

## Human Technology Interaction Amidst Covid-19

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### Abstract

Being isolated from the world, technology is sustaining the humanity. From online meetings to online announcements, from online consultation to personalized treatment, from digital tracking of risky areas to robotic treatment of corona virus infected patients; the technology is everywhere. The current trendy terminology, like Isolation, Quarantine and Social Distancing; has alienated humans from humans. The only connecting link is the technology. In other words, being physically apart, the technology is keeping humans close to friends, relatives, business, government and the health experts. A tweet announcing lockdown, the concept of telemedicines, Arogya setu app, Cowin vaccination app, and covid resources dashboard; all these means are result of the technology. In the pandemic time, humans, with the help of the technology, are sustaining the world. As the relation between humans and technology is strengthening, the world is getting closer to the next Industrial revolution i.e. 5<sup>th</sup> Industrial Revolution. Humans being homebound are trying to exploit the technology to ease the life. They are designing websites containing details of vacant beds, oxygen availability, ventilators and blood plasma. Government is preparing digital platform to vaccinate the world. Health services are being provided digitally. The current paper emphasizes intensifying human involvement with the technology in the healthcare arena, which is inconspicuously giving rise to the 5<sup>th</sup> Industrial Revolution. Humans are prime mover in Industry 5.0.

**Keywords:** Technology, Covid-19, Industrial Revolution 5.0.

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### 1. INTRODUCTION

Multiple cases of pneumonia were identified in Wuhan city of China in early December, 2019. The spreading infection was later identified as SARS-CoV-2, severe acute respiratory syndrome based coronavirus 2. In a few months it engulfed around 190 countries of the world. World Health Organization declared public health emergency in January 2020 due to proliferating infection and further the COVID-19 manifested into a worldwide pandemic in March 2020, annihilating lives of people across the globe (Mohan & Nambiar, 2020). The Coronavirus is the cause of the downfall in the world since December 2019. Along with the unbearable socio-economic loss, the pandemic has disrupted the entire health care system rendering the public devoid of basic healthcare services, owing to skyrocketing cases of Novel coronavirus all at once. Masses have been scrambling to access oxygen beds, ventilators, Medical guidance, masks and PPE kits. In the time of turmoil, technology has come out to rescue. New revolution technology is panacea at the time of physical distancing, isolation and lockdown. The paper attempts to bring forth the intensifying interaction between humans and technology at the time of pandemic in the healthcare

system. Humans across all fields are bringing revolutionary changes being locked in the 4 walls. Rightly said, geniuses don't blame the situations, they work out solutions. With optimum determination and creativity, humans are constantly working out digital solutions despite the abnormal conditions. The moment humans start innovatively playing with various facets of the technology, a new revolution ushers in. This is the idea behind the 5<sup>th</sup> Industrial Revolution. This is how the pandemic is taking the world closer to the 5<sup>th</sup> Industrial Revolution (Hanif & Ifthikar, 2020). Since the outbreak of the pandemic, social distancing and housebound are the most important preventive measures. Isolation of the infected person is the crucial factor which can spread or stop the spread further. The circumstances have necessitated the adoption of technology as the action of last resort which is sustaining the quality life. Digital technology is prominently used in medical activities classified as diagnosis, surveillance and prevention. A research reveals that 50 kinds of software and 15 types of hardware technologies are used in managing the coronavirus disease i.e. COVID. The hardware technology based equipments used in healthcare are computerized tomography machines, mobile devices, robotics, wearable devices, video devices, sensors and 3D machines. Software based technology includes video conferencing based communication platforms like- Zoom, Facetime, Whatsapp, Facebook messenger. Computer based applications like Google apps, email, social media platforms like YouTube, facebook, twitter are significantly contributing in the healthcare service. The underlying motive behind all the technological based hardware and software are -monitoring patients, diagnosing patients, consulting medical experts, communicating, contactless delivery, maintaining and upgrading database for analyses (Vargo et al., 2020). Industry 5.0 is about the skillful use of latest technologies by citizens to better the life. It is offering solutions to complications brought by the pandemic. The hallmarks of Industry 5.0 are personalization and human collaboration with machines. Personalized therapy during covid spread, to meet needs of individual patients and, remote health monitoring have well justified the advent of new technological revolution. The root technologies behind Industry 5.0 are digitalization based technologies involving Artificial Intelligence (AI), Big Data, Block Chain, Cloud Computing, 3D Printing, Internet of Things (Sarfraz et al., 2021).

## **2. LITERATURE REVIEW**

“It is imperative that we work together as an international community to ensure all people are connected and respected in the digital age,” said Keng Thai Leong, Director-General (International Affairs), Info comm. Media Development Authority, Singapore

The innovative technologies are playing key roles in manufacturing of medical equipments, diagnosing the virus, keeping an eye on patients in the hospitals, keeping track of unnecessary movements in the streets, managing data of infected and non infected people, handling supply of essential health care instruments, communicating preventive guidelines and remote discussions among health experts. All the activities are taking place with the help of the technologies (Javaid, Haleem, Vaishya, et al., 2020). The innovative applications of the technologies are being adopted by humans at global level. The smart applications of the technologies in healthcare sector can be identified with the help of literature-

### **2.1 Strengthening Human Technology Interaction**

Technologies are confronting strongly to the pandemic, this can be elaborated by an analyses done on 4830 start ups working on technology driven solution to ensure remote healthcare and public safety. There are companies developing remote healthcare solutions for patients like telenursing and telemedicine services. Inside hospitals- interactive real time mobile apps, disinfectants, sanitizing machines, hospital Robots, 3D Printed Ventilator Valve, Artificial Cough Device and AI Algorithms for monitoring patients are among the effective technologies which are keeping doctors connected with the patients following the social distancing norms. Chatbots and symptom checking mobile applications are also blessings of the technologies, which are playing apt role in disseminating the right information to the right place and at right time. CORD-19 (Covid-19 open research database) is catering to the information needs of millions of users. The

store house of data comprises publications, preprints and archived material on historical viruses (Wang, et al., 2020). The easy access to data is helping the researchers and doctors who are working tirelessly to find the curative medicines and the preventive vaccines. The intervention of humans with the technologies like Artificial Intelligence and Machine Learning is proving significant in the pandemic time. Storing and managing patient details is of big help to the medical staff and the government (Tosheva, 2020). CCTV cameras with face recognition technologies are helping in tracking the infected people who are quarantined. DeepMind is a computer program based company which was acquired by Google in the year 2016. Google's deepMind has created an artificial intelligence based program named 'AlphaFold' which can accurately predict 3D models of the protein structures of the virus. The technology is sufficiently helping in identifying the structure of proteins in the Coronavirus which would help in finding an effective treatment and a preventive vaccines by health institutes ( Computational predictions of protein structures associated with COVID-19, 2020) (Senior et al., 2020).

## **2.2 How Globe confronted COVID-19 with the help of the technology?**

Technologies have significantly contributed in saving lives of people. The early adopters of technical advancement remained successful in maintaining low mortality rates. Big data and AI(Artificial Intelligence) have been of significant help in china in tracking movement of the people in the pandemic epicenter area. China is successfully using AI based data analytics and predictive modelling techniques to get insights of the virus, the results are informational to the medical experts. The AI based tools are also contributing in differentiating normal cold and flu from Covid-19, hence ensuring that only the needful cases are tested for the Covid. The AI based predictive analytics and visual representations not only aware public of the spread but also help the government to adopt the preventive policy measures (StartUs Insights, 2021). Another AI based solution is being provided by Baidu, inc a Chinese multinational technology company. It is indulged in screening the people with the fluctuating body temperature, which further help in isolating the sick people from spreading the disease to others (Cio & Manjunath, 2020). China smartly employed the digital technologies to minimize the physical involvement of humans. By extracting the real time location details of people from migration map, mobile payment apps and social media; Chinese authorities could easily track movement of the people who visited Wuhan, the most infected place in China. Infrared thermal cameras have found pronounced use in detecting people with fever and the cloud based screening has been very useful in directing the individuals to the required resources. Chinese authorities also initiated a QR code system in which people have to fill symptoms survey and record the body temperature. The QR code served as a health status certificate and a travel pass, in which the red colour signified self Isolation for 14 days and the green colour indicated prone to least risk. CloudMinds is a cloud based company in Beijing, it's AI platform, HARIX, devised bracelets and rings which can monitor the patient's signal like temperature, blood oxygen, heart rate.

South Korea used the concept called contract tracing using security camera footage, facial recognition technology, bank card records, and global positioning system (GPS) data from vehicles and mobile phones to provide the real-time data regarding date and time of people's travel, resultanty South Korea is the country with lowest death rates. Singapore has launched a mobile phone application that exchange short distance Bluetooth signals and store the data for 21 days. Ministry of health could access the persons who came in contact with an infected person. There is a UK initiative which is pooling resources to help the health servants in printing PPE kits, head visors, masks and ear guards (Westgarth, 2020). The collaboration of the humans and technologies and an early adoption of the innovative technologies into daily life, both the factors have been of great help in mitigating the loss of lives at the time of the spread of the ghastly virus. Stanford medical scientists in California are looking forward to diagnose and prognose the illnesses and the virus infections using the wearable devices like smart watches (Armitrage, 2020).

CDC central epidemic command centre (CECC) in Taiwan is combining health data with the travel data, to build a monitoring system which provides real-time alerts. For example, it sends automatic alerts during the clinical visits, if the patients have travelled to the infected vicinity. In India, the telecom operators like Jio, BSNL, Airtel, and more, are using the caller tunes to spread awareness about the pandemic. Various non profit organisations in India are forming groups on the social media platforms like facebook, whatsapp, Instagram etc and smartly using the network to match demand and supply of the crucial COVID resources. Consequentially the efforts are successfully ensuring the right supplier to the right place at the right time. The Facebook page named “Adopt a healthcare worker”, is among the appreciable initiatives in the countries like USA and Queensland, which is helpful in assisting the healthcare worker in managing the home duties along with the work. An overwhelming initiative where anyone can volunteer to help the family of a healthcare worker in any possible way while the health care workers can sincerely perform the job (Javaid, Haleem, Singh, et al., 2020).

The efficacious response of the tech-driven countries can inspire the other countries to deal with the horrendous virus using the weapon of technology (Whitelaw et al., 2020).

### 2.3 Industry 5.0 and Healthcare System

Chris Wellise, Chief Sustainability Officer, Hewlett Packard Enterprise, pointed out that, “The disruption of COVID-19 is accelerating the need for agility, adaptability and transformation, not just in terms of the workforce moving online, but in the use of AI and edge to cloud technologies for a more sustainable economic recovery.”

The punch of the 5<sup>th</sup> Industrial revolution is that humans would imagine, program machines and the machines would perform the imaginative tasks. The humans and the machines would partner up to ensure a sustainable world, in which the humans are innovative thinkers and the machines are the performers. The combo is wonderfully applied to its best use to get the world out of the life threatening virus. The technology is boon to the disease stricken world. Smart alliance of the humans with the machines is helping in superb hospital management. There is a real time evaluation and scanning of the patients. The new revolution, which is called Industry 5.0, is already suggesting that repetitive and dangerous tasks would be handled by machines/robots meanwhile the humans would indulge in the innovative areas. In the time of COVID -19, the peculiar features of the new revolution, are used on large scale to protect the spread of virus, by employing robots to monitor the health of the patients. Robots are reaching in the wards where the health workers can't. In the month of February (2020), China began the first Robot run ward to prevent hospital staff from exposure to risk (O'Meara, 2020). Drones and the robots are finding new uses by acting as the suppliers of medicines and deliverer of food; no wonder they are patrolling the streets, announcing necessary guidelines and spraying disinfectants (Marr, 2020). Biosensors are used for diagnose and analyses of the disease. Artificial Intelligence based devices are imitating the human tasks with an algorithm based intellect; as a result the doctors' burden is reduced. The doctors by employing the AI based tools in the field are devoting their time to more needful patients. Medical equipments are digitally supplied to the right place at an appropriate time. IR 5.0 technologies are resulting in better cooperation between patients and doctors despite the mandatory social distancing norms. The technology called cloud computing is facilitating exchange of data in healthcare arena. Hospitals and medical staff are burdened; there is chaos and panic all around. Different patients with different health complications are in need of quick medical consultation and treatment. In the time of urgency paramedical staff is heavily relying on innovative IR 5.0 technologies. The IR 5.0 technologies which are helping the healthcare sector are-

- **Internet of Everything-** The technology helps in connecting people, process and machines. It helping in interchange of information about patient to health experts for better treatment and to administration so that right preventive measures can be broadcasted.

- **Big Data**- It manages huge data of patients to know the count of those who caught infection, to list those who have history of foreign travel and accordingly mark the risky areas.
- **4D CT and 4D MRI**- Four-dimensional computed tomography (4D CT) are diagnostic tools which capture the body's breathing, movement of organs and tumors. Magnetic Resonance Imaging (4D MRI) help clinicians to visualize the blood flow in heart.
- **Smart Sensors**- Used in thermal scanning.
- **Holography**- It is the process which converts information of body into digital form. The holographic images are 3d images which can be magnified with utmost clarity, thus help in quick detection and treatment of problem. Holograms store high resolution image of internal organs and tissues (Javaid, Haleem, Vaishya, et al., 2020).
- **Virtual Reality**-It enables real time exchange of information
- **Internet of Medical Things**- In it there is interconnection of medical devices, applications with medical information technology. This way limited resource like ventilators are shared with multiple patients.
- **Artificial Intelligence**- Tracking the spread of virus, predicting the risky areas.
- **Humanoid robots**- delivering food, medicines, examination of patients and collecting samples.
- **Smart Inhalers**- These are helpful for asthmatic patients by signalling them to take timely medicine.
- **3D Printing**- used for designing masks, face shields, ventilators and other medical equipments.
- **3D Scanning**- use to scan human body with high dimension. In the pandemic time the technology is helpful in diagnosing and determining coronavirus.
- **Machine Learning and Computing**- used to detect disease, forecast the growth of pandemic, and formulate strategies to manage the pandemic.
- **4D Printing**- used to manufacture medical equipments with smart materials like in 3D Printing, with an additional element time. It enables the designed output to change shape with changing time and environmental condition, thus results in innovative treatment (Javaid, Haleem, Vaishya, et al., 2020).
- **Drones**- flying machines assigned task of surveillance, delivery of essentials and broadcaster of crucial information.
- **Telemedicine**- Telephonic consultation is an easy example to understand the term.
- **Smartphone Technology**-Endowed with features like- camera, video recording, GPS, navigation, gaming, Email, web browsers it is used in audio/video communications. The technology is used in contact tracing, marking risky zones. To one's surprise, the technology is also involved in detecting virus. The main uses are in covid 19 monitoring, remote teleconsultation, counselling, education, managing mental health, arogya setu covid tracking etc (Iyengar et al., 2020).
- **Cloud Computing**- Helps in management of patient's record, providing better services to patients, carrying out backend operations, creation and maintenance of health apps. It has also facilitated work from home. Advent of block chain technology in cloud computing has solved cyber security issues and ensure higher data integrity while data exchange. E.g. IBM Company is taking steps to provide access to AI based research output (Singh et al., 2021).
- **Robotics**- Intellectual helpers which tend to substitute humans. The robots are rigorously aiding health sector by monitoring, supplying medicines and essentials to the patients infected with contagious virus.
- **Nanomedicines**- The nano based antimicrobial technology. It is helping preventing, diagnosing, treating and vaccinating (Vahedifard & Chakravarthy, 2021).

## 2.4 ICT and Pandemic

Sunil Bharti Mittal, Founder & Chairman, Bharti Enterprises, succinctly summed up one of the session's key themes: "I am sure we all agree that we would not be able to imagine a world without connectivity during this vital time Mohamed Maleeh Jamal, Minister of Communication, Science and Technology, Maldives, echoed the importance of ICTs in facilitating the response to the pandemic, providing information, social and economic activities to citizens throughout the island country even as usages levels doubled. Connectivity was "the most effective tool in keeping people virtually together and physically distant."

ICT (Information and communication technology), has played a quintessential role in relieving the grief stricken population from stress and strain. The ICT technology is playing an important role in the healthcare sector in the form of various mobile applications and the AI based tools. Government is able to connect with the underprivileged and the vulnerable part of the population via digital means (Bajpai et al., 2020). Surprisingly the digital shift is running the economy in the tough times, as the investments in bandwidth expansion, network equipment, and cloud based software are increasing. Along with Cloud Computing, Artificial Intelligence and Internet of Things; Big Data is also used as means for secure exchange of data. The health records, medical data and the prescriptions are exchanged with utmost safety and originality. Despite so many advantages the digitalization is raising concerns like techno stress, online fraud, security and privacy issues (De' et al., 2020). Remote gene sequencing is another technical application helping in detection of the covid, unmanned cars are also spraying disinfectants in the isolation wards. Besides movable trolleys, online medical advice, and infrared temperature measuring tools are proving beneficial for the covid affected world (HT Brand Studio, 2020).

Information Technology is a field which encompass all the intricacies surrounding sharing of information over internet involving computer and technology. This involves hardware, operating systems, software, applications, storage, databases, servers etc. The healthcare system is significantly transformed with constant employment and up gradation of the new technologies happening with revolutionary shift. The technology based applications are everywhere- in the hospitals, in the laboratories, while communicating the urgent health guidelines, while handling the patient data, while monitoring the affected people and in the treatment of the disease (Nichols, 2021).

## 2.5 Collaborating with Tech Giant Microsoft to Deal with COVID-19

Collaboration is the buzz word in the current time. Collaboration with the technology is the only way linking the isolated people to the entire world. Another study exclusively highlighted the contribution of Microsoft, the multinational technology corporation and some other tech giants in ameliorating the health sector in times of spread of the gruesome virus worldwide. It's an AI based chatbot which is responsibly screening the patients by frequently asking questions based on CDC (Centres for Disease Control & Prevention) guidelines. The symptomatic patients are directed to the telehealth portal for further clinical advice. To respond to the severe paucity of ICU, Medical care unit of Oregon health and Service University brought the concept of virtual ICUs. Keeping in view the pandemic, GE Healthcare's mural virtual solution is also included in Microsoft's azure cloud. The digital service integrates data from multiple systems and provides it on a single screen. As a result the limited resources are optimally provided to the needful patients with least risk who would have otherwise needed physical visits by doctors and nurses. This way with the help of technology, warning scores indicate the patients who are at high risk and accordingly the critical patients get priority in treatment (GE Healthcare, 2020).

National Health Service in UK also resorted to Microsoft's HoloLens with 2 mixed reality headset having 'remote assistance'. This way only one medical staff is exposed to risk in room of the Covid patients while connecting to remaining team via headset. All the details are shared to different experts of the team without any physical visit. St. Luke's University Health Network (SLUHN) with the help of Microsoft 365 is transforming to the digital network assistance by

multiple experts. Using Microsoft teams, apps, dashboard the right clinical prescription is provided to the right patients (Microsoft, 2019). The technologies are playing crucial role in finding out the curative therapies and the preventive vaccines. Adaptive Biotechnologies Corp., partnered with Microsoft, using the AI technology to visualize how immune system respond to covid-19 leading to the ImmuneRACE Study (Immune Response Action to COVID-19 Events) (Uohara et al., 2020). Microsoft Binge launched a map called covid-19 tracker, to showcase the right information on active, recovered cases along with the statistics of people successfully vaccinated (Covid-19 Tracker, 2020).

Conclusively it can be said that humans embraced the technologies, by collaborating with technological corporation to face the global challenge and this collaboration is reinforcing the relation between humans and technology and smoothening way towards the next Industrial Revolution which is Industry 5.0.

## **2.6 Pandemic, Technology and Ray of Hope**

The welfare activities are going online. Various charitable and relief funds platforms are designed to help the needy. Surprisingly, benevolent people are transferring funds online to aid refugees, while sitting at home. The Crowd funding websites are also of great help. Live streaming of Yoga classes and teletherapy are also results of coding based websites. GoFundMe has set up a page to help the covid affected people. 'Invisible hands' is a group of volunteers committed to fight covid by delivering groceries and essential items to the distressed ones (Invisible hands deliver, 2021). Mental health practitioners have been complaining of increasing stress and anxiety level. Resultantly various apps have come up offering meditation techniques, relaxing sounds. Netflix has also added a new feature called Netflix party allowing people to watch movies with friend, family and relatives. According to an editorial in journal science of Robotics, Robots are getting more pronounced role in the pandemic time for preventing, monitoring and treating the virus. TikTok, a social forum has also collaborated with WHO (World Health Organization) to support the world struggling to defeat the COVID-19. It updates the users with the accurate information, reliable information, timely precautionary guidelines and proper health tips so that any misinformation is curtailed. Additionally there is a live streaming from WHO where users can enquire experts and clarify the doubts regarding ways to abstain and lessen the ill effects caused by the coronavirus. Apple in collaboration with CDC, White House and FEMA has launched screening website to give medical advice.

2020 was the year when the countries were heading towards sustainable development goals but the progress was suddenly intervened by a malicious virus which engulfed around 190 countries in no time. The crises did raise possibilities of working out innovative solutions using the technologies. The earlier pandemic which occurred in 1918 brought remarkable revolution in telecommunication likewise the current pandemic is also lighting the spark of innovative tech based solutions to confront the challenging time. The scenario isn't good but sitting idle, and being victim is no solution. Virus would have definitely locked people inside but technology (an innovative outcome of human thought) is roaming all around and helping every possible way to get out from the terrific time.

## **2.7 India, Technology and Pandemic**

Government's guidance, health related services, the required medical assistance including supply of equipments, have shifted to online platforms and all dealings have gone digital. 'Observer' a research foundation collaborated with the Niti Aayog and organized a digital discussion with emphases on the deployment of the technology based solutions and governance innovations to help vulnerable people in the Pandemic time, while also helping to meet development and growth aspirations in the future. Amitabh Kant, Chief Executive officer of the NITI Aayog, appropriately expressed, "A pandemic like COVID-19 with its global reach, must be tackled by three interconnected level of frontline healthcare workers, infrastructure and medical facilities, and technology."

India's 'Swasth', is an example of a private sector-led government-enabled app. It is a collective effort involving private hospitals, diagnostic start-ups and e-commerce firms. With the guidance of over 200 certified and trained medical team, Swasth aid Indian citizens with digital health care products and services. Innovative tech-applications are significantly helping in the prognosis, diagnosis and treatment of afflicted population. E VBAB is another project with digital ideas connecting innovation and development by providing telemedicine facilities linking Indian schools, institutions and hospitals with those in Africa. (Jiang & Ryan, 2020).

India's contact tracing and syndrome mapping app, 'Aarogya Setu', is an example of successful public-private digital partnership led by the government. There are 135 million users and teams of medical specialists working sincerely to help public. The app is helping in relieving an overburdened health care system, by directing self diagnosis and prescribing isolation to the citizens on the basis of a short survey (Kant, 2020). Science Technology and Innovation (STI) approach is a globally acceptable approach which is helping to face COVID-19 (Paunov & Planes-Satorra, 2020).

### 3. CONCLUSION

Volunteers, Students technicians and health workers are smartly employing technology in designing appropriate PPE kits and Masks. Somewhere a data journalist is using visual designs to present the crucial COVID related information. Regional and local governments are also resorting to digitalization based technologies to address to the challenges posed by the devastating virus. The technology is skillfully used by local national and international ministry as means to provide the fundamental health guidelines, ensuring the flow of essential services and fulfilling the communication gaps. It is transmitting health related guidelines; diagnosing people with the coronavirus infection, treating the patients and what more. The smart usage of the technologies is of great help in monitoring and anticipating the spread of the disease. Those people, who are affected with the fear and negativity due to the scary virus, are engaged in social media, online gaming, yoga apps and meditation learning apps, e-trainings and many more. They are exploring new fields of knowledge on internet. Again, the credit goes to the technology. The technology has been shouldering crucial responsibility along with health workers in ensuring healthy globe, in terms of physical health as well as mental health. Further the increasing bond between humans and technology is taking the world close to the new technological revolution which is the 5<sup>th</sup> Industrial Revolution or Industry 5.0. The pandemic has opened various digital pathways to keep up the pace of life. The gift of technology is accompanied with the numerous challenges associated. The challenges involved in the digital shift are- protection of the human rights, safeguarding equality, overcoming the digital divide, dealing with the rising security concerns and coping with the privacy issues. Adopting digitalization based technologies while addressing the aforesaid concerns amidst the pandemic could restore the world to normalcy along with an indefinite gift of technologies (Vargo et al., 2020).

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