



# ANDROID GAME DEVELOPMENT USING VCROSS – PLATFORM APPLICATION IN UNITY GAME ENGINE WITH C# LANGUAGE ZOMBIE SHOOTER

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**Abstract:** In this paper, we present the design and implementation of the Cross Platform game called ZOMBIE SHOOTER. This game get vary from other Zombies game, because the idea of our game is different form others. It is a shooting game and was developed keeping the Android, Windows, and Windows Phone Operating System in mind. The aim of our project is to connect player with more than four guns and hundred percent of health and consumables are provided. The players should rescue two members from the zombie world. It's like an one man army game. This game can be played in the Android, Windows, and Windows Phone Operating System, it depend upon the game conversion. The game has been designed and implemented and soon will be available on the Google Play Market and Windows Store. The game has been tested on Windows 10 for PC, running Android Lollipop and Redmi Note 7S running Android KitKat. So, it should run on other compatible devices as well.

Keywords: Cross-Platform Plugins, Unity Game Engine, ZOMBIE SHOOTER, Software Development, Android Development, Windows Development.

## I. INTRODUCTION

Unity3D Game Engine is an integrated development tool used to develop interactive contents like video games, architectural visualization and real-time 3D animations. Its editor runs on Windows and Mac OS X platforms. Though it runs on only two platforms, it has the ability of developing applications for multiple platforms which are mentioned as follows – Windows, Windows Phone, Mac OS X, iOS, Wii, Linux, Android, Web Player, etc. All we need for it to develop the application on respective platforms is the software development kit (SDK) for it. There are various plugins to export the application to different players like Flash Player, etc.

The functions that are supported by Unity3D are very abundant. All type of game developments are possible with Unity3d such as shaders, physics engine, network, terrain manipulation, audio, video and animation. Unity3D produces the applications based on JavaScript and/or C#. These are used to assign the animation or real-time transition of the Game-Objects defined in the application. GUI of Unity3D helps a new developer to approach easily, and script and program the transition of the GameObject.

This study aims to design and develop applications on multiple platforms using Unity3D Game Engine and with the help of scripting and programming get enable between one or two devices. So, the users can play either in a single or same/different devices running same/different platforms can play against each other. For the efficiency of the game development process, this study aims to plan, design, develop and test a smart game based on multi-platform game

## II. RELATED STUDIES

### Introduction to Unity3D:

Now-a-days the devices like Smartphones, tablets, iPad, iPhones have taken the application development to a whole another level. The cameras on these devices can be used to recognize business card and decrypt encrypted codes like



barcodes, QR-codes, etc. by simply scanning them. Here in this era, networking is also a major factor, as many or mostly all applications running no-a-days require a proper network connectivity. So, we have come up with an idea of using this network connectivity to next level by using this cross-platform connectivity in the gaming applications. Usually, we have heard about handheld-tohandheld connectivity (i.e. Android - Android, iOS - iOS, Windows Phone - Windows Phone, Android-iOS, Android - Windows Phone, iOS - Windows Phone), but our aim is to enable all-to-all device connectivity so there can be Handheld – PC along with above connections.

Unity3D is a cross-platform game creation system developed by Unity Technologies containing game engine and an integrated development environment (IDE). It is used to develop games for websites, desktops, handheld devices and consoles. Previously released on Mac OS in 2005, it was then expanded to target more than fifteen platforms. It can be run on Windows or Mac OS X system. Supported Platforms include BlackBerry 10, Windows Phone 8, Windows, OS X, Linux(mainly Ubuntu), Android, iOS, Unity Web Player (including Facebook), Adobe Flash, PlayStation 3, PlayStation 4, PlayStation Vita, Xbox 360, Xbox One, Wii U, and Wii. It includes an asset server and Nvidia PhysX physics engine.

The latest version is the Unity released on June 4th 2021. It supports the real-time global illumination based on the Geometries Enlighten technology. Other major changes include physically-based shaders, HDR sky-boxes, reflection probes, a new audio mixer with effects and enhanced animator workflows. Unity 5 brings support for Windows, Mac, Linux/Steam OS, Unity Web player, Android, iOS, Blackberry 10, Windows Phone 8, Tizen, Windows Store apps, WebGL, PlayStation 3, PlayStation 4, PlayStation Vita, Wii U, Xbox One, Xbox 360, Android TV, Samsung Smart TV, Oculus Rift, and Gear VR and AR for a total of 25 supported platforms. The Unity3D game engine is downloadable from their website in two different versions – Unity and Unity Pro.

### Rendering:

The graphics engine uses Direct3D (Windows), OpenGL (Mac, Windows, Linux), OpenGL ES (Android, iOS), and proprietary APIs (Wii). There is support for bump mapping, reflection mapping, parallax mapping, screen space ambient occlusion (SSAO), dynamic shadows using shadow maps, render-to-texture and full-screen post-processing effects.[4] Unity supports art assets and file formats from 3ds Max, Maya, Softimage, Blender, Modo, ZBrush, Cinema 4D, Cheetah3D, Adobe Photoshop, Adobe Fireworks and Algorithmic Substance. These assets can be added to the game project, and managed through Unity's graphical user interface.

The ShaderLab language is used for shaders, supporting both declarative "programming" of the fixed-function pipeline and shader programs written in GLSL or Cg. A shader can include multiple variants and a declarative fallback specification, allowing Unity to detect the best variant for the current video card, and if none are compatible, fall back to an alternative shader that may sacrifice features for performance.[6] Unity also has built-in support for Nvidia's (formerly Ageia's) PhysX physics engine, (as of Unity 3.0) with added support for real-time cloth simulation on arbitrary and skinned meshes, thick ray casts, and collision layers.

### Scripting:

The game engine is based upon the JavaScript and C#. Unity's scripting is built on Mono, an open-source implementation of .NET Framework.[8] MonoDevelop is an open-source IDE for Linux, Mac OS X and Windows. It supports Boo, C, C++, C#, CIL, D, F#, Java, Oxygene, Python, Vala and VB .NET.

### Graphics:

#### Physics: Unity utilizes the NVIDIA PhysX physics engine, which supports:

1. Cloth
2. Soft and rigid-body interactions
3. Ragdolls



4. Joint systems
  5. Wheel collision system

**Terrain:**

1. Terrain Painting
2. Detail Texture Painting
3. Tree Creator

**Networking:**

Unity has a number of built-in features to facilitate creation of standard multiplayer games. Some of the features State Synchronization, Real-time Networking, Remote Procedure Calls, Backend Connectivity. Web integration allows the game to communicate with container web pages and services. Massive Multiplayer Online: Development requires additional work by the developer or the addition of one of several third-party software packages designed for that purpose.

**Asset Tracking:**

Unity also includes the Unity Asset Server - a version control solution for the developer's game assets and scripts. It uses PostgreSQL as a backend, an audio system built on the FMOD library (with ability to playback Ogg Vorbis compressed audio), video playback using the Theora codec, a terrain and vegetation engine (which supports tree bill boarding, Occlusion Culling with Umbra), built-in light mapping and global illumination with Beast, multiplayer networking using RakNet, and built-in pathfinding navigation meshes.

**Platforms:**

Unity supports deployment to multiple platforms. Within a project, developers have control over delivery to mobile devices, web browsers, desktops, and consoles. Unity also allows specification of texture compression and resolution settings for each platform the game supports.[13] Currently supported platforms include for Windows, Mac, Linux/Steam OS, Unity Web player, Android, iOS, Blackberry 10, Windows Phone 8, Tizen, Windows Store apps, WebGL, PlayStation 3, PlayStation 4, PlayStation Vita, Wii U. Xbox One, Xbox 360, Android TV, Samsung Smart TV, Oculus Rift, and Gear VR.

**Unity Asset Store:**

Launched in November 2010, the Unity Asset Store is a resource available within Unity Editor. Store consists of over 7000 asset packages, including 3D models, textures and materials, particle systems, music and sound effects, tutorials and projects, scripting packages, editor extensions and online services. The store also contains many extensions, tools and asset packages such as the package NGUI: Next-Gen UI by Tasharen Entertainment,[14] and the visual scripting extension uScript by Detox Studios, Tidy Tile Mapper, a 2D/3D tile-based game design extension by Doppler Interactive and the input scripting package FingerGestures.

**Invector third person controller:**

Invector's Third Person Templates can help bring your game to life with a high quality Character Controller that takes minutes to set up, we have a solid and highly customizable template so you can focus on making your game unique.

Beginners will have a great learning curve with our several [Tutorials] and [Documentation], no scripting skills are necessary to create something cool. Advanced users will enjoy the thousands of features we included and continue to include over the past 4 years of development and support of our assets.



Investor's [ Community] get's bigger every day with thousands of registered users and hundreds of daily visitations posting questions, helping each other or sharing their creations, integrations, and add-ons developed by users.

### Importing investor third person controller to unity:

Our Templates are a **COMPLETE PROJECT** which means it comes with a custom **Project Setting**, so when you import the package from the AssetStore this warning will show up and that's why we recommend to **import the package on a New and Empty Project**.

There are basically 3 files that are **extremely necessary** for the correct functioning of this template:

- **InputManager.asset** - We have a custom input mapped to support the Xbox360 controller, without it you will receive errors about missing input.
- **TagManager.asset** - Includes all the necessary Tags and Layers for the project to work correctly.
- **DynamicsManager asset** - We use a Layers Collision Matrix, for example, we need the layer "Triggers" to not collide with the layer "Player".

**Not every version of Unity will import those Project Settings by default**, you can manually import those files by going to the tab *Investor* > *Import ProjectSettings* or in the *Welcome Window*.

Now that you have imported the necessary files, you can explore the several demo scenes and figure it out what kind of Third Person Game you want to create.

### INVECTOR THIRD PERSON SHOOTER TEMPLATES FEATURES:

- Shooter Behavior & Animations (Basic & Melee features already included).
- Projectile bullets with trail renderer.
- Throwing objects with Trajectory system (granade, bottles, etc..).
- Optional Melee attacks for Shooter Weapons.
- Advanced damage based on distance & velocity.
- Decal for projectiles based on tags (different materials).
- Advanced Scope View.
- Aiming System with dispersion, range, shot frequency, recoil, etc...
- Particles, Sounds, Custom Bullets to emitt on attack.
- Archery System included.
- Advanced IK Adjustment System based on Weapon/Stance.
- Large number of customization to create different types of weapon.
- Secondary Shot to create powerful weapons.
- Hipfire.

### Vcross-Platform Input Plugins:

Plugins supports all the software inputs such as Android (Mobile Plugins), Windows (PC Plugins) ect., With the input system, you can quickly setup controls for multiple Platforms, from Mobile to VR. The input system package is available from the package manager and verified for Unity latest version(LTS). The Input..GetAxis function is convenient in desktop platform to consolidate Keyboard and Joy stick input. By this Vcross platform input plugins the input for all the controllers are get accessed by the cross platform plugins. Where in cross platform all the mobile control input functions are get Inbuilt in the plugins. This plugins supports on all character controller in FPS and TPS shooting game, by this plugins writing of scripts get reduced.

## III. BODY

### Summary of the Game Development:-

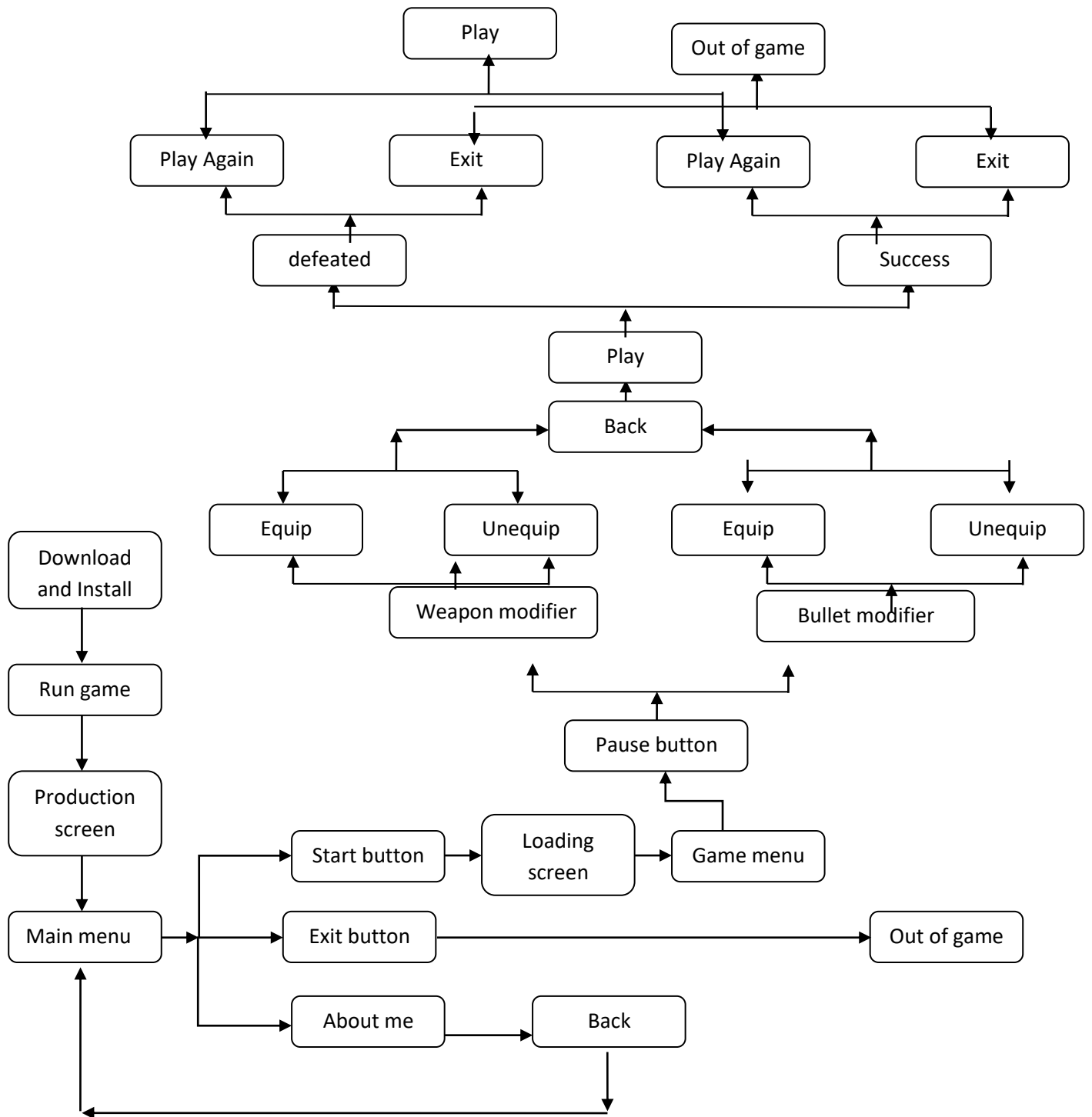
In this research paper

1. Game Name: Zombie Shooter.
2. Game Genre: Classic, terrain (land).



3. Platform: Supports Android-platform by switch platform it can convert Multi- platform (Windows pc, Linux etc.,).

The game working can be seen from following chart:



**Game Characteristics:**

In this zombie game there are four character plays a role.

**1. Player (Hero):**

In this game, player has a more amount of consumables than the enemy ,because more amount of enemies are follow. He has a four set of weapons with scope.

**2. Enemies (Zombies):**

Here, enemies are like a zombie character with ugly face. They are provided with more amount of health than the player and other consumables except weapons. But, the player health gets reduced by attacking by their hands.

**3. Boss Enemy (Zombies leader):**

The boss enemy has a high consumable than all other characters in this game.


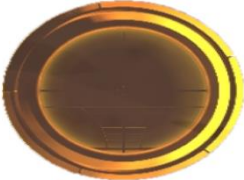

**4. People to rescue (still humans):**

There are two persons who are still human in this city. They should be rescued by the player. These humans are provided with a minimum amount of health like a player, no attackable weapons are provided.







**Core Idea of the Game:**

The main idea of our game is to rescue the people who are still humans in the zombie world. So, the player should kill all the enemies by the consumables provided to the player and then he should rescue the people and get back to the helicopter, where he has started his journey of rescue.


**Graphic Concept Art:-****Character Designing and Modelling**

SL. No	Description	Image
1.	<p>Joy stick button is used to control and move the player all over the city. He can move in such direction they are :</p> <ul style="list-style-type: none"> <li>• Forward,</li> <li>• Backward,</li> <li>• Left,</li> <li>• Right.</li> </ul>	 <p>JOY STICK</p>
2.	<p>Fire button is used to fire enemies (Zombies) and is designed using the Unity epic icon.</p>	
3.	<p>Aim button is to make ready the player at position and aim on enemies.</p>	 <p>Aim</p>






<p>4.</p>	<p>Scope is used to zoom and get attack an enemy. There are variant scope over there.,</p> <ul style="list-style-type: none"> <li>✓ 3x</li> <li>✓ 6x</li> <li>✓ Rocket scope</li> </ul>	 <p>Scope</p>
<p>5.</p>	<p>Reload button is used to reload the gun ,when the bullet get finished in the gun. It takes over 2 to 3 minutes to reload it.</p>	
<p>6.</p>	<p>Crouch is the means of sitting at some position by bending the legs and get shoot an enemy, by doing this the player can hide from the enemy.</p>	
<p>7.</p>	<p>Jump button is used to jump over a thing ,which is slightly half of higher then the player.</p>	 <p>Jump</p>
<p>8.</p>	<p>Weapon change button is used to change the weapon ,depend upon the player selection. The weapons are..</p> <ul style="list-style-type: none"> <li>○ M416 gun</li> <li>○ Shot gun</li> <li>○ AWM sniper</li> <li>○ Rocket launcher</li> <li>○ pistol</li> </ul>	 <p>Weapon Changer</p>
<p>9.</p>	<p>Pause button is used to pause the game and take some rest to modify the game, how to make it solve. It provide some of the option to select the weapon and drop like he think.</p>	 <p>Pause</p>



10.	Back button is used to get back to the game when the weapon and bullets are selected .	 <p>Back</p>
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Game Development:

Sketch architecture




SL. No	Description	Image
1.	<p>This is our production screen to start up our game by using the production name of ours "POPINZS DREAMS PRESENTS" the game "ZOMBIE SHOOTER". Some of pictured images are placed over there.</p>	 <p>Production screen</p>
2.	<p>This is the menu screen of our game. Here there are some button to start up our game.</p> <ul style="list-style-type: none"> <li>✚ Start</li> <li>✚ Exit</li> <li>✚ About me</li> </ul>	 <p>Menu screen</p>
3.	<p>This is the about me screen of our game. Here there are some button to go back after knowing about us.</p> <ul style="list-style-type: none"> <li>❖ About me</li> <li>❖ Back</li> </ul>	 <p>About Me screen</p>





<p>4.</p>	<p>This is the game UI screen ,here contain all the button used by the player. The buttons are...,</p> <ul style="list-style-type: none"> <li>➤ Shoot</li> <li>➤ Joystick</li> <li>➤ Aim</li> <li>➤ Crouch</li> <li>➤ Jump</li> <li>➤ Scope</li> <li>➤ Reload</li> <li>➤ pause.</li> </ul>	
<p>5.</p>	<p>This attacking screen shows the game situation while the player get attacked by the zombies. and the energy of the player getting reduced</p>	 <p style="text-align: center;"><b>Attacking Screen</b></p>
<p>6.</p>	<p>The rescue screen shows ,how many people he have to rescue from the zombie. and get back to the helicopter after getting rescued.</p>	 <p style="text-align: center;"><b>Rescue Screen</b></p>
<p>7.</p>	<p>If the player rescued the people ,who are in the zombies hand. After rescued he should move back to helicopter, when the rescued people hits the helicopter ,the win scene get visible.</p>	 <p style="text-align: center;"><b>Win screen</b></p>



<p>8.</p>	<p>If the player unable to rescue the people or he died in the middle of the game , then the loss scene will be produced.</p>	 <p style="text-align: center;"><b>Loss screen</b></p>
<p>9.</p>	<p>In the bullet modifier scene ,the player can choose the bullet ,what he like to shoot an enemy.</p>	 <p style="text-align: center;"><b>Bullet Modifier screen</b></p>
<p>10.</p>	<p>In the weapon modifier scene ,the player can choose the weapon ,what he like to shoot an enemy. in here the player can equip and unequip the weapon.</p>	 <p style="text-align: center;"><b>Weapon Modifier screen</b></p>

**IV. FUTURE SCOPE**

By using the cross platform application for creating the game in unity, it help the user to create the game quick. It has a great future ahead. By this application the user work get reduced. In some ways they are;

- The input script get lesser.
- For the player movement and action The plugins help much better.

So in the future, this cross platform application Plays a vital role.

**V. CONCLUSION**

This study aims to design and develop a cross-platform gaming application using Unity Game Engine. The functions that Unity3D supports autonomously are very abundant. All game developments are possible such as shader, physics engine, network, terrain manipulation, audio, video, and animation, and it is enabled so that it is possible to revise, meeting demand of user according to the need. For the efficiency of game development process, this study aims to plan, design, and develop a game based on multi-platform game engine using V-cross platform input plugin.



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