



Research Article

Children Care System: Controlling the Use of Smart Devices

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Abstract

Background and Objective: Smart devices have negative influences on human being and especially on the children health. These negative influences inspire the researchers and the vendors to focus on how to avoid such negative issues. This study described the analysis, design and implementation of the software that controls smart devices. The proposed system gives the default time based on the children age, increases or decreases the time when needed, extends the time when video is playing based on specific rules, produces easy to use, attractive and interactive interface and blocks the device when the time is out. **Materials and methods:** The activity diagram showed the flow of data required for the system. The system model determined all the component of the system including the functions, the database, the interfaces and the users. The algorithm generated from the model. The proposed system compared with twenty available similar applications in the play store using seven features. **Results:** The authors tested the system against different types of users. The feedbacks of parents and children were highly promising. Results showed that 86.4% of the parents are satisfied with the time controller, around 91.1% of the children are satisfied with the proposed interface and 100% of the children are satisfied with the multiple sessions of the time allowed and video algorithm. **Conclusion:** The authors concluded that the implementation of this system allows parents to create accounts for their children and control these accounts based on the time allowed.

Key words: Smart devices, children health, software, interactive interface

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INTRODUCTION

Smart devices could be beneficial or harmful. Therefore, the extent of its benefit or harm depends on determining the proper way people use them. Some adults have weak knowledge of the disadvantages of these devices. So, they may use these devices in wrong way which affects their behavior and thinking. In this case, adults who are responsible for them must always keep eye on them in order to advise them whenever they do mistakes. This is not a good solution because adults are not always available to them. Forbid children from using the device with the absence of their responsible adults is also not suitable solution because this will let them use their friends' or neighbors' devices if possible. On the other hand, giving children the full freedom to use these devices for long time will harm them. Giving children rules of using the devices may not be useful if they are not aware of. Actually, it is a serious problem, which faces our society from different angles¹.

One way to avoid any harm is to work on finding intelligent ways that control these devices, especially that these devices are available to the children hands². These devices are not well spread in poor countries but they are available in every house and with all young ages in rich countries like GCC.

Some applications give permission for parents to control the devices of their children specially the time given to them. This permission could keep children away of many risks caused by using smart devices. Other applications lack to control the allowed time given to children. Some applications lack the attraction of the interface of both parents and children such as pages' design, writing styles and suitable attractive colors that keep children happy, active, inspired and so on. Other applications lack the simplicity and flexibility required for both parents and children. The interest of the proposed system lies in the maintaining a healthy life for children in order to reduce negative symptoms of the use of smart devices. Good features of current applications were integrated in the new system together with new proposed features. The proposed system is one step forward of the production of healthy systems that controls smart devices. The system is consistent with the wishes of children such as increasing the time allowed using attractive graphical user interfaces, availability of the remainder time in an attractive shape and so on. This research introduces new algorithm that imposes the time flexibility of watching a video which length is more than the remainder time by following some rules. This feature avoids children to feel frustrated in case of

non-completion the view video. The proposed system uses the results of the questionnaire which reflects the needs of parents and the wishes of children. Building the new system is a great solution. The proposed system works with ages 3-12 and this is considered one of the limitations of it. Another limitation is that the proposed system uses the English language only. Those limitations are the light spots for further work in future plus the generation of new promising and potential features that can improve the current system.

Increasing the number of children who use smart devices and the extent of their attraction to use them for long periods of time lead researchers and vendors to study and analyze this problem seriously. The American Academy of Pediatrics and the Canadian Society of Pediatrics state infants aged 0-2 years should not have any exposure to technology, 3-5 years be restricted to 1 h/day and 6-18 years restricted to 2 h/day³. Use of technology under the age of 12 years is detrimental to child development and learning⁴.

Using smart devices is risky for both adults and children. In May of 2011, the World Health Organization classified cell phones (and other wireless devices) as a category 2B risk (possible carcinogen) due to radiation emission⁵. The time spend on technology is one of the main factors that affect children growth. Technology overuse is implicated as a causal factor in rising rates of child depression, anxiety, attachment disorder, attention deficit, autism, bipolar disorder, psychosis and problematic child behavior^{6,7}. Teenagers access social media sites from cell phones⁸. As reviewed in the clinical report from the American Academy of Pediatrics (AAP), social media, mainly Facebook, offers opportunities and potential risks to young wired users⁹.

About 60% of parents do not supervise their child's technology usage and 75% of children are allowed technology in their bedrooms¹⁰. Parents should have priority of caring their children. Monitoring the children's use of technology and media is one of the missions of parents since it has many risks on children. Many parents seem to have few rules about use of media by their children and adolescents especially non-educated parents. Two-thirds of children and teenagers report that their parents have "no rules" about time spent with media¹⁰.

The judgment on smart devices as harmful or not depends on several things such as child age, time allowed and kind of applications used and their benefits. It is very important to take care of children by controlling their use of the smart devices to keep them healthy and save for their future.

Using smart devices has positive and negative effects on children. In the positive side, it is useful to improve child skills, imagination, the ability to keep information and learn new knowledge¹¹. Besides that, the increasing of the social presence with their families, making them to think positively and fast, intensive concentration and giving greater control over their learning. For the cooperation side, smart devices can increase the cooperative learning. Teachers may ask the children to watch a specific learning video at home and then the discussion will be held between the teacher and children in the class room. So, the class time will be focused on cooperative learning¹².

In the negative side, it will become harmful if it exceeds the healthy usage time allowed, affects children's sleep, eat and social relationships. Also, it affects children's brains configuration. Using smart devices for long time will addictive children like alcoholics or heroin which lead their minds to attention deficit disorders. It also reflects the feeling of fatigue, nervousness, mind distraction and aggressive. Moreover, it decreasing child ability to understand emotional context and read people's facial expressions which will affects in turn the social interactions

in face-to-face meetings and cause misunderstanding for others. So, they will become aggressive and selfish¹².

The followings are some applications exist in the market and they are used for managing the time that kids spend on their smart devices: SCREENTIME¹³, Kids Zone Parental Controls¹⁴, FamilyTime¹⁵, Safe Family Parental Control¹⁶, Boomerang Parental Control¹⁷, Parental Control Board¹⁸, ESET Parental Control¹⁹, Parental Control SecureKids²⁰, Kids Place²¹, SAY HELLO TO SMART PARENTING²², Kids Manager- Parental Control²³, Protect Kid Parental Control²⁴, Norton Family parental control²⁵, WordKik Parental Control²⁶, Qustodio²⁷, Teen Limit Parental Control²⁸, Limitly Screen Time Control²⁹, Mobile Fence Parental Control³⁰, Parental Control and Dashboard³¹ and Ourpact Parental Control and Family Locator³².

Since there are many applications for managing and controlling the time given to children for using their smart devices safely, a comparison between the proposed solution and the mentioned twenty applications was made in order to judge the proposed model.

Proposed model: The suggested solution consists of the following components as shown in Fig. 1:

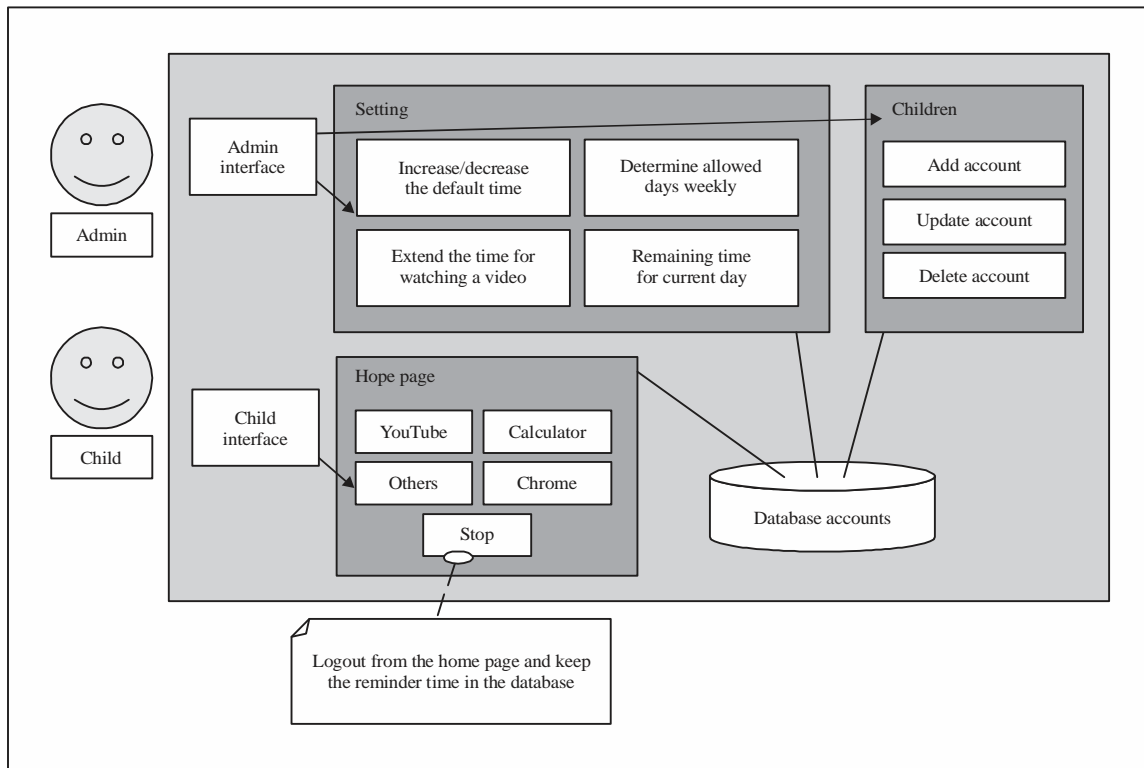


Fig. 1: Components of the proposed model

- **Child interface:**
 - Used to login to the application and allow the child to use the device through the application interface
 - Includes the clock which gradually alarms the child before the allowed time finish. This helps the child managing the important tasks based on their priorities to him/her
 - The block screen which alerts the child that the time is finished. The most popular technology was used to design such screen such as sound, attractive image and written message. Once the screen shows up, the current account will be reset to its default state and can only be started again after 24 h
- **Admin interface:** Attractive interface which is used to access the setting of the application
- **Settings:** Includes the following functions:
 - Increase or decrease the default time
 - Determine the week's allowed-days
 - Extend the time for watching a video
 - Remaining time for current day
- **Children:** Allows the admin to add, update and/or delete accounts
- **Database accounts:** Stores all information about the users and the remainder time

System flow of control: An activity diagram presents a series of actions or flow of control in a system. Activity diagrams are often used in business process modeling to demonstrate activities. Activities modeled can be sequential and concurrent.

Activity diagrams are used for the description of those business processes that describe the functionality of the business system. Since it is likely to describe parallel events, the activity diagram is appropriated for the illustration of business processes, since business processes seldom occur in a linear mode and often show parallelisms.

Figure 2 represents the activity diagram of the proposed solution. Two actors are involved: The parents (or the responsible person) and the child.

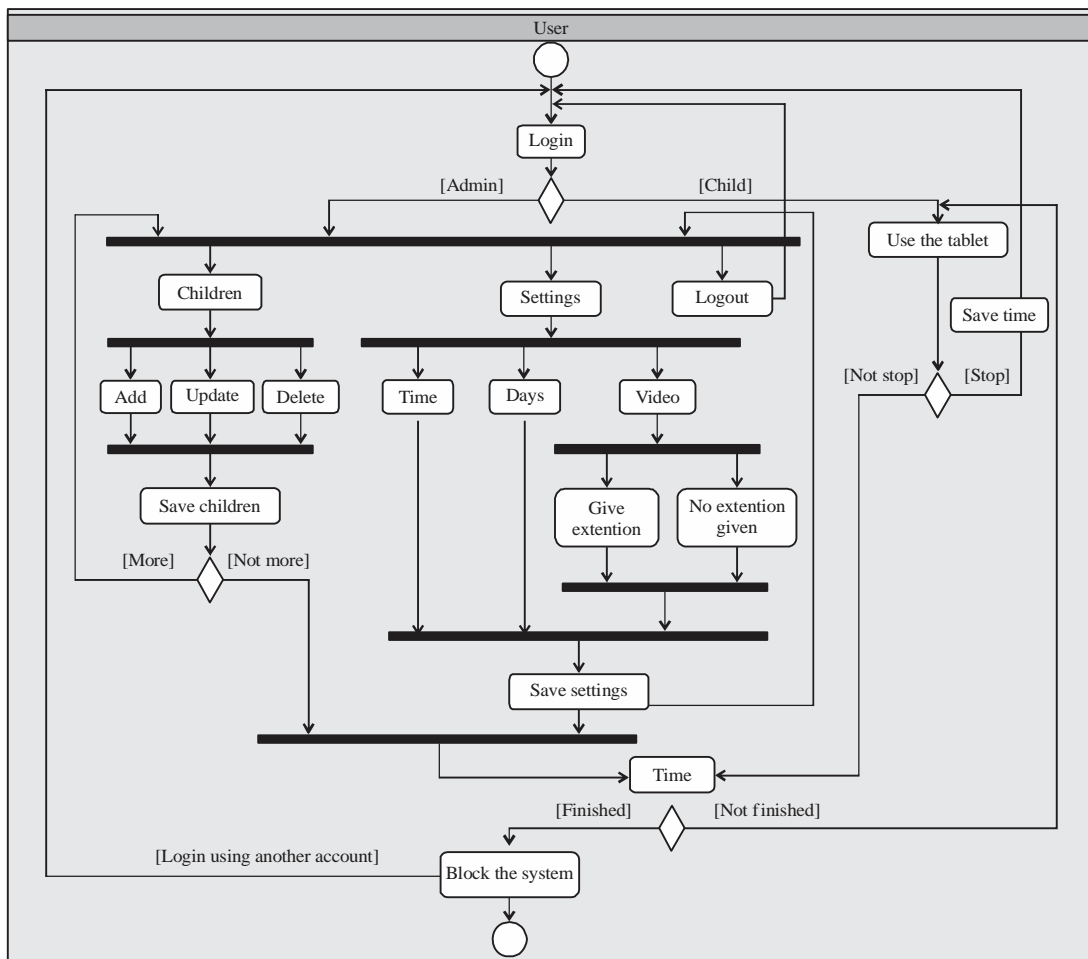


Fig. 2: Activity diagram of the proposed model

When the user accesses the software, he/she should confirm his/her authority to use the application. If the application received a confirmation that the user is an admin, a sub-screen will be shown which displays two options: Child functions (Add, Delete and Update) and system settings. If the admin chooses the first option, he/she will be able to add, delete and/or update accounts. All information then is saved in the application database. If the admin chooses to access the second option then he/she will be able to increase or decrease the default time, determine the allowed days of the week and/or grant extra time to watch a video (if time extension is allowed). If time extension is allowed, then a condition will be considered to verify the proposed rule which says that the maximum extra time given is 30 min. The extra time is given only if the user wants to watch a video and there is no enough time for that. The extension is only given once during the day. If the result of subtracting the reminder time from the video length was less than or equal to 30 min, then the extension will be granted to watch the video till the end. But if the result of subtracting the reminder time from the video length is greater than 30 min, then no extension will be granted and the child will only watch the video till the end of the reminder time (or he/she can use the remainder time for other functions in the device). Up to the researchers' knowledge, the video time extension is a new feature that does not exist in any current application.

If the user confirms that he/she is a child, the child interface will be accessed and the counter starts decreasing. The child uses the smart device through the child interface and can do any activity such as browse the net, use the gallery, play music, play games, watch videos and so on.

The system continually checks if the given time is finished or not. If the given time is finished, the system will be blocked. If the exit button that appeared on the blocked screen is pressed, the system will be returned to login screen in order to start the application for different user.

The algorithm was designed to describe the system flow of control which described before as shown in Algorithm 1. It has many if else statements in order to control the functionality of the system as well as the main while loop which controls the time.

Algorithm 1: Children care systems

```

Login to the application using your own user name and password.
If (administrator) { // The logged in user is an admin
  open a sub-screen with three options (Child functions-Settings system).
  If (children button clicked) {
  Choose from three options in the sub-screen:
  If (Add button is clicked) {
    Add new child
  }
  }
}

```

```

} else if (Update button is clicked) {
  Update data for a required child
} else if (Delete button is clicked) {
  Delete child data from the database.
} // End if
} else if (settings button clicked) {
  Increase or decrease the allowed time.
  Determine the allowed days for using the tablet.
  Allow to extend the remainder time for watching a video.
If (Evaluation button clicked) {
  /* Choose the fields you would like to evaluate your child according it. */
} else if (main evaluation button clicked) {
  /* Evaluate your child behavior and put stars for positive fields. */
} // End if
} else { // The logged in user is a child
  You are a child. So, go to the tablet main screen.
  While (Remainder Time > 0) // Remainder Time's value is in minutes
  {
  Counter Down--;
  If (Remainder Time > 1 && Remainder Time <= 3) {
    Circular progress bar color will be green;
  } // End if
  If (Remainder Time == 1) {
    Circular progress bar color will be red;
  } // End if
  /* If child want to watch a video */
  If (extend the Remainder Time is allowed) {
    If (Video Time - Remainder time <= 30) {
      Extend the reminder time till the opened video finish;
    } else {
      Watch till the Remainder time finish;
    } // End internal if
  } else {
    Watch till the Remainder time finish;
  } // End external if
} // End while
If (Remainder Time == 0) {
  The system will be blocked for this account till the next day start;
  Block screen will be appeared to inform the child that the time end;
} // End if

/* There will be an Exit button on the block screen */
If (Exit button is clicked) {
  The system will be returned to login screen.
} // End if

```

METHODOLOGY

The following are the methods used in this study:

Questionnaire: Two questionnaires were conducted. First questionnaire collected data about the behavioral use of the smart devices. Parents and children aged up to 12 were being invited to participate in the study.

One of the main important questions was about the daily time spending on device use by children. Another important question was if the parents wish to limit the time of the device use or not. Some other questions about what parents and

children like to have in a new system were asked. The second questionnaire was conducted after the implementation of the proposed system in order to collect opinions about it. Questions about the flexibility of using the time controller, the attraction of the interface of the controlling system, the feedback from the system about the remainder time and some other questions were asked.

Data analysis: The SPSS Statistics 21.0 (IBM, Armonk, NY, USA) was used to generate descriptive statistics of each question in the questionnaire.

Mathematical calculations: Mathematical calculations are used to find the similarity, complement and availability percentages. Similarity is based on weighted combinations of features³⁵. Given two applications, PS (the proposed system) and A (another application) with n features (F), the similarity (S) of PS to A, S(PS, A) expressed as a value in the range [0..1] and can be transformed to percentage by multiplying the result by 100%. The similarity percentage between each application and the proposed one is calculated by the following equation:

$$S(PS, A) = \frac{\sum_{i=1}^{i=7} \text{weight}(F_i)}{7} \times 100\%$$

The complement (C) of the similarity which represents the proportion of the preference of the proposed system over other applications is calculated by the following equation:

$$C(A) = 100\% - S(PS, A)$$

The availability percentage (AP) of a specific feature (Fn) in the twenty applications is calculated by the following equation:

$$AP(F_n) = \frac{\sum_{A=1}^{A=20} \text{weight}(F_n)}{20} \times 100\%$$

RESULTS

This research study is unique in its field. Up to the knowledge of the authors, there are no researches that compare different applications, in this field, based on the features used. Only few researchers studied the influence of using smart devices on children. These studies will be mentioned below with comparison to the proposed system.

Results of this study were generated by the initial questionnaire before building the solution, the mathematical calculations and the software testing.

Questionnaire results: A questionnaire was made and filled by 200 mothers and fathers in order to know the best solutions which suite the community. The results showed that almost 72% of the sample is likely to limit the usage time of the smart devices given to their children in order to avoid any harm or bad habit that affect their health. This result supports previous studies discussed before in the introduction section which considered that the limitation of usage time of smart devices is of high priority. It also agrees with the studies that discussed the harm of using smart devices for long time daily such as poorer control over attention³³⁻³⁵, diminish sustained intentional abilities³⁶, poorer working memory performance and lower standardized test scores³⁷, poorer performance on the knowledge measures³⁸, psychological arousal and stimulation could disrupt children sleep³⁹. Around 39.45% support the countdown indicator (could be countdown bar, countdown number or others), 29.85% support the digital clock, 36.8% support analog clock and 24.6% support the sand clock. Questionnaire's results showed that most of the sample members are not satisfied with any of these methods. There is clear contradiction between the results of the questionnaire and many of the current in-market applications. The proposed system mixed between the digital clock and the countdown process in order to cover most of the sample opinions and this is considered as an added value to the proposed systems. This mixing is simple and easy to be noticed by children than that if we mix between analog and countdown.

Other results of the questionnaire showed that 45.25% are likely to use funny image, 33.3% are likely to use music, 5.15% are likely to use text and 16.3% chose different other solutions. These results are not highly accepted by the sample. The proposed model improved the blocked screen based on the results of the questionnaire. It mixed the three attractive patterns (funny image, music and text) in one presentation for the blocked screen. All these patterns work together to match all different children wishes to accept the blocking of the device. This is an added value to the proposed system.

Mathematical results: The application that built from the algorithm which described the proposed model compared to other in-market applications in term of seven features that are all applicable to the proposed application. These features are:

- F1 :** No need for internet connection to adjust the settings since it is already embedded in the system. It is easy to update the settings when it is needed if the internet is not available for any reason such as interruption, end of subscription, traveling or any other reason
- F2 :** The child will be continually alert by a colorful digital clock which starts from the maximum allowed time given and countdown until the end of time. The color of the clock is changed in the last min with sound alert (hybrid feature)
- F3 :** The attraction of the blocking screen which helps the child to accept the device block gradually without sadness. The blocking screen uses attractive image, music and written message (hybrid feature)
- F4 :** Give permission for watching a video when the reminder time is less than the video length. In this case, the child can watch the video completely

- F5 :** The ability to exit the application before the time is finished and completes the remainder time later on within the same day (flexibility)
- F6 :** Give extra time for the child when needed
- F7 :** The default time is given based on the age of the child which is calculated automatically from his/her date of birth

Table 1 represents the comparisons between the proposed system and the current twenty applications. Three different symbols were used in Table 1: (Y) which means that the feature is embedded in the application, (N) which means that the application lacks the feature and (I) which means that the application supports the feature but the proposed system improved it. Table 2 represents these features and the improvements made.

Table 1: Comparisons between the proposed application and the other twenty applications

Applications	Features						
	F1	F2	F3	F4	F5	F6	F7
The proposed sys-children care	Y	Y	Y	Y	Y	Y	Y
A1-Screen time	N	I	N	N	Y	Y	N
A2-Kids zone parental controls	N	I	I	N	Y	N	N
A3-Family time	N	N	N	N	N	N	N
A4-Safe family parental control	N	N	N	N	N	Y	N
A5-Boomerang parental control	N	N	N	N	N	Y	N
A6-Parental control board	N	I	N	N	N	Y	N
A7-ESET parental control	N	I	N	N	N	N	N
A8-Parental control secure kids	N	N	N	N	I	N	N
A9-Kids place	Y	N	N	N	N	N	N
A10-Tittle parental control	N	I	N	N	Y	N	N
A11-Kids manager parental control	Y	I	N	N	N	Y	N
A12-Protect kid parental control	N	N	N	N	N	Y	N
A13-Norton family parental control	N	N	N	N	N	Y	N
A14-Word kik parental control	N	N	N	N	N	N	N
A15-Qustodio	N	I	N	N	N	N	N
A16-Teen limit parental control	N	N	N	N	N	N	N
A17-Limitly screen time control	N	N	N	N	N	N	N
A18-Mobile fence parental control	N	N	N	N	N	N	N
A19-Parental control and dashboard	N	N	N	N	N	N	N
A20-Our pact parental	N	N	N	N	N	N	N

Table 2: Improvements made on some features in the other applications

Applications	Feature	Improvements made
Screen time	F2	The attractive design of the digital clock and the circular progress bar around it
Kids zone parental controls	F2	The attractive design of the digital clock, the circular progress bar around it and the counter (countdown)
Parental control board	F3	Improve the blocking image by using attractive image, text and music
ESET parental control	F2	The attractive design of the digital clock and the circular progress bar around it
Parental control secure kids	F5	The attractive design of the digital clock and the circular progress bar around it instead of the sand clock
Tittle parental control	F2	Allow the child to control the remaining time by using pause button and even many times instead of allowing parents to do that
Kids manager parental control	F2	The attractive design of the digital clock and the circular progress bar around it
Qustodio	F2	The attractive design of the digital clock and the circular progress bar around it instead of the sand clock
	F2	The attractive design of the digital clock and adding the seconds as part of the counter to show the progress of the last minute of the time

Table 3: Equivalent weighted values to Table 1 and the calculation of similarity, complement and availability

	F1	F2	F3	F4	F5	F6	F7	Sum	Similarity (%)	Complement (%)
Proposed system	1	1.0	1.0	1	1.0	1	1	7.0	-	-
A1	0	0.5	0.0	0	1.0	1	0	3.0	35.7	64.3
A2	0	0.5	0.5	0	1.0	0	0	2.0	28.6	71.4
A3	0	0.0	0.0	0	0.0	0	0	0.0	0.0	100.0
A4	0	0.0	0.0	0	0.0	1	0	1.0	14.3	85.7
A5	0	0.0	0.0	0	0.0	1	0	1.0	14.3	85.7
A6	0	0.5	0.0	0	0.0	1	0	1.5	21.4	78.6
A7	0	0.5	0.0	0	0.0	0	0	0.5	7.1	92.9
A8	0	0.0	0.0	0	0.5	0	0	0.5	7.1	92.9
A9	1	0.0	0.0	0	0.0	0	0	1.0	14.3	85.7
A10	0	0.5	0.0	0	1.0	0	0	1.5	21.4	78.6
A11	1	0.5	0.0	0	0.0	1	0	2.5	35.7	64.3
A12	0	0.0	0.0	0	0.0	1	0	1.0	14.3	85.7
A13	0	0.0	0.0	0	0.0	1	0	1.0	14.3	85.7
A14	0	0.0	0.0	0	0.0	0	0	0.0	0.0	100.0
A15	0	0.5	0.0	0	0.0	0	0	0.5	7.1	92.9
A16	0	0.0	0.0	0	0.0	0	0	0.0	0.0	100.0
A17	0	0.0	0.0	0	0.0	0	0	0.0	0.0	100.0
A18	0	0.0	0.0	0	0.0	0	0	0.0	0.0	100.0
A19	0	0.0	0.0	0	0.0	0	0	0.0	0.0	100.0
A20	0	0.0	0.0	0	0.0	0	0	0.0	0.0	100.0
Sum	2	3.5	0.5	0	3.5	7	0			
Availability (%)	10	17.5	2.5	0	17.5	35	0			

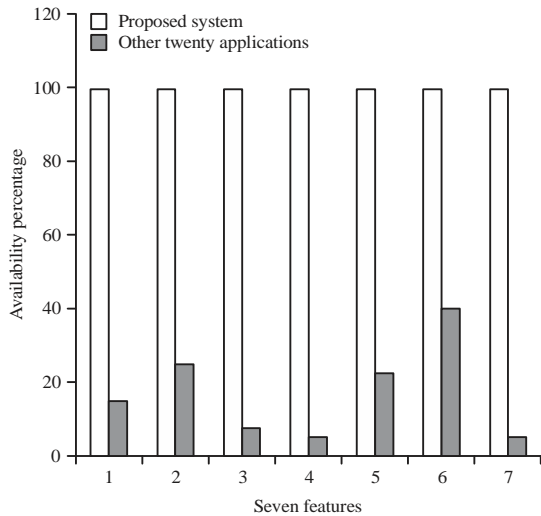


Fig. 3: Comparison between the availability percentage of each feature in all applications (in red color) and the proposed system (in blue color)

In order to find the preference rate of the proposed solution, a weight system was considered. Each Y, I and N letters in Table 1 are mapped to 1, 0.5 and 0, respectively as shown in Table 3.

Table 3 represents the weights, the summation of weights in each row and column, the similarity percentage between the proposed system and each application and their complements. Sum of weights in any column represents the

availability of that feature in the twenty applications whereas, the sum of weights in any row represents the similarity between the application and the proposed system.

Figure 4 represents the similarity of each application with the proposed system. The maximum similarity is 35.7% for one application and the minimum similarity is 0% for seven applications which means that the proposed system is hundred percent unique and distinguished for 35% of the applications. In other word, all the seven features are added values to 35% of the tested applications. Feature 4 and feature 7 do not exist in any application. This is also added value to the proposed system.

Figure 3 shows the comparison between the proposed system and the other twenty applications based on the availability percentage of each feature. Figure 4 shows the comparison between the proposed system and the other twenty applications based on the similarity percentage.

Software testing results: The system was tested with 100 different types of users (parents and children). About 86.4% of the parents were satisfied with the controller which controls the time allowed to use smart devices in order to save children health. This result supports different works in the literature such as the work of Hong Kong Association of Private Practice Optometrists which concluded that about 50% of Hong Kong primary school students showed symptoms of unclear vision and felt eye strain related to the

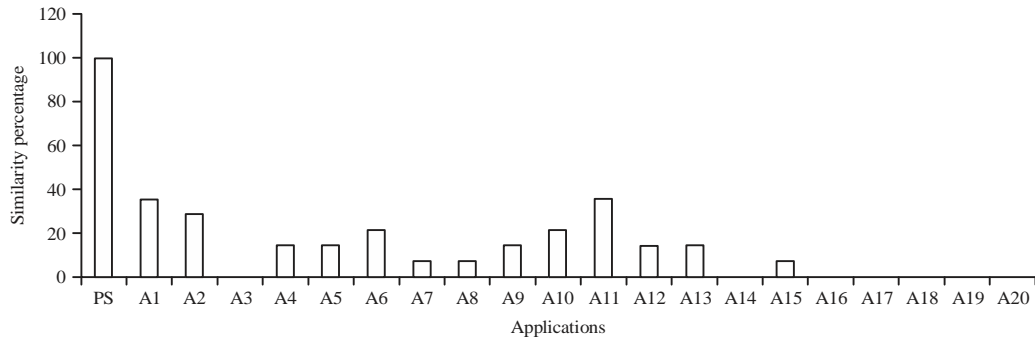


Fig. 4: Similarity between the proposed system and each of the other applications

use of portable electronic devices⁴⁰. Also, Stephen Wai Hang Kwok concluded in his work that at least 40% of the sample perceived physical problems and over 20% perceived family conflict related to smart device use which also supports our proposal to limit the time given to children⁴¹.

The controller implemented the new features (F1, F6 and F7). Parents mentioned that it is easy and effective. About 13.6% of the parents stated that they wish to have more functions and features that give them the ability to give extra time for their children as a gift when they successfully finish some tasks given to them. This opinion will be taken into account in future. About 91.1% of the children were happy with the new interface which combined the new features (F2 and F3). Also, 100% of the children expressed their satisfaction with feature (F5) which allows them to complete their time through different time sessions. About 100% of the children were also satisfied with feature (F4) which allows them to continue the movie they started even their time is finished, but under some specific circumstances. Results showed that all the proposed features play an important role to satisfy both parents and children. All of the seven features added great value to the proposed system.

DISCUSSION

Time spent on smart devices does take time away from other activities such as school work and social life. Also, it could be harmful and affect the children health. The questionnaire made showed the importance of these problems. The main finding of this study is the implementation of the system software that limits the daily time given to children with full attractive and effective interfaces that use suitable colors and graphics. Such interfaces ensure the delivery of optimal contents and a memorable user experience. The system is a dynamic tool that combines current and proposed features with multimedia content. It helps children acquire learning skills and gives

parents the resources they need to help their children achieve their goals. Children can use the most important applications from the desktop of the proposed system (short cut) as well as they can have the advantage to acquire extra time to complete valuable video they are watching. The controller was designed to simplify the process of controlling a smart device easily. Using the hybrid features of the application gives children the convenient feeling that leads them to love technology even their daily time is limited.

Many studies were conducted and shown the importance of limiting the use of smart devices⁴²⁻⁴⁴. Current results are much related to their findings. Some researchers studied the harm received by using the smart devices for long time⁴⁵⁻⁴⁷. Their results support the hypothesis that we stated for the need to limit the use of smart devices. Other researchers explored how technology-related habits may be affecting the development of individuals' social competencies and emotion reading^{48,49}. This research is running in parallel with these results. The proposed system is relevant to different studies that highlighted the importance of attractive interfaces and how they help children to accept the technology⁵⁰⁻⁵². It also created new features that are unique to it. Comparisons with other applications¹⁴⁻³³ showed that none of them combine all these features together. None of them has the hybrid features and none of them allows increasing the video time even the children allowed time is finished.

The proposed system is limited to children between 3 and 12 years old. Children with special needs are not able to use this system easily. In the future, new experiments could be needed to improve the movie's extension time, connect the extension time to other tasks that are given and completed successfully by the child, improving special interfaces for children with special needs and other functions that may improve the success of similar systems which may map the continuously improvement of technology to the smart device but with no harmful.

CONCLUSION

It is concluded that this study recommends the children care system for use by various types of users including parents and children of age 3-12. The proposed system is a novel application with various features. It plays an important role in preventing the children from the negative influences of the uncontrolled use of smart devices. The system is easy to use, easy to install, attractive, accurate and provided with detailed information that make it distinguished in its field. The proposed system allows parents to manage their children accounts, to control the services given to their children as well as the time settings, to control the week days, to change their passwords regularly for security purposes and to grant or revoke the video service with all its sequences. The proposed system also manages the allowed time of the day even the child uses this time through different sessions in the same day. The same family can share the same device with many children in the same day even the time for one of the children is not finished. The video extension time is unique feature included in the proposed system. Children care system is very promising system that is able to highlight the needs of parents and children as well.

SIGNIFICANCE STATEMENTS

This study discovered the satisfactory features and functions that can be beneficial for the save use of smart devices in easy and attractive way especially for children. This study will help researchers to uncover the critical functions and features that many researchers were not able to explore. This study introduces some mathematical concepts that other researchers may use to test the importance of their similar applications besides the results of questionnaire that they may use.

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