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Personal Safety: Utilizing Google API Atinity Microcontroller for Real Time Location - Based Sensor Alerts

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ABSTRACT: The goal of this project is to create a full-featured Flutter Firebase application that is connected with Internet of Things (IoT) technology. It will track registered user whereabouts, cross-reference them with addresses they have recorded in a Firebase database, and promptly notify other users within a 3-kilometer radius. Furthermore, in the event of a user's crisis, the system notifies the authorized family members by SMS, so guaranteeing their protection. A mobile component of the program is intended to communicate with wearable technology in order to track a user's whereabouts in real time. This project uses cutting-edge technologies for effective location tracking and emergency response in an effort to improve user safety and provide peace of mind. As the world grows more interconnected, it is crucial to protect people's safety and security. Utilizing technological developments, especially in the areas of IoT integration and mobile application development, presents viable ways to successfully handle these issues. In this project, a comprehensive solution that integrates location-based services (LBS), real-time data management, and emergency communication features is developed with the goal of improving user safety. The creation of a mobile application built with Flutter, which acts as the main user interface, is the central component of the solution. The backend infrastructure required for notification systems, real-time database management, and user authentication is provided by Firebase integration. Utilizing wearable technology, in particular, improves location monitoring accuracy and efficiency and allows for prompt user replies.

KEYWORDS: Sensor, Libo batteries, Gps, Microcontroller.

I. INTRODUCTION

Individual's safety and wellbeing have become essential in contemporary ever more interconnected world, particularly during ever-changing contexts where unforeseen incidents may occur. Using the capabilities of contemporary technologies like Flutter, Firebase, and IoT, this creative project presents an all-encompassing approach meant to improve user's security and peace of mind. This project primarily makes use of Flutter, a cutting-edge software framework created by Google that is renowned for its capacity to produce visually pleasing and incredibly fast desktop, web, and mobile applications. Because of Flutter's compatibility with different platforms, users can deploy this application on a variety of devices with ease, which guarantees its widespread adoption and functionality.

Furthermore, the core backend services of this project have been powered by Firebase, a potent platform for creating and managing mobile and online applications. With the assistance of Firebase equipment like authentication, cloud messaging and real-time database management, customers and structures can speak and store records correctly [1]. One of the special benefits of this challenge is its ability to note user moves in real time and suit them with recorded addresses. It can ship on-the-spot notifications to the peoples within a three kilometers radius whilst they are nearby. This is mainly beneficial in conditions like getting misplaced in a strange vicinity or encountering terrible atmospheric conditions whilst travel. The undertaking prioritizes facts protection and consumer privacy, the usage of sturdy encryption methods and entry to controls to shield touchy facts. It follows statistics safety laws and industry standards to ensure individuals safety. The machine also focuses on usability, with a smooth to use interface for every age and technical range. It continuously adapts to consumer feedback and undergoes iterative testing for great assurance. The undertaking is applied methodically, with phases like layout, development, checking out, and

deployment following thorough necessities series and evaluation. This assists high requirements of quality and reliability in the usage of regularly occurring software program engineering practices. Moreover, it encourages community involvement through open-supply ideas, attracting contributions from builders globally. By adapting diversity and transparency, the venture benefits from a selection of views and specialties, fostering creativity and development. By including everything, this challenge is a substantial development in use of the era to cope with network protection and well-being problems.

II. EASE OF USE

Domain

The project has been defined as a GPS technology or location-based services which notices individual people safety based on where they are right now by using geographical information. Location Based Service combines a number of technologies like GPS, GIS and mobile applications, including Location tracking, proximity-based notifications, location-based advertising, Emergency alert and navigation to deliver a various number of features[1]. Since Location Based Services can determine an individual's location via precision it is essential to response networks because this allows to deliver the alerts and can get immediate help and support for individual who's in danger.

SPECIFICATION

This project uses a flutter application and a flexible or reliable framework for creating a cross platform applications. A cross platform is a process of working on a multiple operating system like android or iOS using Global Positioning System. Which likewise, uses a Firebase services to assist backend features such as cloud messaging ,real time database management and the user authentication. IOT technologies are used to enhance the tracking capabilities of the individual person[1]. This application can also provide a secured connection through the use of firebase, authentication services and GPS guaranteeing that the individual who can made authentication can access their accounts and data.

Develop a Flutter-based Mobile Application:

- This project may involve creating a prominent mobile app using the Flutter framework. A smooth and deep experience provided to individual across several platforms.
- This flutter app will be easy to use and navigate people with beautiful design who are in danger. It also provides various features and the functionalities about the safety of the individual.
- The layout of this flutter application will have a high value for interface, functions, and performance. This also ensures the comfortableness and pleasant experience of the person who are all using this flutter framework application.
- This application is developed to work with the interface flawlessly throughout the various methods of screen sizes and views, enabling the person with a user interface on phones, tablets, and gadgets.
- By making use of Flutter's large widget library and flexible layout system a flutter based mobile application is developed.

Integrate Firebase Services:

Using Firebase services for backend features includes user authentication ,real time database administration, location based services and alerting the system is important to increase the scalability and flexibility .Setting a user authentication is the first step which is integrated with the firebase backend so the individuals can easily create an account by using emailid , password, login and managing or maintaining their profiles with the flutter application. Firebase authentication methods can support various authentication methods that integrate with the backend firebase.

Implement Location Tracking and Analysis Features:

- The installation of location tracking ensures accuracy, efficiency, and user comfortability, by implementing analytic tools within the application to establish the progress. The program will track users exact positions by using GPS technology to pinpoint your location accurately and monitor the movement of the person[1].
- The application will interface with the system GPS hardware by analysing Flutter's geolocation plugins and APIs, which enables the individuals location data across many platforms and devices[3]. This program uses visual feedback and notifications to keep users interested and informed about what's happening around them.
- These tools are built right into the app custom UI components or use your phones notification system Flutter based notification APIs to provide notifications in real-time, making the users are notified vastly, there are many relevant updates or alerts about their position or nearby locations.
- This way ,you'll get alerts and visuals as soon as there's something interesting or important incident happen nearby.

Implement SMS Messaging Functionality:

The SMS capabilities in this application is the important and essential step towards improving user safety .It also enables timely communication during emergencies. SMS is basic need for every application for informing the user about information. If the user may distress or in an emergency, this application will transform the emergency alert to the chosen contacts, such as family members, riends or emergency contacts. This was done by integrating with SMS gateway serivces or telecoms API's. By using the Flutter's platform-specific plugins and APIs,the application will connect to SMS gateway in a secure and dependable manner. The application also provides effective message delivery across various mobile network . For SMS alerts ,the program will provide standard form of message or customized templates to enhance user experience and enhance alerting procedures.The software also put user security and confidentially, enabling authentication and encryption procedures to safeguard private data sent over SMS. The application will also guarantee specific behavior to industry standards and legal requirements while promoting user confidentially and guaranteeing compliance with the law of governing data protection. It also provide users even more control and assurance. The application might additionally enable them to detect and also authorize the sending of notification via text message before to sending them.

Ensure Privacy and Security:

- It is important to ensure application security and privacy, when maintain sensitive user data like location data. The program will preserve user privacy and prevent data misuse or unauthorized access.
- The program will use algorithms for encryption that protects the sensitive data and information while transmitting the data and storing the data. A backend servers will be encrypted using industry-standard encryption algorithms and protocols, including TLS (Transport Layer Security) or AES (Advanced Encryption Standard), to avoid exploitation by various third-party members.
- This program will have powerful authentication for individual that limit the access to sensitive data support. Firebase authentication services will have to authenticate themselves using secure credentials, such as passwords, fingerprints, or two-factor authentication
- This process will gather and save the number of users data. These includes not allowing the use of cases for which location data gathering is necessary, such as offering location-based services or emergency alerts.

III. METHODOLOGY

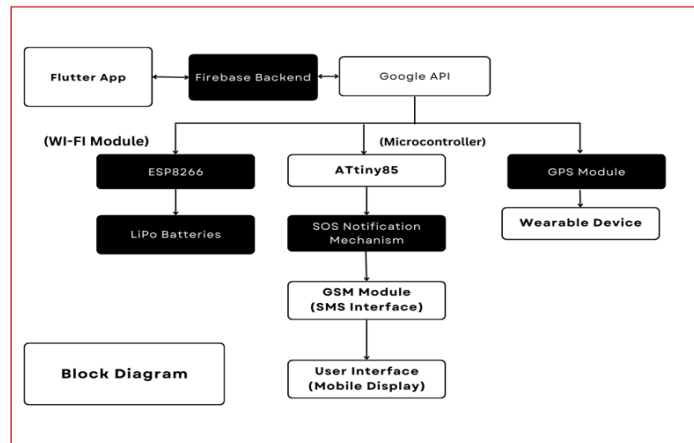
The Flutter application's Location-Based Service (LBS) system provides a various user-friendly feature and also gives a real-time location tracking solution. By this smartphone application, users can easily manage their shared location, addresses and access emergency alert features. This application helps the users to communicate properly and efficiently with the Location Based Service system. To improve the location tracking capabilities, Connect devices with GPS to the mobile application. The IOT technology integration makes sure that the real time tracking is accurate in difficult situations where it would not be practicable to carry a smartphone. Users can enjoy and have a peace of mind knowing that their wearable gadgets will continuously track their location and update the mobile application properly. Firebase's real-time communication [2]. Features provide location-based notifications and allow the system to notify nearby users within a certain radius. This feature helps the users to be aware of each other's locations which improves community safety. In case of an emergency situation, it alerts the surrounding area peoples quickly and help the individuals, by quickly initiating notifications. When the system is turned on it starts to perform programmed actions, like sending an SMS when the individual is in the emergency contacts informing them of the user's current location. This increases users' safety in emergency situation by guaranteeing that they receive proper support and can get a help from their contacts near three kilometres. Apart from this the mobile application-built flutter gives a set of adjustable options to confirm certain user requirement.

Users can customize their experience by changing the settings for Location tracking, notification choices and emergency contact details. By this Location based service tool helps the users to modify it to meet their unique needs. In addition to this, it puts a high priority on user privacy and secure the data by putting strict safeguards to protect sensitive data. User data is safeguarded by secure communication protocols and by encryption methods, while it is in transmit and at rest, confirming that the private data is kept safe and out of the handle of the unauthorized individuals. By abiding compliance requirements and industry best practices, the program builds user's trust and confidence, which promotes long-term engagement and adoption. Considering all things, the flutter powered mobile app gives a smooth and user-friendly platform by managing their addresses, track their locations and when needed getting the emergency help. For location-based services, it is a complete and reliable solution. By using integration with

Firestore, IOT technology and customizable features, the usability of this application is improved and thereby making it a valuable resource for consumers who look for easy to use, safety and to have a peace of mind in their daily life.

IV. EXPERIMENTAL RESULTS

System architecture:



Many applications and efficient tools may develop by using a Flutter, which can serve as the primary interface for users, then it easily links with the Google API (Application Programming Interface). By using the Flutter-based cross-platform characteristics, the application offers various features and a user-friendly interface across various methods and platforms. The application works with the flow of communicating with real-time backend then it transmits user location data and retrieves data information for the location-based services. To enable connection between people and the backend server, the Flutter application uses Firebase's cloud storage and real-time database functions providing data sync and the retrieval. The Firebase backend functions offer key features like data storage, real-time communication, and user authentication. The Firebase offers a flexible and accessible design and the backend enables the Flutter application and the server to exchange data and communicate with a data efficiently. Firebase can use a user authentication feature that allows the backend to use the application and make access safe and protected to the system. Certain things given by the individual users as authentication techniques which include email ID, password, phone number, email ID verification etc, are identified by the authorized person identities. User identities are identified by certain things given by the individual users as authentication techniques which include email ID, password, number verification, email verification etc. This adds a value to this project by allowing the authorized people and keeps the sensitive data safe and secure. Besides that, the Firebase backend, which stores the authorized person location details mentioned in the Flutter applications, maintains data. The Firebase backend keeps the data of an authorized person in an effective manner and making it easy to use and retrieve when they are needed. The Firebase backend uses Firebase Cloud Messaging or real-time database triggers to identify the user's location by sending a notification alert. Firebase Backend allows the person to identify the person nearest to their location [4]. Google API is the important component of the system, which includes the Wi-Fi module like ESP8266 and the microcontroller as ATtiny85 and then GPS module in this project. It offers a variety of location-based services that develop the functionalities of the Flutter application. By using Google API, the individual can navigate path by GPS functions, search places, accurate tracking of the person in danger. The Wi-Fi module provides a communication between the ATtiny85 microprocessor, Flutter app, and GPS module. Google API offers a various collection of location-based data and services. It has the functionalities like size is too small, low power consumption and strong performance, the ESP8266 is cost-effective and also called as two-way communication provides effective and dependable wireless communication that ensures fast and safe data transfer between the devices. The ESP8266 module performs the functions like real-time accurate location tracking and monitoring the user locations. This is done by establishing interfaces with both the Flutter application and the ATtiny85 microcontroller. The ESP8266 module enables support for various Wi-Fi protocols and security mechanisms, ensuring network accessibility and data transfer protection from unwanted access, the ESP8266 module provides support to many features, including OTA (Over-the-Air). ATtiny85 is the essential part of this project. The ATtiny85 microcontroller is essential for handling sensor inputs, processing data. The ATtiny85 microcontroller processes the activities like filtering and analyzing sensor inputs. This allows the microcontroller to perform functions including data fusion, pattern recognition, and predictive analytics. ATtiny85 microcontroller is small and when the button attached

with the ESP8266 module microcontroller is pressed it trigger and send the trigger message alert to the persons near the location, it send the trigger message through wifi, also it acts as a wearable safety device because of its small structure. Atiny85 can also progress proximity sensors that can detect the nearby location of the individuals and then gesture techniques are used to navigate the emergency alerts. GPIO pins and analog inputs are used to notice the current accurate location of the individuals who press the button attached to the Atiny85 microcontroller. Although we can go through the GPS module it identifies the exact location even in the poor network areas. This module includes the feature like track the exact current location, sending the emergency alerts, offline accessibility, sharing the location, monitoring the movements etc. GPS plays a major role in tracking system it can also used in poor internet areas. GPS module monitor the individual location exactly and precisely. This is essential to track and monitor the person in danger by sharing the user location when the button attached with the Atiny microcontroller is pressed. Then libo batteries is the main component in this project working with the GPS module to maintain functionality and accessibility with the location-based services. Libo batteries are rechargeable, lightweight and high in density, this has the capability of strong the power lasting for a long period of time, these are flexible and scalable which optimize energy consumption with some specifications and uses. The SOS notification mechanism can be used in emergency situations.[6] Users can able to use the notification mechanisms in various methods such as tapping the screen, pressing the button or voice recognitions. when the SOS notification mechanism is activated, it starts the process to trigger and track the Global positioning system. when the notification is trigger, it will automatically send the emergency alerts to the contacts near 3 kilometer distance, and explains some guidelines of being safe. In addition user interface is the mobile display which shows everything in the flutter application.

V. CONCLUSION

Google API inside the age of Atinity micro-controllers can enhance private protection by adding actual-time place-based total sensor indicators. This integration help peoples to identify their place correctly and locate environmental precarious, obtaining current details about deficiencies in c locations nearby. Wearable technology guarantees the individuals to receive notifications without delay, maintaining regular preservation of essential security details. This technology is flexible and scalable, appropriate for various settings which include industrial and personal safety applications. Exhaustive, this progressive approach creates a more secure and more at ease place of business play a role with empowering people and the corporations to discover safety risks and reply immediately to emergencies.

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