Game Development for Android Device using Unity 3D

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Abstract

Android is a widely used operating system. As a result android gaming is also in demand. Game designing is a really interactive and creative part of modern IT culture. This has motivated various developers to create interesting games on Android platform. Thus, we aim to develop an entertaining and fun game based on our childhood. Our game is a single-player game which provides multiplayer functionality as well. The childhood games like paper boat and planes are the main objects in game. As the objects are all made up of paper the name of the proposed game is "papeRacer" (a combination of paper & racer). The game will contain different inputs like tap, swipe and motion sensing on different levels. In the game, the player will need to have very good timing and speed in order to win. The objective would be to cross the path full of obstacles in given or shortest time. The difficulty of levels will increase gradually as the game proceeds. Since it is a racing genre game, the multiplayer gaming will focus on races with your friends and let the users compete to be the best. Apart from this even time attack mode enables players to track and beat their own high scores. The platform of the game is developed using Unity 3D game engine and main coding is in C#. Smartphone users have a desire not only for games in general, but for quality games that provide them entertainment and a level of challenge too. Thus the game needs to be constructed in a way that is organized and well planned to give the users the best experience possible. Thus we will try to create a game which is extremely entertaining and intriguing with great graphics to make it visually appealing.
Keywords: Android, gaming, Game design, IT, childhood games, Unity 3D, racing game, arcade game.

1 INTRODUCTION

We aim to build an android based gaming application based on three childhood games. Papers games are the main focus namely paper fish, boat and planes. We will develop this game in Unity3D. The game is a single player type in racing genre. A racing game is one in which the player generally races other vehicles to secure first position. Unlike the racing genre, we feature only the main player vehicle which has to beat the time set by AI. It is a highly dynamic game which won't have repetitive course of routes. The game play would also force the player to select better and quicker paths to win the race. The user will continuously give inputs (tap, swipe or motion) to keep the vehicle moving.

The project includes different modules for each of the events, development of a good user interface, development of game objects, and their movements and actions, using Unity 3D software. This will be linked on the Android platform. The developed game will be ready to run on latest Android 6.0 OS. The paper will describe the system that is going to be developed, the functional requirements of the game, the materials used, the basic architecture and the various phases involved.

2 PROPOSED GAME

The proposed game is a single and multiplayer interface racing game. Its specifications are as given:

2.1 Game Company
 Old school gamers
2.2 Game Name-
 papeRacer
2.3 Game genre-
 Racing type arcade game
2.4 Interface-
 Tap, Swipe or motion sensor.
2.5 Targeted Audience-
 Android users of all age groups.
2.6 Delivery Platform-
 Android 4.0 and above (including Android 6.0)

The game will showcase three major vehicles a paper fish, boat and plane. Each vehicle will comprise of its own

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main level. The levels will contain 5 sublevels each to be cleared step by step to advance and win the game.

The games objective is to be quick and clear each course without colliding to the obstacles. Game environment will be set up near places like hall room, lawn or sky. The actions for vehicles will be to turn left or right. The background will move ahead only on user input. Hence the user will need to give continuous inputs to keep the vehicle moving and reach the end line. If the time taken to cross the finish line is more than the specified goal then the level won't be cleared. Overall architecture of game is interactive and highly dynamic. The user should be prepared for all types of obstacles and react quickly.

The game is being developed for Android 6.0 i.e. Android Marshmallow. Users with Android 4.0 and above will be able to play the game at its best. The graphics will be rendered to an aspect ratio of 16:9 and a vertical orientation will be the output. The game can be easily played on various resolutions and won't have a problem with rendering objects.

3 SOFTWARE REQUIREMENTS

3.2 Unity 3D
Unity 3D is a game engine used for developing games for multiplatform use. It is one of the best features of Unity to allow user to create a game able to run on multiple devices or systems. It makes use of extensive libraries which support many different game functions necessary. It is used for collaborating the animations, art, sound, functions and objects together to create the final product. The coding is mostly in C# and the inbuilt assets are easier to access. Unity can handle and support several art assets and file formats from Maya, Blender, Adobe Photoshop and Illustrator. All these assets are handled by Unity's GUI (Graphical User Interface). They can be very easily added onto any project. Unity's scripting is built on MONO which is basically the open-source implementation of the .NET framework.

3.3 Adobe Tools
This set of software is used for designing game objects, environment and UI.

3.2.1 Adobe Illustrator
It is for creating and editing vector based illustrations such as logos and brand marks or other design elements. Create elaborate, finished illustrations with easy and intuitive touch controls. Vector graphics are scalable images that can be sized as small or as large as you need them to be, and still maintain their resolution and clarity. Send your artwork as layered files to Adobe Illustrator CC or as flat images to Photoshop CC.

3.2.2 Adobe Photoshop
Adobe Photoshop helps the developer create a wide array of objects based on their looks. We can develop the basic environment and art of the game using this. All the game objects will be developed using this tool.

3.2.3 Adobe AfterEffects
Adobe AfterEffects is a digital visual effects, motion graphics, and compositing application developed by Adobe Systems and used in the post-production process of filmmaking and television production. Among other things, After Effects can be used for keying, tracking, compositing and animation. The opening and closing credits are designed using this tool.

3.3   Android SDK
Android SDK is necessary to develop an android game. It is connected to Unity 3D. It provides a platform to develop the game. All the assets required for any android game are provided by android SDK. We can host our games on android platform's Google play service. This even lets us create achievements, multiplayer feature and many more in-game facilities.

4 STEPS IN GAME DEVELOPMENT

1. **Initial Planning:** The pioneer of game development process includes conceptualization of the gaming idea. The game play, the age group, the ratings, game mechanics are all decided in this phase of game development. Various researches are also done to see that the idea is unique and also that it can be implemented.

2. **Technical Requirements:** It includes deciding on the platform based on the targeted audience. The tools and the materials required for the game design are also decided in this phase.

3. **Deciding Game theme & genre:** Based on the game concept, the theme and genre are finalized. In our case, the genre is Role playing.

4. **Designing Game objects & environment**: Game objects are an integral part of game. In this phase, the different game objects are designed using the various softwares.

5. **Developing UI**: The user interface, the menu are developed in this phase.

6. **Adding features & mathematics:** Different algorithm and mathematics are used for score calculation; these features and algorithm are added in this phase. The physics involved in the game is also added.(Example: collision detection, path finding—A* algorithm etc).

7. **Integrating steps:** After the prerequisites of game are developed. This phase includes integrating all the phases to create a responsive and functional game.

8. **Testing & fixing bugs:** The developed game is tested on android platform to see if the game features are working well on the device. Also it is checked to see it supports the various devices and android versions Alpha-Beta testing is performed. If any problem is encountered, it is rectified.

9. **Launch on Android PlayStore:** After it is assured that the game is playable, and is ready to be delivered for use to the public, the game is then published. (In our case will be launched over the Google PlayStore).

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10. Feedback: This step is also extremely critical if you are going to design more games. This is the step where you systematically collect feedback from those who play your game to see where you went right and where you went wrong.
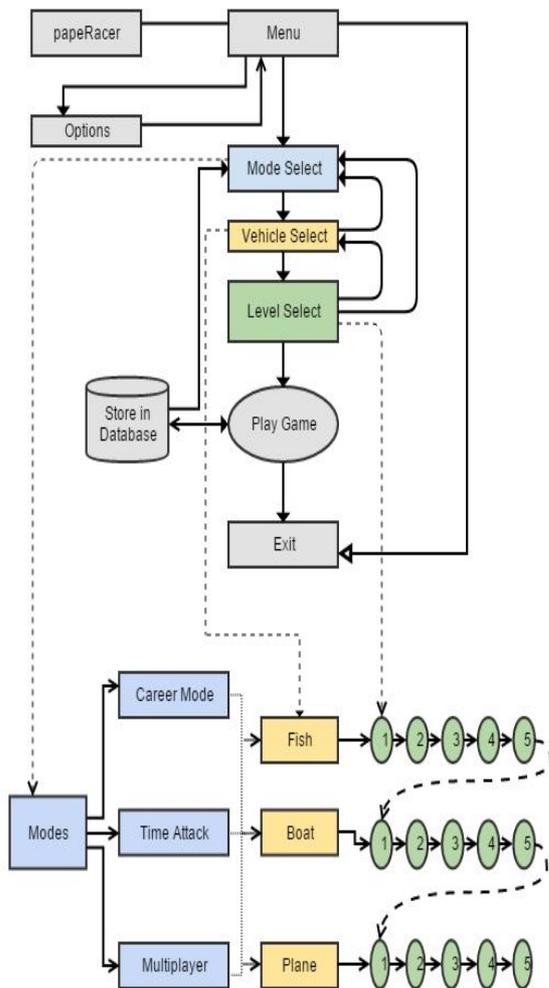
5 GAME FLOW

5.1 Screen Flow

Fig 1: Screen diagram explaining the game design flow.

5.2 Mode Description

The game papeRacer consists of 3 modes:

1) Single player

a) Career mode

It involves taking the vehicle across the collision course, the race track, to the destination (finish) line, avoiding the collision. The career mode consists of 3 main levels with different vehicle on each level. You need to clear each level to progress to the next level. Even in each of these levels include 5 sub levels which are to be cleared in orderly fashion. If the previous round is not cleared, the next levels will remain locked.

b) Time attack:

The player has the choice to compete against time. The player has to beat his own high scores and set a new record for each track. The levels will be same as those in career mode. Thus, only an unlocked level in career mode can be played in time attack mode.

2) Multiplayer

The game papeRacer also includes multiplayer feature. You can compete with your mates to see who is the fastest. The players will connect using Wi-Fi hotspot. It will include time bars of other players. Thus we will provide a clean interface for each player and show their friends progress at the same time. There won't be any need of internet for playing the multiplayer game mode. Again the tracks played here would be same as career mode selection.
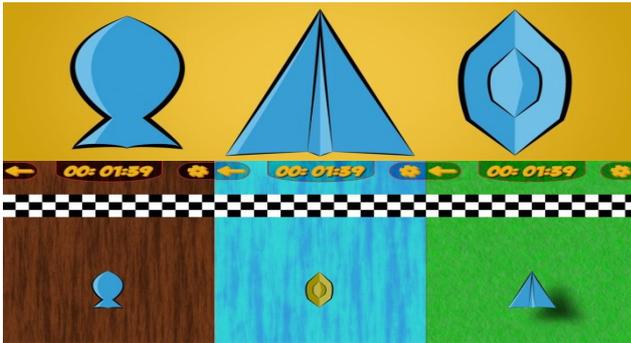
There are 3 stages in each mode based on the vehicle used.

Table 1: Stage and level description diagram

papeRacer	Stage-1	Stage-2	Stage-3
Vehicle	Fish	Boat	Plane
Levels	5	5	5
Environment	Hall room	Lake	Sky
Obstacles	• Pencils • Rubbers • Paper ball, etc.	• Pebbles • Leaves • Wood barks, etc.	• Birds • Trees • Cables, etc
Objective	To jump the hall room without colliding with obstacles on the way.	To swim across the lake without colliding with the obstacles in water.	To fly across the path in air without colliding with the obstacles mid-air.
Interface used	Tap interface	Swipe interface	Motion Sensing

Each mode includes 3 stages (vehicle) with 5 levels each amounting to a total of 15 levels. Initially, only the first level of stage 1, fish, is unlocked. The player is supposed to clear the preceding levels to move forward to the next level. So, the first level of stage 2, boat, is unlocked only when the stage 1 is completely cleared. The subsequent clearance of levels in time attack and multiplayer will also take place. Thus one can play only the unlocked tracks in time attack or multiplayer. In multiplayer mode if one player has advanced more than other player, then the common levels can be selected which are cleared by all players.

5.3 Game Objects

6 CONCLUSION

The project explains the process involved in game development on Android platform using Unity 3D. This paper covers all the topics from general game development to the tools used for game design and also the details of our game design. We intend to create an extremely engaging and addictive game.

The game will be launched on Google play store in the earliest ready for use. We are creating a project which will be used by a wide range of players across the world.

7 ACKNOWLEDGEMENT

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