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Conference Paper

# Design and Development of Mobile Games By Cocos2d-X Game Engine

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## Abstract

Since modern humans have a busy lifestyle, they usually have only limited and short period for rest each day. The purpose of this study is to develop a game for this type of scenario so that people can play this mobile game during their rest period. This game is immediate and brainwashing and a player is allowed to take pauses and resume the game anytime to continue the game at the pauses. Moreover, the operations are simplified so that people of all ages and both sexes can play this game without any problem. The game is programmed to have unlimited levels so that a player can continue playing this game. Upon the end of each level, a player is allowed to buy various types of equipment in order to keep strengthening his/her characters and refreshing the highest score. The development of modern mobile games is much simplified than the earlier days. Various types of game engines and development packages are ready for developers to use so that mobile game development is much simpler. The cocos2d-x game engine is selected in this study as the development environment. It features a convenient animation-making environment and a physics engine so that it is particularly suitable for action role-playing game (ARPG). A new game is created based on Japanese fantasy style and its music and artworks are designed and developed by the researchers in this study. It is a new game that belongs to the research team.

**Keywords:** Cocos2d-x, Android, action game

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# 1. Introduction

For modern youngsters such as students or office workers, they strive for survival and development under a high level of stresses. They could easily feel devastated without any adequate emotional relief. Playing mobile games is one of the good ways of relieving their emotions (Wang & Chen, 2011). With the rising and flourishing development of the mobile game industry, some of the small mobile games have a huge number of players since most people are very busy in their daily life and do not have a section of full time for playing a game. Therefore, small games are easy to play

and excellent for people with only pieces of free time. The target of this study is the mobile game platform and the target research subjects are those office workers and students who have only pieces of free time for playing games. The objective of this study is to develop a mobile action game for the research subjects so that they can pause the fame anytime and it requires not too much thinking while the operations are straightforward.

## 2. Literature Review

With the enhancing average standard of daily life for modern people, the number of mobile phone users keep increasing. There are various new functions available on mobile phones and the mobile game industry keeps developing (Wang & Lao). The mobile game market in Taiwan cannot be neglected and there are all types of mobile games. Popular game types include role-playing games (RPG), first-person shooters (FPS), action games (ACT), etc.

According to the Digital Content Industry in Taiwan that was published by the Ministry of Economic Affairs in 2015, the scale of the digital game industry in Taiwan is 5.1% higher than a year earlier and it reached NTD53.2B. Among all products, mobile games reached the golden cross with online games in 2015 and the total value generated by mobile games increased by 77.8% in 2015. This phenomenon is motivated by factors as follows. (1) The total number of mobile phone users keeps increasing to the performance enhancement of smartphones and the high speed transmission due to the 4G technology. (2) More vendors including medium-to-large game developers, startups, and Indies have indulged themselves into the mobile game industry. This industry is rising and flourishing and the competition is fierce. The revenue from mobile games is no longer neglected by these vendors. In-app purchase is the main profile model for mobile games. Taiwanese Indies including Rayark, Uwan, and Four desire have been actively rolling out their mobile games. Medium-to-large game developers such as X-Legend, Chinese Gamer, and Cayenne have allocated more resource to the layout of mobile games and launched their own mobile games or increased the number of games as an agent. The total scale of this industry reached NTD15.75B.

According to the analysis by Newzoo, the total value of the game industry in Taiwan is USD695M which is the $15^{th}$ worldwide. The total gamer population in Taiwan is 12.8M. 47% of these gamers are paid gamers. Moreover, Newzoo also predicted that the game market in Taiwan will keep growing and the total value of this industry will surpass USD1.06B in 2018. The scale of the mobile game market in Taiwan will be

USD690M. The total number of gamers will be 14.75m which equals to an increase of 15.2%.

The analysis also indicated that the RPG is the most popular type of games in Taiwan. For the top $25^{th}$ games in the Apple App Store and the Google Play Store, the percentage of RPG is respectively 44% and 36%. Moreover, strategy games and puzzle mobile games are also favored by Taiwanese gamers.

A game engine is a module of game program that is already coded. A game engine typically comprises several subsystems which include drawing engine (2D and 3D image engines), physics engine, collision detection engine, sound effects, instructions engine, computer animation, artificial intelligence, Internet engine, and scenario management (Guan, 2015).

The game engines on mobile platform are generally classified into 2D and 3D engines. The commonly recognized engines on the market is Cocos2d-x in the 2D category and Unity3D in the 3D category (Guan, 2015). The merit of using the Cocos2d-x game engine for development is to develop on single platform but to release on multiple platforms. The mobile platforms include iOS, Android, Windows Phone, etc. The game is developed on Windows platform in this study and the Microsoft Visual Studio developer tool is used to access the Cocos2d-x engine via APIs. After the standalone version is developed, the code is ported to Android platform.

## 3. Methods

The flowchart of the research process is shown in Figure 1.

In order to reduce the difficulty of operations, the instructions of this game are simplified into only two instructions, which are respectively swiping on the screen to move and tapping on the screen to attack. The flowchart of the game is shown in Figure 2.

## 4. Results

The main view of this game is shown in Figure 3.

By tapping the buttons to the bottom of the main view, a gamer can switch between different pages. The combat mode is started when the gamer tap the button *Start an adventure*.
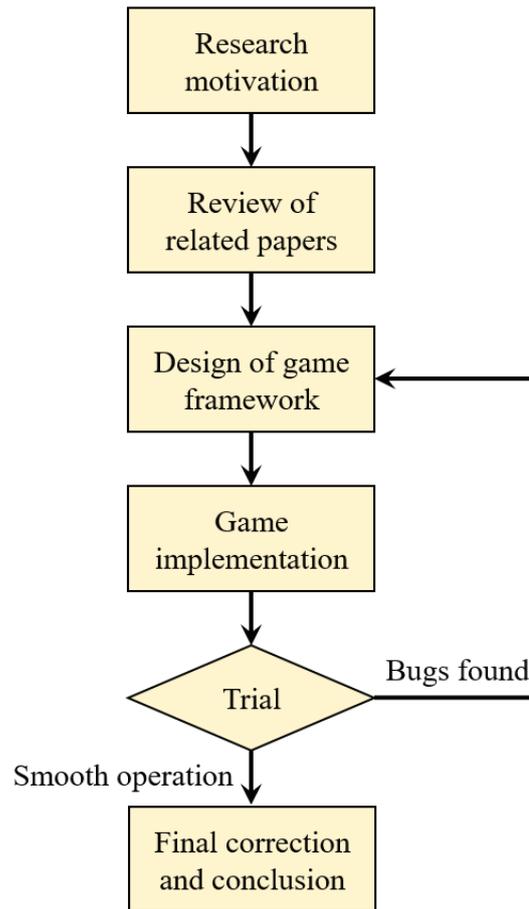
**Figure** 1: Flowchart of research process.
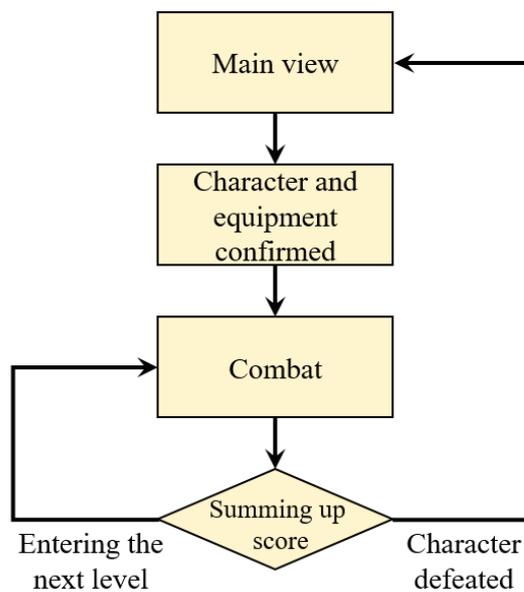


**Figure** 2: Flowchart of the game.

Swiping on the screen can move the character and tapping on the screen will start an attack as shown in Figure 4.
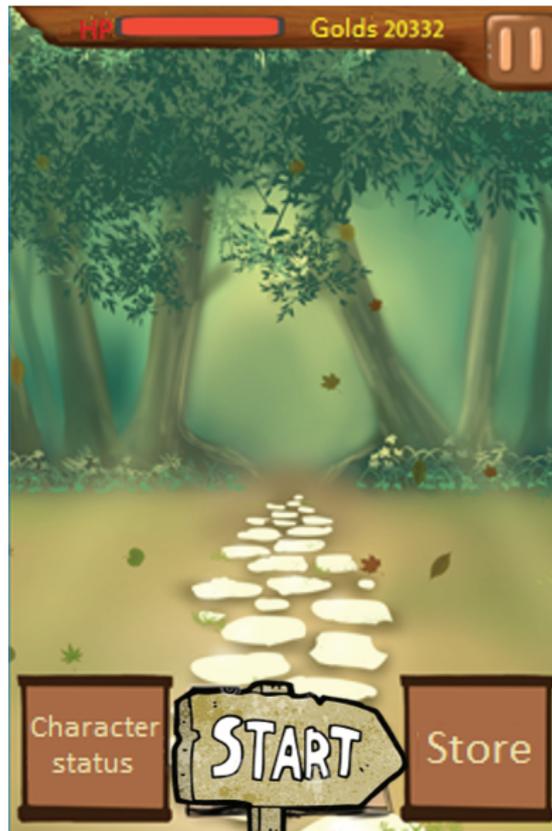
**Figure** 3: Main screen.
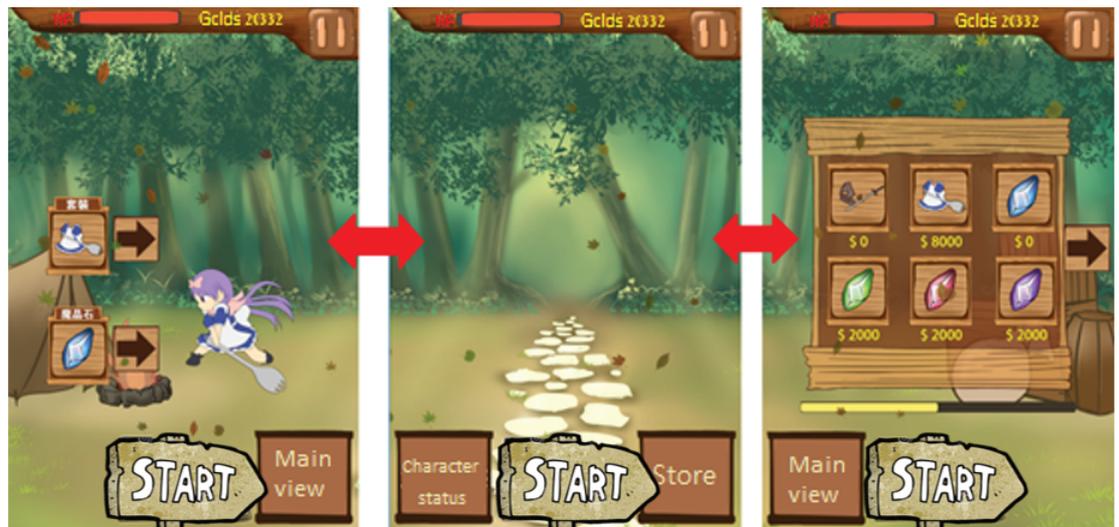


**Figure** 4: Different views of the game.

When the strength is reduced to zero, the score is summed up as shown in Figure 5. After that, the screen shows "GAME OVER" as shown in Figure 6 and it will return to the main view.

**Figure** 5: Summing up the score when the strength is reduced to zero.
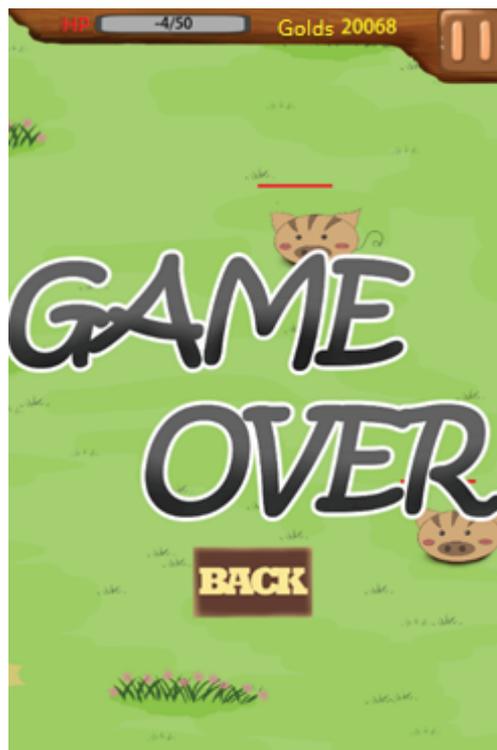


**Figure** 6: Game over shown on the screen.

## 5. Discussion

It was found during the coding stage that the combat views could easily generate bugs since there are more elements and objects to be considered. Since the researchers have less programming experience, there are conflicts between several codes. A clear layout of the logical thinking is required for follow-up game designs. Moreover, each version of the code needs to be archived. If a fatal error occurs on a newer version, the designer can simply revert to an earlier version.

## 6. Conclusion

The current game allows only single player. For follow-up studies, interactions between different players can be included into the game such as the ranking of scores or combat between different players. The pleasure of playing this game could be enhanced. This game should also be uploaded to Apple App Store or Google Play Store for download as a paid app. The number of downloads and players' comments should be tracked as a feedback for the improvement of the app contents.

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