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Headline 2: Technology adding fuel to drive out COVID-19



"The MediCAB is foldable and is composed of four zones – a doctor's room, an isolation room, a medical room/ward and a twin-bed ICU, maintained at negative pressure. Post-pandemic, these cabins can be remodelled into micro-hospitals/clinics for rural places."

- SHREERAM RAVICHANDRAN,
Chief Executive Officer, Modulus Housing, Chennai

providing coronavirus information through advanced technology. Apple and Google have also been working on a contact-tracing tool to help contain the spread of COVID-19. The two technology leaders have launched COVID-19 contact tracing platform called Exposure Notification API. This platform allows public health authorities to build COVID-19 contact tracing apps without violating user privacy.

Moving a step ahead, Microsoft India is funding two projects at the Indian Institute of Technology (IIT) in Delhi focused on COVID-19 detection. One of the projects pertains to the probe-free real-time PCR-based COVID-19 detection assay developed at the Kusuma School of Biological Sciences, IIT Delhi.

The other project is a collaboration between IIT Delhi and National Chemical Laboratory, Pune, and aims to develop an ELISA based diagnostic serological assay against COVID-19. If successful, it will create an economical, commercial process for manufacturing the antigens used in ELISA and home-based diagnostic kits to offer an effective, quick, robust and affordable diagnostic solution to COVID-19 outbreak.

On this note, Rohini Srivathsa, National Technology Officer, Microsoft India, Bengaluru says, "We want to make sure researchers working to combat COVID-19 have access to the tools and resources they need. Researchers at IIT Delhi are leading a critical effort to develop low cost diagnostic solutions that will make COVID-19 testing much more affordable and accessible for all. Microsoft India is proud to support this effort and we hope that by expanding access to our technology resources and grants, we can help accelerate this important work."

Meanwhile, to test faster and predict patients



at risk for mitigating coronavirus transmission, the Silicon Valley based multinational technology company Intel has partnered with the Council of Scientific and Industrial Research (CSIR) and International Institute of Information Technology (IIIT), Hyderabad. As part of the initiative, Intel India is developing an end-to-end system that consists of multiple applications, testing devices, data collection and aggregation gateways, and an AI model-hub platform.

CSIR constituent labs will work with various hospitals and diagnostic chains in carrying out comprehensive diagnostics, and IIIT-Hyderabad will develop risk stratification algorithms that can help in drug and vaccine discovery for long term preparedness to combat the epidemic.

"Intel India is working with CSIR and IIIT-Hyderabad to rapidly develop and deploy solutions in the fight against COVID-19. Intel creates technologies that enrich lives and this initiative exemplifies our focus on deploying advanced technology to find effective and scalable solutions for urgent local needs. Technology has become cheaper, more accessible and far more efficient since SARS-CoV-1 hit us and remains crucial in this fight against SARS-CoV-2 as it

IITs & COVID-19 PROJECTS		
S.No	Institute	COVID-19 projects/products
1	IIT Madras	Nano coated filter media, Wearable symptom tracker, Portable hospital unit, Remote patient monitoring device
2	IIT Delhi	Diagnostic test, Anti-viral nano coating, Vaccine, Face mask, PPE coverall, Hand sanitiser
3	IIT Bombay	Nasal passage gel, Digital stethoscope
4	IIT Kanpur	Vaccine, Disinfectant, Deodorant based sanitiser, Ventilator, Face mask, Disinfectant tunnel, Drug repurposing, Positive Pressure Respirator System, PPE coverall, Anti-viral nasal filter
5	IIT Kharagpur	Vaccine, Predictive model, Diagnostic test, AI based system for social distancing
6	IIT Roorkee	Drug repurposing, Respirator, UV disinfectant, Face mask and shield, Diagnostic test, Ventilator, Herbal sanitiser, Rapid testing software, Screening booth
7	IIT Guwahati	Diagnostic test, Predictive modelling, Vaccine, Antimicrobial spray-based coating, Robots, Face masks and shield, Fever tester, Hand sanitiser, Ventilator
8	IIT Hyderabad	Bag valve mask, Hand sanitizer, Vaccine, Face mask and shield, Protective wear, Ventilator, Smart wearable patch, Drug repurposing, Air purifier, Diagnostic test, Cough simulator, Lithium batteries
9	IIT (BHU) Varanasi	Anti-microbial five layered face mask, Drug repurposing
10	IIT Dhanbad	Disinfection chamber, Anti-viral nano coating, 3D printed adaptor for ventilators
11	IIT Bhubaneswar	Ventilators
12	IIT Gandhinagar	AI tool for chest x-rays
13	IIT Ropar	Ventilators, AI vehicles, Infrared vision system, Wardbot, Portable negative pressure rooms
14	IIT Patna	Face shields
15	IIT Mandi	Disinfection box, Foot-operated Hand Sanitiser Dispenser, Portable ventilator
16	IIT Jodhpur	Therapeutic solutions, Face masks and shields, AI based diagnostic system, Anti-microbial coating, UV steriliser, Monitoring gadget
17	IIT Tirupati	Online awareness games
18	IIT Bhilai	Face Masks, Swabs
19	IIT Goa	Drug, Diagnostic test
20	IIT Jammu	Face shields
21	IIT Dharwad	3D printed Face shields
22	IIT Palakkad	Automated lung ultrasound
23	IIT Indore	Face mask, UV chamber, Temperature sensor

Officer, IBM India / South Asia, Bengaluru.

A similar initiative has been carried out by the American multinational technology company Microsoft Corporation in the form of Bing COVID-19 tracker. It allows users to track COVID-19 infections across the globe and in India at a hyperlocal level. Users can get statistics on infection, recoveries and fatalities in their own states and districts. They can also save locations of their near and dear ones to quickly view stats of those areas at one place.

It has integrated Apollo Hospitals bot for self-assessment and a hub for telemedicine support from reputed healthcare organizations. The tracker offers content in nine Indian languages to provide people across the country access to critical information related to the pandemic in preferred language.

However, Microsoft and IBM are not the only ones



"Healthcare organizations, community hospitals, governments, NGOs, law enforcers, communities, enterprises and care providers can use the KareRing solution to not only manage and limit the outbreak but also provide timely care management to those in quarantine".

- R SRIKRISHNA,

Chief Executive Officer, Hexaware, Mumbai

launched recently in Wayanad district of Kerala where the units are being deployed to treat COVID-19 patients. We are developing micro hospitals that can be deployed rapidly across the nation. The MediCAB is foldable and is composed of four zones – a doctor's room, an isolation room, a medical room/ward and a twin-bed ICU, maintained at negative pressure. Post-Pandemic, these cabins can be remodelled into micro-hospitals/clinics for rural places", shares Shreeram Ravichandran, Chief Executive Officer, Modulus Housing, Chennai.

Another startup at IIT Madras, Helyxon has developed and deployed a novel remote patient monitoring device for COVID-19. The device is a first-of-its-kind in the market that does clinically accurate continuous monitoring of four critical parameters – temperature, oxygen saturation, respiratory rate and heart rate. The cost of the device ranges from Rs 2,500 to 10,000 depending on the configuration and parameters.

Adding on, researchers at IIT Kanpur have built an alternative to N-95 masks in the form of a Positive Pressure Respirator System (PPRS), thereby addressing the problem of acute scarcity of N-95 respirator masks, which are a critical component of Personal Protection Equipment (PPE) kits.

"The PPRS is made up of a snug, comfortable and leak-proof transparent enclosure for mouth and nose which receive positive pressure air from a portable, light, and wearable air-bottle as well as a trolley-mounted large cylinder. While the existing N-95 mask does not protect the user if there is an imperfect seal between the mask and the face, as there is negative pressure inside the mask. In contrast, the PPRS provides uncontaminated air because it uses positive pressures. Thus, contaminated air from the room cannot enter the PPRS even in presence of leakages", says Prof. Nachiketa Tiwari, Associate Professor, Department of Mechanical Engineering, IIT Kanpur.

IIT Hyderabad has come up with an alternative to meet the surge in demand for ventilators at this critical hour. The institute is recommending the use of small devices called bag valve masks to deliver breathing support in emergency situations as they are inexpensive, easy to produce, and portable.

"While bag valve mask is currently hand-powered and therefore not suitable for continuous use as a ventilator, it would be easy to design a similar device powered by an electrical source. Our estimate of the cost is that it can be manufactured for less than Rs 5000, or one-hundredth the cost of a conventional machine. The most sophisticated computer-controlled ventilators cost around Rs 40 lakh while more modest foreign-made ones cost around Rs 15 lakh with Indian-made ventilators costing around



"Technology has become cheaper, more accessible and far more efficient since SARS-CoV-1 hit us and remains crucial in this fight against SARS-CoV-2 as it enables diagnostics, drug and vaccine discovery with higher predictability, speed and accuracy."

- NIVRUTI RAI,

Country Head, Intel India and Vice President, Data Platforms Group, Intel Corporation, Bengaluru



"COVID -19 has thrown unprecedented challenges for the world and industries alike and we must actively implement various measures to help contain the virus. NASSCOM is working with the IT industry in formulating innovative solutions to combat the pandemic."

- DEBJANI GHOSH,

President, NASSCOM, Gurugram

TECH GIANTS PROVIDING COVID-19 SOLUTIONS

Company	Solution
Wipro 3D, Bengaluru	Emergency ventilator system
Larsen & Toubro, Mumbai	Technology management centres
Hexaware, Mumbai	Quarantine care software
Hewlett Packard Enterprise, US	Test labs & OPD centres
IBM, US	COVID-19 Information tracker
Microsoft, US	COVID-19 Information tracker, Funding IIT-D projects for COVID-19 diagnostic tests
Apple, US	COVID-19 Information tracker
Google, US	COVID-19 Information tracker
Intel, US	Multiple application platform



"While the existing N-95 mask does not protect the user if there is an imperfect seal between the mask and the face, as there is negative pressure inside the mask. In contrast, the Positive Pressure Respirator System (PPRS) provides uncontaminated air because it uses positive pressures."

- PROF. NACHIKETA TIWARI,
Associate Professor, Department of
Mechanical Engineering, IIT Kanpur



"With AI, the remote trolley can be deployed autonomously in the high-infection zone to deliver essential supplies. The features of the trolley include detection of obstruction and medical personnel's movement."

- DR ROHIT SHARMA,
Associate Professor, Department of
Electrical Engineering, IIT Ropar

diagnostic kit Corosure developed by IIT Delhi. The base price of the RT-PCR assay is Rs 399. Even after adding the RNA isolation and laboratory charges, the cost per test is considerably cheaper compared to currently available kits in the market. Another highlight of this product is that it is the first probe-free assay for COVID-19, approved by the Indian Council of Medical Research (ICMR).

"We have identified unique regions i.e. short stretches of RNA sequences in the SARS-COV-2 genome. These regions are not present in other human corona viruses providing an opportunity to specifically detect COVID-19. This method uses primers targeting unique regions of COVID-19 that were designed and tested using real time PCR. These primers specifically bind to regions conserved in over 400 fully sequenced COVID-19 genomes. This highly sensitive assay was developed by extensive optimization using synthetic DNA constructs followed by in vitro generated RNA fragments. This is the first probe-free assay for COVID-19 approved by ICMR and it will be useful for specific and affordable high throughput testing. This assay can be easily scaled up as it does not require fluorescent probes", says Prof. James Gomes, Kusuma School of Biological Sciences, IIT Delhi.

Addressing a similar concern related to the availability of low cost diagnostic tests for COVID-19, IIT Kharagpur researchers have innovated a novel portable rapid diagnostic device to detect COVID-19 infection. The equipment will cost about Rs 2,000 if a pilot facility is used and with a large-scale commercial facility, the price can be further reduced.

Another innovative solution has been developed by a startup Modulus Housing incubated at IIT Madras, in the form of a portable hospital unit that can be installed anywhere within two hours by four people.

"Called 'MediCAB,' it is a decentralized approach to detect, screen, identify, isolate and treat COVID-19 patients in their local communities through these portable microstructures. MediCAB has been