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Dealing the Current COVID-19 and Future Pandemics through Internet of Things: an Exploratory Study.

U. Harita,

Assistant Professor, Koneru Lakshmaiah Education Foundation, Vaddeswaram Guntur

uharita@gmail.com

Abstract

Covid -19 , A pandemic situation that shook the entire globe and still continues to sustain unshakably creating further panics among people. It not only created a global emergency but also had challenged the healthcare professionals, clinicians and scientists hunt for solutions or remedies to deal with this nightmare. There was an immediate need of new technologies that could make the current health care services more available and in an efficient manner. This paper attempts to find an approach to provide the necessary service to a victim of Covid -19. Technologies like Internet of Things and Machine Learning prove their excellence in doing the needful.

Keywords: Internet of Things, sensors, Healthcare, Monitoring

Introduction

In the world history, there were several diseases invading humanity. Since the world's first corona virus disease was confirmed in Dec 2019, which further led to the outbreak across the globe. In Jan 2020, the pandemic was declared as international concern of public health emergency by the world health Organization. In order to address this novel Pandemic, the scientists, health care professionals and medical experts join hands in searching for a technology that could render them services in various needs such as screening infected or suspected person in the crowd, control the spread of the virus and find a cure by developing vaccines. Thanks to technologies like Machine learning and IoT.

Early diagnosis can result in fewer infections and, as a result, better health care for those who are affected. By segregating sick people from others, quarantining proven or suspected cases and implementing lockdowns can help reduce the number of COVID-19 infections.

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Following up on COVID-19 patients after they've recovered will aid in the monitoring of recurrences of symptoms and the spread of infection.

The widespread of mobile technologies and smart devices in the healthcare industry has a massive global effect. Health professionals are availing the potential implementation of novel smart and sophisticated equipment for monitoring people's health, resulting in a significant improvement in healthcare in both clinical and non-clinical settings. The Internet of Things enables the integration of physical and digital data. IoT enables the integration of physical devices which further get connected to the Internet and gives clinicians with real-time health status information on a periodical basis without human intervention. Chronic diseases such as diabetes, heart disease, and high blood pressure are significant global economic and social issues. It could also serve as a platform for public health officials to obtain data in order to track the COVID-19 outbreak. This remote monitoring helps us maintain the social distance during the pandemic and reduces the stress and panic of several medical staff. On the other hand Machine Learning gains its importance in its own way as it predicts and forecasts the best or the worst and lets the health care professionals take a optimized decisions.

Emerging Technologies for Covid-19

Health care is one such domain that requires continuous improvement and up gradation to provide a conivinient way of treatment for the patients and create a healthy environment. The goal is to ensure that a patient is supported with the necessary care and treatment at any instant of time. With the blend of IoT in medical care, a patient is continuously monitored through sensors, that collect data and the data through internet reaches the health care professional who could start treatment and provide other services without a delay. For example, using sensors , a patients heartbeat, temperature, pressure can be monitored by the health care professional remotely. This concept of remote assistance is very much required in the existing pandemic situation . when a health care professional is monitoring a covid -19 patient .

Role of Internet of Things in a Covid Environment

IoT has already played a major role in providing services in medical stream and has transformed healthcare to a different level. The connected things also known as smart devices or sensors collected the data and through the internet , the data reaches the medical expert and the treatment and further activities can proceed without delay.

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I sensors

A wide range of sensors are available , a few being listed below

Biosensors – scans during pregnancy/ultrasound

Pressure sensors – oxygen concentrators

Temperature sensors – ventilators

Image sensors – cardiology

Sensors are required to be compact, lightweight, and compatible with body mass, and require very little power for its operation for instance implantable sensors. These also need a surgeon to correctly implant them care must be taken that do not decay over time.

ii drones

Drones are simple aircraft that are controlled remotely and flown without or with minimal human intervention.They can be used to perform searching , monitoring and delivering. Smart drones can be controlled with a smartphone and a controller in a short amount of time, saving time and energy in a variety of industries such as agricultural, military, and healthcare. Different types of IoT-based drones are employed in the healthcare industry , thermal imaging drones, disinfection drones, medical drones, surveillance drones and multipurpose drones.

iii IoT Buttons

A small, programmable button connected to the cloud via wireless transmission is an example of an IoT device. This device can do a variety of repetitious chores by pressing only one button, thanks to its cloud-based coding. One sort of IoT button, for example, allows users to report if any hospital bathrooms require cleaning by simply pressing a button.

iv smart phone applications

Smartphone applications are pieces of software that are designed to do specific activities on a mobile device like a smartphone. Variety of apps are designed to perform a variety of tasks and deal with covid 19 situations. Some of activities are

Track patients diagnosed with COVID-19

Building a map with high risk spots

Taking COVID-19 low-cost tests using a kit connected to a smartphone application

Linking people and health services better

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A proposed architecture to provide the necessary medical assistance to a covid -19 patient

In the recent times we have heard, seen and unfortunately many of us have gone through the pandemic experiencing lack of medical assistance at the right time and losing our near and dear ones. The reason behind such unpleasant occurance is that , there was a lacking in identifying the most needy patients that required immediate attention and that cases of common cold and viral fever could not be differentiated and hence the crowd was not distinguished . The crowd was increasing and created panic among the patients and most of the deaths were identified as panic attacks. There emerged a need where health centers could truly identify the most critical patients suffering from covid and could reach them and provide medical assistance according to the needs. There exits various smart devices , such as wearables, smart helmets are already deployed and they are successfully identifying the people suffering from fever or cold through IR cameras that are put up at the containment zones. The location of the person is identified and the health camps are alerted about the person. This procedure could identify only the face of the patient suffering from fever. It is also known fact that all fever sufferers aren't a victim of Covid-19 and this could not extend further service to person who requires emergency attention.

Our proposed architecture is designed to distinguish the most critical person from the containment zone and to decide his treatment by monitoring his medical history and present situation remotely by collection various information like body temperature, oxygen level, heart rate and most important the age of the person. The necessary details are collected from the victim and the data is then forwarded to the data center where a quick prediction and forecasts are done with the help of certain machine learning algorithms like clustering a decision is taken and based upon the severity the case is treated as emergency or causality(in case of a panic attack). The decision is then reverted to the health camp and now the team of experts decide if the case could be treated at home or the patient is to be moved to the nearest hospital. The hospital nearest from the patient's location is alerted and the team in the health camp takes the responsibility to arrange for the patients migration from home to the hospital. The reason behind notifying the hospital is that , the hospital acknowledges if there is a bed available and if not available , acknowledges back to the health center which lets the center choose another hospital. The scenario is depicted in Fig 1.

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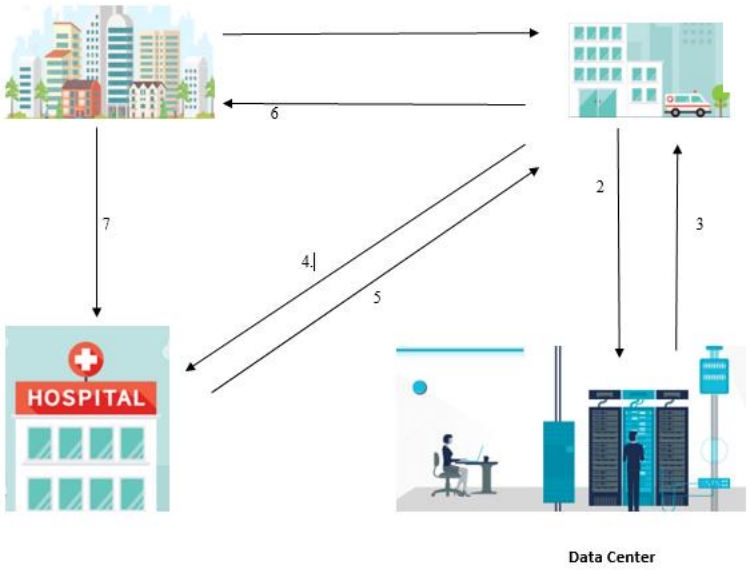

Fig 1. Providing assistance to a Covid -19 victim enabling and blending technologies

Sequence of events

1. The medical data of the victim is received by the health camp center.
2. The collected data is forwarded to the data center where prediction can be done with ML
3. The decision taken by the decision support system is reverted to the health center
4. If the case is an emergency then the nearest hospital with a bed availability is notified.
5. The hospital's acknowledgement is awaited
6. The health camp arranges for the patients shift to the hospital
7. The patient is shifted to the hospital without much delay and with assurance that , the treatment will be provided .

Prediction of Case severity by evaluation of patients vital data like temperature, heart rate, oxygen level and age

Conclusion:

Despite the fact that the world is grappling with the COVID-19 epidemic, various technologies have been implemented to combat the disease. The Internet of Things (IoT), which has been widely employed in the healthcare business, is one of these technologies. During the COVID-19 pandemic, this technology has demonstrated to be particularly effective in combating the disease. In this paper, an attempt is made to perform survey on the recent proposed IoT devices aimed at assisting healthcare personnel and authorities during

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the COVID-19 pandemic. More patients can engage in their treatment utilizing IoT devices with peace of mind if IoT technology is implemented effectively and securely. As a result, authorities and healthcare staff will be able to respond more quickly in the event of a pandemic. As a result, the burden of various diseases, such as infections, hospitalizations, and death rates, can be lowered to a greater extent.

References

1. Nasajpour, Mohammad, Seyedamin Pouriyeh, Reza M. Parizi, Mohsen Dorodchi, Maria Valero, and Hamid R. Arabnia. "Internet of Things for current COVID-19 and future pandemics: An exploratory study." *Journal of healthcare informatics research* (2000): 1-40.

2. Kumar, Krishna, Narendra Kumar, and Rachna Shah. "Role of IoT to avoid spreading of COVID-19." *International Journal of Intelligent Networks* 1 (2000): 32-35.

3. Islam SMR, Kwak D, Kabir MDH, Hossain M, Kwak K-S (2015) The internet of things for health care: a comprehensive survey. IEEE Access 3:678–708

4. Qi J, Yang P, Min G, Amft O, Dong F, Xu L (2017) Advanced internet of things for personalised healthcare systems: a survey. Pervasive Mob Comput 41:132–149

5. Singh RP, Javaid M, Haleem A, Suman R (2000) Internet of things (IoT) applications to fight against COVID-19 pandemic. Diabetes & Metabolic Syndrome: Clinical Research & Reviews

6. Gómez, Jorge, Byron Oviedo, and Emilio Zhuma. "Patient monitoring system based on internet of things." *Procedia Computer Science* 83 (2016): 90-97.

7. Allam, Zaheer, and David S. Jones. "On the coronavirus (COVID-19) outbreak and the smart city network: universal data sharing standards coupled with artificial intelligence (AI) to benefit urban health monitoring and management." In *Healthcare*, vol. 8, no. 1, p. 46. Multidisciplinary Digital Publishing Institute, 2000.

8. M.N. Mohammed, S.F. Desyansah, E. YusufAn Internet of Things-Based Smart Homes and Healthcare Monitoring and Management System : Review, vol. 1450 (2000), pp. 1-15, 10.1088/1742-6596/1450/1/012079