INDEPENDENT GAME DEVELOPMENT

Onuiri Ernest E, Awodele Oludele, Udegbe Andre, Adepoju Benjamin, Wakama Oraibi, Okoro Raymond and Komolafe Oyindolapo

Department of Computer Science, Babcock University, Ilishan-Remo, Ogun State; Nigeria
Corresponding Author: Onuiri Ernest E; ernestonuiri@gmail.com; +2348037281619

Abstract:

With the astronomic growth in the use of smartphones and sophisticated gadgets globally, it is no surprise that the owners of such devices install various software to proper utilize such devices. It is however interesting to find that almost all of the software and games that reside on such devices are of western origin. In recent times, the development of high-end mobile devices and gaming consoles has made gaming an integral part of the human life across diverse cultures. It was therefore the aim of this research work to develop an independent game that would capture the attention and the cultural interest of the gaming market in sub-Saharan Africa as well as help raise awareness for the potentials inherent in the gaming industry, while at the same time fulfilling all the criteria of all good games such as entertainment and at the same time providing mental stimulation to the player. The game waterfall model was used in the development process because it offers better and fluid movement in the game creation process. In view of the foregoing, it was discovered that the game creation process was one that required time and loads of manpower in order to accomplish the tedious task of developing a rich and exciting game.

Keywords:

Mental Stimulation, Game, Independent Game, Software Development, Game Waterfall Model.

1.0 INTRODUCTION

This research entails an expedition into game development and traverses every process from idea development to distribution involved in this tedious aspect of software development. It upholds the requisite quality expected in the game development and has a setting that is adapted to the African tradition tailored to provide the player fun, while at the same time, stimulating mental alertness and perfection of cognitive visual tasks. Playing for stakes with the hope of winning passes as one of the never ending definition of gaming [1]. It depicts that people would play a game with the expectation to win. However, there are other reasons why people play games which includes the reduction of stress and ultimately for the fun. In addition, results have shown that people play games not so much for the game itself but for the wholesome experience which the game creates: an adrenaline rush, an adventure predicated on imaginations, a mental challenge, or the structure games provide, such as a moment of solitude or the company of friends [2]. People play games to create moment-to-moment experiences, whether they are overcoming a difficult game challenge, seeking relief from everyday worries, which hints therefore that players sometimes play games to relieve themselves from the day's stress. Hence, it is not uncommon to see individuals playing one type of game or the other for leisure when they are less busy or while they are taking some time off their routine tasks.

2.0 LITERATURE REVIEW

The first computer games appeared in the middle of the 20th century. Just as the development of smaller but more powerful technology has helped drive the generations of computers, the game industry and the games produced have been driven by the same evolution. This is because technology has allowed for evolution of powerful consoles on which the games physically reside and are played. Just as the same technology has allowed for computers to be mobile as evidenced in laptops, personal digital assistants and smartphones, it has allowed for the emergence of mobile game consoles such as the PSP, the Gameboy, and the Nintendo Wii. All these evolution has provided a richer and more immersive experience in gaming with each development in the technology ultimately resulting in an increasing consumer base which is constantly being entertained by the product. Little wonder we find that quite a number of people play games in order to temporarily detach themselves from reality, whether it be work, school or at play [3]. Gaming consoles have grown from what we have to powerful self-contained machines that play high-end games with high-end graphics and functionality. Currently at the fourth generation with the introduction of PlayStation 4 and the Xbox one, these consoles have processing power that is as powerful as the computer system itself; it is therefore of no surprise that one would see titles such as FIFA that almost accurately mimic the real life scenario to give the player a natural experience while playing. Also, this consoles have been used for advanced simulations such as flight simulation which takes into account the tiny details that are involved in piloting an airplane [4].

2.1 RELATED WORKS

Some of the notable achievements in relation to gaming software development vis-à-vis algorithmic analyses, software and hardware implementations are discussed. In analyzing these related works, consideration was directed towards identifying similarities as well as short-comings.

2.1.1 Temple Run

Temple Run is a video game with an endless running character. It was produced, designed and developed by Imangi studios. The success story of Temple Run makes it an ideal example of the potentials inherent in independent game development. The game entails a single player and is supported by several platforms. The main objective of the game is for the player to escape the grasp of pursuing "demonic monkeys". If caught by the monkeys, the player becomes a "tasty snack". In addition, players can die by falling off a ledge, running into a tree, and failing to slide or jump in time [5].

2.1.2 Angry Birds

This is a puzzle video game developed by Rovio Mobile. The game was released in December 2009. Since that time, the game has accounted millions of downloads and sales. It is the highest downloaded free game of all time. It has all been called "one of the most mainstream games out right now" [6] and "one of the great runaway hits of 2010" [7].

2.1.3 Subway Surfers

This is also an "endless running" game developed by two companies, Kiloo a private company based in Denmark and SYBO games. The game involves a hooligan character who is caught applying graffiti to a metro railway site running as far as possible from the police inspector and his dog chasing from behind through endless train tracks while at the same time avoiding obstacles that require the character to jump, duck, and or dodge oncoming trains or objects. If character is hit by an obstacle, it appears to smash into the screen after which he is pulled up by his shirt by the police inspector. The character collects coins on the train tracks while running, occasionally surfs on hover boards and even fly overhead wires. This game also features "power-ups" such as coin magnet for attracting coins, jetpacks for flying overhead wires to get coins and super sneakers for jumping higher [8].

It should be noted that all of the related works stated above are multiplatform (i.e. they can be played on various devices running diverse operating systems) and single player. This is an exciting feature that is common in independent game development.

2.2 ANALYSIS OF AN EXISTING SYSTEMS

In this section, analyses of games similar to the proposed game system was carried out. The game of choice for this analysis is the popular Temple Run. Temple Run was built with the same development platform with which our proposed system would be built; UNITY.

2.2.1 Violence

In Temple Run, the player is chased by a pack of screaming monkeys. If they catch the player, he will become a "tasty snack" for the monkeys. Similarly, players can die by running off a ledge, running into a tree, or failing to slide or jump in time. The application has no blood or sounds of suffering [5].

2.2.2 Ease of use

The game is very much based on good and perfect timing of the runner, which takes a while to learn. As it progresses, speed increases, making it even difficult to maneuver or master. Whilst the player cannot control how fast or when to run, flicking your finger left and right allows you to make left and right turns whereas the up movement makes the runner jump over obstacles. The down motion allows the runner to slide underneath low hanging scenery. If the player is too slow in any of these movements, it either falls off the path or falls back into the jaw of the enemies, both leading to untimely death (game over). Each time the player achieves an objective, for example, run 1000 meters, a new objective appears. This ensures the game, whilst it does host an unchanging background, ceases to become boring by constantly

updating goals [5].

2.2.3 Media Integration

Temple Run has social media presence. It has connections with the most popular social networks integrated into it. This makes the player motivated to achieve the highest possible score, higher than that of friends and colleagues. In addition, upgradable characters, "power-ups" such as invisibility and speed, as well as ability to resurrect after death all guarantee the game has countless options to hold ones attention and leave the player craving a higher score [5].

3.0 METHODOLOGY

In the game development, there are several methodologies which are used by various studios in the process of developing games. This research adopts the waterfall model. This model was adapted by game developers for game development which is known as the Game Waterfall Model. This method is best suited for the proposed system because it involves planning which is very important for individual and group projects alike. Also, overall game development is not suited for typical software life cycle methods, such as the classic waterfall model [9]. Hence, the game waterfall model is the preferred methodology for this project. The model was created by veterans in the gaming industry to suit the special needs of game development [10]. This model is classified into six phases. These phases are discussed below:

3.1 Requirement Phase

Here, the terms of reference would revolve around the following:

    i.   Establishment of Project Goals
    ii.   Setting tentative development timeline
    iii.   Setting development budget
    iv.   Develop of a game overview

The following are the requirement of the game:

1. Players should be able to restart each game after failing a level
2. Players should be able to exit the game without any complications
3. The game should be optimized for mobile phones
4. The player should be able to go back to the main menu any time
5. The player should be able to save their sessions.

3.2 Specification Phase

This is the phase where the specifics of the game are discussed, debated, decided and documented. It includes the following:

    i.   Define what the game should do to meet identified needs.
    ii.   Detailed discussion and documentation of high-level functionality (e.g. the important features).
    iii.   Detailing secondary-level features (e.g., nice to have, but not critical).
    iv.   Identify game play levels and options.
    v.   Identify settings, mechanics, interaction models, etc.
    vi.   Outline the objectives to be achieved by the user; how the game is "won" and "lost".

3.3 Design Phase

This is the phase where the blueprint for the game system is thoroughly discussed and designed. The specifics of the mechanics running the game, along with other aspects such as graphics and audio are also considered in the process. During this phase, the following is done:

i. Outlining of game specifics.
ii. Identification of all actions and corresponding inferences that would be permitted in the game.
iii. Mock-up screenshots of the game scenes are drawn up.
iv. Design of the user interface.
v. Writing a low-level design on all the functions of the fame (e.g. menu items).

3.4 Implementation Phase

This is the ground breaking of the development process, work starts in earnest. It involves coding of the game logic according to design specifications.

3.5 Integration Phase

This phase involves putting together everything to form an integrated 3D game. Also, several rounds of testing was carried out to ensure the individual components and the overall game system performs according to specification. The game was also debugged in an attempt to discover inherent bugs. A field test was also carried out, where test versions of the game was tested by a group of students to validation testing.

3.6 Operation Phase

The finished product would be launched into the game market. Maintenance and upgrades would be routinely carried out to suit the ever changing trends in the market and also user tastes. Additional levels, features and enhancements would also be added to the game in due course.

4.0 GAMEPLAY

AKOOGUN (warrior): this is the game that was developed by the team to suite our local scene in Nigeria. It all starts with a witch named Safrica sending her demonic skeletons to attack a peaceful village in an ancient Yoruba village; luckily for the village, they have a resident warrior named Ajala. The game play is set in an ancient village made up of farms, huts, hills, farm animals and wells. The player character is able to walk around within the bounds of the village as he wills. When the game begins, the village is invaded by what seems to be skeletons raised by an evil witch from the next town. The goal of the game is to defend the village by battling the foreign entities and defeating the forces of evil. While playing this Indie game, the player character is able to sustain injury from the evil forces. He is also able to run to any nearby coconut tree and drink from its sap to replenish his health vis-à-vis strength (Figures 1 – 3). Also see: **https://play.google.com/store/apps/details?id=ng.com.beanstudios.akogun**

The player objectives are:

i. Kill as many skeletons as possible
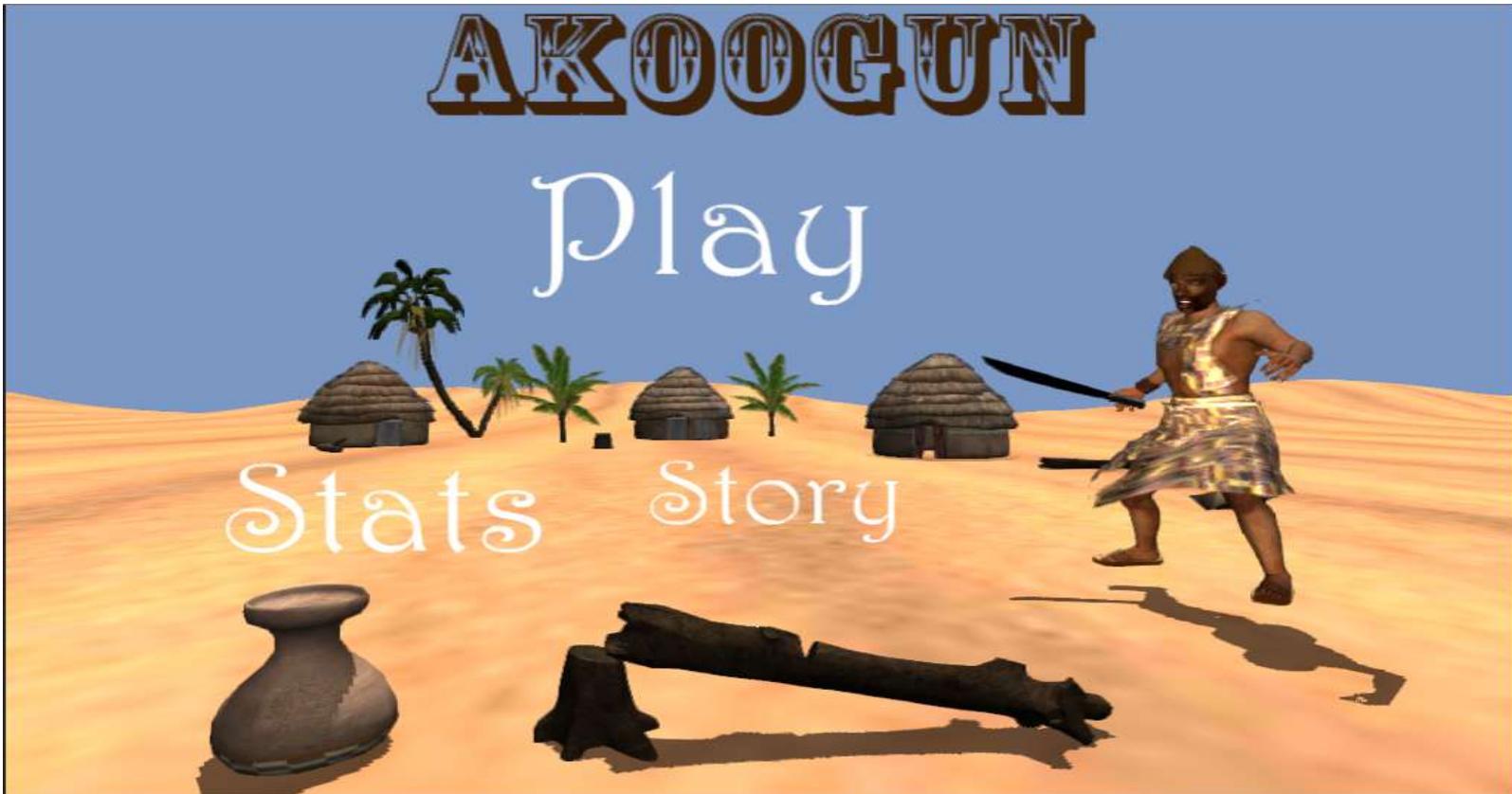ii. Stay Alive

Figure 1: Menu scene
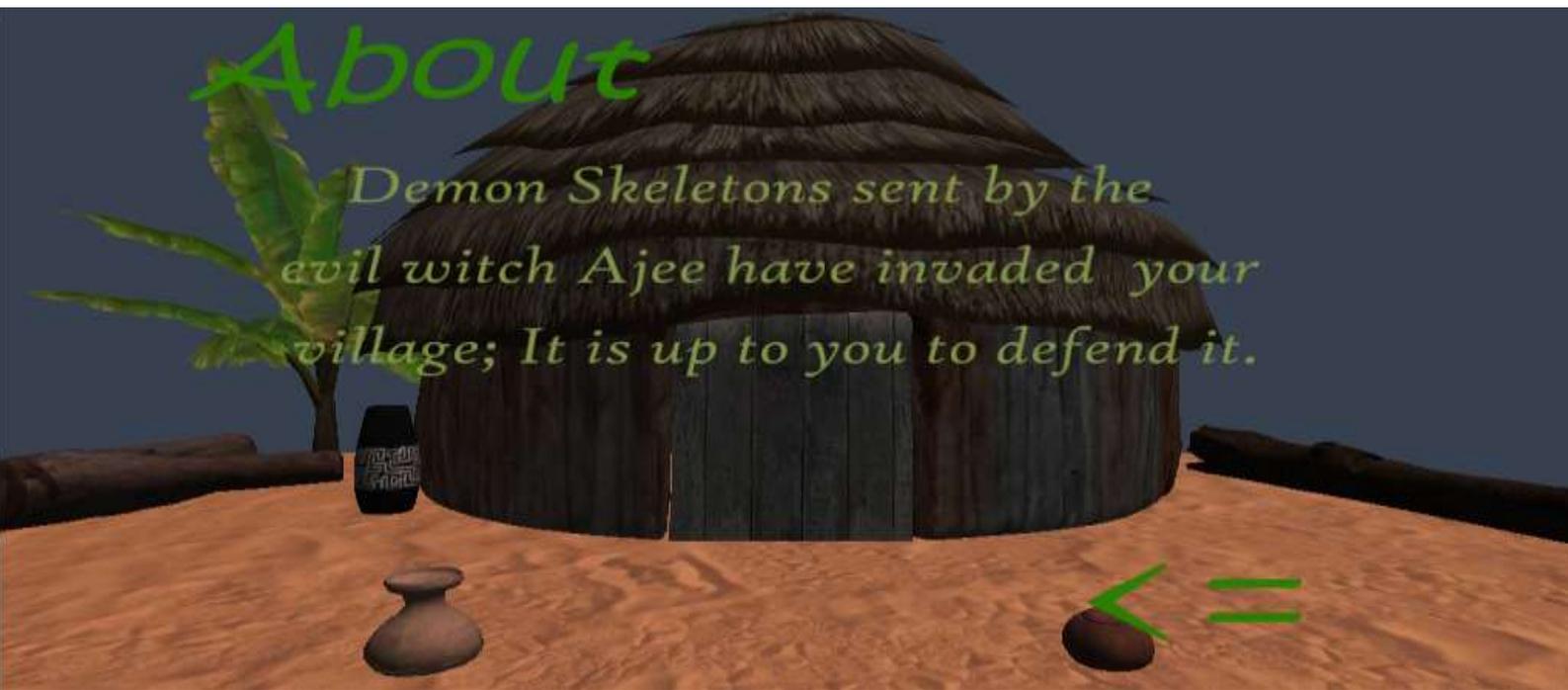
Figure 2 Game Play

Figure 3 About Scene

5.0 REQUIREMENTS

The device required to run this game ranges from laptops to smartphones. These devices must possess a processor of considerable frequency (1.2 – 1.8GHz) and a minimum RAM of 512 MB exclusive for mobile phones. The device should also be running any of the following operating systems: Microsoft Windows, Linux, Macintosh, Android and IOS. To allow the game to be played on web-based platforms, the game would also be compatible on adobe flash and Google native client. For mobile phones, a compressed version would be developed to fit since they don't have the same processing power as with the laptops and high end devices.

6.0 DESIGN TOOLS
The tools used for this project center around providing the ability to manipulate 3D models, sound, program codes, images, videos and ultimately the game itself. Some of the tools utilized were:
  i.   3D Max
 ii.   Poser
iii.   Blender
 iv.   Power sound editor
  v.   Adobe Photoshop
 vi.   Mono-Develop programming environment
vii.   Unity 3D

Programming languages also used are JavaScript and C#. These two languages were utilized by the unity engine to allow flexibility in the programming of the game. As a result, both languages are often employed together in the development of games with unity.

7.0 TESTING

Like any software project, testing is essential to ascertain that the product meets the specifications and the requirements. Although different in nature from traditional software, the testing methods employed in this project were borrowed from the normal methods for classical software development. They are enumerated below:

    i.   Unit testing
   ii.   Integration testing
  iii.   System testing

The unit and integration testing were done at two levels:

- **Level 1 –** This level deals with the work done on the individual game objects that form the building blocks of the game. Hence, the unit and integration tests apply only to these building blocks in this level.

    Unit testing: This involved the testing of the individual components that make up a particular scene in the game. For instance, a character object within the scene would be tested to ascertain that it reacts to player inputs as it should while staying within the bounds of the rules governing the play in that particular scene.

    Integration testing: as the various components that make up a scene come together to complete the scene, it is necessary to ensure that they coexist and all work as they should. This is where level one integration testing comes in. For instance, it would make for a very bad game if the player character could walk through a wall that is meant to act as a physical boundary within a particular scene. Instances like this are all covered during level one integration testing.

- **Level 2 –** At this level, the outputs from level one activities are dealt with; essentially, the scenes set up become the units.

    Unit testing: The individual scenes are tested to ensure they conform to draw up design and specifications. During this testing, errors found either in the logic or programming of the scene are revealed. This provides an opportunity to make the appropriate correction to ensure the integrity of the overall game.

    Integration testing: This testing was done to ensure the seamless blend between the different scenes that make up the game. The transition from one scene to another scene needs to be smooth. It is also expected that additional scenes to the game follow the underlying trend and theme of the game (with respect to logic).

    System testing: The overall result of the project must be tested to ensure it meets all the requirements drawn up at the early stage of the project. This was done at the system test. The tests were done from the developer's perspective (white box testing) and the target audience's perspective (black box testing). The overall goal was to put a stamp on the project as a fulfilled one.

8.0 RESULTS AND FINDINGS

Following the independent game development approach, a few things were discovered and they are outlined as follows. Firstly, using this approach, all the work gets done by a small team usually not up to 10 people. Often times, the result of this approach is a single player game. Also, all the responsibilities that would have been divided among different teams (had a studio development approach been taken) would be done by the tight knit group of individuals in the independent development teams.

Secondly, the resultant game drew public interest as not much has been published in the field of game development in Nigeria. The audience were quite astonished to find that the result of this project could be of standard and could compete with the ones made in the western world and at the same time promoting our rich cultural heritage in Nigeria, this made evident the potential lucrative market that game development has in Nigeria and sub-Saharan Africa.

9.0 RECOMMENDATIONS

The game development industry is one that is seen as lucrative, it is believed to be an untapped industry for African developers to explore and reap big and we believe that Akoogun has the potential to drive game development into dominance in the African space and beyond. In a recent report, it was stated that "the game development is something Nigeria and Africa should consider. People may prefer software developed by renowned western software companies, but it is discovered that Nigerians want to play computer games with some traditional Nigerian content in it." This brings to mind that the game industry of Nigeria and Africa at large is one that has not been explored; until developers would create games rich with African contents this wouldn't be achieved [11]. It is therefore recommended that more developers in the IT field in Nigeria consider the opportunities and potential of game development in Nigeria and Africa as a whole.

In addition, the fact that the game industry is one that compares to the movie industry making a gross income that is comparable to that of the movie industry making it a multi-billion dollar venture. At the end of this research work, conclusions have been deduced that point to the fact that with the right set of tools, it is possible to create games that can stand the test of time as well as maintain rich traditional content, though it requires some sort of special skills that can be honed in the course of the development process. More research can also be done on how games created can stimulate the player's mental ability rather than giving the player fun.

In view of the foregoing, it is noteworthy that the game industry is still evolving and new technologies are fast coming into play. Technology continues to evolve in amazingly rapid speeds. From the very early years of black and white 2D games like pong in 1972 to the first 3D game, Monster Maze in 1981 and from primitive first-person shooters such as Wolfenstein 3D in 1992 to complex, life-like shooters like Battlefield 3 in 2011; there is no doubt that the gaming industry has experienced its fair share of technological evolution [12]. In conclusion, further enhancement can be done to the game system because with the evolution of the digital age, more improved innovations and technologies will be released every day and for one to keep up with evolution and to stand out in competitive gaming industry, upgrades and new ideas would be necessary so that the game in general can be tagged as a nearly perfect game that would match global best practice.

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