

TITLE 1 : Aarogya Setu

- **Designed & Maintained** - National Informatics Centre, Ministry of Electronics & Information Technology, Government of India.
- **Published On** -Google Play Store, Apple Store
- **Citation / Reference** -<https://www.aarogyaasetu.gov.in/>
- **Survey**

The most popular containment zone alert application among the options currently in use in India is called Aarogya Setu. The Indian government created a mobile application to link the public with crucial health services. Its primary features include geo-location-based COVID-19 data, user risk status, automatic contact tracing using Bluetooth, and much more. The movement of an infected individual is tracked using Bluetooth and GPS technology, and the system notifies the public of the locations the infected person has visited while designating those locations as vulnerable ones. It employs cellular triangulation to determine a person's location in the absence of GPS technology. While Aarogya Setu can track down contacts and notify those who have come into touch with someone who has COVID-19, it also actively keeps track of quarantine or containment zones and alerts users who enter them.

The Terms of Use and Privacy Policy must be accepted at the time of registration when installing the application on any Android or iOS mobile device, and ongoing use of the application denotes continued acceptance. Name, age, sex, occupation, phone number, overseas travel within the previous 28–45 days, and whether the user is a smoker are all pieces of information that the app gathers.

This data is kept on a server that is under the jurisdiction of the Indian government. It is hashed and sent to the user's mobile application along with a special digital ID (DID). The user is recognised using the DID. In order for the user's mobile phone to exchange information with another device that has the app when it gets within range, the Bluetooth and GPS services must be turned on.

Their individual IDs, along with the time and GPS location, are kept on the two phones when two users come into close proximity. The format in which this data is kept is encrypted. Only after a person tests positive is it posted to the government-controlled servers of the app.

TITLE 2 : Development of An Android Application for Viewing Covid-19 Containment Zones and Monitoring Violators Who are Trespassing into It Using Firebase and Geofencing

- **Researcher(s)** - Ranajoy Mallik Amlan Protim Hazarika Sudarshana Ghosh Dastidar Dilip Sing Rajib Bandyopadhyays
- **Published On** -National Center For Biotechnology Information (<https://www.ncbi.nlm.nih.gov/>)
- **Citation / Reference** -Mallik R, Hazarika AP, Ghosh Dastidar S, Sing D, Bandyopadhyay R. Development of An Android Application for Viewing Covid-19 Containment Zones and Monitoring Violators Who are Trespassing into It Using Firebase and Geofencing. Trans Indian Natl. Acad. Eng. 2020;5(2):163–79. doi: 10.1007/s41403- 020-00137-3. Epub 2020 Jul 1. PMCID: PMC7328652.

- **Survey**

In this study, the authors concentrated on creating a mobile application to deliver details about the Covid-19 containment zones in West Bengal. The programme also keeps track of the user's whereabouts and sends an alarm if the user enters a containment zone. To keep users informed, the application also offers daily Covid-19 case statistics. The application is made with the Android SDK, and the location information is kept in the Firebase Cloud Firestore. The containment zones are surrounded by geofences made using the Android geofencing client, and notifications are sent using the notification manager. To display the Covid-19 cases in West Bengal, the application also makes use of RESTful web services.

They tested their app with a variety of users in various West Bengal areas, and they discovered that it operated effectively and helped them reach their goal.

TITLE 3 : Tracking the Covid zones through geo-fencing technique

- **Researcher(s)** -Anto Arockia Rosaline R, Lalitha R,Hariharan G,Lokesh N
- **Published On** -National Center For Biotechnology Information .
(<https://www.ncbi.nlm.nih.gov/>)
- **Citation / Reference** -R., A.A.R., R., L., G., H. and N., L. (2020), "Tracking the Covid zones through geo-fencing technique", International Journal of Pervasive Computing and Communications, Vol. 16 No. 5, pp. 409-417.
<https://doi.org/10.1108/IJPCC-06-2020-0057>

- **Survey**

Following the tracking of a suspicious person, the geo-fenced layer is mapped out in the vicinity, and the virtual perimeter is then employed for the subsequent trapping procedure. As soon as the Covid monitoring team updates this geo-fenced layer, the public can view it. The idea of creating a virtual perimeter region is known as geo-fencing. Effective containment zone monitoring is made possible by this virtual perimeter monitoring technology. By utilising an automated system based on wireless infrastructure, it lowers operational costs. Additionally, it promptly alerts the law enforcement to find the offenders. As a result, it facilitates the inspection of containment areas and the monitoring of those who disobey governmental regulations.

Users can receive updates from the Covid team on the alert zone. The Covid team has a number of modules for suspect tracking, hotspot fencing, etc. The Covid team must seek a service from the service network provider in the case of suspect tracking, and following authorization, they will offer the coordinates. According to our telecommunication legislation, it is illegal to share data; nonetheless, exchanging personal information without the individual's knowledge via any means is occasionally allowed with governmental approval for investigative purposes.

TITLE 4 : Geofencing 2.0: Taking Location-based Notifications to the Next Level

- **Researcher(s)** -Sandro Rodriguez Garzon Bersant Deva
- **Published On** -UbiComp '14: Proceedings of the 2014 ACM
International Joint Conference on Pervasive and
Ubiquitous Computing
- **Citation / Reference** -Sandro Rodriguez Garzon and Bersant Deva. 2014.
Geofencing 2.0: taking location-based notifications to the next level. In
Proceedings of the 2014 ACM International Joint Conference on Pervasive and
Ubiquitous Computing (UbiComp '14). Association for Computing Machinery,
New York, NY, USA, 921– 932. <https://doi.org/10.1145/2632048.263609>

- **Survey**

The basic Android application that served as the prototype Geofencing client was used. This client is primarily responsible for carrying out the geofencing server's ongoing location update strategy. This must be accomplished with little energy consumption because the Geofencing client is located on a mobile device. We made the decision to employ the lowenergy Geofencing features of the Android operating system to keep an eye on the safety zone. As a result, a safety zone is considered as a single circular geofence with a required exit on the mobile device. However, they discovered that there was occasionally a significant lag time between leaving the safety zone and receiving a notification from the system about the leave.

In order to address this issue, a specific amount of the safety zone's radius is decreased. While the safety zone and how it is implemented have a significant impact on overall energy consumption, it is also important to make the right choice when it comes to a placement mechanism. In order to reduce power consumption without compromising the necessary position precision, they used a device-based smart combination of various positioning

mechanisms introduced by. By temporarily deactivating placement when a device is not in motion, the Geofencing client also makes use of cutting-edge mobile sensing capabilities integrated into the Android operating system's activity recognition unit. Mobile users who live close to a geo-border fence's will find this to be of particular utility. If the Geofencing server notifies the Geofencing client about a geo-notice, the notification will appear right away.