

GLOBAL BUSINESS LINE

SCIENCE + TECHNOLOGY

December ISSUE

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INDIAN
INSTITUTE OF
TECHNOLOGY
KANPUR

10 AMAZING
INNOVATIONS
of Atmanirbhar Bharat

EXCLUSIVE
INTERVIEW
of Srinivasan Sridharan

RESEARCH &
INNOVATIONS
IN 2020

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About

Global Business Line is a business website that talks about Innovative solutions that can redefine the business goals of the world tomorrow. Global Business Line is the leading source that shares innovative solutions developed by Startup and MSMEs, across the globe, upcoming hot enterprises and is a neutral source for business decision-makers.

Published from Bangalore, Karnataka, Global Business Line is an excellent platform for the enterprise to showcase their innovative business solutions. While the world enterprise market is growing exponentially, there is a vacuum among entrepreneurs of enterprise startups. We believe that there is no other platform that gives companies a heads up on the innovative solutions that the startups are working on, what are the needs that haven't been met yet, and more.

Global Business Line will act as a platform allowing high-level executives in the enterprises to share their insights, which in turn will help the enterprise startup ecosystem, help technology and business leaders with analysis on information business trends, and give a better understanding of the role that enterprise solutions play in achieving the business goals.

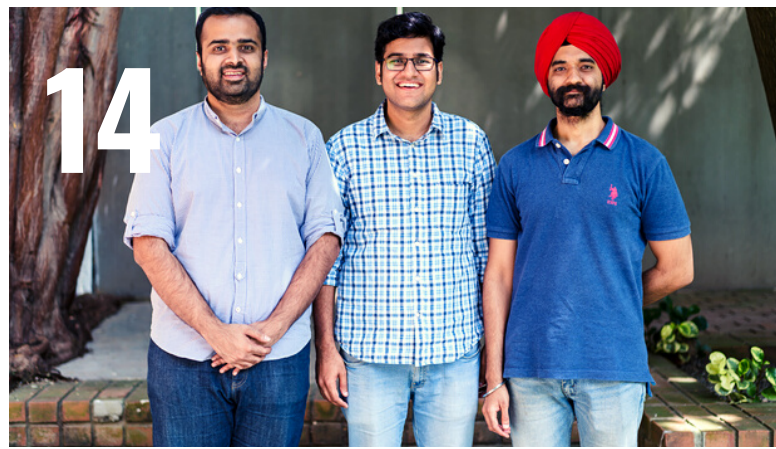
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Aatmanirbhar Bharat Innovation Challenge

The global toy industry is over Rs 7 lakh crore but India's share is very small. We will have to work to increase it. Aatmanirbhar Bharat App Innovation Challenge" to facilitate the techies and start-up community to create world-class Made in India Apps.

"Today there is immense enthusiasm among the tech & start-up community to create world class Made in India Apps. To facilitate their ideas and products @GoI_MeitY and @AIMtoInnovate are launching the Aatmanirbhar Bharat App Innovation Challenge," he tweeted

**Development is
the only way ahead...**



EDITOR'S NOTE

Our Nation's economic growth depends on our capacity to educate, innovate, and build. Long-term national investments in basic and applied research and development (R&D) play an important role in the flow of market-based innovations through a complex system that leverages the combined talents of scientists and engineers, entrepreneurs, business managers and industrialists.

These funds have led to everything from small entrepreneurial initiatives to growth in high technology industries with the concomitant employment of millions of workers. The large impact on employment results from innovation impacts not only in high tech enterprises, but also other industries that benefit from increased capabilities and productivity.

Development is the only way ahead said by honourable PM Narendra Modi and on same message today here I present all readers with full of Research and Innovations in this magazine.

Enjoy Reading!

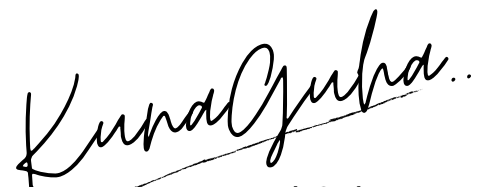


 Kunalguha8

 beingkunalguha

 Kunalguah8

 editor@businessline.global

A handwritten signature in black ink that reads "Kunal Guha" with a stylized flourish at the end.

Kunal Guha
EDITOR IN CHIEF

HOW CAN I PROTECT MYSELF

AGAINST COVID-19?

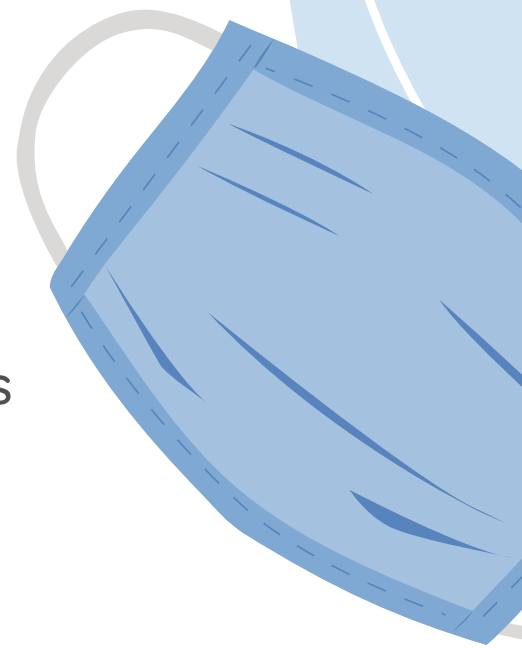
Wash your hands **frequently**

Avoid touching your eyes, nose,
and mouth

Avoid crowded places and put
space between yourself and others

Cough or sneeze into your
bent elbow or a tissue

If you have fever, cough, or
difficulty breathing, **seek care early.**
Call beforehand and follow
medical advice.





While our country has sent an orbiter to Mars and is called the pharmaceutical hub of the world, innovation and research have rarely been a part of our daily conversations outside the gates of university campuses and R&D organizations. This saw a positive change with this global pandemic (COVID-19) and technology, innovation & science became part of our daily conversation but it's still a long way to go. Research and Innovation magazine from the Business Line is a good attempt in this direction. It is helpful in providing information from the world of science and innovation to common users by translating the scientific world into easily understandable yet reliable words.

Each innovation has many stories to tell and the team behind the magazine has been putting a lot of effort in not only carefully selecting the most relevant innovations but also talking to the innovators to collect the stories that make the innovations interesting for users. Why a team has been toiling hard for years in a lab to solve a problem and why should the world care about it- these stories inspire the readers to see a different side of our world. At SIIC IIT Kanpur, we witness hundreds of such stories from innovators. The stories of belief, passion, hard work, and the world must get to read such stories.

I admire the approach and work that the team from Global Business Line is putting behind this wonderful initiative.

-

*Dr. Nikhil Agarwal
CEO, FIRST-IIT Kanpur*



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10 AMAZING INNOVATIONS *of Atmanirbhar Bharat*



VANORA

UV SANITISING ROBOT

The robotic platform, Vanora Robot was designed as a support system for the frontline fighters of the Covid-19. It is a fully functional unmanned robotic platform to disperse high doses of Type C Ultra Violet rays to destroy the structure of all Bacteria, Fungal Spores, and many types of Virus including various strains of Corona Virus.

Vanora Robot can disinfect a room of 140 sq ft in less than 5 minutes, and during which it gives full visual access to the environment, to the person controlling it remotely. It also constantly disinfects the floor it travels on.

The robot can be upgraded with specially designed wheels which give it a multidirectional path making it very agile and easy to control without any technical skills or expertise. You can also add sensors which along with Vanora Robot's artificial intelligence will keep the robot safe from collision damage in the case of a navigational error caused by the technician.



The specially designed wheels which give it multidirectional path make it very agile and easy to control without any technical skills or expertise. Its safety features include autonomous locomotion using artificial intelligence by which its inbuilt sensors will detect and prevent collision with approaching objects.

Vanora Robots modular design makes it easily modifiable to suit various industries, hospitals, hotels, malls and public places which require quick disinfection or remote unmanned access.

Dr. K. R. Kamath, former President of Indian Medical Association (IMA, Mangaluru Branch), Brigadier I. N. Rai, cardiothoracic surgeon Dr. Jayakrishnan and orthopedic surgeon M. Ajith Kumar, Preethika Punjangod, Manager and engineers Akarsh Shetty, Ramkishor K and Mahim Monteiro of Vanora Robots were present.

Prajwal Shetty, Hardware Engineer of Vanora Robots Pvt. Ltd., gave a live demonstration of the robot and said that it has been developed using indigenous technology.



KAAGAZ **SCANNER**

Kaagaz Scanner is a Document Scanner & Storage App that helps user digitize physical documents, so that they can easily be stored, accessed & shared. Kaagaz is free to use, has no ads, required no login, is secure & has a custom watermark feature. It is available in 7 languages - English Hindi, Telugu, Marathi, etc.

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PADMAVATI

IIT Kanpur Incubated Start-ups i.e. Earthface Analytics Pvt. Ltd. & Kritsnam Technologies Pvt. Ltd. have developed a device, for analysing and monitoring water quality through easy to use colorimetric test-strip, based on smart-phone technology.

Padmavati is a portable smart technology that enable the community with on-site and fast fingertip solution for water quality monitoring. Current market available technologies are expensive and are not user friendly. Whereas, Padmavati utilizes low-cost, multi-parameter, colorimetric test-strip based smart technology that will allow us to monitor multiple water quality within 2 minutes using a smartphone. This technology also records instant time-stamps and geo-locations, and stores all data in a cloud server. Therefore, our Padmavati a smart technology has the capability to map the water quality of entire India in one common cloud database for public access.



SHUDH

SMARTPHONE OPERATED HANDY ULTRAVIOLET DISINFECTION HELPER

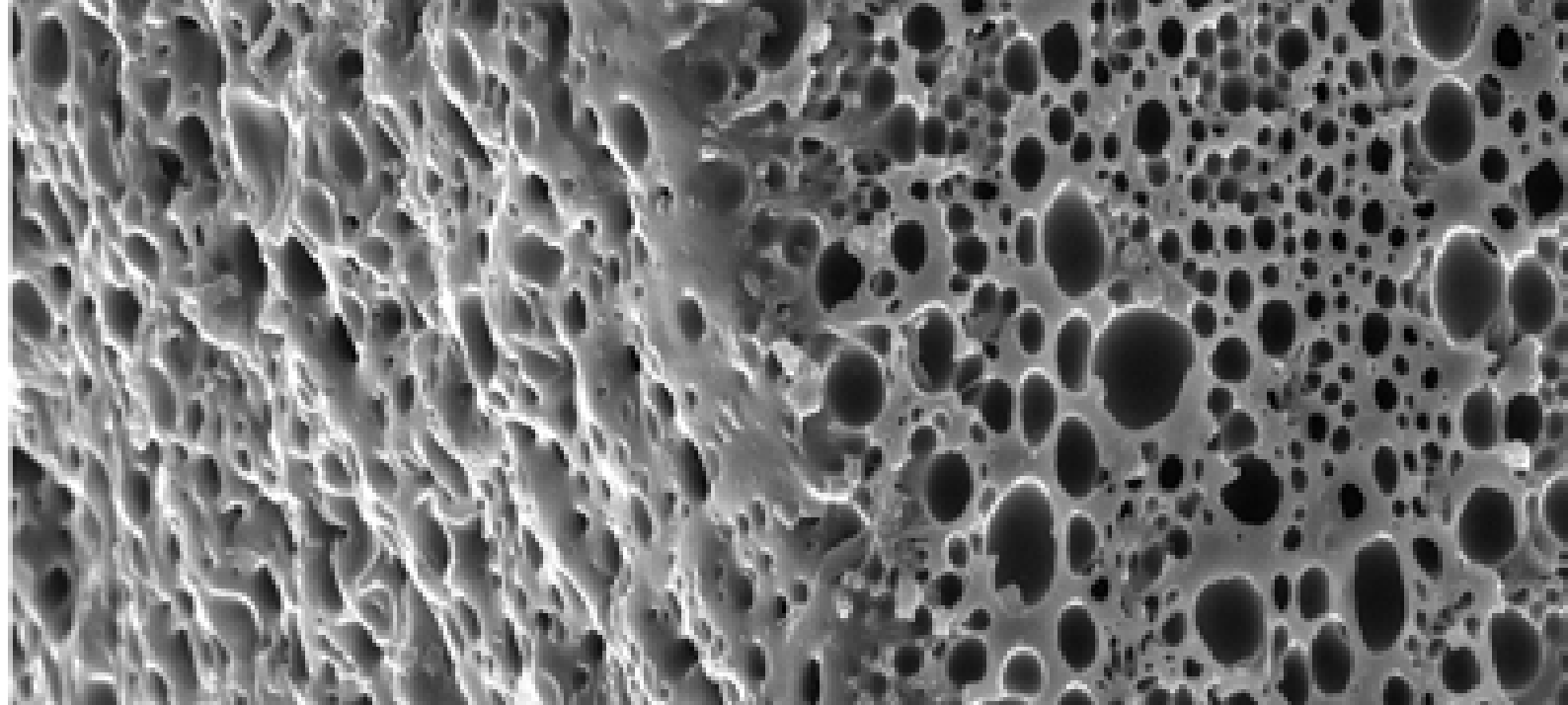
Imagineering Laboratory, IIT Kanpur has developed an Ultraviolet (UV) sanitizing product named SHUDH (Smartphone operated Handy Ultraviolet Disinfection Helper). The on/off, speed, and location of the product can be controlled remotely using your available smartphone while installing an android application. SHUDH has six UV lights of 15 Watts each that can be individually monitored from a distance. Initial testing has proved that the device at its full operation can disinfect a 10x10 squared feet room in about 15 minutes. The product innovators, Prof. J. Ramkumar, Dr. Amandeep Singh, Mr. Shivam Sachan believe that SHUDH can assist in killing the spread of coronavirus at the highly prone places such as hospitals, hotels, malls, offices, schools, etc.



BEEG

BIOCOMPOST ENRICHED ECOFRIENDLY GLOBULE

Imagineering Lab IIT Kanpur in collaboration with Agnys Waste Management Private Limited (start-up at IIT Kanpur) has developed indigenous seed balls named BEEG (Biocompost Enriched Ecofriendly Globule). The initiative guided by Prof. J. Ramkumar has developed the seed balls comprising of an indigenous variety of seeds, compost, and clay. The scientific experiments have helped to standardize the composition and provide a suitable environment for the seeds to germinate when it comes in contact with water. This standardization will cut the hassle of digging a pit and then planting a sapling, and will save the time and preparation of these activities - allows for planting a large number of trees in much lesser time. One needs to throw these seed balls outside, and nature will take care of the rest, rainy seasons are a perfect choice. The initiative has engaged unemployed workers and gardeners who were jobless due to the COVID-19 lockdown. BEEG is enriched with the right ingredients and seeds to germinate early, and are the best way to utilize this monsoon and plant as many trees as possible without risking lives by a social gathering.

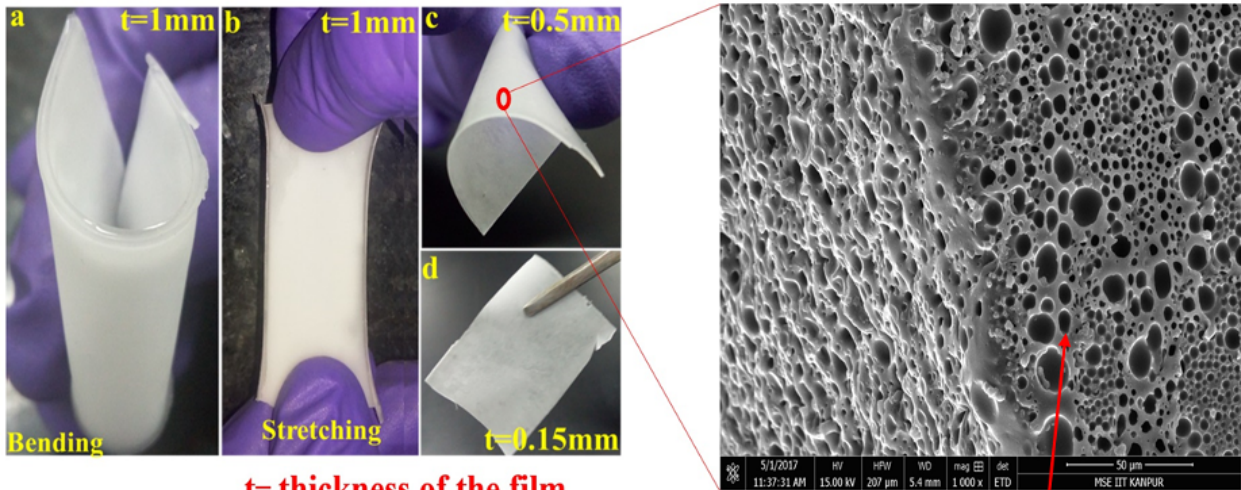


METHOD OF FABRICATING MICROPOROUS ELASTOMER THIN FILMS WITH CONTROLLABLE SURFACE MORPHOLOGY

With patented process, it is possible to fabricate microporous elastomer thin films (thicknesses between 0.150 to 1 mm) especially made of polydimethylsiloxane (PDMS) with controlled monomodal pore size distributions (pore diameter=2-5 μ m) wherein ethyl acetate is used as the diluent and water as the porogen. This innovative process is a simple, scalable and low-cost technique having high reproducibility where small pores in the thin films allow air and water to be circulated; can block bacteria and viruses and have many advantages over existing techniques.

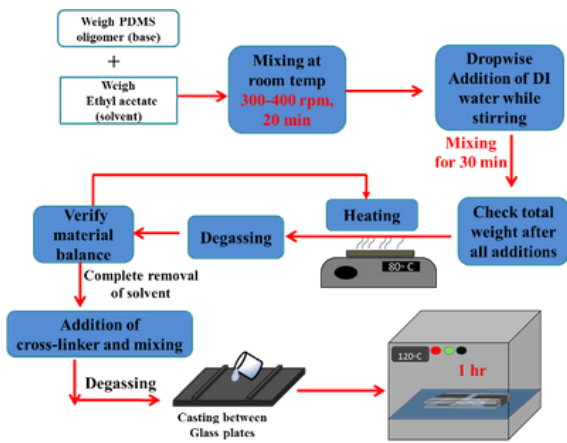
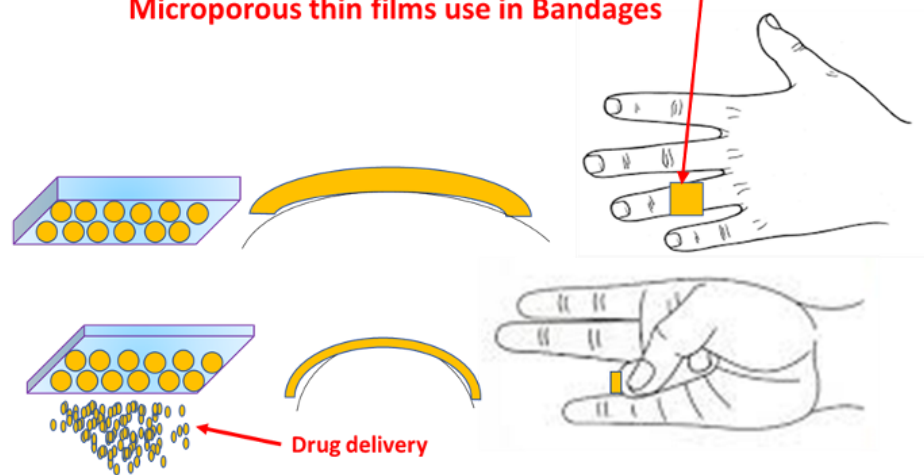
The enhanced hydrophobicity of these films (contact angle $>120^\circ$) and induced controllable porosity would certainly be beneficial for applications in medical bandages and drug delivery depots. The controlled porosity would enable air and drug transmissions to heal the wound faster leaving no scar on skin. Additionally, these novel thin films can also find applications in the fields of cell culture & tissue engineering, targeted drug deliveries, and stretchable bioelectronics.

Fabricated films and pore morphologies



t = thickness of the film

Microporous thin films use in Bandages



Dr. Tushar Deshpande



Prof. Yogesh Joshi



Dr. Sandeep Patil



Prof. Ashutosh Sharma



Yogesh Singh



NOCCARC

ICU VENTILATOR AND HIGH FLOW OXYGEN THERAPY DEVICE



Noccarc V310 Nocca Robotics, an incubatee company of SIIC IIT Kanpur took up the challenge to design and develop a fully functional indigenous ICU ventilator in collaboration with SIIC. Noccarc V310, an advanced ICU Ventilator with top of the line specifications was developed and

commercialized within a span of 3 months looking at the surge in demand for ventilators to treat COVID-19 patients. Noccarc V310 is clinically validated and certified for IEC 60601-1 standards. It meets all the specifications laid out by Government of India through HLL Tender and the machine has been tested by the committee of doctors under DGHS. 200+ installations of Noccarc V310 have been done so far across the country in government as well as private hospitals.



Noccarc H210 With critical market research and experience in rapid product development, Nocca Robotics further identified the need of High Flow Oxygen Therapy Devices in the treatment of COVID-19, in which respiratory support is provided to the patient at lesser

critical stage by delivering high flow warmed and humidified oxygen-rich air through a nasal interface. Catering to this need, Nocca Robotics has now developed Noccarc H210, a High Flow Oxygen Therapy Device which is now clinically tested and commercially available. It is certified for IEC 60601-1 and IEC 60601-1-2 standards. 80+ installations of Noccarc V310 have been done within a month of the launch across the country in government as well as private hospitals.

“Nocca Robotics, an incubatee company of SIIC IIT Kanpur was incorporated in the year 2017, by IIT Kanpur alumni Nikhil Kurele and Harshit Rathore with an aim to design and develop solutions for real world problems. Before the lockdown began in India, Nocca developed products for the solar industry. Noccarc S200 and Noccarc A600, both being the waterless solar panel cleaning robots for large scale solar power plants.

Post COVID-19 lockdown in March, looking at the surge in demand for Med-tech equipment to cure COVID-19 patients, Nocca took up the challenge to develop affordable medical devices- Noccarc V310 ICU Ventilator and Noccarc H210 High Flow Oxygen Therapy Device. Both the products meet top of the line specifications, are clinically validated, certified and are affordable, making them the best option for the end-user.

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The Digital India Aatmanirbhar Bharat App Innovation Challenge was announced in July 2020 by the Ministry of Electronics & Information Technology (MeitY) and MyGov in partnership with Atal Innovation Mission, Niti Aayog for Indian tech entrepreneurs and startups. It entailed building apps under eight broader categories, which included office productivity and work from home, social networking, e-learning, entertainment, health and wellness, business including agritech and fintech, news and games.

The Mantra for the challenge was Make in India for India and the World. Disprz was declared as the winner in the eLearning category among more than 1062 contenders.

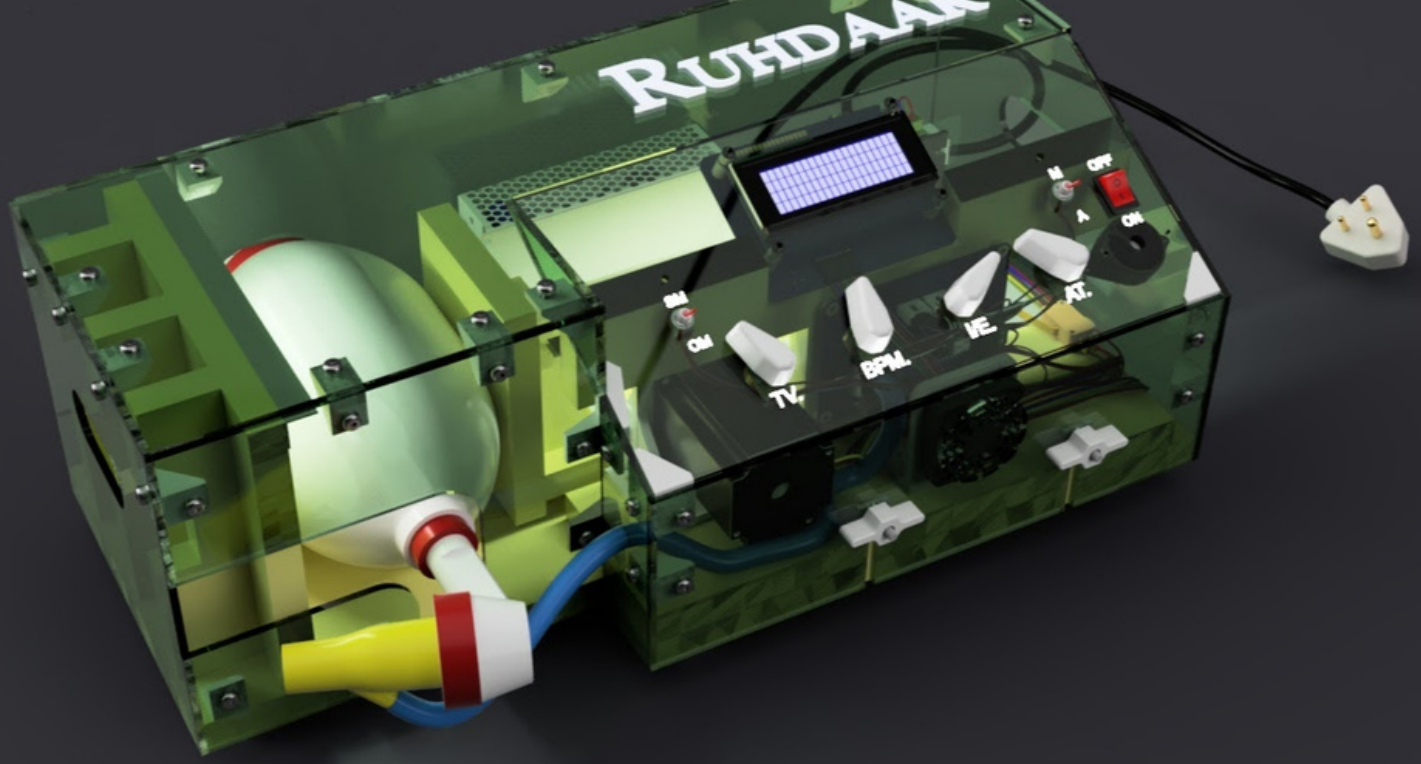
MAP MY INDIA

Experience Maps, Navigation, Tracking & Location Analytics all in one app. Maps- Professionally created detailed map of India with ISRO's Bhuvan Satellite view. Advanced 3D maps with location information. Navigation-Travel the shortest routes & avoid traffic using voice guidance with India's navigation experts IoT Tracking- Live location sharing with other users & MapmyIndia IoT devices Location Analytics- Visual insights on the map like issues reported or reviews of nearby places Find places faster with accurate house-number level search With MapmyIndia Move: Maps, Navigation & Tracking, it's easy to find and navigate to your friend's house address with a smarter search. Also try using eLoc, MapmyIndia's 6 character unique digital address for any place. Simply type the eLoc into the search bar for quick address search.

Share your live location in a securely with your contacts. Example- if you share your location with a friend for 2 hours, your location will continuously update for 2 hours, and the link will expire thereafter. You can also edit and delete sharing permissions at any time.

If you're logged in from multiple devices, app keeps a track of where your devices are. Example, if you have lost your phone, you will be able to track your phone's location to help you find it.

With detailed maps of India, MapmyIndia Move App is made for all billion Indians. Find nearby metro stations, public toilets, parking spots, petrol pumps, etc. with reviews and ratings to help you choose.



RUHDAAR

A team of engineering students from IIT Bombay, NIT Srinagar, and Islamic University of Science & Technology (IUST), Awantipora, Pulwama, Jammu, and Kashmir has come up together and developed a low-cost ventilator named 'Ruhdaar' using locally available material to fight against COVID19. Project head Zulqarnain, a first-year student of Industrial Design Centre, IIT Bombay who teamed up with his friends P. S Shoib, Asif Shah, and Shakar Nehvi from IUST, Awantipora, and Majid Koul from NIT Srinagar designed the ventilator. Further, he took assistance from the Design Innovation Centre (DIC) at IUST to design the low-cost ventilator using locally available materials. Initially, the team aimed to replicate a tried and tested design, but they ended up developing their own design of the ventilator.

"Ruhdaar provides necessary functionalities which can provide adequate breathing support necessary to save the life of a critically ill COVID-19 patient." According to Zulqarnain, the main problem the team faced was a lack of resources. The team tried many designs including a design developed by Massachusetts Institute of Technology, MIT, USA. Moreover, the team came up with their frugal design, considering the resource constraints. The design has been made using advanced software and the team is satisfied with the results.



EXCLUSIVE INTERVIEW

With

SRINIVASAN SRIDHARAN

Principal Engineer 5G technology T-Mobile USA



After an overwhelming response to his scholarly article on 'Significance of 5G Network Validation and Apple iPhone 12 Launch - Review' published on Oct 13, 2020, Mr. Srinivasan Sridharan discusses critical improvements, changes, and innovations in the Wireless Cellular industry in this Global Business Line's interview for 'Research & Innovations' edition. The interviewee, Mr. Srinivasan Sridharan is a Wireless Engineering Subject Matter Expert on 5G, Network Function Virtualization, including Telco Cloud computing. As a Principal Engineer - System

Design for T-Mobile USA, he performs a critical role in designing and validating advanced cutting-edge telecommunication technologies and directly responsible for the Launch and continuous improvement of T-Mobile World's First Nationwide 5G service. He has invented several improvements and has filed multiple patents on wireless cellular technologies with various intellectual property organizations worldwide. He holds the Prestigious IEEE's Senior grade membership awarded to him for his 'Significant Contributions' in his profession.

First off, thanks for all your contributions to the Industry. How and when did your innovation journey start?

My First Innovation was on an algorithm for the 4G LTE wireless cellular and Wi-Fi technologies. Most of the smartphones connect to a Wi-Fi network at home, work, gym, etc. If a smartphone is connected to both 4G LTE base and Wi-Fi simultaneously, then my algorithm would move that user's smartphone from 4G LTE to a legacy technology cell site such as 3G or 2G technology. A legacy technology movement (4G to 3G/2G) would free up the 4G LTE base station resources that can be meaningfully used by a different smartphone needing high-speed data

bandwidth. Once the user gets disconnected from Wi-Fi, the algorithm would push back the device to the 4G LTE base station network. Movement between LTE and legacy technology (while on Wi-Fi) can be initiated either by the system or the smartphone. Thus, I filed two patents in 2014 via my employer Ericsson (then) for both the cases mentioned above. Also, my invented algorithms were deployed by Ericsson on major customer wireless cellular networks worldwide.

How is 5G different from 4G LTE, and what are the advantages?

5G stands for the Fifth Generation of the wireless cellular standards defined by the third-generation partnership program (3GPP) organization, establishing the industry standards for wireless cellular communication. 5G can deliver ultra-high data rates in the volume of Gigabits per second (Gbps) when compared to 4G LTE. The network latency and efficiency are greatly improved, making 5G the next big technology that needs to be adopted.

What are the new use cases of 5G, and how can companies leverage 5G technology?

Several new use cases and multibillion-dollar businesses were born after wireless operators adopted and deployed '4G LTE' worldwide. A classic example can be ridesharing companies – Uber, Lyft, Ola etc. Think about all those new jobs created by these companies in all sectors – Driving, IT, Finance, Manufacturing, etc. It would not be possible for these companies to establish and use mobile data if a faster cellular technology like 4G LTE was not there.

The most discussed use cases for 5G are Augmented Reality (AR), Virtual Reality (VR), 4K Movie streaming, low latency sophisticated gaming, all in the move eliminating the need to be connected to a Wi-Fi router. Like LTE, 5G would bring in several new use cases, which would establish new organizations and job creation worldwide.

Could you please explain the types of 5G cellular networks and the need for network function virtualization/cloud computing?

There are three kinds of 5G cellular networks – Low-Band, Mid-Band, and Ultra-high Band or millimeter-Wave. Low band 5G cellular networks use less than 1 GHz spectrum while mid-band uses 1 to 2.6 & 3.6 to 6 GHz.

Ultra-high bands use a 24 to 40 GHz spectrum. The ultra-high band, also called millimeter-wave, can provide up to 3 Gbps of practical bandwidth. However, the millimeter-wave type of 5G network only travels for a short distance and may not pass through buildings effectively. Thus, it is best suited for dense urban areas where the user is in direct line-of-sight with the cell site tower, such as game stadiums, downtown high-rise buildings, etc. Low and mid-band type provides anywhere between 50 to 500 Mbps of practical bandwidth in a shared environment and best suited for rural and urban areas. The low-band can penetrate the most while mid-band performs better than millimeter-wave in penetration power.

Other than data speeds and bandwidth, 5G cellular technology can also provide Ultra-low latency, which is best suited for the previously discussed new use cases such as AR, VR, etc. which can be achieved on the 5G core network by virtualizing the network and deploying over the telco cloud. Wireless cellular networks can be virtualized and hosted on a private cloud using open source technologies such as Open stack or on a public cloud such as AWS.

Could you explain about your innovation on 'Over the Air Wireless Charging' and the FCC Approval?

I have an approved patent on authorizing and billing of 'Wireless Charging' filed by my current employer T-Mobile. A smartphone or tablet can wirelessly charge its battery using the radio frequency (RF) energy dissipated from a wireless energy source (Cell Site Tower, Wi-Fi router, Wireless Charging Station etc.,). My patent also includes a methodology to approve the wireless charging server based on the fact that the user has a subscriber for this service or not. The operator would also control enabling and disabling wireless charging at a particular battery percentage [E.g., 20% to start and 80% to stop]. FCC approved this technology in Oct 2019. This idea has the potential of generating millions of dollars even if a wireless carrier charges \$1 for unlimited wireless charging per month per subscriber

Thanks for answering and sharing all your valuable inputs, good luck with your future innovations.

Thank you, it was my pleasure talking to you!



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KINESICS - TECH FOR GOOD INNOVATION

VIDEO CONFERENCING FOR DEAF

BY PAVAN MADDURU AND RAVI LOKINEANI
FROM UNITED KINGDOM



Sign languages are natural languages that are essential in daily activities, and it's used in various means of expression for communication. More especially, for the deaf and dumb, it is the only form of communication. It thus provides a substitute for speech among deaf and dumb individuals. Several research works on sign language to make it easier to interact between a deaf-dumb person and a normal person. The American Sign Language, the British Sign Language, the native Indian Sign Language, the Japanese Sign Language, etc. are examples of certain sign languages. Generally, in all of these sign languages, the semantic definitions of the language components vary, but there are signs with a universal syntax.

For instance, around the world and in all types of sign languages, a simple gesture with one hand expressing 'hello' or 'goodbye' has the same meaning.

In order to communicate with normal humans, it is currently difficult and needs to use some tools. Now due to the corona pandemic, there is difficulty in working from home or remote work for "Deaf and dumb" people. In addition, deaf and dumb students are not able to join online classrooms to learn.

That's why we have found it deem to create alternatives for this communication barrier by converting and analyzing the sign language into text and VoiceVoice using machine learning and integrating the same into video conferencing. This would benefit users to join any conference call while their sign language (deaf and dumb users) is captured from the camera. These signs are converted to text, and

VoiceVoice using ML, and the output of VoiceVoice appears for all other users. All the users would be able to view VoiceVoice irrespective of sign language or VoiceVoice as input. Form of segregation between the deaf and dumb to the outside world. All these factors contribute to a promising, legitimate, and great future of communication.

Communication is an act of passing across meanings between two distinct individuals through the means of known signs, semantic rules, and symbols. According to the World Federation of Deaf (WFD), approximately 360 million people suffer from hearing loss, and 70 million people are deaf and mute. People who hear sounds in the mild hearing loss range ranging from 41 dB to 55 dB and generally face trouble listening to sounds if they do not use hearing aids. It has then been a bone of contention on how the deaf and dumb can communicate. Although the traditional means of communicating with the deaf and dumb is by using signs. However, the number of deaf and dumb that understands these signs varies due to different sign languages; examples are; American, British, German, France sign languages, etc. This has brought a lot of questions on how the bridge of sign language can be crossed such that everyone understands these signs through machine learning and video conferencing.

The use of machine learning and video conferencing in this particular aspect has shown a new phase between the difficulties been experienced in the past. Machine learning is simply the study of computer algorithms such that it improves automatically through time, i.e., a mathematical model is built once a pattern is performed. It has its usefulness in various applications, including learning signs and interpreting the exact meaning once the action is performed. So in simple terms, Artificial Intelligence (AI) using machine learning can accommodate lots of data and analyze them. We teach our computers to understand the languages and then interpret them for us and vice versa. This will help to increase the communication between the deaf and the dumb and the hearing people. With the increase in the use of computers due to the digital age, this looks like a viable solution that can increase the chances of deaf and dumb to be integrated into society



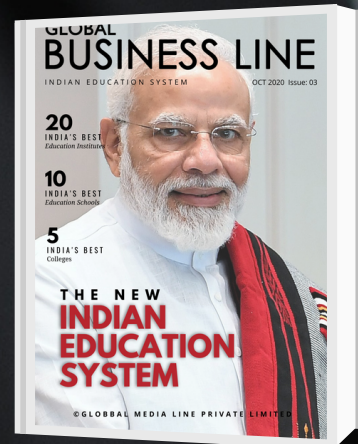
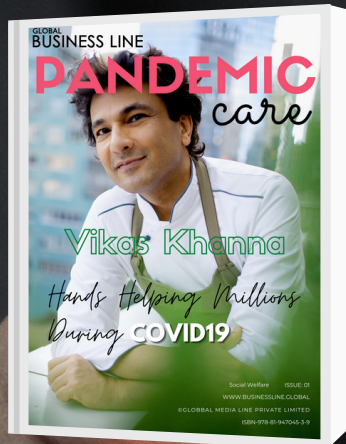
LIFE QUOTE

“Take up one idea. Make that one idea your life; dream of it; think of it; live on that idea. Let the brain, the body, muscles, nerves, every part of your body be full of that idea, and just leave every other idea alone. This is the way to success, and this is the way great spiritual giants are produced.”

-Swami Vivekananda

Readers Choice

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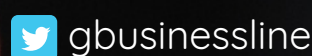
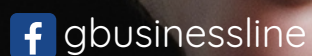


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ISBN-978-81-947045-5-3



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