Started with Google Sheets" in Coursera Online Platform.

Mr. Nandakumar P Introducing Corrosion Science and Engineering in Coursera

Mr. Arumugam K, Participated in Five Day Webinar Series - 2 on “Innovations in Mechanical Engineering and Science” from 8th to 12th December 2020 organised by MESA, Department of Mechanical Engineering, Vel Tech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Chennai,Tamil Nadu, India.

Dr. S. Rajkumar, attended the Five days virtual Faculty Development Programme (FDP) on "ME 8493 Thermal Engineering" Conducted by Sri Sai Ram Engineering College, Chennai, Tamil Nadu from 28.12.2020 to 04.01.2021.

Dr. B. Anand Ronald, conducted the Synopsis meeting for Part Time Research Scholar Mr. Johnny Varghese (Reg. No: 1314299751) on 18 Dec 2020

Dr. N. Nallusamy, conducted the confirmation DC meeting for his part-time research scholar, Mr. C. Karthikeyan on 11.01.2021.

Dr. S. Vijayan, Balaraman G, Jaikumar R V, Sundareswaran R, and Vijayan S A Study on Centrality Measures in Semigraphs 4th International Conference On Applied Mathematical Models, PSG College Of Technology, Coimbatore Department Of Mathematics January 7 - 9, 2021"

Dr. M S Alphin and Dr. C. Arun Prakash, Appointed and served for AICTE and Ministry of Education as evaluators for Toycathon 2021.

Dr. Sathesh Kumar Gopal attended a BOS meeting of AITS, RAJAMPET, Kadappa on 20.01.2021

Dr. KS VijaySekar, ASP/ MECH was invited to be a Technical Committee member at the “The 12th International Conference on Manufacturing Science and Technology (ICMST 2021) and 2021 3rd International Conference on Advanced Nanomaterials and Nanodevices (ICANN 2021), to be held in Shanghai, China during October 16-18, 2021

Dr. K.S.Vijay Sekar has been invited to present his research work in the “Plasticity modelling, parameter identification and applications to forming operations” on behalf of COMPLAS 2021 , the XVI International Conference on Computational Plasticity, to be held in Barcelona, Spain, on September 7-10, 2021.

Student Writeup

VIRTUAL RECRUITMENT

I am **Karan R J** and I would like to share my experience about the MRF placement process. The entire placement process of MRF took place over 3 months. There were 4 rounds - Written test, GD, Preliminary Interview and Final Interview. Each round had eliminations.

ROUND 1: WRITTEN TEST

48 students were shortlisted for Round 1. It had 4 sections. Each section had a separate timer.

Section 1 - Mechanical Objectives: 30 questions to be answered in 30 min. Difficulty level was moderate. Very few problems were asked, rest were theory types. Questions were asked from almost every mechanical core subject.

Section 2 - Aptitude: 30 questions to be answered in 40 min. Difficulty level was easy to moderate. Majority of the questions were from logical reasoning and the rest were from Quants. Logical reasoning questions were very easy and some questions from Quants were a bit tricky, yet they can be solved if you have good practice.

Section 3 - Personality test: 44 questions to be answered in 10 min.

Section 4 - Scheduling Activity: 3 sets of questions to be answered in 20 min. This is an interesting section where a paragraph will be given which has different activities (professional & personal) at different timings mentioned. You will be asked to select or prioritize 5 or 6 activities from 8 activities. The motive of this section is to check how well you balance your work and personal needs.

ROUND 2: GROUP DISCUSSION

15 students were shortlisted for Round 2. Since it was online, we were asked to present our thoughts individually. You can also expect a technical topic for GD.

ROUND 3: PRELIMINARY INTERVIEW

The top performers of the first 2 rounds were selected for R&D interview and the remaining were selected for Maintenance. 2 students were shortlisted for R&D including myself and 11 students were shortlisted for Maintenance. It was a technical + HR round. The panel who interviewed me consisted of 3 members (HR, Manager and a technical person from R&D). After introducing myself, they started questioning from my resume. They asked me to explain my projects, IV, Courses & Certifications, Webinars that I attended etc. The interview hardly lasted for 10 min for me.

ROUND 4: FINAL INTERVIEW

3 students were shortlisted for Final interview (Maintenance - 1, R&D - 2). The panel consisted of 2 members (HR and VP of R&D). It was just a formal interview. The VP explained about various divisions in R&D and asked me in which division would I like to work. They were checking whether I would pursue higher studies & the HR asked my consent about relocating to different places in India. This round lasted for 8 min.

Results were announced 10 days later. 2 students (Maintenance - 1, R&D - 1) received the offer. I had a few rejections before getting this offer. Those rejections try to make you feel down, but keep in mind one thing - It doesn't matter how many times you fall but what really matters is how fast you bounce back. All the best!

Akash S, III-year, writes...

Learning a foreign language is certainly a pretty common trend among a good number of Indians. It not only helps you with your job/study opportunities but also unveils a whole new world of possibilities to explore. Most learn it out of sheer need and seldom out of personal interest for the unknown. My case isn't much too different, at least when I was a mere beginner. I am Akash S, a third year student, Mechanical and I chose German to be my guide to the future. It is a well-known fact across the industry that Germany is a nation where new innovations and technological developments are taking the industry by stride. And so, it comes as little surprise to know that the Universities there are just as good.

My initial inspiration to learn the language came from all my inputs of how great a country it is and how we must strive to reach its technological prowess. To be completely honest, I'd always been interested in studying abroad, as that is the only true time in your life when you can actually spend quality time in a country without the stress of job security and citizenship.

The need for the language is much simpler to explain. To all aspirants who seek to study abroad, or more specifically, in Germany, the following is all you need to know regarding the matter. German universities offer courses in both English and German. But there are specific courses that are offered only in German. In the case that either you need that very same course to master that field of study or maybe even need that course to procure enough credits to graduate, it is very important to have advanced knowledge of the language in advance. The second and more obvious reason is that you are going to live in a strange new country to strange new customs. It is only natural to equip yourself in advance with enough knowledge to fend for yourself and lead a satisfactory social life.

The next obvious question that most people who've finally acknowledged the need to learn the language ask is – How far do I need to go? It is generally recommended to finish at least up to A2 level in order to be able to communicate your mind in Germany. But theory is often different from reality. So, I personally recommend finishing at least till B1. All English courses need no prerequisite level of German. However, the German courses need proficiency of C1 and C2 levels, but we'll always have plenty of time for that, if we so need it, after we make it to German mainland and pick up the language faster by interacting with the locals. I've personally completed till B1 at the moment.

The levels are oriented in increasing order of difficulty. A1 is simply communicative German to make sure you can get a decent meal and are worth your money. A2 is a slight upgrade, which helps you converse fluently with someone. B1 focuses more on grammar. Further levels focus on more complicated sentence structures and grammar nuances.

In conclusion, I believe that learning a new language can never harm you. If you have the time and resources to spare, it is always recommended to learn a language. Whether it is actually essential for our future is a different question. We never know when that single point in our resume will get us a job/promotion one day.

Vimal Kumar Bharathi B R, III-year, writes...

My experience with an NPTEL course

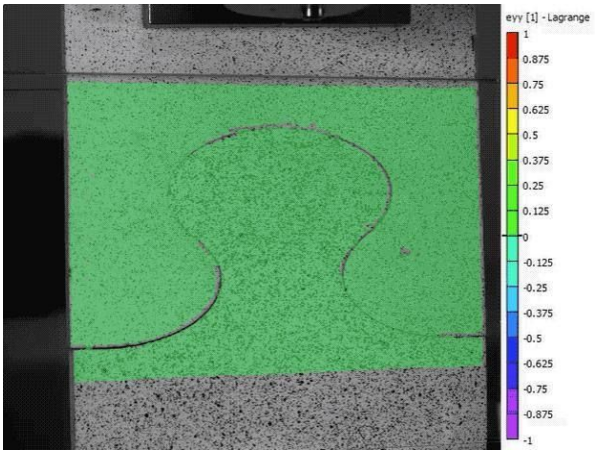
I chose "Introduction to Aerospace Engineering'' conducted by IIT-Bombay and taught by Dr. Rajkumar S Pant as an alternative to the professional elective being offered in the 8th semester. The course was really easy to understand and the learning curve wasn't very steep. The course was divided into modules which made the grasping of the concepts fairly easy. Prof. Pant always used pictures and videos to educate the concepts and also discussed certain phenomena in detail. The first 4 weeks concentrated on basic fluid mechanics and atmospheric properties. The following 3 weeks focused on basic aerodynamics and propulsion. The rest of the weeks mainly concentrated on the performance of an aircraft. This course was one of the most basic but it prepared me for the advanced courses in aerodynamics and jet propulsion. I would recommend this course for anyone who wants a grasp in aerodynamics but is not familiar with the basics.

Mech Marvel

The answer is.... Superbug?

For engineers pursuing advanced, ultra-tough materials, it can pay to look to the natural world for inspiration, and the diabolical ironclad beetle is not a bad place to start. This critter can survive being run over by a car and scientists have now unlocked some of the secrets behind this incredible toughness, which they say paves the way for a new breed of materials that bear similar characteristics.

The research was carried out by engineers at Purdue University and focuses on the incredibly tough exoskeleton of the diabolical ironclad beetle, which is one of the hardest of any arthropod. The Purdue team has uncovered new detail about how the creature absorbs such tremendous impacts.



Using compressive steel plates and CT scans, the team observed the ironclad's exoskeleton at work under increasing pressures, finding that it can handle loads at least 39,000 times its own body weight before fracturing – that's equal to an applied force of around 150 newtons. From there, the team used computer simulations and 3D-printed models to isolate the detailed structures within the exoskeleton, which highlighted the role of a connective suture that runs the length of the beetle's abdomen.

The blades of the exoskeleton lock themselves into one another like pieces of a jigsaw puzzle, which prevents them being yanked out of place under great force. Meanwhile, the suture and the blades divide into layers. Both of these mechanisms together work to spread the load across the beetle and avoid fatal fractures at its neck.

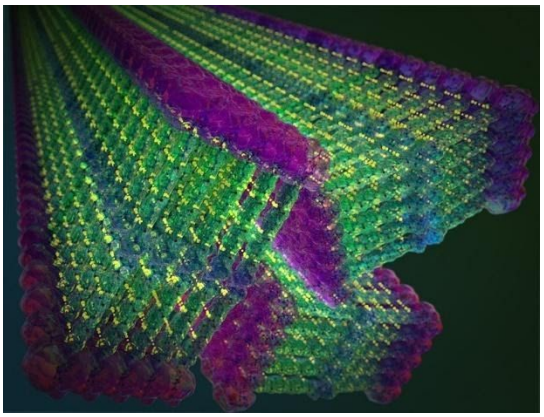
One of the areas the team hopes to apply this knowledge to is in the gas turbines of aircraft, where metals and composite materials need to be combined using heavy mechanical fasteners that can cause fracturing and stress over time.

The engineers created a carbon fiber composite fastener based on the ironclad's exoskeleton structure and carried out loading tests, finding it to be just as strong and significantly tougher than aerospace fasteners used today.

To know more, read through their article published in Nature, or watch their YouTube video on the topic.

Amazing Innovations 185

SELF-FORMING NANORIBBONS



By taking some inspiration from nature and some from the way the synthetic fiber Kevlar is formed, scientists at MIT have developed self-assembling nanoribbons they say are stronger than steel. These molecules feature an outer section that is hydrophilic and likes to interact with water, an inner section that is hydrophobic and doesn't like interacting with water, and strong Kevlar-inspired hydrogen bonds in the middle that enables them to join tightly with other molecules. When water is added the molecules assemble themselves into long ribbons just a nanometer thick, which were found to be stronger than steel. These were then stretched into long threads that could be dried out and handled, with the team finding they could hold 200 times their own weight.

Source: https://newatlas.com/materials/kevlar-inspired-self-forming-nanoribbons-stronger-steel-mit/

Amazing Innovations 186

IODINE FUELED ION THRUSTER

The Beihangkonshi-1 smallsat made the maneuver earlier this month using a self-contained NPT30-I2 electric propulsion system developed by French startup Thrustme. Aside from not needing any valves or plumbing to move the propellant about, solid iodine doesn't slosh like liquids do, is much denser than liquids, and can be configured into any needed geometry for storage. When iodine crystals are heated, they don't melt and then boil. Instead, they directly flash into a purple gas. The ion propellant comes pre-loaded in the NPT30-I2. When the engine is brought on line, the plug is heated and sublimates into gas. The iodine molecules are then given an electric charge and accelerated by a grid, producing up to 1.1 mN of thrust and a specific impulse of up to 2,400 seconds.

Source: https://newatlas.com/science/ground-penetrating-radar-soil-sampling/

Research news and Forthcoming event

Collated from multiple sources

Science and Engineering Research Board (SERB) SERB-TETRA (TechnologyTranslation Award) Last date for submission of the project proposal: 10-Feb-2021 http://serb.gov.in/pdfs/what-new/TETRA_Call_for_proposals.pdf
Biotechnology Industry Research Assistance Council (BIRAC) BIRAC Announces 18th Call for Proposals under the Biotechnology Ignition Grant BIG Scheme Last date for submission of the project proposal: 15-Feb-2021 https://www.birac.nic.in/cfp.php
Department of Science and Technology (DST) Advertisement for submissions of the new proposal under "Cognitive Science Research Initiative (CSRI) Last date for submission of the project proposal: 15-Feb -2021 https://dst.gov.in/callforproposals/advertisement-submissions-new-proposal-under-cognitive-science-research-initiative
Department of Science and Technology (DST) Joint Call 2020 on Digital Transformation for Green Energy Transition (MICall20) Last date for submission of the project proposal: 17-Feb-2021 https://dst.gov.in/callforproposals/joint-call-2020-digital-transformation-green-energy-transition-micall20
Department of Biotechnology (DBT) Call For Proposal In Fundamental Research Under The Bilateral Program With Germany (DBT-DFG) Department Of Biotechnology (DBT)- Deutsche Forschungsgemeinschaft (German Research Foundation) Funding Opportunities For Indo-German Fundamental Research Projects In The Life Sciences Last date for submission of the project proposal: 28-Feb-21 http://dbtindia.gov.in/whats-new/call-for-proposals

Council of Scientific and Industrial Research Collaborative Research Support Programme Under New Idea Fund Scheme The proposals in the prescribed format (see overleaf) should be submitted to DG,CSIR Last date for submission of the project proposal: Twice in a year i.e. on or before 15 September or 15 March. https://www.csir.res.in/sites/default/files/The_scheme_Collobarative.pdf
Department of Health and Human Services – Administration for Children and Families – OCS Community Services Block Grant (CSBG) CARES Act Rapid-Cycle Impact Projects Last date for submission of the project proposal: 21-Mar-21 https://www.grants.gov/web/grants/search-grants.html
Department of Science and Technology (DST) GRAND CHALLENGE – BIOMEDICAL DEVICE AND TECHNOLOGY DEVELOPMENT PROGRAMME Last date for submission of the project proposal: 31-Mar-21 https://www.grants.gov/web/grants/search-grants.html
Department Of Science and Technology (DST) Call for proposals under the National Health and Risk Communication program "Year of Awareness on Science and Health (YASH) for COVID 19" Last date for submission of the project proposal: 31-Mar-21 https://dst.gov.in/sites/default/files/YASH%20Backgrounder.pdf

Inspiring Life Stories

Warrior's Destiny

The only person you are destined to become is the person you decide to be.
– Ralph Waldo Emerson

A great Japanese warrior named Nobunaga was going to war with a fierce enemy with only one-tenth the number of men the opposition commanded. He knew that he could win the fight with a well-planned strategy, but his soldiers were in doubt.

On the way the leader stopped at a Shinto shrine and told his men: "After my visit to the shrine I will toss a coin. If the head comes, we will win; if tails, we will lose. Destiny holds us in her hand."

Nobunaga entered the shrine and offered his prayers. Then he came forth and tossed a coin in front of his men. Heads appeared. The soldiers were filled with confidence and were eager to win the battle.

"No one can change the hand of destiny," one of his attendants told him after the battle.

"Indeed not," said Nobunaga and showed the coin which was doubled with heads on both sides.

Source: https://alltimeshortstories.com/inspirational-stories/
Pic source: https://www.hiclipart.com/free-transparent-background-png-clipart-pzxce

Corporate Wisdom

From the desk of Ramki -– Aspire to Inspire

Meaningful Appraisal

Happy Morning!

How did it Go?

That was the first question I asked my Son as he came home for the weekend. He had told us earlier that morning that he was having his

performance appraisal discussion with his supervisor. And given that he was looking forward to it with a mixture of anxiety & excitement, it seemed only fair that I ask him about it as soon as I could.

It was great, was his enthusiastic response.

A promotion? A big pay hike? I was quick to cut to the chase. After all, if it was a great appraisal, I assumed those would be the logical outcomes.

“No, no”, he clarified. “I didn’t mean great in that sense. It was a fabulous appraisal discussion. I felt so good about the conversation. My boss had many good things to say. And so much useful feedback too. He talked about specific instances over the year, what I did well, what I could have done differently. He was so well prepared. I just loved it!”

Ah, I thought to myself. That’s great advice for all leaders. If you want to ensure your subordinate has a good performance appraisal, make sure you are prepared before you go into that meeting.

Preparation helps ensure you have taken the time to think about the individual. What did they do well? What could they do better? When you spend time thinking about the year gone by, you avoid the recency effect and your appraisal is not swayed by what happened last week.

Preparation allows you to list out specific instances that corroborate your feedback. That helps ensure your messages land well, and are not seen as mere perceptions. Most importantly, when you prepare for the appraisal meeting, you are telling your subordinate that she - or he – matters. That this discussion is important for you. That his or her career matters. That you are committed to helping them do better and grow. The rating is incidental. It is the effort that you are putting in that matters.

We all like to be valued at work. We want reassurance that our work matters. And knowing that your supervisor took the time and effort to prepare for the appraisal meeting tells you that he or she values who you are and what you do.

When a leader recounts small instances from a long time ago to tell you how he or she thought you did a good job, you feel terrific. It tells you that good work never goes unnoticed. And when he or she talks about the misses and gives you feedback on the behaviours you need to change, you listen. Because you can see he or she has thought about it and is giving you specific examples.

Leaders sometimes think they know their team-mates well, so they don’t need to ‘prepare’ for an appraisal meeting. They think they can wing it. Bad idea. We sometimes think the rating is synonymous with the appraisal – and a good rating means a good appraisal and vice-versa. Not true. Preparation can make every appraisal a great one. An appraisal is an opportunity to demonstrate your leadership, and help your people grow. Make the most of it.

"He or She was so well prepared!" That line sums up what made it a great appraisal for the employee. What would your team be saying about you after the appraisal?

#WishingMostAndMore

Have a great day & Wonderful weekend

R. Ramakrishnan

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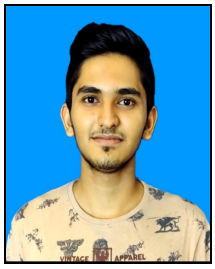

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