JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

FIREBASE BASED GPS ENABLED ANTI THEFT MOBILE SECURITY ANDROID APPLICATION

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Abstract: Anti-theft Mobile Security is an advanced application aimed at bolstering mobile device security through a seamless integration of web and mobile interfaces. The application enables users to register their devices and gain comprehensive access via a web portal and an Android app. In the event of device theft or loss, users can track their device's location through real-time GPS coordinates transmitted to the web portal, even if the SIM card is changed. This paper outlines the current IMEI-based system, introduces the proposed enhanced system, details the methodology and implementation, and discusses results and future improvements.

Keywords – Mobile Security, Location Tracking, GPS coordinates, Fire Base, Anti Theft.

I. INTRODUCTION

In today's digitally driven world, smartphones have become an indispensable part of daily life. They are not only communication tools but also store vast amounts of personal and sensitive data. Smartphones have evolved, so has the sophistication of threats against them, with theft being one of the most pressing issues. The consequences of a stolen smart phone extend beyond financial loss to potential breaches of personal information, identity theft, and unauthorized access to confidential data. Therefore, there is a critical need for robust solutions to enhance mobile security and aid in the recovery of lost or stolen devices.

This project aims to develop a Firebase-based GPS-enabled anti-theft mobile security application for Android devices. The primary objective of this app is to enable users to track and recover their lost or stolen smartphones efficiently and quickly. The application leverages Firebase's cloud services for real-time database management and notifications, coupled with GPS technology to provide accurate location tracking. By integrating these technologies, the proposed solution will offer a seamless and reliable method for users to monitor their device's location and retrieve it with minimal delay.

Anti-theft Mobile Security is a comprehensive application designed to enhance the security of your mobile device. This application features a registration module that allows users to register. Upon registration, users gain access to both a web application and an Android app. In the unfortunate event of a lost phone, users can log into the web application and find the lost mobile details and track the lost mobile location. This triggers the app to send the GPS coordinates of the lost device to the web application, enabling the user to track its location. Additionally, the application is equipped to automatically run and send coordinates even if the SIM card is changed, ensuring continuous tracking capabilities. This seamless integration between the mobile and web applications ensures that users can easily locate their lost devices and enhances overall device security.

II. RELATED WORK

Anti-theft mobile security applications are crucial in safeguarding user data and aiding in the recovery of lost or stolen devices. This survey explores existing technologies, methodologies, and advancements related to mobile security applications with features akin to the described anti-theft solution. It delves into various components such as registration, device tracking, SIM card detection, and the integration of web and mobile interfaces.

1. Mobile Device Security

a. Importance of Mobile Security: Mobile devices often store sensitive personal and professional information. As highlighted by Felt et al. (2011), the increasing dependency on smartphones for financial transactions, communication, and storage of personal data makes mobile security paramount.

b. Common Security Threats: According to a survey by Jain et al. (2016), common threats include physical theft, unauthorized access, malware, and data breaches. Effective anti-theft solutions mitigate these risks by providing tools for device recovery and data protection.

2. Anti-theft Mechanisms and Technologies

a. Registration Modules: Registration modules are crucial as they authenticate users and enable subsequent tracking functionalities. Kim et al. (2012) discuss the importance of user authentication in ensuring that only legitimate users can access tracking and security features.

b. Device Tracking: GPS-based tracking is a fundamental feature of anti-theft applications. Ravi et al. (2015) emphasize the efficacy of GPS in providing accurate location data, which is essential for recovering lost devices. The study also mentions alternative tracking methods such as Wi-Fi and cellular triangulation, which can enhance tracking accuracy in different environments.

c. Web and Mobile Application Integration: The integration of web and mobile applications facilitates remote access and management of security features. According to Smith and Miller (2018), seamless integration ensures that users can access vital functionalities from any internet-enabled device, thus enhancing the user experience and the effectiveness of the security solution.

III. IMPLEMENTATION

In this project there are two users: Mobile user and web user. Mobile user can register and login the app and he can start the services and permit to access the GPS coordinates and check sim information of the device. When the user trigger find my mobile through web application, this application automatically send the information to web application We developing web application to find the mobile location when the mobile is lost. If the sim changed it collects mobile location coordinates and changed sim number through this application.

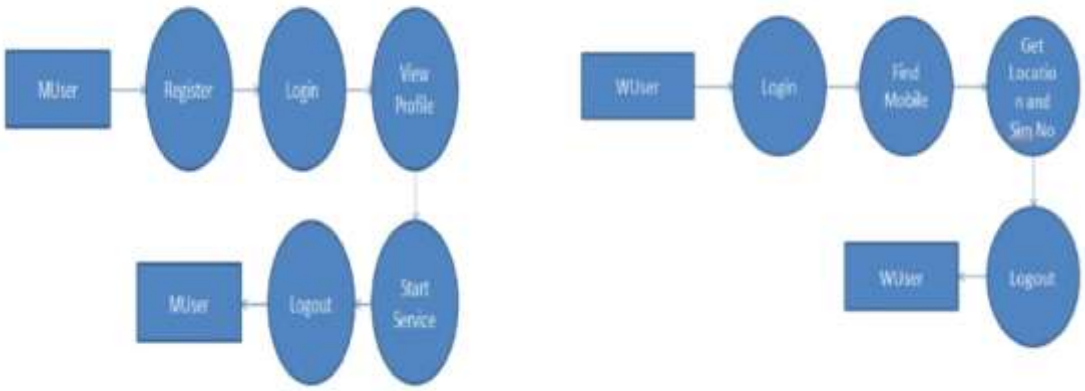

Fig 1. Mobile User and Web User

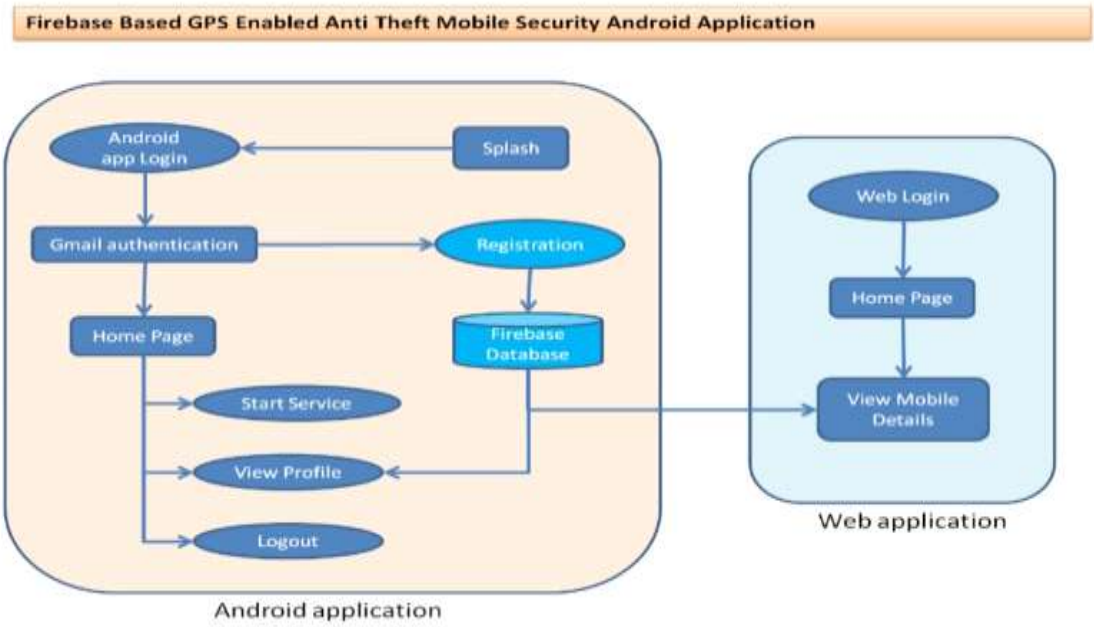

Fig 2. System Architecture

1. System Design: The application is designed with a client-server architecture, where the mobile app acts as the client, and the web application serves as the server.

2. User Registration: Users register their devices through the Android app, providing necessary information and setting up credentials for the web portal.

3. Tracking Mechanism: Upon device loss, users can trigger the tracking feature via the web portal. The mobile app then retrieves and sends GPS coordinates to the server.
4. SIM Change Detection: The app continuously monitors SIM card status, and any change triggers the automatic sending of updated GPS coordinates to the web portal.

- *Functional Modules*

  There are different modules in system listed below:

1. Registration module
2. Login Module
3. Location Tracking
4. Image Capturing
5. Status Update

1. Registration Module:

- User able to set Username
- User able to set Email- Id

2. Login Module:

- User can able to login via Email-Id and Password.

3. Status Update:

- User can able to update current status of device with web application.

4. Location Tracking:

- User able to track mobile location.
- User able to get location details by login via web application.

IV. RESULTS AND DISCUSSIONS

The development of the Firebase-based GPS-enabled anti-theft mobile security application for Android devices has successfully met its primary objective of enabling users to track and recover lost or stolen smartphones efficiently and quickly. The application features a robust registration module, allowing users to create accounts and gain access to both the web and mobile interfaces seamlessly.

Once registered, users can log into the web application to track their lost device, with the mobile app sending real-time GPS coordinates to the Firebase-powered web platform. This integration ensures continuous tracking capabilities even if the SIM card is changed, providing an added layer of security. The application effectively leverages Firebase's real-time database for prompt updates and notifications, enhancing the user experience by ensuring that location data is accurate and readily available.

The combination of Firebase and GPS technology has proven effective in providing a reliable and seamless method for tracking lost devices. Firebase's real-time database and cloud messaging capabilities are pivotal in maintaining up-to-date location information and delivering timely notifications to users.

The GPS component ensures precise location tracking, which is critical for the app's primary function. Despite its success, the application faces challenges such as battery consumption due to continuous GPS usage and reliance on network connectivity for real-time updates. Future enhancements could include battery optimization techniques, offline caching, and sync mechanisms to address these issues. Moreover, the app's security and privacy measures must be robust to protect user data from unauthorized access. Adding features like biometric authentication and remote data wipe would further enhance security. The seamless integration between the mobile and web applications, along with the automatic tracking feature, significantly improves the chances of recovering lost or stolen devices, making this application a comprehensive solution for mobile device security.

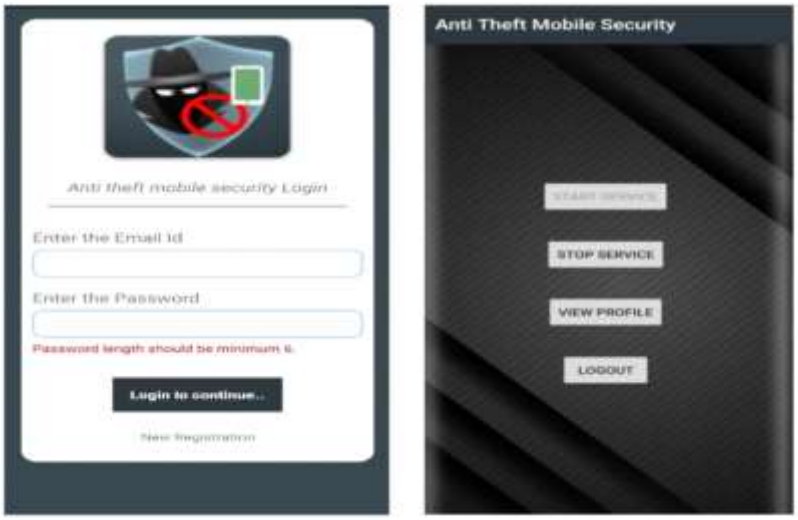

Fig 1: Login page and Home page of Android app

Fig 2: Login page of web application

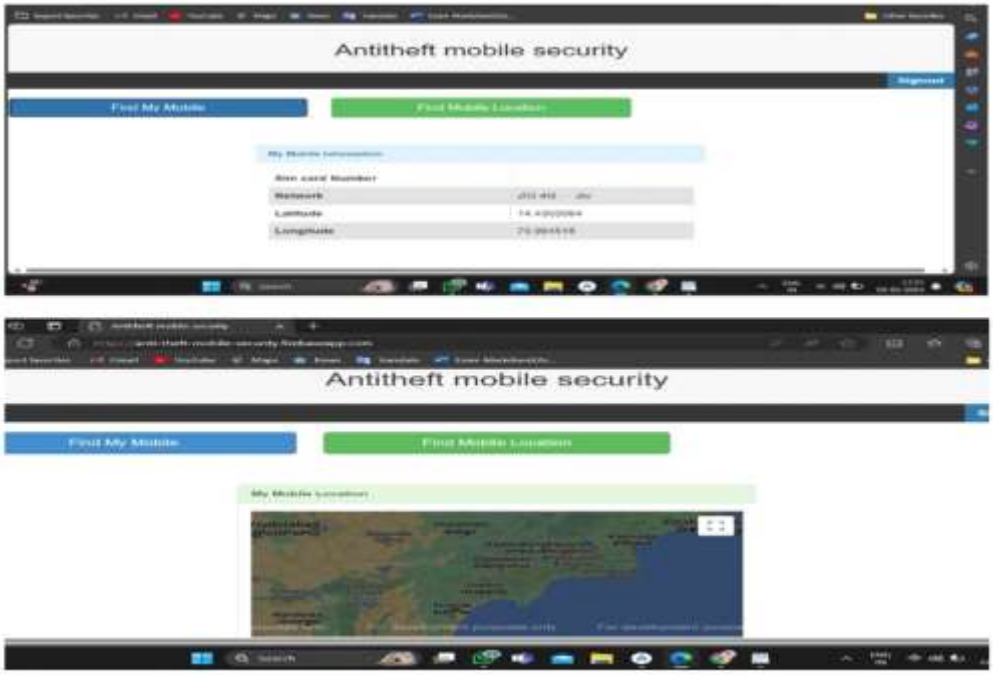

Fig 3**:** Find my mobile and find mobile location pages of web application

V. CONCLUSION

Anti-theft Mobile Security represents a significant advancement in mobile device protection, combining the strengths of IMEI tracking with enhanced real-time GPS monitoring and SIM change detection. This integrated approach ensures continuous tracking and improved security, providing users with a reliable solution for recovering lost or stolen devices. Future developments will focus on enhancing data security, optimizing battery usage, and expanding compatibility to further improve the system's effectiveness and user experience.

VI. FUTURE SCOPE

Future enhancements to the Anti-theft Mobile Security system may include:

1. Enhanced Data Security: Implementing advanced encryption methods to secure transmitted data.
2. Battery Optimization: Developing more efficient tracking algorithms to reduce battery drain.
3. Broader Compatibility: Expanding the application to support iOS devices and other operating systems.
4. Integration with Law Enforcement: Creating APIs for direct communication with law enforcement agencies to expedite the recovery process.

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