



INDUSTRY ACADEMIA CONCLAVE 2021



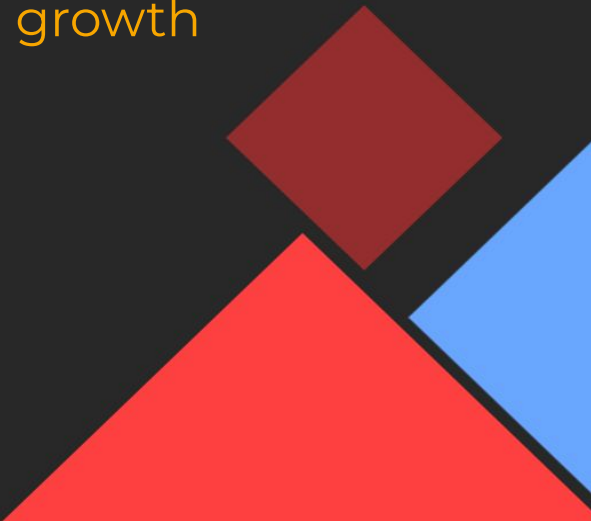
IIT PALAKKAD



Overview

The third edition of the Industry-Academia Conclave (IAC) was held on August 13th & 14th, 2021. Due to the COVID19 pandemic, this year's IAC was conducted virtually. The event comprised a welcome address, keynote addresses from eminent figures in the industry and speakers from multiple disciplines, and a closing session; spanning the two days.

IAC 3.0 proceedings began with a short address by the students' general secretary Shrujan Kanabar. Unlike the previous editions, IAC 3.0 was fully student-driven. In addition, the inclusion of sciences this time shows how IAC has grown over the years, as well as the scope for future editions. Shrujan mentioned these points in the context of IIT Palakkad's unrelenting and unwavering vision for growth regardless of any obstacles.



Welcome Address

Prof. P. B. Sunil Kumar kicked off the event by sharing the institute's statistics and growth since its establishment in July 2015. IIT Palakkad envisions it to be a prominent place of learning, innovation, and discovery, a source for knowledge, technology, and policy for the betterment of humanity. On this note, he briefly spoke about the activities of the various centers and the establishment of new ones. He noted that the Career Development Centre (CDC) has successfully facilitated internships and placements for the students. The birth of the Center for Continuing Education under the Centre For Education Technology is also a significant landmark. They have completed several short-term training programs and one long-term training project on High-Performance Computing, supported by the National Supercomputing Mission.

Concerning research centers, the plan is to provide more seed funding for faculty to work together and establish thematic laboratories. Some of the centers initiated are the Advanced VLSI and System Architecture Lab (EE and CSE), Computational Imaging center/lab (EE and CSE), Environmental Sciences and Sustainable Engineering center (ESSENCE), Physical and Chemical Biology Laboratory (Physics, Chemistry, Mechanical Engineering) and the Centre for research and Education in Data Science (CREDS). Lastly, he gave an overview of other existing facilities and initiatives of IIT Palakkad, such as the Central Research Facilities, Startup and Technology Incubation Centre, and Research and Incubation Initiatives.

Keynote Addresses

Keynote 1:

The first keynote address of IAC 3.0 was delivered by Mr. **Haragopal Mangipudi**, who holds several official positions. To name a few, he is the **founder of guNaka LLC**, the founder and CEO of finUNO, and a board member of ISPMA (International Software Product Management Association). A veteran in software product management, he spoke on **Building Products that everyone loves**. Mr. Haragopal started with a short but impactful story of 'the three stonecutters,' highlighting what it means to be a successful product manager. He then discussed the 'Why?','What?','How?', and 'When?' of developing a product. In particular, he emphasized why a product is required and shed light on everyone associated with it - including users, investors, and the development team. Mr. Mangipudi subsequently spoke about the art of product management in terms of desirability, feasibility, and viability of a product. Then, he talked about how invention is different from innovation - the former being the birth of an idea and prototyping it while the latter is creating deliverable use cases for the invention. The speaker aptly conveyed the wonderful message that while creating something worthwhile for the world, instant gratification is not always ensured but one might get delayed gratification. He also demonstrated how a problem solver is different from a problem definer and how important it is to be a problem definer to be good at product management. The talk ended with a Q&A session where the participants could interact freely with the speaker.

Keynote 2:

Dr. Shankar Venugopal from Mahindra & Mahindra was the next to speak. The topic for his keynote address was future skills for mobility engineering. Four major disruptions in the automotive industry are (i) the transition from internal combustion engines (ICE) to electric vehicles (EV), (ii) autonomous driving, (iii) connected cars (generating data for analytics), and (iv) mobility on demand. After mentioning this, he proceeded to talk about two important types of skills: domain and cognitive. Domain skills include gaining technical expertise, strong communication skills, and an innovative mindset with good ethics. A growth mindset and strong customer orientation also help. On the other hand, cognitive skills can be broken down into different types of thinking. Some of them are highlighted here: The first is design thinking, which involves looking at a problem from both human-centric and engineering perspectives. This is better understood with an example: A general Electric MRI machine, where adding visuals, audio, and styling the machines made the experience of undergoing an MRI scan less daunting for younger patients. The next type is exponential thinking - given the exponential growth of technologies, incredible opportunities to leverage tech and provide value to consumers now exist which should be exploited. Sustainable thinking is another one, where the need arises to focus on developing sustainable technologies and creating businesses that rely on them. Adaptive thinking is another one where a problem is analysed through various lenses and perspectives. This concluded the talk, which was followed by a Q&A session. He briefly spoke about Mahindra's tractor for rural farmers, which was autonomous, affordable, compact, and connected. Additionally, he mentioned that Mahindra is investing in a shared mobility future for India.

Keynote 3:

Mr. Abhinav Anand from LinkedIn delivered the third keynote address. He spoke about Site reliability engineering (SRE) which supplies services needed to support running software. SRE is often confused with being the same as DevOps, but it isn't; the former tells us how to perform a task, and the latter defines the task itself. SRE is a role that Google started. Mr. Anand spoke about Google's team compositions (40-50% SWEs, and SREs) and mentioned that most companies consist of similar teams. He then went over the requirements of SRE and the need for a balance between possible changes and the reliability of a feature being introduced. Having introduced SRE, he proceeded to talk about the basic workflow. He added that discussions are held not to blame an individual but to improve a product's reliability and make sure a similar problem does not arise again. For example, when an alert/issue is raised, not any SRE is on-call but the most knowledgeable person about the topic is turned to. He also elaborated on the SRE workflow at Apple, Google, and his own company. Mr. Anand also highlighted some points on what makes a good SRE. To name a few, strong coding and system design skills, strong communication skills, remaining calm, and not pointing fingers are some of the prerequisites. With this, his insightful talk on SRE and its implementations ended.

Keynote 4:

Ms. Sirisha Voruganti, Managing Director, JP Morgan Chase & Co, leads architecture data and digital technology for consumer and community banking. As a global executive, she is experienced in research, product engineering, and business development. She began by addressing three major segments of fintech and digital transformation. They are the perspective of the financial field and available opportunities, innovations at the front-end and back-end, and how fintech is solving the challenges leading to faster, better, and lower-cost outcomes. Subsequently, she went over the challenges encountered in this sector like data privacy regulations related to cross-border payments, fraud, and risk. Ms. Voruganti pointed out that innovation is crucial and creates many possibilities in finance and other sectors. She then highlighted various state-of-art technologies used in the banking sector and growth of digitization. In addition, she spoke about the necessity of bringing unbanked and underbanked populations together into the financial space globally. Finally, she provided the attendees with a four-fold strategy to make the consumer experience more reliable and different examples of achieving it. On the whole, it was an intriguing and interactive presentation on financial technologies and digital transformation.

Civil Engineering

For the civil engineering department, the talks from the industry representatives began with **Mr. Sadasivan** from **LNTECC**. Starting with an explanation of the **infrastructure of various structures**, he explained in detail a few major structures like the Adani Port Jetty, the second Vivekananda Bridge, in which LNTECC was involved, and other sustainability functions, as well as recent technology initiatives. The Adani Port Jetty uses a precast hollow circular pile and the Second Vivekananda bridge is extradosed/cable-stayed. They are the first of their kind in India. Mr. Sadasivan also illustrated a SWOT (Strength-Weakness-Opportunity-Threat) analysis of his company to help them determine its actual value.

The next speaker was **Mr. Hariharan** from **KEC International Ltd. RPG Group**. He briefly introduced risks and assumptions in the infrastructure field and then elaborated on risk identification, risk management, and the best practices in the industry. He explained many concepts in risk identification with the help of real-world examples and discussed WPI-RBI, WPI-EA, and CPWD indices to manage the risks of price escalation. Finally, he ended the talk by raising the tremendous need for a skilled workforce in the Indian construction sector in the next 25-30 years.

The third talk was delivered by **Dr. R N Krishna** from **KC Contech**. The talk mainly revolved around recent innovations, trends, and challenges in concrete technology. Dr. Krishna emphasised the need for students/young professionals to adapt and learn according to the industry's new requirements. He also briefly discussed cement, SCM, fly ash, AAC, and foam concrete. He expressed the importance of using industrial wastes in concrete, roads, and pavements to reduce the project's expenditure. The speaker then stressed the importance of faster adoption of new technologies in the industry by the government by citing the example of Russia, which adopted the first GFRP code in 1978.

Mr. Sudish MS, Menkol Industries, delivered the next talk. He spoke about his journey as an entrepreneur to the corporate world. He detailed a timeline starting from the incorporation of his company as Percept Engineers Private Limited (PEPL), its acquisition by Pidilite, and merger with Nina Waterproofing. He further explained the challenges of the waterproofing market in India. He also gave a few important tips regarding entrepreneurship viz. identifying the opportunity and importance of service excellence, choosing one's market wisely, being credible in the market, focusing on areas within one's reach, etc. He concluded by speaking about several feats his company achieved for the first time in India and his role

The last talk was delivered by **Dr. Manikandan, Dalmia Cement Bharat Ltd.** He outlined the Indian cement industry and opportunities. Dr. Manikandan started by explaining how the capacity and utilization of the cement industry changed over the years. Then, he explained the reasons for the increase and demonstrated the region-wise capacity installation in India. He ended the talk by citing opportunities in the cement and concrete industry.



Electrical Engineering

The second day began with a talk by **Mr. N Venkatesh, Silicon Labs**. He gave an overview of the company and explained why Silicon Labs is the leader in IoT wireless, embedded systems, and IoT Building Blocks. He primarily touched upon techniques to reduce power consumption through improved transmitter and receiver designs in data transmission. The goal is to enable low latency accompanied by higher battery life to realize faster and more efficient IoT devices. He concluded by talking about the future scope for innovation in energy reduction at the semiconductor level and the system level.

Followed by **Mr. Venkatesh, Mr. Manian Sivaramakrishnan** from **Prodapt** spoke about the Digital Transformation in the Telecom Industry. The theme for his talk was "Connectedness is the fulcrum of progress." He mentioned the three types of connectedness in our daily lives: connectivity, collaboration, and entertainment. Following this, he highlighted some transformational technologies that accelerate connectedness, such as Cloudification and Edge, Artificial Intelligence (AI) and Machine Learning (ML), 5G Communication, and Hyper Automation. He then highlighted some of the participants of the digital transformation ecosystem, such as Hyperscalers, Communication Service Providers (CSP), and Ecosystem Partners.

Mr. Kalyan Kumar Bhiravabhattam, Qualcomm, was the next to speak. Primarily, he talked about Industry-Academic interaction in Multimedia technologies and its importance. The Qualcomm Innovation Fellowship (QIF) is one such example, focused on recognizing, rewarding, and mentoring innovative PhD students across a broad range of technical research areas, based on the core values of innovation, execution, and collaboration. He highlighted the role of Qualcomm in the transition that has taken place from 2G to 5G over the years. Additionally, he mentioned some active areas of interest related to technologies enabled by 5G, such as incorporation into next-generation smartphones, smart city infrastructures, gaming, etc.

Next in line was **Dr. Deb Singdeo** from **Mathworks**. The theme for his presentation was "Model-based engineering platform for electrification". He spoke about softwares such as MATLAB and SIMULINK, and then moved to the topic of Electrification, explaining why renewable energy requires changes in power distribution and transmission technologies. He proceeded by explaining how the aforementioned softwares is used for the purpose of design and testing. The session ended with a discussion on how students can contribute to Mathworks by tackling challenges faced in the industry and taking courses provided by the company to learn more.

Dr. Aninda Bhattacharya from **ABB Industrial Automation Digital** spoke next on the role of industrial analytics in predictive maintenance. Compared to traditional strategies (for example, corrective maintenance), this type of maintenance can save on upto ten times the cost. He highlighted the digitalization of the industry as a whole, a phase which is currently known as Industry 4.0. Following this, he mentioned the role of predictive maintenance here and how ABB Industrial Automation Digital is working towards this goal. The focus is on an integrated approach of asset performance management with the target audience being maintenance engineers/managers, reliability engineers, operation managers, etc.

Next in line was **Dr. Venkata Sivaram Vaddamanu** from **General Electric (GE)**. The theme for his talk was "GE's Grid Software Solution Offerings and an overview of current focus areas of work." Like some of the previous talks, the role of the industrial internet was discussed, but in the context of power grids. Along these lines, he spoke about some technologies such as SCADA, MES, APM, OPM, etc., used for manufacturing/gauging reliability of operations. He then touched upon the software for grid optimization, such as EMS and ADMS, which ensure reliability and stability of the grid. In addition, the software can predict outages and reduce restoration through grid analytics. Dr. Vaddamanu concluded with a few points on customer service at GE enabled by the software solutions.

The penultimate talk was delivered by **Mr. Moindeep Dutta** from **Arm Embedded Technologies Pvt Ltd**. He began by talking about the history of Arm, which is known for selling licenses of designs to other companies in the semiconductor industry. He explained some application-specific processors, in light of the fact that advanced consumer products are incorporating more and more Arm technologies from processors to multimedia IP to software. Arm delivers technologies to drive scalable, energy-efficient System-On-Chip (SoC) solutions which include efficiently optimised software, CPUs and GPUs. Mr. Dutta then proceeded to speak about the various business units in Arm India. He concluded the talk with a note on the Arm University Program (AUP), which includes access to teaching materials, software, online courses and textbooks to help faculty teach the latest technologies from Arm.

The Electrical Engineering session concluded with a talk by **Ms. Srilakshmi Sivaramakrishnan** from **Universal Avionics**. She spoke about general avionics systems in an aircraft and how the information from each system is presented to the pilot for flying and decision making. These avionics systems comprise an Attitude and Heading Reference (AHRS), an Air Data Computer (ADC), a Flight Guidance System (FGS), and a Weather Radar System (WXR) to name a few. She then proceeded to talk about the standards set by the Radio Technical Commission for Aeronautics (RTCA), which is a federal advisory committee. These standards are to ensure safety and to check the specifications, design, implementation, correctness and certification of airborne electronics. Lastly, she mentioned a NextGen surveillance technology - Automatic Dependent Surveillance-Broadcast(ADS-B), which eliminates the need for pilot/operator involvement and uses live data from GPS to operate.

Mechanical Engineering

Mr. Vishal Sharma, Mercedes Benz, delivered the first talk in Mechanical Engineering. The topic was 'Simulation and Modeling in the Automotive Industry.' Mr. Sharma started the address by explaining what simulation is and how it helps us understand our world. He explained how simulation and modeling go hand in hand as models give an abstract idea of a complex system and that models are tested by simulation. Mr. Sharma also highlighted the importance of simulations and models in automobiles' design and their advantages, making them both cost and time-effective while allowing enough space for innovation. Another significant advantage of simulation is that it helps identify mistakes in the early stages of the design process. He mentioned how making assumptions helps design and simulate a model as they greatly simplify a complex system.

The next speaker was **Dr. Karthik Kumar, Saint Gobain**. He gave an overview of Saint Gobain and its subsidiaries and shared information about the company's products and the current developments by their R&D department in super abrasives. As Saint Gobain manufactures construction materials, Dr. Kumar stressed the importance-

- of choosing suitable materials according to the area's weather conditions and how research is conducted to ensure the materials are ideal for the weather. He also explained the concept of a 'digital twin' - a virtual replica of a product. The digital twin can be extensively tested in different weather conditions reducing the cost and time complexities during experimentation. In addition, companies can use the data to understand its properties and produce better products.

The next speaker was **Dr. S Ganeshan**, from **U R Rao Satellite Centre (URSC), ISRO**. Dr. Ganeshan started with some information about the Indian Space program and the vision of the URSC. Then he moved on to the topic of the talk 'Insights on successful Industry - Academic research collaboration' by taking the example of a project on which he had worked. It was a web tool for space thermal materials for the ISRO. Dr. Ganeshan explained the challenges he had faced dealing with contractors during the project. As a result, he wanted to bring in students to work on the project as it would be beneficial for both ISRO and the universities as the students gain exposure during the project. Dr. Ganeshan also explained the stages of product development and his learnings from the project. He then gave some insights into the current trends in the industry and how industry-academia collaboration -

-could help align academic expectations with industry expectations. He then explained ISRO's initiative to promote industry-academia collaboration and encouraged universities to participate. Before concluding the talk, Dr. Ganeshan also discussed the issues in the current industry-academia collaborations.

Dr. Malay Jana, Mahindra Electric, talked about the company's journey in 'Shaping of e-mobility in India,' leading the EV industry in India. He spoke of the batteries used in EVs, specifically about the cells that make up the batteries - with the Lithium-ion and Lithium Titanate cells being the most used. He compared both batteries based on their lifetimes, cost, specific energy, power, and state of charge, highlighting the pros and cons of each. Dr. Jana also talked about the 'Battery Management System' and how it optimizes the usage of batteries based on the working condition of the car and the environmental conditions. He also briefly spoke about the current research trends in batteries, such as solid-state batteries and nanotechnology in battery production. Dr. Jana ended the talk by explaining the current challenge in batteries - increasing power delivery and reducing the weight of batteries.

The next talk was by **Mr. Saransh Jain** from **Hero MotoCorp**. Mr. Jain started the discussion by mentioning a milestone achievement by the company - it manufactured its 100 millionth two-wheeler on the 21st of January 2021. Then, he briefly spoke about their vision and said, "the ten-year-old company, Hero MotoCorp's mission is to Create, Collaborate and Inspire." He also mentioned that the company manufactures a two-wheeler every second with benchmarked manufacturing facilities. Apart from this, Mr. Jain highlighted that Hero MotoCorp has invested over 100 million USD into R&D and gave a brief timeline of the company's evolution into a two-wheeler giant. The inception of the company was in 1984. The first motorcycle they produced was the CD100 in 1985. The company set up many manufacturing facilities over time - a manufacturing facility in Gurgaon in 1997, in Haridwar in 2008, and in Neemrana in 2014, which included the global parts center. In addition, an R&D center - the Centre of Innovation and Technology, was established in Jaipur in 2015. With this, the talk came to a close.

The next speaker was **Mr. Krishnan Sadagopan** from **Ashok Leyland**. Mr. Sadagopan explained how the company is working towards a future with safe transportation and no emissions. He talked about the 'Automobile Evolution' that has taken place due to strict regulations to combat climate change.

He explained how emerging technologies are beneficial for previously less explored fields such as robotics, nanotechnology, and mechatronics. Mr. Sadagopan then provided insights on mechatronics, robotics, and why automobile engineering is a popular choice in the industry. He spoke about job prospects in industries for mechanical engineering. He also explained the changes in the industry from Industry 1.0 focusing on mechanization, 2.0 on electrification, 3.0 on automation, and finally, industry 4.0 emphasizes telematics and information technology. Mr. Sadagopan concluded the talk by giving a brief overview of the company's product portfolio, engine platforms, and its role in manufacturing defense vehicles. He also provided insights into industry requirements such as big data analysis, blockchain, additive manufacturing, vehicle digitization, and many more latest cutting-edge technologies.

Mr. Ayan Karmakar works on MEMS technology in the **Semiconductor Laboratory, ISRO, DOS**. Mr. Karmakar started the talk with MEMS (MicroElectroMechanical Systems) features: the 3 M's - Miniaturization, Multiplicity, and Microelectronics. He then talked about the MEMS components like microsensors and the uses of this technology. Next, he explained micromachining techniques such as bulk and surface micromachining, wafer bonding, and electroplating.

Next, he discussed microstrip coplanar waveguide, suspended microstrip, fin-line, non-radiative guide, and suspended stripline transmission lines. Finally, the talk ended with a brief overview of micromachining in Radio Frequency and its advantages.

The next speaker was **Mr. Srivathsan Narasimhan** from **Rolls Royce**, who talked about designing an aero gas turbine engine system. Mr. Narasimhan first explained why and how the design process works. Then he gave a brief explanation of how a gas turbine engine works and the thermodynamics involved. Next, he explained the various design stages, starting with concept design (stage zero of the design process), then the preliminary design (stage 1), which is developed into a detailed design, aiming to perfect the engine design on paper. Then comes the manufacturing of the engine and the critical part of the design process, testing. Finally, Mr. Narasimhan ended the talk by highlighting some crucial points in the design process and the engine lifecycle and also hinted at the importance of modeling and analysis.

The last talk for the Mechanical Engineering department was delivered by **Mr. Chandrasekhar S** from **Hyundai Motors** on 'Automobile Manufacturing trends and some case studies.' Mr. Chandrasekhar -

- started the talk by explaining the many stages in the product development process, which consist of defining the product, conceptualizing, developing, and testing. He explained how the time taken for product development decreases as the years go by due to the improvement in technology. He then talked about the 'human-centered production system,' which focuses on the operators' skills to combine with automation for better productivity. Mr. Chandrasekhar then spoke about 'Smart manufacturing,' which involves continuous data collection and analysis of data to predict and correct problems during production. He also stated that gaining data science skills is essential. Lastly, he explained how companies are becoming self-reliant, which poses an excellent opportunity for students and researchers.

Computer Science and Engineering

The second day began with a talk by **Mr. Sreedol Menon, Microsoft**. He gave an overview of Reinforcement learning and explained how cutting edge Reinforcement learning(RL) algorithms are being used to tackle some of Microsoft's research problems. He defined RL as a machine learning paradigm that, unlike supervised learning, does not require explicit supervision to enable the systems to learn. RL has succeeded in various tasks like beating world champions in chess and Go, Ad placements, and even accelerating drug discovery. At Microsoft, Mr. Sreedol and his team use RL to improve customer experience. Some applications include real-time bidding applications, fraud detection in transactions, and intelligence code assistance.

The next session was by **Dr. James Henrydoss, Neustar**. He began with the current trends and issues in data centers and a brief overview of designing data centers. Dr. James then talked about how operators can utilize Network Function Virtualization (NFV) to leverage explosive mobile subscriber growth and provide better services. NFV are used in tunneling gateways, traffic analysis, and the next generation of signaling.

He talked inbrief about the recent innovations in network architectures like SDN (Software-Defined Networks) and Dynamic Cloud Model. He mentioned the relationship between SDN and NFV to be complementary where NFV provides agility and SDN creates network abstractions to allow application-aware behavior thus increasing the overall flexibility overall. He also spoke about the Virtualized Network Functions (VNF), VNF lifecycle management, and VNF service chaining in data centers. He concluded by sharing the drawbacks of NFVs during deployment including portability and interoperability issues along with automation and network stability limitations.

Mr. George Peter, Capgemini, gave the next address. Hehas over 20 years of experience in healthcare and financial departments. Mr. George discussed structured risk analysis of IT projects with machine learning models. He started by mentioning the frequency of emergence of new technologies and how repeating the actions based on a similar past project does not guarantee success thereby emphasizing adapting to new technologies. Next, he provided a checklist to evaluate risk, which includes procuring prior similar project data , project requirements, and imbuing new technology. He then concocted the machine learning ideology into risk analysis. Finally, he spoke about how large volumes of previous project data are fed into the model which uses unsupervised learning to find structural patterns to mitigate risks.

Mr. Girish Bharambe, Nvidia, gave the following talk, on GPU computing. Mr. Girish is a senior system software developer at Nvidia. GPU computing refers to using CPU and GPU together to give the best performance.. The potential for significant speedup with minor changes makes GPU computing beneficial and exciting. He also talked about the use of threading to achieve high performance and how it can be used to hide latency in GPUs. In this data-driven age of computing, such methods can reduce computational costs significantly. Finally, he concluded with the different ways we can accelerate applications with the help of libraries, OpenACC directives, and programming languages.

Mr. Achutha Kumar, a senior principal engineer at **Intel**, was the next speaker. He focused on general verification trends and related opportunities. Most of the time in a project is spent on verification to ensure the design is robust. He talked about formal verification, a widely used form of verification. Formal verification has four important phases namely - formal abstraction, datapath formal, formal property verification, and formal equivalence. It is still a niche capability and a requirement of the hour.

Next, **Dr. Venugopal Raghavan, AMD**, talked about AOCC optimizations. The AOCC stands for AMD CPU Performance Compiler and is used for C, C++, and Fortran based on LLVM Compiler infrastructure. It is used in domains such as weather modeling and molecular dynamics. AOCC's robustness comes from the automatic vectorization and scalar and loop optimizations. Then he talked about some of the most important AOCC optimizations like LICM, loop unswitching, loop unblocking. As a concluding remark, he said that the field of compiler design is one such area in computer science where theory and practice go hand-in-hand and has many exciting opportunities.

This was followed by **Mr. Harendra Kumar, Composewell**. In his talk, Mr. Harendra Kumar focussed on Functional Programming, particularly Haskell. The growing size of codebases causes laborious development, expensive maintenance and time-consuming refactoring and debugging among other problems that continue to plague the software industry to this day. While one cannot prevent the growing size of code bases, we can address many of the problems using functional, immutable and lazy programming paradigms. Such paradigms make the code modular and clean. Haskell is a high level programming language that allows all these features making it an ideal choice for large code bases. Towards the end of his talk, Mr. Harendra talks about the Streamly library, a Haskell library developed by Composewell that provides the building blocks to create scalable, high-performance software.

Mr. Siddhartha Mukerjee, Samsung, delivered the next talk. Mr. Mukerjee is currently the director of Samsung Electronics. His discussion focused on transformation from Natural Language Understanding (NLU) to multimodality aware NLU. Mr. Siddhartha primarily works on Samsung voice assistant Bixby. He first introduced the changes in interface paradigm from CUI to GUI, to touch UI, and finally to voice. The remainder of the talk focused on the various challenges and steps needed for NLU. Multimodal NLU is another area that has interesting applications. This talk concluded with a summary of multiple interesting directions and opportunities in NLU.

Physics

Mr. Vinod Arvindakshan from **CDK Global tech company** and **Mr. Vibin Arvindakshan** from **Salesforce** enlightened the students about the diverse opportunities after getting an MSc degree in Physics. They also shared data regarding the market demands and how one can develop their skills which are required in major fields. Mr. Vinod made it an interactive session, asking students to point out the job opportunities they think are suitable after a physics degree. After an insightful discussion, he concluded that one could grab any job opportunity when a wide range of choices are available out there; one just needs to know the right dots to connect. It was a learning experience for both the students as well as the speakers since both parties provided diverse perspectives.

Mr. Srinath Ravichandran, co-founder and CEO of **Agnikul Cosmos**, spoke primarily about entrepreneurship. The company works on launching small satellites and rockets into space - quite an intriguing topic for the Physics students. In addition, the session was interactive with active participation from the students' side. He began with "what is entrepreneurship?" Then, he discussed the various challenges he faced with his startup. He also highlighted some of the prerequisites for a prospective entrepreneur. Generally, however, anyone can be an entrepreneur. The main requirement to start a startup is to be a dreamer, and one can pick up the other skills as the company grows. He mentioned that it's a self-scrutiny process, which tests patience, passion, and many other things. He also remarks that entrepreneurship is not just for realizing our dreams but also for providing jobs and learning opportunities to others. Therefore, he offered an alternative perspective that physics graduates can aspire to be job creators rather than job seekers. With this, the insightful talk on entrepreneurship by Mr. Ravichandran concluded.

Chemistry

The first talk was by **Mr. Raghava Krishna Kanala** from **Hindustan Petroleum Corporation Limited (HPCL)**. He focused on the collaboration and consultancy activities that Hindustan Private Limited Corporation provides through placement and internship opportunities for students. The speaker highlighted the various research fields of HPLC. Few of the primary research areas are fluid catalytic cracking, hydroprocessing, polymer residue upgradation, and exploration of alternative energy sources. HPLC has taken significant strides in developing and commercializing novel technologies & products like LPG cutting gas and corrosion inhibitors, which have led to substantial cost benefits and efficiency improvements in the corporation. The speaker also mentioned some career opportunities for Chemistry graduates in HPLC and encouraged the attendees to come up with various ideas related to the research areas in the future. He included an inspiring quote: 'The main thing is the YOU beneath the clothes & skin- the ability to do, the will to conquer and the determination to understand this great, wonderful, curious world.'



The next talk was by **Dr. Subrahmaniyam Santhanam** from **Saudi Basic Industry Corporation Limited (SABIC)**. It was centered around intellectual property rights and how Intellectual Property (IP) analytics works to prove the infringement of intangible properties, including the creative and innovative works of individuals. It was an eye-opening session about various intellectual properties, which were new to almost everyone. The students acquired insights on many areas of patenting, its significance in research, and how it prevents the risk of reinvention. The speaker listed out a few prerequisites: an analytical mindset, a passion for technology, the ability to connect the dots, etc. He also enumerated institutes that provide training and courses on IP. The attendees also learned about the importance of patents and patenting in research and invention. The idea that 'A good patent fortifies your research proposal' was very well accentuated and it aptly conveyed the importance of intellectual property.

Dr. Shirish Thakre from **Aditya Birla Science and Technology, Bangalore**, gave an interactive final talk for Chemistry about business challenges and opportunities. He provided a comprehensive insight into the company's history, corporate strategy, business structure, and operations. The attendees were exposed to various research areas such as sustainability, digitalization, and many emerging fields like carbon fibers, graphene, and nanotubes. He also stressed the organization's ability to innovate to meet the needs of customers and the market. This session highlighted the importance of talent acquisition and its utilization to meet career opportunities.

Maths

The department of Mathematics held a panel discussion focussing on the Roles of mathematicians in industry, Future after Ph.D. in Mathematics, Maths in Data Science, and AI in the industry. Srinath Guhaprasad and Dr. Jaikrishnan J moderated the discussion. The speakers were Dr. Prasanna Muralidharan, Data & Applied Scientist at Microsoft; Dr. Tulasi Ram Reddy, Assistant Vice President at Deutsche Bank; and Dr. Sandeep Bhupatiraju, Researcher/AI programmer at the World Bank Group. The researchers currently work on applied mathematics in Data Science in medical imaging and computer vision, market risk evaluation in banking, and impact evaluation on judicial data.

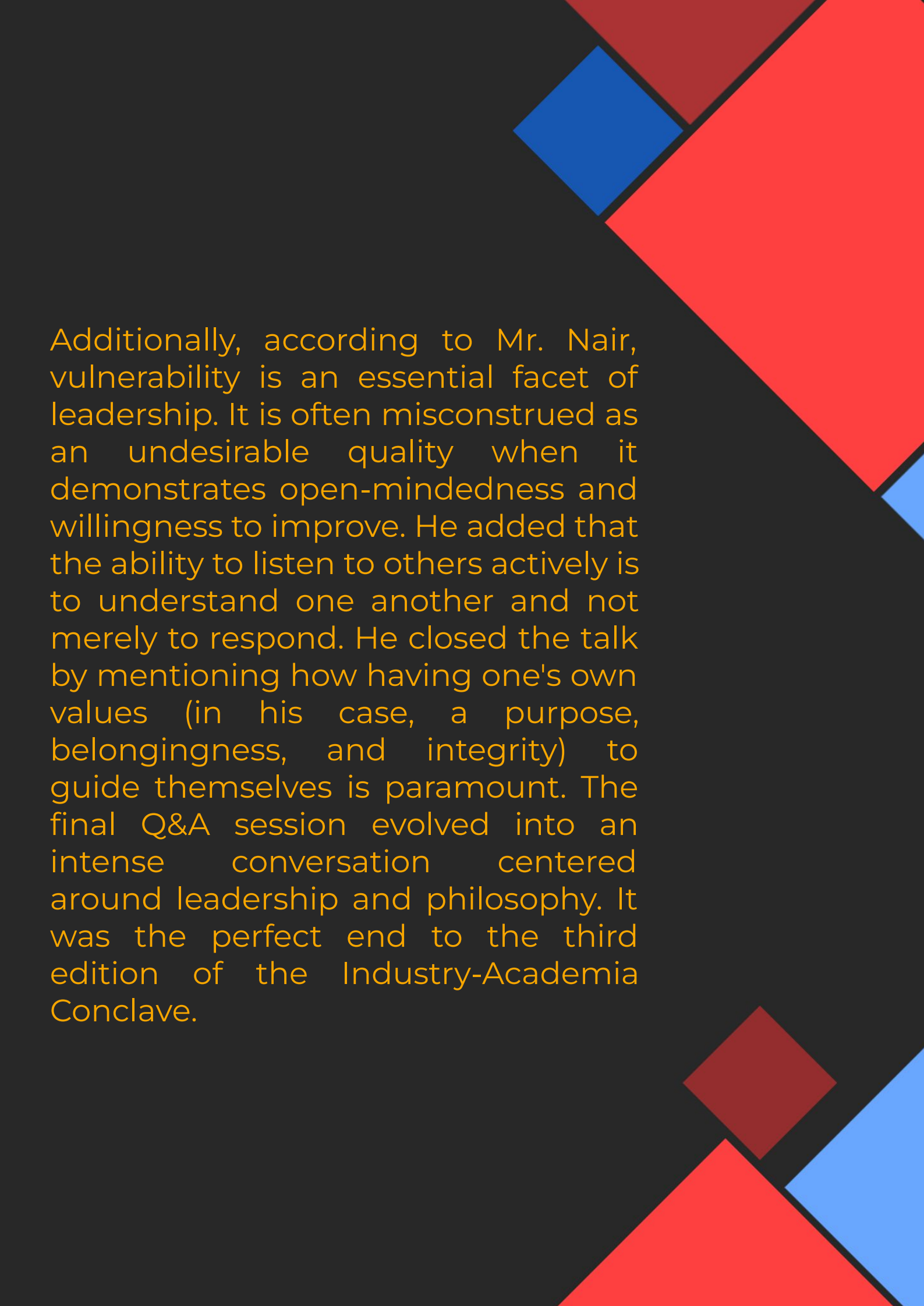
The discussion focussed on the differences between academia and the industry in Mathematics. The speakers unequivocally opined that communication and interpersonal skills are among the most sought-after skills for a career in the industry. A higher-math student typically works in solitude, whereas jobs demand "polished" social and managerial skills. Moreover, professionals come from various backgrounds like Natural Sciences, Finance, Humanities, and Social Sciences. Hence, a student should also concentrate on personality. Though a mathematician's honesty and factual knowledge are greatly appreciated, the way he communicates to an audience with different levels of expertise is critical.

In contrast to rigorous and convoluted pure-math solutions, the industry emphasizes the solution's applications, adaptability, and practicality. The rigor and persistence of a mathematician are, of course, valued; however, one should be able to deliver appropriate solutions in a deadline-constrained environment. The business impact drives the research. Dr. Sandeep shared his personal experience with the need for programming skills. The speakers also stressed that the ability to fail early and learn quickly is the need of the hour.

The Q&A session that followed gave an insight into the available opportunities for an applied mathematician. Some career choices are as data and business analysts, data scientists - in Deep Learning, software engineering, or product development/R&D/corporate research, amongst others . Although mathematicians may find less exposure, it is enlightening that classical applied-statisticians and skilled mathematicians working in social sciences are in demand.

Closing Session

IAC 3.0 concluded with an inspirational talk by Mr. Syam Kumar Nair, Executive Vice President, Salesforce, focussing on technology and leadership. He reflected on the role of technology in our lives and its evolution over the years. Starting with the positives, he then moved on to the disparities that still exist even in the so-called 'developed' countries or 'advanced' economies. The missing piece, in his opinion, is leadership. Without proper leadership, technology isn't as effective as it can be. Inspired by Tesla's mission and Salesforce's CEO Marc Benioff, he stressed his company's commitment to a sustainable future for all as a corporate entity. In short, 4'E's - Equality, Equity, Environment, and Everyone - need to be kept in mind to make technology more efficient.



Additionally, according to Mr. Nair, vulnerability is an essential facet of leadership. It is often misconstrued as an undesirable quality when it demonstrates open-mindedness and willingness to improve. He added that the ability to listen to others actively is to understand one another and not merely to respond. He closed the talk by mentioning how having one's own values (in his case, a purpose, belongingness, and integrity) to guide themselves is paramount. The final Q&A session evolved into an intense conversation centered around leadership and philosophy. It was the perfect end to the third edition of the Industry-Academia Conclave.

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