



1 Bubble Maker
PAPR (Powered Air Purifying Respirator)
 This personal safety device offers the user 360° protection against infectious agents or pollutants in the air around them. It is designed to mitigate the risk of airborne infections in close contact and closed environments such as hospitals, public transport and schools. The PAPR (Powered Air Purifying Respirator) shields the personal space of the user with a transparent bubble. "The device uses fan-assisted positive pressure technology to supply cool, purified air inside the bubble and filters exhaled air to prevent the wearer from infecting others as well," says Dr Swapneil Parikh, co-founder, DIY Health.
PRO: One size fits all. Device doesn't fog up.
WHERE TO USE: Offices, crowded places
PRICE: ₹10,000



Tech Tonic

FIFTEEN INNOVATIONS THAT PROMISE TO CHANGE HEALTHCARE IN THESE TIMES OF CRISIS

By BINDU GOPAL RAO

Medical science is a war that never ends. Viruses mutate. New pathogens emerge from primeval forests. Bacteria become resistant to antibiotics. Medical technology is changing by the minute. When Akshay Chaturvedi's father had a variation in blood pressure, he reached out to his doctor immediately who ordered appropriate tests. "We saved 30 minutes because we had access to the best medi-tech right on his wrist—the GOQii Smart Vital. It's by far the most amazing piece of medical technology I've ever seen that I've got it for my entire family," says Delhi-based Akshay Chaturvedi, Founder & CEO at LeverageEdu. Brand ambassador and actor Akshay Kumar donated the GOQii Smart Vital watch to Mumbai Police Covid-19 Frontline Heroes to monitor their vital parameters. As the world and India fight the Covid-19 pandemic, there is no better time than now to place priority on health innovation. Mind reading gadgets for the paralysed, a portable ultrasound gadget that could make the usual large machine redundant, medical malls, use of virtual reality in neuro-rehabilitation are some of the pioneering innovations redefining medical care. Shravya Shetty, research lead, Google Health team, built an AI system to diagnose lung cancer faster than traditional radiologists. After harnessing the power of technology with cutting-edge ideas on healthcare with smarter products and devices, the industry is on steroids. As the old adages 'Health is wealth' and 'Prevention is better than cure' make sense as never before, different organisations are striving to make a difference in sustaining life.



2 A Good Doze

GOQii Smart Vital smartwatch
 This revolutionary device has an integrated Pulse Oximeter to measure the level of oxygen in blood with real time updates of variations. The smartwatch also measures blood pressure, pulse and 24x7 body temperature to assist in early detection and management of Covid-19. "Due to its unique features such as detecting sleep, steps, calories and heart rate, it gives users a glimpse into various parameters that reflect the health and fitness of individuals. It can be connected to a centralised dashboard that enables remote, continuous monitoring of a large user group with minimal intervention," says Vishal Gondal, founder and CEO, GOQii.
PRO: Easy to wear and available in colourful straps
CON: Dashboard hasn't been launched
WHERE TO USE: Home, office, travel
PRICE: ₹5,999

3 Desi Delight

Shuddhi Basket
 This made-in-India premium product using UVC light comes in two categories—one disinfects office and electronic equipment while another, household items such as groceries. "The baskets are handcraft products made of jute from Kolkata embedded with hi-tech chip systems manufactured in RIF and power labs in Delhi and Gurugram. They are foldable, lightweight and cost-effective, and are easily rechargeable using USB chargers," says Purvi Roy, CEO and founder, Arista Vault.
PRO: It is affordable, lightweight, foldable, easy to carry-and-use product with auto-off facility
CON: It has to be unfolded and folded back with each use
WHERE TO USE: Home, office
PRICE: Starts from ₹2,999



4 Tiny Fighter

Linc Pentonic Covid-19 Killer
 Linc Pen and Plastics Ltd has launched this pocket-sized finger-free touch device designed to avoid contact with surfaces such as elevator buttons, doorbells, card machines, ATM buttons, switches etc. The 70 percent ethanol-based ink of the marker sterilises the surfaces it touches. The pen nib self-sterilises after each use. The easy-to-carry, retractable tool has a push button that is perfect for one-handed use. It's just 122mm long and 20mm wide, and built with a refillable cartridge. Deepak Jalan, managing director and CEO, Linc Pen and Plastics Ltd, says, "Driven by our sense of responsibility towards the health and wellbeing of society, we've created an avant-garde product that would contribute to the safety of people and touch the lives of all."
PRO: It can be used by the cashier to type in the bill amount, ensuring that no interpersonal contact takes place with the customer.
WHERE TO USE: Home, office, travel
PRICE: ₹150



5 Talkative Tech

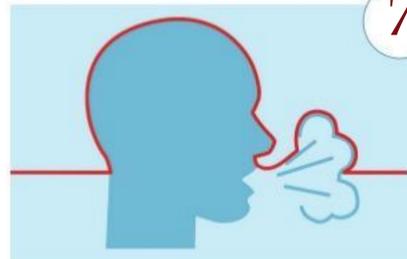
Augnito
 Voice to text in real time becomes a reality with Augnito, an accurate cloud-based software that guarantees error-free documentation. Safe, secure and scalable, it uses deep learning Artificial Intelligence (AI) trained in medical vocabulary. Customised text formatting preferences specific to context, using natural language voice commands and controls, is its USP. Co-designed by doctors and leading AI scientists, Augnito empowers healthcare providers by driving and amplifying Electronic Medical Records systems (EMR). "Its seamless voice automation can be incorporated at every step from radiology to OPD to progress to surgical notes to discharge summaries and lab reports," says Rustom Lawyer, founder, Augnito.
PRO: Augnito understands the entire medical vocabulary to enable doctors to get high quality reports at source, four times faster than typing which allows them to meet and give care to more patients
CON: Available in English only. Regional language development in the pipeline.
WHERE TO USE: Hospitals
PRICE: Starts at ₹2,400

6 Play Misty For Me

Globus ULV Disinfectant Fogger
 This state-of-the-art Disinfectant ULV Cold Fogger from Globus Infocom has proven highly effective in curtailing the scope of infection. It applies sanitiser and disinfectant liquid to high-touch areas to prevent cross contamination. "It generates a fog or mist formed by small Ultra Low Volume (ULV) droplets that remain in the air for several minutes after application. Studies have substantiated that droplets of smaller size are ideal for disinfecting and eliminating pathogens like coronavirus from surfaces. They can reach most inaccessible parts where conventional cleaning cannot," says Kiran Dham, CEO, Globus Infocom Ltd.
PRO: This cold fogger uses 70 percent alcohol-based sanitiser, which can effectively reach large areas in the shortest time, and helps to break the chain of infection efficiently.
WHERE TO USE: Office, crowded public spaces
PRICE: ₹30,000-35,000



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Lung Power

Cough against COVID by Wadhvani Institute

Cough against COVID is a global data-crowdsourcing and open-innovation initiative to build an AI tool that uses cough sounds, symptoms and other contextual information to screen for Covid-19 infection. With just a smartphone, it can be used by people at home to be triaged for testing. Healthcare systems need limited tests for the most likely cases. "Anecdotal evidence indicates that every Covid-19 patient's cough sounds different from that of other. The goal of the initiative is to collect and analyse cough sounds to identify the early signs of Covid-19. However, it cannot be a replacement for the current Covid-19 diagnostic test, but functions as an 'in-between' screening tool to detect Covid-19 infection, allowing the patient to get tested early. It thereby supports public health systems to contain the pandemic," says Dr Rahul Panicker, chief research and innovation officer.

PRO: Will help detect Covid+ patients faster than current processes. Cough samples can be given from anywhere using a smartphone.
CON: In development stage; ICMR has shown interest

Wipeout Warrior

Portable multi-functional UV Sterilizer & Wireless Charger

Dailyobjects.com has introduced a portable multifunctional UV steriliser, which disinfects the phone, tech gadgets, personal accessories by destroying 99.9 percent of the accumulated germs in five minutes. Since UVC light has the shortest wavelength, it has the highest power to kill germs, bacteria, and viruses. It works by breaking down germ DNA, making it incapable of reproducing and functioning. Pankaj Garg, CEO & founder, DailyObjects, says, "Mobile phones accumulate seven times more bacteria than a toilet seat. Personal accessories carry almost 10 times the bacterial load than shopping carts and doorknobs. Only disinfecting can destroy 99.9 percent of all germs on the surface of gadgets and accessories."

PRO: It comes with a wireless charger compatible with all phones and earphones that support wireless charging

WHERE TO USE: Home, office, travel
PRICE: ₹6,000



Deep Discovery

Bosch Digital Pathology Solution

There is just one pathologist per 1.5 million people in some regions of the world to test blood and pathological samples for the doctor to make a diagnosis. Two thirds of such examinations are being carried out with a microscope, which is time-consuming and skill-intensive. Bosch digital pathology solution is designed to use advanced AI algorithms to reshape the capabilities of future diagnostic labs to deliver better patient care. "It also improves access to subspecialty experts, especially for patients in remote areas. It provides the tools and innovation necessary to bridge the gap between patient, diagnosis and pathologist," says Guruprasad S, vice-president and director, Healthcare Business Area, Robert Bosch Engineering and Business Solutions Pvt Ltd.

PRO: Useful when laboratory diagnostics is scarce

CON: Under development

WHERE TO USE: Work place

PRICE: Combination of one-time device sale (Capex) and algorithm as a consumable (subscription) based model

Revivalist Miracle

Powered Exoskeleton

The Exoskeleton is a lightweight, wearable robotics device to assist specially-abled people to walk again. "This externally worn robotic support system enhances the abilities of persons with paralysis, stroke, spinal cord injury (SCI) and other neurological conditions to move and work better. It assists in recovering their natural gait pattern and acts as a mobility and rehabilitation device," says John I Kujur, founder & CEO, GenElek Technologies.

PRO: Consistent use of the machine enables the best adjustments for rehabilitation

CON: High price

WHERE TO USE: Neurologically

injured persons

PRICE: ₹25 lakh (approx.)



11

Multiple Master

Dozee India's only contact-free health-monitoring device tracks heartbeats, respiration, sleep stress-recovery and more with medical-grade 98.4 percent accuracy. It wirelessly monitors health as you sleep. It consists of a thin sheet of MEMS-based vibro-acoustic sensors, data accumulation and a communication unit. "The sensor sheet captures micro-vibrations produced by the body, which are precisely converted into bio-markers by AI-based analytics engines and algorithms. The data is used to analyse the user's health through a smartphone app. Doctors can simultaneously monitor users remotely through a patient-monitoring dashboard. Dozee works on ballistocardiography (BCG) technology," says Mudit Dandwate, CEO and co-founder, Turtle Shell Technologies Pvt Ltd. It's useful in ward monitoring, home monitoring, geriatric care, heart care, high-risk patient care and at Covid care centres.

PRO: High accuracy in studies conducted on over 500 patients

CON: Initial discomfort

WHERE TO USE: Home, office, travel
PRICE: ₹7,999

12 Cold Sugar

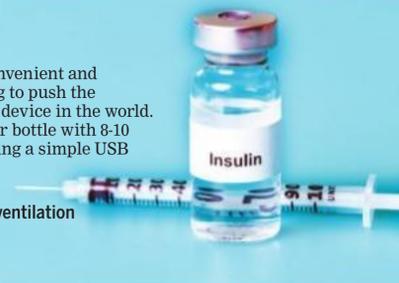
nSULin

This portable battery-operated cooling device is designed to provide a convenient and affordable way to store insulin at 20°C-80°C. Designers Charrette is trying to push the boundaries of technology and design to create the smallest refrigeration device in the world. "The size of the storage device can be compared to a 750ml thermos water bottle with 8-10 hours of battery backup making it travel-friendly. It can be recharged using a simple USB charger," says Prasad Joshi, founder, Designers Charrette.

PRO: It's battery operated and can be charged using a mobile charger

CON: Cannot be kept in an enclosed environment for long since it requires ventilation

WHERE TO USE: Home, office, travel
PRICE: ₹5,500



Cerebral Champion

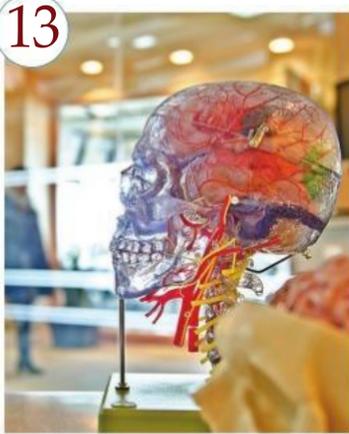
IIT Madras 'Hyperelastic Model' to Understand Brain Injuries

This analysis-driven model can calculate the stress experienced by a patient's brain due to blunt force injury in an accident and a tumour's growth, benign or malignant. Neurosurgeons can use the information to devise tailor-made treatment strategies for faster recovery. The research team was led by Prof Krishna Kannan, Department of Mechanical Engineering, IIT Madras, and assisted by Durga Prasad, doctoral scholar. Says Prof Kannan, "One of the main challenges in hyperelasticity is to derive the mathematical form of the potential with the fewest material parameters."

PRO: The software can help neurosurgeons assess the scope of brain damage

CON: Under development, clinical trials are yet to start

WHERE TO USE: Hospitals



14 Mr Clean

CoronaOven

This unique multi-focal UV disinfection chamber can sanitise any surface in just 10 minutes, thus permitting hospitals to reuse masks, gloves and other PPE. Each microwave-sized compact chamber (33-litre) can disinfect 40 masks per hour, thus massively cutting down PPE waste. "General stores, households and users across the value chain of small-sized products such as milk packets, food packets, watches, spectacles and bags can be disinfected. The chamber is in use at airports to disinfect high-contact surfaces such as trolleys, escalator handles, baggage belts," says Akshay Singhal, founder & CEO, Log 9 Materials Scientific Pvt Ltd.

PRO: A single cycle of the CoronaOven (4 to 8 minutes) can disinfect multiple objects

WHERE TO USE: Homes, offices, public spaces

PRICE: ₹14,399 (33 ltr)



Blood Brother

Axiostat Rolled Gauze

Over 40 percent of road accident fatalities in India are caused by uncontrollable bleeding. Axiostat Rolled Gauze, made of 100 percent Chitosan, helps stop bleeding and make haemodynamic (flow of blood within the body) stable. There is zero trauma while removing the gauze, thereby, eliminating the risk of re-bleeding complications—a common problem with conventional gauze. "When applied to the wound, it reacts with blood to create a robust seal and stops the bleeding. To remove, just add saline or water and wash it off. It's five times more absorbent than conventional rolled gauze," says Leo Mavelly, founder and CEO, Axio Biosolutions.

PRO: Simple to use and can be applied by a non-medical person. It can accelerate bleeding control and wound healing.

WHERE TO USE: Home, office, travel
PRICE: ₹500 onwards



Data is the Prescription

Medical scientists and researchers across the world are engaged in intense work to innovate on current healthcare parameters. According to a recent McKinsey report 'Prioritizing Health: A Prescription for Prosperity', only 40 percent of global disease can be eliminated with known interventions. The scale has to be upped by using enhanced, better-focused technologies like Senolytics that regulate ageing cells causing cellular inflammation and dysfunction. GenNext pharma will be molecularly driven and will use genome editing. For example, 750 GM mosquitos are to be released in Florida for malaria prevention. Premium hospitals that offer luxury hotel experience for patients with holistic hospitality and treatments are coming up in India as well. Technology has shrunk as pocket-sized, touch-free gadgets and wearable devices replace cumbersome analysis machines. For example, a smart watch that enables a stroke-affected patient to control video movements with his brain is in trial stage. Cutting-edge AI and robotics are being deployed to detect and address diseases. Cellular therapy and regenerative medicine are emerging as effective treatment in cancer, such as CAR-T cell therapy, which reprograms T-cells to attack and destroy tumours. The coronavirus has taught the world that viruses are here to stay. 3-D modelling—using a 3-D print of a patient's organs—enables surgeons to do trial practice before conducting a complex operation. They even use robots to enter the heart and conduct surgery. Drones in Africa are sending medical supplies to rural areas, which could be a boon in India where healthcare is inaccessible to villagers. Over four billion people in the world don't have access to medicare. Data is king: aggregators are partnering with drug companies to study diet, sleep and neurological information to create redefined models. It is also eliminating racial bias in healthcare analytics and R&D: DNA from people across the globe is being collected by Nigeria startup 54gene. Big data analysis accelerates treatment options at a speed unmatched by existing systems. Information collected from patient records will help AI to find common links in disease patterns. Lifestyle enabling is another focus area in medicare: stem cell therapy for diabetes using implantable technology gives the patient freedom in living choices. Innovative vaccines such as the AT04A destroy cholesterol and need to be used just once a year. PreMe+You app connects parents with their newborn baby in real time, so that they can watch every moments of the infant. The world is taking baby steps in innovation, because the keystone of progress is good health powered by constantly evolving technology.



Ten Promising Health Innovations

Omics and molecular technologies

A therapeutic or diagnostic that harnesses the various types of molecules within a cell (eg, DNA, RNA, proteins). This includes engineering of these intra-cellular components (eg, genome editing) as well as analysis (eg, proteomics, transcriptomics).

Example: CRISPR and curbing malaria

Innovation: Genetic modification of malaria-carrying mosquitoes using gene-editing technologies (eg, CRISPR); this may potentially enable significant disease reduction by propagating the modified genes across the mosquito population.

Next-generation pharmaceuticals

Newer iterations of traditional chemical compounds (small molecules) and classes of molecules used as medicinal drugs, possibly with multiple and concurrent target structures.

Example: Senolytics and regulation of cellular aging

Innovation: Senolytics (a class of small molecules) may decrease or eliminate aging cells that can cause cellular inflammation, dysfunction, and tissue damage. This has implications for delaying the occurrence of age-related diseases.

Cellular therapy and regenerative medicine

Cellular therapy: A biological product, derived from living cells, that is used for therapeutic purposes to replace or

repair damaged cells and/or tissue. **Regenerative medicine:** A therapy with the power to restore diseased and/or injured tissues and organs, potentially decreasing reliance on transplantation.

Example: CAR T-cell therapy and treatment of solid tumours

Innovation: CAR T-cell therapy reprograms a patient's T-cells (immune system cells) to target tumour cells; when infused into the patient, the T-cells bind to an antigen on tumour cells, attacking and destroying them.

Innovative vaccines

Substances that stimulate the immune system to respond to and destroy a bacterium or virus. In the future, vaccines may be used to target noncommunicable diseases (eg, cancer).

Example: The AT04A vaccine and the lowering of cholesterol

Innovation: AT04A is a vaccine made up of molecules that bind to blood cholesterol and degrade it. The vaccine would be required only once a year, potentially



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improving outcomes.

Advanced surgical procedures

Treatments for injuries or disorders of the body with minimally invasive incisions and/or small instruments, including robotic surgery. Also includes any technique that improves surgery-related processes outside the operating room.

Example: Suspended animation for severe trauma patients

Innovation: A cold saline solution could be injected in the first contact with the patient to cool the body to 10-15°C and stop its normal functions. This would allow time for the surgeon to operate before resuscitating the patient.

Connected and cognitive devices

Portable, wearable, ingestible, and/or implantable devices that can monitor health and fitness information, engage patients and their community of caregivers, and deliver self-regulated therapies autonomously.

Example: E-tattoos for heart diagnostics

Innovation: Ultra-thin e-tattoos can provide longer periods of heart monitoring and increase patient comfort while providing a wider range of data to enhance decision making.

Electroceuticals

Small therapeutic agents that target the neural circuits of organs. Therapy involves the mapping of neural circuitry with neural impulses (administered via an implantable device) delivered to these specific targets.

Robotics and prosthetics

A wide variety of programmable, self-controlled devices consisting of electronic, electrical, or mechanical units and artificial substitutes or replacements for a part of the body.

Example: Next-generation exoskeletons and mobility support

Innovation: Next-generation exoskel-

etons, powered by small motors that mimic human muscles, could allow older patients to recover their autonomy while reducing the likelihood of accidents and falls.

Digital therapeutics

Preventive and therapeutic evidence-based interventions driven by software for a broad spectrum of physical, mental, and behavioural conditions.

Example: AI-powered app to enable behaviour change

Innovation: Digital therapeutics, powered by AI, patient data, and behavioural science, can help patients adopt and sustain healthy behaviours through gamification and other forms of engagement.

Tech-enabled care delivery

It applies new analytics capabilities to determine insights, and applies those insights to providers and patients to improve care outcomes, experience, and efficiency.

Example: Multichannel care delivery using online platforms may facilitate data sharing and improve treatment efficiency. Particularly relevant for chronic diseases like diabetes because patients' glucose levels and other vital signs are continuously shared with the clinician.

Source: McKinsey Global Institute

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Example: Implantable microchips and the mitigation of chronic pain

Innovation: Spinal cord stimulation can improve patient's quality of life, allowing increased mobility, enhanced sleep, and reduced need for pain

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