



User Friendly Mobile Application for COVID Vaccine Distribution and Management

A.M. Chandrashekhar¹, Saket Kumar Bhaskar², Surya Kamal³, Anshul Kumar⁴, Naresh⁵

Assistant Professor, Department of Computer Science and Engineering, JSS Science and Technology University, Mysuru, India¹

Final Year Undergraduate Student, Department of Computer Science and Engineering, JSS Science and Technology University, Mysuru, India^{2,3,4,5}

Abstract: The whole world is reeling under the COVID-19 pandemic that has occurred for once in the last century. Every country including India has been fighting with this pandemic. The most effective weapon in this fight against COVID-19 is its vaccine. We need to strengthen our vaccination system with the help of technology in order to tactically face and reduce the mortality of this pandemic. So, we are presenting a vaccine distribution management system application which is, both, Android and iOS supported. In addition to this our application also asserts for door-to-door delivery of vaccines which increases the standard of immunization in various aspects. Our application vouches for “Centralized distribution and decentralized execution which is bottom-up policy of vaccine distribution. As a result of this policy, we are strengthening the reach of vaccine to those who want to travel and can get different dosages of vaccine in different part India. By enabling technology, we are also plugging the loopholes, present in our current vaccination system. Finally, our application also provides communication channel between the vaccinator and the beneficiary combat myths and misconceptions.

Keywords: COVID-19, pandemic, vaccine, Distribution Management System

I. INTRODUCTION

We are introducing a mobile application named “COVID-19 Vaccine Distribution Management System (VDMS)” that aims to increase the standard of immunization programs, implements priority-based immunization and helps to prevent drop-out in immunization. It also ensures that belief in the vaccine increases by providing communication between health workers and vaccine beneficiaries. Thereby, making the whole process of immunization which includes raising awareness, inoculation and tracking of day-to-day vaccine doses inoculated easier. Altogether, it implements grass root level of vaccine distribution chain.

II. METHODOLOGY

The project is using Flutter SDK as the primary development tool which encourages rapid development and realistic design. Firebase Firestore is used as database in the back-end. Firebase CM is used as solution for messaging and sending notifications for Android and iOS. Firebase Authentication is used for securely signing in with mobile number using OTP.

Modules in our application are as follows:

- Authority module:

Higher authorities can oversee the vaccination programme by keeping track of various data points such as number of people getting first dosage or both the dosage, total number of vaccinated persons etc.

- Worker module:

Health worker can search, sort and filter users based on different attributes. Workers can get to know the exact location using Google Maps feature.

- Registration and verification module:

Users can register themselves using Aadhar number and is verified using the same.

- Chat module:

It provides end to end communication between health workers and person who are vaccinated.

- Status module:

Displays current status like number of doses completed, next date for the jab.

III. MODELLING AND ANALYSIS

The application aims to provide a common application for all the stakeholders with different set of commands available to each of them. At the beginning, everyone needs to register to this app and fill their personal details. The data would then be verified against various databases. UIDAI database would contain AADHAR information about every person in the country. COVID-19 database would be containing the information about COVID-19 affected people. Government departmental database would be used to verify the occupation of the person and will eliminate the problem of impersonation. Thereafter, applicant will be asked to pinpoint their home location on Google Map. After verification, the users will get to see their personalized view of the application with the set of operations that they can do. After opening of dashboard, the application then provides different options based upon different classification of user. Vaccinators would get option of filtering, sorting and searching users using various parameters. After tapping for the particular user, the application then would provide an option to start vaccination process. As soon the vaccination is started by the vaccinator, a message would then be sent to the particular beneficiary, intimating them about the vaccination process along with an OTP for final verification. Vaccinators also have an option to see the address on Google Maps. This will help them to reach the destination without any hassle. Vaccination would be completed by the worker after providing the OTP and verification image of the particular user. Higher authority would also be kept updated with the latest vaccination statistics.

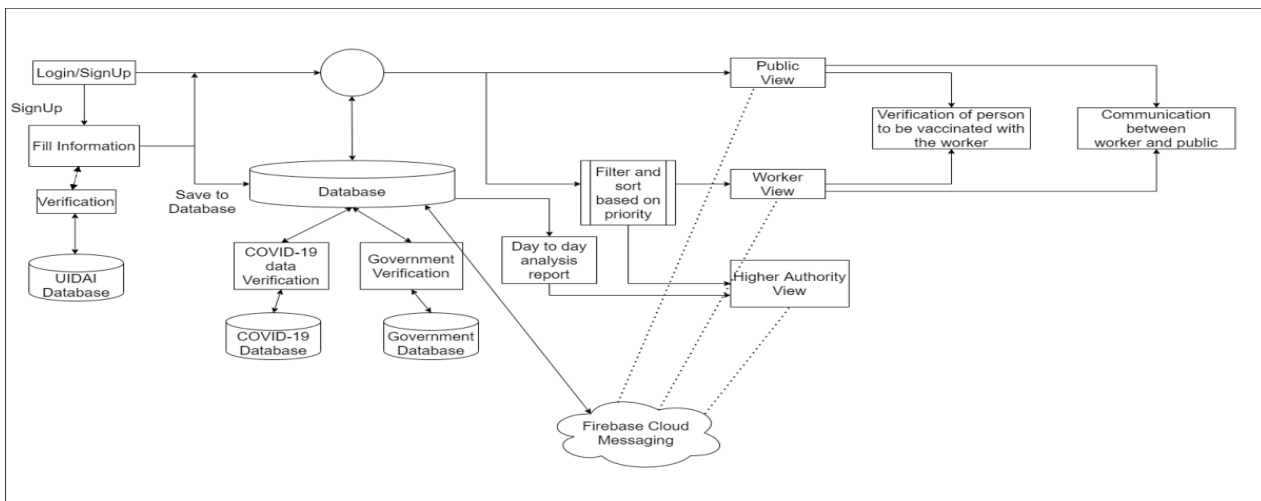


Fig. 1. Architecture of the application

IV. RESULTS

Final application resulted as a real time vaccine distribution management system provides various activities aiding in from registering of users to the completion of vaccination. Each activity can be better understood as a single page in the app. Firebase is employed as Backend-as-a-Service (Baas) for this application. Services such as database, authentication, file storage are handled by Firebase. Firebase being on cloud, provides huge number of benefits over in-premise databases.

Application was both automatically and manually tested for proper real time functioning. Application was checked for its intended behaviour at every stage. With the help of Firebase, consistency and security is provided at every step in the application.

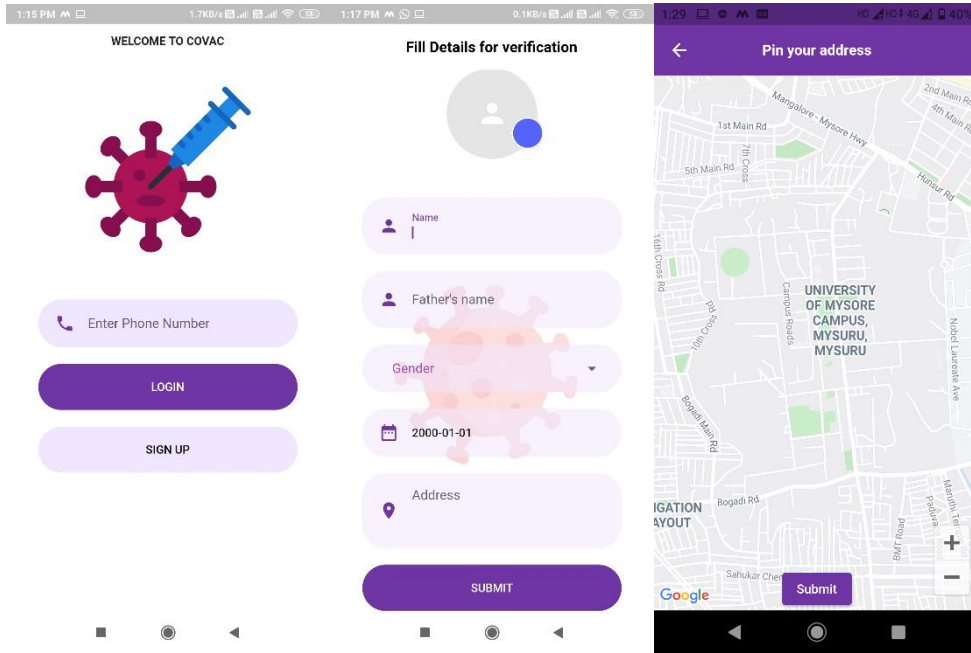


Fig. 2. Login and Signup pages

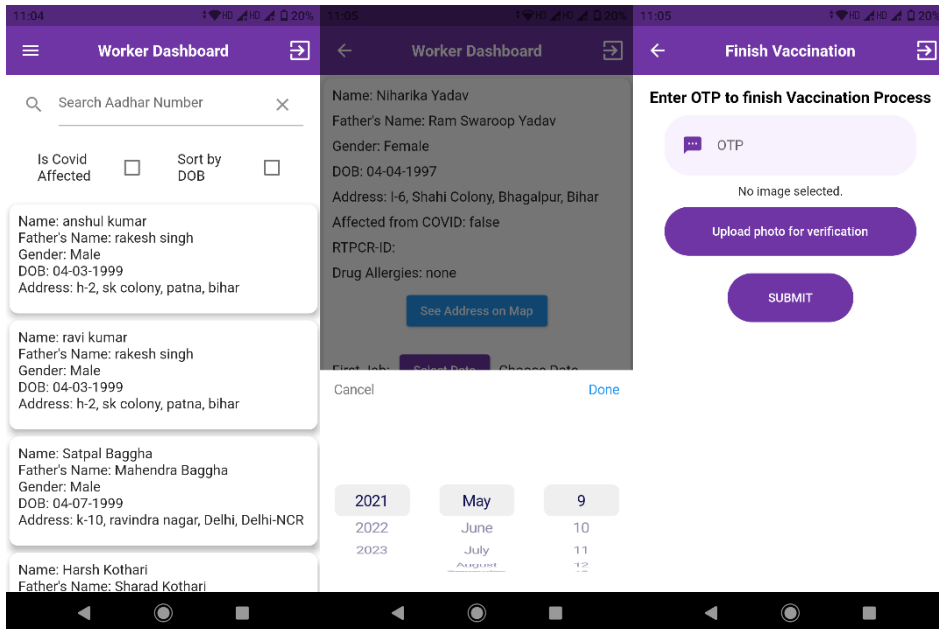


Fig.3. Vaccination start and completion pages

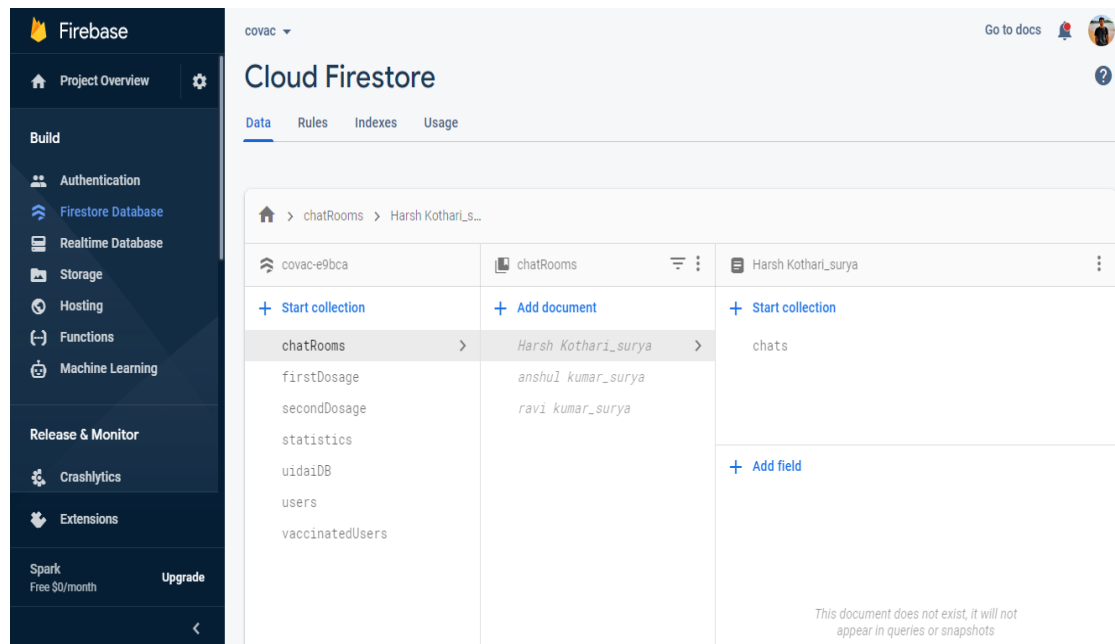


Fig. 4. Firebase Dashboard

V. CONCLUSION

Our project focuses to tackle some of the key issues related to vaccination in India. By reducing dropout rate and vaccine vial wastages, it tries to improve standard of immunization. Thus, we have developed our application for the well-being of society and the nation, as a whole, which is grappling with this unforeseen situation. At the end, since, there is always room for improvement, in future, we can include tracking of inline refrigerators (ILRs) and movement of vaccine vials to incorporate the whole chain of immunization. We can also use machine learning to determine the real expiry date which may vary from printed expiry due to storage issues by using colour of vaccine vial monitor (VVMs). As a result of this, vaccine vial getting expired soon would be firstly used. Our application can also be included in Arogya Setu application to act as e-pass for future use.

REFERENCES

- [1] Shehla Zaidi, Saqib Ali Sheikh, Abdul Momin Kazi, Saleem Sayani "Mobile app for tracking routine immunization performance in rural Pakistan" Operable, acceptable and used for decision making;
- [2] Kumanan Wilson, Katherine M Atkinson and Jacqueline Westeinde "Apps for immunization: Leveraging mobile devices to place the individual at the center of care"
- [3] Chen, Li & Wang, Wei & Du, Xiaozhen& Rao, Xiuqin& Van Velthoven, Michelle & Yang, Ruikan& Zhang, Lin & Koepsell, Jeanne & Ye, Li & Wu, Qiong& Yanfeng, Zhang. (2014). Effectiveness of a smart phone app on improving immunization of children in rural Sichuan Province, China: Study protocol for a paired cluster randomized controlled trial. BMC public health.
- [4] de Cock C, van Velthoven M, Milne-Ives M, Mooney M, Meinert E. Use of Apps to Promote Childhood Vaccination: Systematic Review. JMIR MhealthUhealth. 2020.
- [5] A. M Chandrashekhar , K. Raghuvver, "Diverse and Conglomerate Modi-operandi for Anomaly Intrusion Detection Systems", International Journal of Computer Application (IJCA) Special Issue on "Network Security and Cryptography (NSC)",2011.
- [6] Puneeth L Sankadal , A. M. Chandrashekhar , Prashanth Chillabatte, "Network Security situation awareness system" International Journal of Advanced Research in Information and Communication Engineering(IJARICE), Volume 3, Issue 5, May 2015.
- [7] Sanjana K G , A. M. Chandrashekhar, " comparison of techniques used to provide data security in cloud" international journal for research and development in technology, volume 7, issue 6, June 2017
- [8] A. M. Chandrashekhar, ArpithaM.G."Big data challenges and it's tools" international Journal of Advanced Research in Computer and Communication Engineering (IJARCCCE), Vol 6, issue 6, June 2017.
- [9] Huda Mirza Saifuddin, A. M. Chandrashekhar, Spoorthi B.S, "Exploration of the ingredients of original security" International Journal of Advanced Research in Computer Science and Applications(IJARCSA), Volume 3, Issue 5, May 2015.
- [10] A.M.Chandrashekhar, Thejaswini.S, "Comparative analysis of Indoor Positioning System Using Bluetooth and Wi-Fi", International Journal for Innovative Research in Science & Technology (IJIRST), Volume 4, Issue 1, June 2017.
- [11] Koushik P, A. M. Chandrashekhar, JagadeeshTakkalakaki, "Information security threats, awareness and cognizance" International Journal for Technicle research in Engineering(IJTRE), Volume 2, Issue 9, May 2015.
- [12] A. M. Chandrashekhar, NgaveniBhavi, Pushpanjali M K, "Hierarchical Group Communication Security", International journal of Advanced research in Computer science and Applications (IJARCSA), Volume 4, Issue 1, Feb-2016
- [13] A. M. Chandrashekhar, Jagadish Revapgol, Vinayaka Pattanashetti, "Security Issues of Big Data in Networking", International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET), Volume 2, Issue 1, JAN-2016.



- [14] A. M. Chandrashekhar, Chitra K V, Sandhya Koti, "Security Fundamentals of Internet of Things", *International Journal of Research (IJR)*, Volume 3, Issue no1, JAN-2016
- [15] Sowmyashree K.K, A. M. Chandrashekhar, Sheethal R.S, "Pyramidal aggregation on Communication security" *International Journal of Advanced Research in Computer Science and Applications (IJARCSA)*, Volume 3, Issue 5, May 2015.
- [16] Yadunandan Huded, A. M. Chandrashekhar, Sachin Kumar H S, "Advances in Information security risk practices" *International Journal of Advanced Research in data mining and Cloud computing (IJARDC)*, Volume 3, Issue 5 May 2015.
- [17] Prashanth G M, A. M. Chandrashekhar, Anjaneya Bulla, "Secured infrastructure for multiple group communication" *International Journal of Advanced Research in Information and Communication Engineering (IJARICE)*, Volume 3, Issue 5, May 2015.
- [18] A. M. Chandrashekhar, Jagadish Revappol, Vinayaka Pattanashetti, "Security Issues of Big Data in Networking", *International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET)*, Volume 2, Issue 1, JAN-2016.
- [19] A. M Chandrashekhar , Naveen J., Chethana S., Charith S. "Tackling Counterfeit Medicine Through an Automated System Integrated with QR Code". In: Hemanth J., Bestak R., Chen J.IZ. (eds) *Intelligent Data Communication Technologies and Internet of Things. Lecture Notes on Data Engineering and Communications Technologies*, vol 57. Springer, Singapore.
- [20] A M Chandrashekhar, MukthaG,"On Demand Feedback Analysis for Certification Process", *International Journal on Recent and Innovation Trends in Computing and Communication*,ISSN:2321 Volume: 5.
- [21] A. M Chandrashekhar A M and K. Raghuvver, "Diverse and Conglomerate Modi-operandi for Anomaly Intrusion Detection Systems", *International Journal of Computer Application (IJCA) Special Issue on "Network Security and Cryptography (NSC)"*, 2011.
- [22] Monika M R, A M Chandrashekhar , Sushma J , Navya Nagaraj, "Accident Detection And Alert -An Android App" , *International Journal For Technological Research In Engineering* Volume 7, Issue 10, June-2020.
- [23] Naveen J, Chandrashekhar A.M, Chethana S., Charith S. "Tackling Counterfeit Medicine Through an Automated System Integrated with QR Code" In: Hemanth J., Bestak R., Chen J.IZ. (eds) *Intelligent Data Communication Technologies and Internet of Things. Lecture Notes on Data Engineering and Communications Technologies*, vol 57. Springer, Singapore.
- [24] Akshata D, A.M.Chandrashekhar, "Electronic Health Record Shielding with Attribute-Based Encryption via QR-Code on Blockchain", *International Journal Of Innovative Research In Technology(IJIRT)*, Volume 7, Issue 4, Sept 2020.
- [25] Arpitha M.G, A.M.Chandrashekar, "Big data challenges and it's tools" *international Journal of Advanced Research in Computer and Communication Engineering (IJARCCCE)*, Vol 6, issue 6,June 2017.