Backgrounds Used in 2D Video Games

Introduction

The graphics of a video game are essential to its success. According to Harbour "Probably the most importatn thing to evaluate in your game is whether it is graphically attractive (Harbour 2007)." An essential part of the graphical appearance of a game is it's background. Whether developing a 2D or 3D game, it is a vital part of the graphical presentation. The player will constantly be looking at it... it's always in the background!

There are many options that a developer can take in choosing a background. There are several background types that can be used. This report focuses on commonly used 2D backgrounds, as these are employed widely across the games industry. More importantly, the game associated with this report is a 2D game and studing these types of backgrounds is the most relevant.

Background Types

As mentioned above, there are several types of backgrounds a developer can choose to use in a game. Four types of backgrounds are discussed below, along with essential technologies needed to implement each type of background. However, each category is not mutually exclusive, and an individual background can fit into more than one of the types listed. Examples are provided for each type of background, featured in games that have been released to market.

Type I – Static Image

A static background is simply a bitmap or other picture file that serves as a background image for a game. Since the image is static, all the gameplay takes place in a defined area of the screen. In other words, this means that as the player moves around the screen, the background will never change, at least for a particular level. The background image can still be used to offer barriers to the player, where there are portions of the screen that will block player or other character movement. However, this is not always the case, and there are games that also alow freedom of movement around the entire screen.

There is not any special technology specifically required to implement a static bitmap. Since the background is simply an image file, it can be copied to the background of the screen directly. If the background offers obstacles to the player, this can be defined within the program itself. Naturally, as it is relatively easy to implement a static bitmap background, there is not much opportunity for the background to do anything interesting. The simple display is about all that the background can do.

Older games usually offered static backgrounds. This is because the technology for high end

graphics was unavailable. Additionally, simply displaying a bitmap on the screen is not a complicated process, even for very old computing technology. An example of an older game using this type of background was the classic adventure game *Myst.* Static backgrounds in older adventure games were common. This is because the adventure genre does not rely heavily on action. Therefore, the static image is a good fit for these style of games. Another game type that often featured a static background was the puzzle game. A game to use this type of background was *Puzzle Bobble 2*. The puzzle game usually had more action than an adventure game, but the action was usually limited to a single screen of play at one time.

The game *Myst* was developed in 1993 by the company Cyan. It is a first-person, point-and-click adventure that inspired many future games in the genre ("Myst", n.d.). The story of the game takes place on an island. Various locales around the island are presented to the player as a series of static screens. The game is semi-animated in that movement is roughly simulated by displaying alternate background images. For example, the as the player progresses, the will eventually encounter a rocket ship. At first, the view has the rocket in the distance, but when the player inputs the command to move forward, the next screen has a closer view of the rocket.

Far off image of rocket ship

Close up image of rocket ship

Detailed static bitmap image as a game background

The game *Puzzle Bobble 2* was originally released in arcades in 1996 by the company Taito ("Puzzle Bobble 2" n.d.). The game features a dragon character that shoots colored balls toward the top of the screen. This top portion of the game field was filled with a series of colored balls. When the player matched balls, they would disappear from the screen along with any balls attached to them. All gameplay took place on a single screen, and this allowed detailed bitmaps to be used as backgrounds. Different levels featured different backgrounds, and these backgrounds were also featured in the multiplayer portion of the game.

Type II – Static Tiles

The static tile based background consists of a series of small images called tiles. These tiles

are usually square, especially in older games. The tiles are placed in a grid on the game screen to make up the background. However, unlike static images, tile based backgrounds usually offer more interactivity in the game. In many games, tiles can be removed or manipulated to affect gameplay. Yet early tile based games still limited play to a single screen, and levels were made up of tiles in a specific arrangement. Levels differed by changing the color or placement of tiles.

The technology to implement the tile based background is also relatively simple. Tiles are images with a small size and memory footprint. The major function needed to use tiles is simply a way to load a bitmap or other image file into a game, just like the static image background. However, since several images are being used, a data structure needs to be used to store the arrangement of tiles and which tiles are to be used. This can be accomplished with a simple array, that represents screen coordinates in tile dimensions.

Again, older games used this type of background because older computers could handle this types of images and data structures with relative ease. An arcade classic called Dig Dug is a perfect example of using tiles to create a background and influence gameplay at the same time. Another example is the puzzle game Puyo Puyo 2. As mentioned in the previous section, puzzle games often have a static background do to the nature of the gameplay. This background need not be a simple static image, but a pattern of tile based blocks. This can be less distracting for the player, allowing them to focus on the game action.

The arcade game *Dig Dug* was released in 1982 by Atari ("Dig Dug", n.d.). The game's levels were designed with a series of tiles that represented the ground. The main character would "dig" his way into the ground, and try to destroy a series of monsters by blowing them up with a weapon, or dropping rocks on their heads. As the player "dug" through the level, the tiles would be removed from the screen, leaving a tunnel through the simulated earth. The game levels would vary by the different arrangement of tiles, as well as the placement and types of enemies.

A static tile based background

Repeating tiles help the player focus on the action

The game *Puyo Puyo 2* is a fast paced puzzle game first released to arcades in 1994 (Kalata, n.d.). For the main player, the game takes place on the left side of the screen, and the opposing computer character uses the right side of the screen. These two play fields are divided with an information section about the game in the middle. The foreground of the game is basically a frame to divide the action between players and define the field of play. The background features tiles that fit with the theme of the foreground. The background image is static so the player may focus on the puzzle action. Sets of colored balls fall from the top of the screen, and the player must quickly rotate the balls to match in sets of 4 or more. This will release extra balls on the opposing player's side of the screen. With so much action, a more

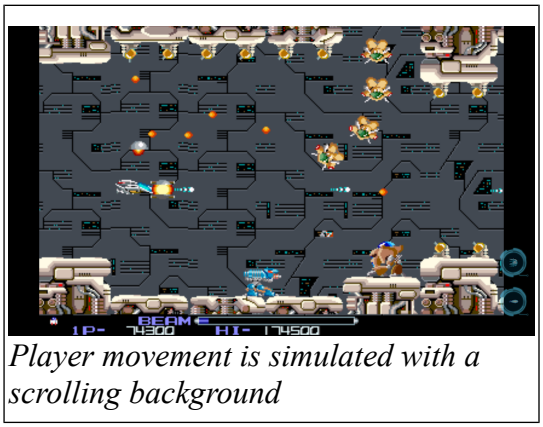
advanced background would probably detract from the gameplay.

Type III – Scrolling

Scrolling backgrounds upgrade the concept of the static background by allowing players to move to different areas of an background image that are currently not displayed on the game screen. These types of backgrounds can use either a static image that is larger than the screen display, or a series of tiles in a grid that is larger than the screen display. Both versions allow the player to move around the current screen and move to the areas off screen by either moving to the edge of the screen, or having the background move continuosly by itself to simulate movement.

These types of backgrounds were very popular in older games, but the concept is still used in many popular games today. Since the ability to implement these types of backgrounds has been around for a long time, there is not much in the way of specialized technology needed to implement them. For example, a static image can be moved by simply displaying a portion of the larger image at different coordinates. However, many games often have very large levels, and to store the visual data in one image file, would result in a very large file size for that image. This is where using tiles can help reduce the file size, but it complicates the implementation process considerably. However, there are several tools that can aid in the creation and display of background images. One of the notable software tools is the Mappy map editor featured in the textbook *Game Programming All In One Third Edition* (Harbour, 2007).

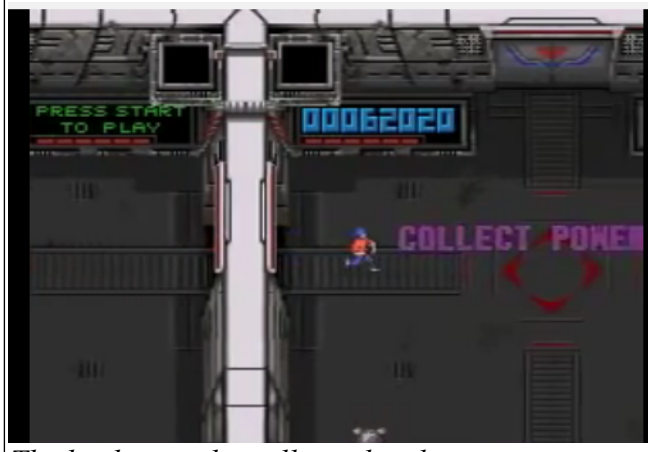
Scrolling backgrounds are often used in games that feature action. As the player moves around, the screen can move and expand the area of the action, or lead players to different areas and levels. In games that scroll the background automatically, the background adds a sense of movement and speed to the action. There are several games that can represent the concept of scrolling backgrounds. The classic shooter *R-Type* is an example that uses background tiles that scroll to simulate forward movement of the player's spaceship. Another classic shooter game that uses a scrolling background is *Super Smash TV*. Whereas *R-Type* used a tile-based background, *Smash TV* features a series of larger images that scroll when the player moves between screens.



Player movement is simulated with a scrolling background

The category of horizontal shooters has been around for a long time. One of the most popular games in this genre is *R-Type*, originally released in 1997, and which has spawned several sequels (Kalata and Gaza, 2005). In this game, the user controls a space ship that can move around the screen. The user tries to shoot enemy aliens that appear throughout the level. Some levels have no background, but many of the best looking levels feature a tile-based scrolling background. As both the background and foreground images move from right to left across the screen, it simulates the forward movement of the player's sprite in the opposite direction. This simulates the appearance of moving through a large area of space, and it makes the game feel very large.

The very popular arcade game *Smash TV* also known as *Super Smash TV*, was released in 1990 for the Super Nintende Entertainment System (Naytor, 2014). The game was meant to take place in the far-flung future of 1999 where a brutally violent game show was the most popular on Earth. The player character was a contestant on the show, which featured waves of enemies that the player could destroy with powerful weapons. Levels in the game consisted of a series of rooms, beginning with the studio. The background image featured a stage and audience. The player woule move to the left the stage to enter the arena. As they moved to the edge of the screen, the next image would appear and scroll along with the previous image to simulate the player moving into the room. Levels in the game consisted of a series of rooms, with each image scrolling in the direction that the player would move to access the new room.



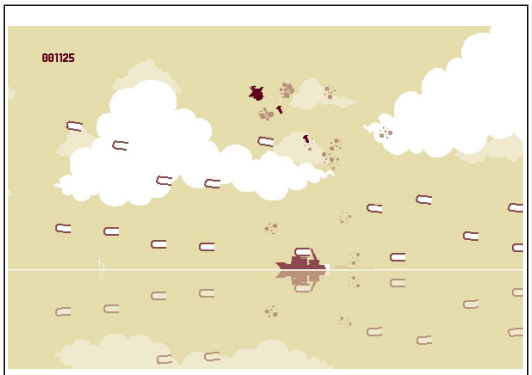
The background scrolls as the player moves between rooms

Type IV – Parallax Scrolling

Parallax scrolling backgrounds take the concept of scrolling backgrounds to the next level. Essentially, there are two levels of backgrounds that can scroll at different rates. This allows the background to simulate depth. The background that is represented as further in the background will scroll more slowly than the background portion that is more in the foreground. With this type of motion, the background will move in a manner that is more true to life and therefore provide more realism. Again, since this type of background is scrolling, this implementation is often used in action games to help enhance the gameplay or add to the feeling of the game.

Since there is another level of background employed in parallax scrolling, the process of implementation is more complex. The portion that is located in the foreground will need to have transparency, so that the images in the background can be seen. Additionally, each background must employ different scrolling rates, therefore each must be treated as it's own entity. To program this directly into program code can be difficult and time consuming. Harbour again recommends using the Mappy map editing software to help implement this type of background (Harbour, 2007). Using other libraries or software can aid in the creation of implementation of parallax scrolling backgrounds in games.

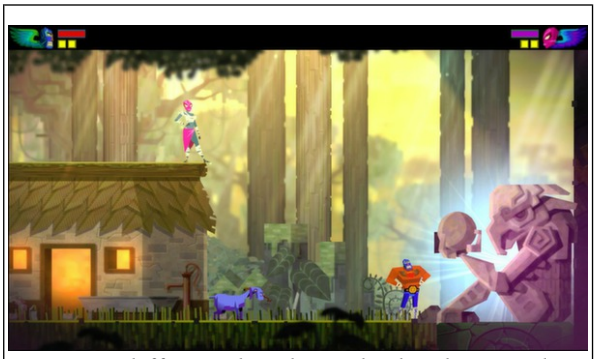
Despite this more difficult implementation, the concept of parallax scrolling has been used in games for a long time. Often however, the parallax scrolling involved foreground images moving faster than the background images, such as in the game R-type mentioned above. Yet even some classic games had scrolling backgrounds. Despite this, with the modern tools and power of today's computers, the ease of implementation of this type of background means it can be used more often in modern games. Two such recent games are the shooter *Luftrausers*, and the action-platformer *Guacamelee*.



White clouds scroll at a different rate than brown clouds

Released in 2014, the shooter *Luftrausers* was developed by Vlambeer and features action packed shooter gameplay ("Luftrausers, n.d.). The player controls a small airplane that can fly around the screen shooting at various enemies. However, the playing field is not limited by the size of the user's screen. The levels are quite large, and mainly feature clouds in the background. Clouds that are further in the background appear as a shade of brown, while clouds that are closer to the screen appear white. The two levels of clouds will scroll across the screen at diffrent rates as the user moves around the level to destroy enemies. The white clouds appear large and move quickly, while the brown clouds appear smaller and move more slowly. This makes the total sky background seem quite large. Even though the game appears to feature quite minimal graphics, using this parallaxing technique shows that there is more than meets the eye when it comes to the implementation of graphics technology!

The fun platforming action game *Guacamelee* was developed by Drinkbox Studios and first released in 2013 (Drinkbox Studios, n.d.). This game is much more graphically impressive than *Luftrausers* yet it also uses a parallaxing background to add depth to the background. In the screenshot provided, we can see trees at different levels of the background. Trees further in the background will scroll more slowly that trees closer to the foreground as the player moves through the level. This type of parallax scrolling is featured prominently in many of the open areas of the game. The effect makes the backgrounds look more realistic, with added depth and detail. Even though the effect is small, the subtlety of the effect adds a lot to the overall feel and look of the game.


Trees at different levels in the background

Conclusion

The four types of backgrounds presented here help to enhance the gameplay and graphical presentation of almost every modern 2D game. Both scrolling and parallax scrolling backgrounds take much more effort to implement than those with static images and tiles. This

usually requires the use of additional software to implement the more advanced features. A map editor such as Mappy can help create and implement these features. However, the use of static images and tiles might not be necessary for all types of games. The movement of scrolling backgrounds is more suited to games that involve a lot of movement, such as action games. Static images can help the player focus in on the gameplay of puzzle games, where a moving backgroud could break the player's concentration.

However, this report has only touched the surface of the possibilities available in the implementation of backgrounds. In the 2D realm, there are many other background types that can be implemented. Backgrounds can be interactive, where the player can use their character to access objects that would appear not be within reach in a game background implemented with the techniques above. A background can also be animated. Where scrolling is a simple movement of images in a specific direction, images in animated backgrounds can move of their own accord. These are just a few more of the several types of backgrounds available in 2D games. Expanding into the realm of 3D increases the potential background types dramatically. A simple internet search can lead to a whole realm of possibilites for the implementation of backgrounds in games!

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