

IOT based smart health monitoring system for covid-19

Asma Nikhat

Asst. Professor

Government College (Autonomous), Kalburagi

Asma25nikhat@gmail.com

Abstract-

The IoT revolution is reshaping modern healthcare systems by incorporating technological, economic, and social prospects. It is evolving healthcare systems from conventional to more personalized healthcare systems through which patients can be diagnosed, treated, and monitored more easily. The current global challenge of the pandemic caused by the novel severe respiratory syndrome corona virus 2 presents the greatest global public health crisis since the pandemic influenza outbreak of 1918. The current global challenge of the pandemic caused by the novel severe respiratory syndrome corona virus 2 presents the greatest global public health crisis since the pandemic influenza outbreak of 1918. Our goal in this study is to determine the role of IoT-based technologies in COVID-19 tracking and control and review the state-of-the-art architectures, platforms, applications, and industrial IoT-based solutions combating COVID-19 in three main phases, including early diagnosis, quarantine time, and after recovery. As the entire world continues fighting the same enemy, consumers and organizations are embracing new technologies and discovering their perks. IoT sensor technologies have played a major role. Sensors have helped people overcome the pandemic's worst phase. This outbreak may have changed perceptions of IoT forever. In times of physical distancing, IoT has allowed remote diagnosis as well as treatment of patients. During the ongoing COVID-19 crisis, IoT has played a pivotal part in properly monitoring patients who are virus-infected through devices and intertwined networks. The industry has inevitably selected to depend on this communication system to safeguard people against the spreading of the virus.

Introduction

WHO does not recommend self-medication with any medicines, including antibiotics, as a prevention or cure for COVID-19. WHO is coordinating efforts to develop treatments for COVID-19 and will continue to provide new information as it becomes available. IoT in healthcare in the last couple of years has assisted workers, especially with patient care, even before the outbreak. In the case of the elderly, IoT tech is capable of monitoring and assisting people with their day-to-day living. Fit bit, for instance, is capable of tracking blood pressure, exercise, and calorie intake while also offering calendar updates, especially on any upcoming health appointment. Those residing alone with conditions like diabetes or heart disease can depend on these wireless devices to keep track of their body and stay healthy. After China, Taiwan was the most predictable to have more number of cases of COVID-19. However, Taiwan quickly militarised and instituted specific methodologies for any possible corona virus case identification, suppression, and resource provision to guard the health of the community. Taiwan provided and integrated its national health insurance database with its immigration department and took catalogue to instigate the creation of big data for analytics; it generated real-time warnings during a clinical visit based on travel antiquity and medical symptoms to aid case identification. They have also made use of this latest technology, which includes scanning of QR code, connected reporting of transport history, etc.

Vision and Concept

Wearable devices such as bands, watches and even glasses were designed initially for fitness and healthcare needs, but they are rapidly becoming a great tool in creating early diagnoses for Covid-19. Wearable can immediately identify whether a patient is experiencing the onset of respiratory problems that may be associated with the disease, then act quickly to make a medical appointment before more serious symptoms appear. In other cases, devices can transmit a warning directly to a healthcare professional so that steps can be taken proactively.

IoT devices are helping hospitals and clinics to diagnose patients from a far and prescribe remote treatment. The remote strategy is critical during crises like the pandemic when hospitals need to optimize the time spent in person with patients that need immediate treatment. IoT-enabled health monitoring solution via mobile app. Vital signs are tracked in real time, delivered first to a mobile device, and then transmitted to the CMED cloud server. The app creates colour-coded diagnoses based on the level of risk to the patient's health. Doctors have been able to identify and escalate emergency situations during the Covid-19 pandemic, and more than 1.5 million people have benefitted from the system.

Discussion

Since early 2020, the world has been struggling with the pandemic caused by the novel severe respiratory syndrome corona virus 2 by striving to control the unprecedented spread of the virus and develop a vaccine. As most efforts to find a treatment or control the spread of the COVID-19 have not shown acceptable results so far, there is a high demand for global monitoring of patients with symptomatic and asymptomatic COVID-19 infection.

In recent years, IoT technology has received significant attention in the healthcare domain where it plays an important role in different phases of various infectious diseases. In the current pandemic, as the contingency of COVID-19 is high, there is an essential need for patients to be connected with and monitored by their physicians proactively in different phases of COVID-19. In this study, we investigate the role of IoT technology in response to COVID-19 in three main phases including early diagnosis, quarantine time, and after recovery.

During the first phase of COVID-19, which is early diagnosis, there is an essential need for faster diagnosis due to the high rate of contagiousness of COVID-19 where even an asymptomatic patient can easily spread the virus to others. The sooner the patient is diagnosed, the better the spread of the virus can be controlled, and the patient can receive appropriate treatment. In fact, IoT devices can speed up the detection process by capturing information from patients. This can be implemented by capturing body temperatures using different devices, taking samples from suspicious cases, and so on.

The second phase, called quarantine time, is an important period of this disease after the patient has been diagnosed with COVID-19, and he or she should be isolated for the course of treatment. IoT devices in this phase can monitor patients remotely with respect to their treatments and stay at home orders by the authorities. They can also clean areas without human interactions. Examples of these types are the implementation of tracking wearable bands, disinfecting devices, etc.



According to the Centers for Disease Control and Prevention (CDC), most people with mild symptoms can recover while staying at home without getting treatments, but there is no guarantee those people will not be Re-infection after recovery. Re-infection might happen with different symptoms of COVID-19. Concerning these possible re-infection in the after recovery phase, the chances of returning symptoms and potential infectivity can be high. To prevent that happening, social distancing should be implemented by deploying IoT devices, including bands and crowd monitoring devices, to track people to ensure the appropriate distance is maintained. In short, IoT technology during the COVID-19 pandemic has proven its usefulness in assisting patients, healthcare providers, and authorities. In this section, we briefly explain the various IoT devices and applications including wearable, drones, robots, IoT buttons, and Smartphone applications that are mainly utilized in the forefront of combating COVID-19.

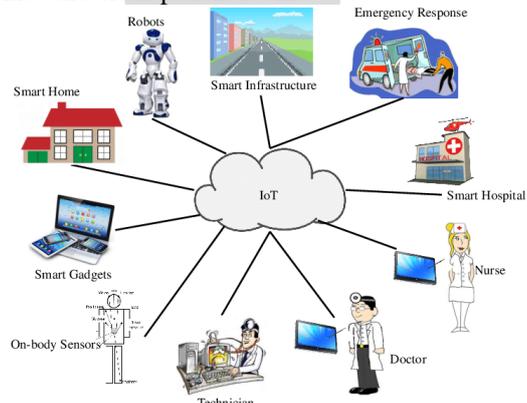
Different applications of IoT in the healthcare sector include:

Telehealth Consultations The virus' contagious effect led physicians to resort to viewing patients through video chat to detect if the patient has fallen prey to the virus without meeting in-person. Communication through technology and confining people indoors is an excellent alternative to the mass rush seen at hospitals and nursing homes for the virus' acute versions.

Digital Diagnostics Various forms of IoT devices are used for tracking health data after performing digital diagnostics. The emergence of the smart thermometers by Kinsa as opposed to traditional thermometers can collect valuable data to share with health experts and to track trends to better protect communities.

Remote Monitoring Remote IoT is capable of monitoring elderly patients' chronic diseases that boost the risk of death from the deadly virus.

Robot Assistance The use of IoT robots is a growing trend. They are used for disinfecting devices, cleaning hospitals, and delivering medicines, thus giving healthcare workers more time to treat their patients. China is the first country to use UVD robots made by a Danish company for keeping their health buildings clean at the time of the crisis. These robots use IoT and help to disinfect treatment areas in nursing homes and clean patient rooms.



Conclusion and future work

According to the last report of the World Health Organization (WHO), as of September 2020, the number of confirmed COVID-19 cases passed 31 million people with an approximate huge death toll of 960,000 people. This disease has similar symptoms as the flu such as fever, cough, and fatigue, which are essential to recognize for early diagnosis. The incubation period of COVID-19 takes from 1 to 14 days. Surprisingly, a patient without any symptoms can possibly be a transmitter of the COVID-19 virus to others. This is when quarantining such people is necessary. Moreover, the recovery period of this disease varies and depends on the patient's age, underlying conditions, etc., but in general it can take between 6 to 41 days. While this disease has a high potential to be spread easily in comparison with similar diseases within the corona virus family, there are many ongoing efforts and much research to mitigate the spread of this virus. In this context, IoT technology has been shown to be a safe and efficient way of dealing with the COVID-19 pandemic.

IoT uses a large number of interconnected devices to create a smart network for the proper health management system. It alerts and tracks any types of diseases to improve the safety of the patient. It digitally captures the data and information of the patient without any human interaction. This data is also helpful for appropriate decision-making.

IoT provides an extensive integrated network for healthcare to fight with COVID-19 pandemic. All medical devices are connected to the internet, and during any critical situation, it automatically conveys a message to the medical staff. Infected cases can be handled appropriately in a remote location with well-connected tele-devices. It handles all cases smartly to provide ultimately strengthened service to the patient and healthcare. IoT seems to be an excellent way to screen the infected patient. In healthcare, this technology is helpful to maintain quality supervision with real-time information. By using a statistical-based method, IoT gets helpful to predict an upcoming situation of this disease. With proper implementation of this technology, researcher, doctors, government, academicians can create a better environment to fight with this disease.

IoT Applications and Robots Keep Hospitals Safe

IoT-powered robots have grown in popularity in places like hospitals during the Covid-19 pandemic. Robots can be programmed to disinfect devices, clean facilities, and even deliver medicine, eliminating the need for human healthcare workers to conduct those tasks and allowing them more time to focus on treating patients. Moreover, hospital administrators can use IoT applications and monitors to more easily keep track of equipment such as wheelchairs, defibrillators, and other vital technology that is critical in dealing with and treating Covid-19. IoT applications are also used in managing pharmacy inventory levels and checking refrigeration and humidity levels of drugs to ensure safety.

Thus, to overcome and make the civilians more aware about the COVID-19 pandemic, the government of India has launched a Smartphone application named as – ArogyaSetu, which is aimed to develop a connection between the important possible healthcare services and the people of India. Similarly, in China, the mobile application called as – Close Contact (English translation) is launched for its civilians. This application tells the app holder about the closeness to the corona-positive person. So that the extra care can be taken while moving outside. USA government is soon going to launch a similar kind of mobile application for its civilians at the end of April 2020.

Moreover, future work should be targeted over data storage and management. The process of making cost-effective adoption applications will also to be considered in further studies.

Reference:

- [1]. <https://link.springer.com/article/10.1007/s41666-020-00080-6>
- [2] <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/question-and-answers-hub/q-a-detail/coronavirus-disease-covid-19>
- [3]. <https://www.fierceelectronics.com/electronics/role-iot-sensors-covid-19>
- [4]. <https://www.simplilearn.com/using-iot-applications-to-manage-the-spread-of-covid-19-article>
- [5]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7198990/>
- [6]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7198990/>
- [7]. [https://www.who.int/india/emergencies/coronavirus-disease-\(covid-19\).](https://www.who.int/india/emergencies/coronavirus-disease-(covid-19))
- [8]. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7556896/>