

Significant Products and Technologies developed at IIT Delhi

IIT Delhi faculty members have carried out cutting-edge research/ innovations that have positively impacted the lives of people and the environment with its adept technologies. Some of the notable products/ technologies developed and commercialized from IITD are as follows:

1. 'DotBook', India's first Braille laptop for visually-impaired

IIT Delhi innovated an affordable electronic Braille display designed for visually impaired people and 3D printed tactile diagrams. Instead of a screen, the laptop displays embossed text in Braille through a touchpad. Users get to feel everything a website has by touching the pad. Putting in maximum information in one line and making it user-friendly was the most challenging part.



The laptop comes with 4 GB internal storage and is expandable up to 64 GB. It is built in Linux. The 40 cell version costs Rs 60,000, and the 20 cell version comes for Rs 40,000. The laptop can be connected with mobile phones and other laptops to provide a visual display for sighted persons.

2. Smart cane and Flexmo Crutches for mobility assistance to people with disabilities

Smart cane informs about the presence of objects before actually touching the object with the cane and thus helps in preventing unwanted contact.



The cane has an electronic travel aid that fits on the top fold of the white cane and enhances the white cane's capability by detecting objects from knee to head height in front of a person. The smart cane further uses ultrasonic ranging to detect obstacles and conveys distance information to the end-users through distinct vibratory patterns.

A Flexmo crutch is a design improvement of the traditional crutch crafted to improve the mobility of a person using crutches. It is the world's first self-standing crutch. By using specially crafted dental flexures based tip design, the FlexMo Crutch substantially improves the stability and mobility of a patient while keeping the cost low. It also incorporates smart techniques to keep energy usage low. The design additionally increases grip on rough terrains such as sand, pebbles and wet surfaces.

3. Cost-effective indigenous tech for user-friendly, affordable dental implants

IIT Delhi researchers, along with Maulana Azad Institute of Dental Sciences (MAIDS), developed a cost-effective indigenous dental implant that will provide user-friendly and affordable solutions for all edentulous situations (missing tooth

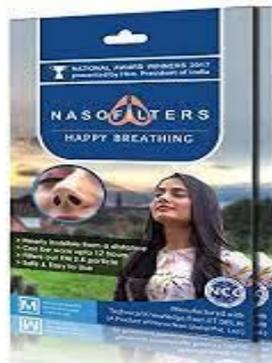


Surgical and Prosthetic kit box for the Dental Implantation

The researchers selected a range of anthropometry in India to base their studies. The design is based on the premise of minimum stress generation during the insertion of threaded Titanium implants. The surface treatment for the implant is developed with a combination of grit blasting and acid etching for better Osteointegration of the implant with the surrounding bone.

4. Nasofilters to protect users from air pollutants, including PM 2.5 particles

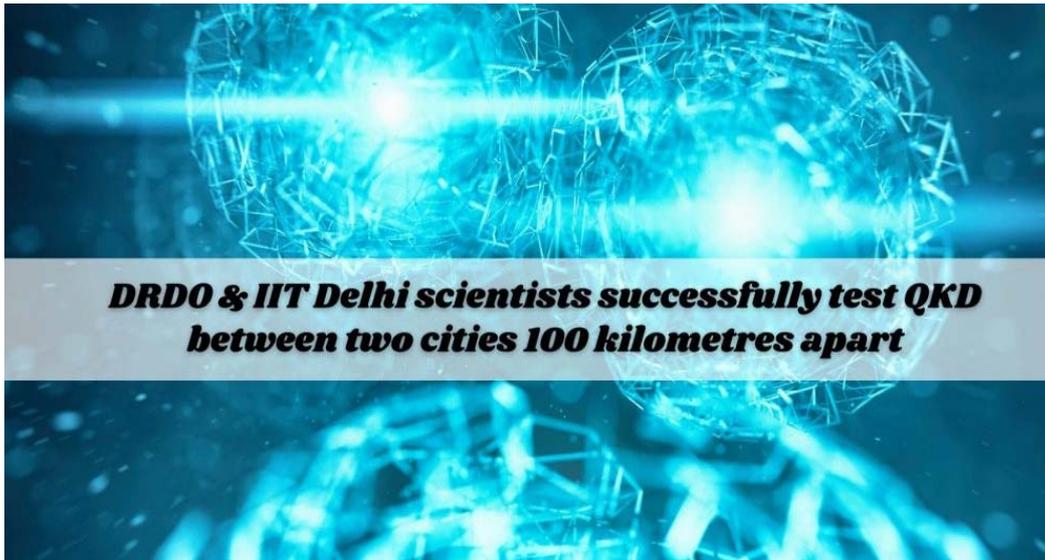
As air quality borders 'severe' levels in the capital, IIT Delhi, in collaboration with Nanoclean Global Private Ltd, has designed a nano-respiratory filter that costs Rs 10. The product, called Nasofilters, is meant to protect users from air pollutants, including PM 2.5 particles, and reduce the risk of respiratory diseases. The product is commercialized and available online as well as in retails.



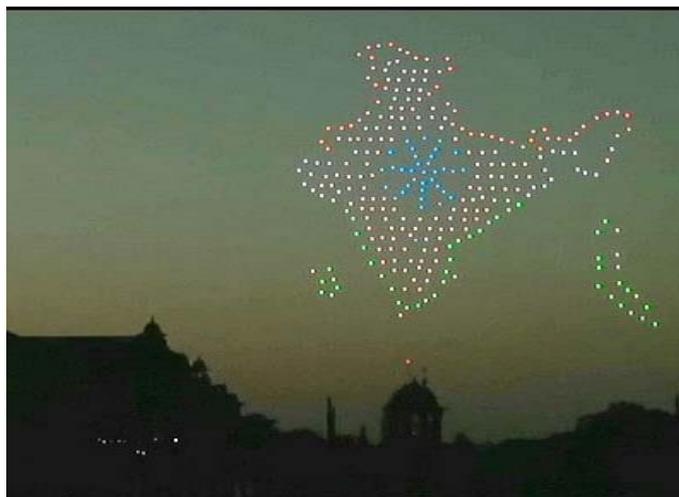
It received the 'Startup National Award' 2017 by former President Hon'ble Pranab Mukherjee and also made it to the South Korean government's list of 'Top 50 technical startups in the world'.

5. Quantum Key Distribution between two cities that are 100 kilometres apart

A joint team of scientists from Defence Research and Development Organisation (DRDO) and Indian Institute of Technology (IIT) Delhi, for the first time in the country successfully demonstrated Quantum Key Distribution link between Prayagraj and Vindhyachal in Uttar Pradesh, a distance of more than 100 kilometres. This technological breakthrough was achieved over a commercial grade optical fibre already available in field. This demonstrated indigenous technology of secure key transfer for bootstrapping military grade communication security key hierarchy. The technology will enable security agencies to plan a suitable quantum communication network indigenously.



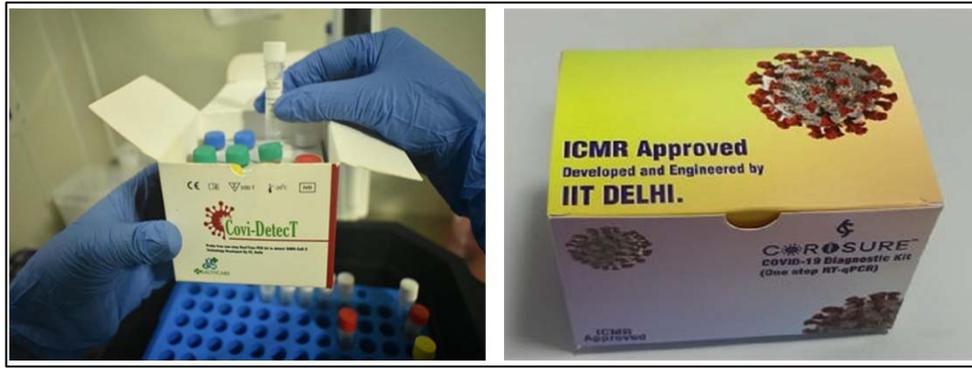
6. Drones made by IIT-Delhi-incubated start up BotLab Dynamics lit up sky at Beating Retreat ceremony



The drones made by the IIT-Delhi startup lit up the sky on the 73rd Republic Day of the Nation and Beating Retreat ceremony. The BotLab Dynamics has been working on building robotics for more than 5 years and successfully connected multiple drones on the great National occasion.

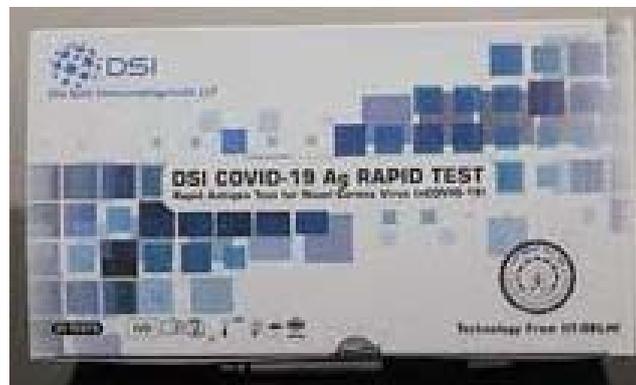
Covid- 19 Research at IIT Delhi

1. RT-PCR-based Assay for Identification of Omicron Variant of SARS-CoV-2



A real-time PCR assay for the diagnosis of SARS CoV-2 was developed by a team of scientists from IIT Delhi. This is a probe-free assay, approved by ICMR and is among the most affordable RT-PCR assays in the country. The assay was licensed to ten companies. Four of these companies obtained CDSCO approval for the assay. The union cabinet minister for MHRD (now MoE) launched the kit in July 2020 and this assay is now sold and used in India for the diagnosis of SARS CoV-2. Six patents including 2 US patents (granted; area = diagnostics), 1 PCT application (filed; area = diagnostics), 3 Indian patent applications (filed; areas including diagnostics and anti-bacterial coating). Three of these patents have been transferred to companies. One of them has been fully commercialized.

2. Rapid Antigen Test kit



An affordable, indigenously developed kit, certified by ICMR is a colloidal gold enhanced double antibody sandwich immunoassay for the qualitative determination of SARS-CoV-2 antigen in human nasal swabs, throat swabs and deep sputum samples. It is suitable for general population screening and diagnosis of COVID-19. The identification is based on the monoclonal antibodies specific for the Coronavirus antigen. The results can be inferred visually with naked eye. A SARS-CoV-2 positive specimen produces a distinct colour band in the test region, formed by the specific antibody antigen colored conjugate complex. Absence of this colored band in the test region suggests a negative result. A coloured band always appears in the control region. Test is found to be suitable for early Ct values (Ct

values between 14 to 32) with a sensitivity of 90%, specificity of 100% and accuracy of 98.99%.

3. PRACRITI



A web-based dashboard that gives details of state and district wise predictions of COVID-19 transmission in the country. The dashboard also takes into account different lockdown scenarios and how the transmission will be affected if the lockdown conditions are changed. This is important to develop the prevention and mitigation strategies for COVID-19. The predictions are updated on a weekly basis to account for any variations in India including changes in the government policies.

4. CoWIN



Developed the CoWIN app in partnership with the Ministry of Health and Family Welfare, Government of India

Additionally, IIT Delhi has also developed following notable technologies:

- Edible Plant-based Mock Meat and Eggs

- Zero-Emission Technology to convert **E-Waste to Wealth**, for treatment of urban sewage streams
- Technology for detection of underwater sound using Acoustic Vector Sensors (AVS)
- A modular, scalable, green EV Charger with a solar interface
- Smart charging station for electronic devices based on Vanadium Redox Flow Battery
- A multi-cylinder Spark Ignition Engine Generator set for electrical power generation, etc.
- Tactile diagrams – a affordable Technology to make pictorial content accessible to visually challenged
- Septiflo™, a Point-of-Care (POC) device for bedside diagnosis of bacteremia and neonatal sepsis