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Significant Role of Telecommunication and MHealth Technology in the Battle Against Corona Virus (COVID'19)

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Abstract: Telecommunication network has been used widely in our daily lives in numerous ways with vast number successful stories. Throughout the world the number of people benefited by the telecommunication and mobile technology enabled with internet is tremendously increasing. Telecommunication technology based applications are providing versatile services in various domains such as health care, education and disaster management. Now, telecommunication technology has contributing vast services to humankind in facing and dealing with COVID'19 pandemic. Hence, the objective of this paper is to review in detail about the significant role of telecommunication technology and MHealth in the fight against the deadly COVID'19 virus. Furthermore, this paper describes about the telecommunication technology and MHealth app for remote monitoring and diagnosis of infective patient, monitoring the quarantine people to prevent the spread of disease, monitoring the patient after discharge.

Keywords: Pandemic; COVID-19, Telecommunication; MHealth; Telemedicine; Tracking

I. INTRODUCTION

COVID'19 deadly highly infectious virus is known to spread very fast to all part of world. The very first cases were detected in Wuhan, China in Dec'2019 and now it has spread very fast to every country. It could affect any healthy person who comes in proximity to any COVID'19 positive cases. Since, there is no vaccine as far now, prevention is the only measure people should follow to overcome this health crisis problem. Hence, government of many countries have proposed many polices and measures to defend against the COVID'19 pandemic. Science and technology have contributed significantly for the implementation of these policies during this unprecedented and chaotic time. This paper focuses on the significant role of telecommunication technologies in the battle against the spread of corona virus. Moreover, this paper presents a survey of telecommunication and MHealth applications that contributes to help and support the health care system to treat and reduce the outbreak of the virus.

II. TELECOMMUNICATION TECHNOLOGY AGAINST COVID'19 : A REVIEW

In this paper, the role of telecommunication and MHealth technology in the fight against Corona Virus has been reviewed under the following groups such as Contact Monitoring and Tracing, Remote Physiological Monitoring, Telemedicine, Tele Imaging, e- Education and Training.

A. COVID'19 Contact Monitoring and Tracing

In the current situation, since many researchers thought the worldwide are involved in primary process of COVID'19 vaccination. The only possible preventative measures against the pandemic are contact tracing, isolation of positive cases and social distancing. In the current era, the versatile development in the field of telehealth technology has emerged as tool in the war against the Covid'19. Through Mobile technology many apps are developed and employed for the purpose of contact tracing and isolation of positive case patient. Thus, with the help of this contact tracing app the library of positive cases can be created and the immediate isolation of the patients can be carried out without causing further spread of the infection. Yasaka et al.[1] developed a peer to peer effective contact tracing Mobile app by applying the anonymized graph of interpersonal interactions to conduct a novel form of contact tracing. Most recently, the world famous and leading technologist from Google and Apple have joined hands to develop a Bluetooth based contact tracing smart phone app that work across both iOS and Android platform.

National Informatics Centre, Government of India developed a mobile application known as Aarogya Setu [2,3] with the primary objective to track the COVID'19 positive cases. This application is designed for Android and iOS Smart phones with the GPS and Bluetooth features to track the virus infected person. Maghdid et al.,[4] developed Artificial Intelligence (AI) enabled framework using smart phones with numerous sensors such as cameras, microphone, temperature sensor, inertial sensors, colour sensor to diagnose the COVID'19. Since the most common symptoms of COVID'19 are as follows fever, dry cough, head ache and shortness of breath. This framework

tries to determine the level of symptoms based on the smart phones embedded sensor measurements. Imran et al[5] smartphone application AI4COVID-19, an artificial intelligence based COVID-19 diagnosis from the cough sample. AI4COVID-19 app based on hybrid deep learning and classical machine learning algorithms to detect COVID-19 coughing by using 2-second cough recordings that were acquired by mobile phone. It demonstrated an ability to distinguish the COVID-19 cough from non-COVID-19-related cough with over 90% accuracy. Rao et al[6] proposed AI based framework for diagnosis of covid'19 using smart phone technology based online survey. Thus, by using the collected data positive cases are identified for quarantine purpose. Therefore the primary objective of this work is to control the spread of the covid'19 among the common people.

B. Remote Physiological Monitoring

Indian Heart Rhythm suggested Smart phone-based handheld ECG devices can potentially save healthcare resources in the current pandemic situation. The measures of restrained advocacy for potentially beneficial effects of HCQ and advice against self-medication can help prevent adverse events related to this drug. Furthermore, kardiamobile-6L[7] device by AliveCor is used for monitoring the QTc every 12 h. Mayo clinic[8] has published a guideline for navigating and circumventing the QTc prolonging for covid'19 patient. Ding et al.,[9] developed a wearable application for Mhealth with an objective to monitor the isolation ward and to record the daily activities COVID'19 positive patients. Khamis et al.[10] proposed QRS detection algorithm for recording and analyzing the telehealth ECG.

C. Tele-Medicine

Telemedicine [11] technology is recently employed system to diagnosis and treat diseases by ordering and delivering the medicine through the telecommunication. Whereas, in COVID'19 , this technology can help to quarantine, monitor the remote positive cases and to monitor the daily routines of recovered person.

D. Tele-Imaging

Medical Image technology such as MRI,CT of the lungs is considered as major important tool in the process of diagnosing the COVID'19 patient. Since, the social distancing is vital measure to prevent spread of virus, tele imaging [12] technology is very much useful for the health care people and radiologist to view, analyze and diagnosis the COVID'19 patients X-rays, CTs and MRIs while working in remote. The following are the various Tele-Imaging techniques they are: Tele-Ultrasound, Tele- X-Ray, Tele-CT, Tele-Bedside MRI.

E. Tele-UltraSound

Smartphone based app with an objective of imaging scanning for different part including the lungs for detecting COVID'19 positive cases.[14]

F. Tele X-ray

Mobile X-ray system is to capture the fast and high quality image of lungs and body parts. Normally, used in Mobile emergency unit, ICU and CCU.[15]

G. Tele-CT

3D portable CT for scanning the image of the lungs and other body parts are taken automatically and accurately.[16]

H. Tele-bedside MRI

3D portable smart phone technology based MRI for scanning 3D image of brain, neck and knee.

I. Tele-ICU

A tele-ICU will be consists of a centralized remote patient monitoring centre with many IC sites, enable the health care person to monitor the patients from remote, it is highly desirable to reduce the spread of infection. The major benefit of tele-ICU was lower mortality rate and reduce the people contact.[17]

J. Education and Training

Since social distancing and lockdown rules are imposed by almost all the country throughput the world to prevent the virus spread of deadly virus COVID'19. Thus in orders to support such a situation, all the educational institution are allowed to remain to be closed. Furthermore, worldwide academic events such as conference, seminars, workshop and all other activities have been organized through online mode with the support of telecommunication technology such Webex, GoogleMeet, Smart Mobile phone technology, Zoom etc. Thus, in today's pandemic situation telecommunication technology is supporting the student community to gain and update their knowledge and learning skill through numerous applications.[18]

III. CONCLUSION

The innovations in the telecommunication technology over the last two decades have supported the humankind in various aspects. In this paper, a review of telecommunication technology and M-health app in the fight against the COVID'19 health crisis is presented. These technology help in avoiding face to face contact of the healthy person with patient and thus maintain social distancing and prevent the virus spread. Telecommunication technology based application extended valuable support to the Health care system in numerous ways such as diagnosis, monitoring of the patients, quarantine and isolated person, clinical evaluation, medicine supply etc. thus, if telecommunication is properly used it can be helpful to the health care people with remote treatment and prevention.

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