CHAPTER SIXTEEN

# Wearable body sensor network: SDGs panacea for an holistic SARS-CoV-2 mitigation, diagnostic, therapeutic, and health informatics interventions

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## 1. Introduction

The recent SARS-CoV-2 (i.e. COVID-19) was originally detected in the last quarter of the year 2019 as just a respiratory infection in Wuhan city of China.[1] This has since become a global pandemic involving over 150 countries all around the world. The World Health Organization (WHO) announced the epidemic as a pandemic on 11/03/2020 and advocated for concerted strategies to promote early warning systems all around the healthcare system.[2] The United States of America declared the disease outbreak to be a federal emergency. The SARS-CoV-2 virus is mostly spread between people through coughing or sneezing and direct interaction, as per current understanding.[3] Whenever droplets have a size greater than or equal to five micrometers, they are referred to as respiratory droplets; when they have a diameter smaller than five micrometers, they are referred to as droplet sections. The droplet portions may be referred to scientifically as "droplet nuclei" with transmission also possible via close contact with infected individuals, direct contact with things in the surrounding environment, and the use of goods on an infected people.[4] Emerging epidemiological evidence

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suggests that the geriatric, defined as those older than 75 years, are more susceptible to SARS-CoV-2 infection than other age categories.[5]

When examining the clinical features of COVID-19, it was found that the likely incubation time was 3 days, with mortality signs manifesting within 14 days in older people.[6] While SARS fatalities were examined in previous studies, it took between 4 and 17.4 days for the very first death signs to manifest.[6] Additionally, it is worth noting that SARS-CoV-2 has a much-reduced incubation time than the other 24 days. Furthermore, a period of toward with little action toward spreading has been reported. Additionally, another pattern found was that it takes a median of 20 days during the first death signs to manifest in those over the age of 70 years and 11.5 days for younger people. As a result of the above, it would seem that an old individual is more prone to get sick than others, necessitating the need for extra measures.

The United States-Centers for Disease Control and Prevention (US-CDC) reported that healthcare professionals faced very significant risks, even while wearing protective gear, due to their close contact with their patients.[7] Substances such as bodily fluids, infected surgical equipment and devices, contaminated surfaces, and aerosol transmissions provide a risk of direct or indirect transmission to victims.[8] SARS-CoV-2 infection results in a spectrum of symptoms comparable to past outbreaks, where moderate fever, coughing, and irregular gastrointestinal activity are described as the main symptoms. Additionally, several investigations have however documented asymptomatic instances.[9] As this outbreak keeps increasing, healthcare services are increasingly burdened with effective ways to respond to the rising operational demands.[1] The need, therefore, arises for the development of an effective healthcare information system capable of monitoring, supporting, treating, and managing the patient's electronic health record (HER).[10] The application of technology-based solutions can easily help health institutions in the process of managing pandemics by encouraging the rapid and widespread dissemination of data, real-time monitoring of transmission, and development of discussion groups and daily operations of essential services.[11] Take for example, information systems have been a crucial factor in China's reactions to the COVID-19 spread. In this instance, technological innovation, including prediction of spread, the monitoring of close contact, and remoteness, has been used at every point of the outbreak.[12] In response to the first wave of the COVID-19 pandemic, healthcare institutions have implemented many immediate solutions and complex technological resources in curtailing the spread. This, therefore, provoked a digital transformation that will always stay with us for a long time and can be subsequently applied as vital interventions to any future outbreaks. Wearable trackers can increase awareness of the health status of oneself, others, and the world and enable the users to choose more acceptable responses to new health scenarios. The wearable activity trackers (WAT) showed considerable benefit inpatient support and self-management in healthcare scenarios, especially in patients with dietary conditions such as hypertension and diabetes. Of the different wearable devices, wearable trackers are by far the most popular type. There are body-worn or handheld instruments or technologies that instantly capture data for improved knowledge of one, others, or the environment.

## 2. Diagnostic and therapeutic advances against SARS-CoV-2

Fatigue, fever, and pulmonary abnormalities are by far the most often seen SARS-CoV-2 beginning symptoms. The theorized group needed clinical tests or imaging techniques to establish the SARS-CoV-2 diagnosis after examining symptomatology and epidemiologic evidence.[13] COVID-19 victims' indications are inconsistent and cannot be utilized to diagnose the condition. COVID-19 has been diagnosed and screened using nucleic acid tests and computed tomography scans.[1] Upon obtaining the SARS-CoV-2 sequence of nucleotides from individual respiratory tract samples through deep sequencing analysis,[14] a range of RT-PCR-based diagnostic assays will be generated. The basic procedure is to collect RNA from the upper respiratory tract, separate it, and confirm its positivity using a particular primer during PCR. Additionally, there is serological testing. A computed tomography scan has been recommended to make a diagnosis of typical cases in epidemic areas, but chest CT screening is not recommended for population densities with minimal rates of infection due to its low good prognosis.[15] However, chest CT testing may be deemed a technique for existing COVID-19 diagnosis in outbreak zones.[15]

Along with nucleic acid PCR and serological screening, there are assays founded on other concepts, such as antigen-based testing, clustered regularly interspaced short palindromic repeats (CRISPR-based) technique, and physics-based procedures.[16] The rapidity with which antigens are detected is one of their primary benefits. Antigen analysis, on the other hand, is extremely specific for viruses but not as accurate as molecular polymerase chain reaction testing. Moreover, the s Specific High-sensitivity Enzymatic

Reporter is utilized to identify novel coronavirus gene sequences.[16] No equipment is needed, as it is comparable to the simple pregnancy test to rapidly identify the existence of a novel coronavirus ribonucleic acid sequence.[17] At the moment, the most often employed detection technique is a blend of nasopharyngeal swab nucleic acid PCR and serological detection using a nasopharyngeal swab.[17] The nucleic acid polymerase chain reaction (PCR) test findings remain the gold standard for COVID-19 detection, although serological testing may be performed in addition.[18,19] The sample location is also important in nucleic acid analysis. The virus is detectable in lungs, feces, blood, urinate, and testicular samples. The most practical specimens are spit or oropharynx swabs. Bronchoscopy is used by physicians to get samples from the lower respiratory system.[20] Nevertheless, this technique exacerbates the patient's discomfort and decreases the test's reliability. At the moment, research indicates that the precision of oropharyngeal swab sampling detection may be greater than that of nasopharynx testing, thus reducing the complexity of sample collection and the patient's discomfort.[20] Considering the lengthy process of developing new medicines from the bottom-up, many US food and drug administration pharmaceuticals previously used to treat other illnesses have been adapted to treating COVID-19 due to their antiviral characteristics. Interestingly, many anticancer agents have demonstrated the ability to treat acute COVID-19 by suppressing overactive immune function and are currently being studied in continuing clinical studies.

## 3. Impacts of SARS-CoV-2 on healthcare informatics

Thanks to the COVID-19 emergency, service distribution by health informatics applications has improved extraordinarily rapidly, demonstrating that WAT technologies have now attained the stage to be used in medical services at an unprecedented speed. It is possible that even at the end of this pandemic, digital interventions will remain in practice. The pandemic has contributed to rapid improvements in the scale of exchange of health records for both primary and indirect diagnosis. However how "emergency" health information systems will continue to work beyond interference with public confidence after the crisis is somewhat unclear. Several countries have enacted digital health policies for remote surveillance and telehealth systems to facilitate health-saving services to be provided and with no physical encounters.[21] The ability of digital health-related technology to shield patients, medical providers, and the population from disclosure has been universally acknowledged and facilitated. In the United Kingdom, primary healthcare has taken on telehealth on a comprehensive basis and has launched a modern, first-ever automated approach to handling digital treatment to the ideal location.

To improve pandemic monitoring, main screening, and accurate forecasts promptly, the disease prevention and information reporting process should be properly assessed. Government healthcare networks need to establish a multisource network that combines data analytics, sharing, integration, and input channels into profitable use. The unified system would improve the connection among different relevant agencies for disease control. COVID-19 detection and the database of all suspected cases can subsequently be used to evaluate and implement a national health information system for future interventions. It is important to know that many patients seen in primary and specialist hospitals can be remotely controlled. Also, this form of treatment can be given by care staff who quarantine following an infection or injury. This involves people with COVID-19 and other future pandemics who can be treated centrally with guidance on the signs of symptoms. The telehealth instruments have therefore taken a center stage and are being taunted as another form of "electronic personal protective equipment (PPE)" that can be applied for the acute medical condition without being physically proactive. Hence, the effect of the COVID-19 pandemic on healthcare informatics will undoubtedly have a long-term effect both on potential patients and health practitioners. By integrating health technologies with healthcare services, diagnostic performance and patients' treatment interactions can be enhanced, and online sharing of large medical resources and real-time knowledge exchange can also be accomplished. The interconnected framework will effectively mitigate the challenges of medical resource scarcity, unequal delivery of healthcare quality, and shortages of healthcare staff. The implementation of an interconnected intelligent healthcare framework for COVID-19 pandemic prevention and control would also provide a positive guide for the design and implementation of future intelligent healthcare frameworks for other public health emergencies.[11]

## 4. Sustainable development goals as panacea for holistic emergency response

The current COVID-19 healthcare emergency has had an overwhelming and detrimental effect on public and civil healthcare systems. This has generated several global healthcare problems and contributed in the past few months to the greatest humanitarian crises the world has ever experienced. These have put to test the competence of health practitioners on the tracking and exploration of modern approaches of digital health technology. The Millennium Development Goals (MDGs) are inextricably linked to efforts in decreasing the impact of infectious diseases. The 2030 Sustainable Development Agenda offers an impetus for policymakers and the global community to reiterate their commitment to supporting health as a core element of development.[22] According to the Sustainable Development Goal-3, the decline in the number of premature deaths and an improvement in life expectancy will only be ensured by the continuity, introduction, and application of a government program focused on public coverage, emergency response services, national health benefits, and accessible preventive care. The Goal-3 of the Sustainable Development Goals (SDGs) was to ensure healthier lifestyles and encourage well-being for every one of all ages with Target 3.8 focused on universal health coverage (UHC) which underscores the value of both individuals and families getting access to affordable health facilities without causing extreme burden.[22] MDG 6 emphasizes HIV/AIDS, influenza, and other illnesses, whereas MDG 4 (decreasing infant death), MDG 5 (enhancing maternal and newborn), and MDG 7C (increasing basic cleanliness and ensuring sustainable access to freshwater) all address infectious disease care. MDG 8E (ensure affordable access to needed drugs in underdeveloped nations in collaboration with pharma firms) and MDG 8F (enable access to the benefits of digital technologies, particularly information and communications technology, in collaboration with the private partners) not only collaborate with these goals but also recommend an improvisatory way to accomplish them.

These health programs also include those tailored to patients, such as curative treatment and community-based services, such as public health.[23] Improving UHC is an effective strategy for all nations to promote fair and safe health conditions and to increase the well-being of people and communities. The improvement of healthcare infrastructure is a part of attaining giant strides through UHC. A functional healthcare system is structured around individuals, organizations, and services required to strengthen, preserve, or rebuild the health of the population. Bolstering the health sector itself is a pathway in ensuring that the success of the system embraces the overarching goals of most government healthcare programs, initiatives, and strategies—consistency, fairness, effectiveness, transparency, efficiency, and sustainability.[23] The success of the MDGs proves that coordinated international intervention can be effective. Amid unparalleled advances in the healthcare system, more than 1 billion people, half of them in developing countries, have been unable to take advantage of the benefits of the MDGs. Infectious diseases make a significant contribution considerably to the global burden of disease in low- and middle-income nations. Annually, these nations lose well over 11 million individuals to major contagious illnesses ranging from AIDS, TB, and influenza to diarrheal infections, measles, and respiratory illnesses. Not only do certain nations bear a disproportionate share of the cost, but also susceptible sections of the society. Particularly, 95% of fatalities from respiratory infections and 98% of fatalities from diarrheal illnesses occur in low- and middle-income countries, while diarrhea, pneumonia, measles, and influenza claim the lives of a large number of infants below 5 years. The newly created SDGs are much more optimistic than their predecessors. SDG-3 provides importance to health and well-being for all populations in particular fields, such as infant mortality, communicable diseases, mental health, and occupational health.

## 5. Innovative technologies for diseases outbreak monitoring and control

### 5.1 Internet-based surveillance technology

Technological advancements play a critical role in the achievement of the SDGs by enhancing the quality and efficacy of modern and environmentally sustainable models of development. It is also important to develop innovative technology that encourages science and drives creativity.[24] These mechanisms can be improved by enhanced information exchange and cooperation between stakeholders in both national and international frameworks. It is also important to develop innovative technologies that encourage science and drive creativity. These mechanisms can be improved by enhanced information exchange and cooperation between stakeholders in both regional and global contexts. Healthcare quality is the degree to which the healthcare services are offered to people and patients and improve the expected survival rates, along with existing technical experience. Intermediate objectives of national health programs, plans, and initiatives were primarily instituted to achieve quality, equity, efficiency, accountability, resilience, and sustainability.[25]

Surveillance of emerging infectious diseases is critical for detecting public health risks early on. The emergence of new diseases is influenced by both human and natural factors, including population size, migration, and trade, as well as environmental issues and agricultural activities. A plethora of novel technologies are becoming increasingly more accessible for not just fast molecular characterization of microbes, but also more precise monitoring of infectious disease activities. An example of this technology is event-based surveillance, which is usually considered as conventional and passive surveillance since it is based on regular reporting of structured predefined information about occurrences and illnesses by healthcare institutions.[26] This kind of monitoring necessitates the presence of a public health network, is often costly, and results in a delay of about 2 weeks between data collection and dissemination. The development of computer science has resulted in the emergence of event-based surveillance as a complement to conventional early warning sign monitoring. Event-based systems are primarily used to gather and analyze unstructured data from a variety of sources, such as news stories, social media, and web searches. True, the bulk of data on initial reporting of infectious disease occurrences come from informal sources such as news reports and the internet. Digital surveillance systems are designed to identify potentially pandemic occurrences before official announcements. The Global Public Health Intelligence Network is one of the most valuable event-based surveillance technologies, scanning a variety of such private sources for unusual disease events and infestation speculations, such as websites, digital online forums, newspaper articles, and news websites.[26]

Remote sensing technology is another method of preventing disease outbreaks. Monitoring the environmental conditions with this technique may aid in illness prediction. Previous studies were able to build an environmental framework that correctly predicted the real incidence rate of a cholera epidemic using satellite imagery to gather data on ocean temperatures, surface height, and chlorophyll A levels. Except for water-borne illnesses, satellite imagery has been utilized to monitor vector movement, such as the location of the *Anopheles* species responsible for malaria incidence in Africa and to simulate Hantavirus pulmonary syndrome epidemics.[27] Vector-borne illness epidemics, on the other hand, are more difficult to forecast owing to the dynamics of vector ecology and human behavior, as well as the diversity of host immune systems among populations.[28] It is essential to closely monitor climatological factors (e.g., increase in sea surface temperature and prolonged rainfall) as well as vegetation and soil indicators to identify alterations that may lead to infectious disease outbreaks. By incorporating such data into prognostic mathematical modeling, signals may be generated to guide public health actions aimed at an epidemic abatement.

The use of mobile communication technologies through mobile phones creates new possibilities and difficulties in the monitoring of developing infectious diseases. Consider the Foodborne Chicago initiative, which was established by the Chicago Department of Public Health to track foodborne diseases through social media. It employs an algorithm to detect and react to tweets about food poisoning. Another new approach to event-based surveillance is "participatory epidemiology," which HealthMap illustrates with an example. The program, dubbed Flu NearYou, enables anybody over the age of 13 who lives in the United States or Canada to participate and submit questionnaires about influenza-like disease activity in their neighborhood. Besides providing information, social media may also aid in the data processing. HealthMap allows users to rate articles based on their importance, which may help to improve the quality of distributed data.[29] Mobile phone data is currently being recognized to monitor people's mobility to better understand the patterns of virus transmission and the pathways of disease importing from district to district.

Additionally, because of the widespread usage of cellphones and the expansion of internet connectivity, even in resource-constrained nations, mobile phone technology is being utilized for infectious disease monitoring. Mobile phones provide two-way communication and may be used to gather data for health monitoring as well as to disseminate critical public health data to the general population. A mobile tracking application such as the MySejahtera app, which was created by the Malaysian government to help in controlling the COVID-19 outbreak throughout their country. It enables users to self-assess their health and that of their family and friends, as well as track their health status during the COVID-19 epidemic. Additionally, MySejahtera allows the Malaysian Ministry of Health (MOH) to track users' health status and perform contact mapping for COVID-19, allowing them to take prompt action in delivering necessary remedies. MySejahtera is also the official channel for the Government of Malaysia's National COVID-19 Immunization Program, which provides vaccine enrolment, scheduling appointments, and the issuing of COVID-19 vaccination digital certificates.

## 5.2 Drawback of internet-based surveillance technology

While internet-based surveillance systems are rapidly utilizing more resources and advanced software for collecting and analyzing data, a regional monitoring disparity persists due to restrictions in communications networks, poor infrastructure and diagnostic capacity, a paucity of qualified staff, and significantly reduced awareness in these aspects, all of which contribute to disease underestimation. Additionally, underreporting and bureaucratic segregation impede attempts to monitor new infectious illnesses. National healthcare authorities must have access to real-time surveillance data on the internet to respond quickly and efficiently to an outbreak. Global cooperation should prioritize strengthening public health capabilities in elevated areas for the development of infectious diseases.

Additionally, concentrating on endemic monitoring concurrently in developing infectious disease "hotspots" would overcome some of the obstacles to early outbreak identification. This is especially true for illnesses in which animal instances precede human cases. Given that the majority of new infectious diseases including the one-health concept enable the development of shared fundamental capabilities for human disease monitoring. Technologies evolve at a breakneck pace as new capabilities become accessible, algorithms improve, and computing speed advances, enabling the creation of more complex surveillance techniques and more appropriate forecasting models. Coordination between agencies, institutions, researchers, and healthcare networks engaged in infectious disease monitoring, on the other hand, is critical for early detection and response to unique risks and, most critically, for the prevention of future pandemics.

## 6. Emergence of wearable activity trackers (WATs) technology

Wearable activity trackers (WATs) are electronic tracking tools that connect users to track and control their overall health measurements, including action taken, level of fitness, moving speed, blood pressure, and sleep quality. These WATs are usually connected to the body, especially the forearm, to help improve or enhance human health management functionality.[30] WAT frequently quantifies consumer activity and health status and instantly uploads the data to smartphone applications and relevant sites.[31] Examples of prominent items with these features include Apple Watch, Samsung Gear, Garmin, Fitbit, Xiaomi, and Jawbone. Given the deployment of these instruments in multiple disciplines of usage and growing scientific priorities, there is little awareness of the large research landscape. To create effective wearable trackers, it is important to consider the consumers of those trackers and their perspectives on designs and functionality by performing interviews or reviewing feedback as part of a user-centered design approach. The race for WAT advancement has begun since its launch, while many of them have not lasted for long, indicating the wearable movement we see today.

As wearable technology continues to advance, it has started to spread to other areas. The incorporation of wearable into healthcare services has become a topic of investigation and innovation in different organizations. Wearable continue to develop, evolving beyond smartphones and setting new frontiers, such as smart fabrics.[32] Technologies include the usage of cloth to execute a purpose such as the incorporation of a QR code into a garment or performance clothing that improves air movement during a workout.[33] Virtual reality is another highly common wearable tech. Stereo headsets have been produced by a variety of vendors for laptops, consoles, and handheld devices. This launching of Google headsets popularly known as the 'Google Daydream' is a practical example of how far wearable technology has evolved.[34] The detection systems for assisted care of the elderly are vital advancements in the field of wearable technology.[35]

The wearable sensors have an enormous capacity to generate large data, with high efficacy in the healthcare system.[36] With this justification, the investigator is turning their attention from information gathering to the development of smart machine learning capable of collecting useful information from data collected, using data mining methods such as statistical classification and neural networks. Other advances of wearable technology include the system that captures the biometric data directly from a patient's body such as body temperature, pulse rate, heart rate, brain wave, and muscle bio-signals to provide useful knowledge in the area of medical care and wellness.[37] Epidermal electronics is an emerging area in wearable technology. It is popularly known as epidermal technology since they are characteristically comparable to the epidermis skin layer. They are directly installed on the skin for active monitoring of physiological and metabolic functions.[38] The epidermal electronics are reportedly being established in the wellness and patient monitoring fields.

## 6.1 Wearable body sensor for tracking and control of COVID-19

Numerous studies on wearable development and execution aiming at sensing physiological characteristics from the human body have been reported. Mobile Wireless sensor systems are the ideal option for monitoring COVID-19 infection and preventing viral transmission.[39] This sensor is linked to a network edge in the internet-of-a-thing platforms, in which the processing takes place and is analyzed to identify the status of health.

The wearable sensor device can monitor and check the status of a COVID-19 patient at a remote location.[39] The IoT design architecture is compared to current technologies to determine the state of COVID-19 digital healthcare. Through all the foregoing research, it has been shown that the combination of IoT and deep learning techniques may successfully aid in tracking and alerting the human health condition.[39] The periphery and cloud computing components of the Internet of Things gather and analyze data in response to threshold circumstances. Deep learning may be utilized efficiently and reliably in strategic planning, therapy assistance, and monitoring and risk. Multimodal illness identification, monitoring, and therapy may all contribute to fulfilling real-time needs.[39] Previous wearable sensor design from previous studies (Table 1) is potent enough for the design of body sensors for the monitoring and control of COVID-19.

**Table 1** Current adoption of wearable body sensor for health monitoring.

| Body sensor design | Purpose of design and limitations | References |
|---|---|---|
| Visual interactive digital health monitor | To assess COVID-19 patients' physiological health indicators | [40] |
| IoT alert system | Emergency medical support | [41] |
| Convolutional neural network-based deep learning system | Obtaining patient X-ray scan data | [42] |
| Multilayered IoT-based deep learning with spatial pattern | Brain and central nervous system and data transmission through the skin into the cloud | [43] |
| API for the front end biomedical wearable | Dashboard for clinicians for EMG sensing utilized to aid in the detection of neuromuscular disorders | [44] |
| IoT devise with body area monitor | Capture data to give an advanced detection of a heart attack | [45] |
| IoT-based social distancing strategy | Contactless enclosed safety is achieved via social distance, mask sensing, and temperature monitoring | [46] |
| Geolocation and monitoring of COVID-19 areas | To keep an eye on individuals and send out alerts through cell phone | [47] |
| AI-based sensors for wearable health | It serves as a heart rate, temperature, and activity sensor. | [48] |
| Android web layer and Peripheral Interface (API) for cellular telephones | COVID-19 symptoms are monitored, managed, and analyzed | [39] |

Bassam et al.[39] presented one of the most important reports on wearable design for COVID-19. The designed Internet of Things-based monitoring system is capable of measuring physiological indicators and symptoms in COVID-19-infected patients and transmitting them to a peripheral interface (API) that serves as a database for perusing and monitoring the infections threshold. Additionally, the work offered geographic information on potentially infectious patients who are quarantined or self-isolated. The archived database system can be utilized to notify medical personnel of a patient's condition, symptoms, and chosen spot. The suggested system comprises three stacks: wearable IoT, cloud, and mobile or online interface. Such layers operate independently and communicate with one another to enable wireless surveillance of COVID-19-infected individuals. Among the important features of the design, the study is that it has the potential to have a substantial effect on notifying health practitioners of possible infected individuals using geographic information to predict and assess the evidence. A database is built to hold all healthcare records of potentially infected patients and to retrieve data for analysis.

## 6.2 Current adoption and challenges of wearable activity trackers (WATs)

While wearable activity trackers (WATs) have been gaining traction since their commercial launch a decade ago and there is extreme demand in the usage and effect of these systems in various ways.[49] The demand for wearable emerging electronic technologies has dramatically grown and a variety of manufacturers have introduced the various design of wearable products. According to the International Data Corporation (IDC), the global demand for wearable tracking devices is anticipated to rise from 113.2 million products sales in 2017 to 222.3 million products sales in 2021.[50] A significant part of market analysis is the user willingness of adopting intelligent technologies which have profound consequences for firms to accelerate the process of diffusion. In the current sense, one of the main results of wearable activity trackers' acceptance and adoption is that its design as an all-purpose device is unrealistic and not economically feasible. Instead, the use of various designs and data structures can also be built that fit different user personal preferences.[51] Wearable activity trackers (WATs) growth has advanced quickly and accuracy testing has not maintained pace with the number of instruments in usage. The survey on the adoption and implementation of WATs is primarily based on the dialogue approach which makes it clear that a WAT gadget doesn't identify the desired outcomes in itself.

The confidentiality experience of wearable activity tracker may be influenced by attitude, personal confidence, and functionality of the device. For instance, more psychopathic users are more mindful of data privacy, while more secure users are less worried about confidentiality consequences. Based on an increase in user personality awareness, Karen et al.[52] proposed the customization options of developers and designers for different user groups with different secrecy preferences. While wearable healthcare technology has grown promisingly, its introduction has been delayed in contrast with other well-known portable technology devices such as mobile phones and tablets. This is because wearing healthcare technology is still being commercialized in a developmental stage, with most of the prestudies centered on its technical development, leading to insufficient comprehension of its spreading process.

## 7. Conclusion

The COVID-19 pandemic has underscored the need for more harnessing of digital infrastructure for remote monitoring. We see a need for more robust disease detection and monitoring of public health, which may be enhanced via wearable sensors since existing viral diagnostics and vaccinations are sluggish to develop. While this technology has been utilized to connect physiological measurements to everyday life and human performance, its use in forecasting the occurrence of COVID-19 remains a need. Wearable device users may be notified if alterations in their indicators match those linked with COVID-19. Anonymized data targeted to specific areas, like neighborhoods, may offer public health officials and academics a useful tool for tracking and mitigating the virus's transmission. As the world is being confronted with this deadly scourge, the utilization of wearable sensors has great potentials to help quickly build stable and secure information technology systems for the early detection, tracking, and control of SARS-CoV-2.

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