

Science and Technology efforts in India On COVID-19

Compiled by:

Vigyan Prasar

**(An autonomous organization of Department
of Science and Technology, Government of
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Science & Technology efforts on COVID-19

by

Department of Science and Technology (DST)

➤ **DST sets up Task Force for mapping of technologies by Start Ups on COVID-19**

DST has set up a **COVID 19 Task** force for mapping of technologies from R&D labs, academic institutions, start-ups, and MSMEs to fund nearly market-ready solutions in the area of diagnostics, testing, health care delivery solutions, equipment supplies. Some of these solutions include masks and other protective gear, sanitizers, affordable kits for screening, ventilators and oxygenators, data analytics for tracking, monitoring, and controlling the spread of outbreak through AI and IOT based solutions, to name a few.

Website link: <https://dst.gov.in/dst-sets-task-force-mapping-technologies-start-ups-covid-19>

➤ **Proposals invited on COVID-19 & related respiratory viral infections**

Science & Engineering Research Board (SERB), an autonomous institution of the Department of Science & Technology, invites proposals as part of special call under IRHPA (Intensification of Research in High Priority Area) scheme specifically designed for COVID-19 and related respiratory viral infections to ramp up national R&D efforts for new antivirals, vaccines, and affordable diagnostics.

Website link: <https://dst.gov.in/pressrelease/proposals-invited-covid-19-related-respiratory-viral-infections>

➤ **TDB invites technology proposals for fighting COVID 19**

The **Technology Development Board (TDB)**, a statutory body under Department of Science & Technology invites proposal applications from Indian companies and enterprises to address protection and home-based respiratory intervention for COVID-19 patients. The proposal may include technologically innovative solutions like low-cost masks, cost-effective scanning devices, technologies for sanitization of large areas as well as for contactless entry, rapid diagnostic kits and oxygenators, and ventilators.

Website link: <https://dst.gov.in/pressrelease/tdb-invites-technology-proposals-fighting-covid-19>

➤ **DST launches nationwide exercise to map & boost Covid19 solutions with R&D, seed & scale up support**

DST has set up a “Covid19 Task Force” for mapping of technologies from R&D labs, academic institutions, start-ups and MSMEs. The capacity mapping group has representatives from DST, DBT, ICMR, MeitY, CSIR, AIM, MSME, Start-up India and AICTE. The aim is to identify the most promising start-ups that are close to scaleup, who may need financial or other help or connects based on its projected demand to rapidly scaleup.

Website link: <https://dst.gov.in/dst-launches-nationwide-exercise-map-boost-covid19-solutions-rd-seed-scale-support>

➤ **Tech by Pune based Startup incubatee of Scitech Park to disinfect Maharashtra hospitals in Covid 19 fight**

A technology developed under the **NIDHI PRAYAS** program initiated by the Department of Science and Technology (DST), Govt. of India by an incubatee company of **Scitech Park, Pune** has emerged as an effective solution for India's fight against Covid 19 by reducing the viral load of infected areas within a room significantly within an hour. Its usefulness in killing disease-causing viruses and bacteria has been scientifically tested by various globally renowned labs in different types of closed environments like houses, hospitals, schools, farms, industries, and so on. One hour of operation of Ion generator machine reduces viral load within a room by 99.7% depending on room size.

Website link: <https://dst.gov.in/tech-pune-based-startup-incubatee-scitech-park-disinfect-maharashtra-hospitals-covid-19-fight>

➤ **Coating developed by JNCASR may prevent transmission of infection**

Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR), an autonomous institution under the Department of Science and Technology, has developed a one-step curable anti-microbial coating which, when coated on different surfaces such as textile, plastic and so on could kill a range of virus types including COVID 19. The molecules developed have an ability to chemically cross-link with different surfaces upon UV irradiation. Upon the formation of the coating, it has been shown to permeabilize the membranes of pathogens (i.e. bacteria) leading to their inactivation.

Website link: <https://dst.gov.in/coating-developed-jncasr-may-prevent-transmission-infection>

➤ **SCTIMST ties up with Wipro 3D to manufacture automated ventilators to meet COVID 19 related crisis**

Sree Chitra Tirunal Institute for Medical Sciences and Technology (SCTIMST), an institute of National Importance of the Department of Science and Technology, has tied up with Wipro 3D, Bengaluru to jointly build up on a prototype of an emergency ventilator system based on Artificial Manual Breathing Unit (AMBU), developed by SCTIMST followed by its clinical trial and manufacture. The ventilators can help meet urgent requirements arising out of the Covid 19 related crisis that the country is facing. AMBU bag or a bag-valve-mask (BVM) is a hand-held device used to provide positive pressure ventilation to a patient who is either not breathing or who is breathing inadequately.

Website link: <https://dst.gov.in/sctimst-ties-wipro-3d-manufacture-automated-ventilators-meet-covid-19-related-crisis>

➤ **DST-SERB announces first set of approved projects to combat CoVID-19 & related respiratory infections**

Department of Science and Technology-- Science and Engineering Board (DST-SERB) announced several special research project calls to urgently ramp up national R&D efforts against the epidemic.

The first set of 5 projects has been selected by DST-SERB, which will be supported for further development into implementable technologies. Three of these projects concern the highly important issue of antiviral and virustatic surface coating of inanimate surfaces, such as personal protection equipment (PPE); while another one deals with the identification of metabolite biomarkers in CoVID-19 infected patients enabling therapeutic target identification; and the last one concerns with the development of antibodies against the receptor-binding domain of the spike glycoprotein of coronavirus.

Website link: <https://dst.gov.in/dst-serb-announces-first-set-approved-projects-combat-covid-19-related-respiratory-infections>

➤ **DST sets up rapid response centre at SINE, IIT Bombay to combat COVID-19**

Department of Science & Technology, Government of India in a rapid response to combat COVID-19 global pandemic approved setting up of a **Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH)** at a total cost of Rs 56 Cr to scout, evaluate and support the innovations and start-ups that address COVID-19 challenges. **The Society for Innovation and Entrepreneurship (SINE), a technology business incubator at IIT Bombay** supported by DST has been identified as the Implementing Agency of the CAWACH. CAWACH will identify up to 50 innovations and startups that are in the area of novel, low cost, safe and effective ventilators, respiratory aids, protective gears, novel solutions for sanitizers, disinfectants, diagnostics, therapeutics, informatics and any effective interventions to control COVID-19.

Website link: <https://dst.gov.in/dst-sets-rapid-response-centre-sine-iit-bombay-combat-covid-19>

➤ **Hand sanitizer prepared by ARCI provided to police personnel on duty during COVID 19 crisis**

Considering the scarcity of hand sanitizers in the market, **International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)**, Hyderabad, an autonomous R&D Centre of Department of Science and Technology (DST), Govt. of India, has produced hand sanitizer as per the WHO standards and distributed it among police personnel in Hyderabad, students, and staff of the institution. A team of scientists, students, and staff voluntarily came forward and produced about 40 litres of sanitizer.

Website link: <https://dst.gov.in/hand-sanitizer-prepared-arci-provided-police-personnel-duty-during-covid-19-crisis>

➤ **Challenge COVID-19 Competition (C3)**

National Innovation Foundation – India (NIF), an autonomous institute under the Department of Science and Technology, Govt. of India has come up with a call inviting innovative citizens to participate in its Challenge Covid-19 Competition (C3). All interested innovators are welcome to participate with their creative ideas and innovations for problems or issues like reducing transmission of Coronavirus through original creative ideas, innovations, which can supplement the efforts of the

government in slowing or eliminating the spread further, innovative ideas which can make activities like sanitizing one's hands, body, and home items etc.

Ideas are also invited for gainful engagement of people at home, healthy food for nutrition and boosting immunity specially at the time of lockdown when raw materials are limited, (Personal Protective Equipment) PPE's and rapid diagnostic testing facilities for capacity building of healthcare and other areas.

Website link: <http://nif.org.in/upload/challenge-covid19-competition-c3.pdf>

➤ **IIT Kanpur researchers to design a cost-effective virucidal coating of surgical masks for preventive measures against COVID-19**

Science and Engineering Research Board (SERB), a statutory body under Department of Science and Technology, is supporting a research by a team of scientists from IIT Kanpur for developing a protective coating that would greatly help in making medicated masks and medical wear (**PPE**) for fighting COVID-19. The researchers from the **Department of Chemistry in IIT Kanpur** will be designing the virucidal coating using polymers which can resist attachment of bacteria and virus. An additional protection will be included to the polymer coating using molecules that can either destabilize and/or neutralize corona viruses and other viruses like influenza. The combination of anti-microbial polymer coating and functionalized drugs is also expected to provide a synergistic antiviral effect.

Website link: <https://dst.gov.in/iit-kanpur-researchers-design-cost-effective-virucidal-coating-surgical-masks-preventive-measures>

➤ **DST and DBT funded startup develops silver-based disinfectant to fight COVID-19 pandemic**

Weinnovate Biosolutions, a Pune based startup supported jointly by the **Department of Science and Technology (DST)** and **Department of Biotechnology (DBT)**, has developed a non-alcoholic aqueous-based colloidal silver solution uniquely made from its NanoAgCide technology for disinfecting hands and environmental surfaces. The newly developed disinfectant is non-inflammable and free of hazardous chemicals and can pose as an effective sanitizer to prevent the spread of the infection through contact, the prime method of transmission of the pandemic, thereby protecting health professionals and infected people.

Website link: <https://egov.eletsonline.com/2020/04/dst-funded-startup-develops-silver-based-disinfectant-to-fight-covid-19-pandemic/>

Science & Technology efforts on COVID-19

by

Department of Biotechnology (DBT)

➤ **COVID-19 Research Consortium**

Department of Biotechnology (DBT) and Biotechnology Industry Research Assistance Council (BIRAC) announce **COVID-19 Research Consortium** and request for proposal with a focus on Diagnostics, Vaccines, Novel Therapeutics, Repurposing of Drugs or any other intervention for control of COVID-19.

Website: <http://dbtindia.gov.in/latest-announcement/dbt-announce-covid-19-research-consortium>

➤ **THSTI-ESICMC&H partnership for COVID-19 testing**

THSTI bioassay lab will now function as an extension of diagnostic facility of ESIC Medical College and Hospital - Faridabad for COVID-19 testing. The first and only COVID-19 testing facility in the Faridabad region. The MoU signed between the two institutes will also enable training of manpower and capacity building at ESI hospital for COVID-19 testing by the bioassay lab team.

Website link: <https://thsti.res.in/news.php>

➤ **ICGEB launches COVID-19/SARS-CoV-2 Resource Platform**

The **ICGEB** platform, which has been fully integrated into the state-of-the-art Web site at ICGEB, offers Tools with links to Resources and Procedures, including Protocols for Standard Operating Procedures (SOP) in the preparation, isolation and detection of Sars-CoV-2 RNA by Polymerase Chain Reaction (PCR), Reagents for positive control, and a Sequencing Service for local isolates of the virus, through our partner lab in the AREA Science Park. The ICGEB is offering Technical Assistance in the form of on-line Video Tutorials in the preparation, isolation and detection of Sars-CoV-2 RNA, as well as Remote, Technical Assistance during the reproduction of SOPs.

Website link: <https://www.icgeb.org/icgeb-launches-covid-19-sars-cov-2-resource-platform/>

➤ **Rajiv Gandhi Centre Biotechnology to develop humanised monoclonal antibodies to treat COVID-19**

The monoclonal antibodies are antibodies that recognise only specific proteins, called antigens, on the surface of specific bacteria or viruses. To deploy them as treatment, scientists take monoclonal antibodies produced by mice and change their protein sequences to resemble those of humans. These humanised monoclonal antibodies have a lower chance of being rejected by the patient's body as well as can be mass produced in mouse cell lines. According to Dr. Pillai, the **RGCB** had a technology transfer agreement with the Oklahoma Medical Research Foundation to develop such humanised monoclonal antibodies.

Website link: <https://science.thewire.in/the-sciences/covid-19-research-empowered-committee-dst-dbt-niv-testing-kits-hcq-rt-pcr-gisaid/>

➤ **NII to develop antibody-based therapy for COVID-19**

DBT's **National Institute of Immunology (NII)** in Delhi is going to procure coronavirus and blood samples from recovered patients. Dr. Amulya Panda, Director, NII, says that the samples from recovered patients will help in analysing the antibody quality in the blood with an aim to develop an antibody-based therapy. According to Dr Panda, studies are also underway on the spike protein of the novel coronavirus to develop a vaccine. Scientist at NII will utilize their previous expertise of vaccine development. They have previously developed an immunomodulator for leprosy and are well equipped, from the laboratory to animal house and to the product development cell, to take a vaccine candidate from the laboratory to industry.

Website link: <https://www.natureasia.com/en/nindia/article/10.1038/nindia.2020.56>

➤ **THSTI efforts to understand the epidemiology of COVID-19**

The **Translational Health Science and Technology Institute (THSTI)**, Faridabad, is working on an ELISA test for serological studies across the country which will essentially help understand the extent of disease spread in India. According to Dr. Gagandeep Kang, executive director, THSTI, the epidemiology research should take centre stage at this point in the life of the pandemic in India. Dr. Kang said that it would help in understanding where and to what extent the disease has spread in India. According to her, the Indian population is dense and there are so many poor people. Social distancing, therefore, may be a difficult proposition. The first task should be boosting public health research to help control the spread. The next step should be research for developing additional diagnostic tools, drugs and vaccines.

Website link: <https://www.natureasia.com/en/nindia/article/10.1038/nindia.2020.56>

➤ **Development of diagnostic kit for COVID-19 by THSTI**

According to Dr. Gagandeep Kang, executive director of DBT's Faridabad based autonomous institute, the **Translational Health Sciences and Technology (THSTI)**, institute is developing its own **diagnostic kit for COVID-19**. At present most of the kits used in India at current time are developed by the National Institute of Virology (NIV), Pune. NIV is also validating nine alternative kits from private firms. Such validation involves running clinical samples through the kits and measuring the rates of false-positive and false-negative results. The THSTI's diagnostic kit is still some time away from being ready to use.

According to Dr. Kang, Government of India's memo regarding easing the norms of on COVID-19 research will make it easier to validate the test with human samples at THSTI also. Such efforts will boost the development of diagnostics and conducting clinical trials in this regard.

Website link: <https://science.thewire.in/the-sciences/covid-19-research-empowered-committee-dst-dbt-niv-testing-kits-hcq-rt-pcr-gisaid/>

➤ **DBT's Rapid Response Regulatory Framework for COVID-19**

The Department of Biotechnology (DBT), Government of India along with **Drug Controller General of India (DCGI)** has developed and notified a Rapid Response Regulatory Framework to provide expedited regulatory approvals for all diagnostics drugs and vaccines. Vaccine development is being supported with three Indian industries. Research on therapeutic and drug development has started. According to

reports from Union Health Ministry, ministry is talking to all states and union territories about the action plan being undertaken by the stake holders.

Website link: <https://economictimes.indiatimes.com/small-biz/startups/newsbuzz/covid-19-task-force-to-map-of-technologies-to-fund-nearly-market-ready-solutions/articleshow/74839708.cms?from=mdr>

➤ **C-CAMP propelled technology accelerator partnership with UNHIE & Social Alpha for developing technologies**

The DBT's Bengaluru based bio-incubator, the **Centre for Cellular and Molecular Platforms (C-CAMP)** has quickly catapulted a technology accelerator in partnership with the **United Nations Health Innovation Exchange (UNHIE)** and the non-profit firm Social Alpha to help innovators, start-ups and entrepreneurs with breakthrough innovations. According to Dr, Taslimarif Saiyed, CEO C-CAMP, the innovators will be able to take full advantage of an ecosystem of scientists, regulators, investors and industry in closing last-mile gaps in commercialising their technologies.

Website link: <https://www.natureasia.com/en/nindia/article/10.1038/nindia.2020.56>

➤ **DBT as a part of task force for mapping of technologies on COVID-19**

The Department of Science and Technology (DST) is coordinating an effort to upscale the appropriate technologies and manufacturing available in India for addressing a plethora of issues related to COVID-19, as well as scout for new and developing solutions more relevant to the country to help prepare the country for exigencies arising out of COVID-19 pandemic. The **Department of Biotechnology** along with other stakeholders have been made a part of such task force. The capacity mapping group will identify the most promising start-ups that are close to scale-up and may need financial or other help or connects or projected demand to rapidly scale up. The nodal officers of concerned Ministries and Departments have been requested to expedite the process of obtaining information on such start-ups and other entities supported by them that have technology solutions for any important aspect of COVID-19.

Website link: <https://dst.gov.in/dst-sets-task-force-mapping-technologies-start-ups-covid-19>

➤ **DST and DBT funded startup develops silver-based disinfectant to fight COVID-19 pandemic**

Weinnovate Biosolutions, a Pune based startup supported jointly by the Department of Science and Technology (DST) and Department of Biotechnology (DBT), has developed a non-alcoholic aqueous-based colloidal silver solution uniquely made from its NanoAgCide technology for disinfecting hands and environmental surfaces. The newly developed disinfectant is non-inflammable and free of hazardous chemicals and can pose as an effective sanitizer to prevent the spread of the infection through contact, the prime method of transmission of the pandemic, thereby protecting health professionals and infected people.

Website link: <https://egov.eletsonline.com/2020/04/dst-funded-startup-develops-silver-based-disinfectant-to-fight-covid-19-pandemic/>

Efforts made by DRDO in nation's fight against COVID-19

➤ Hand sanitizer

Hand sanitizer being the basic weapon used to prevent the spread of COVID-19. The DRDO has successfully developed in-house sanitizers. By 3rd week of March, it was produced in sizable quantities and distributed to major offices and establishment within the capital. Approximately 4,000 litres of hand sanitizer has been provided to Indian Armed forces, Armed Forces Medical Corps, Defence Security Corps, 1,500 litres to Ministry of Defence, 300 litres to Parliament of India, and 500 litres to various security establishments and high offices to address sanitization issue at first to keep administration work without fear of contamination.

Website link: <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1608649>

➤ Body Suits

Body Suits is critical requirement for doctors, medical staff, sanitations workers, etc so that they are not contracted by COVID-19 during their work. Earlier, DRDO had developed this body suit for medical & paramedical staff to manage & evacuate the casualties in the event of radiological emergencies, which right now is converted as a full body suit to stop contamination. The suit is washable and has passed the ASTM International standards. The suit is widely tested by DRDO and other agencies and found suitable for the cause. M/s Frontier Protective Wear Pvt Ltd Kolkata, transfer of technology holder that is already working with Ministry of Textiles, and M/s Medikit Pvt Ltd Mumbai are producing 10,000 suits per day with some works continuity problems. Each suit costs Rs 7,000.

Website link: <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1608649>

➤ Efforts made by DRDO in nation's fight against COVID-19: N99 masks

Five layer **N99 masks** with two layers of nano mesh are very advanced. These are one of the critical times to stop spread of Corona. Its production vendors are M/s Venus Industries Mumbai, M/s IMTEC Kolkata. Capacity is 10,000 N99 masks per day. Material for these are is sourced from Ahmedabad Textile Industry's Research Association, which is already having plenty of government orders for N95 masks. The mask costs Rs 70 per piece.

Website link: <https://pib.gov.in/PressReleaseDetailm.aspx?PRID=1608649>

➤ Ventilators

Since COVID-19 affects pulmonary functions, keeping in mind the futuristic requirement, Society for Biomedical Technology (SBMT) programme of DRDO has been modified to cater to the current situation. Defence Bio-Engineering & Electro Medical Laboratory (DEBEL), Bangalore (a DRDO lab) has identified a vendor (M/s Scanray Tec Pvt Ltd, Mysore) to produce **critical care ventilator**. It has been created by using existing technologies like breath regulators, pressure/flow sensors, etc. Presently, innovation is on to create 'Multi Patient Ventilator' wherein several patients can be supported by a single ventilator. This innovation is expected to be available within a week. Around 5,000 ventilators will be produces in the first

month and 10,000 subsequently. The DRDO has identified local alternatives to supply of critical components. Already Secretary (Pharmaceuticals) has identified nine companies for design transfer to produce and Mr Anand Mahindra for fabrication of components. Each ventilator unit will cost around Rs four lakh.

Website link: <https://pib.gov.in/PressReleseDetailm.aspx?PRID=1608649>

Science & Technology efforts on COVID-19 by Indian Institute of Technology (IIT)

➤ IIT Kanpur researchers to design a cost-effective virucidal coating of surgical masks for preventive measures against COVID-19

Science and Engineering Research Board (SERB), a statutory body under Department of Science and Technology, is supporting a research by a team of scientists from **IIT Kanpur** for developing a protective coating that would greatly help in making medicated masks and medical wear (PPE) for fighting COVID-19. The researchers from the Department of Chemistry in IIT Kanpur will be designing the virucidal coating using polymers which can resist attachment of bacteria and virus. An additional protection will be included to the polymer coating using molecules that can either destabilize and/or neutralize corona viruses and other viruses like influenza. The combination of anti-microbial polymer coating and functionalized drugs is also expected to provide a synergistic antiviral effect.

Website link: <https://dst.gov.in/iit-kanpur-researchers-design-cost-effective-virucidal-coating-surgical-masks-preventive-measures>

➤ Call for Proposal for COVID-19 Research at IIT Delhi Supercomputer

IIT Delhi is committing a total of INR 1 crore worth of High Performance Computing (HPC) Resource for COVID-19 research to merit based proposals selected from a nationwide call of proposals. All proposals will be evaluated by experts from IIT Delhi. Proposals will be evaluated on first come first serve basis. Deadline for submitting proposals is 15th April.

Website link: <http://www.iitd.ac.in/content/call-proposal-covid-19-research-iit-delhi-supercomputer>

➤ Indian Institute of Technology (IIT), Guwahati Invites COVID-19 Grand Challenge

Indian Institute of Technology (IIT), Guwahati is seeking solution(s) from the students community on measures that can be adopted on priority basis to tackle this pandemic crisis of any one of the broad objectives on Detection of infected persons, Precautions to halt its spread, Newer treatment approaches, Society impact, Behavior changes, Disease outbreak pattern, Resources distribution, Transportation of goods, Migration of humans, Supporting health care workers, Supporting essential services.

Website link: <http://www.iitg.ac.in/upload/17004822395e8608c700915.pdf>

➤ DST sets up rapid response centre at SINE, IIT Bombay to combat COVID-19

Department of Science & Technology, Government of India in a rapid response to combat COVID-19 global pandemic approved setting up of a Centre for Augmenting WAR with COVID-19 Health Crisis (CAWACH) at a total cost of Rs 56 Cr to scout, evaluate and support the innovations and start-ups that address COVID-19 challenges. The Society for Innovation and Entrepreneurship (SINE), a technology business

incubator at **IIT Bombay** supported by DST has been identified as the Implementing Agency of the CAWACH. CAWACH will identify upto 50 innovations and startups that are in the area of novel, low cost, safe and effective ventilators, respiratory aids, protective gears, novel solutions for sanitizers, disinfectants, diagnostics, therapeutics, informatics and any effective interventions to control COVID-19.

Website link: <https://dst.gov.in/dst-sets-rapid-response-centre-sine-iit-bombay-combat-covid-19>

➤ **Researcher make hand sanitizer for local use in Indian Institute of Technology (IIT), Kharagpur**

A team of researchers from **IIT Kharagpur's** School of Medical Science and Technology quickly developed an alcohol based hand rub following the present scenario of scarcity of hand sanitizers/ hand wash preparations in the market due to their heavy demand. The team created the formulation based on guidelines recommended by the World Health Organization. The Transport Section of the Institute has also developed another formulation.

Website link: <https://kgpchronicle.iitkgp.ac.in/preventive-care-iitkgp/>

➤ **Face Shields for Healthcare Workers During Lockdown**

Professor Santanu Dhara and Professor Sangeeta Das Bhattacharya, researchers at the School of Medical Science and Technology at **IIT Kharagpur** have made a prototype to make face shields for healthcare workers from home during the lockdown. The face shield is an essential part of the personal protective equipment (PPE) required for healthcare workers taking care of patients with suspected COVID-19.

Website link: <https://kgpchronicle.iitkgp.ac.in/making-face-shields-for-healthcare-workers-during-lockdown/>

Efforts made by Indian Institute of Science (IISc) fight against COVID-19

➤ **3D printed valves for split use of ventilators to serve multiple patients**

The use of **3D printed valves** are to enable the use of ventilators for multiple patients.

Website link: <https://covid19.iisc.ac.in/index.php/2020/04/01/3-d-printed-valves-for-splitting-of-ventilators-for-serving-multiple-patients/>

➤ **A recombinant subunit vaccine for SARS-CoV-2**

The goal is to develop a rapidly producible **vaccine** for protection to front-line health workers, senior citizens and individuals with co-morbidities such as cardiovascular disease and diabetes.

Website link: <https://covid19.iisc.ac.in/index.php/2020/04/04/a-recombinant-subunit-vaccine-for-sars-cov-2/>

➤ **Cyclone separator design for compressor exit flow oil and dust particle clean up**

The aim is to develop a **cyclone-based oil droplet separator** system as part of the ongoing IISc ventilator development effort, which can be used to reduce the oil droplet and dust particle load on standard filters, thereby prolonging their life and reducing the requirement for frequent maintenance intervals.

Website link: <https://covid19.iisc.ac.in/index.php/2020/03/30/cyclone-separator-design-for-compressor-exit-flow-oil-and-dust-particle-cleanup/>

➤ **Drones for disinfection**

As people are locked inside their homes, they are primarily responsible for their personal hygiene and care to prevent the spread of COVID-19. However, central/state governments and various civic bodies are undertaking various measures to disinfect outdoor spaces and public infrastructure, which is a massive resource-intensive task. General Aeronautics (GA), a startup incubated by the Society for Innovation and Development, IISc, is helping the Bruhat Bengaluru Mahanagara Palike (BBMP) in accelerating the process by using **drones to disinfect hard-to-reach areas**.

Website link: <https://covid19.iisc.ac.in/index.php/2020/03/30/drones-for-disinfection/>

➤ **GoCoronaGo – contact tracing app and network analytics**

The **app GoCoronaGo** to help identify people who may have crossed paths with COVID-19 positive subjects by tracking their interactions in the past using bluetooth and GPS. It uses temporal network analytics in the backend to understand the risk propensity even for distant contacts, understand disease spread and identify high-risk people who are likely to contract and spread the virus. It also provides alerts on isolation and proximity scores, and helps enhance social distancing. It also has a geo-fencing feature for those who are under quarantine, and has the ability to provide their symptoms which is used in the risk evaluation.

Website link: <https://covid19.iisc.ac.in/index.php/2020/04/02/gocoronago-contact-tracing-app-and-network-analytics/>

➤ **Mobile diagnostic testing lab for COVID-19**

The goal is to scale up mobile **diagnostic testing capabilities** and cut down turnaround times from sample collection to test results from 1-3 days, as India is preparing to deal with a spike in the number of cases across the country. As the pandemic spreads to the interior parts of the country that do not have access to advanced molecular diagnostic test capabilities, there is an urgent need to build and deploy safe and accurate testing capabilities at various locations.

Website link: <https://covid19.iisc.ac.in/index.php/2020/04/01/mobile-diagnostic-testing-lab-for-covid-19/>

➤ **Modeling of epidemic spread in Indian urban conditions**

This project aims to **model the epidemic spread** taking Indian urban conditions into account. The goal is to assist epidemiologists and decision makers with (a) understanding the effectiveness of imposing and lifting various kinds of restrictions (b) anticipating hospital needs (c) devising testing strategies.

Website link: <https://covid19.iisc.ac.in/index.php/2020/04/02/modeling-of-epidemic-spread-in-indian-urban-conditions/>

➤ **N95 mask renewal**

In the event of a shortfall of N95 masks, propose **devising a method to clean** them without affecting their specifications.

Website link: <https://covid19.iisc.ac.in/index.php/2020/03/30/n95-mask-renewal/>

➤ **Oxygen concentrator**

Development of **low-cost oxygen concentrators** that could be coupled with ventilators. Zeolite of a specific size is being used to separate oxygen from the air. A mechanism is being created to control the flow and direction for optimum oxygen generation. The operation of this process is automated. This concentrated oxygen can be directly used with ventilators.

Website link: <https://covid19.iisc.ac.in/index.php/2020/03/30/increasing-oxygen-concentration-for-ventilators/>

➤ **Project Praana: Open Source Ventilator Development**

Project Praana (Sanskrit/Kannada for “breath/life”) is a voluntary prototype ventilator design effort run by a group of engineers primarily associated with IISc. Project Praana aims to use components available in India to build a mechanical ventilator, whose production can be rapidly scaled up. Praana is designing the system as much as possible with components used in the automotive and water filter industries in India. If necessary, some critical sensors deployed in space and defense applications can also be repurposed for this emergency.

The main aspects of the design are: easy sourcing of components in India, quick manufacturability and simple user interface.

Website link: <https://covid19.iisc.ac.in/index.php/2020/03/30/project-pranaa-voluntary-ventilator-prototype-design-effort/>

➤ **UV-based disinfecting device**

A **UV based disinfection system** would be efficient in killing the virus as well as faster cleaning cycle time. This can also be used to decontaminate reusable personal protective equipment in times of extreme scarcity which presently is for single use.

Website link: <https://covid19.iisc.ac.in/index.php/2020/03/30/uv-based-disinfecting-device/>

Science & Technology efforts on COVID-19

by

Council of Scientific & Industrial Research (CSIR)

➤ **Low-cost paper-strip test for COVID-19 testing**

The **Institute of Genomics and Integrative Biology (IGIB)** have successfully developed a low-cost, paper strip test which can detect the raging coronavirus within an hour. COVID-19 test uses the cutting-edge, gene-editing tool - Crispr-Cas9 to target and identify the genomic sequences of the novel coronavirus in the samples of suspected individuals

Website Link: <https://yourstory.com/2020/04/coronavirus-indian-scientists-low-cost-paper-strip-test-covid-19>

➤ **Potential drug targets for COVID-19: Based of life cycle of virus in host cell**

Potential drug targets for COVID-19 based on their life cycle in host cells and Catalogue of various targetable proteins are Angiotensin Converting Enzyme ² (ACE2); Transmembrane protease, serine 2 (TMPRSS2); SARS Spike Glycoprotein - human ACE2 complex; Native Spike Protein (S) and others.

Website Link: <https://iicb.res.in/COVID19/assets/files/AT.pdf>

➤ **COVID-19 Location Tracker**

An interactive map built from **GIS data** of cities in India from where the patients were picked up.

Website Link: https://drjit1806.shinyapps.io/COVID_19_GIS_Pockets/

➤ **Fatality vs temperature correlation for COVID-19**

The dataset provides a preliminary investigation to understand if any correlation exists between the **number of deaths and the average temp** (in °C) of Feb and March 2020. The data has been divided into different world regions. March data have been calculated until March 27, 2020.

Website Link: <https://iicb.res.in/COVID19/assets/files/KC.pdf>

➤ **Breakthrough technological intervention against COVID-19**

Call for R&D proposal from Industry and start-ups for breakthrough technological intervention against COVID-19 on effective containment intervention, assistive devices (like ventilators), diagnostic kit, novel drugs, vaccines and trace technologies.

Website Link: https://www.ccmb.res.in/news/year-2020/nmitli_2020.pdf

➤ **Expression of Interest for Collaboration, Research and Testing for COVID-19**

The **Institute of Genomics and Integrative Biology (IGIB)** is inviting Expression of Interest (EOI) from academic and commercial organization with specialized know-how, IP, indigenous infrastructure and production capacity for sharing of expertise, knowledge and resources for development of assays, testing, capacity building and reagents supply etc for COVID-19. The aim of the collaboration/ partnership would be towards expediting the R&D and accelerating solutions that could be useful for the public

Website Link: https://www.igib.res.in/sites/default/files/COVID19_EOI.pdf

➤ **CCMB is developing test kit for Covid-19**

CCMB is helping incubating companies to come up with the idea of developing test kits. Also, CCMB is testing and validating the diagnostic kits they offer. Quality and accurate results are of paramount importance in the case of a test kit. If the kits produce 100 percent results, they will be approved

Website Link: <https://vigyanprasar.gov.in/isw/CCMB-may-soon-come-up-with-diagnostic-kits-for-Covid-19-hindi.html>

➤ **CCMB and AIC-CCMB joined with CCAMP in its COVID-19 Innovations Deployment Accelerator (CIDA) Programme**

C-CAMP has launched **C-CAMP COVID-19 Innovations Deployment Accelerator or C-CIDA** on 26th March, 2020 to help accelerate COVID-19 innovations stuck in last-mile issues. Innovations can be under following categories: screening, diagnostics, therapeutics, vaccines, containment strategies, public health & other categories including but not limited to focused technologies

Website Link: <http://www.ccamp.res.in/covid-19-innovations-deployment-accelerator>

➤ **Call for proposals for mobilizing the development of products and technologies to fight coronavirus pandemic**

CSIR-NMITLI is inviting proposal from academic and commercial organization in areas such as effective containment interventions, assistive devices, innovative diagnostics, novel drugs, new vaccines, etc for COVID-19
Website Link: https://www.cecri.res.in/portals/0/News_files/CSIR_NMITLI_Advt.pdf

➤ **CSIR scientists engaged in battle level to fight Covid-19**

CSIR is working on a five-point agenda to deal with Covid-19. These include molecular level monitoring, making affordable screening kits, developing medicine, developing hospitals and personal protective equipment and supplying medical equipment to understand the risk and nature of the disease

Website Link: <https://vigyanprasar.gov.in/isw/CSIR-scientists-engaged-in-battle-level-fight-Kovid-19-hindi.html>

Science & Technology efforts on COVID-19 by Indian Council of Medical Research (ICMR)

➤ Covid-19 information by ICMR

This provides complete information related to Covid-19 like Testing Laboratories, Rapid response team, Diagnostic kit evaluation, Testing strategy, etc.

Website Link: <https://www.icmr.nic.in/content/covid-19>

➤ COVID-19 - Sample collection guidelines

This document gives information on sample collection, packing and transport to laboratory for COVID-19 testing. It is used by hospitals involved in collecting samples for COVID-19 testing

Website Link: http://www.nie.gov.in/images/leftcontent_attach/COVID-SARI_Sample_collection_SOP_255.pdf

➤ Information regarding testing of samples for sars-cov-2 in the emergency situation

Regional **VRDL, ICMR-NICED** is a designated centre for testing of COVID-19, presently catering to the states of Sikkim and West Bengal

Website Link: <http://www.niced.org.in/news/covid19.htm>

➤ Standard Operating Procedure for Specimen Collection, Packaging and Transport Guidelines for 2019 Novel Coronavirus (2019-nCoV)

This document describes the information for collection, packaging and transport of clinical specimens to Influenza group at **ICMR-National Institute of Virology (NIV)**, Pune, Maharashtra for diagnosis of 2019 Novel Coronavirus (2019-nCoV)

Website Link: http://niv.co.in/SOP_Specimen_Collection_2019-nCoV.pdf

➤ ICMR provides COVID-19 Testing Labs in India

ICMR provides a map of all COVID-19 Testing Labs across the India. **Indian Council of Medical Research (ICMR)** is amplifying test sites and more laboratories are being opened to conduct tests across states.

Website Link: <https://covid.icmr.org.in/index.php/testing-facilities>

➤ How rapid antibody tests are different from existing PCR tests for Covid-19

PCR (polymerase chain reaction) test require nasal or throat swabs. It takes about five hours for the results to come out whereas, rapid testing kits give early results. They

use blood samples of suspected patients and normally takes around 15-30 minutes to give the result. Under this, one has to clean their finger with an alcohol swab and use the lancet provided for finger-pricks.

Website Link: <https://www.indiatoday.in/india/story/how-rapid-antibody-tests-are-different-from-existing-pcr-tests-for-covid-19-explained-1663441-2020-04-05>

➤ **Union Government places orders for over 10 Crore Anti-Malarial Hydroxychloroquine tablets**

The Indian Council of Medical Research (ICMR) has recommended the **anti-malarial drug** for those involved in the care of suspected or confirmed cases of the coronavirus and also, for asymptomatic household contacts of laboratory confirmed cases. As a result, the order for 10.70 crore more tablets of the anti-malarial drug hydroxychloroquine has been placed. Over 70 lakh tablets were purchased earlier.

Website Link: <https://swarajyamag.com/insta/covid-19-union-government-places-orders-for-over-10-crore-anti-malarial-hydroxychloroquine-tablets>

➤ **AarogyaSetu App**

AarogyaSetu App is an initiative for staying informed and alert against COVID19. The App aims to develop a digital Bridge to fight against COVID-19.

Website link:

https://play.google.com/store/apps/details?id=nic.goi.aarogyaSetu&hl=en_GB

The India Science and Technology (ISTI) web portal serves as a one stop online information guide to bring together a collection of resources in response to the COVID-19 outbreak. These resources are generated by efforts made by numerous initiatives and schemes made available by several Departments and Ministries of Government of India. These are being implemented by public supported research institutions in India. The content presented here relies on the best available scientific understanding of the disease and its transmission.

To get more information on COVID-19, please visit:

<http://www.indiascienceandtechnology.gov.in>