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SafeGuard: Smart Emergency Response Platform

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Abstract: ***Road Traffic accidents are the leading cause of death and injury in many parts of the world, often worsened by delays in emergency response , sometimes due to unconsciousness or lack of identification of the victims .SafeGuard:Smart Emergency Response Platform is web based software framework designed to lessen this delay by merging QR code basedidentification ,real-time geolocation tracking , and cloud based data management .Each user is assigned unique QR code linked to secure emergency profile that includes vital information such as name , blood group ,allergies and emergency contact numbers . In such situations ,when first responders scan this ,all this information and the nearest hospital locations will be available instantly to them . System is built upon Firebase Authentication andFirestore Database for secure real time .It is easily extensible to IoT integration for crash detection mechanisms in near future ,making integration into smart city and healthcare infrastructure. The system made with Firebase Authentication and Firestore Database facilitates secure ,real time access and storage of user data. Moreovermulti channel alert system will additionally notify emergency contacts via text message ,email , or push notifications , effectively minimising the response gap .Built for scalability ,automobile telematics and public safety networks , providing a solid foundation for future smart city and healthcare infrastructures .The system aims to ultimately develop connected , intelligent and life saving emergency ecosystem improving survival outcomes and public safety overall***

Keywords: Road Traffic Accidents , QR code Identification , Real Time Location Tracking , Smart City Infrastructure , Cloud Computing ,FirestoreDatabase , OpenStreetMap API

I. INTRODUCTION

With the growing number of vehicles and increasing urban congestion ,road accidents have become a major global concern . According to WHO ,millions of lives are lost each year due to delayed emergency response and the lack of critical medical information during the golden hour . Traditional systems depend on manual reporting , which often fails when victim are unconscious or unidentified . To overcome these challenges ,SafeGuard: Smart Emergency Response Platformis developed as an intelligent web based system that integrates QR code technology , cloud computing and real time geolocation to reduce response time .Each user is assigned a unique , secure QR code linked to a digital emergency profile containing essential medical details and emergency contacts .The system uses Firebase and Firestore for encrypted ,real time data storage and OpenStreetMapsAPI ,offering scalable solution for future smart city and IOT integration

II. METHODOLOGY

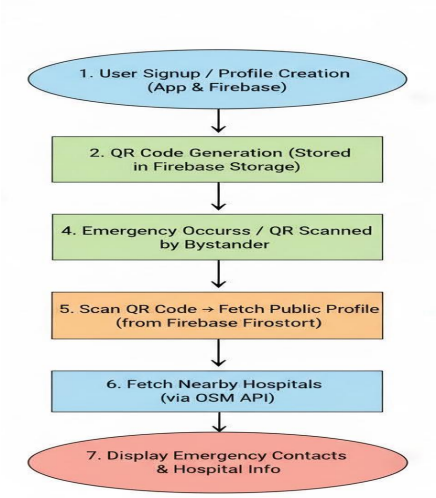


Fig. 1 Structure of system

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The SafeGuard system is designed to minimize emergency response time and support quick access to users vital medical data and live location tracking . A simple step by step process is followed in workflow , from user registration to emergency notification , ensuring the system remains fast and secure while being practical enough for real world use :

A. User Registration and Data Collection

They start the process by registering through the web platform ,where they build up their digital emergency profile ,which includes essential details such as name ,blood group ,allergies ,emergency contacts ,and a profile photo .A unique tokenized QR code is the automatically generated upon submission and linked to their cloud profile

B. Data Storage and Security Management

All data is safely kept in Firebase Firestore ,supporting real time updates and encrypted communication . Firebase Authentication ensures that only verified users can access or edit their profiles , maintaining data privacy to be correct and the integrity of the system

C. QR Code Scanning and Information Retrieval

In this respect , through the QR code first responders or any other bystander can use any smartphone to scan it during an emergency .System instantly retrieves the persons basic medical information displaying nearby hospitals through OpenStreetMap API integration .Sensitive details will remain protected and will be partially visible to maintain privacy

D. Real Time Alerts and Notifications

Whenever any QR scan or emergency trigger occurs, the system sends notifications automatically to the registered contacts of the user via SMS ,email , or push notification .These include location of the victim with basic medical information so that immediate assistance is ensured.

E. Future Integration and Scalability

The architecture is designed to be scalable ,with future integrations with IoT based crash sensors ,vehicle telematics and public safety networks for the smart city infrastructure.

III. RESULT AND DISCUSSION

Everything begins with our Sign-Up Page (Fig.2), which has a clear and simple design:

1) User need to first Sign Up with a Valid “E-MAIL Id”.
2) Person need to Create a “PASSWORD”, and then “CONFIRM PASSWORD”.
3) After this completion person need to click on “Create Account”.

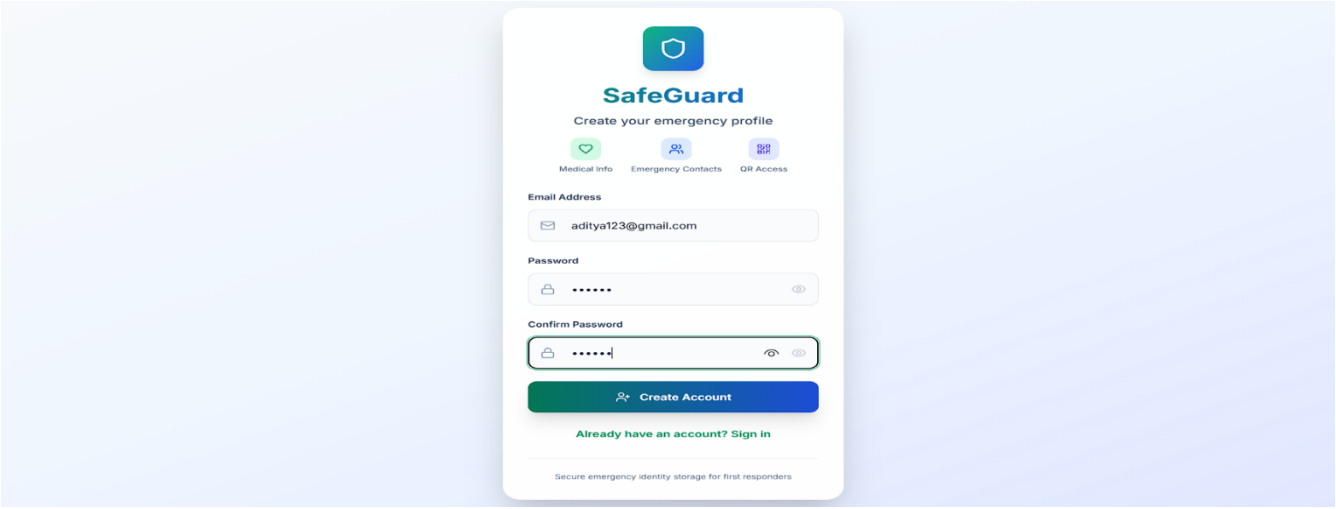


Fig. 2Sign-Up Page.

This is the Front page of our website. If a person has its account already its just need to click on sign in button and need to sign in with a email id and password.

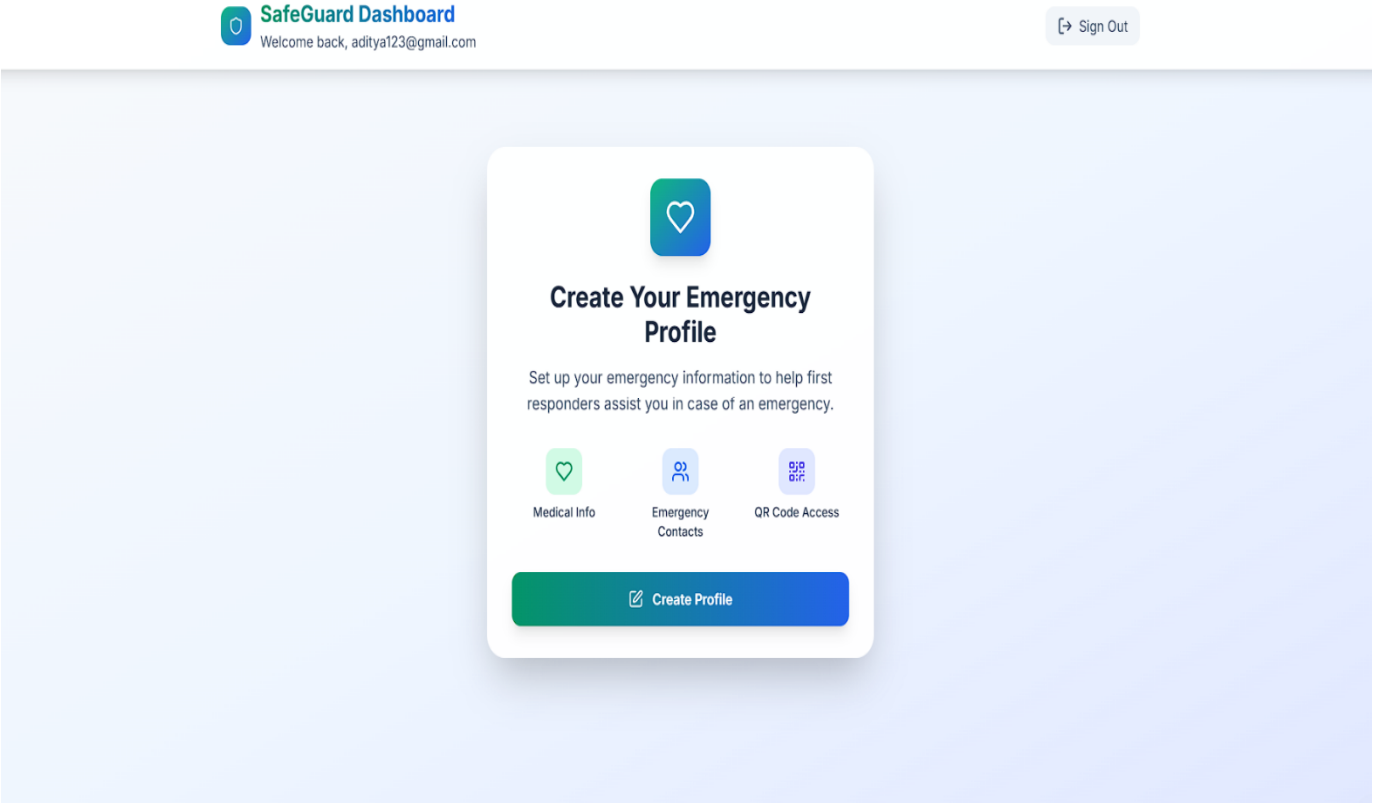


Fig. 3Dialogue Box to Create Profile.

After Clicking on Create Account a small box will be display as shown in (Fig.3) Person simply need to click on “Create Profile”.

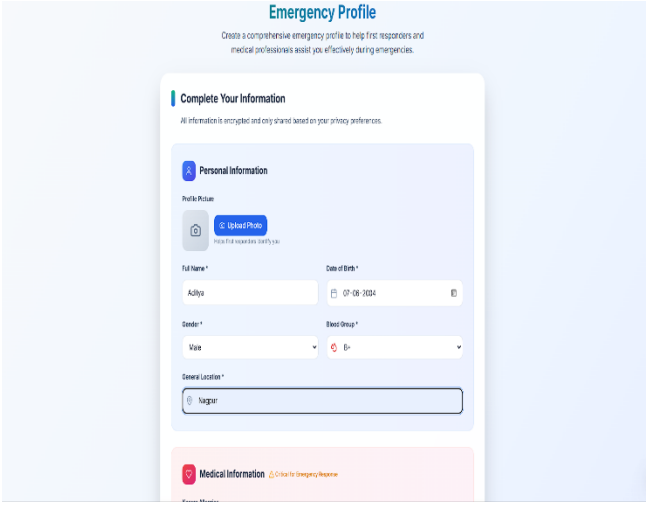


Fig 4(A) Profile page.

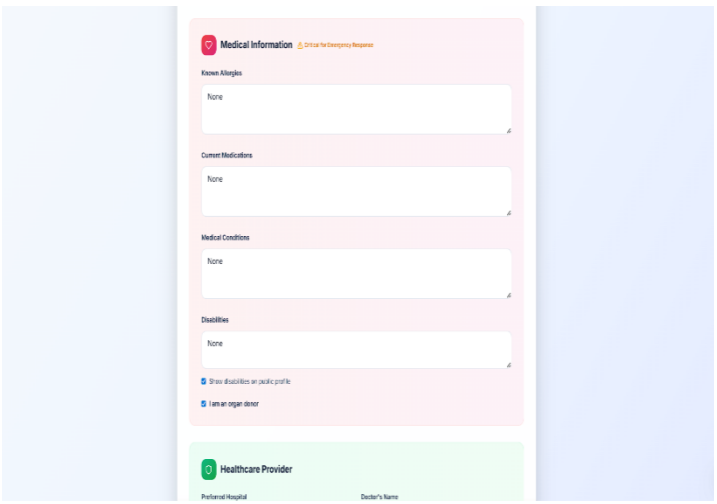


Fig 4(B) Profile page.

After Clicking on Create Profile a Person need to fill all the information as shown in Fig 4(A) and 4(B).The Information need to fill are: 1)Name 2)Date of Birth 3) Gender 4) Blood Group 5)Location i.e City 6) medical information like any alergies…etc.

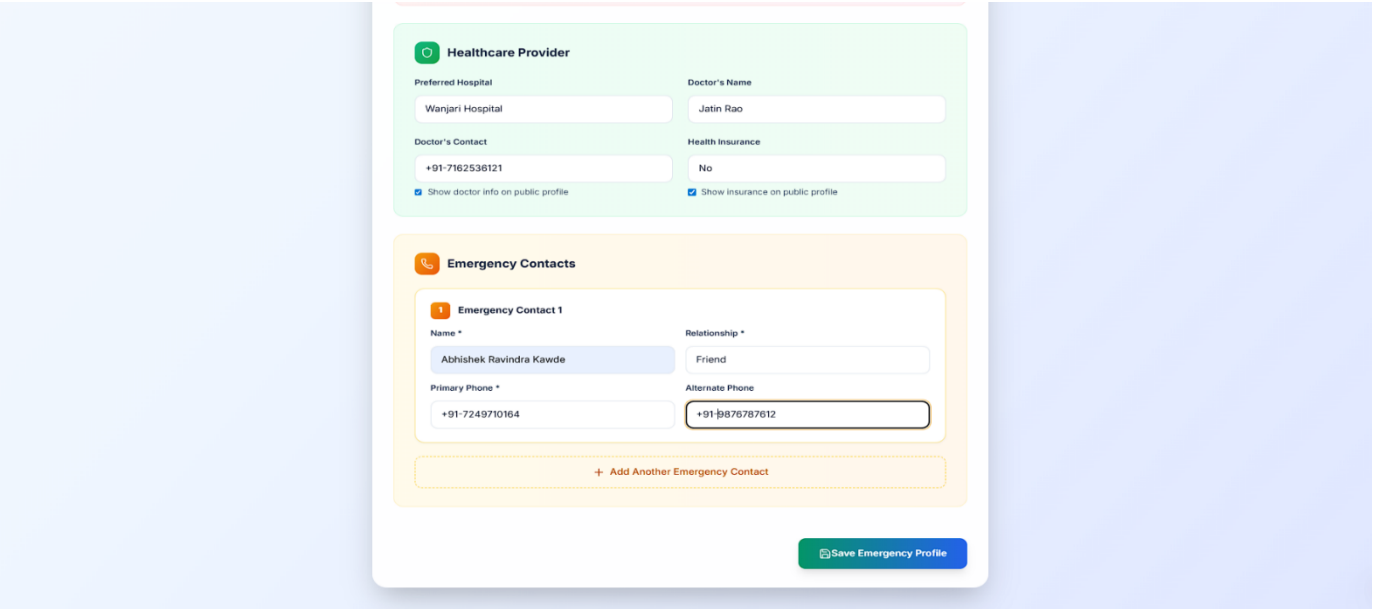


Fig 5: Emergency Contact

Here it comes a main part Person need to fill its all information compulsory as in (Fig 5). This will provide to give the Victim recognize fast and provide him to provide medical help as fast as possible with the help of doctor number filled by the user.
After filling all information person just simply need to click on a button “Save Emergency Profile”.

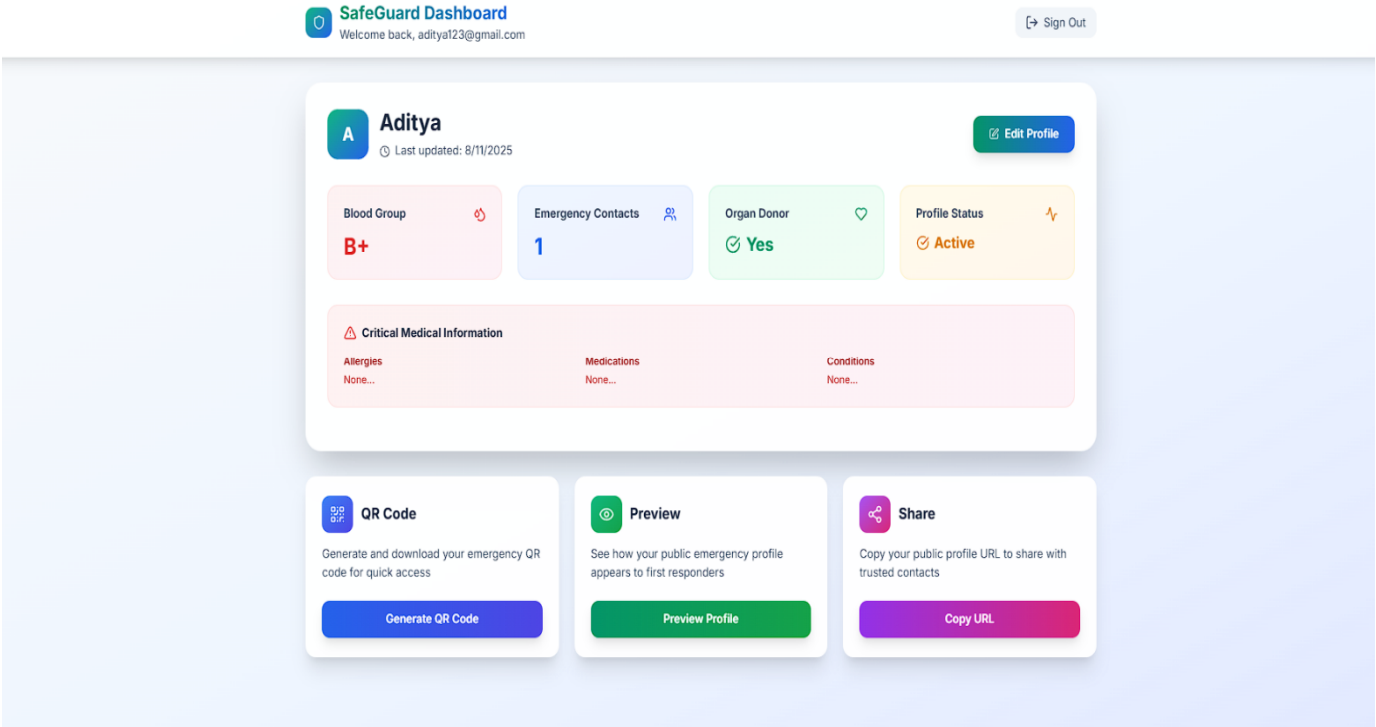


Fig 6. Profile Review.

After clicking on save emergency profile it will display your profile status if person want to edit any information there is “EDIT PROFILE” button by clicking on this user can edit their information. All the information which will be display to the person who will scan will show to you first as shown in Fig 6.

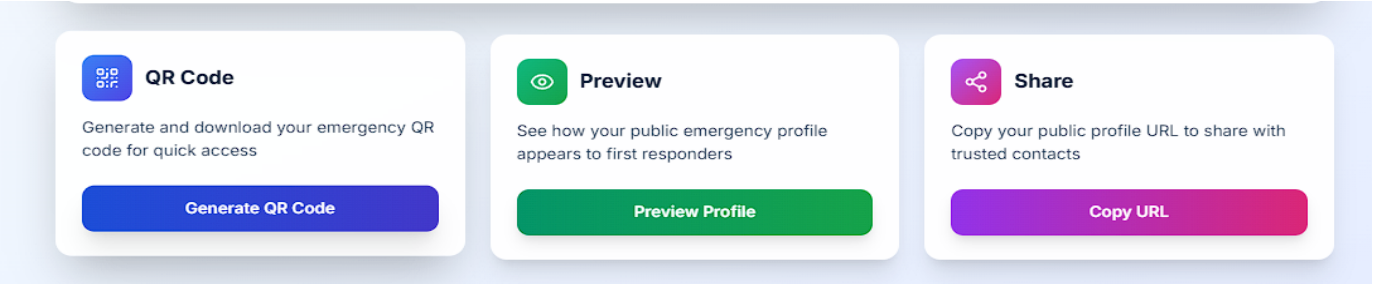


Fig 7.

This are the three button:

1) Preview button: will show you how your information look to the person who will scan the QR code.
2) Copy URL: Through this you can directly share your profile link to anyone of your contact.
3) Generate QR Code: This will generate your QR code.



Fig. 8QR Code.

The QR code will look like as shown in (Fig 8) user just simply need to download that QR Code by clicking on “Download QR Code” button after clicking on this the QR code will get download automatically.
Now person can take a print of this QR code and stick it anywhere they wants to either on therehelmet ,car , bike dashboard

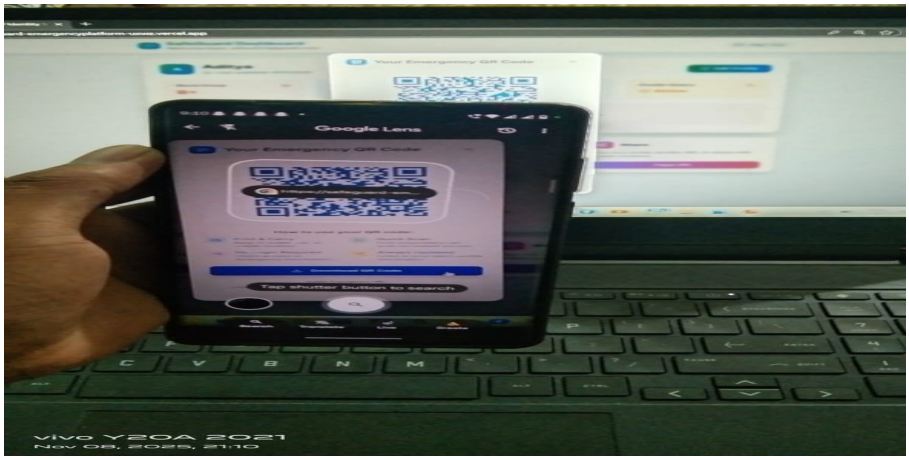


Fig. 9Scanning a QR

User just need to open the scanner of phone and scan the QR Code as Shown in (Fig 8) once any user scan the QR code it will generate a Link Person just need to click on the link and this will re-direct to the Users emergency information that has been already filled by the user as in the Emergency Profile.

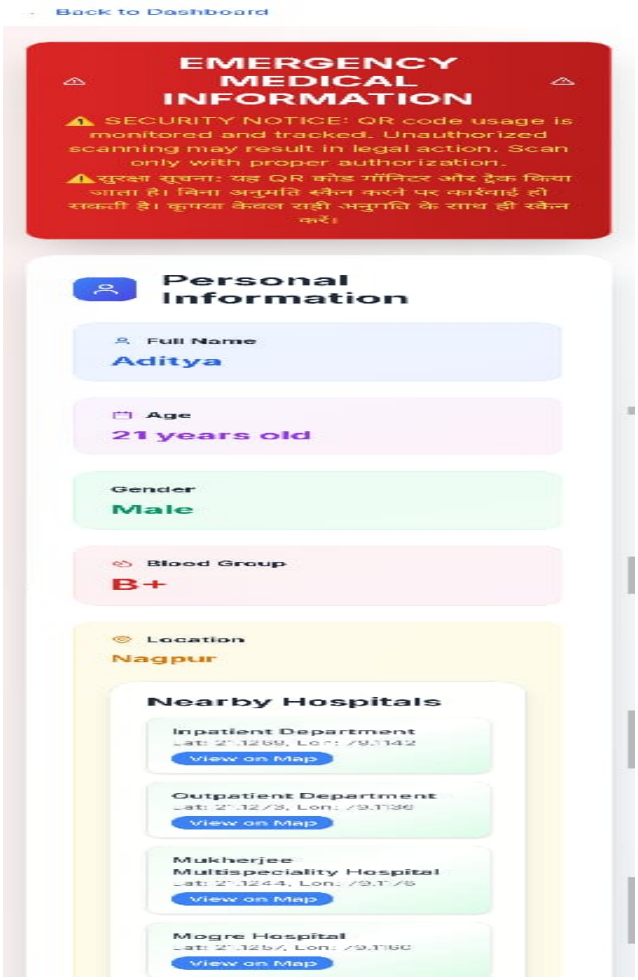


Fig 10(A) User Information.

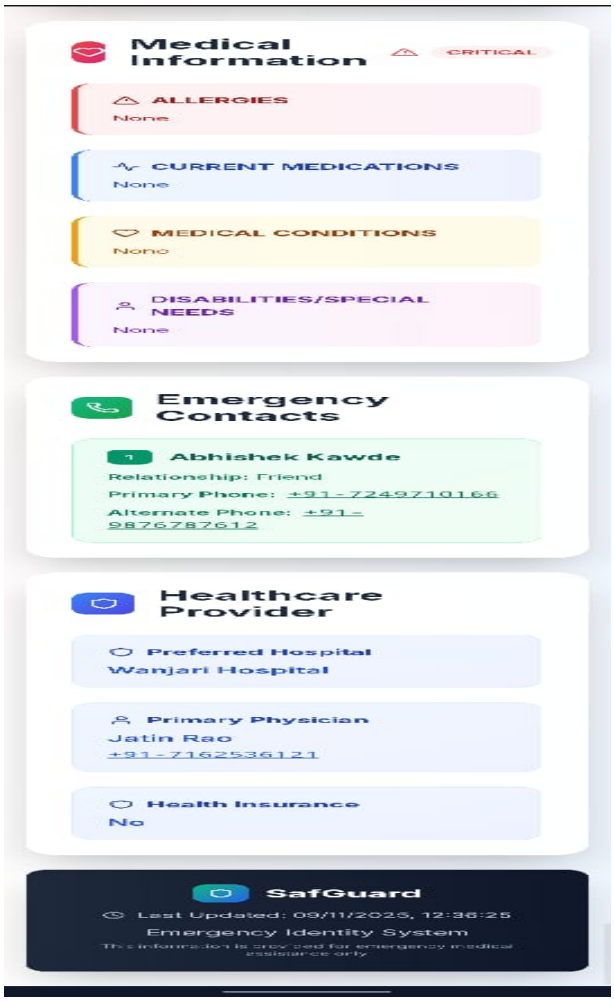


Fig 10(B) User Information.

After Scanning the QR code the user information will get display on the phone as shown in Fig 10(A) and Fig 10(B). Not only this It will show the nearby
Hospitals so that victim can get immediate medical help.

IV. CONCLUSION

SafeGuard : Smart Emergency Response Platform presents a practical solution to one of the most critical challenges in modern public safety delayed emergency response . By combining QR code technology ,cloud computing and real time geolocation , the system enables instant access to vital medical and contact information during accidents or medical crises .It bridges the gap between victims ,first responders and healthcare facilities reducing the time lost in manual reporting and improving the chances of survive during the “golden hour.

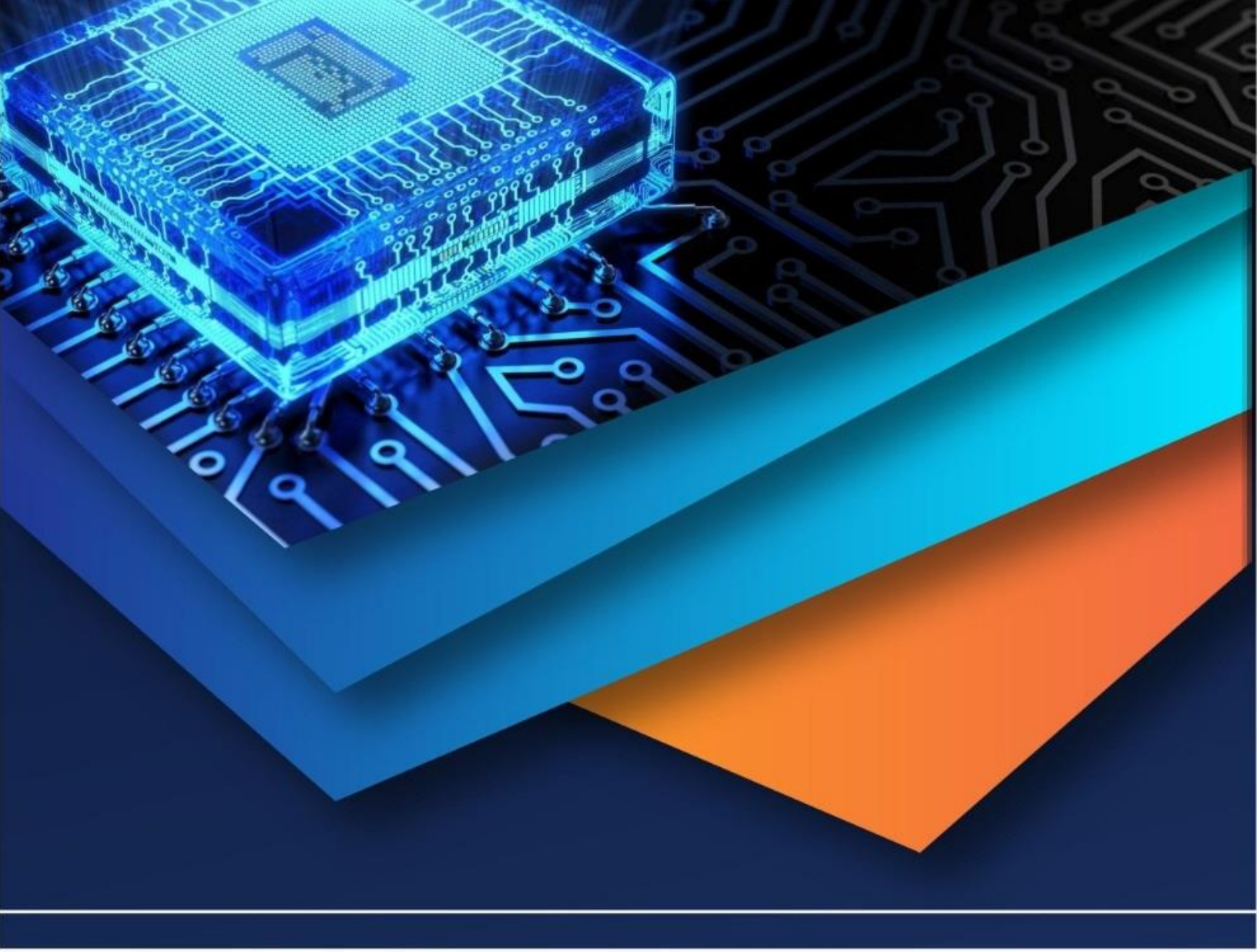
The use of Firebase and Firestore ensures secure real time data storage and communication while the integration of OpenStreetMap APIs enhances location accuracy . Its alert mechanism further ensures that emergency contacts and hospitals are notified instantly ,creating fast and reliable rescue process.

In conclusion ,SafeGuard demonstrates how accessible ,affordable technology can make emergency responses more intelligent ,secure and effective ,With future integration of IoT sensors and effective .With future integration of IoT sensors and vehicle telematics ,it holds great potential for deployment within smart city and national healthcare infrastructures ,contributing to safer and more connected communities

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