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KIDS CARE APPLICATION

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Abstract: Parental control applications are essential for promoting healthy digital habits among children. This paper introduces *Kid Care*, a parental control system for Android mobiles and Android TVs that enforces strict screen time limits. Once the allowed time expires, the screen is automatically disabled and can only be reactivated with a secure passcode, ensuring parental supervision. The system includes uninstallation protection to prevent unauthorized removal. *Kid Care* is evaluated for its usability, security, and performance, addressing challenges like power efficiency and bypass prevention. Future improvements involve integrating AI-based monitoring and adaptive usage analytics. The study highlights the growing importance of reliable digital parenting solutions in today's connected environment.

Keywords: Parental Control, Screen Time Management, Child Safety, Digital Parenting, Android TV, App Security, Uninstallation Protection, Multi-Device Synchronization

I. INTRODUCTION

The fast pace of digitalization in households and learning spaces has resulted in greater exposure to screens by children through tablets, smart TVs, and mobile devices. This makes it imperative that there be proper digital parenting software that enables adults to monitor and control children's screen time. Kid Care Parental Control System is built to address this requirement by offering a safe and versatile platform for device activity monitoring and control on Android-based platforms. Parental control software is necessary in the modern technology era, where digital distractions and excessive screen time can be detrimental to children's health, sleep, and school performance.

Conventional device restriction tools often provide limited functionality and weak security measures. They frequently depend on manual supervision and static rule sets that can be bypassed by tech-savvy users or fail under common scenarios such as device reboots or offline operation. Moreover, many lack features like uninstallation protection, profile-specific control, or secure enforcement mechanisms. These limitations reduce their effectiveness, especially in homes with multiple children and shared devices.

The Kid Care system addresses these shortcomings by introducing a robust and secure parental control framework built specifically for Android smartphones and Android TVs. The application focuses on key features such as passcode-based security, strict screen time scheduling, secure app locking, and real-time monitoring tools. It also supports offline compatibility and persistent rule enforcement even after restarts, ensuring uninterrupted protection.

Unlike traditional time-restriction systems, Kid Care includes modular components that allow parents to set detailed usage rules, track activities through interactive reports, and customize profiles for individual children. Security is central to the design, incorporating elements such as uninstallation prevention, device lock enforcement, and fail-safe mechanisms that protect the system from tampering. These features work together to provide a comprehensive solution that supports responsible digital behavior while maintaining device usability for educational or essential apps.

The system architecture includes components for profile management, activity monitoring, and schedule enforcement, all of which are accessible through a user-friendly dashboard designed for both technical and non-technical users. Real-time notifications and usage logs allow parents to respond promptly to any rule violations or attempts to access blocked content. The project also emphasizes performance, with lightweight execution suitable for low-end Android devices and seamless integration into family environments.

With screen time challenges increasing globally, especially after the rise in remote learning and entertainment reliance, the Kid Care Parental Control System provides a timely and scalable solution. It empowers parents with the tools to enforce healthy device habits, reduce dependency on constant supervision, and ensure a safer digital experience for children. This project presents a foundational step toward the evolution of digital discipline tools and highlights the critical role of secure, user-centric design in modern parental control systems.

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II. RELATED WORK

The rising use of smartphones and connected devices among children has driven the development of numerous parental control solutions. However, research indicates that many current systems lack adaptability, robustness, and comprehensive control features. Traditional applications often depend on static rule-based restrictions or app-level locks that can be bypassed or fail under certain usage conditions. These limitations are especially evident in Android environments where custom ROMs, app cloning, or device reboots compromise the enforcement of control rules.
Previous studies on mobile control systems focused primarily on application whitelisting, usage limits, and content filtering, with limited support for offline operation or user-specific profiles. While some platforms introduced scheduling mechanisms, few have provided secure implementations that persist through device restarts or tampering attempts. Existing research has also raised concerns about systems generating false positives or imposing overly rigid rules that hinder essential educational or communication needs.

To address these challenges, newer frameworks have proposed the use of modular enforcement architectures and lightweight monitoring agents that function even in low-resource environments such as Android TVs. These systems improve scalability and reduce system latency while ensuring that critical services remain uninterrupted. Parental control solutions often integrate dashboards, yet studies show that many fail to offer real-time feedback, intuitive controls, or multi-child profile management, limiting their effectiveness in diverse family environments.

Some recent works have explored integrating notification systems that alert parents in case of unusual usage patterns or unauthorized access attempts. However, without proper security mechanisms, such as passcode-based access or uninstallation protection, many applications remain vulnerable. Attempts to introduce cloud-based controls and cross-device synchronization have shown promise but require advanced security layers to protect sensitive data related to children's usage patterns and behaviour logs.

Further studies highlight the need for user-friendly dashboards with customizable rule sets, real-time visualizations, and easy schedule configuration tools. Application interfaces should minimize complexity while supporting dynamic adjustments such as screen time extensions for special events or educational use. Solutions that fail to incorporate such flexibility risk user fatigue or non-compliance due to overly rigid control structures.
In parallel, research into adaptive control models that learn usage behaviour patterns and recommend optimal screen time policies remains under development. Some experimental systems use behavioural analytics and decision trees to tailor usage enforcement based on device activity trends, but these methods often require cloud resources and raise privacy concerns.

Lastly, growing research interest in privacy-preserving parental controls suggests the importance of secure architecture. This includes storing user profiles and logs locally or with end-to-end encryption and enabling role-based access control to ensure only authorized caregivers can view or modify settings.
The Kid Care Parental Control System draws from these studies by implementing a secure, modular, and lightweight design optimized for Android platforms. It incorporates best practices from existing work while addressing limitations such as offline enforcement, tamper resistance, and multiple child support. With features such as passcode authentication, secure app termination, and activity reporting, this project aims to offer a robust foundation for future enhancements in digital parenting tools.
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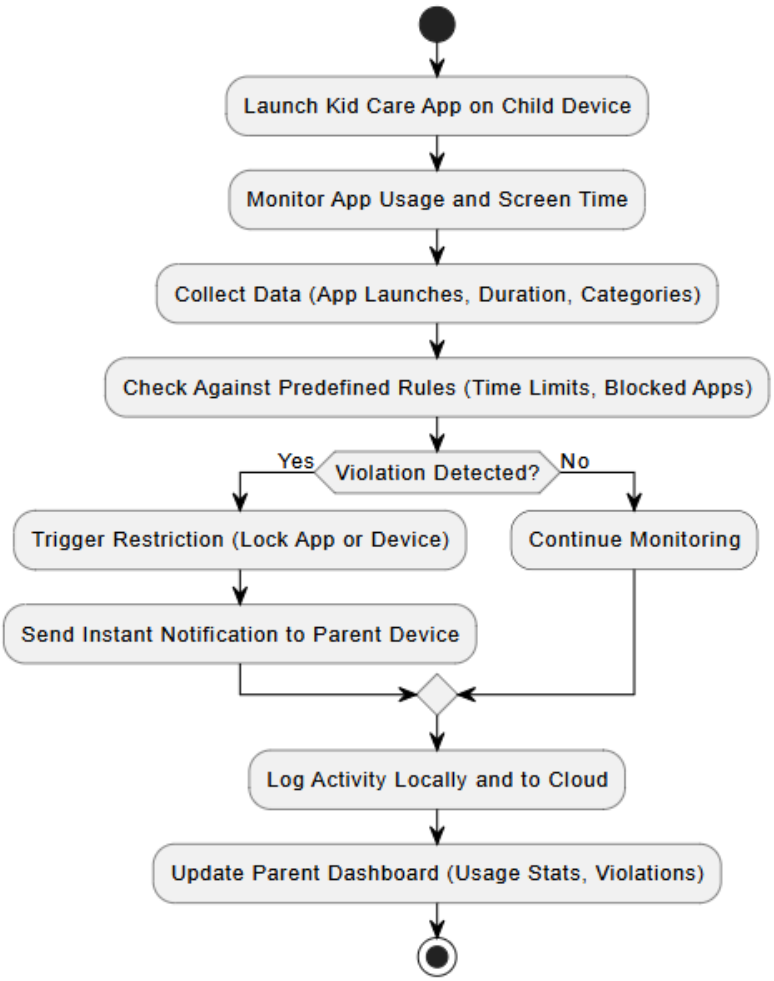

III. PROPOSED METHODOLOGY

A. System Architecture

The proposed Kid Care Parental Control System uses a centralized, real-time management architecture to monitor, manage, and control children's device usage. The system collects screen time data, app usage logs, and device activity metrics from children's devices. This raw data is sent to a preprocessing module, filtered, normalized, and transformed into structured usage profiles. A rules-based enforcement engine applies time restrictions, app usage policies, and device lock schedules based on parent-defined configurations. The system leverages a mobile and web-based interface developed using the Flutter framework (for mobile) and Django (for admin web) to allow parents to set rules, monitor activity, and receive alerts. The modular architecture enables integration with cloud platforms for secure data storage and future scalability. Alerts about rule violations or unusual activity are instantly pushed to the parent's dashboard, ensuring timely oversight. The design supports both manual overrides and automated enforcement actions such as app blocking or screen time suspension.

B. Monitoring Workflow

The control process begins with continuous monitoring of children's app usage and device screen time through a background service on the child's device. This data is transmitted to the Kid Care server, where it is processed to remove redundant entries and converted into structured usage patterns. Based on the parents' configured schedules and rules, the system evaluates whether usage is within allowed limits or violates defined restrictions. When abnormal or restricted usage is detected (e.g., usage during sleep time or exceeding screen time limits), the system triggers alert notifications to be sent immediately to the parent's app or admin dashboard. All events are logged with timestamps, device ID, app name,

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and rule violation details for review. Visualization tools, such as usage charts and logs, allow parents to view trends and respond as needed. The system ensures transparency by keeping a detailed log of all system actions and user interactions, accessible via the dashboard. Designed for fast and reliable performance, the system aims to help parents quickly detect, understand, and respond to screen time misuse in real-time.

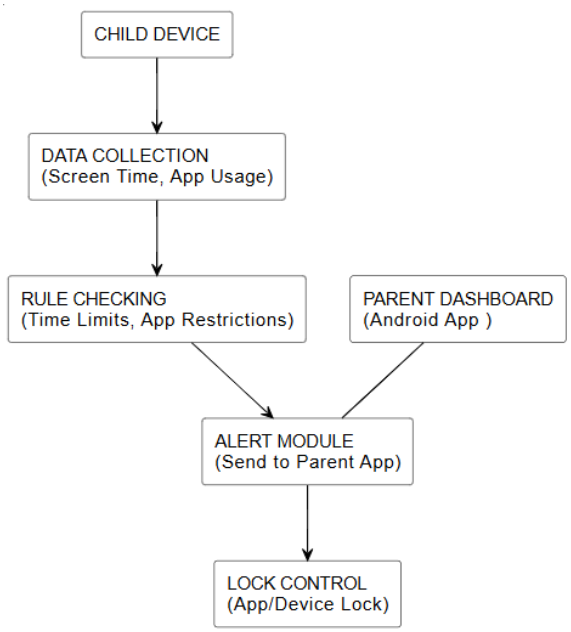

Fig (b) Workflow estimation

C. Server Functionality

The Kid Care application leverages the Django web framework to provide robust server-side functionality, enabling scalable and remotely accessible parental control operations. Authorized users, typically parents or guardians, can securely access the system from any browser without the need for additional software installation. The server supports secure REST APIs that facilitate communication between the mobile application, backend services, and connected devices. Key functions include real-time alert delivery, parent authentication, access log viewing, and configuration of time-based rules and access controls. The system supports multi-user functionality, allowing family members to manage profiles and rules across different devices. Built-in security features, including encrypted sessions and secure login mechanisms, ensure protection from unauthorized access. Additionally, the architecture is designed to support cloud integration for centralized monitoring of children's device usage and remote policy enforcement.

D. Implementation

The Kid Care system was implemented using Python and the Django framework to create both the backend logic and the administrative interface. The backend handles user management, rule enforcement, and time limit monitoring, while the frontend, built with Django templates, allows users to configure device access rules, view real-time usage logs, and receive alerts. Time tracking and lock enforcement logic are developed using native Android services for performance optimization. The dashboard interface enables guardians to easily modify screen time settings, activate device lock remotely, and monitor children’s digital activity across multiple devices. All reports are automatically logged, with options to download daily or weekly summaries for review. The modular system design makes it easy to extend functionality, such as adding support for Android TV or expanding to cloud-based synchronization. The solution is optimized to run efficiently on low-resource environments such as entry-level mobile devices and local home servers.

IV RESULTS AND DISCUSSION

A. Achievements

The proposed Kid Care parental control system successfully addresses several challenges commonly found in traditional device monitoring approaches by offering real-time access control, strict screen time enforcement, and remote

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management capabilities. Unlike conventional apps that rely on basic timers or manual supervision, Kid Care integrates a web-based and mobile-accessible dashboard that enables parents to monitor and control device usage remotely. The system ensures timely enforcement of usage limits through an automated locking mechanism and secure passcode-based unlocking, preventing unauthorized device use beyond allowed hours. Although the system operates effectively under standard home network conditions, certain challenges emerged during implementation. These include potential server load during concurrent access and the need for consistent background services on mobile devices to maintain enforcement accuracy. Future improvements may involve implementing lightweight background daemons and asynchronous request handling to reduce latency and ensure consistent performance. Furthermore, as demand grows, incorporating cloud storage and syncing options will support broader accessibility and multi-device integration. Adding mobile notifications and enhanced activity insights could further improve parental responsiveness and decision-making.

B. Discussion

The Kid Care application demonstrates the effectiveness of a centralized, server-driven parental control system that is both scalable and adaptable to various device types. The Django-powered backend, combined with Android client support, enables efficient communication and policy enforcement between the server and child devices. Parents can configure usage schedules, view activity logs, and trigger remote device locks, providing a practical tool for managing children's screen time. Although the system operates effectively under standard home network conditions, certain challenges emerged during implementation. These include potential server load during concurrent access and the need for consistent background services on mobile devices to maintain enforcement accuracy. Future improvements may involve implementing lightweight background daemons and asynchronous request handling to reduce latency and ensure consistent performance. Furthermore, as demand grows, incorporating cloud storage and syncing options will support broader accessibility and multi-device integration. Adding mobile notifications and enhanced activity insights could further improve parental responsiveness and decision-making.

IV. CONCLUSION

The Kid Care parental control system has a server-supported modular design that accommodates real-time monitoring and device control and hence represents a scalable solution for contemporary digital homes. With the use of Django-based web interfaces and secure API communication, the system supports remote access, device locking, and schedule enforcement, all in an easy-to-use environment. Such a design permits simultaneous management by several authorized users, i.e., parents or guardians, of screen time settings and tracking across several devices.

As powerful as it is, the system comes with issues common to real-time applications like maintaining uniform synchronization and background service reliability across a variety of Android devices. Ensuring performance and responsiveness, its use of asynchronous task handling, coupled with lightweight background services, is encouraged. The system already provides prompt notifications, full usage logs, and secure control features that facilitate families to establish healthy screen manners.

In the future, the architecture is set to extend to mobile notifications, edge-based decision enforcement, and coverage of more platforms, such as Android TV. These enhancements will further improve flexibility, decrease latency, and enable more seamless control of children's digital activity across multiple contexts.

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