

Robotic Technologies and AI Systems for Healthcare During the COVID-19 Pandemic: A Report

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Abstract

Robotics is an multidimensional field that meshed with computer science and engineering, The goal of robotics is to help and assist humans. Today, robotics is used in many disciplines, like technological advances, researching, designing, and building. Robots serve various experimental works, may be in commercial or domestic, or in military. As the coronavirus emergency exploded into a full-blown pandemic in early 2020, wash out many businesses, robot manufacturers found the needful in this situation. Robots does not need masks or sanitiser, to get infected. In many countries robots set out to sow its seed of defence against transmission from one infected person to another. It plays a key role while checking temperature which were equipped with thermal cameras at their head top. Also, they are accoutred with cameras and microphones, can also initiate patient oxygen levels. In this paper we dealt Robotics against Covid 19 in different countries.

Keywords: Covid 19, Pandemic, Robotics, Technology, Various Countries.

Objective: The main significance of Robotics technologies would address the following themes,

- To check the raise in temperature in a remarkable place.
- To assists patients by fulfil their needful.
- To help doctors by replacing their presence to avoid contact to the patients in hospitals.
- To sanitise the viral spot.
- To transport foods and medication for infected patients.

Introduction

UK, India, Brazil, France, Turkey, Russia, UK, Italy, Spain, etc., were the leading covid 19 affected counties. Robots have been rooted in manufacturing sector for past thirty years, employed for tasks such as stacking, casting, painting, sorting, welding, component soldering and so on. The new coronavirus has affected nearly all continents; at the time of writing, South Korea, Iran, Italy, and other European countries have experienced sharp increases in diagnosed cases. 220 Countries and Territories all throughout the planet have announced an

aggregate of 154,005,858 affirmed instances of the COVID-19 that began from Wuhan, China, and a loss of life of 3,222,718 deaths.

Robots can be sent for disinfection, passing on remedies and food, assessing essential signs, and aiding line controls. During the 2015 Ebola flare-up, workshops coordinated by the White House Office of Science and Technology Policy and the National Science Foundation recognized three expansive regions where advanced mechanics can have an effect. Robots have frequently been utilized because of fiascos and emergencies, for example, the Fukushima atomic plant emergency in 2011[1]. Diagnosis and prognosis, prediction of risk, early warnings and alerts, uses of robotics and drone technology are analyzed [2]. Robots are presented in the COVID-19 pandemic to help specialists for the better treatment of supply to the contaminated patient [3]. The contribution of robots, relating to human interaction for future industrial robotics [4]. Robotics technology is a first step in making healthcare delivery safer and efficient for patients and healthcare workers. Autonomous Intelligent Systems for Healthcare During the COVID-19 Pandemic is being analysed by [5] Mahdi Tavakoli et al.

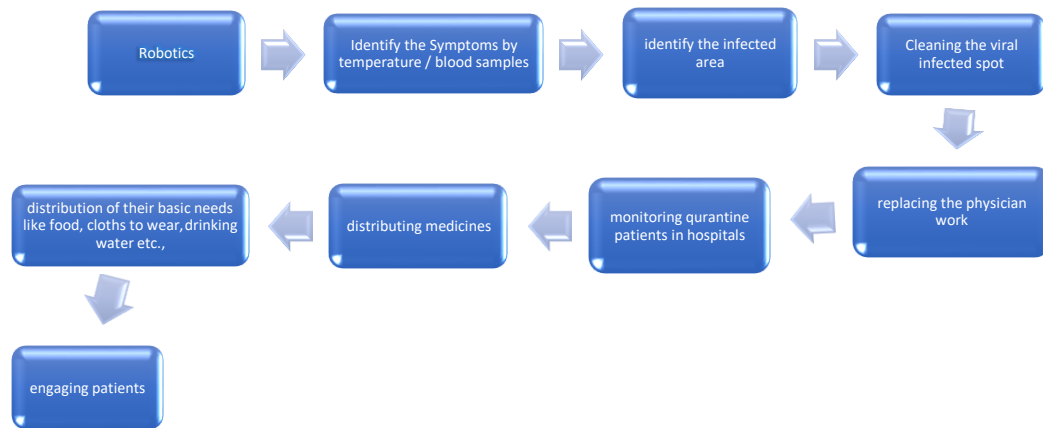
Robots are being utilized to do neurologic and muscular medical procedures viably. In far off areas, this innovation is utilized to inspect and treat patients. Specialists would now be able to perform tasks with insignificantly intrusive methodology. This trend setting innovation does exceptionally complex medical procedure [6]-[9]. Usage of Robots, AI and Service Automation while in Travel, and Hospitals and Companies [10] & [11]. There are explicit kinds of robots that are helpful to oversee conveying fundamental clinical things, and investigation of COVID-19 patient treatment and its future innovations in China, were narrated by [12]. This paper would discuss different types of Robots and their capabilities in the medical field in various countries during the COVID-19 pandemic.

DIMINISHING HUMAN-TO-HUMAN CONTACT:

Metropolitan mechanical technology is to a limited extent a technique for subbing people on the grounds of productivity, unwavering quality, and cost investment funds just as expanded capacity in co-ordinations, medical care, and social administrations. Robots can perform and supplant key 'human' capacities in metropolitan pandemic control, either self-ruling or controlled a good way off, to limit the danger of sickness transmission.

CHECKING, MANAGING AND CONTROLLING DEVELOPMENT:

A focal errand of territorialized COVID-19 administration has been to control development and implement lockdowns through human policing and cell phone-based following. Mechanical technology and AI — including facial acknowledgment programming—offer new types of regional control in the sky, on the ground, and at designated spots. Before COVID-19, mechanical applications in the public domain were restricted by worries for public wellbeing, yet with restricted conversation of reconnaissance and social control. Those worries remain yet there is maybe now a more tolerant way to deal with metropolitan automated investigations, reflecting new estimations of human danger and broadening the extension and size of trial applications. The Robots play a key role in pandemic situation like,



- Capability to move around its current circumstance according to the necessary assignment
- Cover required distance either by strolling with legs or with wheels
- Able to control themselves utilizing power through various sources
- They can be implanted with savvy insight fairly like individuals and can be modified according to the necessities
- Can work in a hazardous climate and do modern assignments dependably
- Can play out a dull errand exactly

Robotics in China:

China was perceived for its extraordinary limit in mechanical technology, independent frameworks, and AI, with specific qualities in facial acknowledgment innovations (Ding, 2018). The Chinese model of AI improvement is supported by the execution of 'safe city drives', an aftereffect of the developing utilization of facial acknowledgment innovations to screen and oversee residents in the metropolitan public domain through CCTV and progressed AI. Expanding on these frameworks, the state, urban areas, and corporate accomplices promptly repurposed existing AI and mechanical applications to satisfy the need of COVID-19 control. China's reaction is 'maybe the most driven, deft and forceful dis straightforwardness regulation exertion ever', drawing on a scope of innovative, computerized, and social control procedures. Our advantage is in four arrangements of automated and AI-empowered pandemic administration applications.

Supplanting people in help conveyance Private area firms have been attempted trying of ground and airborne mechanical technology principally for products conveyance, yet this is confined in many nations remembering China by viable difficulties for arranging complex metropolitan conditions, administrative cut off points, and significant expenses. Coronavirus has given China's driving internet business and conveyance firms a command for self-sufficient conveyances to clinics and private mixtures on open streets.

Coronavirus has likewise started extension of robot use for clinical vehicle and business cargo conveyances, particularly in isolated regions, where already drone utilize had been precluded. However, disregarding the upgraded job of advanced mechanics in pandemic coordination's, it effects have been negligible regarding the quantity of packages conveyed Table 1. For example, the most discussed JD.com robot serving a Wuhan emergency clinic ran a pre-planned straight course of just 600 meters, conveying up to 15 bundles each day. These 'last-mile' self-governing conveyances during the COVID-19 pandemic are to a great extent limited time show projects as the foundation is not yet set up to take into account more broad self-ruling tasks and the forthright expenses stay restrictive. The following is the chart that estimates the growth of Robotics from 2017-2021 in unit wise. Here units denote the growth rate annually Fig.1.

Year \ Types	2017 (in Units)	2018 (in Units)	2019 (in Units)	2020 (in Units)	2021 (in Units)
Logistics	69,000	111,000	171,000	267,000	423,000
Medical Robots	66,000	84,000	111,000	150,000	201,000
Field Robots	30,000	30,000	33,000	36,000	39,000
Defence Robots	27,000	30,000	36,000	39,000	51,000
Domestic/Personal use Robots [Vacuum, floor cleaning]	60,000	75,000	99,000	138,000	195,000
Entertainment Robots	33,000	33,000	39,000	42,000	45,000

Source: World Robotics 2019

Table 1: World Robotics 2019

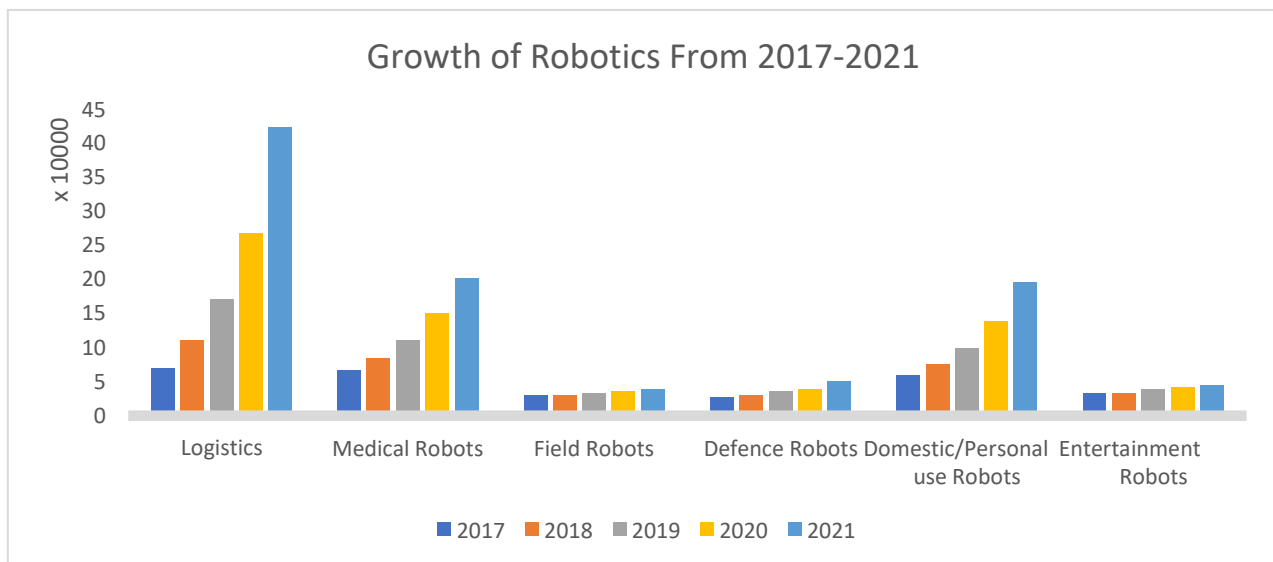


Figure 1: Growth of Robotics from 2017-2021

Robotics in India:

India, the country stamped with second emerging number of Covid-19 cases, a little pack of centres has started to use robotic technology to interface patients with their dear ones, and help clinical benefits workers on the cutting edges of the wide spread.

In Bangalore, Robotics inventor has planned for ample robots to complete errands going from cleaning surfaces to responding to patient inquiries and empowering conferences with specialists. Their most mainstream model named Mitra, which implies companion in national language and expenses about 10,000 dollars. Utilizing facial-acknowledgment innovation, the robot can review the names and features of patients it has interacted with. Mitra can move around freely, assisting patients with interfacing and specialists through its video camera joined in her chest. Mitra entertains patients and help physician by remembering drugs.

In a hospital belonging to city of Noida, northern India, has sent two Mitra robots — one to evaluate patients for Covid side and the other in the ICU. Patients feel happy and think positive whenever the robot visits them. This Robots utilizes "top tier security" for video takes care of between specialists, patients and their families. For inside and out telemedicine counsels, a stall is worked around the robot to give patients security Fig.2.

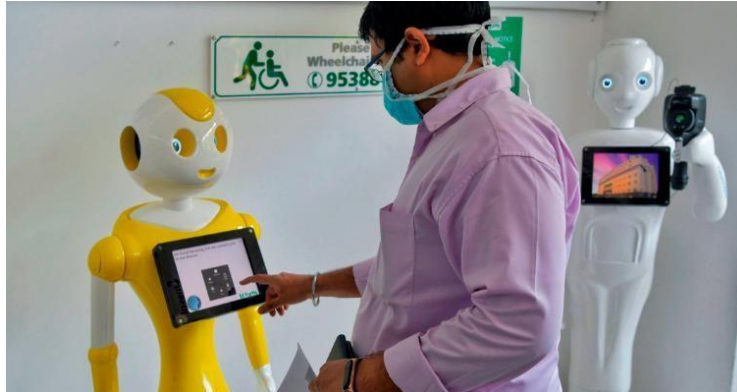


Figure 2:Robot scanning human body

The mechanical trolley will convey food and prescriptions to patients at Poddar Hospital. The Brihanmumbai Municipal Corporation (BMC) dispatched a mechanical streetcar to lessen contact between medical care laborers and COVID-19 patients.

The automated streetcar will convey food and meds to patients at Poddar Hospital. From avoid contact among patients and medical services staff, the streetcar will likewise help further lessen the number of PPEs utilized during exercises, for example, food dissemination in Covid wards.

United States of America:

TUG Athens, RP Vita iRobot, Roomba i7 iRobot, Moxi-diligent Robots were some of the robots used by Americans during these pandemic situations for cleaning, alerting officials, clinical works like picking up accurate vial medicine level, PPE kit, cleaning the infected places, helping peoples by food carrying drones, Manufacturing Face masks, Precaution items, medicines, helping in vaccine manufacturing Fig.3.



Figure 3:RP Vita iRobot in hospitals

European Countries:

A handsome of robots guard patient to-patient transmission at a clinical focus in Kigali, Rwanda. Patients entering into the office get their temperature checked by the machines, which are furnished with warm cameras on their heads. Created by UB Tech Robotics, in China, the robots likewise utilize their apt appearance—they look like in Star Wars movie character—to stand out enough to be noticed and remind them to sanitise their hands and wear mask. To accelerate COVID-19 testing, a group of Danish designers at the University of Southern Denmark and at Lifeline Robotics is building up a completely robotized swab robot. It utilizes PC vision and AI to recognize the spot inside the individual's respiratory tract, at that point an automated arm with a long swab comes to in to gather the example—all finished with a quickness and consistency that people can't coordinate.



Figure 4: Robotized Swab Robot

Tommy is one of six new robots helping specialists and attendants care for Covid patients at the Circolo Hospital in Varese, a city in the northern Lombardy district that is the focal point of the flare-up in Italy. It is robots with huge flickering eyes are wheeled into rooms and left by a patient beside so specialists can take care of other people who are in more genuine conditions. it has a screen, a tablet. Furthermore, the tablet,



obviously, has a receiver, an approach to impart both outwardly and through the sound between the patients and medical caretakers and specialists distantly Fig 5.

Figure 5: Robot handling human beings

It will measure BP and oxygen saturation for the affected patients in the Intensive care unit. These two basic health conditions were identified by using Tommy the Robot without any transmission.

United States Russia:

Researchers divulge robot cleaner to battle Covid-19, A robot intended to sanitize constructing in order to keep Covid under control was disclosed at a Russian gallery. Ultrabot utilizes high-dose bright light, which authorities guarantee, is successful in annihilating the infection.

In Moscow, there was a demand for delivery services for the common peoples was constantly growing and hence it had increasing the trend. To avoid contacts had started testing autonomous delivery robots. It has also started using them professionally in Innopolis, a tech district in Tatarstan region.

United Kingdom:

Robots have been squeezed administration in some spaces of England. This technology utilise the town of Milton Keynes for almost two years to convey staple goods, however more have been sent to convey supplies to wellbeing experts who have less an ideal opportunity to shop.

The UK-wide loss of life crossed the inauspicious 20,000 passings, as practices and plans for more prominent utilization of robots and robots to convey fundamental supplies were optimized, especially to support wellbeing experts managing the pandemic. Drone robots have been used in few areas of England. Robots have been utilized in the city of Milton Keynes for almost two years to convey goods, yet more have been sent to convey supplies to wellbeing experts who have less an ideal opportunity to shop. Transport secretary declared to convey fundamental clinical supplies by drone from the terrain to the Isle of Wight on the south shore of England. It includes a robot with a payload of up to 100 kg and distance ability of in excess of 1000 kilometers. In Milton Keynes, Star ship, the organization produces conveyance robots, has seen a flood sought after for robots conveying things inside a 6 km sweep. Bundles, staple goods and food are directly conveyed from stores, at the time that the client demands by means of a portable application. When requested the robots' whole excursion and area is checked on a cell phone. This work (drone preliminary) can possibly altogether improve administrations for our neighbourhood local area by decreasing hanging tight occasions for test results and accelerating the exchange of significant, conceivably life-saving drug. Different kinds of automated airplane are to be tested to perceive the development of clinical supplies between the clinics in Hampshire.

Robotics in Brazil:

The Brazilian government will utilize robots fuelled with computerized reasoning (AI) to aid the planning and following of COVID-19 diseases. As per the priest, intuitive voice reaction (IVR) robots will trigger programmed calls and do such a virtual conference with as numerous as 125mn Brazilians, Utilizing AI, the robot will get some information about contacts with those tainted, driving on open vehicle and everyday consideration to see how the episode is creating. Later that has helped every Brazilians in the hilarious period. Orders for a Brazilian pig-taking care of robot, which plays traditional music while apportioning suppers, taken off this year as ranchers endeavoured to reduce expenses in the middle of the COVID-19 pandemic. The machine utilizes straight feeders permitting the creatures, which are partitioned in pens, to get the specific measure of feed required for every feast. As it works, it plays traditional music, which the organization claims mitigate creature stress. The following were increase in professional robots on various mode due to Covid-19. It has been highlighted the drastic increase from 2020 and above Fig.6.

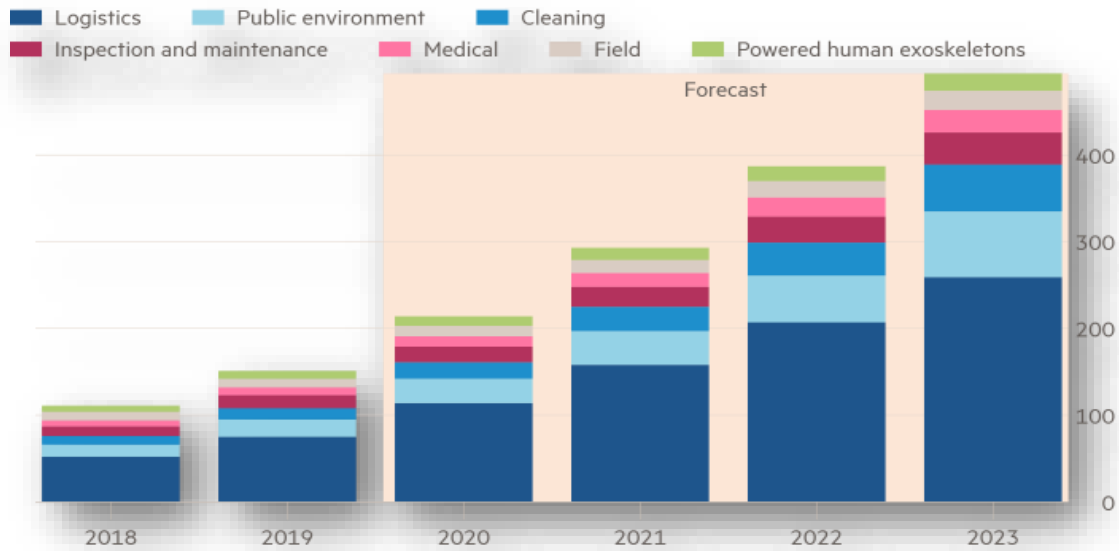


Figure 6: Mode of Robots that increase in Professional service

Conclusion

The COVID-19 pandemic has caused outrageous strains on medical services frameworks and has closed down practically the whole worldwide economy. As the logical and exploration local area is battling to track down a quick arrangement and a fix, Smart and Connected Health has become the centre innovation for quick forecast, demonstrating, assessment, and assessment of tainted patients. Before COVID-19, these advances were growing quickly yet the pandemic has sped up certifiable experimentation, and these exhibitions have broadened the opportunities for their more extensive application. We investigated the part of advanced mechanics and robot innovation in overseeing general wellbeing and pandemics. There are without a doubt monetary, social, and medical advantages of metropolitan advanced mechanics, yet these gainful uses ought not abrogate the requirement for significant public examination of their application in various metropolitan settings. Basic metropolitan examination can help guarantee that the sped up innovative reaction to pandemic control doesn't support or broaden the proprietorial rationale of the smart city.

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