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# Contact-Tracing Applications (Covid-19): A Survey on Their Worldwide Adoption and Problems

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**ABSTRACT:** Several countries across the world are pondering how to return to routine as the number of COVID-19 cases continues to fall. To keep the spread of virus under control and avoid a new epidemic, researchers are considering the possibility of using contact monitoring. With so many options available, contact tracking is accessible, but it still has privacy protection issues that make general application a tough task. A new architecture for contact tracing based on blockchain technology is offered. Incorporating blockchain with contact monitoring applications allows users' personal privacy to be protected while simultaneously giving the general public and government agencies with a thorough spotlight on all incidents that have been proven. The COVID-19 contamination in the general population is also calculated and published on a blockchain to aid with contact tracing. In these areas, prospective transmission concerns might be effectively disclosed while still maintaining the confidentiality and integrity of data. Finally, a variety of statistical solutions are shown and conclusions are drawn.

**KEYWORDS:** Covid 19, Contract Tracing, Blockchain.

## I. INTRODUCTION

COVID-19, a SARS COV2 variation, has been shown to be one of the most dangerous and difficult-to-treat infections on the world. Around the end of 2019, the COVID-19 (new coronavirus) spread significantly in Wuhan, China, infecting a large number of people. There is now a domestic epidemic under control, but the unique COVID-19 virus is quickly spreading across several locations. In the current viral epidemic, Europe has emerged as the focal point. The new coronavirus has presented a huge danger to people's well-being and physical and mental health all across the world because of its tremendous transmission capabilities and potential for disease epidemics. COVID-19 is a highly contagious virus that may be spread both directly and by implication from an infected person to a healthy person by the transmission of nose and mouth droplets and fluids produced during hacking or sniffing. The exact cause of the illness is still a mystery. It is our goal in this research to provide an efficient, powerful, and safe way to track COVID-19 patients' interactions. We wrote this post to raise awareness about the dangers of coronavirus transmission in areas with a high density of people and high levels of mobility. There is little resistance against viral transmission in densely populated locations, particularly if the sick and uninfected persons are in close proximity to one other. For contact tracing to improve, advanced technology may be integrated into the present public health system. People's health and well-being is a major aspect of contact tracing, which is done to assist local community engagement and collaboration in the fight against unstoppable illness transmission.

### Existing system and drawbacks:

A contact is a person who has been exposed to one or more of the following: 1) within one metre of a probable or confirmed case for at least 15 minutes; 2) direct physical contact with a probable or confirmed case; 3) direct care for a patient with probable or confirmed COVID-19 disease without the use of recommended PPE; or 4) other situations as indicated by local risk assessments.

### Problem statements:

The present state of COVID-19 has had a significant influence on India and the rest of the globe. In India, the mortality rate is quite low, but the recovery rate of those who have been infected is not, which is putting the country in a tough position. Even though community transmission has just recently begun in India, the number of infections is rising at an alarming rate. Indian authorities have taken a few critical measures, such as making masks and sanitizer readily accessible, and giving free diagnostic testing and diagnosis. COVID-19 "do's and don'ts" events are held in public settings to educate the general people on what to do and what not to do.

### Objective:

We can track the whereabouts of covid-19 patients using an Android app, and these location information are kept in the blockchain.

## II. LITERATURE SURVEY

As viral diseases like Severe Acute Syndrome (SARS), H1N1 and Ebola emerged in recent decades, they disrupted human life and triggered an economic and health crisis. If you come into touch with a sick person's body fluids or respiratory droplets, you might be infected as well, since these illnesses are highly contagious. Each individual who has come into touch with the ill person has to be physically contacted and tracked. Paper [1] presented an Efficient Privacy-preserving Touch tracing for infection detection (EPIC) that enables individuals to upload their information privately to the server and afterwards, if any person is sick, the lets other users know whether they have come into contact with that ill person previously. The whole process is carried out in the privacy of your own computer, and no personal information is sent to the server.

disease. It was quite difficult to do the manual contact tracing with the little labour available. The demand for digital contact tracing (DCT) increased in this situation. As discussed in paper [2], Singapore, a densely populated country, was prepared for the Covid-19 pandemic by introducing digital tracing techniques such as Safe Entry, which uses the cloud to register visitors, and TraceTogether, an app that uses Bluetooth to swap anonymous identifiers between nearby phones.

A Bluetooth-based contact tracking approach known as Trace Together was the first of its kind to be implemented throughout the country. In response to the epidemic, Singapore's Government Technology Agency and the Ministry of Health created a flattening of the curve programme. BlueTrace is a privacy-preserving protocol that makes it easier for participating devices to log Bluetooth encounters for contact tracking while still protecting the privacy and personal information of users.

In the absence of vaccinations, non-pharmaceutical treatments (NPIs) focused on the Covid-19 suitable guidance on social distance and more effective contact tracking methods using mobile phone apps to flatten the curve. A new EPIC process known as the Beep Trace was developed by Hao Xu and colleagues in paper [4] by utilising a blockchain to connect users and authorised solvers in order to eliminate the need for user identification and location data while also extending battery life and making it globally available. In order to limit the number of pandemic cases, it also speeds up digital contact tracking. The Covid-19 pandemic digital interaction tracking privacy issues have been addressed with this blockchain-enabled approach.

Eun-A Kim's research in paper [5] reveals how the Korean system's reaction to Covid-19 was in the workplace and public spaces. Early diagnosis in public settings and strict adherence to social distance were crucial to Korea's success in eradicating the epidemic. Despite recurrent breakouts in previously unmonitored workplaces including karaoke, nightclubs, and job transfers, the country's infection rates have remained stable without causing significant harm to yet. Isolation events, physical separation and community confinement have been used throughout the nation in order to minimise the transmission of illness from person to human.

How Taiwan dealt with the Covid-19 outbreak is described by Shu-Wan Jian et al. in study [6]. Digital techniques and a relational database were important in tracking contacts. For the first time in 2017, the Taiwan Center for Disease Control (TCD) developed a nationwide contact tracing model called TRACE, which linked contact information to other databases, was used to monitor the well-being of contacts, and helped manage contact through daily descriptive studies and performance indicators. The TRACE method was able to avoid all asymptomatic and pre-symptomatic infection. Case evaluation, contact list development, well-being monitoring over the phone and self-reporting using web-app, and quarantine of close friends were all steps in the contact tracking process.

According to Paige Koetter et al. in their research [7], the United States tackled the covid-19 epidemic by doing extensive physical contact tracing. Medical, nursing, and public health students worked together to build a team that was

directed by clinicians and epidemiologists. They phoned the sick individual on the phone and helped trace the others they had come into contact with and ensured that quarantine and isolation were carefully maintained, which averted the detection of asymptomatic and presymptomatic cases." In spite of these difficulties, they were able to successfully control Covid-19 in the United States using contact tracing. Many skilled students have to be put together in order to carry out the procedure in a methodical manner. To make matters worse, when more people were needed to assist in contact tracking, it became tiresome and laborious.

The current contact tracking system is centralised, which makes it simple for information to be hampered, resulting in a decrease in privacy. Using 5G technology and a BC-based health application called PTBM, researchers built a privacy-preserving paradigm for interaction in edification. Decentralized contact tracking based on BC technology and secure encryption and decryption is what this approach is all about. Faster communication and reduced latency are enabled by 5G networks, while secure data storage and public location privacy are made possible by blockchain, ensuring the privacy of both users and patients.

According to Anshuman Kalla et al., in their work [9], contact tracking of Covid-19 illness has been much improved by the use of blockchain technology. One of the top ten digital methods for battling the COVID-19 infection is the use of blockchain. As a decentralised system for tracking contacts, each block contains a collection of data that is then linked to the previous block to create a cryptographic chain. Disaster management, patient data security, e-government, contactless delivery, migration and production management, automated study, and online education are all made easier using the blockchain technique.

Blockchain and Artificial Intelligence are discussed by Dinh C Nguyen et al. in paper [10] as a digital weapon in the battle against the COVID-19 pandemic. This COVID-19 epidemic is being combated via a system built on the Blockchain and AI technology. The Blockchain technology is used in a wide range of applications, including early identification of the virus, quicker delivery and ordering of medications in pandemic tracking, and privacy protection for patients and users. Using artificial intelligence (AI) may help with outbreak evaluation and infection identification as well as vaccine manufacture and the prediction of future outbreaks like COVID-19.

There is a systematic review in article [11] by Wei Yan Ng et al. on the application of Blockchain technology in COVID-19 and non-COVID-19 linked apps in healthcare. COVID-19 related applications including as contact tracking, pandemic control, and vaccination monitoring utilise BC technology. Management of digital healthcare data, IoT, and supply chain monitoring are all non-COVID-19 concerns that must be dealt with. The Outbreak of corona virus and non-corona virus-related healthcare applications may benefit greatly from Blockchain technology.

There is a technique proposed in article [12] by Rajesh Kumar et al., which uses Blockchain-based joined knowledge to train a global deep learning system that uses the most recent data to improve the identification of CT scanned pictures. A CT (Computerized Tomography) scanner data normalisation approach has been presented to deal with the validity of data from different medical facilities and various CT scanners. To identify infected patients, a capsule network-based segmentation and classification was used. Last but not least, a mechanism is devised to preserve data while simultaneously training a global model utilising blockchain technology and federated learning. It's a sophisticated model since it's able to analyse data from a variety of hospitals.

According to a report by Santhosh Nandi and others, the supply chain for the COVID-19 epidemic may be redesigned using Blockchain-based Circular economy. Implementation of the following qualities in the supply chain is required: localisation, agility, and digitalisation (LAD). Finally, a possible solution that incorporates Blockchain and the circular economy's main capabilities is related to LAD. The goal of the circular economy (CE) is to minimise carbon footprints by recycling, repairing, and reusing products in a looped system. Rather of relying on a central authority, the Block Chain Technology (BCT) operates on a decentralised network of users who have agreed to authenticate the accuracy of the data they are exchanging. In order for supply chains to be supported, researchers should investigate the function of administrations in using BCT-CE-LAD replicas.

An in-depth analysis of the medical features, analysis, handling, and impact on the global economy of the COVID-19 pandemic is provided in paper [14] by Vinay Chamola et al., who also discuss the role played by various technologies such as artificial intelligence, blockchain, internet of things, 5G, and unmanned aerial vehicles (drones) in the fight against the pandemic. These technologies aid in reducing the disease's negative consequences and speeding up the recovery process. Different key sectors worldwide are affected by the outbreak and various technology institutions, research organisations, and businesses are seeking to employ different current technologies to succeed and prevent the spread of the epidemic.



There has been a rapid increase in the number of cases with COVID-19 and a huge amount of information has been gathered from this condition. There is also a pressing need to store, manage and analyse this massive data set in an efficient manner so that it can be used by healthcare experts to tackle this pandemic. Using Blockchain technology to combat the COVID-19 epidemic is discussed in study [15] by Het Shah et al. The large-scale data must be sent across the Internet, which is vulnerable to cyberattacks. As a result, the immutability and transparency offered by Blockchain technology make it an ideal solution for storing data. In order to battle the COVID-19 pandemic, it authenticates the user transaction and verifies the payments or supply chain, and analyses the digital vaccine passport.

Several countries in the area are rushing to hide the sickness, for example, by closing their borders, while also researching ways to mitigate the overall economic impact. There is another method to cope with worldwide clinical and logical collaboration, as DaborResiere et al. argue in their study [16]. An ambitious plan of coordinated measures focused on meeting the immediate needs of non-industrial countries while also considering long-term and global considerations. COVID19 has shown both the value of multilateralism in times of crisis and the extent to which international support has collapsed. Fighting a disease requires the dissemination of factual information about the condition.

Using Bluetooth-enabled mobile phones, Bakhtawar Aslam et al., propose a BC-based system that protects patients' privacy by tracking their contacts. A mobile app connects to the planned BC system for contact tracing of the whole population through Bluetooth and transmits the collected data to health departments and administrative offices in the vicinity to carry out critical and desirable operations, such as ensuring the safety of the public (e.g., like isolation the contaminated individuals affecting around). While a result, the suggested system provides users with a measurable instrument that protects them against contaminated and exposed persons as they go about their daily activity. It is possible for a mobile phone app to look at a person's COVID position and determine whether or not they are contaminated based on the symptoms they display.

This research [18], written by WenzheLv et al., addresses the safety, secrecy, and conveying efficacy of computerised interaction tracing in contradiction of the COVID-19 sickness by developing a decentralised BC framework. A distributed BC architecture and a combination of cryptographic approaches will be used to provide contact tracing and area resistance data security in the convention's intended format. Zero-knowledge verification and key escrow are used to protect the secrecy of uniqueness. On-chain proof of area responsibility has been divorced from the distinctive cryptographic identity of the owner, making it very impossible to follow and identify the owner of the data.

A few mobile phone applications have been developed by governments, international organisations, and other groups to help stop the spread of the virus. " Regardless, the collection and use of data, as well as the security of that data, are subjects of growing concern. B. Sowmiya et al., in this article [19], dissected a complex system of interaction-tracing applications that perform various security and protection functions. We divided interaction-tracing programmes into three categories: security, data storage, and data safety. Finally, the AES encryption standard and arbitrary cloud storage are used to protect information obtained.

Cell phone-based and remote organization-aided apps are used in the newest contact tracing approach, the COVID19 contact tracing. As Mohammad Javed et al. said in their paper[20], the fundamental developments, processes and applications of those applications anticipated for this ailment were examined. As a scientific classification, they were rated on their inadequacies against a wide range of difficulties and lattices discovered throughout our investigation, as well as the possible perfect features that processes may really indicate. Our next step was to analyse the core technologies, protocol specifications, and interaction tracking applications in depth.

#### FINAL THOUGHTS

Due to the fact that SARS COVID-19 spreads via intimate personal relationships, contact tracking will be critical in the fight against its spread. For contact tracking programmes, cell phones are an ideal starting point because of their convenience, limitless ownership, and customization. As a result, governments, international organisations, and other groupings have developed a number of mobile phone applications aimed at limiting the spread of the virus. A number of advanced mobile phone apps are being developed to limit the rapid spread of COVID-19. It is a major part of the present inquiry to follow others in close proximity to the infected-distressed person. As a result of the current global lockdowns, the economy of all countries throughout the world are reflected in the current state of affairs. Here, it is necessary to look

at specific approaches to deal with both social and physical segregation, as well as monetary activities for check-ins, in order to do more study.

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