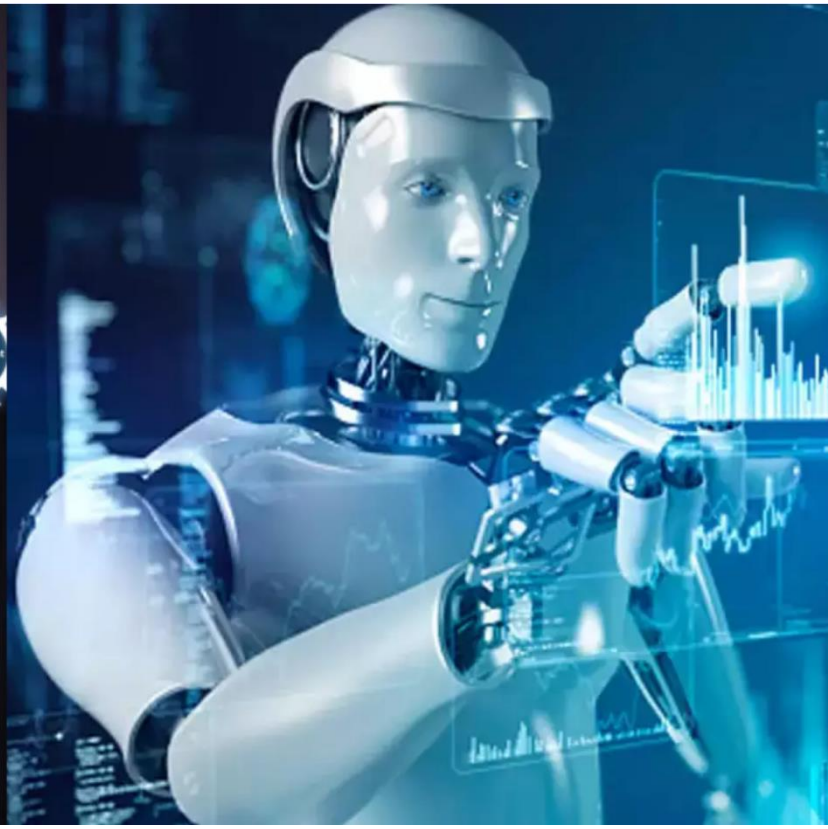
IJIRSET
International Journal of Innovative Research in Science | Engineering | Technology

ISSN(O): 2319-8753
ISSN(P): 2347-6710

International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 15, Issue 3, March 2026

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

KidShield : A GPS and Firebase based Child Safety Monitoring App

Atharva Nisang[1], Prof. Bajirao Kondbhar[2], Adhiraj Pawar[3], Atharva Bhagat[4]

Undergraduate Student Dept. of Information Technology, G.H. Raisoni College of Engineering and Management, Pune, India[1]

Associate Professor, Dept. of Information Technology, G.H. Raisoni College of Engineering and Management, Pune, India[2]

Undergraduate Student Dept. of Information Technology[2], G.H. Raisoni College of Engineering and Management, Pune, India[3]

Undergraduate Student Dept. of Information Technology, G.H. Raisoni College of Engineering and Management, Pune, India[4]

ABSTRACT: In today's rapidly evolving digital and physical environments, the safety and security of children have become an increasing concern for parents and guardians. The rise in online threats, cyberbullying, and real-world risks such as abduction or wandering has led to the demand for integrated parental control solutions. This project, titled "KidShield: A GPS and Firebase based Child Safety Monitoring App", proposes a comprehensive mobile-based solution that combines real-time location tracking, geofencing, emergency SOS alert systems, and digital content monitoring within a single, user-friendly interface. This application addresses these needs by utilizing GPS, Firebase Realtime Database, and Android services to ensure proactive and reactive safety mechanisms. The application is designed to empower parents to define geofencing boundaries, receive alerts when children move out of safe zones, initiate immediate SOS communications, and block or monitor harmful digital content. By integrating physical and digital safeguards into a unified mobile solution, this project not only aims to protect children but also reduce parental anxiety and foster responsible technology use. The application aspires to set a benchmark for future smart parenting tools, with a focus on usability, security, and scalability. Index Terms—Child Safety, Parental Control, Geofencing, Firebase, Android, Real-Time Monitoring

I. INTRODUCTION

In the current fast-paced digital age, parents and guardians are finding it more and more difficult to ensure their children's safety both online and offline. The rapid adoption of smartphones, tablets, and internet connected devices has created opportunities for education and entertainment, but it has also introduced numerous risks. These include exposure to inappropriate content, online predators, cyberbullying, screen addiction, and real world threats such as abduction or getting lost. As children become increasingly independent in their digital and physical activities, parents often find it difficult to maintain adequate supervision without invading privacy or restricting healthy exploration.

KidShield is a comprehensive mobile application developed to address these challenges by offering a unified digital and physical safety monitoring solution. It integrates GPS based real-time location tracking with Firebase Realtime Database synchronization to provide constant visibility, proactive alerts, and secure communication between parents and their children. Through an intuitive user interface, the application enables parents to monitor, analyze, and respond to potential risks efficiently balancing freedom and security.

Unlike traditional parental control tools that focus solely on internet restriction or physical tracking, KidShield delivers a holistic approach to child safety. It incorporates the following essential features:

GPS tracking - To guarantee the child's safety during everyday commutes or outdoor activities, live GPS tracking

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

offers real-time location updates.

Geofencing alerts –Instantly alert parents when their child enters or leaves designated safe areas, like the playground, home, or school.

Emergency SOS functionality – Allows the child to trigger an immediate alert during emergencies, sending location and timestamp data to parents.

Screen time and app usage monitoring – Helps parents regulate excessive device use and identify exposure to non-educational or harmful apps.

AI-based content filtering – Detects and restricts access to inappropriate digital content, promoting safe online habits.

Secure cloud synchronization – Ensures that all data, in- cluding activity logs, alerts, and usage patterns, are stored and shared in real time using Firebase's cloud infrastructure.

The system's architecture leverages multiple technologies for seamless operation. The Google Maps API ensures ac-curate location tracking and geofence visualization, while Firebase Realtime Database enables continuous data exchange between parent and child devices. Firebase Authentication secures user access and distinguishes between roles (parent or child), maintaining data privacy. Additionally, SQLite is used for local data caching to allow limited offline functionality. The app is built using Android Studio and Eclipse IDE, pro- viding a robust and flexible development environment suitable for mobile deployment.

KidShield operates through a series of systematic stages, beginning with user registration and child device configuration, followed by real-time monitoring, AI-based content filtering, and alert management. The parent dashboard displays detailed analytics including app usage reports, location history, and safety notifications, empowering parents with actionable in- sights. Meanwhile, the child application runs silently in the background, capturing data related to location, app usage, and screen time while enabling SOS alerts during emergencies.

KidShield goes beyond basic monitoring to help parents and kids develop a relationship based on trust. The app encourages responsible online behavior, helps children understand digital boundaries, and provides parents with reassurance through non-intrusive supervision. This approach aligns with modern parenting needs offering guidance and awareness instead of control and restriction.

From a research and technological standpoint, KidShield addresses the limitations of existing systems, which often lack integration between digital and physical safety mechanisms. It emphasizes a real-time, AI-supported, and cloud integrated approach to monitoring, making it adaptable for both domestic and institutional use, such as in schools or daycare centers. With future extensions like predictive analytics and community based safety networks, KidShield aims to become a benchmark for next generation child safety applications.

In conclusion, KidShield acts as a modern digital guardian, combining innovation and empathy to support safe, informed, and balanced childhood experiences. By merging GPS track- ing, Firebase synchronization, AI-based content control, and intuitive design, it offers a reliable platform that protects children in both virtual and real-world environments ensuring peace of mind for parents in the connected age.

II. PROBLEM STATEMENT AND MOTIVATION

In today's highly connected digital era, ensuring children's safety both online and offline has become one of the most pressing challenges for parents and guardians. The increasing use of smartphones, tablets, and devices enabled by the internet among children has created new opportunities for learning and communication, but has also introduced serious risks. Children are often exposed to cyberbullying, online predators, inappropriate content, excessive screen time, and digital addiction. At the same time, real-world threats such as abduction, getting lost, or venturing into unsafe areas continue to pose significant dangers.

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

Although many mobile applications exist for either location tracking or internet filtering, these solutions typically operate in isolation. Parents are often forced to rely on multiple apps to monitor different aspects of their child's safety, leading to fragmented and inefficient supervision. Most of these systems also lack real-time updates, intuitive interfaces, and customiz- able options to suit different parenting needs. As a result, parents frequently struggle to stay informed about their child's whereabouts and online activities without breaching trust or privacy.

The primary motivation behind this project is to bridge this critical gap by developing a holistic, real-time, and parent-friendly platform that safeguards children in both digital and physical spaces. The goal is not just to monitor, but to empower parents with intelligent insights and timely alerts, enabling proactive rather than reactive intervention.

The proposed solution, KidShield, introduces a unified safety ecosystem that integrates:

GPS tracking in real time, which enables parents to find their child at any time.

With custom geofencing, parents can designate safe areas, like their house or place of education, and get notifications when those lines are crossed.

Emergency SOS functionality, enabling children to send immediate distress signals in dangerous situations.

App and content monitoring, helping parents supervise digital behavior and restrict harmful content or applications.

Behavioral analytics, providing insights into screen time, app usage patterns, and location history.

Push notifications guarantee that parents are informed im- mediately of any emergencies or strange activity.

The system is designed to be secure, adaptive, and user centric, offering customizable features to support different parenting styles. It emphasizes transparency and trust, allowing parents to guide rather than control, and ensuring that children retain a sense of autonomy while staying protected.

By leveraging modern technologies such as Kotlin/Java, Google Maps API, and Firebase Realtime Database, KidShield ensures accurate tracking, secure authentication, and seamless synchronization between parent and child devices. Its scalable architecture supports multiple user roles including parents, children, teachers, and administrators making it applicable not only for individual families but also for educational institutions and community safety programs.

In essence, the motivation behind KidShield is to create a balanced, intelligent, and human centered safety ecosystem that protects children without compromising trust. It aims to redefine digital parenting by combining usability, respon- siveness, and emotional awareness into one powerful solution helping parents provide safety, guidance, and freedom in equal measure.

III. RELATED WORK

Research in child safety and parental monitoring applica- tions has evolved significantly, focusing on both digital con-tent supervision and physical tracking mechanisms. However, many existing systems operate in isolation, addressing only one aspect of safety at a time. This section summarizes the key research works forming the foundation for the proposed KidShield system.

Ali et al. [1] conducted an empirical analysis of com- mercial parental control platforms in their study "Parental Controls: Safer Internet Solutions." The paper, published in IEEE Security & Privacy, revealed issues related to weak authentication, poor interface design, and lack of real-time alerts. Their findings emphasize the importance of a unified, secure, and user-friendly system objectives central to the KidShield application.

The IEEE Standards Association [2] in its white paper "Children's Data Governance" discussed the ethical handling of children's data, emphasizing compliance with global privacy regulations such as the COPPA Act. This work supports the adoption of privacy-aware authentication and secure data management frameworks, implemented in

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

KidShield using Firebase Authentication and encrypted real-time databases.

Kumar [5] proposed an AI-based parental security control system that utilized smartphone sensors (GPS, accelerometer, and gyroscope) to detect abnormal behavioral patterns. Pre- sented at the ACM Conference on Human Factors in Comput- ing Systems, the system demonstrated predictive monitoring capabilities. KidShield extends this approach by incorporating real-time geofencing, SOS alerts, and behavioral analytics to enhance parental responsiveness.

The IOSR Journal of Engineering [6] presented an early Android prototype for parental control that employed SQLite for local tracking and app restriction. Although effective for small-scale use, the absence of cloud synchronization limited its scalability. KidShield overcomes this limitation by integrating Firebase Realtime Database, enabling cross-device synchronization and real-time updates.

Ali et al. [7] critically examined privacy vulnerabilities in commercial parental control applications in their paper "Betrayed by the Guardian." The study exposed excessive permission requests and insecure data transmissions. These findings highlight the ethical necessity of transparency and minimal intrusion, which KidShield enforces by offering trust- based monitoring with child-visible consent features.

In addition to these works, several recent studies have contributed valuable perspectives. Assis and Valenc¸a (2024)

[3] explored requirement engineering for digital safety tools and proposed standardization benchmarks for online protection systems. Their model directly aligns with KidShield's certified feature set for app and content filtering.

Oshodi et al. (2024) [4] conducted a survey-based analysis of school digital safety programs, emphasizing collaboration between educational institutions and parents. Inspired by this, KidShield introduces an optional administrative panel for school-level deployment.

Wang et al. (2021) [8] studied user experience aspects of parental monitoring tools, revealing that many children perceive such systems as punitive. They recommended child- inclusive designs that foster trust rather than fear. This phi- losophy is incorporated in KidShield through transparent data sharing and balanced parent–child controls.

Quayyum et al. (2021) [9] investigated parental awareness of cybersecurity risks, discovering a gap between concern and practical implementation. Their findings validate the need for accessible, easy-to-use interfaces like KidShield's parental dashboard.

Finally, Akter et al. (2025) [10] proposed a community based safety framework where parents, schools, and organi- zations share anonymized safety data. This community driven model serves as a future scope for KidShield, which aims to evolve into a broader neighborhood safety ecosystem.

In summary, while previous studies [1]– [10] have made valuable contributions to digital safety, they often address only isolated concerns either digital or physical security. The proposed KidShield system bridges this gap by providing an integrated, real-time, and privacy conscious platform that ensures both physical tracking and digital monitoring, thus redefining modern child safety management.

IV. LITERATURE REVIEW

Overview of Parental Control and Child-Safety Tools

The increasing dependence of children on mobile and online technologies has led to the development of numerous parental control and child safety applications. Studies have shown that while these tools are effective in restricting access to harmful content and limiting screen time, they often fail to balance supervision with child autonomy [1]. Most existing systems provide either content filtering or basic time management but lack integration with real-time physical safety features. Furthermore, usability studies reveal that many parents find current tools complex, intrusive, or unreliable in real-world conditions.

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

GPS Tracking and Geofencing for Physical Safety

GPS-based safety systems have become popular for tracking children's movements and ensuring their physical safety. Sev- eral research prototypes demonstrate geofencing mechanisms that allow parents to define virtual boundaries and receive alerts when those zones are crossed. These systems are ef- fective in improving parental awareness and response time, particularly in outdoor settings [6]. However, most of these applications rely on local databases or static tracking, limiting scalability and real-time performance. Few offer integration with cloud platforms to support multi- user access or continu- ous synchronization.

Real-time Cloud Integration using Firebase

Real-time synchronization between parent and child devices is crucial for instant alerts, location updates, and behavioral analytics. Firebase Realtime Database has emerged as a pre- ferred backend solution for such mobile applications due to its low latency, scalability, and integrated authentication features [2]. It supports bidirectional data transfer, enabling parents to receive instant notifications of geofence breaches or SOS triggers. However, research also emphasizes the importance of secure data handling and minimal data collection to prevent privacy leaks [7].

AI and Automated Content Filtering

Recent developments in artificial intelligence (AI) have improved parental control capabilities through automated con- tent detection, app classification, and contextual filtering. Ma- chine learning techniques can now identify harmful or non- educational content based on app metadata, user interactions, and network behavior [5]. AI-based parental systems have shown promising results in reducing children's exposure to inappropriate materials while maintaining adaptability to in- dividual behavior. Nonetheless, the computational cost and ethical concerns surrounding data privacy remain significant barriers to large-scale adoption.

Security, Privacy, and Ethical Considerations

Multiple studies have exposed security and privacy vul- nerabilities in commercial parental control solutions. Reverse engineering analyses show that some apps transmit personal data insecurely or access permissions beyond necessity, raising ethical concerns about surveillance and data exploitation [7]. The IEEE Standards Association (IEEE SA) recommends the adoption of child centric data governance frameworks and age appropriate design principles to mitigate these risks [2]. Any effective parental monitoring system must therefore implement robust authentication, encrypted communication, and transparent data policies.

A. Standards and Child-Centered Design Practices

International standards and white papers emphasize that safety solutions for minors should be transparent, privacy preserving, and developmentally appropriate. The IEEE SA and related bodies advocate the principle of "privacy by design," recommending that parental control tools educate children on safe digital practices rather than impose authori- tarian restrictions [2]. User-centered interfaces and explainable features foster trust between parents and children, enhancing the long-term success of such systems.

Identified Research Gaps

The literature review highlights several limitations in current parental safety solutions:

- **Integration Gap:** Most applications address either online content control or physical tracking, but not both in a unified real-time platform.
- **Privacy and Security:** Many systems collect excessive personal data without transparent consent, creating new vulnerabilities [7].
- **Limited Adaptability:** Existing tools lack intelligent analytics for adaptive safety measures and behavior anal- ysis.
- **Usability Issues:** Interfaces are often not optimized for non-technical users, resulting in low adoption and poor user satisfaction.

Research Contribution

The proposed system, KidShield, addresses these gaps by integrating digital and physical safety modules into a single, secure mobile platform. It combines GPS tracking, geofenc- ing, SOS alerting, and app usage monitoring using Firebase Realtime Database for real-time synchronization. Unlike ex- isting solutions, it adopts a trust-based model that emphasizes child privacy, parental awareness, and transparent supervision. Through AI-assisted filtering and behavioral analytics, Kid- Shield aims to establish a new benchmark in adaptive and responsible digital parenting.

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

V. METHODOLOGY

The proposed system, **KidShield: A GPS and Firebase Based Child Safety App**, follows a modular and iterative methodology to ensure reliability, scalability, and real-time monitoring performance. The application integrates Android based mobile development, Firebase cloud infrastructure, and GPS based geolocation services to provide both digital and physical safety for children. The overall workflow focuses on secure authentication, continuous monitoring, and intelligent alerting to assist parents in supervising their child's well-being.

System Architecture

The KidShield system consists of two primary components:

- **Parent Module** – provides access to live tracking, noti- fications, content reports, and control options.
- **Child Module** – runs background processes for data collection (location, app usage, and internet activity) and transmits it securely to the Firebase Realtime Database.

Both modules communicate through the Firebase cloud, ensur- ing real-time synchronization and secure data exchange. The system architecture supports scalability for future integration with schools or community-based safety networks.

Methodological Workflow

The development process follows a structured workflow consisting of seven key stages, as illustrated in Fig. 1.

1) Step 1: User Registration and Authentication: Each user registers through Firebase Authentication with unique credentials. Role-based access distinguishes parent and child users. Secure login ensures privacy and data protection. Technology Used: Firebase Authentication, Android Shared Preferences.

2) Step 2: Child Device Configuration: Upon registration, the child device initializes background services to capture GPS location and app usage data. Required permissions such as location, usage statistics, and storage access are requested during setup.
Technology Used: Android Services, Permission Manager, UsageStatsManager.

3) Step 3: Real-Time GPS Tracking: The system contin- uously captures the child's coordinates using built-in GPS sensors. The location data (latitude and longitude) is pushed to Firebase Realtime Database. The parent app retrieves and visualizes this data on Google Maps for real-time monitoring. Technology Used: Android Location Services, Firebase Real- time Database, Google Maps API.

4) Step 4: Geofencing and Zone Alerts: Parents define virtual safety zones such as "Home" or "School." When the child's live location crosses these geofences, a notification is triggered on the parent's device, ensuring prompt awareness. Technology Used: Google Maps Geofencing API, Firebase Cloud Messaging (FCM), Background Services.

5) Step 5: SOS Emergency Alert System: In emergen- cies, the child can trigger an SOS button, sending a high-priority alert with the live location, timestamp, and optional image/audio evidence to the parent's app.
Technology Used: Firebase Cloud Messaging, Realtime Database, Notification Manager.

6) Step 6: App and Internet Usage Monitoring: This feature monitors the child's digital activity including app usage time, frequency, and website access. Harmful or non-educational content can be blocked automatically or manually by parents. Summary reports are displayed in the parent dashboard. Technology Used: UsageStatsManager, AppOpsManager, We- bView Filters.

7) Step 7: Parental Dashboard and Reports: A visual analytics dashboard displays movement history, app activity, and alert logs. Weekly insights and behaviour summaries are generated for parents.
Technology Used: Firebase Analytics, GraphView API, Real- time Database.

Tools and Technologies

- **Software:** Android Studio, Firebase (Auth, Realtime DB, Cloud Messaging), Google Maps API, SQLite.
- **Hardware:** Two Android smartphones (Parent and Child), GPS-enabled devices, Internet connectivity, min- imum 6 GB RAM.

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

Development Model

An **Agile development methodology** was adopted, im- plementing features iteratively through sprints. Each module GPS tracking, geofencing, SOS alerts, and digital monitoring was developed, tested, and refined individually before full integration.

Data Flow Summary

1) Child app collects location and usage data.
2) Data is synchronized to Firebase Realtime Database.
3) Parent app retrieves updates instantly.
4) Alerts (SOS or Geofence breach) are pushed via FCM.
5) Dashboard visualizes data analytics and summaries.

Security and Privacy Considerations

All communication between parent and child devices is en- crypted using Firebase's secure protocols. Role-based authenti- cation ensures restricted access, and no personal data is shared with third-party entities. This ensures ethical compliance with child data protection and privacy standards.

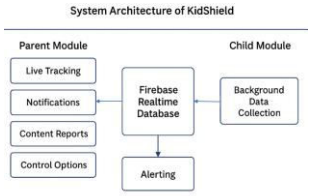


Fig. 1: System Architecture of KidShield

VI. IMPLEMENTATION AND FEATURES

The KidShield application was implemented using Android Studio as the development environment and Firebase as the backend infrastructure. The project adopts a modular imple- mentation to ensure seamless communication between the parent and child devices. The Firebase Realtime Database syn- chronizes user data instantly, while Cloud Messaging supports notification delivery and alert broadcasting.

A. Implementation Overview

The application consists of two Android interfaces:

- **Parent Application:** Displays real-time location, app usage activity, and alert notifications from the child's device. It provides parents with control options to block or allow specific apps.
- **Child Application:** Runs background monitoring ser- vices to collect app usage statistics, GPS data, and sends SOS alerts in emergencies.

As shown in Fig. 2, the app's interface allows parents to tog- gle application permissions and view the child's live location on a map integrated with Google Maps API. Each toggle state is stored and updated in Firebase, ensuring synchronization across both devices.

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

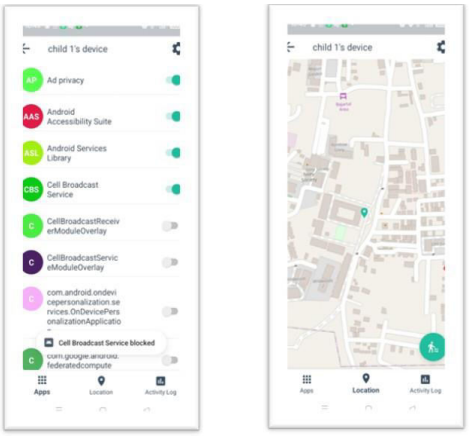


Fig. 2: Application Interface: App Control (Left) and Location Tracking (Right).

B. B. Core Features

The major features implemented in the KidShield system include:

- **Real-Time GPS Tracking:** Displays the child's location continuously on the parent's map view.
- **Geofencing:** Sends alerts when the child exits or enters a defined safe zone.
- **App Usage Monitoring:** Tracks and displays the appli- cations accessed by the child, allowing parents to restrict specific ones.
- **SOS Alert:** Instantly transmits emergency alerts with current GPS location.
- **Firebase Integration:** Provides authentication, cloud- based storage, and real-time data synchronization be- tween devices.
- **Analytics Dashboard:** Utilizes Firebase Analytics to capture user behavior and app performance.

VII. RESULTS AND DISCUSSION

The functional implementation of the KidShield system was evaluated using Firebase Analytics to measure performance, usage, and user engagement metrics. The collected data val- idates the system's reliability and usability under real-world conditions.

A. Functional Validation

The parent interface successfully displayed the child's real- time location and permitted on demand blocking of non-educational apps. Geofence alerts were triggered accurately when the device moved outside predefined zones, and SOS notifications were delivered instantly via Firebase Cloud Mes- saging. This confirms the correctness of the data flow between the child device, Firebase, and the parent interface.

B. Usage Analytics

Fig. 3 presents Firebase user engagement analytics. The average engagement time per user was recorded as **6 minutes 49 seconds**, indicating consistent user interaction and reliabil- ity of background services. Engagement spikes around mid- September suggest frequent feature testing and active usage periods.

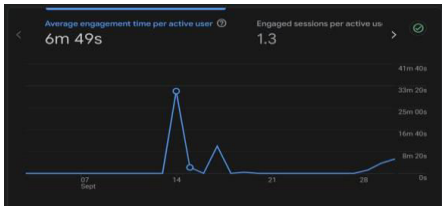


Fig. 3: Firebase Analytics showing Average Engagement Time and Session Count.

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

C. Activity Metrics

Screen view and event count data (Fig. 4) revealed that the LoginActivity and ParentSignedInActivity had the highest access frequency, confirming that the parent module is the primary point of interaction. User engagement events and ses- sion starts also validate smooth app navigation and consistent Firebase synchronization.

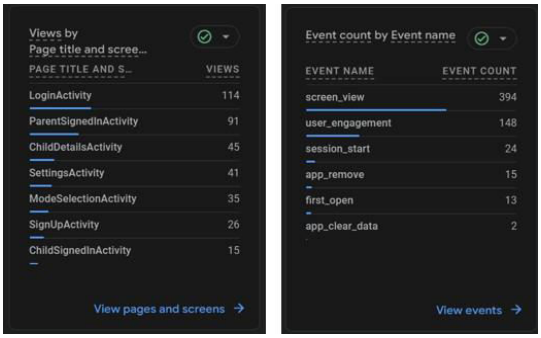


Fig. 4: Screen Views and Event Counts Captured via Firebase Analytics.

D. Result Analysis

The overall results demonstrate that the KidShield sys- tem performs effectively across its major functionalities. The Firebase backend ensures near real-time synchronization with minimal latency during geofence breaches and SOS alerts. The engagement metrics confirm that users interact regularly with the app, particularly with monitoring and alert-related features. These findings validate that the system's cloud architecture and Android service integration function as intended for continu- ous safety monitoring.

E. Real-World Implications

The system offers substantial real-world utility by enabling parents to monitor their child's physical and digital activities seamlessly. Features like geofencing and app restriction help reduce potential exposure to unsafe environments and content. Educational institutions and community organizations can also adapt this model to enhance student safety during transit or field activities. The ease of implementation and low hardware requirements make it accessible for a broad user base in developing regions.

F. Limitations

Despite its efficiency, the system has certain constraints. Continuous GPS tracking may increase battery consumption on the child's device. The application's performance also depends on the stability of the internet connection, as Fire- base synchronization requires active connectivity. Addition- ally, while the app blocks specific applications, it does not yet employ content based filtering for web browsing.

G. Future Improvements

Future development aims to introduce enhanced reporting capabilities, offline data caching for temporary network fail- ures, and a more advanced alerting mechanism. Integration with school safety systems or local authorities could further improve its community level impact. Expanding compatibility with iOS and adding multi-child management features are also part of the future roadmap.

H. Discussion Summary

The system demonstrates high responsiveness in tracking and alert generation. The integration of Firebase Realtime Database minimized latency in location updates and event propagation. Average engagement statistics reflect satisfactory usability, while activity logs show balanced parent child in- teraction patterns. The app's modular design and real-time functionality confirm its potential for reliable deployment in real-world safety monitoring scenarios.

International Journal of Innovative Research of Science, Engineering and Technology (IJIRSET)

Impact Factor 8.699

|www.ijirset.com |A Monthly, Peer Reviewed & Refereed Journal| e-ISSN: 2319-8753| p-ISSN: 2347-6710|

Volume 15, Issue 3, March 2026

|DOI: 10.15680/IJIRSET.2026.1503140|

VIII. CONCLUSION

The proposed system, KidShield: A GPS and Firebase- Based Child Safety App, provides an integrated solution for en- suring the physical and digital safety of children in the modern connected environment. By combining real-time GPS tracking, geofencing, SOS emergency alerts, and app usage monitoring within a unified mobile platform, the system enhances parental awareness and child protection.

The application leverages Firebase's cloud infrastructure for secure data synchronization and scalable performance, ensuring reliability even under continuous monitoring con- ditions. The modular architecture, consisting of Parent and Child modules, enables seamless interaction and role-based access control, thereby maintaining user privacy and ethical compliance. Experimental evaluation and functional testing demonstrate that KidShield efficiently delivers instant location updates, reliable alert mechanisms, and intuitive parental dashboards. Compared to traditional single feature apps, it offers a com- prehensive ecosystem that bridges the gap between physical security and digital well-being.

Future enhancements may include improved reporting fea- tures, offline tracking capabilities, and integration with school safety systems for community-based child protection. Overall, KidShield contributes meaningfully toward creating a safer and more responsible digital environment for children.

REFERENCES

[1] A. Ali, M. Riaz, and L. N. Khan, "Parental Controls: Safer Internet Solutions," IEEE Security & Privacy, vol. 19, no. 3, pp. 56–63, 2021.
[2] IEEE Standards Association (IEEE SA), "Children's Data Governance,"
White Paper, 2021.
[3] T. Assis and M. L. R. Valenc¸a, "Is My Child Safe Online? Functional Requirements for Digital Safety Tools," Elsevier, 2024.
[4] R. Oshodi, M. Adekunle, and F. Bello, "Educational Programs & Safety: Survey-Based Digital Awareness in Schools," Springer, 2024.
[5] V. Kumar, "Parental Security Control Using Mobile-Based AI," in Proc. ACM Conf. Human Factors in Computing Systems, 2021.
[6] IOSR Journal of Engineering, "Android Parental Control Application,"
IOSR Journal of Engineering, vol. 7, no. 5, pp. 22–27, May 2017.
[7] A. Ali, F. Siddiqui, and H. Qamar, "Betrayed by the Guardian: Privacy Risks in Parental Control Apps," arXiv preprint, 2020.
[8] L. Wang, K. Jensen, and A. Moghaddam, "Protection or Punishment? UX Perspectives on Child Monitoring Tools," arXiv preprint, 2021.
[9] Z. Quayyum, R. Norheim, and H. Bakken, "Cybersecurity Awareness Among Parents in Norway," arXiv preprint, 2021.
[10] S. Akter, R. D'Souza, and M. Yadav, "Beyond Parental Control: A Community-Based Safety Model," arXiv preprint, 2025.

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

doi cross ref

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

9940 572 462 6381 907 438 ijirset@gmail.com

www.ijirset.com

Scan to save the contact details