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BLOCKCHAIN TECHNOLOGY TO COMBAT THE CRISES OF COVID-19 PANDEMIC AND INFODEMIC SITUATION

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Abstract: Corona virus 2019 (Covid-19) is an infectious disease caused by SARSCoV-2 (severe acute respiratory syndrome) (SARSCoV-2). As a result, the World Health Organization (WHO) and nearly every country's health agency has recommended that the best medication for combating the COVID-19 pandemic is keeping social distance and quarantine. This pandemic has had a negative impact on practically every element of human life, as well as many business sectors and global areas. Another big issue is the bogus information epidemic (sometimes known as the "disinfo epidemic"), which is intensifying the pandemic. In these circumstances, blockchain technology can be used to discover health security problems, analyze preventive actions, and speed up decision-making processes so that action may be taken quickly and effectively. We begin by noting some of the broader issues that have developed throughout the COVID-19 outbreak.

Index Terms- Corona Virus 2019(Covid-19), WHO, Blockchain, Vaccine, Infodemic, Pandemic

I. INTRODUCTION

On December 31, 2019, the World Health Organization (WHO) received notification of instances of pneumonia from an unknown cause in WUHAN, CHINA. On January 7, 2020, Chinese authorities identified a novel coronavirus as the cause, which was given the temporary designation "2019-ncov." The WHO designated COVID-19 and SARS-CoV-2 as official designations on February 11, 2020. The coronavirus illness outbreak has been confirmed in over 210 countries and territories as of June 2, 2021. Over 3.5 million people have died as a result of the virus, which has infected roughly 171 million people globally. The United States, Brazil.[1] The appropriate management and safe recovery of the huge amount of personal health data created by the usual activities of conducting business and providing services is a significant concern for the healthcare industry. Wearable and other healthcare monitoring technologies generate large volumes of personal health data. [4]

One of the primary characteristics of the contemporary era is technological advancements, which may assist us to overcome the obstacles provided by COVID-19. Artificial Intelligence (AI) and Machine Learning (ML), the Internet of Things (IoT), Blockchain, robotics and unmanned aerial vehicles (UAVs), 3D printing, nanotechnology and synthetic biology, 5G communications, cloud and edge computing, and Big Data can all be used to develop intelligent emergency management strategies for the COVID-19 pandemic. The European Parliamentary Research Service (EPRS) has identified the blockchain as one of the ten critical technologies to combat COVID-19. [3] Each transaction performed in a block of the network is validated through a process based on the consensus distributed across all nodes. Blockchain technology is part of a larger category of Distributed Ledger technologies, whose operation is based primarily on a register structured into blocks linked to a network. [5]

II. SURVEY ON COVID-19

COVID-19 has taken many lives around the world and poses an unprecedented threat to public health, food systems, and the workplace. The economic and social consequences of the pandemic are devastating: tens of millions of people are at risk of falling into extreme poverty, and the number of people who are undernourished, which is currently projected to be approximately 690 million, might climb to 132 million by the end of the year. The epidemic has had an impact on the entire food chain, exposing its vulnerability. The pandemic has been affecting the entire food system and has laid bare its fragility. Farmers and agricultural workers have been unable to access markets, including to acquire inputs and sell their goods, due to border closures, trade restrictions, and confinement measures, disrupting domestic and international food supply chains and limiting access to nutritious, safe, and diverse meals.

2.1 Vaccines

The COVID-19 vaccinations' influence on the pandemic will be determined by a number of factors. These factors include the vaccines' efficiency, the speed with which they are approved, manufactured, and supplied, the potential for new varieties, and the number of people who get vaccinated. Many possible COVID-19 vaccines are being developed by scientists all around the world. These vaccines are all designed to train the immune system how to recognize and block the virus that causes COVID-19 in a safe and effective manner. [10]

While numerous COVID-19 vaccines have demonstrated to be highly effective in clinical studies, COVID-19 vaccinations, like all vaccinations, will not be 100% effective. The World Health Organization is aiming to ensure that licensed vaccines are as effective as possible so that they can have the maximum impact on the epidemic. Several types of possible COVID-19 vaccines are being developed, including:

- Vaccines based on inactivated or weakened viruses, which use a type of the virus that has been inactivated or weakened but still triggers an immune response despite the fact that it does not cause disease.
- Protein-based vaccines, which safely produce an immune response by using innocuous protein fragments or protein shells that resemble the COVID-19 virus.
- Viral vector vaccines, which use a non-pathogenic virus as a platform for producing coronavirus proteins and eliciting an immune response.
- RNA and DNA vaccines are a cutting-edge method that generates a protein from genetically modified RNA or DNA, which then safely triggers an immune response.

III. BLOCKCHAIN

A blockchain is a method of storing data that makes it difficult or impossible to manipulate, hack, or defraud the system. A blockchain is a digital log of transactions that is duplicated and distributed across the blockchain's complete network of computer systems.

3.1 Blockchain in healthcare

In the field of healthcare, Blockchain has a wide range of applications and uses. The ledger technology allows for the secure transfer of patient medical records, the management of the pharmaceutical supply chain, and the unlocking of genetic codes by healthcare researchers. The most popular blockchain healthcare use at the moment is keeping our sensitive medical data safe and secure, which is unsurprising. It's a matter of safety. In the healthcare industry, security is a big concern. Because of its capacity to preserve an incorruptible, decentralized, and transparent log of all patient data, Blockchain is ripe with security applications. Furthermore, while the blockchain is transparent, it is also private, masking any individual's identity using complicated and secure protocols that can preserve the sensitivity of medical data. Patients, doctors, and healthcare providers can all share the same information swiftly and safely thanks to technology's decentralized nature. [1]

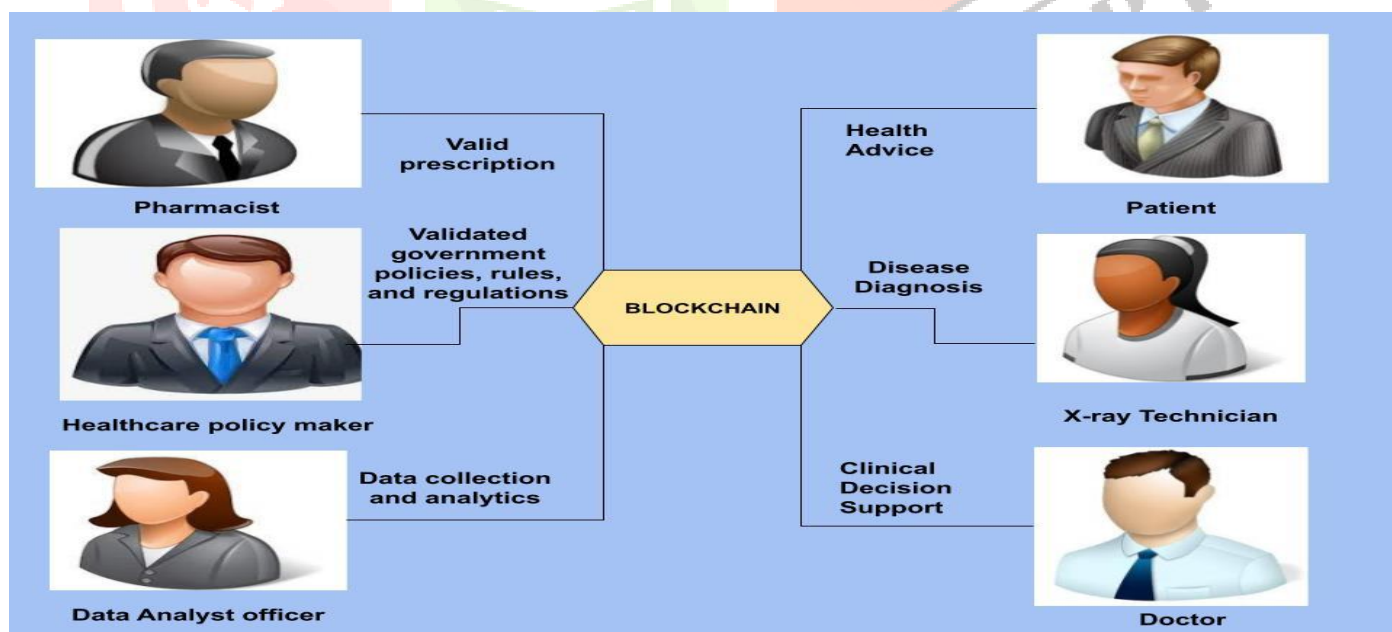


Figure 1: Blockchain for healthcare data management

3.2 Blockchain and Covid

The rapid spread of the COVID-19 pandemic has revealed the modern healthcare system's shortcomings in dealing with public health catastrophes. It is clear that implementing cutting-edge technology like blockchain can aid in the efficient planning of operations and resource deployments. Blockchain technology has the potential to improve clinical trial data management by lowering regulatory approval delays and facilitating communication between various parties in the supply chain, among other things

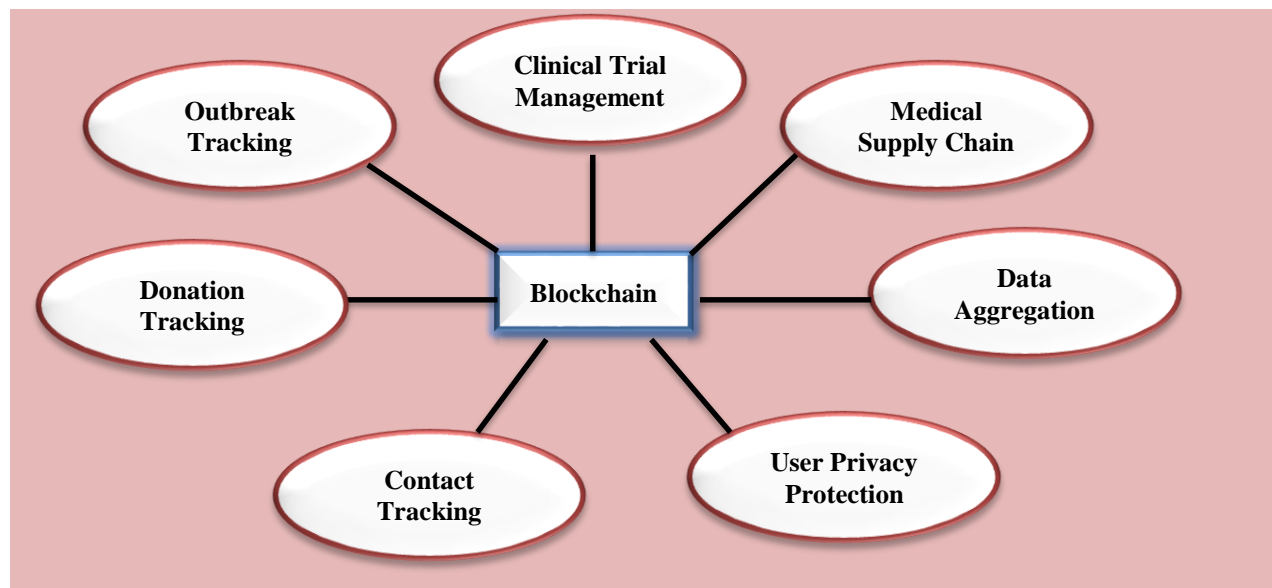


Figure 2: Blockchain use cases for Covid-19

Blockchain technology has a number of possible applications that could aid in the fight against the present pandemic. It can be used to streamline vaccination and medicine clinical trials, boost public awareness, manage donations and fundraising efforts publicly, and serve as a dependable data tracker. [2]

IV.COVID-19 INFODEMIC

COVID-19 has led to a parallel pandemic of disinformation that directly impacts lives and livelihoods around the world. Falsehoods and misinformation have proven deadly and sowed confusion about life-saving personal and policy choices.

4.1 Outbreak of infodemic

Miss Sylvie Briand, director of WHO's Health Emergencies Programme's Infectious Hazards Management and creator of WHO's approach, said: "Every outbreak will be accompanied by a type of tsunami of information, but within this information, you will always have disinformation, rumours, and so on." We know that this occurrence existed even in the middle ages. However, with the advent of social media, this issue has been reinforced. It progresses at a quicker and faster rate, similar to how diseases spread through people and progress at a faster and faster rate. So, it's a new challenge, and the difficulty is [time], because if you want to fill the hole, you'll have to be faster... During an outbreak, the most important thing is to ensure that individuals do the proper thing in order to minimize or lessen the disease's effects. So, it's not just information to keep people aware; it's also information to keep people educated so they can act responsibly." [13]

Soon after the WHO labelled the epidemic a public health emergency of worldwide concern, it announced that the new coronavirus pandemic was accompanied by a "infodemic" of misinformation. The WHO has also labelled it a "second disease" that is accompanying the pandemic. An epidemic is defined as an oversupply of information, both true and deceptive, that leaves individuals unclear whether to accept or reject it when they need it. Misinformation can take two forms: "disinformation" is aimed to disseminate lies with or without malicious intent, and "misinformation" is meant to spread lies with or without malicious intent. Regardless of the classification, both are hazardous, and the pandemic and human health are the main concerns here. [6]

On February 26, 2020, the first coronavirus case in Pakistan was reported. However, false information about the virus had been spreading for a long time. In January 2020, viral WhatsApp messages began circulating about people dying in China as a result of a "mystery sickness". Soon after, a number of Facebook pages and Twitter accounts began sharing video clips from a Hollywood film and comparing them to the scenario in Wuhan. The mainstream media in Pakistan was cautious in its coverage of the coronavirus, but this was more due to its reluctance to comment on anything contentious relating to China than any sense of social duty. [7]

4.2 Why, What and How of the Covid-19 is disinfodemic

Falsehoods are frequently hidden among facts, and the epidemic dresses itself up in familiar formats. It employs well-known techniques, such as creating false or misleading memes and posing as legitimate sources, as well as tricking individuals into clicking on links that lead to criminal phishing expeditions. As a result, disinformation about COVID-19 has an impact on material across the board, including information about the disease's origin, distribution, and incidence; symptoms and treatments; and government and other actor actions.

COVID-19 misinformation has used a variety of media to contaminate public awareness of the epidemic and its impacts. Many have polished their skills as a result of anti-vaccination efforts and political disinformation. They commonly smuggle falsehoods into people's minds by emphasizing sentiments over reasoning and sentiments over deduction. They rely on

preconceptions, division, and identity politics, as well as credulity, cynicism, and people's attempts to make easy sense of a complex world.[8].

These policy briefs were based on research that identified four major demographic format types

- Emotive narrative constructs and memes.
- Fabricated websites and authoritative identities.
- Fraudulently altered, fabricated or decontextualized images and videos.
- Disinformation infiltrators and orchestrated campaigns

V. BLOCKCHAIN BASED SOLUTIONS FOR COVID-19

Because of the widespread use of social media, the COVID-19 pandemic is a global issue, and the epidemic around it has exacerbated the magnitude of the crisis. Reducing the spread of fake news, in turn, lessens the severity of the disease epidemic by limiting stakeholders' reckless and erroneous behaviors. As a result, employing technology like the blockchain to ease the transmission of information in a trustworthy and authorized manner across diverse stakeholders within an information ecosystem has become extremely vital during a pandemic. [12]

Because the Blockchain is decentralized, there is no single location where it may be stored, making it a database or ledger that can be shared across a network. Only authorized individuals have access to this ledger since it is encrypted. Because the data is shared, the records cannot be tampered with. As a result, no single body will be in charge of the data. Data security is considerably improved by decentralizing data storage. Because other nodes in other locations will continue to function, any assault or outage at a single site will not have a devastating effect. We disseminate the data across a global network rather than uploading it to a centralized cloud. The cloud is shared, making it hard to mess with, and the files are encrypted so that only the owner can see them. [11]

5.1 Blockchain to store patient's information

Blockchain has shown enough promise to become an important part of the COVID-19 fight, as it would provide efficient tracking and monitoring solutions, assure a transparent supply chain of critical items and donations, and secure payments. It can be used to more effectively gather and examine patient data, as well as screen patients' movements to ensure the appropriate social separation while protecting their identities.

By providing safer mechanisms for health information transmission of medical data in the healthcare business, Blockchain has the potential to revolutionize the way patients' electronic health records are exchanged and preserved. By putting the patient at the center of the health system and boosting the security, privacy, and interoperability of health data, blockchain technology has the potential to revolutionize health care. By making electronic health records (EHRs) more efficient and secure, this technology could create a new model for health information exchange (HIE). [14]

Where transparency and immutability are desired, the Blockchain is best suited for recording transactions with a small digital footprint. In other words, it's perfect for circumstances when there's a lack of confidence among network participants and data blocks are small. Identity verification of patients, providers, or suppliers; supply chain management; and administration of dynamic patient permission to data usage are all examples of situations where the blockchain could be used in health care. [16]

5.2 Vaccine and medical equipment distribution enabled with Blockchain

During the COVID-19 Pandemic, the world's major supply chains failed not only for essential items such as hand-washing soaps and toilet papers, but also for lifesaving ventilators and PPE kits in clinics and hospitals. With the benefits of Blockchain technology, one can easily get distributed ledgers with audible records to track every asset in the supply chain. [18].

To deal with such a major catastrophe as COVID-19 now and in the future, a well-designed healthcare management system is required. To protect themselves and others from COVID-19, frontline health responders require more than 89 million masks, 39 million gowns, 76 million gloves, and 2.9 million liters of hand sanitizer per month, according to the WHO. All of the above-mentioned objects are managed using blockchain technology. During the PV-19 crisis, it is also projected to improve medical record administration, insurance claim processing, clinical and biomedical research, and enhance biomedical and healthcare.

Despite all of the efforts, the two successful coronavirus vaccines — Pfizer and Moderna – are required to be stored and transported at sub-zero temperatures. The doses will no longer be effective if they are placed beyond the safe temperature range for an extended period of time. Furthermore, Pfizer must be administered within a few weeks of the first dose. The process must be resumed if a patient needs to wait for a lengthy amount of time. Security officials raised concern about criminals taking advantage of the issue to create counterfeit doses during an official meeting with Pfizer. However, before supplying vaccinations to healthcare practitioners, even supply chains will be needed to establish the validity of their products.

Due of the intricacy of multidimensional supply chains, it may be difficult for a corporation to track down problems. The process may be made a lot easier with a dependable, transparent, and repeatable delivery system using the finest blockchain development platform. In addition, the Blockchain can give real-time visibility of vaccine distribution and the chain of custody from manufacturing to administration, removing any gaps between public and private institutions. [17]

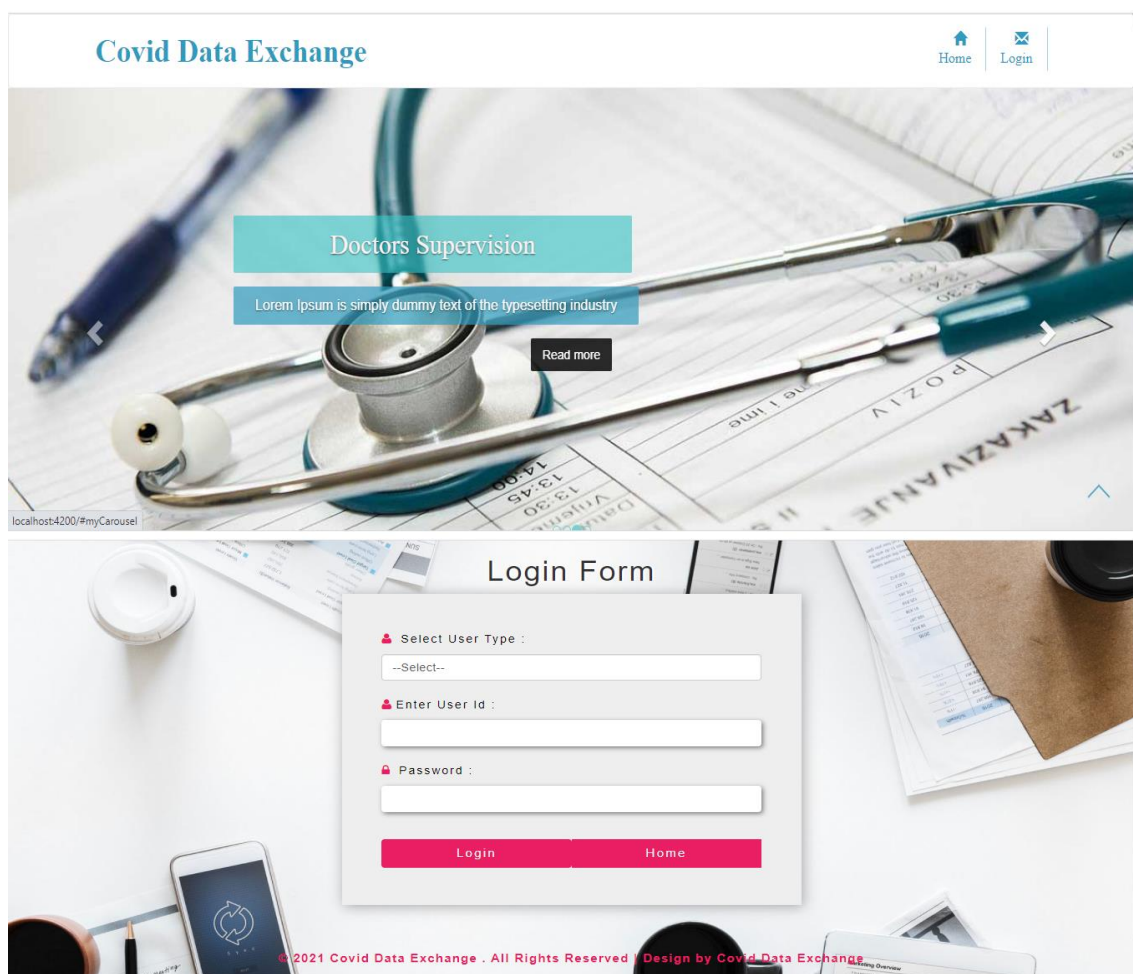
5.3 Blockchain to solve infodemic or misinformation

Every day, a fresh set of perplexing data points on the number of positive and negative tests, patients admitted to hospitals, deaths, hospital beds occupied, ventilator shortages, and so on are published. These figures enable policymakers and the general public to watch COVID-19's progress in real time as new information becomes available, making it a data-driven pandemic. [20] On the other hand, these figures offer a significant difficulty because decisions based on them are frequently inaccurate and incomplete. In pandemic management, data verification and validity are critical for public conclusions and recommendations based on recorded or reported data statistics. As a result, tracking apps have become important and beneficial in preventing the spread of the virus while also ensuring data quality and integrity. [15]

The developing technology of blockchain has been declared to transform the way information is produced and shared. The problem of fake news can be efficiently dealt with thanks to the blockchain's traceability, transparency, and decentralized nature. [19]

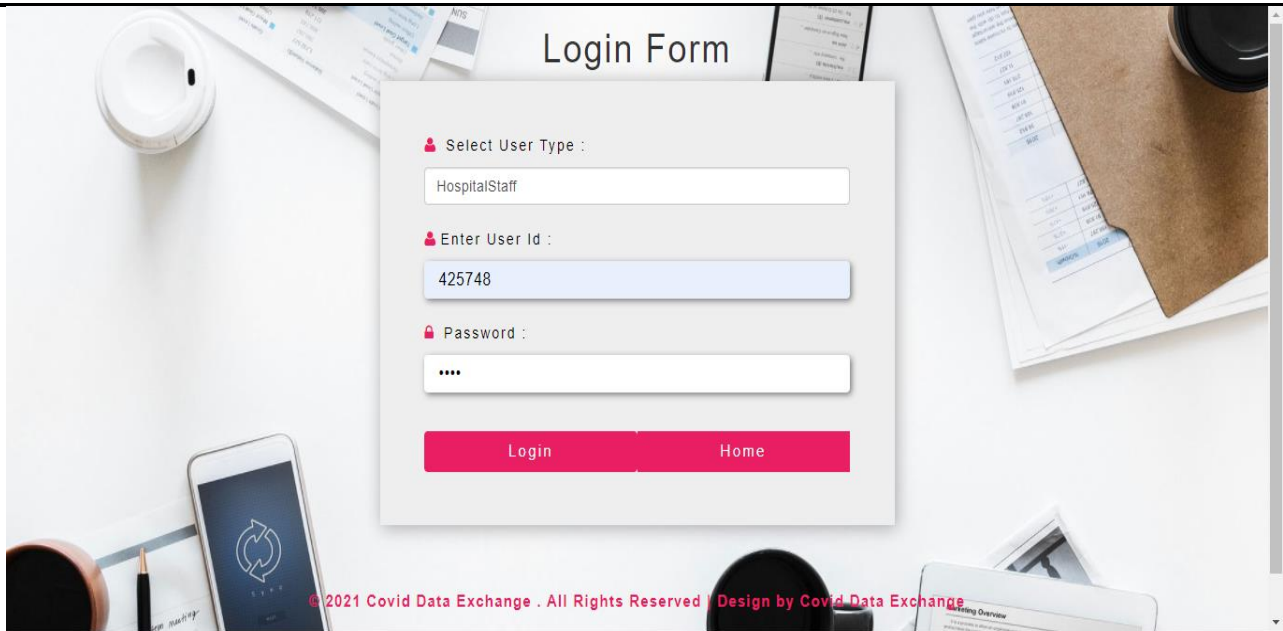
VI. RESULTS ANALYSIS & DISCUSSION

The below snapshots show the result of our project based on blockchain. It provides a privacy preserving framework for Health information exchange. This framework provides a secure way for patients to control their medical data, authorize access to their medical records and preserve personal autonomy.



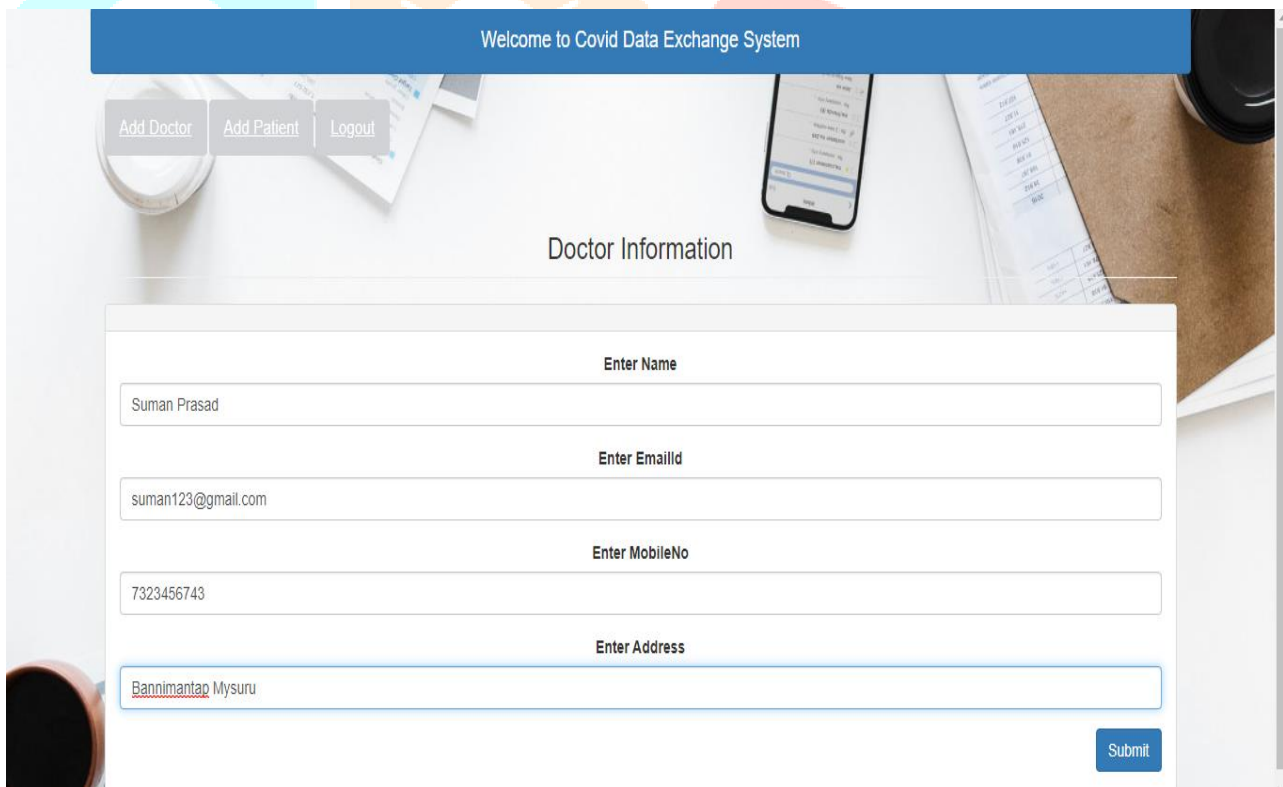
Snapshot 1: Home page and Login page

The above snapshot shows the home page and login page of the application where login page accepts authenticated user Id and password.



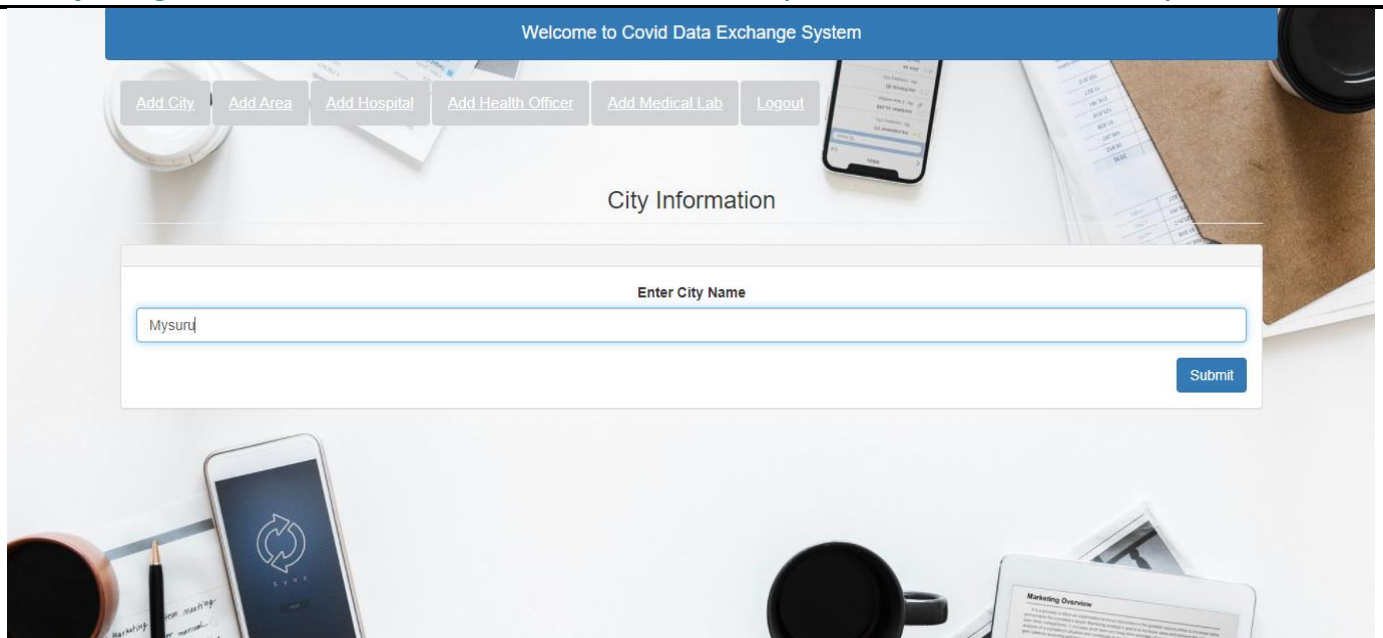
Snapshot 2: Hospital Staff login page using valid credentials

The above snapshot shows the login page of hospital staff where valid credentials need to be entered. The respective user ID and password for hospitalstaff to login will be sent to his respective Email ID.



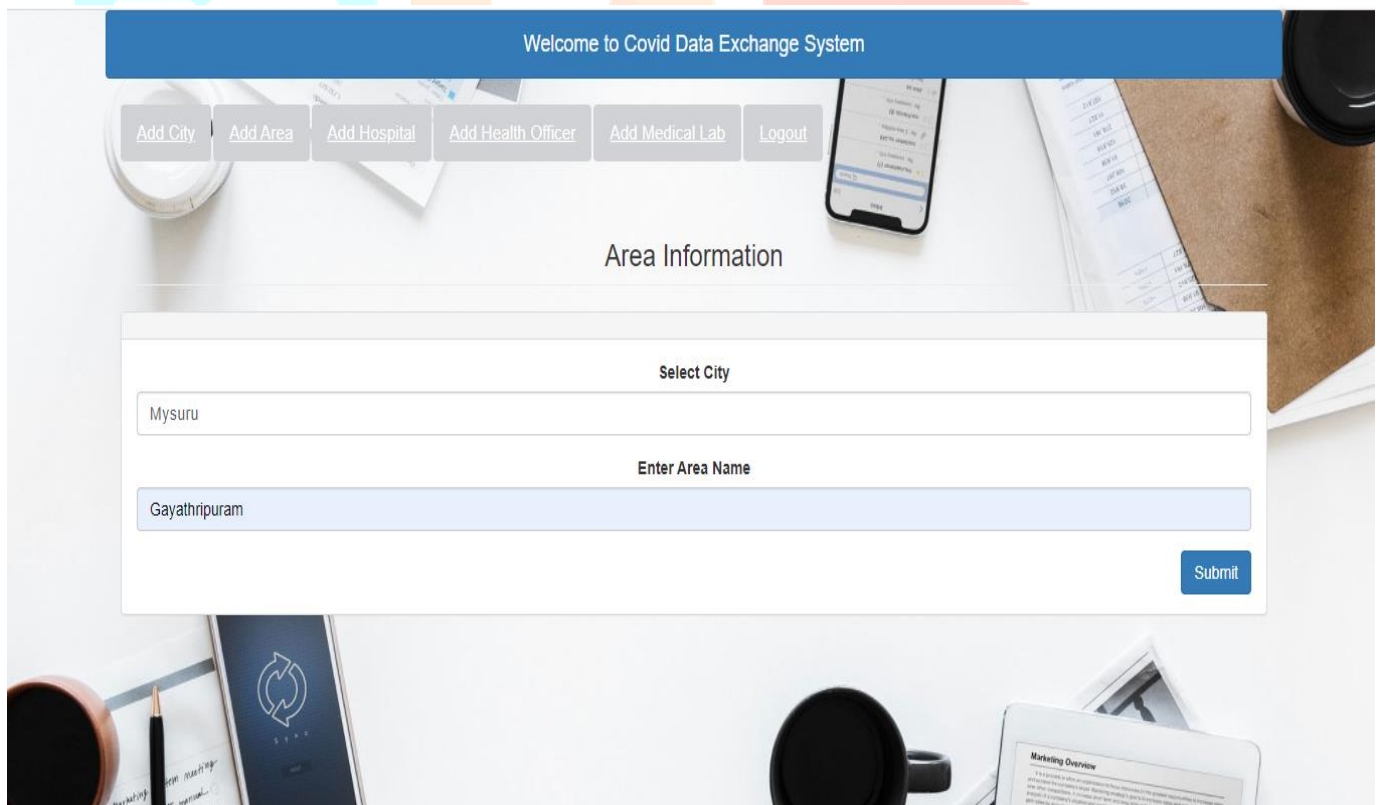
Snapshot 3: Hospital Staff adding doctor information

The above snapshot shows adding doctor's information by hospital staff with labels such as Name, Email-Id, Mobile No and Address.



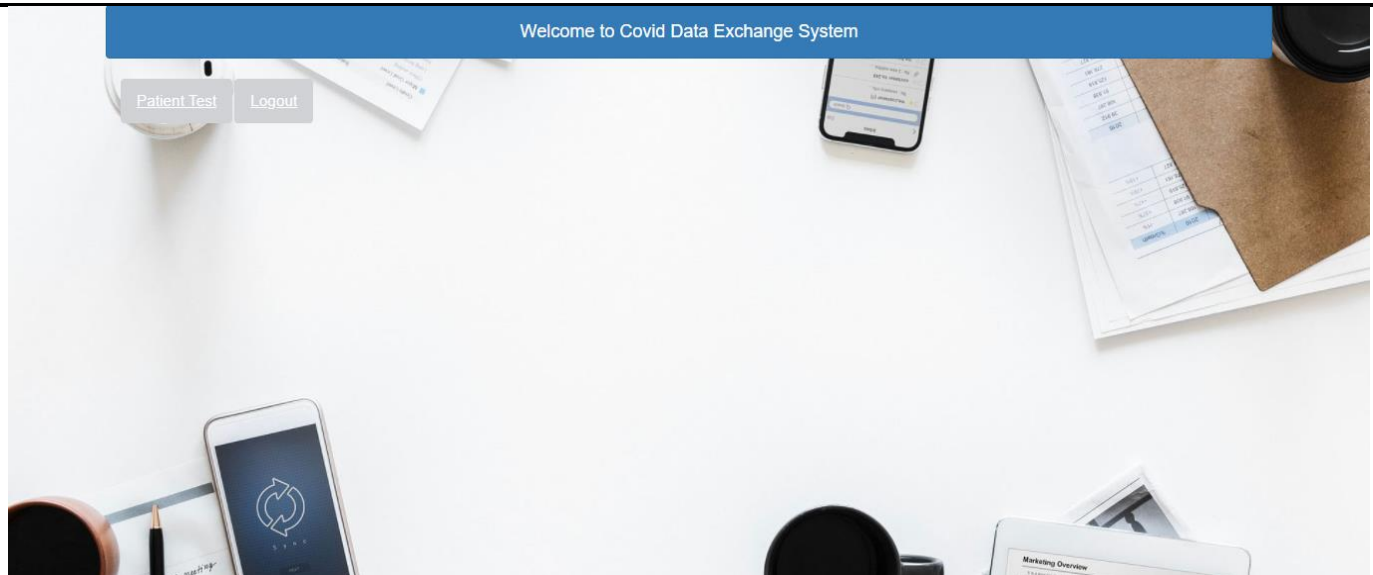
Snapshot 4: Health admin adding information about city

The above snapshot depicts the page health admin can see after login. Health admin can add information about city, area, hospital, health officer and medical lab. Here we can see adding information about city.



Snapshot 5: Health admin adding information about area

The above snapshot depicts adding information about area by health admin with labels such as city, and area name.



Snapshot 6: Medical Lab can view this page after login

This pic shows the page which we get after we get logged in as Medical Lab. Here we can add patient's test result.

VII. CONCLUSION

People from all over the world are working hard to find the best solutions concerning the development and testing of vaccines, preventing the spread of infection and quick identification of viral carriers since coronavirus is extremely contagious. Both a lack of accurate and timely data and pervasive misinformation are causing increasing harm and growing tension between data privacy and public health concerns. In fact, blockchain potential use cases in healthcare vary accordingly to satisfy different requirements, such as data sharing, security and data access.

VIII. ACKNOWLEDGEMNT

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