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Design and Implementation of an Android Game: Buzz the Coin Man using Android Studio and LibGDX

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ABSTRACT: Online gaming is a form of entertainment, with guardians' help and direction it can assist youngsters with fostering their inventiveness, support associations with friends and improve key reasoning and strategic thinking. It can likewise help them construct persistence to accomplish objectives, assemble versatility and improve their interchanges abilities so they realize how to regard others' perspectives. Play store hosts various kinds of versatile games for youngsters to develop their critical thinking and insightful abilities. Different types of quiz games can boost the child's learning ability and comprehensibility. The global digital media market has reliably been developing, with gaming representing the greatest share of market revenues. In 2020, the global online gaming market created roughly 21.1 billion U.S. dollars in revenues, which means a record 21.9 percent development contrasted with the earlier year. This lift was obviously due to the global COVID-19 episode, which constrained numerous individuals to remain at home and go to digital roads of diversion and discover new channels to associate with others. Right now, there are an expected 1 billion online gamers worldwide with China, South Korea, and Japan having the greatest online gaming reach among the population. In 2025, online gaming crowds are projected to outperform 1.3 billion. The main objective of this research work is to prepare a report on an android application that the author is working on. The Author is working with libgdx along with Android studio. Android software development is a process in which we create new applications to run them in devices with android operating system. The languages used for creating android apps are Kotlin, Java and C++ using Android SDK that is the android software development kit while using other languages. Libgdx is a Java-based game development application framework that permits to make games for different stages: Desktop, Android, BlackBerry, iOS, and HTML5. LibGDX upholds the most recent OpenGL graphics innovation. The application made by the author can not only be used for gaming purpose but can also be used to increase concentration power. As the user will have to coordinate the hand and eye movement with the movement of coins and bombs appearing on the screen. Author have compared their work on android application with the existing applications and found satisfactory.

KEYWORDS: Android Game Development, Android Studio, Android SDK, Libgdx

I. INTRODUCTION

An Android is basically a mobile operating system which is based on the modified version of the Linux kernel and also other open source software. It is designed for touchscreen mobile phones like all the tablets and smartphones. A group of developers known as the Open handset Alliance developed the Android which is commercially sponsored by Google. The very first commercial android device was launched in September 2008, and was unveiled earlier in 2007. Since 2011 the bestselling OS worldwide smartphones is the android, and since 2013 bestselling OS worldwide tablets is also android. According to the report by Google there was about 2 billion monthly active devices, thus Google has managed to add 500 million devices in 24 months or about 20 million devices per month as in 2015 there were 1.5 billion active users. As people can use multiple accounts and multiple devices therefore there are most likely less than 2.5 billion users. Nonetheless the growth is impressive. An Android developer is a person who basically designs applications for android marketplace. It has its direct competition with the app store of Apple. That implies the job of an android developer revolves around developing applications for the tablets and smartphones. They can either work in large organizations or even at their homes or sometimes app development agency employs them. To be an android developer employee often requires a Bachelors of Technology degree in computer science or Software development, but a work experience is not required. According to the studies, demands for android developers and not only android but all software developers are expected to rise 17% through 2024.

A considerable number of Mobile Apps flood Google Play store each day. From children to grown-ups, smartphones are the most advantageous approach to internet gaming. Because of Google play store offering a plenty of multi-genre games that never stop to astonish clients. Where seniors favor some best android games like candy crush saga, adventure games draw the consideration of children. Applying your strategic abilities, speaking with your co-players, and driving a group assists you with consolidating abilities that ad lib your insight and conduct. You can devise a system with your partners and conceptualize thoughts to take care of a given issue that you can likewise apply to genuine circumstances. Android Games are the most ideal path for youngsters to have a great time and adapt all the while. Play Store allows you to look through arrangements of versatile games for vocabulary and learning.

The global digital media market has reliably been developing, with gaming representing the greatest share of market revenues. In 2020, the global online gaming market created roughly 21.1 billion U.S. dollars in revenues, which means a record 21.9 percent development contrasted with the earlier year. This lift was obviously due to the global COVID-19 episode, which constrained numerous individuals to remain at home and go to digital roads of diversion and discover new channels to associate with others. Right now, there are an expected 1 billion online gamers worldwide with China, South Korea, and Japan having the greatest online gaming reach among the population. In 2025, online gaming crowds are projected to outperform 1.3 billion.

Apps are produced for an assortment of reasons: tending to business necessities, fabricating new administrations, making new organizations, and giving games and different kinds of substance for clients. Designers decide to create for Android all together to arrive at most of cell phone clients. Utilize the Android software development kit (SDK) to create applications that exploit the Android working framework and UI. The SDK incorporates a far reaching set of development apparatuses including a debugger, software libraries of prewritten code, a gadget emulator, documentation, test code, and instructional exercises. Utilize these devices to make applications that look incredible and exploit the equipment abilities accessible on every gadget. To create applications utilizing the SDK, utilize the Java programming language for building up the application and Extensible Mark-up Language (XML) records for depicting information assets. By composing the code in Java and making a solitary application double, you will have an application that can run on both telephone and tablet structure factors. You can proclaim your UI in lightweight arrangements of XML assets, one set for parts of the UI that are basic to all frame factors and different sets for highlights explicit to telephones or tablets. At runtime, Android applies the right asset sets dependent on its screen size, thickness, district, etc.

II. LITERATURE STUDY

Several people have worked on Android Studios for developing android applications. Some of these models are mentioned below:

Justin R. Martinez, Wenbin[1]"The Design and Implementation of an Android Game: Foxes and Chicken" Luo2 Vol.3, Issue.2, March-April. 2013 pp- 1129-1134. In this paper, the author has designed, implemented and also have tested the android game. It was developed for cell phones with the Android versatile operating system. The Foxes and Chickens game itself has starting points in South America, where it is mainstream in certain nations. In any case, apparently, no digital version of the game was accessible for mass utilization. Their exploration tried to cure this opportunity determined to add qualities and pleasure to clients of the Android cell phones. Subsequent to going through severe computer programming cycles of particular, design, coding, and testing, the author effectively developed the game.

Development of Native Mobile Application Using Android Studio for Cabs and Some Glimpse of Cross Platform Apps by Neha Verma , Sarita Kansal , Huned Malvi [2].This paper portray about the Cab application created using Android Studio. It additionally include about the Cross Platforms on which development of android and IOS both platforms application should be possible. Cross platforms Paper moreover includes an illustration of Cab application which will show its working and its employments. Taxi Application is an Android Application which is build in Android Studio 8.0.1. Android Studio is an official integrated development tool or environment for Google's Android operating system. It is build on JetBrains' IntelliJ IDEA programming.

An Evaluation of the Framework Libgdx when Developing a Game Prototype for Android Devices by Rakiv Ahmed and Jonas Aule [3].This paper is about evaluation of the framework Libgdx, regarding 2D game development for the Android platform. Different frameworks are likewise investigated momentarily. The game being worked on is an original game called Magnificent Marbles and is multi-modular as different games for cell phones. The Background

segment talks about the Android platform and its connected tools alongside game models, likewise frameworks are introduced here.

Dong Nguyen [4] with DotGEARS developed the game Flappy birds. A straightforward 2D game made by an independent designer was positioned first in the Apple App Store and Google Play Store rankings. This achievement exhibited that an all-around planned straightforward game with strong addictive power could be an enormous achievement.

Jianye Liu Jiankun Yu [5] "Research on Development of Android Applications" 2011 Fourth International Conference on Intelligent Networks and Intelligent Systems. Presented the Android platform and the highlights of Android applications, gave an itemized depiction of Android application framework from the planned of designers. A straightforward music player is given as occasion to outline the essential working cycles of Android application segments. This paper give direction to understanding the activity instrument of Android applications and to creating applications on Android platform.

Kathuria and A. Gupta, [6] "Challenges in Android Application Development: A Case Study" International Journal of Computer Science and Mobile Computing, vol. 4, no. 5, pp. 294–299, May 2015. The paper talks about the design and improvement of an Android based application named as iquiz that can help understudies in arrangement of serious tests like UGC-NET, GATE and so forth while they are on move. This paper likewise features different difficulties looked by engineers in Android App Development.

L. Ma, L. Gu, and J. Wang [7], "Research and Development of Mobile Application for Android Platform," International Journal of Multimedia and Ubiquitous Engineering, vol. 9, pp. 187–198, 2014. This article presents the application by eliminating the redundancy. Three sorts of uses are created base on Java and Android SDK - Weibo customer, video player and sound player. The sound player utilizes the ContentResolver and Cursor to get music documents and plays the music by utilizing the Service Components to call the Media Player class behind the scenes.

III. METHODS

To make an android applications there are some few steps that an android developer must perform. The very first step that an android developer does in order to make an android application is that of making a development environment on your desktop so that the other requirements of the applications can be fulfilled and can support the android development goals.

For that the developer will download an Android Studio with the latest version which currently is version 4 released in May 2020 Android Studio version 4. With every new version come new and advanced features to make your application more and more user friendly and attractive. For making applications for android phones and tablets you will need both android studio and android SDK, and thankfully they both comes in a package together when you download the android studio.

Android Studio is an integrated development environment (IDE) which is an interface where we can type our codes in java or Kotlin and can access every different tools that we need for the development. All the libraries and API's in the Android SDK can be accessed by the android studio. We can build our apps in APK using Gradle and can also test them on virtual device that is the emulators or we can even connect our own devices within the system via cords and test the application on our own mobile or smartphone device.

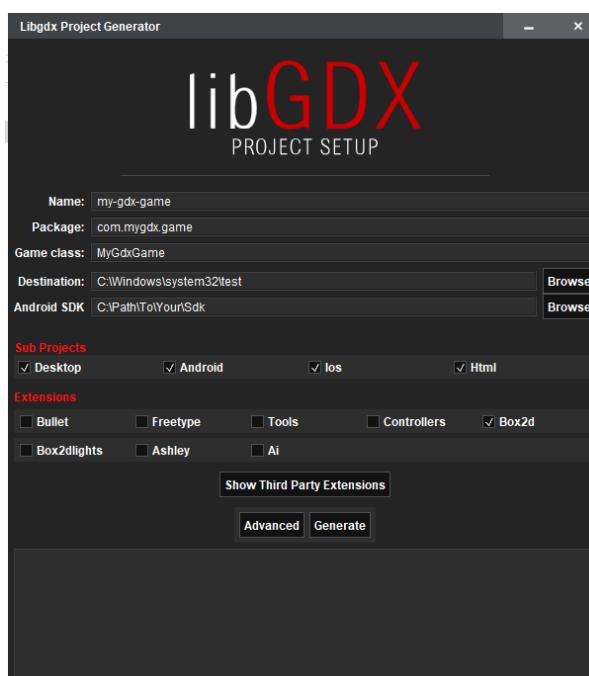
However, while making the android application the developer must keep in mind the size of the application, as all the versions of android might not be able to handle the size of game and the game might lag or will not run smoothly. Therefore, the developer must always keep in mind the size of the application. In this research paper, the author have used Android Studio and Libgdx as the platform to make the application for all android devices. The author has also kept in mind the size of the application so that all versions of android devices can access the application. Figure 1 shows the latest android version used for making the application.

**Figure1.**Android Studio**IV. IMPLEMENTATION**

In this research work, author have used android studios and libgdx as the platform to make an android application. Though Android Studio is the best platform for developers to start developing applications and it provides much tools and resources in a single place. Other than android studio we can also use Unity for cross-platform application development. Visual studio with Xamarin can also be used with C#.

libGDX is a free and open-source game-development application framework written in the Java programming language with some C and C++ components for performance dependent code. It considers the development of work area and portable games by utilizing a similar code base. It is cross-stage, supporting Windows, Linux, Mac OS X, Android, iOS, BlackBerry and internet browsers with WebGL support. LibGDX has a genuinely basic arrangement, with the assistance of a straightforward Java program.

Now in order to generate a project the author has download the libgdx Project Setup Tool , then open your command line tool, go to the download folder and run `java -jar Jgdx-setup_latest.jar` or, open the application in java. At the point when you start up the application, it will look something like as it is shown in figure 2.

**Figure2.**Libgdxproject setup

Note: In Figure 2 the screenshot have been taken on Windows and shows path that differs from a Linux or any other Operating system installation. However, the form is the same on any Operating System compatible with this setup application.

In IntelliJ IDEA or Android Studio, you can decide to open the build.gradle file and select "Open as Project" to begin. In Eclipse, pick File -> Import... -> Gradle -> Existing Gradle Project (ensure that your newly created project isn't situated within your workspace). In Netbeans it is File -> Open Project.

You may have to refresh the Gradle project after the initial import, if a few dependencies weren't downloaded at this point. In IntelliJ IDEA/Android Studio, the Reimport all Gradle projects button is a couple of revolving around bolts in the Gradle device window, which can be opened with View -> Tool Windows -> Gradle. In Eclipse right click on your project Gradle -> Refresh Gradle Project.

You are approached to give the accompanying boundaries which are, Name, Package, game Class, Destination and Android SDK. The Name boundries have the name of the project or the application working on. Package will have the name of the Java package where the code will live for example, com.badlogic.mygame. The name of the main game Java class of your application, for example MyGame, will be in Game Class boundry. The destination will have the destination of the folder where the application is made. The Android SDK will have the destination of the area of your Android SDK. With Android Studio. The figure number 3 shows where to get the Android SDK destination in Android Studio.

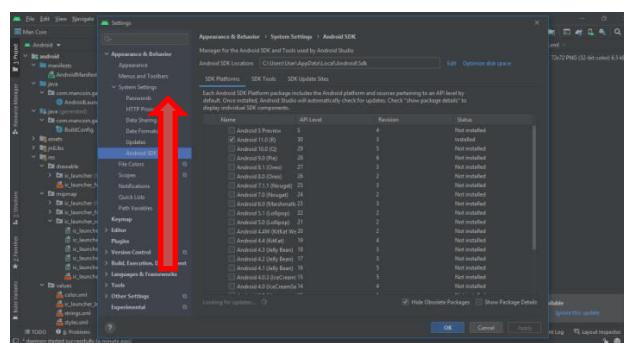


Figure3. Android SDK location

Now to open the project on android studio either right click on the folder which the name of your application and open it with android studio or open android studio and open existing projects. The project file will have three public classes, public void create(), public void render(), public void dispose(). Create method is called once when the Application is begun. Render method is called each frame, and is utilized to display whatever should be displayed. It is too used to refresh any variables/classes maybe that ought to be refreshed, like a camera. Dispose method is considered when the application is obliterated, and is utilized to free any assets, for models *Textures* or the *SpriteBatch*. An object must be disposed of in the event that it implements the Disposable interface. Figure 4 shows the public classes that are used in the main code of the application.

```

@Override
public void create () {
    batch = new SpriteBatch();
    background = new Texture("bg.png");

@Override
public void render () {
    batch.begin();
    batch.draw(background, 0, 0, Gdx.graphics.getWidth(), Gdx.graphics.getHeight());

@Override
public void dispose () { batch.dispose(); }
}

```

Figure4: Public Classes

Other public classes that can be used are Pause, Resume, and Resize. Pause method is considered when the application is paused. Generally, when the application loses focus. Resume method is considered when the application ought to be

resumed. Typically, when the application recovers focus. Resize method is considered when the application is resized. This method is ordinarily used to resize a viewport. The Assets folder in the android studio is used to store all the images used in the making of the application. You can simple drag and drop images, if using windows, as shown in figure 5.

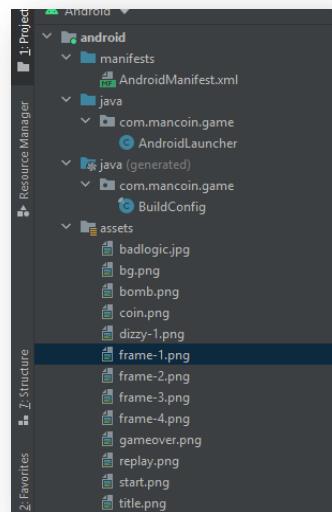


Figure5: Assets Folder

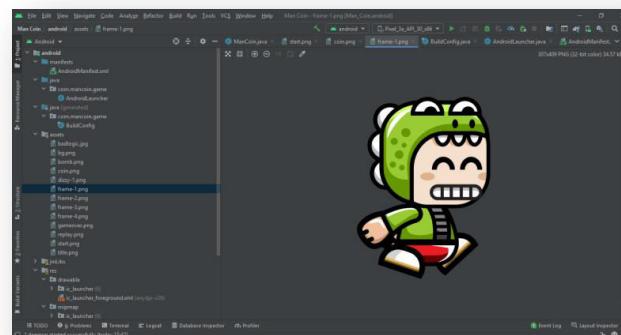
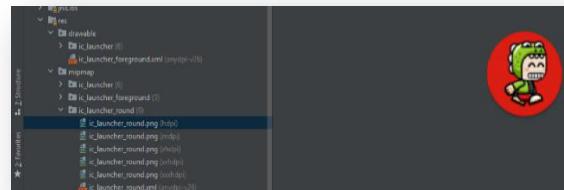


Figure6: Character Image.

Figure 6 shows the image of the character that is used in the making of the android game. Mipmap->ic_launcher_round folder is used to create the icon for the application. You can simply overwrite the ic_launcher.png file in each of those folders with your own custom image. Keeping in mind to make sure you match the sizes of the existing images in each folder. ic_launcher_round folder is shown in figure 7.

**Figure7:** ic_launcher_round folder

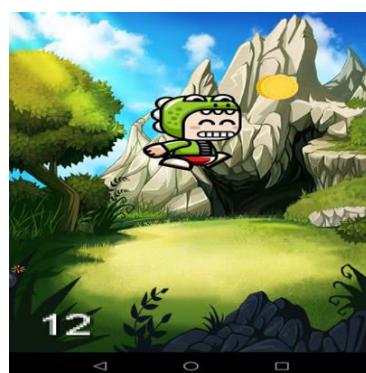
V. RESULTS & DISCUSSION

Here, the author has created a game application that runs on android devices. The author named the application as Buzz the Coin Man.

**Figure8:** Android application Coin man

Figure 8 shows the splash screen of the android game application. It is an android game application which has the character named Buzz. Buzz has to collect coins, as the character collects the coins, the scores will start increasing from 0 to as many coins is collected.

As the player collects the coins, it will disappear from the screen as shown in figure 9. But if the player comes in contact with any of the bombs, the player will loses all his/her points and GAME OVER, shown in figure 10.

**Figure9:** Scoring

**Figure10:** Game Over screen

Figure 10 also shows that, by clicking on the REPLAY button the player is able to restart the game again and enjoy.

VI. CONCLUSION

Android has gotten exceptionally well known as it is an Open-Source, Linux-based Operating System, primarily designed by Google for advanced mobile phones and tablets. It is designed so that permits the engineers and gadget producers to change the software configuration as indicated by their requirements. Learn Android App Development to change your portable like you need. There is no doubt that there will always be the need of an android developer as we all can see that android is growing rapidly. The demand for developers is increasing constantly; moreover, it is one of the highly paid professions today. To learn how to make an android app is now became easy for people as several courses are now available online to teach you. Also the costs are affordable for people to access these courses. But if you want to work in a reputed company as an android developer you must be proficient in coding and android programming. Developers also have a benefit as they can publish their apps on Google App store and can actually earn from it. We can also make gaming apps. Android applications platform guarantees immense occupation potential in the current IT field. "As of now there are between 50–70 thousand expert versatile application engineers in India. This number is totally deficient. By 2020 we will have more than billion telephones associated with the web. My gauge is that we will require 20 million application engineers around then, Android offers great professions to begin with. Thus, it is certainly a success circumstance for you.

VII. FUTURE WORK

As working with on android applications have numerous future opportunities, the author have some future plans for it. In future, the author intend to make the application that display the highest points any user ever scored so that the new user have a bench mark to beat also make more applications that are not just relevant in the field of gaming but also applications that will help users in many different ways. Each business person needs to contend with creativity to catch the consideration of more likely clients. It is on the grounds that a definitive objective of any business is to create income. Further, the advancement of the Android development platform offers business people with a cost-effective and scalable opportunity to create applications. Android mobile applications have influenced most of the industries as part of the digital revolution today.

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