

# Effective Management of Smartphone Usage Time based on an Innovative Application

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**Abstract:** The fast growth of technology has made smartphones an integral part of our daily lives. As a result, mobile phone users dedicate a significant part of their daily time, using their mobile phones. This paper describes and analyzes this phenomenon and proposes an innovative application to reduce the usage time. More specifically the proposed application focuses on the ways in which the mobile phone usage affects peoples' daily lives. Research is also conducted on existing market applications, which focus on topics such as the improvement of the problematic smartphone use. In parallel, existing applications are categorized and the most important are presented. Subsequently, the "dimTimer" application is proposed, which aims to help users to appropriately manage their smartphone usage time. Through this application, users will be able to set the maximum mobile phone daily usage time, which will help them in managing their personal time effectively and will prevent the excessive smartphone use.

**Keywords:** Excessive smartphone use, Problematic smartphone use, Smartphone addiction, Time management

## 1. Introduction

THE progress of multifunctional smartphones is a result of the evolution of mobile phone technology. Smartphones, in addition to their basic functions, provide access to functions such as social media, email, and video. Mobile phone use has grown significantly in recent years, with the number of users reaching 4.23 billion worldwide. Consequently, the increase in the use of mobile phones has created new fields of research and study, while researchers are studying the adverse effects of the problematic smartphone use [1].

The problematic smartphone use and the possible negative impacts on peoples' daily lives is an issue that has concerned and continues to affect the existing literature. Occasionally, numerous researches and studies have dealt with this topic. In their conclusions sometimes these studies converge, while other times diverge. As a result, there is not any globally acceptable smartphone application, able to help users fight the excessive smartphone usage phenomenon. This paper considers all pros and cons of existing applications, in order to propose a novel application that will effectively confront problematic smartphone use. It also adds new features such as deep personalization, rewarding and gamification (e.g. screen brightness) to become user friendly and increase its massive acceptance perspective.

## 2. Related Work

According to Panova and Carbonell, the existence of addiction in smartphones cannot be supported, due to the lack of serious psychological or physical effects, which can be associated with addictive behaviors. Thus, it is suggested to use the term problematic smartphone use [2]. Although phones are useful, the problematic smartphone use can cause various problems to adolescents in different levels such as emotional, social, and behavioral issues [3]. In addition, excessive use of smartphones and internet can cause anxiety, depression, insomnia or hyperactivity, especially to the youth [4]. Other negative effects of problematic use of social media and smartphones include antisocial behavior, family issues, inadequate academic performance and reduced physical activity [5].

Mobile phone technology allows users to use their mobile phones continuously, wherever they are. This constant use of mobile phones also indicates that the users are available for communication during the day. The Ofcom study reports that on average, people check their cell phones every 12 minutes during the day [6]. Another survey conducted by Time Mobility Poll in 2012, shows that 84% of people replied that could not stand even a day away from their mobile phone. This shows the dominance of mobile phones in both the field of information technology and the field of communication [7].

At the working level, smartphone's technology allows employees to work on their free time and outside of the office. Therefore, this constant availability of employees, leads to a forced balance of working and personal time. Although smartphones offer a lot of possibilities to employees, recent studies have pointed out that their use for work during the free time of employees may cause negative effects on health and well-being, such as problems related to sleep and work stress [12].

Finally, the development of technology is increasing the possibilities and features provided by mobile phones, making them necessary to their users. According to Belk's theory, it is argued that what is commonly used in a person's daily life can become an extension of himself. For example, smartphones can be personalized and reflect their users' identity [13].

### 3. Research Prerequisites

In this paper sixty-one mobile phone applications have been identified for the purpose of this study. They were designed to help users improve various issues related to the problematic smartphone use. They suggest solutions for issues such as the reduction of mobile phone usage time, the daily effective time management, the parental control, the recording of user's activities, etc. For better presentation, these applications were divided in six categories, according to their usage and content. These categories are the following:

- (a) phone addiction,
- (b) mobile phone usage,
- (c) time management,
- (d) screen time tracker,
- (e) phone monitoring,
- (g) parental control.

Most applications are available for free by downloading them from the internet. However, some of the applications have an upgraded version with additional features, which has a corresponding cost. Finally, the most representative applications from each category are presented in the next subsections.

#### 3.1. Phone Addiction

In order to deal with the problematic smartphone use, several applications in this category suggest locking out the user's phone for a period which is defined by the user. However, in case of emergency the user has the option to disable the application or to exclude some functions. It is worth noting that some applications stand out from the rest, in terms of originality and for the solutions they propose for the mobile phone overuse.

One of them is the application "*Forest: Stay focused*". According to its official website, this application helps users focus on the essential things in life. The purpose of the application is to maintain the user's attention, in the completion of the process of a virtual planting of a seed and then in its evolution into a tree. If disconnected from the application during the process, then the tree will wither. In

addition, the virtual coins earned by users are utilized by the "*Forest: Stay focused*" team, donating them to a tree planting organization, where it creates real planting orders [14].

Another noteworthy application is "*Hold - make it happen*". This application rewards its users when they do not use their mobile phone. If a mobile phone is not used within twenty minutes, then ten points are earned. These points can be then redeemed with coupons in the United Kingdom and Norway. This can be considered as a disadvantage, as users in other countries will not have the same motivation to use the application [15].

Another example of an interesting application is "*SPACE: Break phone addiction, stay focused*". This application was designed, according to its creators, to achieve a balance between phone use and daily life. Through this application, users can set various goals depending on their needs. Users have the option to control the time of phone use, to monitor the progress of the implementation of the goals over time, to exclude the use of certain applications where necessary, and to receive advice on how to improve the problematic mobile use [16].

#### 3.2. Mobile Phone Usage

A common feature of applications in this category is the possibility of counting the time of phone use. In some cases, the user can block the applications he wants, to ensure the reduction of their usage time.

An example from this category is the application "*OFFTIME - Digital disconnection*". The purpose of this application is to allow users to disconnect from their mobile phone, so that they have free daily time. Some functions of the application are the following: the selection of the disconnection limit time, the presentation of statistics for mobile phone usage, the access for disconnection of all connected electronic devices, the participation in events with friends and family without electronic devices, the audio adjustment during disconnection etc. [17].

Another application worth mentioning is "*YUKAN: Go offline to change the World*". The usage instructions are easy to follow. Users choose a social purpose in which they want to invest their offline hours from their mobile phone. Further, social organizations collect donations according to the offline hours of each user. Therefore, the benefit is twofold, money is raised for a social purpose and users enjoy other activities in their free time without their mobile phones [18].

### 3.3. Time Management

In this category, a common feature of the applications is the ability to count the daily usage for various activities, for better daily time management. For example, the application “*Brain Focus Productivity Timer*” helps users to complete their tasks during the day. Specifically, it is based on the Pomodoro

technique, in which users start a task and upon completion they are rewarded with a break. This process is repeated until all the planned tasks are completed [19].

### 3.4. Screen Time Tracker

The applications of this category have the possibility, by

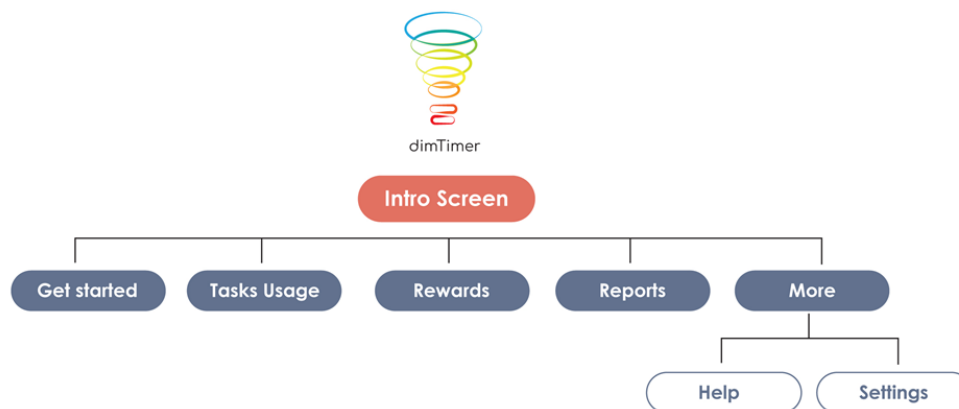


Fig. 1: Diagram for the “dimTimer” application.

monitoring the screen of the mobile phone, to count the usage time of the applications and activities of the user. For example, some of the functions of the application “*Phone usage tracker: Screen time monitoring*” are the following: monitoring the frequency of opening an application, recording the starting time of the application, as well as weekly and monthly usage statistics, definition of personal goals and information during their development[20].

### 3.5. Phone Monitoring

The applications included in this category count the mobile daily usage time. The application “*Usage Time. Smartphonoholic*” shows the total daily time of the device, as well as information and statistics for the previous days. In this way, the user has the full control over how and when to use his mobile [21].

### 3.6. Parental Control

The purpose of the applications in this category is to control the children's mobile phone usage by parents. In particular, the “*Google Family Link for parents*” application enables parents to set rules, manage the applications that allow their use, control the time of mobile phone use, lock the mobile phone for a certain period and discover the mobile location [22].

## 4. Design and presentation of “dimTimer” application

### 4.1. The proposed novel application

For the purposes of dealing with the issue of the problematic mobile phone use, this paper proposes an application called

“dimTimer”. The name consists of two words “dim” and “timer”. These words are related to the adjustment of brightness and time, which are the main features of this application. More specifically, the application calculates the remaining daily mobile phone usage time and reduces accordingly the brightness of the screen.

### 4.2. Innovative characteristics of the application

In comparison to similar applications on the market, “dimTimer” innovates in several areas. The decreasing feature brightness of the screen helps the user to realize the remaining daily phone usage time. In this way, the reduction of time is visible, and as the remaining time decreases the degree of difficulty of mobile use increases accordingly. Essentially, this will force users to reduce their activities on the mobile phone due to the limited visibility of the screen.

In addition, this application treats each mobile phone activity differently depending on its type. Therefore, there will be a measurement system, which will deduct usage time depending on the activity performed by the user in each case. For example, for every minute that corresponds to the unlocking of the screen, a half point is deducted, while for every minute that is equivalent to opening and using an application, three points are deducted. Therefore, different value is given to the way of reducing the time, depending on the mobile phone use.

### 4.3. Application Design

The design of the application is minimalistic with a light background. However, users are able to select the dark mode from the settings menu, with a dark background. The logo of the application symbolizes a lamp in combination with an hourglass. It consists of various levels and colors, which will be reduced downwards depending on the time of the mobile

phone use. At the same time, as the phone usage time decreases, will be indicated the exact percentage, which will correspond to time and screen brightness. Colors at the upper levels are cooler than those at the lower levels of the logo. Thus, as time decreases, the colors will be warmer. Warm colors such as red and orange are intense and cause attention, that is why they are used in warning signs. Consequently, in this case the purpose of those colors is to warn the user for time reduction.

#### 4.4. Application Presentation

After the installation of the mobile application, the user will select the preferable maximum daily time limit of phone usage, up to five hours during a twenty-four-hour period. However, the maximum daily usage limit, can be changed from the settings menu. Also, it will be possible, to exclude specific mobile usage tasks within the specified time limit. Such as making incoming and outgoing calls and using the calendar. The reason of excluding specific basic usage procedures is because there are users whose work makes extensive use of those feature necessary. Also, the use of the calendar contributes to the effective time management.

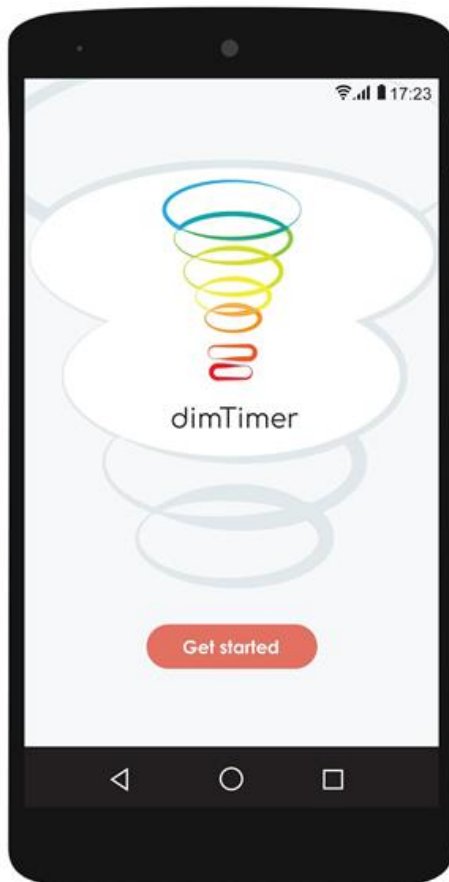


Fig. 2: Display of introductory screen of “dimTimer” application.

For the navigation to the different screens of the application, the menu located at a fixed place at the bottom of the screen

will be used. The menu will consist of the following categories: “Get Started”, “Tasks Usage”, “Rewards”, “Reports” and “More”. “More” will consist of the subcategories: “Help” and “Settings”. In the category “Tasks Usage” will be presented all the applications and activities that the user has already installed on his mobile phone. Each time the mobile phone is used, the initial daily time will be deducted, as well as the brightness of the mobile screen.

As already mentioned, each minute of use that will be deducted, will correspond to a particular credit, which will vary depending on the type of activity. The credit that will be deducted which will be equivalent to one minute of use, will be listed next to each activity. In addition, below each task the remaining time of use in minutes will be shown. The said time will be calculated by the system, in proportion to the daily usage limit set by the user. When the specified time limit elapsed, the time and brightness of the screen will reach to zero. As a result, the user will not be able to continue using the mobile phone. At any time, the application can be turned off upon user’s request.

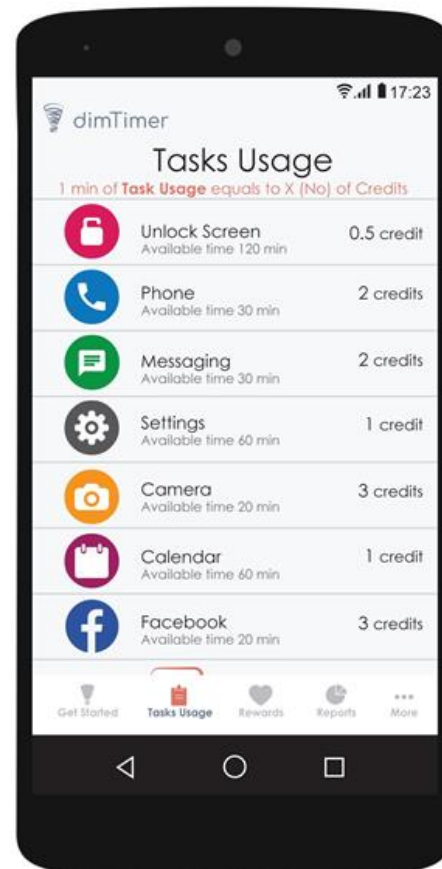


Fig. 3: Display of “Tasks Usage” screen of “dimTimer” application.

It is important to mention an additional feature of the application, which is the existence of rewards in the form of increasing the usage time limit and brightness of the phone. To redeem them, the user must complete specific activities. All activities in “Rewards” category will have thirty minutes minimum duration. As in the category “Tasks Usage”, each

minute of implementation of a specific activity will be related to analogous credit. For example, thirty minutes of physical activity will correspond to one point per minute, which will be credited in time and brightness of the screen. Therefore, the total reward time in this case will be thirty minutes, which will be equal to thirty credits.

Another feature of the application will be the daily, weekly, and monthly reports, regarding the calculation of mobile phone use in minutes. In specific, in the category “Reports” the total phone time, rewards time and tasks time will be calculated.

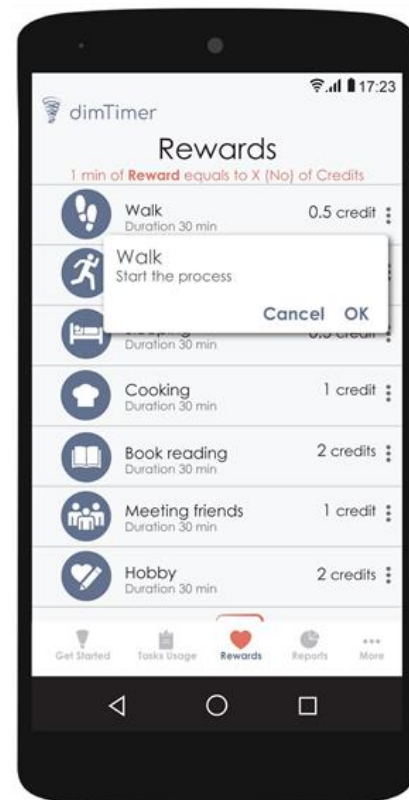
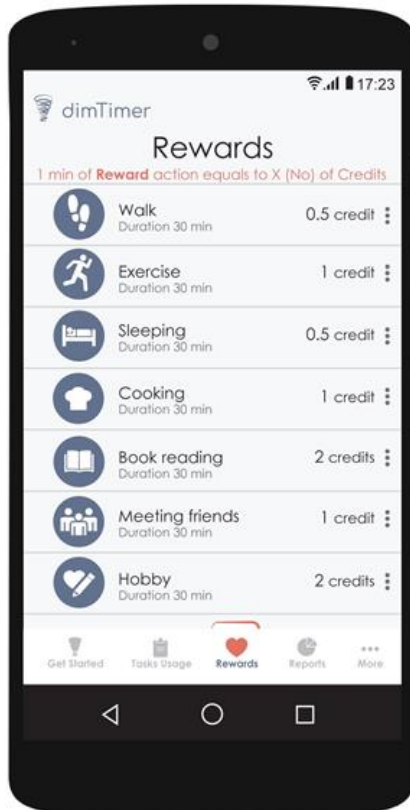


Fig. 4: Display of “Rewards” screen of the “dimTimer” application.

Additionally, a detailed diagram for each task and reward will be displayed. All information about reward and subtraction credits, will be presented in detail in the subcategory “Help”. All the different categories in which points will be deducted or credited will be shown. Finally, on the subcategory “Settings”, it will be possible to activate the dark mode and set the maximum daily usage limit. Also, the terms and conditions and the current version of the application will be available.

## 5. Conclusions and Future Work

Studying of the existing literature led to the conclusion that the problematic smartphone use is an existing phenomenon, which has negative consequences on the daily life of people. The problematic phone usage affects users physically or psychologically. At the same time, previous studies have shown that efficient time management can help reducing daily stress, thereby improving the quality of life [23].

The excessive smartphone use, which affects the management of users' daily time, is a contemporary and current matter, which needs further study, as mobile phone technology is evolving rapidly. As a result, the abilities and capabilities of smartphones are increasing and improving. The implementation of the application “dimTimer” at a future stage, even on a trial basis, it is important to extract more



comprehensive and valid conclusions since the assessment will be based on practical and meaningful interaction with users. Finally, it is important to have such applications available to users, will help them to control the mobile usage time efficiently.

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