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Journal of Technology Leadership and Innovation

From India for the World

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CII STRIDE

Preface

CII had launched STRIDE, CII Journal of Technology Leadership and Innovation, an industry first from CII. The inaugural issue was released by Dr Jitendra Singh, Union Minister of State (Independent Charge) Science & Technology; Minister of State (Independent Charge) Earth Sciences; MoS PMO, Personnel, Public Grievances, Pensions, Atomic Energy and Space on **16 December, 2021**.

The Journal is named as 'STRIDE', which also abbreviates for the core themes and focus areas of the journal - Science, Technology, Research, IP, Design & Entrepreneurship. The Journal is a multidisciplinary, peer-reviewed, special expertise periodical. It broadcasts and presents 'unique, original & impactful' technologies and innovation accomplished by industry, researchers, academia and the Indian science and technology ecosystem at large.

The second edition of the STRIDE journal will be focusing on Design. With design playing an integral role in India's big leap towards AatmaNirbhar Bharat, the Confederation of Indian Industry is strategizing for a new orbit in shaping design for India's growth trajectory. This Journal explores the opportunities and scope of design and innovation ecosystem of India. Design can assist in developing solutions for energy efficiency, sustainable living, water conservation and waste minimization in our homes, workplaces, public buildings and in our everyday activities. It highlights and reinforces unique strengths of Indian industry and by bringing together considerations of form, function, aesthetics, culture, engineering and lifestyle, the design process helps solves problems & creates new value and markets and shape up the future of India (& world) in the coming decade.

The papers featured in the journal will have technology leadership perspective oriented with key focus on design, innovation and IP. The Journal will also feature successful design case studies from industry, and a section on worked-upon-design ideas. The design ideas presented are planned to be the blue-prints of design (not necessarily unique in every case) which can be picked up for incubation and development by any industry, research lab or design innovation centre across the nation. In doing so, and in the process of publishing blueprints of these untested-design ideas, the journal is also envisaged to become a national repository of design and innovation ideas, while enabling collaborations.

We would like to thank our patrons from the Government departments, leading industry leaders, eminent designers and academicians, and international experts with whom we had a series of interactions to converge on the expectations and eventual features of this journal. We look forward to having further views and feedback to help us in improvising and continuously evolving the journal and its impact.

Message

Mr Vipin Sondhi,
Chairman, National
Mission on Technology,
Innovation and Research

The growth of Indian businesses is influenced by the engines of innovation and consumption. They drive each other to the new horizon of growth. To create sustainable market for products and services we need to find gaps and challenge existing interventions, identify un-tapped market and tailor the solutions that could improve quality of life.

Pragmatically every business is driven by Technology and Innovation. In the rapidly changing environment, an enterprise's ability to deliver personalized and innovative products will define its performance and longevity. Innovations are organizations' capital to be a leader in a highly competitive and unpredictable market. The economic significance of innovation and its use as a strategic business tool has increasingly gained importance in todays business scenario. Most leading companies have introduced innovation as one of their core values.

New India and the businesses place a strong emphasis on innovation backed by technology which indeed is supported by robust design of process and framework along with product. Such Innovation backed by technical interventions and design strategies will aid Innovation leaders to sustain an organization's strategic and economic leadership in the marketplace. Design is poised to be an essential component in transforming and enabling business and, on a larger scale, society.

Design prowess is hence proven by various announcements in the Union budget session 2022 inviting design interventions in the metro systems, civil structures and enhancing knowledge in urban planning and design led manufacturing scheme to build the 5G ecosystem as part of Production Linking Intensive Scheme encouraging designers to work closely with Telecom sector giants.

With this in view, the second edition of the CII STRIDE will be helpful in drawing our keen attention towards the facts that design contributes in a huge way in crafting the innovation framework that will in turn help India to step-up in the international marketplace, much at par or even above, the international standards.

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Mr T V Narendran, Past President, CII
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Udayant Malhoutra
Chairman
CII National Committee on Design
CEO & Managing Director
Dynamatic Technologies Ltd

Design as a movement for the post-pandemic world

We may want to think that design was in its nascent stage back in the 1960's when India got its first Design Institute, the NID, followed by IIT Bombay and CEPT. However, the truth lies in the rich cultural heritage that is seen in every corner of India, which we tend to ignore in the name of Modernism. Necessity is the mother of invention they say, but we didn't need a Bauhaus movement to teach us the brilliant architectural solutions of the public baths of Mohenjo-Daro and Harappa. And that the step-wells of Rajasthan need to harvest the rain water for the dry, arid days that lay ahead and hence its design.

Design has to be intuitive, it has to make use of the resources available at hand and it has to bring the unseen into the seen by using imagination. For those who think that Design is only about creativity, putting forth brilliant functionality, need to wake up and smell the coffee. Design is equal parts of creativity and science. For example, the intuitive UI / UX of an iPhone comes from the creative side of design. The research that went into the font, icon, the colour scheme etc. comes from science part of design.

Design as a movement in India is grooming itself to move from craft-based design solutions to more service-based solutions. We are evolving with every Start-up that takes birth

and we are the cusp of creativity and science. It's almost like going back to our roots and understanding why being agile, inclusive, enterprising, thoughtful and flexible was relatable back then, and relevant even now.

To quote M. P. Ranjan, *"Very little is known about the early days of design in India because very little has been written about it anywhere. The news media and the wider general business and political media is simply not interested in design and they have studiously avoided any commentaries about design and designers ever since the Indian Independence. Design journalism was tucked away in back pages and remote corners of art and architecture reporting and sustained design publishing has been a long time coming and it still has a long way to go."*

In an ideal world, this figure below by M. P. Ranjan further goes on to elaborate what the ideal process of designing should be.

Source: M P Ranjan

However, we are now in a world that is moving from post-pandemic to an endemic world. The norms for Co-creation, Design Thinking, Ideology, Agility etc. have changed. The pressure on Designers as thinkers and leaders has changed dramatically. While clients have moved to shoe-string budgets, the need for impactful creation has increased. The need for innovation and holistic design has found a new meaning. And the enterprising designers are reaping the benefits of this sudden shift. For those who pivoted to add value based on the current needs, grew by leaps and bounds. Multi-discipline became the buzz word.

Let's take the mask industry for example. According to an article published in 2020 on Fast Company, "*on crowdfunding sites like Kickstarter and IndieGoGo, inventors have raised millions of dollars for new designs of face masks, gloves, and other PPE. University engineering labs have turned their attention to making masks and face shields. The results run the gamut from clever to outlandish. It's now possible to find startups crowdfunding for or selling a silver-plated antimicrobial glove, a face mask hidden in the brim of a hat, and a protective bubble that covers the user from head to chest. (All three designs have raised thousands of dollars on crowdfunding sites.)*"

The truth of the matter is that while good intent may have been the reason to pivot, many innovators choose to ignore the basic principles of Good Design and work only on the Creative half and ignore the Science half of design completely. On one hand we had mask-makers like Boz Zou, cofounder and CEO of UM Systems come out with a crowdfunding campaign that raised thousands of dollars, only that it had not undergone testing from the National Institute for Occupational Safety and Health (NIOSH), a federal agency in the U.S. In fact the fine print didn't even say that that the mask will protect users from COVID-19 specifically, or even mention COVID-19 at all.

On the other hand we saw a class action lawsuit against Redcliffe Medical Devices has lied to crowdfunding contributors about its Leaf facemasks. The campaign had raised over 4 million dollars from its backers. "This see-through mask that featured carbon HEPA filters that claimed to possess N95 and even N99 ratings."

The underlying point here is that sometimes full-blown crisis is especially effective for driving innovation. If we take a moment to breathe, unlearn, relearn and learn new things, Design can indeed save the day. For example, according to Scott Star, "handle bars and other stainless steel washroom accessories can be finished with durable antimicrobial coatings that promote greater hygiene in some of the least hygienic spaces imaginable. Likewise, hands-free latches on toilet partitions can serve a dual purpose by helping to minimize touchpoints while maximizing accessibility." In the same light, carpets can be designed in a creative way that they naturally integrate the acceptable social-distancing norms for public spaces.

Having said this, our story doesn't end here. With the advent of Metaverse, Designers will soon have to cater to a world that wants to experience everything outdoorsy while sitting on its armchair. The question is, are we ready to pivot yet again?

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https://www.fox2detroit.com/news/shady-ppe-businessman-gets-unmasked

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https://www.gensler.com/blog/product-design-in-times-of-crisis

http://design-for-india.blogspot.com/

KNOWLEDGE PAPERS

Industry-Academia interface in India- A Perspective

Rangan Banerjee

Director, Indian Institute of Technology, Delhi

IIT Delhi's vision is to serve as a valuable resource for industry and society, and be a source of pride for all Indians. In the context of this vision, we will examine industry-academia collaborations. Industry-academia collaborations are the subject of many panel discussions where there is usually a lament on the missed opportunities, the lack of thrust, and differing perspectives.

What are the differences between academia and industry in India?

The academic world is characterized by openness and the free exchange of ideas. The industry believes in using knowledge for competitive advantage and wants to protect essential know-how from competitors. The industry is keen on profits and quick results. In the Indian context, the industry has also been used to buying (often importing) tried and tested technologies. Industry often perceives academia to be theoretical and out-of-sync with reality. There is a belief that academia has very long timeframes. Academics feel that the industry is unwilling to experiment and try new ideas.

Both stereotypes are based on the past. The reality is that there are significant challenges and opportunities for both academia and industry. For India, there is new confidence – as we are keen to move to become Atmanirbhar. The nation is moving to a future where our industry must be globally competitive, which can only be achieved with the support of a strong academic and research ecosystem.

What are the current modes of industry-academia collaborations?

To illustrate these, I will give examples from IIT Delhi: Often industries have specific short-term problems that need to be solved – these are usually handled as consultancy projects – testing of structures, designs, identification of retrofits, new materials, better prediction tools. At times faculty are retained as consultants for a fixed number of days annually, and their advice is sought on critical issues. Longer-term problems that involve research inputs are structured as industry-sponsored projects. Often industry sponsors offer master's or Ph.D. student projects. There are examples of prestigious industry fellowships in cutting-edge areas like Artificial Intelligence, advanced materials, and defence research.

Another mechanism we have is to engage industry practitioners as Professors of Practice to ensure relevance, provide helpful input to students and faculty to help make our research relevant to industrial needs. Industries have also sponsored Chair Professorships in some key domains of interest. These specialised chairs provide recognition to successful professors and incentivize research in cutting-edge and industry-relevant areas. Professors of Practice and Adjunct Faculty from industry can help bridge the two worlds of academia and industry. Similarly, sabbatical for faculty members in industry and industry retainerships or part-time advisory roles can enable the faculty to understand the workings of the industry, better.

The cutting-edge research facilities at leading higher education institutions and universities can be useful for industrial R&D. At IIT Delhi, the Central Research Facilities, the Nano Research Facility and the Sophisticated Analytical Technology and Help Institute (SATHI) have state-of-the-art equipment like Atomic Force Microscope, XRD, and optical instruments that can be used by researchers and industry across the country. We also have models of specialized Master's programmes for industry – for instance M.Tech in VLSI Design, Tools and Technology at IIT Delhi is a targeted programme for sponsored industry students or students funded by industry projects. We also run specialised continuing education programmes for industry professionals. Another programme targeted at making us Atmanirbhar is the post-graduate diploma programme in "Visionary Leadership in Manufacturing" run jointly by IIT Delhi and National Institute of Industrial Engineering

(NITIE).

For large-scale technology development, we have indigenous examples for the triple helix model – industry, academia, and the Government. The Department of Science and Technology has such schemes in a mission mode for critical areas. The Ministry of Education, along with the Department of Science and Technology, launched a targeted competitive scheme for new technology and product development (IMPRINT), where part funding from the industry is essential. A few examples of the triple helix model at our institute will illustrate the idea- A diesel vehicle running on Dimethyl Ether (DME) and hybridized with diesel was developed by IIT Delhi and Ashok Leyland and Indian Oil Company and was funded by the Department of Science and Technology.

IIT Delhi and Thermax have developed a prototype for converting coal to Methane with funding support from the Department of Science and Technology. IIT Delhi has a successful collaboration with DRDO and a Joint Technology Centre, which now involves industry and defence participation. There is a realisation that synergies can be exploited when industry and academia act together and define common goals.

Industry can license the intellectual property and know how developed by academics and researchers. Technology business incubators and initiatives like the Innovation Hub for Robotics at IIT Delhi help enable technology based start ups. Industry can strengthen these ecosystems and partner with these startups to enable them to scale up and create a large scale market impact.

Despite all these models and examples, Indian R&D funding is predominantly from the Government. For most higher education institutes in the country, 80-90% of the research funding is from the Government. In the US, most R&D funding in technology areas is from the industry. It is important for the Indian industry to significantly increase its

research funding and also have more robust partnerships with academia. The industry should provide inputs to academia to ensure the relevance of the curriculum and create better industry-ready professionals. We have seen the establishment of Centres of Excellence in Quantum Technologies, Artificial Intelligence, Robotics & Drones, New Energy Technologies , Renewable Energy, Waste-to-Wealth, Clean Air, Smart Manufacturing, Sustainable Infrastructure, Law & Technology, Smart & Protective Textile (Industry funding from GMR, Schlumberger, RENEW Power, and Nokia)

What are the barriers? What needs to be done?

Barring a few exceptions, industry does not welcome cutting-edge researchers and PhDs into research and development roles. The importance of specialised professionals who can provide a competitive advantage for industry has to be recognised. There is the well known valley of death where the university prototypes need to scale and become market ready. This could be done with the use of industry manufacturing and design facilities.

We need to establish long-term strategic relationships between industry and higher educational institutes (IITs, universities), which provide multiple modes of interaction.

What is the role of design?

It is increasingly evident that design thinking is an essential part of engineering education. IIT Delhi has set up a School of Design. Apart from the specialised Master's in Design, we have started a Bachelor in Design (four-year B.Des course) and soon plan to start a B.Tech in Design. Immersion, problem identification, and design are being emphasised in our curriculum. Learning by doing and working in teams will be key. Industry can offer design challenges for student-teams and have mechanisms to interface with industry professionals.

Endnote

If we want our industry to be globally competitive and our universities and IITs to be relevant and world-class, it is essential that we have a new resolve to work together to build an Atmanirbhar society. We must reorient ourselves and commit significant resources toward this common goal.

Design Considerations for the Immersive World

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Abstract

The role of designers has transitioned from defining the form and aesthetics of a product using a pencil and paper to transforming user experience and impacting business outcomes using advanced technologies such as Artificial Intelligence, Virtual Reality and Augmented Reality. These technology driven immersive experiences are transforming the way people learn, work, seek entertainment and shop. While harnessing technology for fulfilling different user needs is a multidisciplinary effort involving computer scientists, engineers, healthcare professionals, neuro scientists and many others, the role of the designer is to humanize the technology and make it more friendly, engaging and approachable for end users.

Given the new opportunities and challenges that technology innovation provides us with, there is a need for designers to develop knowledge, skills and attitudes that will enable them to harness the rapidly evolving technology innovations and address changing needs of users.
 This paper explores definitions, design principles and applications for virtual reality in domains such as Healthcare, Manufacturing, Tourism, Education, Entertainment and others.

Definitions

Augmented Reality (AR) uses a camera enabled device such as a smartphone, tablet or Head Mounted Device (HMD) to view a computer-simulated layer on top of the real world.

Virtual Reality (VR) immerses the user in digitally simulated 3D worlds where they can explore the environment, sense their own presence and interact in the virtual space. This can be experienced using VR Headsets.

Mixed Reality (MR) is the merging of real and virtual worlds to produce new experiences, where physical and digital objects co-exist and interact in real time and the user feels presence in the environment.

Keywords: Immersive Experience, Virtual Reality, Design Principles, Presence, User Control, Fidelity

1) Introduction

There are new paradigms of user interaction through touch, gesture, voice and gaze as enabled by emerging technologies such as mobility, virtual reality, augmented reality, mixed reality, powered by artificial intelligence. As technology is rapidly transforming and users are becoming more discerning, there is a need for designers to focus on the quality of user engagement and experience in order to help them achieve their goals.

2) Factors Determining Immersion

 There are a few factors that determine the degree of immersion of a user feels with AR or VR content. A simple but important decision a

Figure 1: Changing paradigm in user interaction with gesture, voice, and gaze based interactions

designer needs to make is the choice of the correct device for experiencing the virtual environment. Often the choice is determined by level of fidelity to cost for the end user. For instance if virtual reality is to be used as a training tool for a large number of students with a limited budget, the google cardboard is a good choice. Whereas for healthcare simulations for surgeons which involve critical sensory motor skills a more expensive but immersive head mounted device like HTC Vive may be more appropriate. Figure 2 highlights the available Head Mounted Displays and devices vs the experience for the users.

IMMERSIVE	HTC Vive Oculus Quest 2 Merge AR VR headset	Magic Leap Microsoft HoloLens Google Glass Enterprise Edition 2
AMBIENT	Google Cardboard Oculus Go Utopia 360 Headset	Daqri Epson Lenovo Mirage Star Wars
	VIRTUAL	AUGMENTED

Figure 2: The reality matrix of hardware for experiencing AR and VR

Other factors such as visual fidelity, sense of presence in the virtual environment, the degree of control, the congruency of interaction in the digital world vis a vis the real world, the narrative and gameplay are some of the key factors that play a role in the degree of immersion of the users.

3) Design Guidelines

While there are several parameters that help to build a successful immersive experience, the following are five key design guidelines that critically impact the quality of the virtual environment.

1. Perceptual Design As storytelling and cinematics in 360 VR environment is different from films, attraction points must be used to draw the attention of the user to where the director wants the attention to be. These attraction points can be visual or auditory. These would ensure that the user follows the plot in the intended sequence.

2. Spatial Design and relative scale of the environment play an important role in creating immersion as well as influence what the user feels. Small and claustrophobic environments might invoke a feeling of discomfort. Large and open environments provide a sense of smallness however a sense of comfort to the user. In both cases visual fidelity to the real world is important for the user to feel a part of the virtual world.

3. Sound Design plays a significant role in the success of a VR environment. Audio is essential to create an immersive experience, especially when it is used binaural to give a sense of the location of the sound and spatialization of the environment. Game designers should consider

indoor and outdoor sounds differently from each other.

4. Interaction Design should be intuitive and allow for the environment to easily fit the mental models of players. For example, cause vs effect in VR games must be consistent throughout levels. Consistency is necessary good to have for all games, but it is essential for VR games. It is because VR is a full -body experience. If things keep changing between levels, players may lose orientation.

5. Navigational Design Using the appropriate navigation method for the immersive environment is essential and should be decided at the early stages of design. The navigation should be designed appropriately for the user. Novice users may find it difficult to navigate using the hand controllers or walking within the environment, therefore for them there should be limited movement to complete a task. Novice users may also experience motion sickness more quickly therefore navigation should gradually transition from a basic to advance level for them.

4) Applications of VR, AR and MR

While VR, AR and MR are highly engaging for the end user, these experiences should be carefully selected in short sequences for the applications that really need immersion, as extended use may cause motion sickness and eye problems. For instance in the domain of

healthcare where the cost of failure is high, VR is a good tool for training nurses and doctors on critical clinical procedures, decision making and communication skills. Areas such as safety training in manufacturing plants is also great application for VR, where the learner can practice decision making in a risk-free environment. VR and AR are also a good tools for teaching concepts in science, history and geography where visualization of different procedures and environments are required. AR and VR are being used as a great marketing tool which help customers experience a product before they buy it. Companies like IKEA, Pepper fry and Tata Motors have used this feature effectively.

Conclusion

The user becomes a protagonist within the virtual world and is in control of the outcomes of the virtual story that plays out. However, the virtual environment is a double-edged sword; though it provides immersive power to the VR medium, ill-designed experiences may cause unintended consequences such as motion sickness, and unmet user goals. Therefore, it is essential to understand the design principles of the VR medium and perceptual system of humans to make the experience successful for the users.

Figure 3: Applications for Virtual Reality across sectors such as Retail, Healthcare, Travel, and Education

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Technology as the Fulcrum of Corporate Startup Partnership

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Abstract

In the ever-evolving dynamics of today's tech-driven world, corporate-startup collaboration sets up win-win avenues right for both entities – from learning and creating to scaling and growing. In an attempt to become more relevant and competitive in their space, corporates and startups build relations basis technological innovation while adapting to a new result-driven engagement model. This framework enables corporates' overall innovation strategy with tech leading the surge thereby thrusting up the corporate-startup partnerships to its zenith. Drawing on pertinent references from today's corporate-startup collaboration, the article throws light on how both the entities have come together to address myriad modern-day challenges using the power of technology.

Introduction

'Alone we can do so little, together we can do so much' - Helen Keller

Corporates and startups are coming together more than ever now. The pandemic has played a huge role in reinforcing and cementing the bridges between corporates and startups. Systematic engagements with startups with aligned priorities are generating impactful outcomes for both the entities. The corporate innovation channels are forging a solid path of collaborative engagement. This partnership is playing a major role in shaping the future of every aspect of life, including how we live, work or learn. Successful partnerships are built on solid foundation, and there are strong binding elements. In this era of digital transformation, technology is playing a crucial role in bringing about a mindshare between corporates and startups, cruising its way through challenges and opportunities to positively impact our everyday lives.

The Emerging Landscape

The 2020 Global Networking Trends Report [1]

forecasts that 14.6B IoT devices would find a place amidst us by 2022 and IDC estimates that 48.9B connected devices would be in use by 2023. Thanks to the penetration of internet through broadband, 3G and 4G, the world has suddenly come into existence in the hands of billions of mobile phones and computing device owners. The access to an external world has changed the trajectory of thought process of the users of computing. This change fueled a burgeoning demand and resultant supply of a flurry of applications in all possible areas. From entertainment to healthcare, agriculture to aviation, the expectations of the internet users transitioned into a need for instant gratification. The spectrum includes the likes of Koo, Meditate with Wysa, Legends of Runeterra and Zelish to name a few, which topped the charts this 2020[2]. While this is a much-intended change, it calls for a widely converged infrastructure - safe, sturdy, and holistic enough for the end users. As a boomerang effect, this in turn is spurring newer applications in areas hitherto less touched by digitization, and startups are leading the way.

Technology has advanced in leaps and bounds over the last 20 years, and we have witnessed changes that could hardly have been predicted at the millennium's start. The emergence and institutionalization of novel solutions as well as the combinatorial evolution of value propositions primarily spearheaded by startups and big corporates have driven market innovation. Today, technology is inspiring and impacting lives in every sphere. If academics want to research markets in a "socio-political-technological-material framework," they must consider the role of technology in market transitions [3]. If a serial entrepreneur wishes to embark on a new mission to help mankind though his/her changemaking initiatives, he/she should consider the various emerging technologies that can play an influencing role. The PREFET Methodology based study [4] sums up an intriguing list of top 20 trends with the greatest potential for growth and influence from 2020 to 2025. The technology trends outlined below though indicatory is likely to

spark research and have a significant impact in the future, thereby leading to significant market shifts.

Information and Communication Technologies (ICTs)	Biotechnology	Environmental technology
3D printing modules Adaptive assurance of autonomous systems Neuromorphic computing and biomimetic AI Limits of quantum computing DE coherence and use of machine learning Ethically trustworthy AI and anonymous analytics Beyond 5G hardware New approaches to data interoperability in IoT	Cognitive augmentation & intelligence amplification Regenerative medicine Drug discovery and manufacture using AI Bioinformatics and AI in Omics Bio robotics/bionics	Energy efficient water treatments Algae against climate change High temperature superconductivity and twist electronics Self-healing batteries Net zero concepts and beyond smart grids Arctic climate change Zero power sensors and ocean wiring and sensing

Table 1. List of Future and Emerging Technologies [4].

Despite the COVID-19 pandemic, India's startup environment has risen at an exponential rate in recent years. In 2013 [5], 1652 investment rounds totaling a value of $3.51 billion were completed. The number of investment rounds fell to 1516 in 2017, but the budget line rose to $6.43 billion. In India, a total of $10.60 billion was invested in a total of 1471 investment rounds in 2018. A total of $14.27 billion was invested in Indian startups in 1482 investment rounds in 2019, prior to the COVID-19 epidemic. Despite the COVID-19 epidemic and the lockdown, 1152 investment rounds resulted in a total of $11.4Bn infusion in 2020 [6]
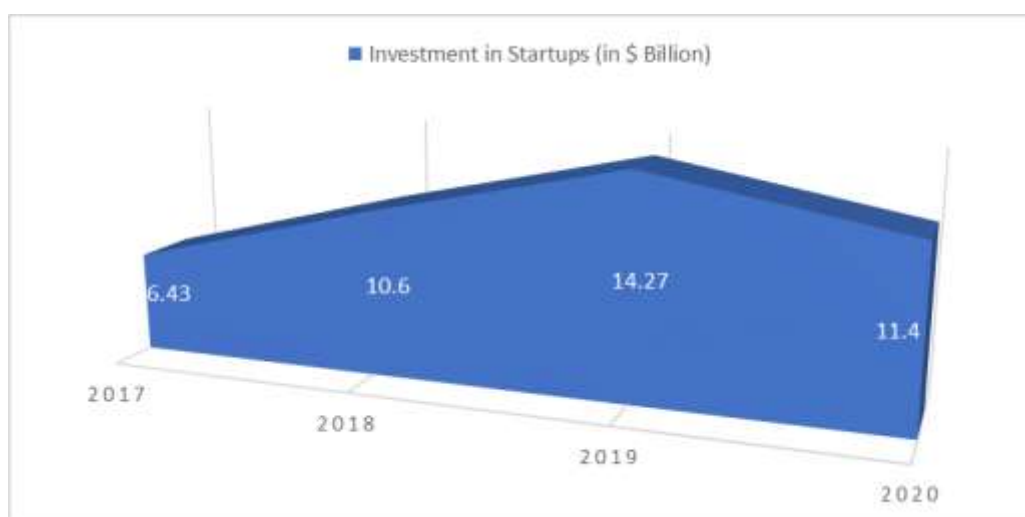

Fig 1. Investments in Indian startups

Keeping aside challenges and uncertain times, the Indian startup ecosystem is flourishing at an unprecedented speed. Courtesy of the startups and corporates who have come together now to take innovation to a whole new level – to solve the challenges that millions of us face every day. And in that mission, technology has been the propeller in binding the two key elements for the greater good.

Opportunities and Challenges

Accessibility, quality, and the need for speed have been the biggest drivers of new startup ideation. This brought in a fresh infusion of ideas, applications, and products into all possible verticals. However, as a pleasant surprise the creators did not stop at creating products in silos, but the wow factor came in when the applications could derive insights knowledge from external sources as well as communicate with users and machines outside their own. The real power of communication resulting in collaboration opened a host of opportunities, connecting areas like satellite and agriculture, bots and insurance, to name a few. Much notable is the contribution of artificial intelligence that seeded and powered the applications, cloud technologies that simplified the entire sophistication, and edge computing technologies that connected the two.

In a typical startup cycle, moving from ideation to prototype, to getting an entire product built is a significant milestone. Startups achieve product market fit traversing through multiple iterations of customer feedback. The resultant product usually serves well for the initially intended customer set. As the startups start scaling up, challenges abound not only in areas of team productivity, pace of delivery, but also of product and technology. The techno-product requirements typically tend to span across setting up of infrastructure and platforms, ensuring security and facilitating seamless collaboration. The magnitude of increasing requirements calls for enterprise grade offerings to overcome such roadblocks. This juncture is an inflection point.

The Power of Partnerships

At this juncture, startups now having developed significant expertise in their respective fields of operation, open up for partnerships with market leaders. They look forward to joining hands with corporates that have established their supremacy in infrastructural and platform based offerings. For corporates that take pride in their stability and existing market reach but are on constant lookout for ways and means to expand their innovative index, this inflection point is indeed significant. In the pursuit of expanding the tentacles of digitization, corporates are excited at the prospects of looking at newer market opportunities and contribute a whale in making lives easier and livelihoods smarter. The era of open innovation has floored questions about the potential of its success, thereby opening the doors of corporates as well as startups in a pursuit to engage with each other. Corporates today have dramatically changed their approach toward startups and look forward to being part of their scale up journey. They primarily look at accelerating strategic fit (sourcing and selecting ventures that had a strategic fit with one or more of their parent corporation's business units) and/or accelerating venture emergence (sharpen product-market fit, focus on specific target markets, attract users and customers, and build investor readiness) [7].

The newer world order, especially post pandemic, is witness to the dramatic evolution of solutions that are helping people, applications, machines stay connected through the power of technology. The interplay of startups and corporates is hence markedly higher in the technological domain. The startups and corporates that are adept at realizing this tectonic shift are exposing their respective application programming interfaces (APIs) and integrating with each other. Corporate startup accelerators like at Cisco LaunchPad, are stepping up to aid the startups in these integration efforts. Going a step further, by providing exclusive access to

hardware and software platforms as well, validation of joint solutions is readily accomplished. They also help identify and equip the startups in areas of technological gaps and redefine their architectures. An arduous process of figuring out the intricacies for building joint offerings, is now short circuited through structured corporate frameworks of corporate startup accelerators. The efficient routing mechanism of startups through these frameworks is forging the path for faster access to new markets with innovative joint offerings.

Driving Impact Together

Armed with technology ammunition, joint solutions of startups and corporates are creating waves in all walks of our lives. Thanks to today's corporate accelerator programs that have given a new dimension to the face of this partnership by creating many avenues of mutual growth and betterment. In India, as the number of cutting-edge startups is on the rise, big corporate houses have now started engaging with them more often than not. B2B startup accelerator programs of the likes of Cisco LaunchPad have come a long way in this mission to build a world of common good by harnessing the power and impact of modern technologies. Since its inception in 2016, Cisco's startup accelerator program [8] has not just helped many tech startups grow to the next level by facilitating industry-leading mentoring, investor and ecosystem connect initiatives, but also helped them discover their potentials to the fullest by architecting newer growth trajectories through collaboration. Healthcare startups have leveraged on many of Cisco's technologies to take critical care to the very corner of the country. Through their eICU and tele monitoring solutions, CloudPhysician and CareNation have joined hands to ensure affordable access to quality healthcare. Startups working in the agritech space are now making farmers more informed on how technology can play a key role in giving them better yields. For one of the large southern states of India, a

satellite tech startup Satsure in partnership with Cisco is offering remote crop monitoring services using satellite imagery and AI. Post pandemic, the future is going to be driven by a hybrid model – be it in the education space or in the way we work. And corporates have already done their bit by partnering with many high potential startups in these domains to ensure an unhampered learning environment. The aforesaid references are just a start – corporate-startup partnership is in fact heralding many areas of innovation across verticals – in India and globally.

Conclusion

With most corporate changemakers [9] donning the double responsibilities of driving organizational growth while actively advocating for societal innovation, we have seen the emergence of a result-driven engagement model. Technology is acting as the binding force, thrusting up the corporate-startup partnerships to its zenith. After a massive setback due to the outbreak of the global pandemic, the technology sector in India is now heading towards a strong recovery [10]. With industries, startups and big corporates embracing newer technologies to mitigate the risks and loss incurred, strong deal pipelines have started shaping up. Full marks need to be given to the collaborative effort of all these entities who have come closer than ever now – innovating solutions that are sustainable and are always up for the game. Despite challenges being thrown at us by the biggest pandemic the world has ever seen, with the coming together of mighty corporates and influential startups, the big impact of this collaboration has not just been visible, but invaluable for the society - for us all. As Mother Teresa rightly said, "I can do things you cannot, you can do things I cannot; together we can do great things". Here's to the power of technology in unlocking the joint innovative potential of corporates and startups for a better, smarter, safer world.

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Co-Innovate @ Brunel: Design Innovation Support as a Driver of Business Capacity

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Abstract

This paper presents Co-Innovate, a design innovation support programme run by Brunel Design School, Brunel University London. Established in 2012 and funded by Brunel and the European Regional Development Fund/ Greater London Authority, the programme is made up of two complementary projects: Brunel Co-Innovate Journeys and Bridging the Gap. The projects are both aimed at using design innovation to grow the business capacity of Greater London-based companies, with the former supporting SMEs and the latter start-ups. The projects deliver the support in three different formats: 01) educational workshops centred around the design innovation-related knowledge transfer from the academia to the business community, 02) mentoring on design management and business development strategy and 03) collaborative projects whereby the businesses taking part work with Brunel Design School students and academics to develop their product and service concepts into the near market-ready solutions. Since the establishment, Co-Innovate has supported approximately 500 companies, successfully facilitating their business growth and thus stimulating the Greater London economy by design.

Main Text

Brunel Design School at Brunel University London manages several different design innovation support programmes for businesses - with the common goal of stimulating the business capacity growth by design. The programmes vary in terms of the types of companies they target, the particular nature of support being available and the level of engagement of the School's academic and professional staff and students (Cosco and Garaj, 2020). Arguably, the most successful of these programmes is Co-Innovate (Brunel University London, 2021), which has been running continuously since 2012 and consists of two parallel projects: Brunel Co-Innovate Journeys and Bridging the Gap.

Both projects provide the support exclusively to businesses registered in the area of Greater London, with Brunel Co-Innovate Journeys targeting small and medium-sized enterprises (SMEs) and Bridging the Gap focusing on start-ups. To qualify as an SME and be supported under Brunel Co-Innovate Journeys, a business must have less than 250 employees, the annual turnover below £43 million (€50 million) and be more than 18 months old. To be eligible for support under Bridging the Gap, a start-up must not exceed the first anniversary of incorporation. At the start, the two Co-Innovate projects have been funded jointly by Brunel University London and the European Regional Development Fund (ERDF). Following Brexit, the ERDF's funding responsibility has been transferred to the Greater London Authority (GLA) and the future financial assistance for the programme is likely to be sought from the new UK Shared Prosperity Fund, which is currently being developed by the UK Government. The participation in Co-Innovate by SMEs and start-ups is free of charge.

The Co-Innovate design innovation support, both by Brunel Co-Innovate Journeys and Bridging the Gap, comes in three different formats: 01) educational workshops, 02) mentoring and 03) collaborative projects. The educational workshops are aimed at improving the competitiveness of participating businesses via the knowledge transfer covering different design-related and other relevant business topics, such as design thinking, digital branding and marketing, sustainability and intellectual property rights. The workshops are organised by the Co-Innovate administrative staff, with the delivery by Brunel academics and, in some cases, external experts, and usually take two connected sessions of up to 6 hours in duration to enable the topics to be explored in detail. The workshop sessions are typically attended by several different companies at once.

The mentoring aims to facilitate specific issues to do with the management of a particular product or service design project and/or provide guidance on the overall business

development strategy. Taking place in the "one-to-one" setting with a single business, the mentoring rounds are carried out in regular intervals over a period of between a few months to a year and delivered individually by the three project's Innovation Directors for the SMEs partaking in Brunel Co-Innovate Journeys and by the Entrepreneurship Director for the Bridging the Gap start-ups. All having extensive experience in design management and general business support, the four directors are also responsible for developing links with the Greater London business community to recruit the businesses suitable to join the two projects. The mentoring support format is especially interesting for the start-ups enlisting to Bridging the Gap, with the total mentoring time per business for this project being on average much longer than for Brunel Co-Innovate Journeys. The SMEs tend to be more interested in the project-specific design management mentoring, while the start-ups usually balance the project design management with the business strategy support, which is only natural considering their development level.

An example of a successful Co-Innovate mentoring outcome is the start-up called Cosi Care, set up by the Brunel Design School alumna Lauren Bell. A graduate of the BSc Product Design programme, Miss Bell formed the business based on her major project work immediately after she graduated in the academic year 2017/2018 and enrolled it for the Bridging the Gap mentoring support soon thereafter. Cosi Care (www.cosi-care.com) manufactures and markets a set of innovative medical products facilitating the instant itch-relief for children suffering from eczema and other skin conditions. The products (Images 01 and 02) enable the children to relieve the itching sensation without scratching and damaging their skin. One of a number of start-ups emerging from the Brunel Design School, the Bridging the Gap mentoring contributed to Cosi Care getting off the ground and becoming an established company.

The collaborative projects are the most in-depth format of the design innovation support provision available through Co-Innovate. The projects in most cases revolve around an early design concept by the supported SME or start-up, which the company wishes to develop into a market-ready solution in collaboration with the Brunel Design School students and academics. In the initial stage of a collaborative project, the company works with the Innovation or Entrepreneur Director to define the project design brief specifying the concept, its purpose, the relevant target users and the expected project deliverables. The brief is then taken into the collaborative process either as a group coursework assignment or an individual major project at the undergraduate or master's level. The group projects are usually implemented as the design process module assignments for the MSc Integrated Product Design programme, seeing the MSc students work on the brief during one academic term under the supervision of several academic tutors. These relatively short projects generally produce a set of different high-level responses to the brief by a number of student teams and, as such, function as the crowdsourcing of ideas rather than delivering the final product or service solutions. In contrast, the individual projects, which are conducted as the major project by a MSc student or a final year student attending the School's BA Industrial Design and Technology, BSc Product Design or BSc Product Design Engineering programmes, involve the student in working on the project under the close supervision of an academic for two academic terms and deliver a detailed solution that is often very close to being market-ready.

An interesting example of a collaborative project is Olus, a novel organic air-purifier using plant-based biodegradable filters capable of removing 99% of particulate air pollution (Images 03 and 04). Olus is the major project by Louie Duncan, a 2020/2021 graduate from the BSc Product Design Engineering programme who designed the purifier in response to the brief by the London-based Christian P Kerrigan Architecture. In addition to helping businesses

Image 01: Cosi Care by Lauren Bell, Academic Year 2017/2018

Image 02: Cosi Care by Lauren Bell, Academic Year 2017/2018

diversify and progress their design concepts, the collaborative projects also bring benefits to the students and academic staff getting involved in the collaborations. The students benefit from having an early experience of working with industry, which strengthens their professional skillset and CV, thus making them more employable after graduation. As for the academics, the collaborations enable keeping in touch with the real-world issues outside the academia, which adds to their relevancy both in teaching and in research. Over the years, the Co-Innovate programme has worked with circa 500 Greater London-based SMEs and start-ups, helping them improve their design management processes, successfully bring new products and services to the market and grow as a result. Although based in Brunel Design School and with the majority of the companies taking part being design-focused, Co-Innovate is also open for collaboration in other areas - with the

academic departments across Brunel University London, including engineering, healthcare, law and Brunel Business School and the eligible businesses with the support needs beyond design.

Over the years, the Co-Innovate programme has worked with circa 500 Greater London-based SMEs and start-ups, helping them improve their design management processes, successfully bring new products and services to the market and grow as a result. Although based in Brunel Design School and with the majority of the companies taking part being design-focused, Co-Innovate is also open for collaboration in other areas - with the academic departments across Brunel University London, including engineering, healthcare, law and Brunel Business School and the eligible businesses with the support needs beyond design.

Image 03: Olus by Louie Duncan for Christian P Kerrigan Architecture, Academic Year 2020/2021

Image 04: Olus by Louie Duncan for Christian P Kerrigan Architecture, Academic Year 2020/2021

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A sneak peak into shared experiences: A user research

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Abstract

Introduction: It is no secret that many of us at some point in time have shared our subscriptions or the premium account memberships for OTT UGC platforms and e-commerce with our family, friends, and colleagues. These 'shared experiences' come with a lot of concerns. This study aims to explore the concerns of users when having 'shared experiences'.

Method: This study was carried out amongst users with shared experiences (n=14) from January - February 2022 in India. They were interviewed using an author constructed semi-structured interview schedule. Post obtaining consent, they were interviewed and the data was analysed using thematic analysis.

Results: The mean age range of the users was 25.92 years with a male female ratio of 1:1 consisting of college students, working professionals and homemakers. Most common shared experiences were on OTT platforms followed by e-commerce and online food ordering. The primary reason for sharing was cost effectiveness. Some common problems faced by users included lack of profiles and/or their security (password in absentia), autopay, data privacy, and same time use by multiple users.

Conclusion: Users are sharing their subscriptions and memberships with friends and family mostly due to cost effectiveness but are concerned about their privacy. For upcoming digital products, it will be important to improve the overall user experience for these shared experiences.

Keywords: Shared experiences, user experience, user research, digital experience

Introduction

In this globalized world, consumers today have multiple options for pretty much everything in life- be it food, clothes or even travels. The same holds true for digital experiences. From MakeMyTrip to cleartrip for online flight bookings, OTT platforms like amazon prime, netflix, zee5, disney hotstar, and sonyLIV, online music like amazon music, apple music and youtube music and even online food ordering like swiggy and zomato. A multitude of choices, our users with 'dil maange more' attitude (translation: heart wants more) but a 'bachchat' (translation: saving) belief are found to be sharing these digital products with their friends and family. Many companies have taken cognizance and have started providing options for users to share their subscriptions and premium memberships for the digital products such as amazon prime video, Netflix and zee 5. However, this 'shared experience' comes with various difficulties for the users. With this research study, we aim to explore these shared experiences.

Methodology

Research objectives

● Explore the perceptions of users on shared experiences

● Discover user scenarios of shared experiences

● Examine the user needs, wants and pain-points.

Research design

Retrospective qualitative research vis-a-vis in-depth interviews were opted for this study.

Operational definition

● Share experience (SX) here is defined as the user experience of two or more users sharing/ owning a subscription or membership of digital products including but not limited to OTT, e-commerce etc.

Sample

Users in the age group of 18+ yrs pan India were recruited using snowball sampling. The sample size was proposed to be 12 or until data saturation. The study was carried out from January to February 2022.

Data collection and analysis

Data was collected through an author devised semi-structured interview schedule and was analysed using thematic analysis.

Results and Discussion

Demographic details

Fifteen users were recruited of which one was excluded due to socially desirable responses. The data analysed is of fourteen users (n=14) with a mean age of 25.92 years, and the male: female ratio of 1:1 (50% male, 50% female). They were mainly from tier 1 cities like Delhi, Mumbai, Bengaluru and Kolkata (71.4%); followed by tier 2 cities like Moradabad, Lucknow, Indore and Haridwar (28.6%). Majority of the participants were working professionals (50%), followed by college students (35.71%) and home-makers (14.29%). Majority of the users shared more than one app (92.86%) most commonly with family (61.54%) followed by friends (38.46%). Most common apps constituting of SX included OTT platforms like Netflix, amazon prime video, hotstar, zee5 and SonyLIV; online food ordering like swiggy and zomato; amazon prime for e-commerce; music apps like amazon music, and youtube music and others including ola, uber and urban company (figure 1). All users (100%) reported not sharing or even desirous to share their social media accounts with anyone be friends or family.

On qualitative analysis of the data, three themes emerged namely cost effectiveness, frequency of use, and social reciprocity.

Theme 1

A. Cost effectiveness: The most recurrent theme identified was that the users indulged in SX due to the pricing of the platforms. The users wanted to experience a digital product/s, but due to the pricing they were driven to share or purchase the product/s with friends and family.

"Netflix has great options to watch, but it is a little expensive, so me and my two other friends share it."

The key determinants of users financial well being includes both earning and spending 1. Users seem to be hardwired for a savings attitude aka bachchat (In Hindi) and hence the saying 'a penny saved is a penny earned'. The users for shared experiences (SX) do take this seriously not only purchasing subscriptions and memberships at discounted prices but also putting their privacy at stake by sharing it with each other.
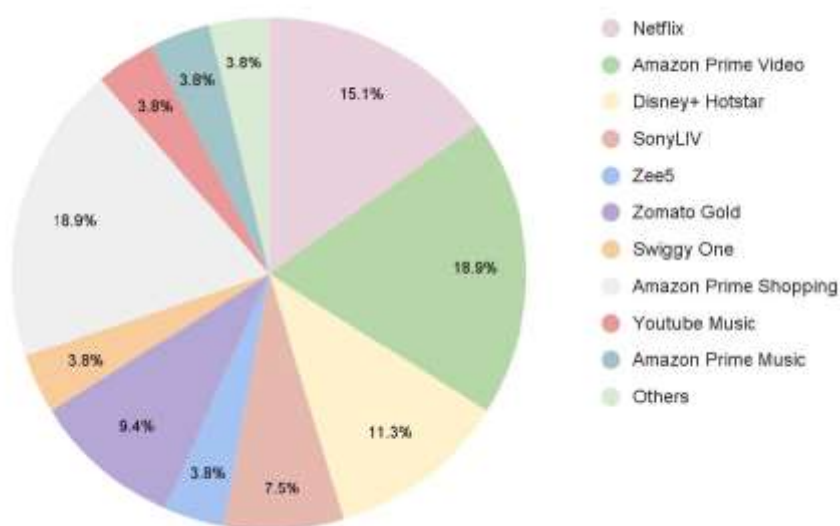

Figure 1. Depicting platforms of shared experiences

This behavior can also be explained by the 'Jugaad' attitude (Jugaad is officially accepted in Oxford Dictionary). We as humans are on a look out for creative solutions to our problems, and SX seems to be a feasible jugaad with low opportunity cost.

Theme 2

B. Frequency of use: When the users are aware that they might not be using the product/s very frequently, instead of purchasing the subscription or membership, they prefer borrowing it or sharing it to save cost.

"Started with game of thrones, but now I share hotstar for IPL with friends."

Another occasion for SX is to redeem one time or rare special benefits from an app.

"When my family and I go for dinner, we use my daughter's friend's zomato gold to get discounts" (transliterated from Hindi).

"Recently the republic day sale on urban company was very nice, I used my sister-in law's account to get salon services"

Users indulging in infrequent use of a product or service are likely to share because of the perceived value 2. Simply put, if the user wants to use a product or service for a specific occasion or restricted duration, instead of making a specific purchase, they seem to prefer sharing as the perceived value seems to be low. On the other hand, for the owners of the product or service, the perceived value is higher due to which they are okay to share because of the actual investment made by them as well as it feeds to the social behavior (discussed next).

Theme 3

C. Social behaviour: Another theme emerging for SX as it is viewed as an ideal and normative social behavior.

"This is how it is these days, I have Prime Video, my other friends have Netflix, Hotstar, and SonyLIV each and we all share all these platforms."

Borrowing knowledge from anthropology, psychology and sociology, we know humans are social beings who thrive and strive for social recognition (Cooley, 1902) and social belongingness (Maslow, 1943). SX seems to be a catalyst for fulfilling these basic human needs. Another interesting social behavioural construct at play is 'reciprocal altruism'- the notion that if I help someone, tomorrow they will help me (Trivers, 1971). This can also help in explaining why in a group of users having shared experiences, there may be more than one product and one owner.

Pain-points of shared experiences

Although shared experiences might seem as a boon, it comes with various bitter experiences as reported by the users:

1. Data privacy: With shared experiences, the most common concern is that of data privacy ranging from purchase history to watch list, and auto suggestions. For e-commerce and food ordering platforms another added concern of people having access to addresses and number of other people.

" My paternal uncle got to know I have a girlfriend through my Amazon prime shopping.

Not just her name, but her address and number...I had purchased a V-day gift for her since it was lockdown and we couldn't meet.

2. Lack of profiles and/or their security: The like of Netflix, Amazon Prime Video and Zee5 have started providing profile functionality which lets the user create multiple profiles and each can be customized to the user type, however they seem to be lacking security and anyone with access to main account can access all profiles, thus rendering profile function less effective.

"One of my cousin (minor) uses my profile on Amazon Prime Video when he wants to watch PG, R or A rated content instead of the kids profile created by his parents"

3. Autopay: With most of the SX platforms storing payment details, the users have had bitter experience of payments being made from their accounts. This includes autopay

subscriptions mostly in OTT platforms, Amazon wallet payments and refunds added as coupons on swiggy and zomato.

"It was INR 179/- payment done by my aunt through my amazon prime account. Mom said it's a small amount and to let it be. It might seem like a small amount but still…"

4. Same time use by multiple users: Many apps have an upper limit to the number of users who can use at one time. It becomes inconvenient when it is SX.

"Zomato Gold can be redeemed at a restaurant only limited times a day. My friend had used my account and when I wanted to I couldn't."

"Amazon prime music has a limitation to listen to one device at a time…"

Implications

With human centered or user centered approach stealing the limelight, empathy has become crucial for product owners and developers. Whilst introduction of features like the profile seems to cater to shared experiences of users, it is far from ideal. With a lack of exploration of SX, this study might be able to help owners, designers and developers to introduce novel solutions to make this SX a more pleasurable and safe experience and even increase the perceived value for increased customer satisfaction, loyalty and repeat use.

Study limitations

While inferring insights from this study, it is important to bear the following in mind. This was a qualitative study conducted on a relatively small sample which was recruited through snowball sampling and might not be truly representative of a larger population.

Conclusion

Users today are sharing their digital subscriptions and memberships, but not without certain difficulties. Understanding this side of users will help the companies improve the overall user experience of their products resulting in happy users.

Conflict of Interest

This study was conducted for and by Red Baton Design Studio and doesn't include any research data of clients. The authors declare no conflicts of interest.

Author Agreement Statement

We declare that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

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Novel use of AI techniques in Quality Inspection for Precision

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Abstract

The article explores various techniques for automated quality inspection in the precision manufacturing industries. The key focus is to identify and compare the different kinds of machine vision problems in the industry. The article, further, introduces a novel technique of using AI for quality inspection and demonstrates an application in an assembly line and a discrete manufacturing setup. The deployment results confirm that this method leverages AI to automate quality inspection for those processes to achieve the desired benefits. **Index Terms:** Artificial Intelligence, Manufacturing, Quality Inspection, QA, QC, Machine Learning, Machine Vision.

I. Introduction

Quality has reached utmost importance in most precision manufacturing applications due to the decentralization of the global supply chains. While in the 1990s 100 parts-per-million defect numbers were acceptable, most manufacturers currently demand 0 parts-per-million defect numbers. This demand for a higher quality along with the continuous drive to reduce the manufacturing cost of products has led to a direct need for automation in quality inspection processes. While manual Quality Inspection workforce is still 25%+ of the total workforce for most precision manufacturing companies, the COVID-19 uncertainties have further increased the demand for human-independent objective processes in the manufacturing shopfloor.

There have been attempts to use conventional computer-vision techniques to detect the presence/absence of parts and dimensional defects in precision manufacturing. This work presents a novel way of doing the surface quality inspection with the use of novel artificial intelligence techniques.

The rest of the paper is organized as follows: Section II discusses the background of Machine Vision and the current trends. Section III discusses the problem statement while Section IV highlights the key advantages of the new implementation, Section V describes some of the deployment results. Finally, in Section VI the conclusions and scope for future work will be discussed. Some of the cases where said implementation has been successful in automating quality inspection for the first time. We will explore an automated vision inspection system for an assembly line and a discrete manufacturing setup.

II. Machine Vision Background

Machine Vision has been used in manufacturing since the 1930s [1] to solve various quality-related problems. But they have been restricted to very specific use cases. However, Artificial Intelligence was so compute-intensive that deployment of the same to solve more advanced Machine vision problems was not possible without significant investment in server hardware in the manufacturing environment. The environmental challenges of the manufacturing shop floor make such a deployment traditionally unthinkable.

A 2006 report stated that machine vision was $1.5 billion in North America Alone [2], with the advent of new tools and technologies in machine vision the market and the scope has grown much bigger. By 2025 it is estimated to be a $13 billion market world-wide. [3]

Globally the Machine vision trend has been driven by traceability use cases in Pharma and Electronic PCB manufacturing [3]. As the trend for automation increases, machine vision has been growing in parallel with robot guidance systems.

However, the Automotive industry has the largest market share and will continue to grow for various needs from customized to generalized applications majorly focusing on quality control in discrete manufacturing, guidance and productivity in assembly. APAC including China and India hold the largest share for Machine Vision and

Automation, as they have some of the largest manufacturing facilities.[3]

With advent of smart cameras, processing on the edge with powerful processors, the technology trend will gradually move from Image processing with large set of cameras for various use cases to minimalist smart cameras with AI capabilities.[4]

III. Problem Statement

Industrial cameras have come a long way and can handle multiple use-cases with a single camera built-in controller, lighting, and lenses at high speed, but they operate with fixed-function algorithms. They are good at OCR (Optical Character Recognition) which is useful for traceability applications, but if there is some background variability, for example, oil on the metal surface or printed letters on reflective polythene with a varying surface, the number of false outputs drastically increases. Furthermore, there are non-standardized surface defects that are common in stamping, die-casting, machining applications that are very difficult for traditional vision systems to work with. These include dents, scratches, burrs, and other imperfections. When a traditional machine-learning setup needs to be used for this, it needs good parts as well as bad parts for the deployment as well as a lot of initial data for getting the right accuracy.
As the part to be inspected becomes more subjective, industries have traditionally switched to manual inspection, which comes with its own challenges. For instance, identifying a surface defect on the oily surface or casted surface can be easily done by an operator, but is difficult with machine vision applications, because of the variability of the surface finish. However, a trained operator can distinguish between a foreign particle on the surface and the defect area, but a machine vision can interpret the oil deposit as rust and reject a good part. This leads to many undesired results.

Manufacturing bad parts at scale for training an inspection system is often impossible and this leads to deployment challenges at scale in manufacturing. When we combine this with the challenge of deploying servers for running traditional AI-powered systems, we realize why there is such a low adoption rate of this kind of state-of-the-art technologies in manufacturing.

IV. New Implementation

In this section, the new implementation is discussed. The new implementation integrates a layer of AI on top of traditional machine-vision techniques to drastically improve accuracy and enable complex surface inspection use cases. The system has a training interface where the operator can add as less as 100 good images of various parts, and then start the training process. The system internally detects the different kinds of faults and finish issues and provides the final model on Edge-Compute systems on the shop floor. The system can be deployed as a self-learning system and can become a part of the shop floor's "Continuous Improvement Process" The biggest challenge for AI systems is in terms of the processing power needed to build and deploy the models on the shop floor, which is a day-to-day requirement. This work also discusses drastic optimization that has been done on embedded systems to enable running such software on hand-held devices. When such models are tuned for a single operation, and with the advent of new computing paradigms such as general-purpose GPU and CUDA it has been proven that complex deep-learning models can be run on such hand-held
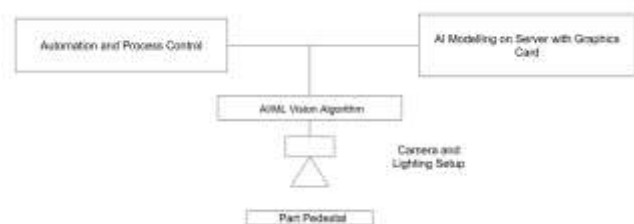

Fig. 1: AI-Powered Inspection Architecture

hardware. This makes the process faster and more efficient.

Fig. 1 describes the typical architecture of an AI-powered Inspection system. The following are a few of the major considerations with the implementation of systems:
1. Number of surfaces to inspect
2. Area with uniform constant lighting using standard industrial lighting solutions.
3. Poka-yokes specific to your part or assembly process to reduce the part movement. Fixed part locations typically improve the accuracy of AI-powered Inspection systems.
4. The level of automation based on the cost-takt time trade-offs.

V. Test-Setup and Results

Feature	Description
ARM64-based Application Processor	ARM Cortex A-57 microprocessor cores: Hexacore (6-Core Carmel CPU+ 6MBL2 + 4MBL3)
System Memory	4GB LPDDR3 SDRAM; 32-but wide; up to 800MHz
GPU	Nvidia Volta with 384 CUDA cores.

In this section, we discuss the experimental testbed to evaluate the proposed solution and the results obtained after the experiments are also incorporated within.

A. Experimental Testbed

An ARM64 based Linux device was used as the experimental device. The hardware capabilities of the same are listed out in Table I.

B. Experimental Results

Test-case	Total Products Tested	Conventional Vision System Accuracy	AI-based Vision System
Packaging Defect	5,32,600	94%	99.96%
Packet Forming Defect	5,10,000	92%	99.98%

The performance benchmarking was conducted using the standard images for a test-run. The application was running on top of the stock system. The performance data was compared with a typical conventional vision system setup. The results are depicted in Table III and shows an improvement for almost all kinds of test-cases with a very big improvement in the accuracy.

VI. Conclusion and Future Scope

The purpose of this work is to discuss a novel method of inspecting products on the manufacturing shopfloor based on AI techniques that have been developed for this study. In this work, only a small subset of defects and products have been captured. This can be further enhanced by improving the model architecture and generalizing it better for different kinds of products. One of the key areas of development is the subsequent reduction in the number of false positives.

As things get more complex on the manufacturing shopfloor, it becomes important to also understand the operations and the SOP (Standard Operating Procedures) defined. While the obvious answer would be a Gemba Walkthrough, with the advent of remote mechanisms and people-independent processes, analytics on the video for the plant operation is an exciting new frontier for a lot of development. The ethical challenges of constant surveillance would remain an interesting bottleneck for technology to solve.

About Us:

SwitchOn.io is an Edge AI company focused on helping the Automotive and FMCG sector guarantee the quality of products in their manufacturing lines using AI. SwitchOn specializes in field-trainable surface-inspection systems at high speeds and has delivered unique solutions in Europe and India to machined, die-casted and assembled parts, achieving zero defects within weeks of deployment in the plant.

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IP backed financing in India and intricacies thereof

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Abstract

An intellectual Property (IP) conducive environment is arguably an imperative for any economy that wishes to be competitive in the 21st century. Thriving and encouraging ecosystem for allowing for creation, protection and further monetization/ commercialization will go a long way to encourage inventors to innovate, and ultimately also boost local economy while furthering technological advancements.

Many countries across the globe have recognized this need and have been visibly making efforts to reduce the uncertainty around need for investing in IP creation, protection and enforcement by developing an IP commercialization framework that provides certainty to return on these investments. According to certain reports, India is emerging as the third largest economy for start-ups. Startups are usually built on a foundation of business ideas that may also have new technologies either as a basis or a means to the commercialization goal. Any encouragement provided to these organizations will go a long way to encourage further investments in the business without compromising on appropriate IP protection in a timely manner. Same goes for SME and other small and medium scale companies.

It may be timely for India to also consider appropriate policy changes that incentivize innovation. Developing IP as a monetizable asset would propel and foster innovation mindset. Individual innovators, Start-ups and SME's can also attract investments from local and overseas multinational corporations to grow their businesses, boosting the country's economy.

Introduction

Intellectual property is increasingly being recognised the world over as an important commercial asset and the driving force to technological progress and economic development of a country [1]. Intellectual property is also a type of an "intangible asset". This makes valuation a challenge, unlike tangible properties such as land or other movable or immovable properties where valuation can be done under a more predictable set of guidelines. Examples of Intellectual property include patents, trademarks, copyrights, designs, etc. In case of intangible assets such as IP, factors such as possibility of future "incremental inventions", "research exemptions", uncertainty of timelines and litigation outcomes indicate that rights conferred are not strictly "absolute". Similarly, copyright protected material may be copied within the broad limits of statutorily recognized "fair use". The interpretation of these words can sometimes be subjective. Difficulty in predicting future cash flows due to a variety of specific risk factors are unique to IP based valuations.

In the present knowledge-based economy, the role of intellectual property and its appropriate protection is becoming undisputable. Increasingly IP is becoming an important currency for economic development and IP commercialization an increasingly attractive option to monetize IP [3]. IP is valuable for every business, including hi-tech, pharmaceutical, and agricultural sectors which make huge investments in research and development (R&D) and sometimes with longer product lifecycles. In case of the medical devices sector, post R&D and prototyping, regulatory approvals can also take up a lot of time and funds. If high quality IP can be recognized as a tool for raising capital, this will go a long way in maintaining a sustainable innovation friendly environment that brings economic benefits to the innovators but also to the local economy.

Background

IP assets can become tool to raise funds by seeking capital from private investors, VCs or banks [2]. The investor/lender, may assess whether the products/ services offered by a company are protected by at least one type of

IP such as patents, trademarks, industrial designs, copyright or any other related IP rights [2]. However, in reality, large transactions in which IP is used as collateral have been executed most often by companies in distress or under threat of bankruptcy, when all other options to raise loans against tangible assets have been exhausted. The low valuations are largely attributed to the higher risks like infringement, technological obsolescence and unauthorized use of intangible assets .

Types of financing transactions

IP rights can be used as a "direct collateral" to apply for bank loans. This option can be used by IP owners to expand their business.

In another model known as the "Sale and lease back model", IP owner sells the patent with complete transfer of ownership for a reasonable consideration (funding). The purchaser has the option of buying the patents and consequently the assignment is organized in the name of the new owner. The original IP owner is then granted a license to use the IP, in return for specified royalty payments for a defined period of time. At the end of this period, the original owner has the option to buy back the IP asset(s) at a predefined price. The advantage of this model is that the firm can increase short-term liquidity while continuing to use the IP. This kind of IP monetization helps the initial patent holder secure funding, expand business with certainty and with an option to get the IP portfolio back for future business plans [5].

There is another model known as the "venture Debt" model, used by Start-ups that have completed several rounds of fund raisings. This option features both debt and equity characteristics. It is used complimentary to venture financing based purely on equity. The advantage is that it prevents dilution of equity while securing additional funding for existing equity holders. The funds are accepted as loans on certain interest terms. The Start-up issues "warrants" for equity in the company, which are acquired by the lender. IP assets can sometimes be key to facilitate these deals [5].

Under "IP Collateral Enhancement" model, the IP assets are used as additions to a broader collateral package. The borrower assures the lender of honouring the loan via insurance, or a third-party guarantee. IP is used as collateral based on valuation of the IP. Credit enhancement reduces credit/default risk of a debt, thereby increasing the overall credit rating and lowering interest rates.

Further, "Securitization of IP rights" can be defined as a process in which a company pools the rights to receive certain "future payments" from certain assets and sells that right in the form of securities. With structured finance gaining popularity securitization transactions have become more popular. Securitization differs from collateralization on the matter of deployment of funds. While the royalty pay is used to pay back the interest and principal in debt scheme, in securities it is used to support one or more securities, whose credit rating could be of a quality higher than the company's secured debt. Some rating agencies analyse the possible future cash flows [6].

An "asset-backed security" (ABS) on the other hand, is an investment security, a bond or note, which is collateralized by a pool of assets, such as loans, leases, credit card debt, royalties, or receivables. The instruments that become a part of the pool are called securitised assets [7].

Challenges with using IP as a collateral

Apart from being difficult to value because of unpredictable factors involved, IP is usually not the sole collateral for the lender. IP usually has zero value for risk weighting loans. Typically, zero direct lending value are ascribed by banks to the IP. Many lenders tend to undo rate the value of software as collateral file software can actually be used along with other types of intellectual property. [3] [9]

Appropriate valuation can significantly mitigate possible risks and help manage expectations for both parties. Technical valuations can vary based on the time, methods used, external environment, balance life time of an IP asset (e.g patents or design rights)) and factors considered. Strength of patents are easy to

ascribe to heavily litigated patents. It is difficult to predict the enforceability of freshly granted patents.

Unpredictable enforcement environment can make valuation more challenging.

Current National Scenario

India has emerged as the third largest economy for start-ups in IP intensive industries including technology and biopharmaceuticals [1]. There are established acts and rules that dictate governance related to Trademarks, Patents, Copyrights and Related Rights, Industrial Designs, Geographical Indications, Layout Designs of Integrated Circuits, Plant Varieties, Information Technology and Cybercrimes, Data Protection [3] etc..

Government initiatives such as the launch of a "National IPR Policy, 2016" for promoting IPR commercialization as one of the objectives is commendable. Traditional asset securitization process is still deeply embedded in the lending process.

Several statutes contemplate creation of security interests over intangible property, but License and assignments are still the preferred ways of IP monetization.

To arrive at implementable recommendations, the interplaying legal provisions need to be examined in detail to identify the main bottlenecks. Some of these acts and regulations are the Companies Act, 2020 [5], SARFAESI (The Securitization and Reconstruction of Financial Assets and Enforcement of Securities Interest) Act, 2020 [6], Banking Regulation Act, 1949 [7], Patents Act, 1970 [8], Designs Act, 2000 [9], Trade Marks Act, 1999 [10]

Current International Scenario

Governments across the globe have been introducing various policies to encourage an IP financing ecosystem for the last few decades. IP exchanges have been setup, which not only offer a wide platform for buyers and sellers to trade IP, but also bring in the necessary transparency. Several countries such as China, Hongkong, United Kingdom, Singapore,

Malaysia, Korea, Philippines, Switzerland, Germany etc seem to have made some headway in this direction.

Current Trends

Many countries seem to have adopted ways best suited as per their own governance structures. If designed appropriately, IP financing schemes will benefit startups, SME and also the participating lending institutions. Innovative provisions such as interest rate subsidy on IP backed loans and inclusion of credit guarantees for risk sharing between the lending institution and the government etc. will go a long way to encourage these practices. IP exchange platforms, different types of financing options such as loans, equity (including preference capital), debt convertible to equity and vice versa, etc. can be designed based on local needs and available infrastructure.

Summary

It is recommended that governments create a cadence to encourage filing and monetization opportunities and mechanisms to raise capital through IP. Collaterals can be based on present and future opportunities of securing royalties.

Such initiatives will further help fledgling Startups [4] [5], MSME's and other industries and entrepreneurs who can focus on creating IP assets while having the required cash flow to expand their businesses in India and abroad.

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DESIGN: A catalyst for change

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Design cuts across various sectors and areas crucial for economic development and for improving daily lives of citizens. With the changing time, it is pertinent to embrace the change and adopt new methods to become globally competitive.

The recent trends predict that the next generation of consumers has new values and needs. Design should provide them with unique, sustainable, efficient or purposeful experiences. To be specific, Design should be more eye-catching and outstanding; design should provide an experience rather than a basic product; design should not be wasteful, but sustainable; design should provide smarter, simpler, efficient solutions; and design, devices and vehicles should be designed for multiple purposes to fit different occasions. Wellness-oriented purchases and experiences have become a key marker of the current time. At the same time, the need for sustainability and convenience in their daily lives grows.

Here, we are taking an example of a country that has adopted holistic approach and design strategies to grow exponentially to become global leader: South Korea. The country which holds 5th rank among the 132 economies featured in the Global Innovation Index 2021 was amongst the poorest countries in the world back in 1960's. - South Korea performs best in Human capital and research.

In last 50 years, - South Korea has achieved an economic alteration which was truly unbelievable. It has transformed into a world-class, high-tech Organisation for Economic Co-operation and Development (OECD) economy known for its consumer electronics such as smartphones or flat screen TVs and its manufacture of products such as cars, ships and oil and gas platforms—Korea is currently building the world's largest semisubmersible platform.

There has been a Design boom in Korea since early 1990s as a result of rapid industrialization. The TV documentaries entitled "Winning by Design" and "Why Design" helped to convince the senior management of Korean industrial corporations and Government to take necessary actions to establish a national design agenda that would lead to path of Korea being world class design nation.

Korean manufacturers who initially focused on low-cost mass production had to shift gears and develop their own designs to compete with domestic market. The Korea Handicraft Demonstration Center established then was responsible for uplifting industrial design education by establishing courses in universities and for sending trainees to get the know-how from United States. Korea Craft/Design Research Centre established in 1965 was later termed as Korea Design Center. Further christened as Korean Institute of Design Promotion in 1970 is the sole flag bearer of design planning and implementing design policies and strategies aiming to raise quality of life by design and design lead innovation.

In 2013, the country's president, Park Geun-hye, announced the plan to move the country towards a "creative economy". This plan opened up new growth model based on innovation, design and entrepreneurship.

The Korean success which brought per capita GDP from 10% of the US's in 1962 to 50% in 2012 was achieved by a relatively small number of very large, world-leading global brands such as Samsung, LG and Hyundai. Known as chaebols (chae in Korean means wealth or property and pŏl means faction or clan), these companies are leading in the R&D space. According to the Korea Industrial Technology Association, large companies accounted for 74% of private R&D investments while SMEs and venture firms accounted for only 13% and 11%, respectively.

South Korea aimed for holistic growth, where Government expanded infrastructure for the Design Industry, corporates activated design management system and universities produced highly qualified designers. Government procurement office gave priority to good design products an MOU was signed in inline with this strategy in 2002. Synergy between government policies, networking infrastructures that comprise Korea Design Center, regional Design

Center and Design Innovation Centers led to this rapid shift.

Notable initiative in Korean Design history is Good Design (GD) Selection mark, which has been consistently organized since 1985, it is hosted by Ministry of Trade, Industry, and Energy (MOTIE). Good Design (GD) symbol backed by Korean government has been the quintessential mark of outstanding quality, creating awareness among general public.

To summarize the key factors that resulted in the success saga of South Korea were the "Government -Pull", "Civilian-Push" model for design promotion system, reformation of design education system for cultivating design experts to cater to diverse set of challenges and sectors and most importantly establishment of large-scale corporate design centres for enhancing the quality of the end product.

From India context, this is the right time for taking necessary actions to foster design. As we see exponential growth in number of Design institutions setting up in the country, industry having the right mindset to invest in design strategies and Government encouraging MSMEs to invest in design interventions. Having said that, we need dedicated efforts from the key players to achieve broader objective.

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DESIGN SUCCESS STORYBOARD

Havells Freedom Flexible Light Solution

Sumit Singh

Context:

The modern-day illumination systems have to be in sync with the trends of space designs being flexible, connected and premium with unobtrusive minimal attributes. Lighting directly effects the mood and psychology of a person because it impacts the human circadian cycle by simulating different types of hormones. Hence, Space design for human wellbeing is a key emerging factor that challenges designers to create a better experience. Architects have been experimenting with various kind of lighting solutions however they have been lacking a common design language limiting their creativity. Companies/ employers are finding ways to have a positive and effective work environment for the employees which enhances the productivity and effectiveness.

The Challenge

- The trend of continuous professional lighting for architectural space **demands shape and length customization** to meet the design requirements specified by the architects & interior designers hence, are not favourable for onsite customization. Leading to an **increase in the time gap** between the customization and final installation of the luminaire, which itself is a design challenge.
- To achieve continuity, luminaires are attached end to end which leads to light **leakage & non-uniform lights** while glowing. **Glare, alignment and uneven gaps** between the luminaire becomes the key issue.
- Depending upon the application, different luminaires are used in a same project which lacks the standard design language .

Statement:

Premium & sophisticated luminaire to attract Class A architects and specifiers in professional lighting category, which adapts to various architectural spaces, considering user and usage at the center of the creative process.

The journey:

Following the complete Design Thinking process wherein the focus was on three pillars:
- Consumer wellbeing centric/ oriented
- Viable for business
- Technologically feasible

The journey started with empathizing the consumer by understanding them, their needs and pain points. One-on-one interaction with

various architects, retailers and consumers was conducted to find various insights.

Followed by an extensive market research, benchmarking, channelizing problem areas and analyzing consumer interactions was done to come up with goals and refined brief

Multiple rounds of ideation, form exploration and technical experiments were done. Selected concepts were then validated by many architects and specifiers. The most favorable concept- 'freedom' was taken through the rigorous engineering and testing validation

Goals:

- Sustainable design approach with premium, minimal design attributes which are in harmony with the modern interiors.
- Freedom of achieving different tessellated shapes.
- Modular and scalable design approach to avoid customization & saving the overall budget & time of the project.
- High efficacy with desired photometry

Design:

Freedom is an intelligent architectural indoor professional luminaire designed to adapt to varied ecosystem. The integrated human centric lighting system makes it sustainable, smart, energy efficient and psychologically enhances the experience of a space by focusing on the user needs. The design intent is to achieve flexibility and modularity, giving freedom to the architect to achieve various possible shapes for premium and sophisticated architectural spaces.

Features:

MODULAR: Design language is a simple and minimal with aluminum body for premium visual appeal. The shape of the individual modules are capsules, with connected continuity as its primary intent. Minimizing the gap between the modules provides unhindered visual illumination.

FLEXIBILITY: Fast and user-friendly installation Various tessellated shapes can be achieved by changing the angles provided between modules. This helps in achieving a greater flexibility for various onsite conditions.

UNIFORM GLOW: Uniform light distribution smoothens the mood of the user and enhances the visibility inside the application area and also in the work place.

HUMAN CENTRIC LIGHT: Incorporates smart lighting management system based on the circadian cycle of the human body which defines type of light required during a specific time at a particular location. Impacting the psychology of the user in a better way, providing a pleasant work environment and increasing the productivity.

ONE DESIGN SOLUTION FOR ALL: The design flexibility allows the luminaires to cater various applications based on the user/ space need. Enables a common design language for varied ecosystem in an architectural project 'One for All '. Freedom has continuous tessellation options with infinite length for open office space, workstation areas, conference room, meeting rooms, lobbies, art galleries, cafeterias, and retails.

NEXSTEM: BRAIN COMPUTER INTERFACE (BCI) HEADSET

Swapnil Soni

Image source Adobe stock   MATROSVV

Nexstem is a new-age technology company working to enhance human capabilities by empowering the brain to seamlessly interact with machines and execute complex tasks with just a thought. Nexstem's mission is to change the way humans interact with machines. The design and development of Nexstem's Brain Computer Interface (BCI) headset and SDK is a step towards fulfilling this mission. Studio Carbon was tasked with the Design and development of Nexstem's BCI headset. This case study delves into the challenges, development process and design decisions throughout the evolution of Nexstem's BCI headset.

The space of Brain Computer Interfaces is one that is nascent but is bound to have a crucial impact on the generations to come. Brain Computer Interfaces (BCI) now and in the future would not be limited to individuals of a particular expertise or profession and hence the design of a universal headset presents crucial challenges. Functionally, BCIs need to cater to various head sizes and shapes while also maintaining sufficient contact of the electrodes with the scalp to ensure good signal reception. Hence fit and comfort were of utmost priorities. Viscerally, the headset needs to be acceptable for a wider audience, some as contrasting as gamers and scientists, meaning a design language that is appealing to a wide spectrum of users.

The design team seeked answers to these challenges through well founded research marked by extensive secondary and primary research. One common lead from both the research practices was that BCI's at present share a few traits with their clinical counterpart, the electro encephalogram (EEG) device. EEG's in general require experienced professionals to operate and considerable time to setup. Their electrodes also need continual lubrication to ensure signal reception. Visually, EEG's are quite overwhelming with various appendages. BCI's at present share some of these traits with EEG's in various degrees of intensity. Some require lubrication, frequent changes in electrodes and the overwhelming outlook.

For a device aimed at making an entry into consumers spaces, offices and homes, it was crucial that these traits were tackled. The context it catered to demanded an easy to use device, with a minimal setup time and one that needs no form of expertise. Moving away from electrodes that required lubrication or frequent replacements was also key. The visual outlook of the headset needed a redefinition and not bounded by the likes of EEG. A base need was to make the styling and the visceral nature of the device more amicable and approachable.

These key insights laid the foundation as to what the device would shape into.

With the insights in place, the subsequent step was to optimise the physical architecture of the headset. The headset was set to use 18 electrodes, 16 to capture brain activity and 2 as reference electrodes. The 16 electrodes followed the 10-20 system of electrode positioning. The initial electrode positions set by the nexstem team were optimised with an intention to have a balance of function and compaction. Electrodes which reached out further from the origin, say Cz, such as ones near the forehead were brought closer. This was done to reduce the space or volume that the headset could occupy, resulting in a more compact and portable package. This exercise was done closely with the team at Nexstem to avoid any form of loss in performance while optimising for compaction. The two reference electrodes underwent a change in position as well, from right beneath the ear lobe to above the ear. in accordance with the inputs from Nexstem's team a more bony section of the head where the activity was less and would not contribute to noise was preferred. The resulting layout was one that was quite compact in comparison to its predecessor making way for the compact device that the nexstem headset would turn out to be. The optimised electrode positions were plotted in 3D space for various head sizes and orthographic views were arrived at making way for silhouette ideations. The design team explored various form directions by means of connecting the electrode positions. In contrast to the initial preference of

a closed headset design by the technical team, the design team suggested an open headset design. The hypothesis was that, the open structure would allow for flexibility and better fit for various head sizes and this would later be proven right.

One of the open headset designs was taken forward to be refined, which was marked by a distinct three arm appendage. The product development and form styling went hand in hand, as form was a key factor in enhancing the headset's function. Taking insights from the research into consideration, a more amicable design language was curated. One that featured more organic surfaces and blends with sculpted creases. The large curvaceous forms made for an approachable attribute.

The headset design went through 23 iterations of which 10 were key product revisions. The iterations explored material choices, mechanisms and were optimised for space and comfort. To state a few of the key revisions, Nylon was a material that was arrived at for the device's body, this further amplified the flexible nature of the open headset design. The electrode holder materials were narrowed down to brass which significantly reduced noise. Localised spring mechanisms and bi-layered memory foams were explored for a more comfortable fit. The three arms were later integrated with an expansion rail mechanism to allow for a universal fit. All these revisions reflected when the first user reviews started coming in of how comfortable the headset is. The finalised prototype was given a class-A surface treatment for a smooth and spotless surface. This enables light to flow seamlessly over the product, imbuing a sophisticated feel unlike any other. In order to make the product ready for manufacturing, several factors were taken into consideration, such as cost optimization, materials, parts, joineries, ease of assembly etc.

The final outcome was a result of a constant effort to balance the feasibility of production of the headset as well as the design intent and aesthetics. Challenges such as cable routing, electronic mounts, bosses and joineries were

iterated to reach a balanced solution. Production was done through vacuum moulding in batches of 15, and were meant for developers and core users who would aid Nexstem in further tuning the product.

Nexstem's journey throughout the process helped them gain backing from several big names of the industry. The final design, through its several iterative evolutions resulted in a product that is functional at its core and is aesthetic, making the product a true game changer in it's segment.

DESIGN

REPOSITORY

GoSolo - A Mobility Solution

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Problem Area:

Elderly and people with limited mobility who use wheelchairs to mobilize, aspire to be a part of the system and community by making independent efforts. Present affordable wheelchairs in a lower-middle- income country like India are functional assistive devices with a serious tone that often intimidates it's users. They facilitate the user to travel from point A to B but lack the ability to assist them in performing various daily activities without the help from a caregiver in different environments. Majority of wheelchair users develop a stigma towards wheelchairs because the appearance of the equipment screams "medical device" and they depend on extra help to transfer or stand up despite the use of assistance equipment. It also makes the users reluctant to use the wheelchairs in public, thus 'isolating' themselves from the society and doing what they love!

Design Solution:

GoSolo is an elegant mobility device that disguises itself as a lifestyle product and expands on the capabilities of the traditional form of motorized wheelchair. The product has an aura of warmth, care and simplicity while aiming to encourage independence and provide for the user's physical needs. GoSolo assists the user in a wide range of daily routine activities. It enables self transfer from the device to sofa, chair, bed or cars and vice versa without the help from caregivers due to the flip armrest and seat height adjustment ; 75% reduction in user's effort to stand up due to its unique and patented seat tilt mechanism ; clear visibility of the ingredients in the pot on the gas stove or reaching the ground to pick up the fallen comb without help, due to the seat height adjustment ; reducing hassle to carry spectacles, medicines etc, writing or chopping vegetables and finding a railing or cane to hold for body support to stand up or while standing due to the multi-utility front support handle ; fits in a car boot due to collapsible and compact design. It provides hassle free movement in crowded spaces and 360 degree turning in tight spaces. Simple user interaction of the controller reduces cognitive load of the user. Gosolo makes spaces like homes, offices, educational institutions, airports etc. more engaging, exclusive and accessible.
GoSolo increases the user's cultural inclusivity by ; allowing them to wear flowy attires like saree, dhoti, etc. due to covered mechanics ; reaching ground level to perform pooja or enjoy a picnic while sitting at a lower level like others due to the seat height adjustment; going to public gatherings like weddings, exhibitions,

religious places, parks etc. by breaking the barriers of isolation because of its appealing aesthetics .

Design Process and Methodology:

GoSolo is created by identifying and analysing the needs and desires of existing and potential users. The goal of this solution is to find a middle ground where a 'need' can be understood and a 'desire' can be fulfilled. The project began with a lean engineering approach and progressed to the development of technology. It employs a non-linear design process with iterative loops to develop and refine the concepts. The application of design ethnography resulted in a key insight - 'if mobility assistance devices are designed to reflect user needs, aspirations and aesthetics that fits in home and public spaces, it will gain greater acceptance.' A User-Centric Design based understanding is applied and efforts have been made to broaden the horizons of perception of mobility aid devices as mere equipment to support the body to personal gadgets which the user can embrace. The project uses Simplicity as inspiration and has a universal design undertone. The project evolution is driven by introspection, intuition, and inclusivity.

Project: ENABLE

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Heart Lung machine, being a very important device in most of the Open-Heart surgeries, it is being used more than thousands of time every hour all around the world by surgeons to save lives. Redesigning the User-Experience/User-Interface of a Heart-Lung Machine to enhance & increase the efficiency of life-saving of millions of people around the world. The primary research was an Intense 5 days spent in the operation theatre witnessing around 8 open heart surgeries, filled with continuous observations and interactions with the user, usage, product, context. The Heart-lung machine that I have redesigned is the Maquet Heart Lung Machine hl-20. It has 3 control panels 1. System Control Panel(SCP), 2. Roller Pump Module(RPM) and 3. Cardioplegia monitor(CM). I have worked on all the 3 panels redesigning them according to user needs to drastically reduce the time and efforts of treatment where every second is very crucial to save the patient's life!

The existing control-panel of this heart-lung-machine had serious-usability-issues like -The user gets to know that the limit has been exceeded only when the machine has stopped or starts beeping which might be dangerous in surgeries. Addressing the existing problems & critical issues that exist in the UI/UX of a Heart-Lung Machine that in turn drastically reduces the time of treatment where every second is very crucial to save patients' life in emergency situations. Completely designed new Control panels to support the user who is under intense cognitive load, to aid in the fast saving of lives in emergency operations! In the new Design the Time is reduced Drastically- In the original design, it took 80 - 120 seconds to achieve a certain selection while in this newly designed panel it can be achieved in 3 or 4 seconds, time reduced Drastically which is very crucial in an emergency where every second is very crucial to save the patient's life.

This new design would help the perfusionist (User of the machine) to use this device quicker and in an easier way to assist him/her save lives better during emergencies when he/she is under Intense cognitive load. Specially designed High resistive knobs to enable a highly controlled selection of blood flow into the heart. All the clutter of buttons have been brought to only 3 knobs Only 3 rotary knobs has reduced the amount of work which was needed to be performed by various number of buttons & reduces the complexities to only 3 knobs.

At a single glance when looked from top to bottom the perfusionist will get to know the patient's pressure & temperature in all the channels in the minimum time & the most intuitive manner. Specially devoted alarm panel for quick decision for emergency actions. The finalized concepts have been taken to Adobe XD & started to digital prototype the concepts to check for usability and track the no of click points and trying to refine the prototypes

MSME INNOVATIVE SCHEME
(A component under MSME Champions)

The MSME sector in India has an enormous economic, social and environmental impact and has the potential to create new economic opportunities and strengthen its long-term competitiveness. Innovation in business processes, product development and technology up-gradation can further play a vital role in the overall development, sustainability and well-being of the organization. However, it is also known that MSMEs in India with innovative ideas often work in isolation. Therefore, to become an innovation driven economy and to enable the MSME sector of the country with a competitive edge, Ministry of MSME, Government of India has restructured the whole strategy to bring this sector at parity with large organisations and created the *MSME Innovative Scheme which is a combination of Incubation, Design intervention and IPR protection initiatives to enhance MSME competitiveness and transform them as National and International Champions. The scheme acts as a hub for innovation activities facilitating and guiding development of ideas into viable business proposition that can benefit society directly and can be marketed successfully.*

The primary objective of the Incubation scheme is to promote and support untapped creativity and to promote adoption of latest technologies
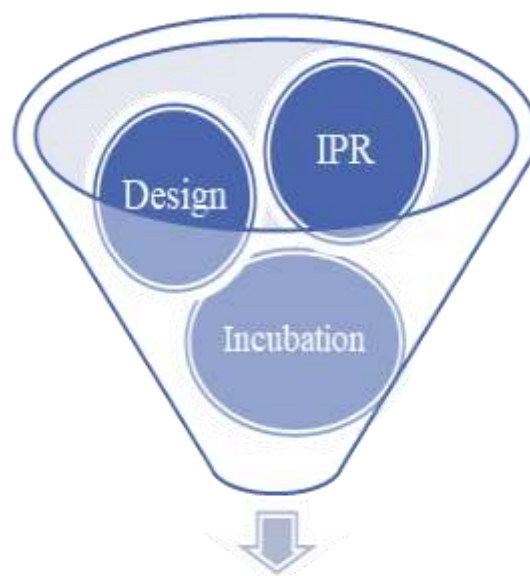
MSME Innovative

in MSMEs that seek the validation of their ideas at the proof-of-concept level.

Incubation

Institutions such as Technical Colleges, Universities, other Professional Colleges/ Institutes, R&D Institutes, MSME-DIs/ Technology Centres or any Institute/ Organization of Central/State Government may apply for registration as a Host Institute (HI) and act as a Business Incubator (BI) for nurturing of ideas from the initial stage of conceptualization to the commercialization

stage through HIs/ BIs. MSMEs, Individuals, Students who want to develop their innovative ideas may apply through registered HIs.

Financial Assistance of up-to Rs. 15 lakhs per idea to HI is available under the scheme for developing and nurturing the ideas. Also, financial assistance of up-to Rs. 1.00 crore is available for procurement and installation of relevant plant and machines including hardware and software etc. in BI for R&D activities and common facilities for Incubatees of BI.

Design

The objective of this component is to bring Indian manufacturing sector and Design expertise/ Design fraternity on to a common platform. It aims to provide expert advice and cost-effective solution on real time design problems for new product development, its continuous improvement and value addition in existing/new products. The Design scheme will help MSMEs to avail advice on all aspects of design. It helps MSMEs realize and achieve their design-related objectives. This specialist advice will be provided by experienced designers for new product development as well as enhancing existing product portfolio.

For the Design Projects approved for any MSME, 75% (Micro) and 60% (Small & Medium) of the total project cost will be contributed by GoI up to a maximum of Rs. 40 lakhs. For the student design projects approved for any MSME,75% of the total project cost will be contributed by GoI up to a maximum of Rs. 2.5 lakhs.

The implementing agencies for the Scheme, presently are Indian Institute of Science (IISc), Bengaluru, IITs (Kanpur, Indore, BHU, Roorkee, Ropar, Bhubaneshwar), NITs (Tiruchirappalli, Warangal, Silchar, Arunachal Pradesh, Jaipur, Allahabad, J&K, Bhopal, Nagpur, Calicut, Kurukshetra, Surathkal, Raipur). More implementing agencies such as Indian Institute

of Technology (IIT), National Institute of Technology (NIT), Reputed Industrial Design Institutes, Tool Rooms etc., may also be included.

Intellectual Property Rights [IPR]

This component offers legal and intellectual property filing support including patents, trademarks, copyrights, designs, geographical indications (GI) etc. The programme also provides IP advisory, consultation, Patentability Searches, Technology Gap Analyses and IP commercialization through establishment of Intellectual Property Facilitation Centres (IPFCs) across the country.

The objective of the scheme is to improve the IP culture in India with the following interventions:
• To enhance the awareness of Intellectual Property Rights (IPRs) amongst the MSMEs and to encourage creative intellectual endeavour in Indian economy;
• To take suitable measures for the protection of ideas, technological innovation and knowledge-driven business strategies developed by the MSMEs for their commercialization and effective utilization of IPR tools.

MSME-Development Institutes, Technology Centres and any other associated Field Organisations directly or indirectly under the administrative control of Ministry of MSME and Government Bodies /Departments / Autonomous Organisations being Run on Autonomous or Commercial Lines, MSME Industry Associations, Societies / Cooperatives / Firms/Trust and Other profit and non-profit Bodies, NGOs representing or working for MSMEs, Research/ Technical & Educational Institutions, Universities/ colleges with a track record of assisting MSMEs etc are eligible for registration as Intellectual Property Facilitation Centres.

A Grant of up to Rs. 1 crore to an IPFC in milestone-based (three or more) instalments is available under the IPR Scheme.

The maximum financial assistance to the eligible applicants under the IPR component is as follows:

- Foreign Patent: Rs. 5.00 lakh

- Domestic Patent: Rs. 1.00 lakh

- GI Registration: Rs. 2.00 lakh

- Design Registration: Rs. 0.15 lakh
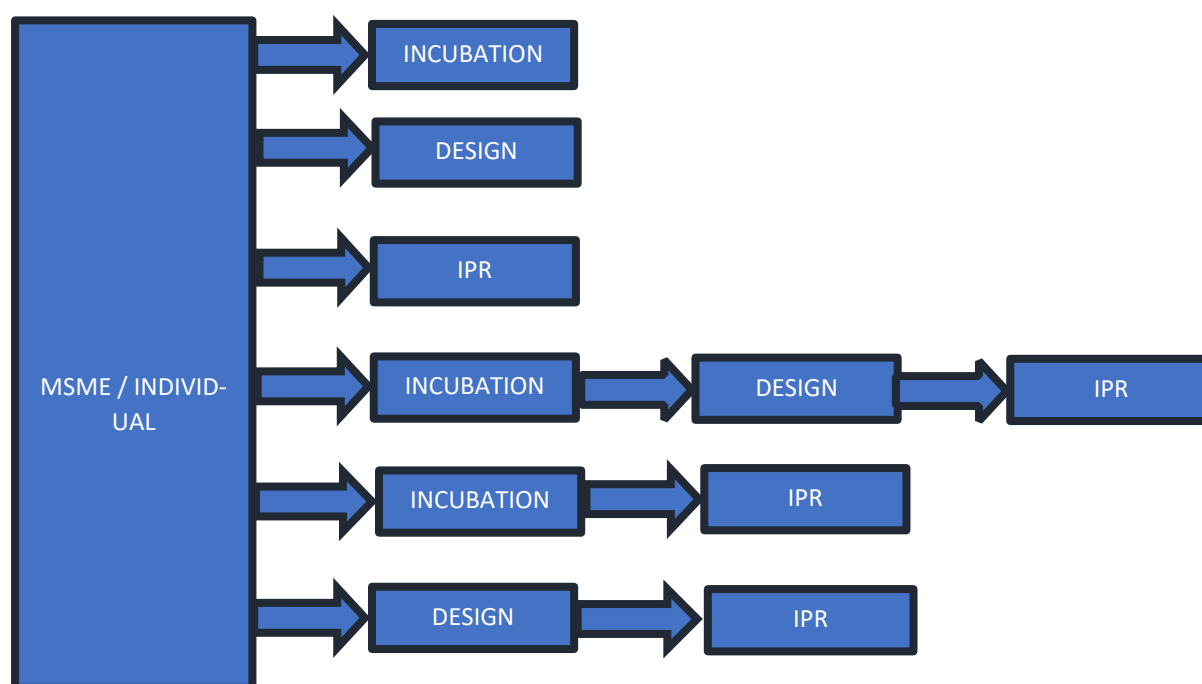
- Trademark: Rs. 0.10 lakh

Interoperability Arrangements

The MSME Innovative scheme is designed by integrating three components viz., Incubation, Design & IPR schemes wherein each component can have interoperability with other components during the phases of intervention to enhance capacities/capabilities of champion MSMEs. MSME can have opportunity to suitably interlink benefits among three components during the period/stage of implementation. One scheme may enter from one completed gate to the gate of another scheme as per the requirement of the MSME, while ensuring that the original scheme it enrolled for is taken to the natural conclusion. At the time of applying for the next scheme, the applicant should adhere to the respective scheme guidelines for that particular scheme.

Seed Capital support fund for supporting MSMEs

To encourage MSME/others to stimulate the commercialization of their Ideas/Designs/Patents and facilitate preparation for pre-investment series funding, financial assistance of up to Rs.1.00 crore as equity for the Seed Capital Support is available under the MSME Innovative Scheme.

Fordetails about the scheme and application, please visit https://innovative.msme.gov.in

Science · Technology · Research · IP · Design · Entrepreneurship

Journal of Technology Leadership and Innovation

Call for Papers

CII STRIDE, Journal of Technology Leadership & Innovation, is a multidisciplinary, peer reviewed periodical that broadcast and present 'unique, original & impactful' technology, design and innovations accomplishments in India, providing the knowledge leadership needed in taking decisive steps towards innovation excellence.

The Journal will feature papers that have technology leadership perspective oriented with key focus on innovation, design, IP and techno-commercial applications.

We invite original papers that may engage with (but are not limited to) following themes:

- Theoretical and conceptual perspectives on current and potential new technologies and design innovations.

- Global and Indian trends, analysis and case studies, in relation to industry best practices, on technology, innovation, design and IP

- The role of technology, design and IP in shaping and realizing entrepreneurial processes and/or strategies. (Business and technical applications).

- The role of technology, design and intellectual property in relation to societal or organizational change, innovation and value creation from a competitive, financial, social or sustainability perspective

The papers are reviewed by a CII panel of subject experts in the field of technology, design and IPR. The panel members are:

Prof Pradyumna Vyas, Senior Adviser—Design, Confederation of Indian Industry, Board Member, World Design Organisation (WDO)

Mr R Saha, Senior Adviser—Intellectual Property, Confederation of Indian Industry

Manuscript guidelines and submission information

- Please download the guidelines from the link, or mail your enquiries to stride@cii.in

- Papers are accepted all throughout the year.

- Acceptance / Rejection Notification: Depends upon nature of work and based on reviewer's comment

- Manuscripts submitted to this journal will be considered to be the author's original work and it has not been previously published in any other journal or online forum

- CII STRIDE is an open access publication with a purpose to enhance technology and innovation aspirations of India.

Mail your papers and enquiries to stride@cii.in

Internal Review Panel

Confederation of Indian Industry

The Confederation of Indian Industry (CII) works to create and sustain an environment conducive to the development of India, partnering Industry, Government and civil society, through advisory and consultative processes.

CII is a non-government, not-for-profit, industry-led and industry-managed organization, with around 9000 members from the private as well as public sectors, including SMEs and MNCs, and an indirect membership of over 300,000 enterprises from 286 national and regional sectoral industry bodies.

For more than 125 years, CII has been engaged in shaping India's development journey and works proactively on transforming Indian Industry's engagement in national development. CII charts change by working closely with Government on policy issues, interfacing with thought leaders, and enhancing efficiency, competitiveness and business opportunities for industry through a range of specialized services and strategic global linkages. It also provides a platform for consensus-building and networking on key issues.

Extending its agenda beyond business, CII assists industry to identify and execute corporate citizenship programmes. Partnerships with civil society organizations carry forward corporate initiatives for integrated and inclusive development across diverse domains including affirmative action, livelihoods, diversity management, skill development, empowerment of women, and sustainable development, to name a few.

As India completes 75 years of Independence in 2022, it must position itself for global leadership with a long-term vision for India@100 in 2047. The role played by Indian industry will be central to the country's progress and success as a nation. CII, with the Theme for 2022-23 as Beyond India@75: Competitiveness, Growth, Sustainability, Internationalisation has prioritized 7 action points under these 4 sub-themes that will catalyse the journey of the country towards the vision of India@100.

With 62 offices, including 10 Centres of Excellence, in India, and 8 overseas offices in Australia, Egypt, Germany, Indonesia, Singapore, UAE, UK, and USA, as well as institutional partnerships with 350 counterpart organizations in 133 countries, CII serves as a reference point for Indian industry and the international business community.

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