

Developing an Alerting Application for COVID-19 Containment Zone

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Abstract— In a densely populated country like India, it is very difficult to prevent the community transmission even during lockdown without social awareness and precautionary measures taken by the people. Recently, several containment zones had been identified throughout the country and divided into red, orange and green zones, respectively. The red zones indicate the infection hotspots, orange zones denote some infection and green zones indicate an area with no infection. This paper mainly focuses on development of an Android application which can inform people of the COVID-19 containment zones and prevent trespassing into these zones. This Android application updates the locations of the areas in a Google map which are identified to be the containment zones. The application also notifies the users if they have entered a containment zone and uploads the user's IMEI number to the online database. Therefore, this application can be used as a tool for creating further social awareness about the arising need of precautionary measures to be taken by the people of India.

Indexed Terms- HTML, CSS, JS

I. INTRODUCTION

Currently there are several research works undergoing in the country to prevent COVID-19 cases from rising. Previously our country was importing medical kits like PPE (Personal Protection Kits), mask from outside, but now it has been successful in developing these kits. Along with taking initiatives to fight this disease, our country has also taken steps to make people aware of the disease. The news and media have a great part in creating this awareness by informing the public about the

preventive measures that can keep them away from infection. Awareness among the people to carry out all the preventive measures can immensely help to reduce spread of the virus. The country has created containment zones throughout the cities wherever COVID-19 cases have been reported to prevent further spread of the virus. These containment zones have been kept isolated from the outside public to ensure no contamination occurs outside.

We focus on developing a mobile based application to provide information regarding the COVID-19 containment zones. The application further tracks the user's location and provides notification alert if the user has entered a containment zone. The application also provides daily COVID-19 case statistics to the users to keep them updated. The application is developed on Android SDK and uses Firebase Cloud Firestore to store the location data. Android's geofencing client is used to create geofences around the containment zones and notification manager is used to provide notifications.

II. LITERATURE REVIEW

[1] Title: The COVID-19 Pandemic zone alerting application

Author: VINAY CHAMOLA,VIKAS HASSIJA, VATSAL GUPTA(2021)

The unprecedented outbreak of the 2019 novel coronavirus, termed as COVID-19 by the World Health Organization (WHO), has placed numerous governments around the world in a precarious position. The impact of the COVID-19 outbreak, earlier witnessed by the citizens of China alone, has now become a matter of grave concern for virtually every country in the world. The scarcity of resources to endure the COVID-19 outbreak combined with the

fear of overburdened healthcare systems has forced a majority of these countries into a state of partial or complete lockdown. The number of laboratory-confirmed coronavirus cases has been increasing at an alarming rate throughout the world, with reportedly more than 3 million confirmed cases as of 30 April 2020. Adding to these woes, numerous false reports, misinformation, and unsolicited fears in regards to coronavirus, are being circulated regularly since the outbreak of the COVID-19. In response to such acts, we draw on various reliable sources to present a detailed review of all the major aspects associated with the COVID-19 pandemic. In addition to the direct health implications associated with the outbreak of COVID-19, this study highlights its impact on the global economy. In drawing things to a close, we explore the use of technologies such as the Internet of Things (IoT), Unmanned Aerial Vehicles (UAVs), blockchain, Artificial Intelligence (AI), and 5G, among others, to help mitigate the impact

[2]Title: Real-time alerting system for COVID-19
Author :Arash Alavi, Gireesh K., Ekanath Srihari Rangan(2020)

Early detection of infectious diseases is crucial for reducing transmission and facilitating early intervention. In this study, we built a real-time smartwatch-based alerting system that detects aberrant physiological and activity signals (heart rates and steps) associated with the onset of early infection and implemented this system in a prospective study. In a cohort of 3,318 participants, of whom 84 were infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), this system generated alerts for pre-symptomatic and asymptomatic SARS-CoV-2 infection in 67 (80%) of the infected individuals. Pre-symptomatic signals were observ...

It will also alleviate the financial and emotional pressure that patients face during their stay in hospitals. In addition, it can act as one of the solutions to improve the low-standard healthcare system in Egypt [1]. In comparison to the prior applied systems, it has been found that the designed system is cost efficient, simpler in structure and more dedicated to COVID-19 virus. The proposed system is designed to include a transmitter, a receiver, and a virtual communication channel adopting IoT

technology. The implemented part of the system is centered on the sensory and the patients' interactions with the system. The obtained results revealed its efficiency compared to the state of the art systems.

[3] Title: Tracking the COVID-19 zones area
Author: Alan L. Porter , Yi Zhang, Ying Huang and Mengjia Wu(2019)

The unprecedented, explosive growth of the COVID-19 domain presents challenges to researchers to keep up with research knowledge within the domain. This article profiles this research to help make that knowledge more accessible via overviews and novel categorizations. We provide websites offering means for researchers to probe more deeply to address specific questions. We further probe and reassemble COVID-19 topical content to address research issues concerning topical evolution and emphasis on tactical vs. strategic approaches to mitigate this pandemic and reduce future viral threats. Data suggest that heightened attention to strategic, immunological factors is warranted. Connecting with and transferring in research knowledge from outside the COVID-19 domain demand a viable COVID-19 knowledge model. This study provides complementary topical categorizations to facilitate such modeling to inform future Literature-Based Discovery endeavors

III. PROPOSED SYSTEM

Android application shows the location of the containment zones to the users. It also notifies the user when he or she trespasses the boundary of a containment zone or stays in the containment zones. Creating the perfect contact-tracing and alerting system to replace the manual Process Done by Medical Welfare in the country. It also provides the alerting information and notification to the people using the application.

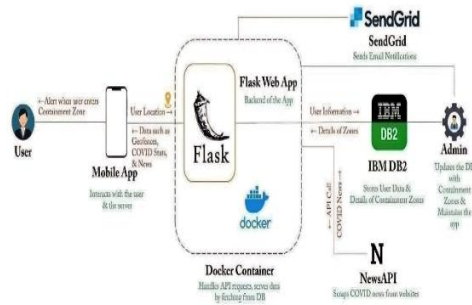


Figure 1.1 Architecture Diagram

A solution architecture (SA) is an architectural description of a specific solution. SAs combine guidance from different enterprise architecture viewpoints (business, information and technical), as well as from the enterprise solution architecture (ESA).

Technical Architecture (TA) is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.

IV. RESULTS AND DISCUSSION

Tests have been carried out in various containment zones across West Bengal for the validation of the Android application. The identified containment zones chosen for the testing of the application were visited one by one. Table 2 shows various containment zones identified for conducting the test, the date, time of entry, time of receiving the notification alerts upon entering. From Table 2, it is highlighted that the application sends notification alerts within 5–8 seconds on entering.

Containment zone with the time of carry. The time of receiving notification alerts in the android application and the extracted IMEI number of the trespasser in the corresponding containment zones which is uploaded to the online database.

Serial number	Name of the containment zone	Date of entry in the containment zone	Time of entry in the containment zone	Notification time	IMEI number
1	Bamangachi	21.04.2020	09:30:16	09:30:21	356129106619221
2	Belgachia	20.04.2020	09:45:50	09:45:55	356129106619221
3	Garden reach	22.04.2020	10:55:10	10:55:18	868134038083620
4	Garia	22.04.2020	11:52:19	11:52:25	356129106619221
5	Golabari	21.04.2020	11:20:50	11:20:59	356129106619221
6	Kaikhali	20.04.2020	10:42:12	10:42:25	868134038083612
7	Mudiali	23.04.2020	09:46:00	09:46:08	356129106619221
8	Nayabad	23.04.2020	10:58:21	10:58:28	356129106619221
9	Park circus	20.04.2020	11:35:12	11:35:17	868134038083612
10	Tikiapara	22.04.2020	09:35:23	09:35:30	868134038083612

Figure 4.1 Sample result

A. Performance Metrics

Performance metrics are used to measure the behavior, activities, and performance of a business. This should be in the form of data that measures required data within a range, allowing a basis to be formed supporting the achievement of overall business goals. Geo-fencing API from Android is used to create virtual boundaries or fences around geographical locations (Create and monitor geo-fences). The developers can add geo-fences at different locations by providing the latitudes and longitudes along with radius to define the virtual boundary at that location. Geo-fencing technology senses the user's current location and checks whether the location is inside any of the geo-fences created. A broadcast receiver receives intent contained in a pending-intent (an android API) sent by the location services when the user has entered, dwelt, or exited a geo-fence as shown in and can initiate a background work or send a notification.

The geo-fence transitions events include enter, exit, and dwell and multiple transition events can be set for the geo-fences. In this application, the dwell transition is set for the containment zones with a loitering delay of 5 seconds and an expiration duration set to never expire. The broadcast receiver is set to initiate a notification by the notification manager upon receiving an intent. Once the geo-

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[PubMed] [CrossRef] [Google Scholar]

- [4] Bihar Saathi (2020)
<https://play.google.com/store/apps/details?id=com.ibihar.saathi&hl=en>
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<https://firebase.google.com/docs/Firestore/client-libraries>
- [10] CoBuddy-COVID19 tool (2020)
<https://play.google.com/store/apps/details?id=www.facetagr.com.cobuddy&hl=en>