Age and Maturity Based Parental Control System

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Abstract

This study developed an age and maturity-based parental control system to address the current problem of limiting children's internet exposure. The goal of the study, which focused on 50 parents or guardians who were randomly selected, is to understand the worries they have about their kids' access to digital content. The main objective is to create a customized parental control system that takes the child's age and maturity level into account. With this strategy, content limitations should be addressed in a more advanced and specific way, resulting in a more efficient and unique digital parenting experience. A user-friendly interface that makes it simple for parents to control and monitor their children's access to digital content is one of the goals of this research. It aimed to offer insights that can improve the functioning of the suggested solution by evaluating the system's efficacy based on participant input. In the end, this study desires to enable parents to better navigate the world of technology, creating a more secure and stimulating online environment for their kids' development.

Keywords: *parental control, internet exposure, digital content, age-based, maturity-based, customized system, user-friendly interface*

INTRODUCTION

In today's digital world, kids spend a lot of time online, exploring different apps and content. This study, "Age and Maturity Based Parental Control System," looks at making online safety better by creating a smart system. This system adapts to how old a child is and how mature they are, kids get smarter in using the internet as they grow up changing how they think and act online. Parental control apps are typically created to assist parents in overseeing their adolescents' online activities and safeguarding them from potential internet-related dangers. These applications primarily target parents as their main users, and as a result, they often prioritize enhancing parental control through limitations and surveillance (Wisniewski P. et. al, 2019). Over the use of the Internet by young children and adolescents, the digital age has introduced many new challenges, including excessive screen time, inappropriate online content, cyber-predators, and cyberbullying (Duchaussoy ,2020).

Some apps provide parents with fine-grained reports about children's usage of the phone, their social interactions, and their physical location. An

example of the former is the content discovery platform Safe Mode with Free Games for Kids by KIDOZ, and the latter is the Norton Family app. To provide these features, parental control apps rely on the collection and handling of children's behavior (e.g., location, browsing activities, and phone calls) and personal data (e.g., unique identifiers and contacts), in many cases, using techniques and methods similar to those of spyware (Chatterjee et al., 2018).

The Internet has become an essential part of the daily lives of children as well as adults. Researchers want to make sure kids have a safe online experience and parents can guide them well. It is a useful tool that can provide non-identifying information and allow people to interact appropriately with their family, friends, classmates, or co-workers (Yamada et al., 2021). Nonetheless, interactive touchscreen gadgets have been a part of young children's lives in the previous decade, and toddlers have had their first experience with touchscreen technology before the age of two. The goal of the study was to uncover several aspects of children's smart mobile use at home, such as mobile device usage frequency, favorite app types, and

parent beliefs and tactics. The current study discovered that parents use mobile devices to support their children's learning at home.

Parents' excessive control over their children's behavior can lead to traumatic emotional experiences such as insecurity, neglect, or isolation in their daily lives. Children may try to find alternatives to reduce harmful effects, or to avoid adversity in such situations. Perhaps the most popular alternatives are Internet technologies which are among the indispensable technologies for today's youth who were born in the era of digital technologies and their rapid spread every day (Cetinkaya, 2019).

Modern mobile parental controls help parents keep an eye on children's use of digital devices by kids. Even though many kids receive their first smartphone and social media account before they turn 13, few parents use these services. To create future mobile parental control, there are several of privacy, security, and usability issues that must be resolved, according to the literature (Gnanasekaran & De Moor, 2023).

While certain technological aspects, like exposure to audio-visual media, have been associated with negative impacts on cognitive development and academic achievement, recent research is establishing connections between children's cognitive development and the use of touchscreen devices along with well-designed mobile applications (apps) (Portugal et al., 2021; Sheehan et al., 2019).

The current results provide strong support for the claim that children can engage in mature counterfactual reasoning early in development. When presented with a sufficiently simple and clear physical causation task, children as young as 4 demonstrated mature counterfactual reasoning - an ability previous results suggested did not emerge until middle to late childhood. We have considered several possible reasons for children's earlier success on this task than others, and many of these (Nyhout & Ganea, 2019).

In the Philippines, digital parenting is highlighted as a crucial method to prevent online abuse of children, according to a report from the Philippine Information Agency (PIA). This strategy involves parents educating themselves and their children about safe internet practices, as well as setting rules and guidelines for internet and social media usage at home. By taking a proactive approach, Filipino parents can help safeguard their children from the potential hazards of the digital world (Oblianda, 2023). The solution proposed in the "Age and Maturity Based Parental Control System" app is like a helper for parents. Imagine it as a tool that understands how old your child is and how much they understand about the online world. If the child spends too much time online, the app helps parents set limits. It's like a friendly guide for parents to keep their kids safe and make sure they have a good time online. This solution aims to make the online world a safer place for kids, giving parents the peace of mind that their children are protected while exploring the digital landscape.

Statement of the Problem
The following are the specific problems that this study aimed to address:
1. Exposure to inappropriate and sensitive content of applications or websites of the child according to their age.
2. The child uses excessive time in online activities.
3. Parents' difficulty in restraining the child in online activities.
4. Identify the maturity level of the child.
5. Children lack social interaction with their family and friends.
6. The danger of cyber-predators and cyberbullying poses a pressing threat to the safety of individuals, particularly minors, in the digital age.

Objectives of the Study
The main goal of the study was to develop a parental control system with dynamic features in conjunction with the control and monitor configuration of the application.
1. To block the inappropriate application and websites on the child's devices.
2. To monitor and control the time of the child on their online activities.
3. To limit the use of the child on their devices.

4. To provide a maturity assessment tool to identify the maturity level of the child.
5. To be able to locate the child's location.
6. To avoid the potential threats of cyber-predators and cyberbullying by the monitoring features of the app.

Scope of the Study

This study entitled "Age and Maturity Based Parental Control System" focused on developing a different parental control system that can be able to categorize the maturity level of the child using a maturity assessment tool validated by a Psychology Expert, in a general locale of 50 participants parents in Angeles City which will able to supervise the child device by their signed-in accounts, throughout the development parent or guardian will able to block the inappropriate application to their child according to their age and maturity. The system has recommended applications to block on a child's device that can empower parents to make informed decisions about restricting certain applications on their child's device, aligning with the parental control system's objective of providing tailored content management based on the child's age, maturity level, and content appropriateness. once the needed gathered data is completed on the child's device, screen time monitoring is displayed to catch up on the spend time of the child's leisure activities online to able to have a limitation and break hours for their personal or other needs, location is shared to able to guarded the physical location of the child once it's online via GPS, SMS, Notifications and Activity log of the child can be read and record on the parent device once the application is set up. The study can help the importance of parents or guardians know about supervising the child's device for monitoring and security purposes concerning child's online activity.

Delimitations of the Study

This study Age and Maturity Based Parental Control Systems focused on the online safety of the child. The web filtering feature is constrained to specific browsers, namely Google, Opera, and Mozilla, limiting its functionality to supported platforms. Additionally, the detection of specific inappropriate words for filtering poses a challenge due to inherent difficulty and time constraints, impacting the comprehensive evaluation of word detection capabilities. The TomTom SDK is used to locate the user's device and can route the location of the child. It can navigate directly to the GPS location of a child, but it requires a subscription fee to be able to navigate the specific direction of the child to be implemented in an application, and the study does not explore the practicalities or subscription requirements associated with this SDK. The Maturity assessment test within the app is considered preparatory and not conclusive for categorizing the maturity level of the child, as professional psychologists are necessary for a more accurate determination. Furthermore, the system's effectiveness is restricted to specific languages and lacks support for diverse languages or cultures, potentially limiting its efficacy in multicultural settings where diverse linguistic and cultural backgrounds are prevalent. The study will concentrate on specific types of devices (Android). The study may focus on a specific age group of children and teenagers, such as those between 5 and 18 years old.

Conceptual Framework
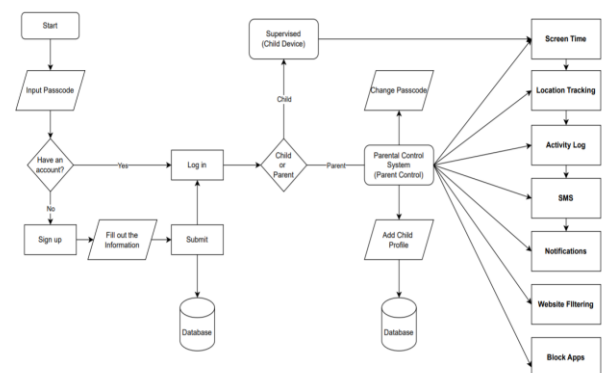
The application starts with two primary requirements: "Register" and "Login". In Sign-up, you will create your account by filling out the form, and then data will be entered into the database. When you have successfully logged in, create a profile account for the parent and child. If you are a parent, you will monitor your child's use of feature block applications, screen time, data usage, activity

log, and location tracking. If you are a child, you will be supervised.

Significance of the Study

Based on its title, the study will benefit the following:

To the Parents. The system will help the parents have to control and monitor their children using the internet.

To the Children. The system will be able to monitor the online activities of the child on their device.

To the Researcher - The study can be used for references on review of related studies to help the researchers.

To the Future Researcher - The study will help the future researcher to have a reference for their future study.

METHOD

The study discusses how the researchers plan to develop the application Age & Maturity based Parental Control. This chapter includes how the development process to its research design, system development methodology, data collection, and analysis, the implementation of the design, the procedure, and the participant involved in the study.

Algorithm

Deep Neural Networks (DNNs) are extensively employed for data-driven modeling. Comprising layers with nodes and edges that encapsulate mathematical relationships, a DNN undergoes updates to these relationships through backpropagation during data training. After training, these modified relationships serve as equations to forecast output variables based on input variables. Consequently, a notable strength of DNNs lies in their ability to articulate relationships within a system, irrespective of the system's nonlinearity and complexity (Kwon et al., 2023).
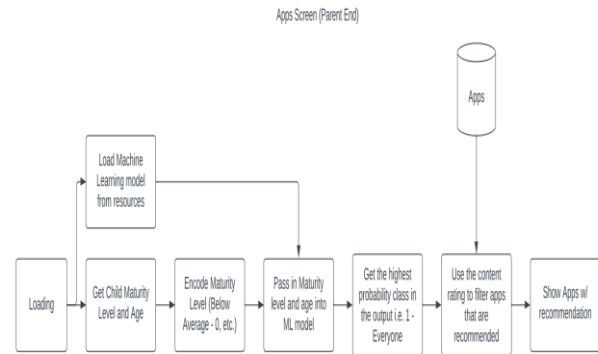
The DNN model's input layer is the age and maturity level of the child based on the data input of the parent in adding a child profile the maturity level comes from the result of the maturity assessment tool categorized as Below Maturity Level = 0, Average Maturity Level = 1, Above Maturity Level = 3, The Second inputs are the application/datasets from Kaggle that has a content rating leveled in 0-5, wherein 0=Unrated, 1=Everyone, 2=10+, 3=13+, 4=17 and 5=18+. The hidden layer normalization of the model is two Dense Layer 64 units with rectified linear unit (ReLU) activation function and Dense Layer 6 units with softmax activation function. Then the higher probability will be the output of the model which is used to automate recommended blocked apps for the children in the application to restrict by the parent on their device.
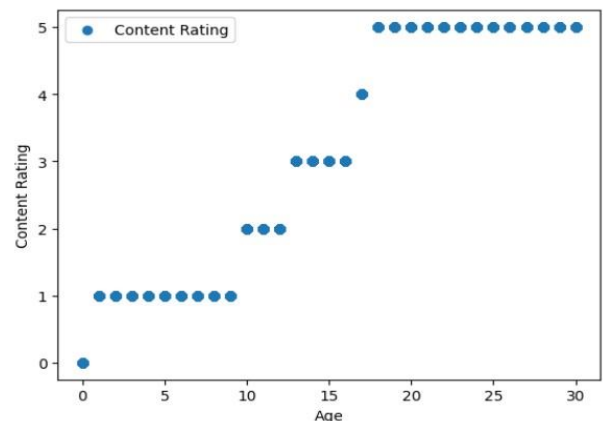
In theoretical terms, the model's probability output is intricately linked to the correlation between the age input and the age restrictions set for applications in the dataset. This means that the model considers the child's age, provided as input,

and analyzes how it aligns with the age restrictions assigned to various applications within the dataset.

Simultaneously, the model takes into account the category of the child's maturity level, as determined by the maturity assessment tool. This information is compared with the content ratings of applications in the dataset. The content ratings typically categorize applications based on their suitability for different age groups, ensuring that the content aligns with certain maturity levels.

For example, it may use rectified linear unit (ReLU) activation functions in hidden layers, and a softmax activation function in the output layer. These layers and functions help the model make complex calculations and transformations, ultimately producing a probability output.

In simpler terms, the model is designed to evaluate whether the child's age and maturity level align with the age restrictions and content ratings of various applications. The output probability reflects the likelihood that the child should or should not have access to a particular application based on these considerations. This approach aims to provide a nuanced and tailored recommendation for parents, allowing them to make informed decisions about the appropriateness of applications for their child's age and maturity level.

Research Design
In this study, the researchers used descriptive research, a quantitative research method that attempts to collect quantifiable information for statistical analysis of the population sample. It is a popular market research tool that allows one to collect and describe the nature of the demographic segment. The objective collection of data, primarily focused on numbers and values, suggests being "associated with, of, or depicted in terms of a quantity." Results of quantitative observation are derived using statistical and numerical analysis methods. It implies the observation of any entity that can be associated with a numeric value such as age, shape, weight, volume, scale, etc. (Manjunatha, 2019).

Various types of numerical data are collected in quantitative research. There are instances where the numerical structure is imposed and instances where the numerical data is quantitative by nature. Researchers can aggregate data through statistical analyses ranging from basic to highly complex when they gather quantitative data. Contrary to qualitative research, quantitative research employs techniques like surveys, controlled observations, and experiments. Social scientists who study communication use quantitative research methods to examine events or phenomena that have an impact on people. People research is the focus of social scientists (Ahmad,2019).

Participants
The participants in this study are both parents or guardians with children ages 5-18 years old of Angeles City, parents are regarded as the major stakeholders for these apps; thus, the apps frequently emphasize increased parental control through limitation and monitoring. Parental control software apps are one method that parents employ to monitor the risks of teen online content. Parents can use their cellphones to ban, filter, or monitor their children's internet behavior with these apps. This study explains why collaborative strategies for managing internet safety and privacy within families are important in this generation and society. Participants in this study are parents or guardians, as well as children, who have been exposed to technology and would like to offer a safe internet environment for their family.

The sampling technique used in the study is Convenience Sampling a non-probability sampling method that is a less objective strategy compared to probability techniques. In this sampling approach, participants are chosen directly by the researcher, referred by others, or opt to participate on their own. Several non-probability sampling forms exist, including purposeful sampling involving the researcher's direct selection, snowball recruiting relying on referrals, and convenience sampling where participants choose to participate after the study announcement by the researcher (Stratton,2021).

Procedure

This section discussed the methods that the researchers used to collect data. These techniques assisted the researchers in gathering information that helped the system take shape and grow over time. The following methods were utilized to collect data:

1. Web Research- The assistance of web research has greatly impacted the researcher's understanding of a parental control system, facilitating a deeper knowledge of its features and contributing to the improvement of the overall study concept.
2. Questionnaire - The purpose of the questionnaire is to systematically gather valuable data from participant includes Parent or Guardian, IT experts, and researchers, regarding the Age & Maturity Based Parental Control System. The questionnaire has been designed with a focus on assessing the system's performance based on the ISO 25010 Criteria, encompassing Functionality, Reliability, Usability, Efficiency, and Maintainability.
3. Evaluation Form - this is a feedback platform that professionals can use to provide and receive feedback. It normally includes questions to assist the person in completing the form. Depending on the industry and purpose, the structure of this document may vary (Career Guide, 2021). The evaluation form is used by the researchers to document and measure the satisfaction of the Users and IT experts with the system's performance. One of the keys to the success of your performance management process is to have good evaluation forms (ISO-25010-Assessment-tool-IT Experts).

Evaluation Criteria for Users

The researchers used a structured questionnaire based on Software Quality Assurance ISO-25010 for the evaluation of the users on developed parental control. Descriptions of the evaluation criteria are the following:

- Functional Suitability - The degree to which the collection of functionalities covers all of the defined tasks and user objectives.
- Performance efficiency - The degree to which a system's response and processing times and throughput rates fulfill criteria when executing its duties.
- Compatibility - The degree to which the system can carry out its role without difficulty.
- Usability - The degree to which a system can reach the specified aim in terms of being effective and efficient in meeting the needs of the user.
- Reliability - The degree to which a system is effective and usable when needed.
- Security - The degree to which the security of a system or application pertains to its effectiveness in safeguarding information and data against vulnerabilities and security flaws.
- Maintainability - The degree to which users perceive the system's efficacy and efficiency in terms of reusability and testability.
- Portability - The extent to which a system may be successfully and efficiently changed to a software or other operational or consumption environment.

Data Analysis

The researcher conducted a questionnaire/survey thru Google Forms, encouraging all participants to assess the Parental Control App. Respondents were contacted both personally and through an online messaging platform. Researchers politely requested that participants respond genuinely to all the required questions and take the survey seriously to enhance the user experience of the parental control app.

Percentage Distribution is employed as a transparent metric to illustrate the correlation between a couple of factors as a percentage of the total frequency, standardized to 100. This method proves especially valuable in showcasing the frequency of survey results and other data. Tables, bar graphs, and pie charts are commonly utilized for presenting percentage frequency distributions. The fundamental formula for calculation is as follows:

$$P = \frac{F}{N} \times 100$$

Where: P = Percentage
F=Frequency
N = Number of respondents

Frequency Count Distribution is a representation, presented either graphically or in a tabular form, that illustrates the details of findings within a defined range. The interval size is determined based on the specific data under analysis and the objectives of the analyst.

Likert Scale is a rating scale commonly used to measure the subjective experiences of a respondent, to easily analyze someone's point of view. It is widely utilized in a quantitative research data collection.

Table 1. Five-point Likert Scale

Numerical Rating	Description
5	Excellent
4	Very Good
3	Good
2	Fair
1	Poor

Table 1 Shows the scale that represents the measurements of the participants' responses. It was determined by how well the participants understood the application's function. As an evaluation of the application, numerical ratings appeared in the questionnaires completed by the participants. Each numerical rating has a different meaning.

Table 2. Likert Scale for Interpreting the Evaluation Result

Numerical Rating	Description
4.20 – 5.00	Excellent
3.40 – 4.19	Very Good
2.60 – 3.39	Good
1.80 – 2.59	Fair
1.00 – 1.79	Poor

Table 2 shows the scale for interpreting the participants' evaluation results includes the three IT experts.

The **weighted mean** was used to summarize the total response of the participants after they completed the questionnaires. The general response will only be one of the scale's five interpretations.

The weighted mean is calculated using the following formula:

Mean: $\bar{x} = \sum / N$

Where:
$\bar{x}$ = mean x = Number of respondents   n= total number of respondents
f= weight given from each respondent   n= total number of respondents

RESULT

This chapter delves into all aspects of the findings, encompassing system and application outputs, as well as various hardware equipment utilized in the study. Additionally, it presents the assessment outcomes from both language technology IT experts and non-IT experts.

Evaluation Results

This section of the research comprises the whole outcome of the evaluation done by users and IT professionals. The evaluation criteria were based on the ISO-25000 or Software Quality Assurance characteristics or measurements.

Table 3. Evaluation Results of I.T Experts

Criteria	Mean	Descriptive Rating
Functional Suitability	3.89	Very Good
Performance Efficiency	4.11	Very Good
Compatibility	4.00	Very Good
Usability	3.94	Very Good
Reliability	4.08	Very Good
Security	4.4	Very Good
Maintainability	4.13	Very Good
Portability	4.44	Excellent
Overall Mean	4.12	Very Good

Table 6.0 presents the results of the evaluation completed by three I.T. specialists. The table displays the mean for each criterion, as well as its qualitative interpretation and ranking. The overall mean of the evaluation scores for software

performance was 4.12, which corresponds to Very Good. This suggests that the system satisfies the user's needs, is dependable, simple to use, efficient with resources, and simple to maintain and manage. The system's Functional Suitability received a score of 3.89, which is considered Very Good. This demonstrates that the system has accomplished its primary goal, which is further defined by its completeness, correctness, and appropriateness.

Performance Efficiency has received a score of 4.11, which is considered Very Good. This demonstrates that the system has accomplished its primary goal, as evidenced by its operational behavior, resource efficiency, and capacity.

The compatibility was scored a 4.00, which is considered very good. This demonstrates that the system has accomplished its primary goal, which is further defined by its appropriateness, learnability, operability, user error protection, user interface aesthetics, and accessibility.

Usability was given a 3.94 rating, which is considered very good. This demonstrates that users and evaluators alike considered the system to be learnable and simple to use, independent of their prior experience with computers and systems in general. This also indicates that the system's graphical user interface is well-designed and appealing.

The system's reliability performance was scored 4.08, which is a very good result. This demonstrates that the system has accomplished its primary goal, which is further defined by its maturity, availability, and fault tolerance.

The confidentiality, integrity, accountability, and authenticity of a system are all Security characteristics of software. This attribute received a grade of 4.4, which is considered Very Good.

The system's maintainability function received a score of 4.13, which is considered Very Good. Modularity, reusability, analyzability, modifiability, and testability are all indicators of system maintainability.

The system's Portability was the final characteristic to be assessed. It received a 4.44, which is an Excellent ranking in this category. This measure is broken down into sub-categories such as the system's ability to run on various platforms and environments, ease of installation and setup, compliance, and replaceability.

In ranking Portability have the highest rating of 4.44. Followed by Maintainability with 4.13, Performance Efficiency with 4.11, Reliability with 4.08, Security with 4.4, Compatibility with 4, Functional Suitability with 3.89, and the lowest Usability with 3.94 ratings.

Among the metrics that were used in ISO 25010 Functional Suitability has the highest score in Non – I.T. Experts while Portability has the highest score in I.T. Experts.

Table 4. Evaluation Results of Non-I. T Experts

Criteria	Mean	Descriptive Rating
Functional Suitability	4.11	Very Good
Performance Efficiency	3.89	Very Good
Usability	3.99	Very Good
Reliability	3.82	Very Good
Overall Mean	3.95	Very Good

Table 7.0 presents the fifty (50) parents on the application's functional suitability, performance efficiency, usability, and reliability. The overall mean of the application performance evaluation was 3.95, which translates to a Very Good rating.

The system's Functional Suitability was evaluated with a score of 4.11, indicating a Very Good equivalent assessment. This emphasizes the project's exceptional performance in terms of functionality, completeness, accuracy, and appropriateness.

The rating for system performance efficiency is 3.89, indicating a Very Good rating. This indicates that the system operates efficiently, meeting the required response time, processing speed, and throughput rates during its various functions. To fulfill its functional requirements, the application

employs the appropriate amounts and types of resources. Furthermore, in accordance with the specified requirements, the application extends to the extreme limits of a system's parameters.

The system usability was rated as 3.99, which is Very Good. The application assesses user suitability and achieves learning objectives for effective, efficient, and satisfying usage. It ensures simple operation and control via a user-friendly interface, accommodating a diverse range of users and capabilities for specified goals in a given context.

The system's reliability performance was rated 3.82, which is a Very Good result. This demonstrates that the system has completed its task.

DISCUSSION

In this section, the researcher presents and discuss the summary of findings. Our conclusions, and recommendations make suggestions for improving the project.

Summary of Findings

The researchers decided to develop an age and maturity-based parental control system, which parents and children can use. Data collection to demonstrate how the research is more reliable based on what researchers found on the internet. The research conceptual framework discusses how the application is processed and how the system flows. The Deep Neural Networks (DNNs) algorithm was used by the researcher to create a model that can effectively analyze the block-recommended app for children. Descriptive Research Design was used in research design to collect, analyze, and present information about system features. The researchers used the agile model to plan the application, design the application, and test it for bugs to be fixed. Once the application was completed, the researchers deployed it together with information about the application's performance, and after that review was used to evaluate performance. The researchers limit the application to those parents who are willing to use it as participants. The hardware specifications used in the application are only for Android users, and the researchers created the application using a desktop computer. The researchers used Kotlin

programming languages for software specification and coding. The System/Application Output displays the outcomes of all transactions. While the researchers were completing all of the application requirements, they distributed a questionnaire to determine the application's overall success. When the result is completed, the researchers begin their final steps to complete all of the requirements.

Conclusions

This section presents the researchers' conclusions based on the objectives stated in the introduction of the study and the results obtained throughout the study's completion. The goal of the age and maturity-based parental control system is to monitor their child. The researchers have features such as automated recommended blocked apps based on the child's age and maturity level resulting in the DNN model of the system. The researchers have screen time limits that you can easily set for your children to avoid excessive usage, location tracking, and even tracking where they are. Website filtering ensures they only visit safe websites, read and record SMS and notifications, and an activity log keeps track of what they do online.

Recommendations

The researcher's recommendation needs to improve the application's functions and design. Furthermore, the recommendations are based on the study's limitations. The researchers advise future researchers to integrate word detection algorithms to identify and flag potentially harmful or inappropriate language in messages, comments, and online conversations, as well as data usage provide detailed reports on data usage, highlighting which apps and websites consume the most data, Add some free Third-party application for location features to directly navigate the child' phone, focus on web link the websites not to application using for a web link, In addition lessen the question on maturity test make it 5 to a max of 10 questions.

The panelist's recommendation such indicates the device model name of the child's phone is already implemented; the application must activate as an administrator so it cannot uninstall easily on the child's phone.

The maturity assessment test was reviewed by a psychological expert; however, the tool used in the system is not deemed satisfactory in terms of accuracy. For further concerns about the maturity test, it is strongly recommended that you consult with the psychological expert personally for a more in-depth assessment.

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