

CLASSIC 8 BIT UNITY 2D GAME

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INTRODUCTION

Pac-man is an arcade game. Pac-Man was developed by Namco and first released in the 1980s. [1] Pac-man has been one of the best 8-bit classic game. After the release of Pac-Man, it became a social wonder that returned high sales. Pac-man was popular in the 1980s and still continued to be one of the most popular games out there, even in this era of 3D and high end graphic games.

When the first Pac-man was released it was competing against the Asteroids and Space Invaders, which were few of the most popular classic games out in the 1980s. Pac-man succeeded by creating a new genre of arcade game, which was very interesting to play and is still played even now. Pac-man had been described of being a breakthrough in video game industry. According to the Golden Age of Video Games Pac-man is one of the longest running video game. It is also one of the highest grossing video games of all time, raising well over \$2.5 billion in the quarters of the 1990s. [2][3]

GAMEPLAY

The gameplay of Pac-man is very simple. The player will control the Pac-man. The Pac-man moves around the maze. The maze has pac-dots which are in the maze on the level start. As the Pac-man moves around the maze the Pac-man eats the pac-dots. When all the pac-dots in the maze are eaten by the Pac-man, the Pac-man is taken to the next stage. The stages in Pac-man are never ending. Pac-man progresses to the next level if he eats all the pac-dots in that level and if he has any lives left. As the stages progress the speed of the ghosts and the speed of the Pac-man also increases.

In every stage(level) there are 4 ghosts/ enemy (Blinky, Pinky, Inky, Clyde). These ghosts roam the maze after the game starts. Their main goal in the game is to catch Pac-man. If a ghost touches the Pac-man, the Pac-man loses a life. The Pac-man is considered to die or lose a life when a ghost occupies the same tile as the Pac-man. Pac-man will have only 3 lives in the game. When all the lives have been lost, the game ends. In some gameplay, we can set the Pac-Man to gain an extra life when the player scores 10,000 points by eating the pac-dots and ghosts.

In every level, the maze will be the same only the speed of the ghosts and Pac-Man will increase. Near the four corners of the maze there are flashing dots, also known as the Power Ups or Power Pellets or Energizer. The Power Ups provide the Pac-Man with the temporary ability to eat the ghosts. As soon as the Pac-Man eats the Power Pellet the ghost's reverse direction and turns deep blue. The ghosts will be scared of Pac-Man for a few seconds normally 8 seconds. After a Pac-Man eats a ghost, the eyes of the ghost remain and returns to the ghost house where they are restored to their normal color.

As soon as the power of the power pellet starts to decrease, the ghosts will flash white to indicate they are about to become more dangerous and back to their ability of eating the Pac-Man. As the levels progress the eating of power pellet will have no effect on the ghost i.e. the Pac-Man won't be able eat the ghosts, but they make the ghosts to reverse from the direction that they were travelling.

GHOST HOUSE

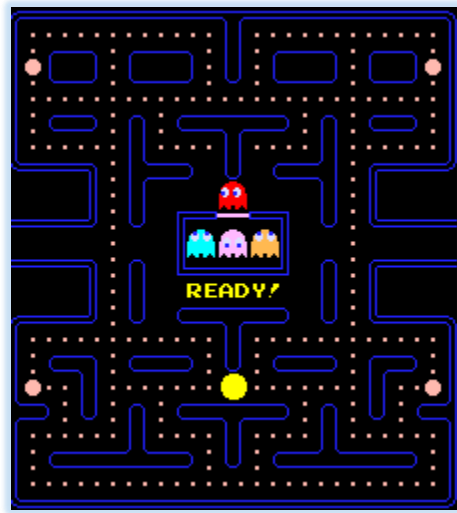


FIGURE 1: GHOST HOUSE

The enemies in Pac-Man are known as ghosts. [4] When the game starts the player is attacked by all 4 ghosts. As we see in the diagram, only one ghost is outside of the ghost house. The ghost house is the center box in the game where the ghosts will start and return to when they have been eaten by the Pac-Man or as a result of their position being reset when the Pac-Man dies. If it is not for the reasons described above the ghosts house is not accessible. This means that neither the ghosts or Pac-Man is permitted to enter that area.

GOALS

The main goals of the Pac-Man is to progress through much of the levels without being eaten by the ghosts. Since the Pac-Man starts with three lives, it gives the player the ability to stay alive even if the Pac-Man is eaten until there is no more lives. Eating each pac-dots gives the Pac-Man 10 points. Eating the power pellet gives the Pac-Man the ability to eat the ghosts. The Pac-Man has a kill streak. The highest or maximum kill streak a Pac-Man can get in a row is 4. If the Pac-Man can eat all the ghosts during the time he has eaten the power pellet he will receive 1600 points. The scoring of kill streak is shown below in a table.

KILL STREAK	POINTS
1	200
2	400
3	800
4	1600

TARGET TILES

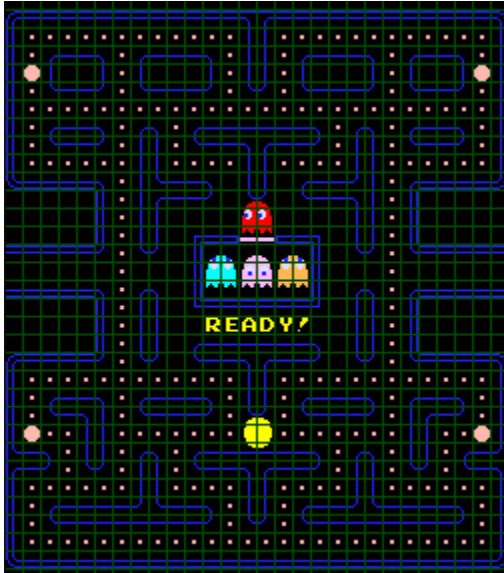


FIGURE 2: TARGET TILES

The maze in the Pac-Man game is split into tiles. According to game internals “Tile” in this context refers to an 8 x 8 pixel square on the screen.

The optimal screen resolution of the Pac-Man is 224 x 288 pixels. A ghost is considered to have eaten the Pac-Man if they occupy the same tile. Every pellet is also in the center of its own tile. [5]

GHOSTS

THE RED GHOST (BLINKY)

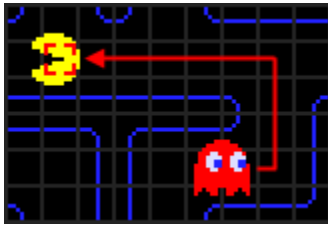


FIGURE 3: RED GHOST

The red ghost always starts outside the center box on the start of the game and is the first one to threaten the Pac-Man. The red ghost is referred to as Blinky, and the game represents his personality as shadow. Blinky almost always follows Pac-man, unless he takes a different route in order to catch him. The speed of Blinky increases by 5% in each level. Blinky will destroy the Pac-Man if you give it the chance. He is also referred as the “purser” or “chaser”. [5]

THE PINK GHOSTS (PINKY)



FIGURE 4: PINK GHOST

The pink ghost starts inside the ghost house. He is the first one to always exit from the ghost house and his nickname is “Pinky”, and the game represents his personality as being speedy. Speedy does not mean that he moves the fastest in the game but his targeting scheme attempts to move him to the place where Pac-Man is going, instead of where he currently is. Pinky’s targeting mode is by looking at the Pac-Man’s current position and selecting the tiles that are four tiles ahead of Pac-Man. [5]

THE BLUE GHOST (INKY)

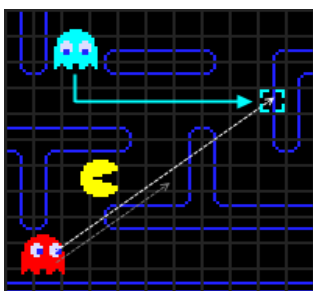


FIGURE 5: BLUE GHOST

The blue ghost starts inside the ghost house. The blue ghost won't exit from the ghost house until the Pac-Man has eaten at least 30 of the pac-dots and his nickname is “Inky” and the game represents his personality as being bashful. Inky uses a complex targeting scheme. [5]

THE ORANGE GHOST (CLYDE)

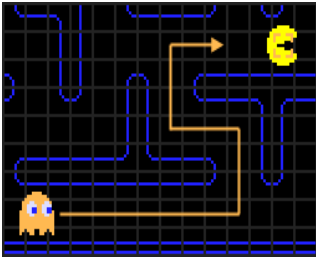
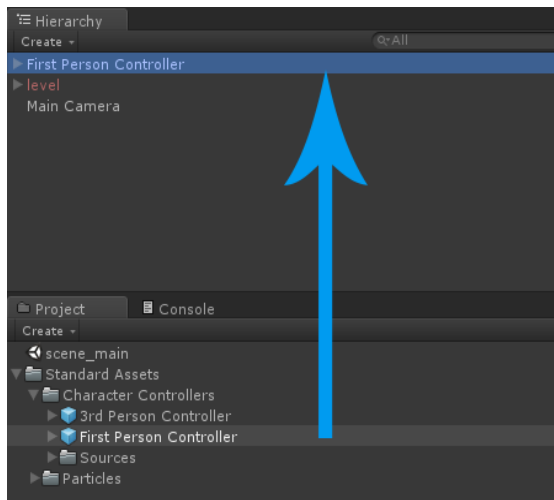


FIGURE 6: ORANGE GHOST

The orange ghost starts inside the ghost house. The orange ghost is the last one to exit from the ghost house and his nickname is “Clyde”. The game represents his personality as being pokey. He is not concerned about the Pac-Man at all. Even when Pac-Man is right in from of him, he changes his mind and heads a different way altogether. [5]

PART 2

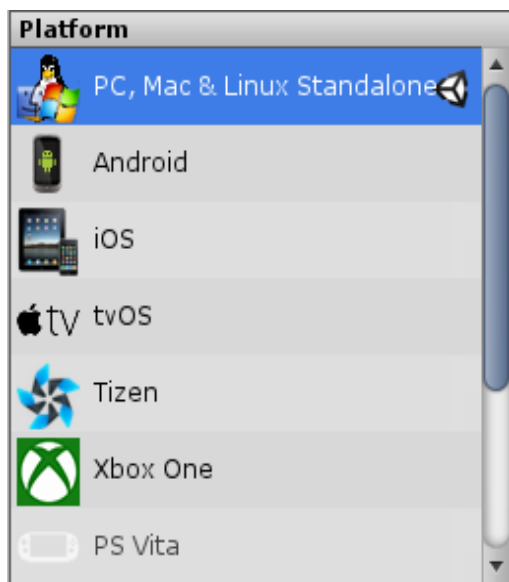
THE GAMEPLAY



The gameplay of Pac-Man can greatly be improved using unity game engine. Making a 3D Pac-Man game would make the gameplay more fun and interesting. Also, making a First-Person View Pac-Man would be a really nice development that could be made with unity 3D. When we are creating a new 3D game we can see Character controls folder in the assets folder. In there we will see a 3rd person controller and first person controller. Select the first-person controller and drag it into the hierarchy. And just position it on

the level. And just delete the Main Camera object that is already present in the hierarchy.

USER INTERACTION



User Interaction can be improved in the Pac-Man game. In the 1980's people used arcade machines to play the Pac-Man game. They use a lever in order to control the Pac-Man around the maze. In the modern context, we can improve this game by adding touch capability. We can now use Unity build and Run feature to make the game work in any environment. We can make this game to work in smartphones. This allows the player to use the display in order to control the Pac-Man. Or say if we were playing the game on

the phone we can make the Pac-Man move around the maze based on the gyroscope of the phone. Basically, having the Pac-Man move around the maze by user turning the phone sideways in order to turn left and right. This allows the game play to be more challenging yet

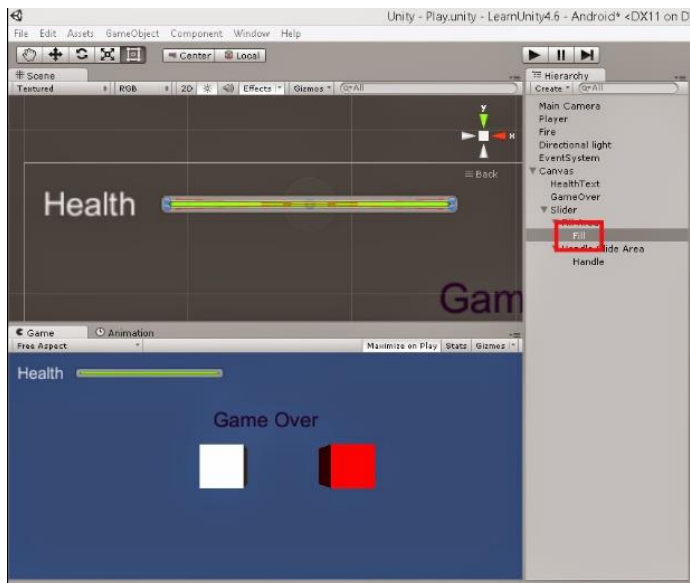
will entertain the user into keep playing the game. This link has the methods necessary in order to make gyroscope enable Pac-Man

<https://docs.unity3d.com/ScriptReference/Gyroscope.html>.

GRAPHICS

The graphics of Pac-Man can be highly improved. Unity has support for advanced visual and audio affects with great material support. Unity 3D is very advanced compared to the old classic game development. We can make the level look different with different textures and animations in the game. We can make the maze more visually pleasing rather than sticking to the classic black background and blue maze walls.

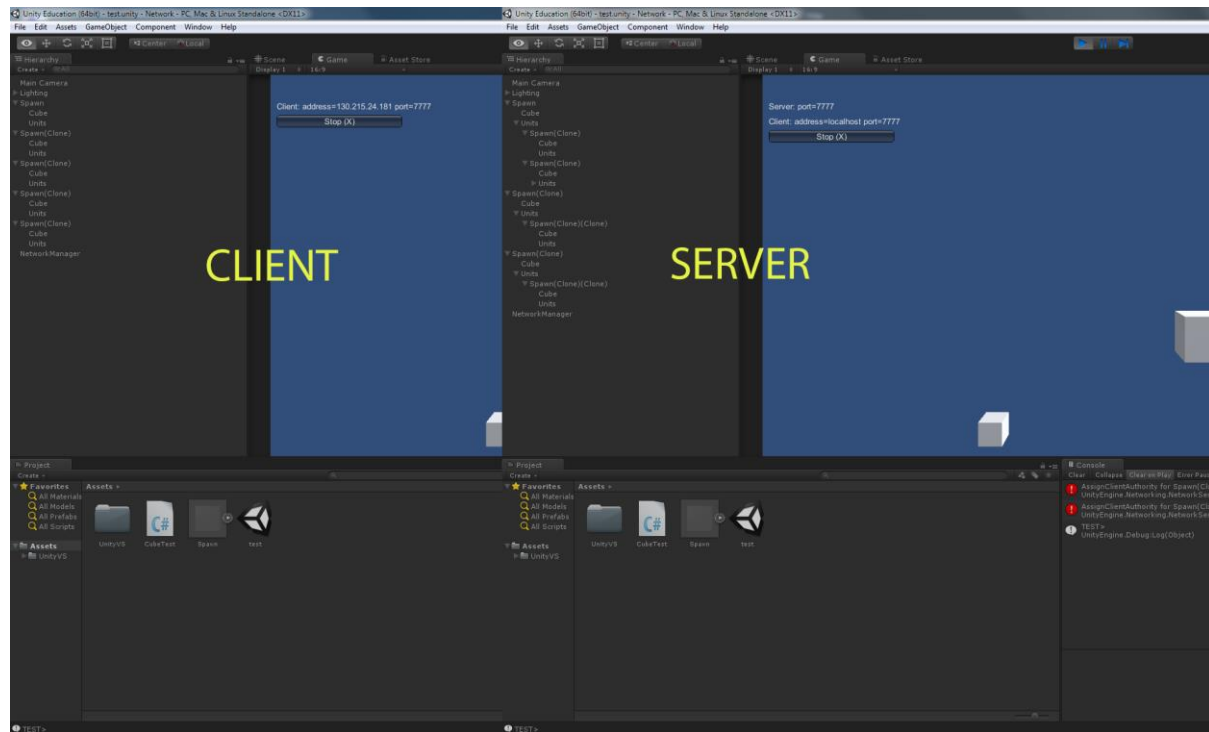
PLAYER UPGRADES



In the classic games, Pac-Man receives only 4 power pellets or energizers. This allows the pacman to eat the ghosts. But I would like the Pac-Man to have more upgrades. Basically, for every hundred points in the game he receives 1 coin or in game money. This money can be used by the player to buy upgrades for the pacman. For example, say we have a display on top of our game which shows pacman health. The player can increase the health capacity of the Pacman. So, when Pac-Man collides with the ghosts

his health decreases and won't lose any life until his health fully finishes. We can also add many more features like Invisibility (one time use to pass in through the ghosts). In Unity we can use a slider in order to represent the health or the other upgrades that we want to show.

MULTIPLAYER



Pac-Man was generally a single person or player game. In this era, we have the ability to play with people all around the world. Multiplayer games are growing day by day. Pac-Man multiplayer will be a great add-on in game. This allows the player to play with others in real-time. The current person screen will be on the left and the other person's screen on the right. Whoever finishes the level first wins the game. This will make the game more fun and enjoyable because we are competing against another player in order to win the levels. Unity Multiplayer is the easiest way to create real time, networked games for Unity. It's fast to implement and highly customizable. According to the unity website, Unity-provided servers ensure that your players can find and play with each other. [6]

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