# Creating an ADU System: Design and Development of a Mobile Application Tailored for Users Battling Addiction

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## ABSTRACT
As the number of innovative smartphones increases day by day, the addiction to smartphones also increases. Smart addiction is significantly known as "Nomophobia." This research reflects on manifesting a momentous mobile application that is designed for addicted users, especially adolescents. The developed application abstains users from those applications that are gradually allowing users towards addiction in terms of time. Using AI, this application works in three interconnected parts. Firstly, this application tracks those applications responsible for killing valuable time and leading users towards addiction. Secondly, this application can turn off those addicted applications in the working hours. Finally, provide users with some critical advice to support them mentally to avoid those applications. This research also does some experiments regarding this developed application, which is based on user satisfaction. This article also ensures comparison among different existing applications and includes tested results.

## Keywords
Addiction, System Usability Scale (SUS), AI, Application, Nomophobia.

## 1. INTRODUCTION
According to recent statistics on smartphone addiction, around 75% of users have an addiction to the Smartphone, and most of them are educated a person. This smartphone addiction is called "Nomophobia." It's a matter of great wonder that a smartphone user checks their device 47 times a day on average and almost 17,155 times in a year. Some statistics also reported that nearly 80% of users check their phones within one hour before going to bed. This alarming rate is increasing day by day. This addiction can impact the physical and mental health of smartphone users. "Nomophobia" leads the user to anxiety, stress, narcissism, loneliness, depression, attention deficit disorder, and sleep deprivation. So, this is so important to find a unique solution to overcome "Nomophobia."

On the other hand, as the number of users of mobile applications is increasing day by day, we have to design and plan a unique solution for better improvement and efficient use. Take a short journey to see the role of Android applications in the modern world. For almost every socio-economical part of a country, the Android application can be a great solution as an obvious solution. The improvement in the field of android application assures the most straightforward solution in the socio-economical area of a country. Again, the android application refers to the source of entertainment through its most significant features, such as gaming, audio and video visualization, improved graphics, and efficient uses. Thus, android application becomes one of the fundamental parts of our day to day life. But it's a matter of great regret that users of the mobile app are not aware of how android application induces our healthy growth and cause addiction.

On the other hand, many great contributors have made significant contributions to the reduction of smartphone addiction. In Paper [1], the authors developed an application that was titled "AppDetox." This application enables clients to intentionally make a decision that allows users to build a shield from utilizing specific applications. Paper [2] proposed an exhaustive cellphone that can be usable in a logging framework (a customer application and a server). In different factual investigations, results from more than 800 man-use logs are introduced. The author of the paper [3] represents positive and negative parts of the Smartphone for the general public and prescribes arrangements. The key idea is to decrease the negative aspects of a Smartphone. This paper also acknowledges more advantages of the Smartphone as well as leaving innovation. The author of the article [4-7] developed a self-indicative scale that could recognize cell phone-addicted users based on the Korean self-symptomatic program for Internet enslavement (K-scale) and the cellphone, which had its very own highlights. In the paper [5], the authors analyzed the predecessors and the outcomes of youngster's advanced cellphone habits. In the Authors of the paper [8-13] here, the examination was to create symptomatic criteria for web dependence issues (IAD). Again, the authors assessed the legitimacy of the proposed indicative standards for separating non-subordinate from the ward web to ensure its use by the overall public.

As discussed earlier, the word "Nomophobia" results from this addiction. The people living with this addiction The number of people living with a substance use disorder is increasing at an alarming rate. So, our motto is to develop a unique solution to overcome this problem and ensure the effective use of mobile applications. The contributions of this paper are as follows:

- An effective way to find out heavily usages applications, based on time and some other characteristics of installed applications.
- A smart way to turn off those applications which lead users towards addiction during the working periods.
- An effective way to support users smartly to recover from this addiction.

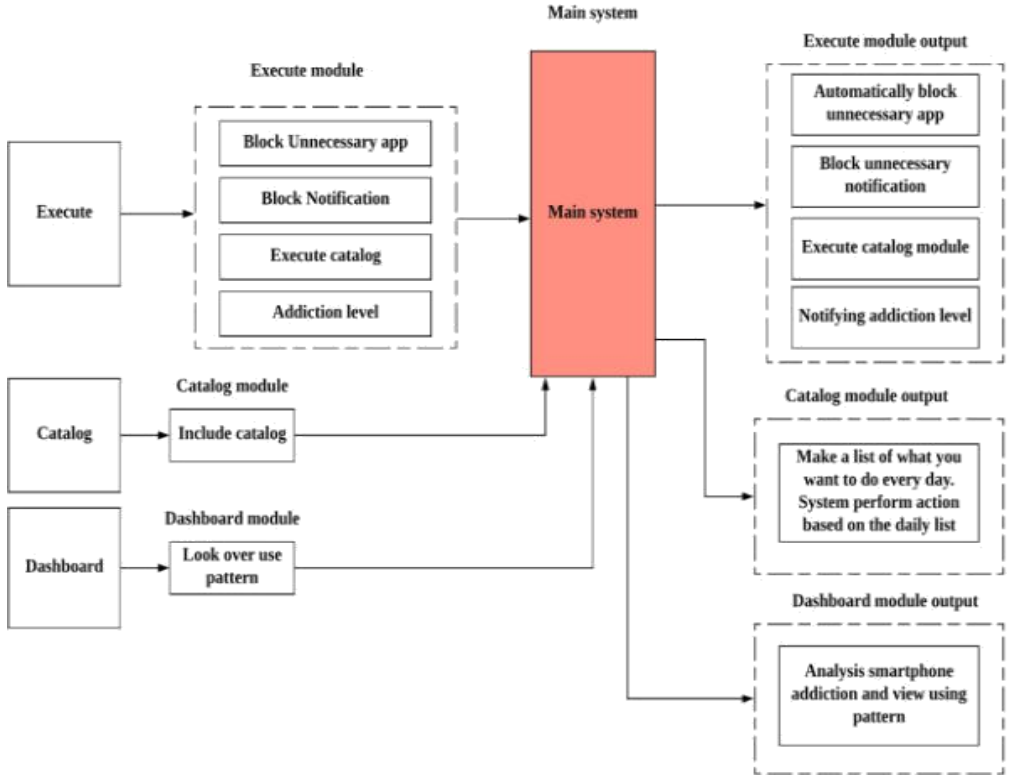


**Fig 1: A Diagram of Proposed Architecture**

This article is arranged into six sections. Section 2 provides an overall proposed methodology for this proposed solution. Section 3 represents the working principles of our developed application. Section 4 illustrates the implementation and testing of our proposed solution. Finally, section 5 presents the conclusion of this manuscript.

## 2. MATERIALS AND METHOD

This section will discuss the system architecture design used by the proposed system architecture (PSA) system in response to reducing the addiction to smartphones. Figure 1 shows the proposed system architecture (PSA) diagram. This proposed solution consists of four interconnected sections: Execution, Catalog, Dashboard, and System chain. Every part of this model has several types of inputs and outputs. Typically, the execution part is responsible for different kinds of data processing. Catalog plays a significant role in making schedules. The dashboard is responsible for analyzing the smartphone and making different types of patterns. On the other hand, the system chain is accountable for making connectivity among these modules.

Besides, this formed framework is partitioned into some interrelated segments. These segments are inescapable for keenly diminishing smartphone enslavement. Clients are effectively ready to treat these segments in their everyday purposes for the investigation of smartphone enslavement. Again, these three sections describe the working principle of our proposed solution.

### 2.1 Working Procedure of Catalog

We refer to Catalog as the first weapon to resist "Nomophobia." Due to work correctly, the Catalog module can be performed automatically and manually. Catalog section tries to find out the working hours of a person exclusively for a student or employer. To accomplish this goal Catalog module is started by accessing the calendar and time Application programming interface (API). In manually working criteria, the user needs to complete a daily task that they want to do in their day-to-day life. The regular job refers to a school or university opening time, closing time, meeting time, dinner and lunchtime, and a time when we do not want to use addictive applications. The Catalog can be performed by a complete artificial intelligence (AI) action in response to daily tasks. This action can be performed command automatically by blocking heavily used applications such as social applications and unusable applications. Most adolescents can't attend class in proper time because of addiction to gaming or other social apps. The valuable time is gone dull because of this type of addictive application. This module has been designed to reduce the level of addiction. The user will have to do daily tasks, and the system will automatically decide on some action. The action can block the most useable app or gaming app so that adolescents or general people can't access the system for a particular time, and this action can be performed based on the daily task. Figure 2 shows the catalog section and its working procedures. Here, the catalog module accesses the calendar and analysis time and period, finding out heavy usage applications in the analysis box. Using AI, a decision is sent from the analysis box. Then, the necessary actions have been taken.

### 2.2 Working Procedure of Dashboard

Our developed application can run in the background as well as take some permissions before installing apps. The central aspect of the dashboard provides some advantages for phone monitoring. This process mainly depends on making a statement of daily limitations. Automatically a graph will be created, and there will be placed a list of applications that are used in regular life. *Figure* 3 shows the working criteria of the dashboard on how our developed system solution. Here the system initializes first and checks the permission from the users. After getting permission, the system will start monitoring and looking at overuse patterns—a successive

pattern matching results in the restriction of some applications. Otherwise, the system will display the use pattern.

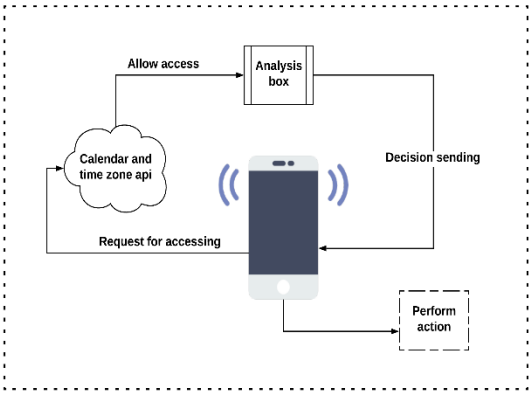


**Fig 2: A Block Diagram of the working procedure of the Catalog**

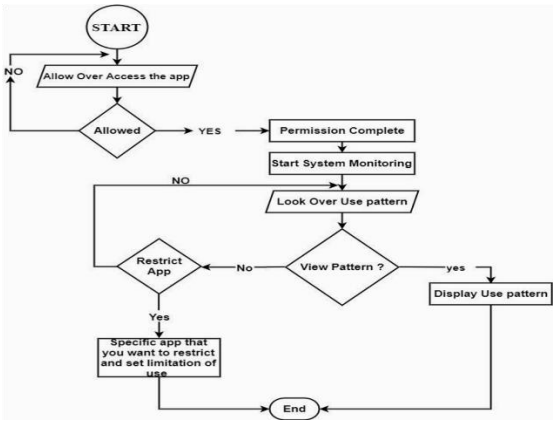


**Fig 3: A Working Flow Chart of the Dashboard**

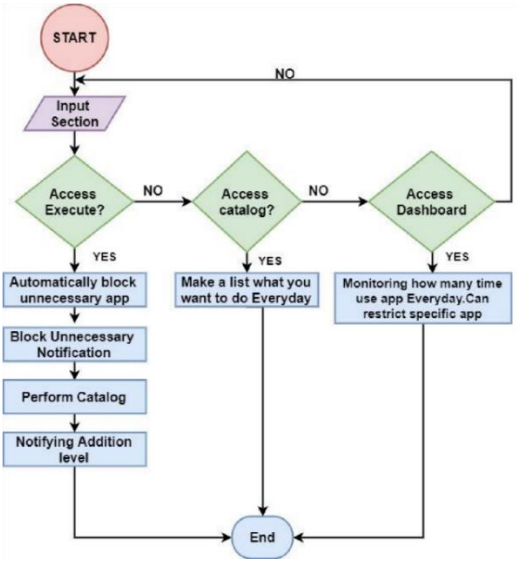


**Fig 4: A Working Flow Chart of the Execution Unit**

## 2.3 Working Procedure of Execution Unit

We refer to this section as the second to resist "Nomophia" and "Narcissism." This section will be started automatically and acted upon. The action can be categorized into four interconnected sections, such as blocking unnecessary applications, blocking useless Notifications, executing Catalog, and Notifying addiction level. Figure 4 shows the execution section as its working procedures. First of all, the execution section focuses on the blocking of unnecessary applications because of wastage of space. This section can be performed by exploring an application using a pattern, much like in which applications are used more. The system will remove the less useable applications from the system. The second part of execution is blocking useless notifications that will halt unnecessary notifications. As a notification, increase interest in what is happening in corresponding applications. The third part of execution is to execute catalog performance automatically by matching calendar dates and respective time issues in response to AI. Without a holiday, this system will block some gaming applications, VPN browsers, and social media-related applications for a particular period. This strategy will help users to reduce smartphone addiction at a certain level.

## 2.4 Working Procedure of System Chain

The system chain is a chain of regular interaction with various modules and applications. The system chain is responsible for providing a relationship between multiple applications and commands. When a user wants to see the activity from the dashboard, the system chain will give that command to the execution unit. Using Artificial Intelligence (AI), the system will find a way to track out addictive applications. Thus, the system chain can be called the "manager" of our proposed application because it ensures the management of smartphones and supports the users. Figure 5 shows the block diagram of the system chain. This Figure represents how regular users are connected with smartphone activity and form a system chain.

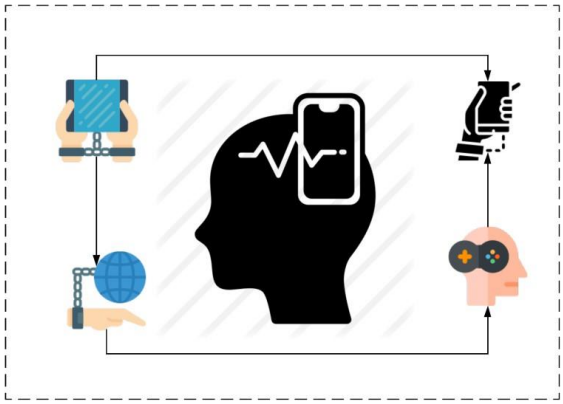

**Fig 5: A Working Flow Chart of the System Chain**

# 3. IMPLEMENTATION AND TESTING

This section is classified into four interrelated experiments or experience testing issues. Here, Section 3.1 shows the proposed system interface development. Section 3.2 tracks out a comparison table with existing system applications. Section 3.3 shows a survey on the average time of daily Internet usage, and finally, section 3.4 discusses the system usability testing scale (SUS).

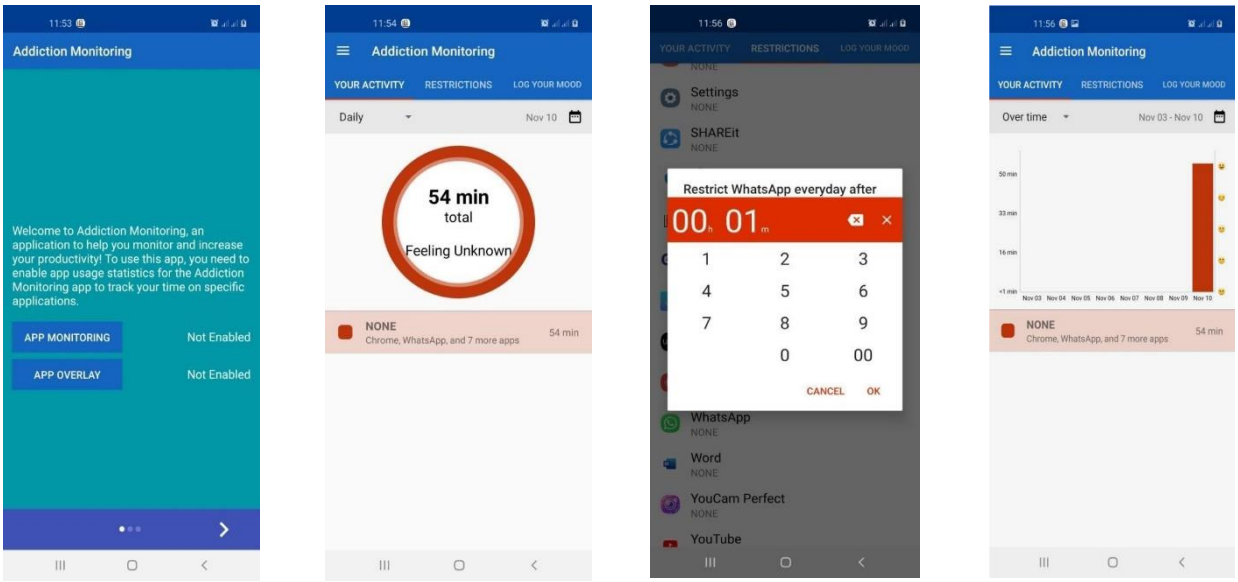


**Fig 6: User Interfaces of Our Developed Application**

## 3.1 Developed User Interface

Figure 6 shows the developed application layout or direct user interface. The first two screenshots represent Homepage and required settings, respectively. The second two screenshots represent the Catalog and dashboard. To check if this application is compatible with different users' smartphones, we take five samples and install them on their devices. Hopefully, we will find the same satisfactory result.

## 3.2 Analysis of Smartphone Addiction Level

We have performed a survey among different department faculties and students. In the wake of the survey report, we have tried to highlight how many hours a day the internet user spends on the Internet. The details sequence is shown in Table 1. This table presents the addiction level in terms of waste of time. We have found an average time of 7.57 hours.

**Table 1. A Survey on Smartphone Addiction Level**

| Group | Application time | Daily average use (hours) |
|---|---|---|
| Faculty of low | Social media | 7.20 |
| Faculty of Engineering | Games | 8.50 |
| Undergraduate student | Social media and games | 9.50 |
| College student | Games and social media | 9.90 |
| Child | Games | 6.00 |
| Male student | Social media | 7.50 |
| Female student | Games | 4.30 |

## 3.3 System Usability Scale (SUS)

The System Usability Scale (SUS) [14] is a reasonable yet Successful apparatus for surveying the ease of use of an item, Including Web locales, PDAs, intuitive voice reaction Frameworks, TV applications, and more. [15]. It's fast and reliable for estimating the ease of use. For our developed application, we found the secured average SUS score is 68.04, which indicates that this system is sound to use. Figure 6 presents SUS, which was conducted on our university premises. This result indicates how usability varies from user to user and their satisfaction with our developed system. Figure 7 shows the associated result of the SUS score.

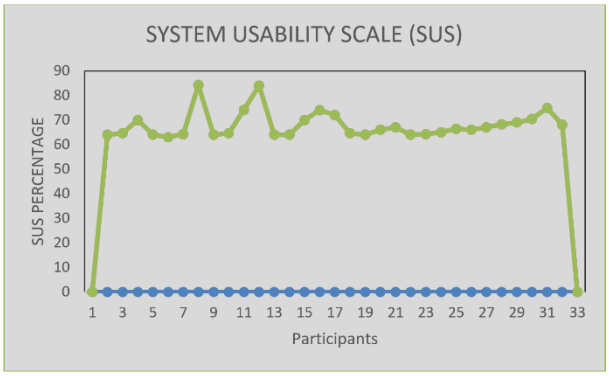


**Fig 7: A number of participants in SUS score experiments**

## 3.4 Subsections

In this comparison part, we take seven existing apps. We try to figure out the contributions and matching features of various applications. We have tried to build up an application with all the exclusive features, in Table 2. First, include the application name. We also refer to the platform of each application, try to track out features, and match them with the developed solution.

**Table 2. Table captions should be placed above the table**

| Application name | Platform | Key feature | Matching feature |
|---|---|---|---|
| AppDetox | Android | Notifying addiction level by rule. | Yes |
| Moment | IOS | Track how much phone you use daily, and get notified. | Yes |

| ClearLock | Android | Block unnecessary applications. | Yes |
|---|---|---|---|
| Quality time | Android | Track daily using the time of individual application. | Yes |
| OFFTIME | IOS, Android | Set rules and restrictions of individual apps. | Yes |
| Flipd | IOS, Android | Hide distracting Apps and games. | No |
| AntiSocial | Android | Regular app use report | Yes |
| Application name | Platform | Key feature | Matching feature |

## 4. CONCLUSION

The proposed system will execute a vital foreword for smartphone-addicted users. It would be possible to identify the most useable applications so that the users can discern the addicted level. This research mentioned a model that assures reducing mobile phone dependency. This system provides a catalog module for reducing the level of addiction, especially for adolescents, because they are moving towards "Nomophobia." Usually, Users will have to constitute daily notes. The system will automatically remove the unusable apps or gaming applications so that the user can't access the application for a specific time or directly during working hours, which will decrease the dependency on the smartphone. This system provides a Dashboard where apps users able to observe monthly system report by the graph. Whenever someone uses the application for a long time, the system will alert with a notification. The objective of this research is achieved. The proposed research manifested and examined efficiency. We have performed a comparison of the existing solutions. Moreover, we have found the System Usability Scale (SUS) score of 68.04. These results indicate that this system is suitable for practical implementation. However, this research can be elaborate to get accessible for the IOS platform and integrating Emotion API for recognizing human being's affection..

## 5. ACKNOWLEDGMENTS

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## 6. REFERENCES

[1] Löchtefeld, Markus, Matthias Böhmer, and Lyubomir Ganev. "AppDetox: helping users with mobile app addiction." Proceedings of the 12th international conference on mobile and ubiquitous multimedia. ACM, 2013.

[2] Ahn, Heejune, Muhammad Eka Wijaya, and Bianca Camille Esmero. "A systemic smartphone usage pattern analysis: focusing on smartphone addiction issue." Int J Multimed Ubiquitous Eng 9 (2014): 9-14.

[3] Sarwar, Muhammad, and Tariq Rahim Soomro. "Impact of smartphone's on society." European journal of scientific research 98.2 (2013): 216-226.

[4] Kwon, Min, et al. "Development and validation of a smartphone addiction scale (SAS)." PloS one 8.2 (2013): e56936.

[5] Park, Cheol, and Ye Rang Park. "The conceptual model on smartphone addiction among early childhood." International Journal of Social Science and Humanity 4.2 (2014): 147.

[6] Tao, Ran, et al. "Proposed diagnostic criteria for internet addiction." Addiction 105.3 (2010): 556-564.

[7] Young, Kimberly S., and Robert C. Rogers. "The relationship between depression and Internet addiction." Cyberpsychology & behavior 1.1 (1998): 25-28.

[8] Koo, Hyun Young. "Development of a cell phone addiction scale for Korean adolescents." Journal of Korean Academy of Nursing 39.6 (2009).

[9] Jones, Tessa. "Students' cell phone addiction and their opinions." Elon J Undergrad Res Commun 5.1 (2014): 74-80.

[10] Bisen, Shilpa, and Yogesh Deshpande. "An analytical study of smartphone addiction among engineering students: a gender differences." The International Journal of Indian Psychology 4.1 (2016): 70-83.

[11] Ramo, Danielle E., et al. "Cannabis mobile apps: a content analysis." JMIR mHealth and uHealth 3.3 (2015): e81.

[12] Beard, Keith W., and Eve M. Wolf. "Modification in the proposed diagnostic criteria for Internet addiction." Cyberpsychology & behavior 4.3 (2001): 377-383.

[13] Kim, Hyunna. "Exercise rehabilitation for smartphone addiction." Journal of exercise rehabilitation 9.6 (2013): 500.

[14] (2019) The UIEXTREND website, Available: https://uiuxtrend.com/measuring-system-usability-scale-sus/.

[15] Bangor, Aaron, Philip Kortum, and James Miller. "Determining what individual SUS scores mean: Adding an adjective rating scale." Journal of usability studies 4.3 (2009): 114-123.