A History of Video and Computer Games

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ABSTRACT

Video games and computer games have become popular forms of entertainment in our society. The newest technology makes it possible to render millions of polygons a second, creating very realistic graphics and impressive games. Not long ago, however, the primitive dots and circular-shaped characters of the first video games were all that was needed to fascinate gamers. The classic arcade games as well as early computer games earned their place in history by using graphical techniques and styles of game play that would be copied for years to come. As computing power increased and costs fell, many new games improved upon their ancestors by featuring the latest in graphics and speed. There were some games, though, that in addition to being unique, also defined entire genres and made such an impact on the industry and on gamers that they would never be forgotten. This history of video and computer games is an attempt to trace from the very beginning the story of various games and home consoles and why they were significant.
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Introduction

In the last few years, the video game industry has grown at a staggering pace. In 2001, the industry had broke a record with 9.4 billion dollars in sales and new consoles like the Playstation 2, the X-Box, and the GameCube helped the industry to reach 10.4 billion dollars in the United States alone for 2002. Video games have become a part of life in America, for kids and adults alike. A survey conducted in 2000 showed that “61 percent of all U.S. video-gamers are eighteen and over, with a full 42 percent of computer gamers and 21 percent of console gamers thirty-six years of age and older” (Poole 6). Games today span many categories and use state of the art hardware to create the ultimate gaming experience. However, it has been claimed that current games are little more than flashy spin-offs of the old classics, with little creativity or advancement save the improvements in graphics and polygonal detail. Of course there are exceptions, with games like Doom having such an impact on the video game industry that it would be hard to argue that they are anything less than revolutionary. The goal of this paper is to trace the history of computer and video games starting as far back as Spacewar and Pong and continue until the present, making stops along the way to highlight specific games. Certain games have been important to the video game industry because they have offered features or graphical innovations and have set a new standard for games that follow. The term video game is used very loosely and although some would claim that the term “video game” is very different than the term “computer game,” with the portability of games today between platforms and the commonalities between games in the arcade, on home consoles, and on the computer, it is not incorrect for the term “video game” to be all-encompassing. The choice of games to elaborate on, like any attempt at summarizing important events in video game history, is quite subjective, but the general plan is to give descriptions of many of the classic arcade and
computer games and why they were important. Following that, a broad overview will be given of how Nintendo and other companies with their home consoles brought the video game industry back to life. Finally, the concluding sections will outline the different genres that currently exist in the world of video games and specific titles that fall into each category. Tremendous advances in technology have brought about an array of impressive video games over the last three decades. However, a great deal of credit should be given to the originators, games that defined a new industry with no predecessors to imitate.

The First Video Games

Much controversy surrounds the beginning of the video and computer game history. In the 1950's and early 1960's the story unfolded with several men who have been dubbed as the creator of the first video game. In 1961, DEC's PDP-1 computer was sent to MIT where a man named Steve Russell described it as, "the size of about three refrigerators, and it had an old-fashioned computer console with a whole bunch of switches and lights" (Herz 6). Russell and his colleagues realized how they could cause the visual display to change based on their interaction with it. Russell stated, "So we said, gee, space is fun, and most people don't appreciate how to maneuver things in space. And so I wrote a demo program that had two spaceships that were controlled by the switches on the computer" (Herz 6). Spacewar as it was dubbed became a staple in the history of computer games and was played by computer programmers throughout the 1960's. According to author Stephen Poole, "Its structure offered many of the virtues that are still essential features of videogames: simple rules with innumerable combinational possibilities; the competitive urge to destroy your opponent's spaceship; the pleasure of mastery over a well-defined, consistent system; the challenge of reacting instantly to craft governed by inertial physics; and the sensual buzz of playing with animated patterns of"
lights" (17). The popularity of Spacewar, was due not only to the quality of the game, but also to Russell's position on what should be done with the code and rights to the game. Rather than attempt to sell his new game, Russell simply allowed the game and source code to be copied and spread as people wished. Although access to a computer for the average person was limited in the 1960's, versions of Spacewar spread across the country until it enticed many people into the mysterious computer realm. "And looking back, it wasn't powerful algorithms or lines of data-crunching code that lured them into computing. It was a primitive yet strangely compelling game, two little spaceships on a screen shooting bullets at each other - electronic dodgeball" (Herz 8).

Russell's game was exciting and fun to play but the algorithms he used were simple math calculations to simulate gravity and rotate a point in a plane. The physics equation to calculate an object's position using variables to describe velocity and acceleration due to gravity is simply:

```plaintext
//given: s = position, v = velocity, t = time, and A = constant for acceleration
s(t) = s(0) + v(0) * t + \frac{1}{2} * A * t^2
```

By setting up initial variables and recalculating the ships velocity and position at specific intervals, a computer could easily simulate physics and display the output on a screen. The mathematical formula to rotate a point in a plane was also nothing innovative, but implementing it in a computerized game had never been done before. Rotating a ship in a video game when the player presses certain controls is done by simply recalculating the new position of each point of the ship in the plane. Trigonometric lookup functions as well as line drawing functions between vertices make this more efficient today but the basic routine would look like:
//determine if the player has the right arrow key down (this could be any type of input)
if(KEY_DOWN(RIGHT_ARROW_KEY))
{
    //angle is equal to five degrees
    angle=5;
    //Call the function to rotate the ship which uses an angle in degrees as a parameter
    RotateShip(angle);
}

//given: the center of the polygon (ship) is defined as the origin (0,0) so all points will be relative
//to the ships center
//when the RotateShip function is called it rotates all of the points on the ship based on the angle
//passed to it; this code will demonstrate rotating one point at position (x0,y0)
RotateShip(angle)
{
    //trig formulas to calculate the new point
    new_x = x0 * cos(angle) - y0 * sin(angle);
    new_y = x0 * sin(angle) + y0 * cos(angle);
}

For a ship that is made up of several points, these calculations can be done on each of the points and when the ship is redrawn using the new points, it will have rotated the amount of degrees
specified. Although many of these calculations were commonly used by mathematicians and scientists, Spacewar abstracted the details and let players control the ship with simple input commands like rotate, accelerate, and fire. Many other computer games would follow in Spacewar's footsteps, including similar space simulation games as well as games that defined new genres.

Before exploring other early games, a man named Willy Higinibotham should also be mentioned. At Brookhaven National Laboratory in 1958, a computer game was designed by Higinibotham, although others claim that his “game” really should be considered more of a demonstration rather than a true game. Leonard Herman, Jer Horwitz, Steve Kent, and Skyler Miller, in an article on GameSpot.com, state that “In an effort to keep visitors to the Brookhaven National Laboratories in New York from being bored, physicist Willy Higinbotham invents an interactive table-tennis-like game that is displayed on an oscilloscope” (Herman). Higinibotham did not obtain any copyright or patent on his work, which left the door open years later for games such as Ping-Pong and Pong to take advantage of many gamers' addiction to table-tennis style games.

In the midst of the Spacewar phenomena during the mid 1960's, a man named Ralph Baer attempted to bring the popularity of computer games to the home television set. In 1966, “He begins researching interactive television games. The defense contractor he works for, Sanders Associates, is interested and gives him the latitude needed to develop it” (Herman). As computer chips to create such a system became available, Baer began looking for companies to license his idea and product. Baer’s product was called the Brown Box and he contacted several companies who made television sets to pitch his idea. Finally, Magnavox agreed to do business with Sanders Associates and by 1972 had created a home video game system they called the
Odyssey. Throughout the country, the Magnavox Odyssey was demonstrated for the public along with a series of games that were available for the system. At one show in Burlingame, California in May of 1972, a man named Nolan Bushnell attended and played Odyssey's table tennis-style game, which would be of great significance. Magnavox ended up selling 100,000 Odyssey systems, and the start of the home video game system competition would soon begin. In regard to the technical specifications of the Odyssey, "Because micro chips were so expensive at that time, the Odyssey was designed using only 40 transistors and 40 diodes" (Kuittinen). As for graphics, "None of the Odyssey's games had color or sound, and players had to hang plastic overlays on the television screen, because the machine's twelve variations on tennis, ping-pong, and hockey were all really the same game played on different grids" (Herz 34). Although the video game craze had begun, room for improvement on graphics and game types would allow competing game system manufacturers to prosper.

The Original Video Game Giant - Atari

As Ralph Baer and Magnavox were working on their home video game system, Nolan Bushnell was heading in a different direction. Seeing the possibility of making money by charging people to play computer games like Spacewar he "joined pinball company Nutting Associates to develop a mass-market version of Spacewar. In 1971, 1500 units of Computer Space, the first arcade game, were produced. The project bombed" (Poole 19). Bushnell could use larger computer circuits, too big to put in a home video game system, to make more advanced games. However, he realized that people did not like this type of game because it was too strange and complicated for the general public. After leaving Nutting, Bushnell started his own company with partner Ted Dabney, which they named Atari. Needing a different game (and possibly after viewing the games on the Magnavox Odyssey), "Bushnell hires Al Alcorn to
program games. Since Alcorn is inexperienced, Bushnell has him program a simple video tennis
game as an exercise. They call the game Pong, for two reasons: first, "pong" is the sound the
game makes when the ball hits a paddle or the side of the screen, and second, the name Ping-
Pong is already copyrighted" (Herman). The Pong prototype was a large blue and yellow game
with a simple control to guide the paddle on the screen. As for the hardware, “The electronic
guts are entirely solid-state and hardwired...no ROMs or microprocessors are present. This baby
is made to do one thing and one thing only” (Hunter). After failing to convince company Bally
of his product, Bushnell installed his new Pong game in a local bar called Andy Capps. The
game was an immediate hit and the bartender was forced to call Al Alcorn because it broke down
from being jammed with quarters. Simplicity worked for Bushnell with the only instruction on
the game being, “Avoid missing ball for high score” (Poole 19). With each unit costing 500
dollars to produce and pulling in 100 dollars a week in quarters, Atari became a success and sold
8500 Pong machines in one year (Hunter).

Pong revolutionized the gaming world because for once, a computerized game became
popular with people who had never used a computer. Many competitors would try to copy
Atari’s success and would release their own version of Pong. Even Bushnell was forced to pay
for rights to Pong because of Magnavox’s lawsuit claiming Pong copied their version of the ping-
pong style game that Bushnell had seen at the Burlingame demonstration. In a very short time,
numerous Pong games would be released, trying to get in on the video game explosion. The
following list, which is from William Hunter’s website, dedicated to the history of video games,
shows just how many pong clones were released by Atari and its competitors: *Eloping* – Taito,
Soon after the success of the arcade version of Pong, Atari and its competitors released several significant arcade games. Kee Games released Tank, which used ROM chips for memory, allowing the game to have graphics superior to previous games like Pong (Hunter).

Atari began work on a home version that might compete with the Magnavox home video game system. By partnering with Sears, and using a chip developed by General Instruments, Atari sold thousands of Pong home systems. People waited for hours outside Sears during the holiday season of 1975 for their home Pong system. Atari would go on to release many other titles and systems, but in 1976, Bushnell sold Atari for 28 million dollars to Warner Communication after creating one of the first major video game giants (Hunter). Bushnell had opened the doors to an industry that would explode as video games and video game consoles became commonplace in American culture. Warner Communication invested a great deal of money into Atari and as semi-conductor technology increased, so did the sophistication of the video game industry. Cartridge-based home systems and small handheld games became very popular in the late 1970’s. Atari released games at a frantic pace taking advantage of the public’s love of Atari’s new home VCS or Video Computer System. By 1979, 400,000 units of Atari’s VCS had been sold (Jung). During this time period, two Atari employees, Steve Jobs and Steve Wozniak, finished an arcade game called Breakout where a Pong-style paddle and ball were used to break bricks at the other end of the screen. The arcade game did well, but not quite as well as its creators who would soon leave Atari and start a computer company called Apple. Apple became
a major player in the computer industry as Jobs and Wozniak would create a multi-million dollar company, but before that, they were video game creators at Atari.

**Atari’s Competition**

Two other video game consoles had also been released but neither would gain popularity because of Atari’s dominance. RCA’s Studio II and Fairchild Channel F were interesting attempts by outside companies to break into the home console industry but Atari’s VCS, later the 2600, would prove too strong. Although Atari was dominating the home console market, several new arcade games were released whose innovative ideas would make them extremely popular and would cut into Atari’s sales. One such game, *Space Invaders*, was described as the first blockbuster video game because of its sales and because it brought video games out of the arcades and bars and was found “popping up in department stores, restaurants and other mainstream venues” (Hunter). *Space Invaders* was a very simple game, like other popular titles, but offered things other games did not. As rows of aliens made their way down the screen, the goal was to fire and shoot the aliens while avoiding the aliens’ shots by hiding behind the stationary bunkers. According to Stephen Poole in *Trigger Happy*, *Space Invaders* gave several “firsts” to the world of video games. “Space Invaders was the first game to feature animated characters. The serried ranks of aliens waggled their brutish tentacles across the screen,” (Poole 22). In addition, a high score was maintained and displayed on the screen, giving the gamer something to aim for besides simply shooting hundreds of aliens. Lastly, *Space Invaders* was the first “endless” game because no matter how many aliens one killed, eventually the waves of aliens would move so fast that it would be impossible to stop them from reaching the bottom. Although there was no way to “win” the game, the desire to stop the invaders could not be overcome, and thousands of gamers would dump coins into the many arcade units that spread
throughout America (Poole). The Japanese company, Taito, that designed the game, licensed it to Midway and *Space Invaders* became a national phenomenon in Japan and America. After some time of breaking sales records and snatching the public’s quarters, Atari would buy the rights to release *Space Invaders* on their VCS.

**Easter Eggs Make Their Way Into Video Games**

Many computer gamers in the 1970’s were fans of the text-based adventure game known as *Colossal Cave Adventure*, or *ADVENT*. When Atari created a graphical version of the popular adventure game in 1978 and released it under the title *Adventure*, the game proved to be a success. However, what made it historically significant was the fact that it included the first “easter egg” in a video game. An easter egg is a secret or hidden part of a computer application or game put in by the designers. Warren Robinett programmed *Adventure* and reportedly was upset that Atari did not credit their game designers so he put the first easter egg into a video game. If a player moved into a secret room then a hidden message was displayed, identifying Robinett as the designer. Easter eggs, hidden items, cheat codes, and secret rooms have become common in many of today’s video games since they offer surprises and make the game fun to play even after completing it. However, Warren Robinett’s name as a hidden message in *Adventure* is considered the first easter egg in a video game.

**Vector Graphics**

Another breakthrough game was released in 1978 by game company Cinematronics. *Space Wars*, although similar to Nolan Bushnell’s older *Computer Space* game, utilized something no other video game had ever used, vector graphics. Line-based graphics (vector graphics) were significant because “Vector graphics are the earliest form of polygon graphics to
appear in video game applications” (Herman). Vector graphics would allow games to display graphics that could be much faster and sharper than ever before.

Before vector graphics, video games (Space Invaders for example) looked very blocky because the graphics were displayed by lighting up certain pixels on the screen to give the appearance of shapes. This graphical display method is called raster graphics and is the most common way to display graphics on a television or computer monitor. A CRT, or cathode ray tube, fires a beam of electrons at the screen, and the electrons light up the phosphorescent material they come in contact with. Next, the electron gun that fires the beam drops a small amount vertically and makes another horizontal sweep across the screen. This continues at a constant rate because the phosphor on the screen that glows to display the colored light only stays excited for a brief amount of time. Therefore, the electron beam must constantly make sweeps across the screen to keep the picture visible. Since the electron beam can only travel horizontally a diagonal line must be drawn by doing several sweeps, which can be demonstrated as follows, with each line being a sweep and o equaling off and x equaling on:

```
oooooooooox
oooooooooxo
ooooooooxoo
ooooooooxo0
oooooooooxo
ooooooooxo0
ooooooooxo0
ooooooooxo0
ooooooooxo0
ooooooooxo0
```

In memory, a certain amount of space for each pixel must be used to determine if the electron beam should excite the specific pixel. In a 2-color display mode, the only variable is whether the electron beam should be on or off, which determines if the pixel will be lighted up on that pass.
On a simple black and white display, one bit must be used for every pixel, essentially saying whether the pixel is on or off. With color, the memory requirements increase greatly because enough bits must be stored for each pixel to determine which color should be displayed. If 256 colors are desired, then 8 bits or 1 byte for every pixel must be stored in memory. Depending on the amount of pixels, this memory requirement can be very significant. Although the constant horizontal movement of the electron beam might seem very inefficient, the advantages of raster graphics become obvious however, when ample memory and processor power are available and when drawing very colorful, photorealistic pictures. Because the beam of electrons is already making passes over every pixel on the screen, the electron gun can maintain a constant rate and light up potentially every pixel on the screen. However, a time existed when memory was not as inexpensive as it is today, and a photorealistic video game was not necessary or possible. Games like Space Wars and later Asteroids, really only needed to draw sets of connected lines on the screen to represent the ship and the various asteroids or other objects. These polygons and other primitives could easily be drawn by simply tracing the shape out with the electron gun, just as a person might draw a polygon with a pencil. Why waste the resources or display time with raster graphics when the electron beam could be programmed to trace out only the lines on the screen that needed to be displayed? Vector graphics use the electron beam to draw line graphics in this way and became a solution to overcome memory and speed limitations inherent in raster graphics. Very sharp objects and polygons could be drawn without sacrificing speed or memory. Writing code for a vector display is also very simple. Using a two color display, basically only two commands are needed to tell the electron gun what to do. Either the beam should be off and the gun moved to a specific position or the beam should be turned on and moved, which is the
same as drawing a line. An example of code that could be used to draw a triangle on a vector display might look like:

MoveTo(0,0) //moves electron gun to position 0,0
LineTo(10,20) //draws a line from 0,0 to 10,20
LineTo(0,20) //draws a line from 10,20 to 0,20
LineTo(0,0) //draws a line from 0,20 to 0,0

Today however, vector graphics are used less frequently because colorful, full screen images require nearly every pixel to be swept over anyway, so raster graphics make more sense. Although small in number, some advanced drafting applications and displays that require speed and sharp lines still use vector graphics.

**Atari Continues To Release Popular Games**

Back in the world of videogames, Atari stayed on the edge of the new technology and display techniques with their release of *Asteroids*. *Asteroids* was Atari’s second attempt at vector graphics; a game that offered high scores and the ability to enter one’s initials into the game after a gamer beat the old top score. One graphical innovation that made *Asteroids* exciting to play was the use of “wraparound” screens. To overcome the limitation of being able to display only one screen’s worth of graphics, Atari designed *Asteroids* so that when a player flew his or her ship off one side of the screen, it would reappear directly opposite the screen flying in the same direction. In C++ the code might look as simple as:
//implement wraparound for the ship

//given: SCREEN_WIDTH, SCREEN_HEIGHT are the values of the screen’s width and height

//wrap horizontally

if(ship_x>SCREEN_WIDTH)
    ship_x=0;
else if(ship_x<0)
    ship_x=SCREEN_WIDTH;

//wrap vertically

if(ship_y>SCREEN_HEIGHT)
    ship_y=0;
else if(ship_y<0)
    ship_y=SCREEN_HEIGHT;

An illusion of a curved surface was created because “topologically, the spatial arrangement of Asteroids, though it looked flat, was actually equivalent to the surface of a torus (a doughnut with a hole in the middle)” (Poole 117). Not only was Asteroids a hit, but it became Atari’s all-time best selling game, with over 70,000 units released. Again, a simple space simulation dominated the video game market, enabling players to fly a tiny rocket powered space ship around asteroids, shooting them into smaller pieces. By 1980, Atari’s gross income was “marked at 415 million dollars” and it “became the fastest growing company in the history of America” (Jung).
As video games began to push into new territory by experimenting with the idea that the world could be bigger than the size of the screen, the early 1980's brought us very creative games that took advantage of this new graphical concept as well as several classic single-screen games that became enormous hits. One drastically different type of game, *Defender*, was developed by Williams Electronics and introduced “horizontal scrolling” into the video game vocabulary. Instead of wrapping the ship around to the other side of the screen when the ship “moved”, the actual world scrolled sideways behind the ship allowing the gamer to explore areas much bigger than the actual screen. *Defender* went a step further since “it was the first video game to feature an artificial ‘world’ in which game events could occur outside on-screen view presented to the player” (Kuittinen). A small window at the top of the game contained a radar displaying this world so players could see where enemies were located and the different peaks and valleys of the terrain. One description of the graphical interface in *Defender* states that “the arrangement of space on the primary screen is rather as if we found ourselves in the center of a large circular strip, onto which is projected the battle action” (Poole 118). While platform-jumping games and many other genres would adopt the side-scrolling style for years to come, *Defender* was very popular and deserves credit for making this innovation prevalent in video games.

Although *Asteroids* had been a huge success, Atari did not slow down in the least in its efforts to develop new and creative games. *Battlezone*, a tank simulation game, used red and green vector graphics to draw the shapes in what is known as wire-frame images. Rather than draw an entire solid tank or object (which technically would not have been possible at the time), frames were drawn with lines, giving the illusion of a three dimensions but using much less computational power. Some have claimed that *Battlezone* was “the first video game to feature
truly interactive 3-D environment” (Kuittinen). In the 1990's, the first-person shooter would become one of the dominant genres in all of video game history as processor speeds increased and remarkable companies like iDsoftware released breakthrough titles such as *Wolfenstein 3D* and *Doom*. However, *Battlezone* was a very primitive ancestor of these first-person shooters in the way it displayed graphics and allowed multi-dimensional exploration. Three dimensional wire-frame simulations would become common in not only video games but also scientific applications. In addition, more people began to take the technology used in video games seriously when “the US government later commissions an enhanced version of *Battlezone* for military training purposes” (Herman).

**The First Character - Pac-Man**

Despite the success of simulation war games, shooters, and space games, one game’s uniqueness and desire to offer some variety in the world of video games would help it to become the best-selling arcade game of all time. *Pac-Man*, developed by Namco, is one of the most popular and best-selling games of all time, but Namco had several other successes before it released *Pac-Man*. Japanese company Namco purchased the Japanese subsidiary of Atari and first earned a place in video game history when “in 1979 they design the first ever colour arcade game with *Galaxian* (colour had previously been replicated with the use of overlays on the screen, al la *Space Invaders*)” (Hunter). *Galaxian* was similar to *Space Invaders*, but the alien ships were allowed to move around on the screen, out of formation, creating a style of space shooter that would be expanded upon in the following years. Controlling a fighter ship that could move only left and right, the goal for the player was to fire projectiles up at the alien ships, while avoiding the bombs and new multi-colored aliens that tried to crash into the player’s ship. Eventually, follow-up games like *Galaga* would offer even better graphics as well as the ability
to win extra ships and play in bonus levels between normal rounds. Midway licensed many of Namco's games so that they could be sold and distributed in America. Namco and Midway's ultimate contribution, though, to the history of video games would be in the form of a yellow circle with a wedge missing for his mouth: *Pac-Man.*

While working at Namco, designer Toru Iwatani got the idea for *Pac-Man*’s form after eating a piece of pizza and looking at the shape that was left. “I designed Pac-Man to be the simplest character possible, without any features such as eyes or limbs. Rather than defining the image of Pac-Man for the player, I wanted to leave that to each player’s imagination,” said Iwatani (Poole 148). Iwatani wanted to create a game that was more similar to a cartoon than the standard space shooter that dominated arcades. Due to graphics limitations, *Pac-Man* would be drawn as a yellow circle rather than a detailed pizza. However, instead than controlling a simple yellow circle with no personality, players would become *Pac-Man*, the first animated character in any video game. The wedge-shaped chomping mouth identified this icon of video game history to the thousands who played *Pac-Man* in years to come. Interestingly, the original name of this game and character was “Puckman, from the Japanese phrase pakupaku, meaning to flap one’s mouth open and close” (Hunter). When the game was licensed by Bally/Midway to be sold in the United States a decision was made to change the name because of foreseeable problems of replacing a certain letter in the name with an “f”. Although the first character in video game history might have been known as Puckman, “the game is renamed after executives see the potential for vandals to scratch out part of the letter P on the game’s marquee, which might discourage parents from letting their children play” (Herman).

With no guns to fire, the game-play of *Pac-Man* was very simple. A control stick directed *Pac-Man* in one of four directions, while his chomping mouth gobbled down dots that
were placed throughout the single screen maze. Four ghosts, Blinky, Pinky, Inky, and Clyde had to be avoided as they chased Pac-Man, which became extremely difficult as the player passed level after level. Pac-Man's one defense were the large, blinking dots near the corners of the maze that turned the ghosts blue and allowed them to also be eaten. High scores were kept in memory and displayed, so there was the constant desire to eat bonus fruits and chase down blue ghosts in order to topple the high score. Effective use of sound also added to the quick tempo of the game, especially after a large dot was eaten and the dash after the ghosts had begun. The ghosts in Pac-Man also implemented a very primitive artificial intelligence used in some other early video games. Rather than mindlessly wandering around, a type of tracking AI is used so the ghosts can essentially chase the player throughout the maze. Game programming author Andre LaMothe reveals how simple this AI is in C++ with the following example (Lamothe 726):

```c++
//given: player is at player_x, player_y
//and game creature is at monster_x, monster_y

//first test x-axis
if(player_x > monster_x)
    monster_x++;  
if(player_x < monster_x)
    monster_x--;  
```
//now y-axis
if (player_y > monster_y)
    monster_y++; //change
if (player_y < monster_y)
    monster_y--; //change

Modern games contain much more complicated artificial intelligence, including finite state machines, decision trees, path finding, and other AI techniques, but early games like Pac-Man demonstrated how simple AI could make games entertaining.

Although offering nothing revolutionary in terms of game-play or graphics, Pac-Man proved that a character, even a video game character, could be identified with and could create a very addicting and fun game. In future games, designers would attempt to create various characters and villains with the ultimate goal of making the games more fun to play because of their characters. Some games may have even gone so far as to put more work into the characters than the actual game-play, making it hard for the characters to become popular since people simply do not play games that aren’t fun. However, Pac-Man offered both; the game was fun and the character fit perfectly into the setting and into American culture in 1980. With Atari’s Asteroids holding the old record of 70,000 units sold, and Midway President Robert Mullane initially unimpressed with the game and its “silliness,” Puckman first looked like it might be declined by Midway to be licensed in the United States. However, after some convincing by executives, Midway would change the name and release the best selling arcade game of all time, selling 100,000 units in America and thousands more worldwide (Hunter). Although sales of the game itself were impressive, with some figures counting 300,000 worldwide and counterfeits
almost equaling that amount, probably more amazing was the amount of merchandise designed and sold with America’s new video game character on it. Everything that could sport a yellow, circular-shaped *Pac-Man* was marketed, including “T-shirts, jackets, sweaters, coffee cups, stuffed dolls, bed sheets, cereal, board-games, books, towels...you name it, it had *Pac-Man*’s yellow mug on it” (Hunter). In addition, the video game had become so ingrained in mainstream culture that books detailing strategy made the New York Times best-seller list, a song entitled “*Pac-Man Fever*” was number nine on Billboard’s Top Ten, and stories featuring the game would be written in People and other popular magazines (Herz 131). As creator Toru Iwatani might have originally intended, *Pac-Man* even became the star of his own cartoon TV show. Besides various clones of the popular original, multiple sequels followed *Pac-Man* for years to come including: *Ms. Pac-Man*, *Pac-Man Plus*, *Super Pac-Man*, *Mr & Mrs. Pac-Man*, *Baby Pac-Man*, *Jr. Pac-Man*, *Professor Pac-Man*, *Pac & Pal*, *Pac-Land*, *Pac-Mania*, *Pac-Attack*, *Pac-Man 2*, *Pac-In-Time*, *Pac-Man VR*, *Pac-Man Ghost Zone* (Kuittinen).

With the quick release of *Ms. Pac-Man*, arcades and video games began to target females as well as the male gamers that dominated gaming sales. What was it that made video games, and in particular a game with an identifiable character like *Pac-Man*, so engaging? Interactive games offered people the ability to see their actions represented visually on a screen, enabling them to control their favorite characters. According to Stephen Poole videogames are fun “through a joyously exaggerated sense of control, or amplification of input...This is one very basic attraction of all types of interactivity, and it also seems to be a near-universal pleasure among humans in the modern industrialized world. Why do people enjoy driving cars?

Amplification of input” (Poole 148). *Pac-Man* was the first character in video games that could be controlled with Poole’s “amplification of input.” Instead of driving a ship or block-shaped
tank, the ability to seemingly control a being or character became an obvious hit with gamers around the world. *Pac-Man* capitalized on being the first, but other companies would soon introduce their own unique characters to capture some of *Pac-Man*'s success. One company above all others learned how to design popular games by first inventing creative characters like Mario and Donkey Kong.

**Nintendo Establishes Itself In The Video Game Industry**

Nintendo, an electronics company located in Japan, entered into the video game industry in the late 1970's and early 1980's inspired by the success of Atari and the booming video game industry. Nintendo's first hit, *Donkey Kong*, was an arcade game designed by Shigeru Miyamoto and inspired by the classic movie King Kong. A large gorilla, Donkey Kong, at the top of the screen, tossed barrels down at the hero, Jumpman, who navigated a series of sloped platforms and tried to rescue his captured girlfriend. Like *Pac-Man*, executives were wary of breaking from the standard shooter arcade mold but finally agreed to release the game. Nintendo of America sold 65,000 units of *Donkey Kong* and competed closely with Midway's hit at the time. More importantly, Nintendo established itself in the United States and continued to release follow-up games to *Donkey Kong*, featuring the main characters from the original. *Donkey Kong Jr.* was released in 1982 but the saga would really begin for Nintendo when Nintendo of America renamed hero Jumpman. Because of a resemblance to the man who owned Nintendo of America's warehouse, Mario Segali, Jumpman was renamed to Mario, a character who would transcend even *Pac-Man*'s popularity (Herman). Another platform style game called *Mario Bros.* would be released in 1983 by Nintendo and starred Mario and his brother Luigi, who was named after the owner of a Pizza restaurant near Nintendo's warehouse (Hunter). Nintendo would market their video game characters like no game company had even done until Mario
became a character known in a majority of American homes. It would take Mario to bring the video game industry out of the collapse it would face in 1983.

The Fall Of Atari And The Entire Industry

Although the arcade and home game industry had peeked in the early 1980’s with profits greater than the motion picture industry, their successes would be short lived. Innovative titles like Dragon’s Lair, an interactive animated film that featured laserdisc technology, would be released, but the problems throughout the industry would be too much for the established companies to overcome. First, Mattel’s Intellivision and Coleco’s Colecovision offered serious competition to Atari’s outdated system. Coleco’s model had an impressive “8 bit 3.58 MHz Z-80A CPU, 8K system RAM and 16K of video RAM allowing a screen resolution of 256x192. It has the amazing capability to display 32 sprites on-screen at the same time” (Hunter). Atari’s first VCS system was operating on a 1.19 MHz 8-bit Motorola 6507 microprocessor and their choice to hold out on upgrades to their hardware would contribute to their downfall.

Hardware was not the only problem for Atari. While employees were leaving Atari to form independent game developing companies, a secretive group of game developers working for Mattel’s Intellivision, known as the Blue Sky Rangers, were creating innovative games. One of their titles, Astrosmash offered breakthrough artificial intelligence, as the game’s difficulty attempted to adjust itself to the skill level of the player, resulting in a more enjoyable game for a variety of players. Before, Atari had responded to competition by porting their arcade successes like Asteroids to the VCS and having an instant hit game. By licensing the arcade smash Pac-Man, Atari believed they could release another popular game for their system to keep gamers from jumping ship. However, the version for the Atari was terrible, with “blocky” dissimilar graphics and slow game-play. Consumers were upset because as one source said, “it is painfully
apparent that the game is a rush job to make the 1981 Christmas season, in order to quickly recoup the money paid by Atari to Namco for the Pac-Man license” (Hunter). Atari’s mistakes did not stop there. In 1982, Atari acquired the rights to develop the game E.T.: The Extra-Terrestrial, based on the hit movie, for 21 million dollars. Supposedly Atari created more game cartridges than the number of their home consoles that had been sold. Not unlike Pac-Man, Atari’s version of E.T. was very unpopular and sold extremely poorly. To deal with the huge stock pile of unsold games, “massive numbers of both Pac-Man and E.T. games end up in a huge landfill in New Mexico, along with millions of other unsold and unwanted game cartridges” (Herman). With the reign of the video game giant Atari coming to an end, investor’s dumped a huge amount of parent company Warner Communication’s stock in December of 1982. The other gaming consoles did not survive the collapse and by 1984, the video game industry would be down to 100 million dollars worldwide. Although this may seem like a large amount of money, in the previous years the video game industry in America had surpassed the 3 billion dollar mark (Hall). A company that started with one man’s hit arcade game Pong, had grown to a multi-million dollar giant and just as quickly crumbled to dust. It appeared as though home video game consoles would be a thing of the past. However, hero Mario would save the day and usher in a new era for the video game industry.

**Computer Games Begin To Thrive**

As home video games were declining in sales, computer games began to pick up steam. A select following since the early Spacewar era had been interested in computer games, but the popularity had never been close to that of home games. With home consoles, there was no question as to what the unit was for, namely, to play games. However, computers could do other things. Should a computer be used only for business with spreadsheets and other applications or
should it have games on it as well? Early mainframe games after *Spacewar* that became popular followed the trend set by *ADVENT*, short for Adventure, which was the first "computerized version of interactive narrative" (Poole 18). In this type of text-based exploration game, the player would be given a location or scenario and then the "user typed in commands – ‘north,’ ‘look,’ ‘kill snake,’ ‘use torch’ – to move around the virtual world, use objects and solve fiendish puzzles" (18). Later games like *Hunt the Wumpus* and *Zork* offered more complex puzzles and a better language parser, allowing more than just simple commands to be typed. However, computer games would not become truly popular until it was possible for people to have a personal computer in their home. Several advancements made the home computer an affordable option in the early 1980's, and game companies would spring up to take advantage of the new market. 5 ¼ floppy disks would allow games to be easily distributed on the new computers that were entering people's homes. The Apple II, TRS-80, and several Commodore computers like the 64 would become the motivation for computer game companies to market new types of games. By being written for several different machines, the *Zork* series was able to sell 750,000 games by 1986 (Herz 148).

Many of the dominant game companies today got their start in the early 1980's, including: Epyx, Broderbund, Sierra On-Line - then called "On-Line Systems", Electronic Arts - EA, Infocom, Origin, Lucasfilm Games – LucasArts, and Strategic Simulations, Inc (Finkelstein). Origin’s *Ultima* series became a staple in the role-playing genre with players developing their character throughout the course of the game. With *Ultima IV*, Origin broke new ground and introduced moral implications into their game. Rather than just killing or blowing up enemies, "the main point was figuring out how to be heroic in a world with ethical consequences" (Herz 158). Strategic Simulations' *Pool of Radiance* took advantage of many
computer gamers' common interest in Advanced Dungeons and Dragons, where players used pen and paper along with dice to explore fantasy worlds. Although played for years without a computer, AD&D was nicely adapted to the new electronic medium because of the ability to hand over all calculations to the computer and simply have fun playing the game (Baratz). With IBM's release of the PC and the multitude of IBM-PC clones that were produced by other manufacturers, the 1980's gave people the ability to play games at home on something other than a specific video game console. However, the difficulty for developers to deal with constantly changing hardware was a problem that still exists today for when using the computer as a gaming device. Designing a cutting-edge game is not profitable if the majority of gamers cannot run it on their system or it is not compatible with many types of hardware. Programming for all platforms is difficult and time consuming and is often not even possible. Although many computer games have been revolutionary and influenced future games on home consoles, their popularity and sales have often been limited. Despite a slower processor and less frills than a computer, video game consoles are simpler to use for the average gamer and have a previously defined set of hardware that attracts game developers. Certain revolutionary games for the computer may be some of the best games ever created, but beginning in 1985, home consoles would again come back to dominate the video game industry because of their advantage over computers.

The Beginning Of The Console Wars

Two companies can be held responsible for bringing the video game industry back to life. Although games are the very heart and soul of the video game industry, the actual home console can be nearly as important and deserves its place in history. As computer technology was advancing, 8-bit processors became cheap enough to use in home consoles. In addition, the price
of Dynamic Random Access Memory, or DRAM, was also falling, which allowed game developers to use the faster memory to design better graphics and more complex games.

Japanese company Sega released a home console called the Sega Master System, which initially did very well in a stagnant home console market. Observing Sega’s success, Nintendo released their Nintendo Entertainment Center (NES) in Japan in 1985 and later nationwide in the United States. The NES contained “an 8-bit CPU (6502 @ 1.79 MHz) and 2 kilobytes of RAM. The graphics were capable of maximum of 256x224 pixel (NTSC) resolution and 16 simultaneous colors from a palette of 52 colors” (Kuittinen). The included title, Super Mario Bros., was an instant hit, catapulting Nintendo to the top of the new appropriately named “cartridge wars.”

Atari’s release of a new console and Sega’s U.S. release of the Master could not touch Nintendo’s success, in part because of Nintendo’s large advertising efforts. Others have claimed that Nintendo did much more than basic marketing to ensure their spot atop the video game industry. After being involved in numerous lawsuits, Nintendo earned a reputation as the most “notorious game company” in history.

It was claimed that “Nintendo has an illegal monopoly on the video game industry, achieved through illegal practices, such as fixing prices and using computer-chip lockout technology to prohibit unlicensed development of NES software” (Herman). More specifically, Nintendo wanted to limit or at least receive some incentives from third-party game developers from the sales of their games. A special “key-chip” was required in each cartridge so that it could run on the NES. By obtaining a patent on the “key-chip” it would be illegal for any company to create games without first licensing the technology for the chip from Nintendo and obviously paying them. Game companies were forced to abide by Nintendo’s terms because of their huge share of the video game market (Hart). To be fair, Nintendo’s popularity also should
be credited to several early games that were immediate hits and have now become classics. Besides the Super Mario Bros. series, Nintendo released titles such as The Legend of Zelda and Metroid that have been followed up by countless sequels on several of Nintendo’s later consoles. When Super Mario Bros. 3 became the all-time best selling cartridge game in history, it looked like Nintendo could not be touched in terms of market share, as Atari had looked previously during the early 1980’s. In a remarkably familiar error, Nintendo felt their system did not need to be upgraded while several competitors broke new ground with the release of 16-bit machines.

A new system, NEC’s Turbografx-16 had a short span of success, but ultimately Sega’s new Genesis, released in 1989, would offer stiff competition that Nintendo had not expected. The Sega Genesis offered “a 16-bit CPU (Motorola 68000 @ 7.6 MHz) and 72 kbytes RAM in addition to 64 Kbytes video RAM. The graphics were capable of 320x224 to 320x448 (NTSC) resolution and 61 simultaneous colors from a palette of 512 colors and 80 sprites” (Kuittinen). Sega’s new system as well as developers who left Nintendo looked as though they might be able to shake Nintendo’s hold on the market. In turn, Nintendo created and released a 16-bit system in 1991 called the Super NES that “sported a better graphic processor, offering nearly 63 times more on-screen colors than the Genesis and hardware scaling and rotation of sprites” (Hart). The only downfall was that the main processor for the SNES ran at only half the speed of the Genesis. To capitalize, Sega created several games that could run faster than the SNES. Sega’s biggest achievement though was to create a popular character that might compete with the likes of Mario and Luigi. Sonic the Hedgehog, Sega’s quick, blue hedgehog that could roll up in a ball and move extremely fast, challenged Mario as video game superstar. In a heated battle for years to come, Sega and Nintendo would vie for supremacy as the top video game company.

Other systems by NEO-GEO, NEC and Atari would attempt to steal sales from Sega and
Nintendo, but it was the real competition between the arch rivals that would force them to come up with new hardware and games. Portable devices like Sega’s Game Gear and Nintendo’s Game Boy let gamers play away from the TV. Sega also released a system that used CD’s instead of the standard cartridge and later the 32-bit Sega Saturn. Nintendo competed well with its next generation 64-bit system called the Nintendo Ultra 64. The feature list was impressive with a “64-bit CPU (customized MIPS R4300i series @ 93.75 MHz) and 4.5 Megabytes of RAM. Its graphics are able to display resolutions of 256x224 to 640x480 pixels with 32-bit RGBA pixel color frame buffer support, and 3D graphics hardware acceleration” (Kuittinen). In the late 1990’s Sega would develop their Dreamcast system but eventually became a more focused software company after the success of its consoles declined. Even though Nintendo would triumph over Sega in the long run, two other competitors would enter the video game industry and bring it to where we are today.

**Other Major Players Enter The Console Wars**

In 1992, Nintendo was in the process of developing a CD device in conjunction with Sony. After backing out of the deal, Nintendo continued to develop cartridge-based games, while an angered Sony decided to bring their device into the gaming industry. With the release of the Sony Playstation in 1995 along with a string of quality games, Sony began to secure its place in the video game industry. After a price drop in 1996, Sony sold millions of their Playstation units despite the commotion surrounding the release of the Nintendo 64. Statistics flew from each company with Sony claiming in 1997 that the Playstation was the most popular console. They showed that “5 million units have been sold in Japan, 4 million in the United States, and 2.2 million in Europe. These numbers nearly double four months later, when the 20 millionth unit is sold” (Herman). Not to be outdone, Nintendo released its extremely popular 64-
bit version of the Legend of Zelda series called The Legend of Zelda: Ocarina of Time. Sales were phenomenal and it appeared Sony and Nintendo would be the top players in the video game industry. In a shattering blow, computer giant Microsoft announced its plans for its X-Box, a console that would come “equipped with an Intel 733MHz Pentium III CPU, an Nvidia NV2a 250MHz graphics processor, 64MB of unified RAM, an 8GB hard drive” (Herman). Sony’s Playstation 2 also was impressive when it was released with a DVD drive similar to the X-Box as well as a number of quality games. Nintendo’s comparable console, the GameCube was released with the standard array of popular Nintendo titles like a new Zelda game as well as titles geared toward younger gamers. Currently, all three companies are doing well in the video game market, each with its select following of gamers and list of hit games. Probably the biggest advantage now though goes to the customer who is faced with companies that compete heavily by dropping prices and work to create fun games. Once again, the video game industry is a market bigger than the motion picture industry thanks to innovative companies and most importantly, great games.

Genres That Exist Today

With some exceptions, most video and computer games can be classified into a small list of genres that have aged and evolved with the gaming industry. Certain games could easily be classified into more than one category but in general, a game developer often has a specific type of game in mind when he is designing the game. Although this may limit the creativity of new games and genres, it is understandable for developers to follow popular trends in the industry because the ultimate goal for the company is to make a profit by marketing and selling copies of the game. By creating variations and sequels of popular games, game companies attempt to capitalize on the success of established genres and game types. Despite the similarities among
games in the various categories, every so often a blockbuster game is released that redefines what a successful game in that genre should contain. Following is a very subjective list of games that have had a strong impact on each game genre.

**Adventure/RPG**

Several games mentioned previously were early adventure games that offered worlds to explore and monsters to kill. As graphic adventure games began to outnumber classic text games like *ADVENT* and *Zork*, different variations on the adventure genre were born. Besides exploring and solving quests, character development took on important roles in many such games, as the need to improve the character with various armor upgrades or skills became necessary. The *Final Fantasy* series achieved outstanding success in Japan and America, and with the more than ten games in the series, it currently shows no signs of slowing down. With the first title in the 1989/1990 on the NES, *Final Fantasy* games allowed the player to fight enemies with a team of characters, using the classic turn-based format that had been popular in computer games and board games. By the late 1990's the series began using more detailed, move-style cut scenes mixed into the game to enhance the story and graphics. One of the first games to offer video was an early CD-ROM title called *The 7th Guest*. It broke ground for computer games by intermingling high quality video in an adventure type game and was responsible for many upgrades to a CD-ROM in order to play the game. Probably the most graphically unique and impressive game at the time that took advantage of the space on CD-ROM's and hard drives was *Myst*. *Myst* and its sequels have captivated players because of the extremely detailed 3-D worlds and interesting puzzles. Rather than character creation, the game is devoted to the realistic artwork and video that made the game such a popular adventure/exploration game. On the other hand, the *Ultima* series set the tone for the character
development RPG, especially with the use of the Internet to let each player's character interact and fight monsters together. Massively Multiplayer Online RPGs (MMORPG) like *Ultima Online* and *Everquest* took advantage of the enhanced gameplay that came with working together with others over the Internet and the desire to create the most powerful character. Online auctions and deals were made where virtual weapons and even the character itself could be bought and sold for real money. Some players, however, have always preferred the solo adventure, and *The Legend of Zelda* series has been a top choice of many RPG fans. The main character, Link, must use his sword along with various weapons to conquer evil in each of the *Zelda* games that have been released on Nintendo’s different consoles.

**Driving/Flying Simulations**

The driving/flying category has been around since the very beginning of video game history. Although some space shooters might be similar to games in this category, a more specific racing simulation game became common with early titles like *Night Driver* and *Pole Position*. As graphics have become more advanced, the different racing and driving games have also advanced, letting drivers navigate very realistic locations and obstacles. Flying must also prefix this category because a variety of futuristic hover vehicles and planes have been designed to let gamers leave the road and race each other in the air. *Pole Position*, by Namco, offered arcade gamers the ability to use a steering wheel and pedals to race their car around the primitive course. Usually, racing games either offer power-ups and obstacles to hinder opponents or tend to create a realistic environment in NASCAR type games where the focus is simply on racing. The popularity of driving/flying simulations prospered on the home consoles because of the ability to race other players sitting a few feet away. The lack of single player racing games, on the computer for example, makes it evident that the goal in these games is to beat other gamers.
to the finish line by being the best driver. Nintendo put their classic characters on go-carts in the Super NES title *Super Mario Kart*, which became a very popular racing game. On the other hand, a more realistic approach that companies like Microsoft have taken in this genre is to create titles like Microsoft's *Flight Simulator*, where the gamer is in the cockpit of a very realistic airplane, controlling everything a real pilot would have to control. Newer racing games follow a similar style with the *Gran Turismo* titles on the Sony Playstation, which is a recent series of quality driving simulations that allow you to select from over 100 cars that handle and respond very differently.

**Action/Platform**

After Nintendo’s *Donkey Kong* and *Super Mario Bros.* platform games became tremendous hits, other companies tried to imitate the 2D, side scrolling action game by offering their own flavor of the jump/shoot style game. *Pitfall* on the Atari was a popular jumping game where the character had to avoid crocodiles by navigating obstacles and swinging on vines. On the early NES, games like *Contra* and *Metroid* allowed the gamer to jump from platform to platform and fire weapons at enemies. Sega competed with its *Sonic the Hedgehog* series, while a range of Hollywood movies like *Batman Returns*, *Rambo*, *Predator* and countless others became the basis of action video games (Herz 26). The advances in hardware and new home consoles have allowed several popular games in this genre to be redone in 3D worlds. *Super Mario 64* and *Pac-Man World* have been released in 3D as well as a multitude of games that still try to capitalize on letting the gamer play as their favorite action star from the big screen. On the Sony Playstation, *Crash Bandicoot* has been described as the “closest approach yet to a true interactive cartoon” (Poole 29). In this action/platform game, a very odd, orange-colored animal
is the main hero character, and his goal is to jump on enemies and collect fruit in a variety of
detailed 2D and 3D worlds.

**Fighters**

The most common fighting games have always been arcade-style two player combat
games where each player makes his character punch and kick in an effort to defeat his opponent.
*Way of the Exploding Fist* and *Yie Ar Kung Fu* were early home computer fighting games that
offered a very limited number of moves (Poole). A variety of wrestling, boxing, and fighting
games were released on the NES with one of the most popular being *Mike Tyson's Punch Out*.
However, the games that brought the fighting genre to where we are today were *Street Fighter II*
and *Mortal Kombat*. *Street Fighter II* and the numerous follow-ups were arcade hits that
featured huge characters with a wide array of punches, kicks, throws, and special moves. The
quick pace and power bars representing each character's health drew crowds at the arcade, who
would wait in line to try their best at being the best fighter. Closely following *Street Fighter II*,
*Mortal Kombat* was a very similar fighting game that highlighted very gory and unbelievable
strikes and fatality moves. With the release of these games on home consoles and the spread
from the arcade into the home of these more violent fighters, video game opponents began to
protest even at the Congressional level for more control over the video game industry. The next
breakthrough for fighters came from Sega's *Virtua Fighter* and the later 3D games that used
more complex moves and detailed, polygonal characters. Probably the most popular series today
in the arcade and on home systems is the *Tekken* saga, which contains some of the most realistic
looking characters and complicated button combinations to date.

**Ecosystem Simulation/“god-games”**
Dating back to early text-based simulations like *Hammurabi*, this genre offers the opposite of the RPG genre. Rather than develop a single character, in the various “god-games,” the goal is to control entire worlds or cities and manage things like money, people, and food in the appropriate manner. By abstracting to the common overhead view of the kingdom, games in this category allow long term decisions to come to fruition in short time periods and the consequences of decisions to become clear. The ground breaking game in this genre, *SimCity* by Maxis, proved to even their publisher that a game with few goals that lets gamers play and develop their own world could be fun. Despite the option to complete goals, many people who played the original *SimCity* simply wanted to have fun with the software “toy” aspect of the game (Baratz). The multitude of similar ecosystem games like *SimEarth, SimAnt, The Sims, Civilization, Roller Coaster Tycoon* and *Populous* all take advantage of people’s delight in watching their creations develop. Part of the attraction of creating an individualized world as Hertz says is “You can build something that looks like Detroit without building in racial tension” (Hertz 223).

**Strategy**

Although most video games require some type of strategy, this genre has emerged with a number of successful games where the focus is on having a better strategy than the opponent. Often similar to overhead “god-games,” the gamer is given a limited amount of resources and sometimes a base where he or she must train armies and develop skills to overcome a comparable enemy. Many of these types of games are war simulations like *Command and Conquer*, while others are set in a fantasy environment where wizards, goblins, knights, and heroes are common. Other more futuristic games have different weapons and characters but offer similar game play. Blizzard has become a very successful company with its hits in this
genre like *Warcraft* and *Starcraft*, which use a RTS (Real Time Strategy) style, making the gamer use both strategy and quick reflexes. Other turn-based strategy games make players take turns with their option of moving characters or attacking.

**Puzzle**

A number of classic card and board games have been adapted to the computer and home video game systems. However, some software puzzle games, like *Tetris*, have a devoted following comparable to that of any card game. In the Russian puzzle game *Tetris*, a variety of different shaped blocks fall from the ceiling and must be positioned correctly to clear rows and keep the game from ending. Other games like *Bust-A-Move* and *Dr. Mario* have unique ways of eliminating objects on the screen. *Mahjong* and its multitude of clones, where shapes and colors must be matched, have become popular downloads on the Internet as well.

**Sports**

Understandably, it might seem odd that a game about sports would be popular when it is played on a computer or home system. If a person wanted to play a sport, he or she would probably just go play that sport, so what need could there be for a video game that imitates a sport? Many people enjoy video games who are not physically able to do the variety of activities required in real sports. Even athletes enjoy playing as their favorite professional or collegiate team and beating friends in their favorite sport even if it is a video game. In the 1980’s early home computers offered multi-sport games like Konami’s *Track and Field*, Epyx’s *Summer Games* and *Winter Games*, and Ocean’s *Daley Thompson’s Decathlon*. As hardware has advanced, so has the level of detail in the creation of stadiums, players, controls, and realistic game play. From simple NES games like *Ice Hockey* and *RBI Baseball* to the 3D games of today like *NBA Jam* and the *Madden* football series, sports games of all types have been available.
Arguably the biggest name in sports video games today, Electronic Arts, has developed a reputation for releasing realistic, high quality games each year that allow customers to play as their favorite real life teams during that season.

**First Person Shooters/Pure Shooters**

Another category that requires the player to shoot bullets and laser beams is the First Person Shooter (FPS). What specifically defines this genre is the perspective the player is put in to shoot at objects on the screen. In pure shooters like *Duck Hunt* on the NES and *Time Crisis* in the arcade and on the Sony Playstation 2, a physical, plastic gun that plugs into the console is used to shoot ducks and enemies on the screen. However, the FPS genre is very much in debt to John Carmack and John Romero, the designers of *Wolfenstein 3D*, *Doom*, and *Quake*. After leaving Softdisk, Carmack and Romero created their own company, id Software, and released *Wolfenstein 3D*. Although limited in that the walls were all at ninety degree angles and there was no ability to look up or down, *Wolfenstein 3D*, for the first time let games walk around in a three dimension world and shoot at enemy dogs and soldiers. The real revolution, however, came in 1994 with the release of *Doom*. "Doom casts the player as a marine on Mars, tramping around an invaded base from the hero’s point of view and, with the aid of a comically powerful arsenal, blasting the demons back into the bloody hell from which they erupted," describes Poole (24). Thousands downloaded *Doom* from the Internet to play the shareware version and later send in money to obtain the complete version of the game. By bypassing publishers, id Software was as innovative with their marketing as they were with their game design. With very little plot or character development, *Doom* became important to the history of computer and video games because it opened the doors to a new 3D world and showed just how captivating a game could be. Many reviewers stated that *Doom* was the first game that actually made them afraid, when
they would sit at their computer with the lights low and speakers turned up. One description reads, “I liken Doom to the kind of social/mythological/creative revolution the Beatles caused in the 60's and 70's. Nothing was the same since it came on the scene” (Carlson). No source captures the entire story of Carmack and Romero better than Kushner’s Masters of Doom. In his introduction he states about Carmack and Romero that “they were self-made individuals who had transformed their personal passions into a big business, a new art form, and a cultural phenomenon. Their story made them the unlikeliest of antiheroes, esteemed by both Fortune 500 executives and computer hackers alike” (Kushner x). Doom introduced the public to these icons and to a game that would come under federal scrutiny after the Columbine school shootings but would rise to the top as probably the most influential game of all time. Besides killing monsters, users could connect by the Internet or local networks to battle each other in so called “deathmatches” where an entire terminology to describe this type of game was born. After Doom, id’s release of Quake again was a landmark in game history because it made incredible use of new hardware acceleration techniques available on top of the line video cards. As computers and video cards have become faster, a host of FPS have become popular including Unreal Tournament and Half-Life. Even if the FPS does not appeal to everyone, “Every gamer was at least partially blown away by Doom,” (Baratz). When Carmack released all of his source code for Doom, in 1997, he completed his contribution to what will probably be the biggest game in history. Hundreds of adaptations and clones have followed but no game will ever replace Doom or revolutionize the industry in the same way as Carmack and Romero.

Conclusion

Video games have come a long way since Space Invaders and Pac-Man. Competitions over the Internet and large tournaments are not uncommon today, with millions of people across
the globe enjoying the variety of video games available. As long as companies continue to develop games that are fun to play, gamers will continue to feed the video game industry, which is growing at a phenomenal rate. Many classic games influenced the titles available today and will always be an important part of video game history. Hopefully though, new ideas and clever game designers will use the advancements of today’s world to create many more breakthrough games. With speech recognition becoming more commonplace and as the possibility of using new interactive devices grows, the potential to design a game unlike any before is always present. In any case, there is no doubt that video games will continue to be a unique form of entertainment and will attract new generations who will only hear rumors of what an Atari of NES was like.
WORKS CITED


Herman, Leonard, Jer Horwitz, Steve Kent, and Skyler Miller. "The History of Video Games.


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TIMELINE

1960 - Table tennis game is demonstrated on an oscilloscope by Higinbotham
1961 - Spacewar is created by Russell at MIT

1970 - Bushnell develops Computer Space
1972 - Baer and Magnavox develop the Magnavox Odyssey
1972 - Dabney, Bushnell, and Alcorn release Pong

1975 - Pong home consoles are sold
1976 - Bushnell sells Atari for 28 million
1977 - Atari's VCS (later the 2600) is marketed
1978 - Midway releases Space Invaders; Space Wars and Adventure are also released
1979 - Atari’s Asteroids is a success

1980 - Pac-Man is another hit for Midway; Battlezone and Defender are released
1981 - Donkey Kong offers a change of pace
1982 - Colecovision is marketed as well as Atari's 5200; Pole Position is released
1983 - Dragon's Lair is innovative but the gaming industry crashes
1984 - Nintendo develops a home console in Japan

1985 - Nintendo tests the NES in the U.S.
1986 - Nintendo releases the NES in America with Super Mario Bros.
1987 - The Legend of Zelda for the NES is a success
1988 - Development companies have issues with Nintendo’s “key chip”
1989 - Nintendo’s GameBoy and Sega’s Genesis home console hit the market
-SimCity is released on the PC and MAC

1990 - Nintendo’s Super Mario Bros. 3 becomes the best selling cartridge game ever
-Final Fantasy comes out on the NES
1991 - Sega unleashes Sonic the Hedgehog; Nintendo unveils its SNES;
-Street Fighter II is popular in the arcades
1993 - Virtua Fighter does well in the arcades
1994 - Doom stuns gamers

1995 - The Sega Saturn and Sony Playstation are sold
1996 - Nintendo releases its Nintendo 64; Quake is another hit on the PC by id Software
1999 - The Sega Dreamcast is marketed

2000 - Sony’s Playstation 2 is successful
2001 - Nintendo releases the GameCube; Microsoft enters the industry with the XBox
# Video Game Home Console Data

<table>
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<th>Console</th>
<th>Processor (Bits)</th>
<th>Processor (MHz)</th>
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