Computer Networking and Technology Improvement in the Age of COVID-19

Prakash Kanade
Hobby Researcher in Robotics, Artificial Intelligence, IOT, USA
Email: Prakashsrs@gmail.com
Monis Akhtar
Cambridge Institute of Technology, Bangalore
Email: monisakhtar0503@gmail.com
Fortune David
Faculty, Facilitator, LeenaBOT Robotics, Nigeria
Email: fortunekbz2009@gmail.com

---ABSTRACT---

Corona virus has plagued the world and has brought the life around the world to a standstill. The virus is highly transmissible, and with no vaccine or cure, the solution to it would be to follow strict quarantine. Governments from around the world have focused on the containment of the virus with varying degrees of success. Certain countries maintaining a low mortality rate are worth praise, and a detailed study of these efforts would benefit other countries to fight the virus. The use of technology and its integration into crucial strategies in fighting the deadly disease have proven beneficial on many fronts. Technology is being used to tackle unavoidable circumstances that may have arisen but put people at risk. Technologies that minimize human contact and can be remotely controlled reduce the risk of virus transmission from one another. The study aims to identify some remote technologies that have proved beneficial in the fight against the deadly Corona virus.

I.   INTRODUCTION

On December 31, 2019, the China Health Authority alerted the World Health Organization (WHO) to several cases of pneumonia of unknown aetiology in Wuhan City in Hubei Province in central China. Cases have been registered since December 8 2019, and many patients have worked or lived in the Huanan Seafood Wholesale Market.[1].

"Total Cases" = total cumulative count (64,743,136). This figure includes deaths and recovered or discharged patients (cases with an outcome).
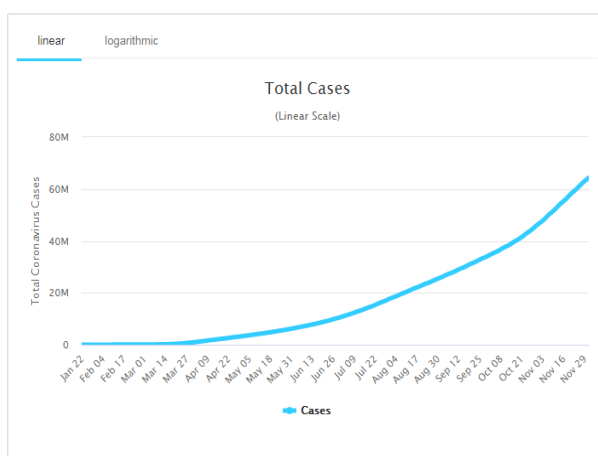

Fig no. 1 Total COVID cases by worldmeter [1]

As of Dec 1st 2020, there have been a total of 64 million cases with a death toll of 1.5 million people worldwide. The proportion of death or the fatality rate is 2.54% in the whole world.

The recovery rate in the early days of the pandemic was 58.2%, and the death rate was a record high of 41.8%. The numbers are very different, even though the total numbers of cases daily are increasing. As of December 2020, the recovery rate has gone up to 97.46%, and the death rate has come down to 2.54%
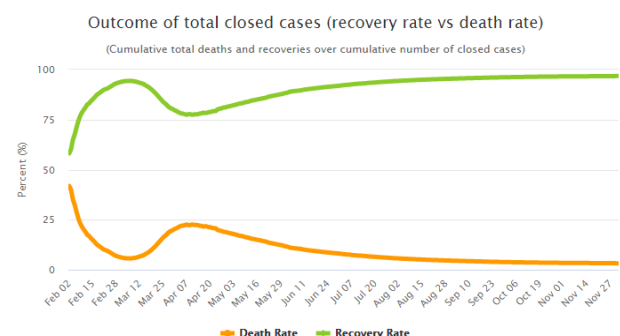
Fig no. 2 COVID recovery vs death cases by worldmeter [2]

Many countries are incorporating remote technologies into the COVID-19 response, and remote technologies are used for tracing, surveillance, care, quarantine and many more. As a result, severe infection is reducing, and in turn, the recovery rate is improving, and the death rate is decreasing day and day.

II. CASE STUDY
2.1 iMumz – Week by week Pregnancy Program

Fig no. 3 iMumz Pregnanacy app [2]

Owing to Corona virus and subsequent quarantine, people are confined to their homes to avoid the spread of the disease. Everyday life has almost come to a standstill, and this may cause distress and anxiety to several people. Pregnant women feel more depressed when they are unable to go to their daily check-ups and reach out to their doctors for timely advice. 55.7 % of the women suffer from pregnancy-related anxiety during early-to-mid pregnancy as determined by using the PRT scale [2]. Extensive literature review revealed that iron deficiency is a global nutritional problem affecting up to 52% of pregnant women [3]. iMumz, a mobile pregnancy app has come to their aid during this lockdown period. It is hosting live sessions and addressing queries with assistance from over 100 experts including obstetricians, nutritionists, yoga and mental health experts. iMumz offers medical knowledge through AMA sessions, meditation and mental exercises to help pregnant women be safe and stress-free during the lockdown [4]. iMumz has 50k+ downloads on Google Play Store and 50k+ download on App Store.

iMumz is a brainchild of Pruoo Health Tech Private Limited by a team of a senior gynaecologist, a meditation teacher and two young IITians. According to Mayur Dhurpate, co-founder iMumz, while debating why the Americans/Chinese kept winning, my friends used to close arguments with, it's in their DNA. But along with DNA as a blueprint, it's the womb environment which plays a crucial role in shaping the child's health.

The idea was born that we have to provide the mother with the best womb environment to have intelligent, happy and healthy babies. Women may participate in activities on the app that stimulate their imagination and make them aware of the benefits of mindfulness. It promotes activities like mindfulness, music therapy, conscious breathing, creativity, brain boosters, physical activity, foetal learning and more. These practices help them bond with their babies and reduce their stress and anxiety. These exercises help them to connect to their babies and reduce their stress and worry. At present, iMumz has more than 15,000 users with 1,200 to-be-mothers entering the site every week and 2,500 active users every day. [2]The app launched a premium paid version on April 1 to continue offering reliable information free of charge to pregnant women during the locking time. Remote consulting sessions are also expected in the future.

2.2 The NSCI Dedicated Covid Hospital

In March 2020 as the crisis deepened in Covid, Dr Muffazal Lakdawala, one of India's leading private bariatric surgeons, volunteered with the Municipal Corporation of Mumbai (BMC) to help prevent the spread of the pandemic in his beloved city of Mumbai. This facility is now one of the most extensive Covid-positive facilities in Mumbai, with Dr Lakdawala leading a team of 40 health professionals providing quality care to more than 2,000 patients. The NSCI Dedicated Covid Hospital is a 500-bed facility that has been set up and put into operation for just five days to provide quality care to positive Covid Mumbai patients on a scale. The facility was built on a 'contactless' clinical model, probably one of the first in India. All activities, such as patient examinations, doctor-patient communication and swab collection, take place in a 'contactless' manner through a glass cubicle, making it safe for physicians and reducing the chances of nosocomial spread. NSCI was the first Covid centre to use artificial intelligence X-rays to help detect the presence of Corona virus precisely even without a swab test result. This enabled them to monitor the disease's progress, predict who was more likely to worsen, and act with caution by putting oxygen on such patients.

A new addition to the centre includes 'portable container ICUs' built by Dr Lakdawala to help solve the problem of lack of ICU beds and doctors. Designed within shipping containers, these modular ICUs can be transported in the back of a truck to any part of India where they can be run remotely by an experienced nurse who tracks patients. This unique concept will open a new frontier in the war against Covid-19 and will help to make quality care and treatment available to the most disadvantaged parts of society. The facility, in its two months of operation, has treated 18000 patients, which can be considered a massive achievement at an early stage of the pandemic. By July 10,

the facility had shown the country's highest recovery rates at 82.11 per cent where the national average stood at only 51 per cent [5]. In an exclusive interview with timesnownews.com, Dr Muffazal Lakdawala said, "We used technology. We used 'contactless' clinics because patients and doctors were not comfortable talking to each other in hazmat suits. The doctors and nurses were themselves scared of the infection if they stayed with patients (for any amount of time). With the contactless clinics, we took away the fear of the doctors and have also managed a 0% infectivity rate. So far, we haven't had a single healthcare worker turning positive.

The other thing is that doctors could now easily sit in a comfortable environment without their hazmat suits and discuss the patients' problem. This enabled them to give their time freely and spend more time with patients. Medicines were distributed on time, and we used camera systems to zoom into patients. So, if a patient was not well, we could rapidly zoom into his/her visuals and ask our limited number of doctors to go in quickly and help the patient. We monitored those on O2 right from their bed with devices which helped remote monitoring" [6]. The NSCI facility was built on these principles, and its success stems from the use of remote technology with ingenuity, which helped to save many lives despite limited resources. The methods introduced at NSCI now serve as an excellent blueprint for the development of other centers around the country and the world.

2.3 Mitra

In India, the country with the world's second-highest number of Covid-19 cases, a handful of hospitals has started to use robots to connect patients with their loved ones and assist healthcare workers on the frontlines of the pandemic. Bangalore-based Invento Robotics has designed three robots to carry out tasks ranging from disinfecting surfaces to answering patient questions and enabling video consultations with doctors [7]. Mitra is a Hindi word meaning a friend was deployed by hospitals to help connect Coronavirus infected patients to friends and family.
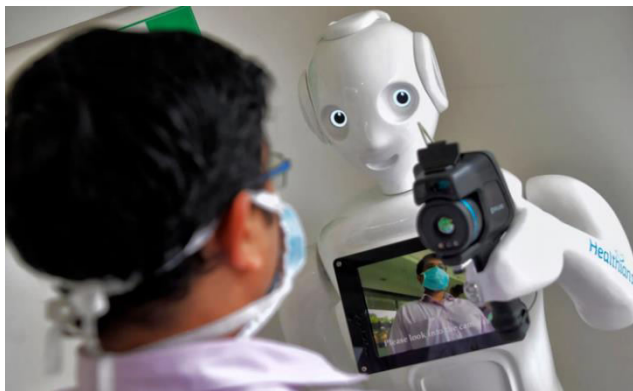

Fig no. 4 Mitra robot in action [3]

A semi-autonomous robot designed to be at the frontlines of this war against the virus. Mitra screens patients effectively without exposing health professionals to the virus [8]. Its piercing eyes are equipped with facial recognition technology to help it recall people it has previously interacted.

A tablet attached to Mitra's chest allows patients to see loved ones, as well as medical staff unable to access the wards. The robot, developed by Bangalore-based start-up Invento Robotics, cost the hospitals 1 million rupees ($13,600) [7]. "Mitra can be the nurse's or doctor's assistant, take readings and vitals, remind them of medications," says Balaji Viswanathan, CEO of Invento Robotics [7]. Mitra is mainly used by patients who are not able to communicate using their phones [8].

2.4 C-Astra

Another innovation at Invento Robotics is C-Astra, C-Astra series of robots, meant for the much-sought-after automated screening, diagnosis and disinfection services in COVID isolation wards, in a couple of large hospitals in Bangalore today [9]. C-Astra's UV disinfection technologies can play a role in a multiple barrier approach to reducing the transmission of the virus, causing COVID-19. UV disinfection technologies can play a role in a multiple barrier approach to reducing the transmission of the virus, causing COVID-19.

Fig no. 5 C-Astra robotfrom Invento in action [4]

UV disinfection technologies can play a role in a multiple barrier approach to reducing the transmission of the virus causing COVID-19. 6 UV Lamps mounted on the Astra

robot would emit intense UV light at 253.7 nm wavelength, as per current medical device standards. [10] The device is available for rent and can be taken by hospitals or shop owners.

III. COMPUTER NETWORK SYSTEM FOR COVID TREATMENT

In many hospitals at some scale they have implemented computer networked remote treatment system.

In this system, no need for doctor or nurse to go near patients to take reading or do treatment. They can do all these at a safe distance using Bluetooth enabled handheld devices like phone or tablets.

Once device in proximity of the ward it will auto connects to the fully networked computer system using Bluetooth. Once connected using app installed in handheld devices healthcare worker can operate a robot hand installed next to patients bed to take readings or provide medicine or food.

Networked computer installed next to patients bed can be used to make zoom call with family members to talk with loved once during this difficult time, without this its impossible for family members to reach to their loved ones.
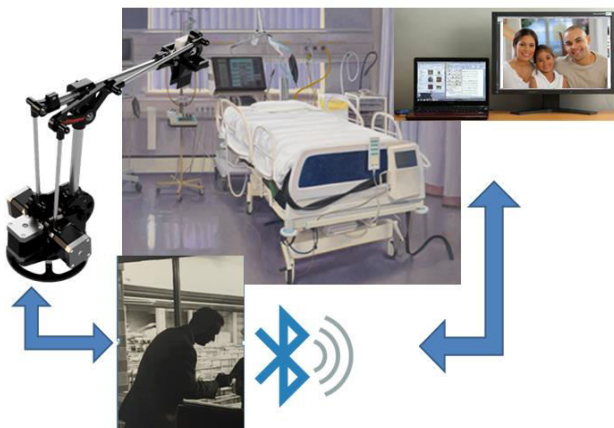

Fig no. 6 Fully network connected system for COVID patients treatment [13][14]

IV. CONCLUSION

The incorporation of emerging remote technologies into the pandemic strategy and response may be one of several characteristics that have flattened the incidence curves of COVID-19—use of such remote technologies area proof that these technologies are a boon. iMumz, NSCI and Mitra are one of the few examples of such technologies that have been used in response to corona virus outbreak, there has been the use of many other technologies that did play a good role in the fight against Corona virus. Every day new technologies are being researched and launched to fight the spread of the disease. Comprehensive responses from countries that have been active in containment and mitigation will provide insight to other countries that are still facing a surge in cases.

V. REFERENCES

[1] Lu, Hongzhou, Charles W. Stratton, and Yi-Wei Tang, "Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle," *Journal of medical virology,* vol. 92, no. 4, pp. 401-402, 2020.

[2] Nath, Anita, Shubhashree Venkatesh, Sheeba Balan, Chandra S. Metgud, Murali Krishna, and Gudlavalleti Venkata Satyanarayana Murthy. "The prevalence and determinants of pregnancy-related anxiety amongst pregnant women at less than 24 weeks of pregnancy in Bangalore, Southern India," *International journal of women's health,* no. 11, pp. 241-248, 2019.

[3] Abu-Ouf, Noran M., and Mohammed M. Jan, "The impact of maternal iron deficiency and iron deficiency anemia on child's health," *Saudi Medical Journal,* vol. 2, no. 36, pp. 146-149, 2015.

[4] N. Gowthaman, "YourStory," August 30 2020. [Online]. Available: https://yourstory.com/herstory/2020/03/mobile-app-pregnant-women-health-coronavirus-lockdown.

[5] D. H. Institute, "DR MUFFAZAL LAKDAWALA FIGHT AGAINST COVID," 2020. [Online]. Available: https://www.thedigestive.in/dr-muffis-fight-against-covid.

[6] A. Reyar, Interviewee, *Stadium as isolation centre, contactless clinics & remote monitoring: How NSCI Dome handled COVID-19 crisis.* [Interview]. June 19 2020.

[7] I. Gerretsen, "Robots are joining the fight against coronavirus in India," CNN Business, London, 2020.

[8] A. P. Adnan Abidi, "Mitra the robot helps COVID patients in India speak to loved ones," Reuters, New Delhi, 2020.

[9] "Mitra Robot," Invento Robotics, [Online]. Available: https://mitrarobot.com/covid/.

[10] FM, "Invento Robotics to pilot automation of COVID isolation wards with Astra series robots today," Future Medicine, 2020.

[11] Kalpana Sunder, "RoboDoc: how India's robots are taking on Covid patient care," The Guardian, 2020.

[12] Team Invento: Kaundinya Panyam, Balaji Viswanathan, Bharath Kumar, "C-Astra Robot - Invento Robotics," hackster.io, 2020.

[13] Sunay Kanade, Prakash Kanade, "Medical Assistant Robot ARM for COVID-19 Patients Treatment," *International Research Journal of Engineering and Technology,* vol. 7, no. 10, 2020.

[14] Sunay Kanade, Prakash Kanade, "Raspberry Pi Project – Voice Controlled Robotic Assistant for Senior Citizens," *International Research Journal of Engineering and Technology,* vol. 7, no. 10, 2020.