ORIGINAL RESEARCH PAPER
Volume-8 | Issue-11 | November - 2019 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CHANGES IN GAMING TECHNOLOGY

Computer Science

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ABSTRACT

Whenever we talk about video games, it reminds us of the time when we used to play them as a kid. We often think about them and recall what they were like and even often end up comparing them to the latest generation of video game. In this research paper we talk about some of the crucial elements that highlights how the video games have changed over the decade. 1. Artificial Intelligence (AI) 2. Game Portability 3. Evolution of Consoles 4. Graphics 5. Online Gaming

KEYWORDS

INTRODUCTION

According to a statistical report that was recently done, it was estimated that the video game revenue was about $9.4 billion in the 2000 and that it has increased to a mammoth total of $74.66 billion in the year 2016 and is also expected to grow to a whopping $90.07 billion by the end of the year 2020.We have come a long way from the time of "Spacewar!", which is credited as the first widely available and influential computer game from the year 1962, to more recent ones like "Sniper Elite 4","Grand Theft Auto 5" and "The last of US". The aim of this paper is to discuss how games have changed over the past decade, with improvements in computer hardware and software that can render graphics, audio and video beyond our imagination.

In the following sections we discuss about how games have changed over the past decade due to various technical advancements that we have made.

1. "Artificial Intelligence"

A multiplayer video game where we don't have anyone to play with is a dull and boring experience, and this is where the Artificial Intelligence comes into play. Technically speaking, Artificial Intelligence has been there since the very beginning of the video game industry. There is nothing new or innovative about it, and it has been there, since the time we were playing games like Pong. The only thing that has changed is that AI today is starting to mimic Homo sapiens more and more each day.

Artificial Intelligence in Old games:-

1. Sim City
   Released: 1989
   Developer: Maxis

SimCity was a simulation and a city-building type game, which could also be called a real life simulator.
In the game, the player gets a plot of land to build house, factory and many other buildings to keep the inhabitants of the city happy and satisfied.

Game AI

- Being first in the series of the Sims game, it introduced a new form of gameplay, known as controlling a complex simulation.
- Each and every part of the city is modeled in a very realistic manner, using Artificial Intelligence if required.
- The new and emerging properties of the games environment are perfectly balanced to keep the user/player/gamer satisfied and happy.

2. Black & White
   Released: 2001
   Developer: Lionhead Studios

In the year 2001, Lionhead Studio developed a gold video game for the Windows platform called "Black & White", which was published Electronics Arts. In the video game the protagonist/player ruled over an island which was inhabited by a huge variety of tribes, and had the ability to teach different animal like creatures to perform a certain task.

Game AI

- The gameplay is centered on the cooperation with a colossal artificial intelligent animal that can gain from a situation and can take rewards and punishments.
- The game engine also utilizes a strong AI architecture, established in the domain of cognitive science, which is also known as belief-desire-intention (BDI).
- MI (Machine learning) techniques such as decision trees & neural networks are also used with enormous success.

Artificial Intelligence in Newer games:-

3. F.E.A.R.
   Released: 2005
   Developer: Monolith Productions

F.E.A.R. (First Encounter Assault Recon) is a Survival horror first-person video game developed by Monolith Production, where the user/player help contain supernatural phenomenon and armies of cloned superhuman soldiers.

Game AI

- In the game AI uses for the first time in a mainstream game a planner to create context-sensitive characteristics. Even till this date this technology is still used as a reference for various studios
- The NPC'S are capable of using the environment very smartly, like finding cover behind a table or tipping a bookshelves or opening a door or crashing through a window.
- Even the squad tactics are used to great effect. The enemies can perform evasive maneuvers, use a suppressor while firing, etc.

2. "Portability"

We as humans have an obsession of making everything portable, from desktops to cell phones, from transistors to compact storage units like floppy disk to a compact USB drive, as how could we leave the gaming industry behind. The gaming consoles were miniaturized, so that they can be easily used anywhere and can be transported easily. As a result, people were now able to play video game whenever, wherever they wanted, which also meant that the you did not have to carry around a television set and a gaming console in order to play a game of "MARIO KART" against your friend.

3. "Evolution of Consoles"

The Early Years:-

1. Mattel's LED-based Handhelds (1997-78)

Although the unique idea of having replaceable game cartridges in handheld game consoles wouldn't take hold for another decade, but Mattel was successful in their attempt to pry video games away from cash consuming arcade machines and dim and dull televisions with their successful line of handheld consoles that were based on LED.

2. Nintendo Game & Watch Series (1980-91)

After the risk were increased from Mattel's LED handhelds, Nintendo chose to present their first Game and watch Handheld in the year 1980 and would proceed to create handfuls more consistently, offering a little look at what the organization must offer later on. In spite of the fact that the comfort highlighted a clock and alert, however the genuine focus of fascination were the diversions, which incorporated the honor winning titles like Donkey Kong, Mario Bros and Balloon Fight.

Specifications:-
- Display: LCD
- Power: 2 x LR44 batteries
- System Development Status: Complete
- System Release Status: Released

Notable Mentions:-
1. Milton Bradley Microvision (1979)
2. Epoch Game Pocket Computer (1984)

The new wave:-

1. Nintendo Game Boy (1989)

It's just not possible to undermine the importance and impact of the Nintendo's Game Boy, the original Game Boy. The Original Boy among its different manifestations is one of the most successful video game console of all time. One of the major factors in its success is its sensible cost ($109 US at the season of dispatch), however, the most it is a result of the variety of video games it had, and in particular, the drop-dead genius move of bundling Tetris with the system.

Specifications:-

Console Dimensions	3.5x5.75x1.25mm
Screen Resolution	160x144
Power requirement	6V,0.7W or 4A batteries
Shades on screen	4 variety of grey

Some of the after highly successful consoles of this time are:-
1. Lynx Atari - 1989
2. Turbo Express by NEC - 1990
3. Game Gear by SEGA - 1990
4. Nomad by SEGA - 1995
5. Game.com by Tiger Electronics - 1997
6. Geo Pocket by Neo - 1998
7. GBC (Game Boy Color) - 1998
8. Game Boy Advance (GBA) - 2001

The Current Generation:-

1. PlayStation Portable (2004)

The most technically advanced handheld system till date.

Specifications:-

Name of Console	PlayStation portable
Color available	Black, White, Red
Console Dimension	170x74x23mm
Weight	260grams
CPU	1-333MHZclock frequency
System Memory	32 Mega bytes
DRAM	4 Mega bytes
Display size	4.3 inch
Access Control	Region code

2. PlayStation PRO (2016)

PlayStation PRO is the most high-tech gaming console till date by Sony, and is the successor of PlayStation 4

Specifications:-

Weight	3.3 kg
CPU	x86-64 AMD “Jaguar”, 8 cores
GPU	4.20 TFLOPS, AMD Radeon based graphics engine
System Memory	8gb GDDR5
Storage	1TB
Power supply	AC 100V, 50/60Hz
Dimensions	295x55x327 mm

CPU – Central Processing Unit
GPU – Graphical Processing Unit

Notable Mentions:-
1. Xbox 360, One
2. PlayStation vita
3. PlayStation 3
4. Nintendo Switch
5. Nintendo Game Cube
6. PlayStation 2

4. “Graphics”

OK, now let's be honest. Pong was not exactly a beautiful game. It didn't have complicated textures, shaders or sprites that are found in all the games now a days. As time passed, there have been major advancement in the way graphics are used or provided or rendered on any given gaming platform.

Technological advancement has allowed for enhanced computer graphics with the help of hardware upgrades. One on the problem with Pong era, was that it had very limited amount of processors. As a result of which there was nothing that could have been to correct choppy performance. But today it is the era of high-end hardware that allows for more pixels, instructions and shading (even on an enormous scale).

But what makes a computer game fun and interesting to play? This might possible be the toughest question to answer in the field of video game development. From a players perspective, enhanced graphics doesn't always necessarily means amazing gaming experience (Example - Watchdogs). The days when astonishing graphics alone were enough to sell a game are probably over. Due to constantly evolving graphics hardware, visual impression of reality is becoming as closely as possible due to new visual effects.

Graphical elements of Computer Games:-

There are several different graphical elements that have to be paid attention, while a game is being developed. Some of them are:s
- Color
- Perspective
- Realism
- Presentation
- Dimensionality

The **dimensionality** of a game's graphics can fluctuate among 2D, 2D and 3D graphics. 2D designs are generally utilized on board based games implementations, where sufficient data about the game is shown from the top view. 2D graphics are likewise called pseudo 3D, and been adopted from movies to give the fantasy of playing a 3D game.

When discussing dimensionality, one also need to pay consideration regarding the perspective of the displayed game scene. FPS (First person shooter) or 3PS (Third person shooter) games that are produced using a 3D game engine, as a rule, utilize the accustomed perspective camera, while a few genres, like strategy or role-playing, make use of an isometric model.

Color plays an important role in putting up an atmosphere. It can convey mood of the characters.

Presentation defines how the game universe and the characters display on the screen. It can vary from only text to 1st or 3rd person mode, or even being just the top down view of the world. It even describes the user interface integration and the immersion factor.

Whether the game looks and feels realistic of not defines the **realism** of the game. There are various factors that contribute to the perception of realism in a video game, like realistic and human like characters, sound and realistic behavior of characters and game objects.

5. “Online Play”

With the introduction of online gaming, online multiplayer video games have started to receive the much deserved credit and recognition amongst the gaming community. At a certain point, online and multiplayer features have become one the most important feature necessary for the success of a newly launched title. Thanks to the development and evolution of Massively Multiplayer Online Role Playing Game (MMORPG), online gaming has become an entirely different experience in today's world.

6. “Case Study: Rockstar Games”

From 1997- 2013: Evolution of Grand Thief Auto

1997 Grand Thief Auto

Developed and released by DMA Design (now known as Rockstar North) a small game development studio at the time in Edinburg, Scotland.

Initially Released in Europe and North America in October 1997 for the platform MS-DOS and Windows by Microsoft

Planned milestones for Grand Theft Auto that were never completed on time:
- **Development begins**: 4 April 1995
- **Complete game design**: 31 May 1995

- **Engine**: 3 July 1995
- **Look and feel**: 2 October 1995
- **First play**: 3 January 1996
- **Alpha**: 1 April 1996
- **End of production**: 1 July 1996

As per the first reports for the game architecture, the introduction of Grand Theft Auto (GTA) is a type of a pre-draw or rendered type of animation. The game version for Windows 95 was created with the help of Visual C/C++ variant 2.0. The DOS variant of the game was created with the assistance of Watcom C/C++ version10, Microsoft MASM 6.1 and Rational System DOS extender (DOS4GW) form 1.97.

System Requirements:

Clock speed of 166MHz Pentium or equivalent
16Mb of RAM
Keyboard
Windows 95 or Windows 98
80 MB of Hard Disk Space

1999 Grand Thief Auto II

Grand Theft Auto 2 is released

DMA Design has been bought by the US' Take Two Interactive and will soon become Rockstar North, part of Rockstar Games.

Grand Theft Auto 2's computer version received a "Silver" sales award from the Entertainment and Leisure Software Publishers Association (ELSPA), indicating sales of at least 100,000 copies in the United Kingdom.

System Requirements:

CPU	Minimum of Pentium 200mhz
RAM	32 Mb
GPU	8 Mb
Direct X	6.1
Operating System	Windows 95 minnimum
Storage requirement	70Mb
Sound	Sound card
Resolution	SVGA Monitor(color)

RAM- Random Access Memory
DX- Direct X
OS – Operating System

2001 Grand Theft Auto III

GTA series re-entered the market with the launch of Grand Theft Auto III. It was the first 3D game in the Grand Theft Auto franchise, along with a third-person camera, along with the ability to steal unlimited number of cars and hidden reward system to help make the game the breakthrough game for the franchise

Grand Theft Auto III is considered to be the first 3D game in the series that utilizes the RenderWare game engine developed by Criterion Games.

System Requirements:

Operating System	Windows-2000/XP minimum
CPU	Pentium III® 450 MHz CPU
System RAM	96MB
Graphics	16MB video card
Storage requirement	500MB
Direct X	8.1

2002 Grand Theft Auto: Vice City

Developed on a game engine called Renderware.

Not much is known about that, Rockstar is one of those strict developers that doesn't say anything about its previous or current developments.

System Requirements:

CPU	Minimum of Intel Pentium 5
RAM	256MB+GPU
GPU	Nvidia GeForce3/Radeon 8500
Direct X version	9.0
Storage requirements	1.55GB
Operating System	Windows98,SE,ME,2000,XP
Sound Card	Direct X compatible

2004 Grand Thief Auto: San Andreas

San Andreas is released to similar success, with new highlights including BMX back flip, sightings of Big Foot and a hero who gets fat in the event that he doesn't eat soundly.

System Requirements:

Operating System	Minimum Windows XP
CPU	Minimum Intel Pentium 4
RAM	384MB
Storage Space	4.7GB
GPU	128MB of Video RAM
Sound Card	Direct X 9 compatible

2008 Grand Thief Auto IV

After three further less-successful follow-ups to GTA III, Grand Theft Auto IV brings with it a new level of experience. Labelled the 'HD universe' by its manufacturers, the setting has much more realistic gameplay and introduces online multiplayer to the series.

System Requirements:

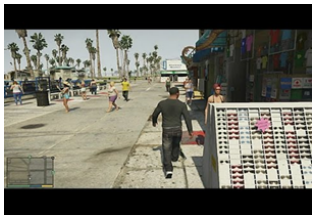
CPU	Intel Core 2 Quad 2.4GHz
RAM	Minimum 2GB
Storage Requirement	18GB
GPU	Minimum Nvidia 8600 or equivalent
Direct X	9.0
Sound Card	Direct X compatible

2013 Grand Thief Auto V

With pre-order sales of 2.5 million, Grand Theft Auto V is set to one of the best-selling video games of recent times.

System Requirements:

CPU	Intel Core i5 3.2Ghz minimum
RAM	8GB
Operating System	Windows 10,8.1,8,7
GPU	Nvidia GTX 660 2GB minimum
Storage Requirement	72GB
Direct X	10
Sound card	Direct X compatible



Conclusion

Where is the video game industry really heading towards? 20 years ago technology seemed to showcase what the future might hold for video game industry. It is possible that, maybe something similar to that might happen today. While it isn't actually possible to foresee the eventual fate of the video games, it is reasonable for say that augmented reality and virtual reality has been an intriguing issue of discussion among the general population lately and is yet to contribute a ton to the advancement of gaming technology.

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