



Wydział Matematyki Stosowanej

Development of Computer Games

3D MONSTER SHOOTER

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Work Distribution Table:

<i>Name/Surname</i>	<i>Description of game development part</i>
<i>Adam Wojtala</i>	<i>Full project work, mechanics, whole game set with assets elements.</i>

Description of Monster Shooter Game

Description of Your Game.

1. 3D game
2. What type is your game? 3D shooter game
3. What genre is your game? *Singleplayer, survival game*
4. Platforms (mobile, PC or both?) *PC platform*
5. Scenario Description. Whole scene is in the scary dungeon. Player, which is at the start in front of first huge doors must find correct path to escape from this terrible place. In addition, dungeon is full of monsters, which player must beat to survive and win the game.

GAME FEATURES

List of features

1. Main player and character in game
2. Weapon for player
3. Health, damage for player
4. Zombie enemy with mechanics
5. Zombie spawner
6. Pick up system for player
7. UI (main menu, screens etc.)

Feature #1. Main player and character in game

Main player in the game is made by standard assets package (reference of package in section: "Assets and resources used"). Character holds a gun (also next section), which is equipped to "FirstPersonCharacter". "Also shootpoint" is equipped to this, which contains a mark to shoot by pistol.



Below is the fragment of First Person Controller script, which is generated automatically by standard assets package.

```

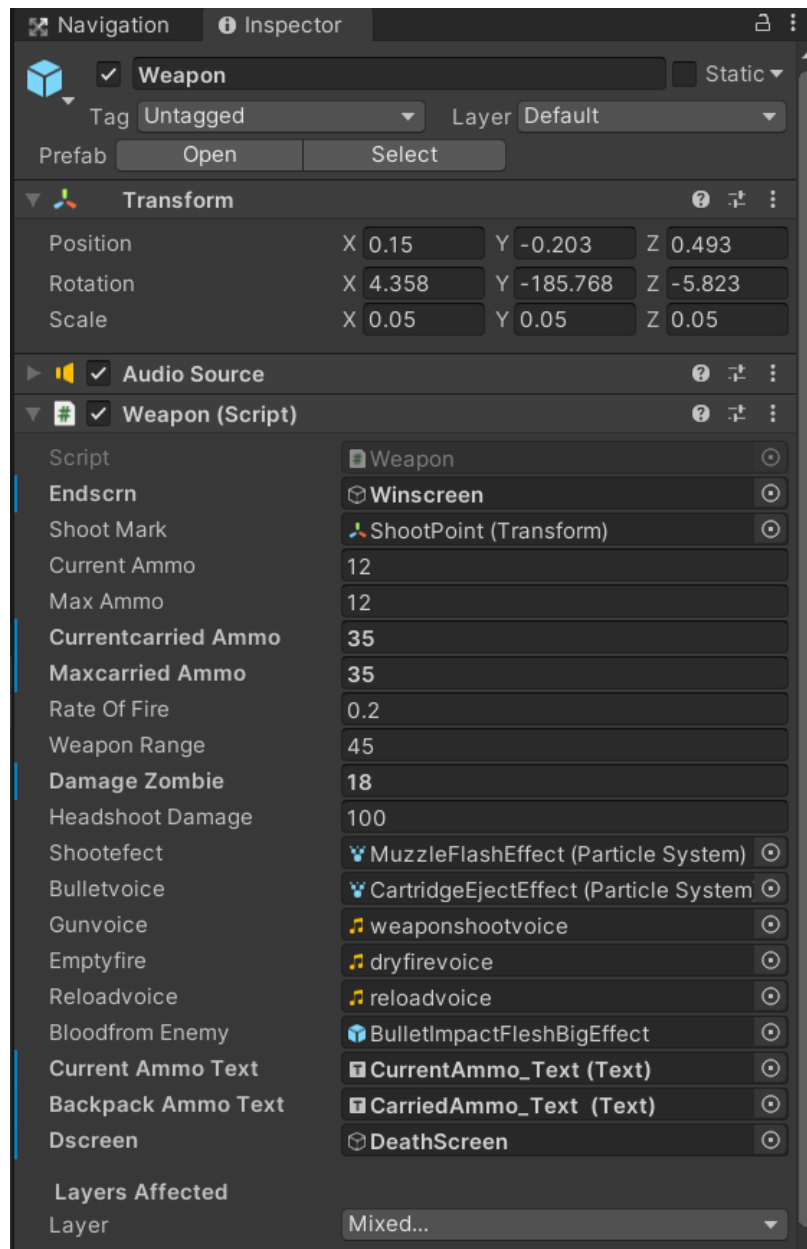
public class FirstPersonController : MonoBehaviour
{
    [SerializeField] public bool m_IsWalking;
    [SerializeField] public float m_WalkSpeed;
    [SerializeField] public float m_RunSpeed;
    [SerializeField] [Range(0f, 1f)] public float m_RunstepLenghten;
    [SerializeField] public float m_JumpSpeed;
    [SerializeField] public float m_StickToGroundForce;
    [SerializeField] public float m_GravityMultiplier;
    [SerializeField] public MouseLook m_MouseLook;
    [SerializeField] public bool m_UseFovKick;
    [SerializeField] public FOVKick m_FovKick = new FOVKick();
    [SerializeField] public bool m_UseHeadBob;
    [SerializeField] public CurveControlledBob m_HeadBob = new CurveControlledBob();
    [SerializeField] public LerpControlledBob m_JumpBob = new LerpControlledBob();
    [SerializeField] public float m_StepInterval;
    [SerializeField] public AudioClip[] m_FootstepSounds;    // an array of footstep sounds that will
    [SerializeField] public AudioClip m_JumpSound;           // the sound played when character leaves the
    [SerializeField] public AudioClip m_LandSound;           // the sound played when character touches
}

```

Table 1. FPC script code fragment

Feature #2. Weapon for player

Player has a weapon, which is the pistol as an element downloaded from asset store. Gun is equipped to First person controller and has functionality of shooting, reloading ammo and also dry fire voice (link in next section). Pistol has damage value, which can player shoot against zombie enemy, and its value is 18 points. Also backpack for ammo is equal to 35 and current carried ammo is 12 bullets. Other weapon are mentioned in the screen below, such as rate of fire. Player can shoot by: left mouse click and by: ctrl key, reload by Q key.



Whole weapon look can be see at first screen in features section. Script for weapon with functions, such as: Dryfire(), Shoot(), Shootray(), Reload() and other:

```
void Start()
{
    shootefect.Stop();
    Bulletvoice.Stop();
    gunshootv1 = GetComponent<AudioSource>();
    AmmoUI();
}
```

🔊 Unity Message | Odwołania: 0

```
void Update()
{
    if (Input.GetButton("Fire1") && currentAmmo > 0)
    {
        if(!Endscrn.activeSelf )
        {
            Shoot();
        }
    }
    else if (Input.GetButton("Fire1") && currentAmmo <= 0)
    {
        if (!Endscrn.activeSelf )
        {
            DryFire();
        }
    }
    else if (Input.GetKeyDown(KeyCode.Q) && currentAmmo <= maxAmmo)
    {
        if (!Endscrn.activeSelf )
        {
            Reload();
        }
    }
}
```



```

void DryFire()
{
    if (Time.time > nextFire)
    {
        nextFire = 0f;
        nextFire = Time.time + rateOfFire;

        if(!dscreen.activeSelf)
        {
            gunshootv1.PlayOneShot(emptyfire);
        }
    }
}

1 odwołanie
void Shoot()
{
    if (Time.time > nextFire)
    {
        nextFire = 0f;
        nextFire = Time.time + rateOfFire;
        currentAmmo--;

        if(!dscreen.activeSelf)
        {
            gunshootv1.PlayOneShot(gunvoice);
        }

        StartCoroutine(ShootEffects());
        ShootRay();
        AmmoUI();
    }
}

1 odwołanie
void ShootRay()
{
    if (Physics.Raycast(shootMark.position, shootMark.forward, out hit, weaponRange, layer))
    {
        if (hit.transform.tag == "Enemy")
        {
            ZombieHealth zombiehealth = hit.transform.GetComponent<ZombieHealth>();
            zombiehealth.HealthAmount(damageZombie);
        }
    }
}

```

```

1 odwołanie
void Reload()
{
    if (currentcarriedAmmo <= 0) return;
    StartCoroutine(ReloadTime(1f));
    gunshotv1.PlayOneShot(reloadvoice);
}

1 odwołanie
IEnumerator ReloadTime(float time)
{
    while(time>0f)
    {
        isReloading = true;
        time -= Time.deltaTime;
        yield return null;
    }

    if(time<=0f)
    {
        isReloading = false;
        int ammoneeded = maxAmmo - currentAmmo;
        int AmmoCalculate = (currentcarriedAmmo >= ammoneeded) ? ammoneeded : currentcarriedAmmo;

        currentcarriedAmmo -= AmmoCalculate;
        currentAmmo += AmmoCalculate;

        AmmoUI();
    }
}

1 odwołanie
IEnumerator ShootEffects()
{
    Bulletvoice.Play();
    shooteffect.Play();

    yield return new WaitForEndOfFrame();

    shooteffect.Stop();
    Bulletvoice.Stop();
}

Odwołania: 4
public void AmmoUI()
{
    CurrentAmmoText.text = currentAmmo.ToString();
    BackpackAmmoText.text = currentcarriedAmmo.ToString();
}

```

Another important function is zombie kill counter, every time player is killing one monster counter is one up. Script which tells about that:

```

public static MainUI instance;

[SerializeField]
TextMeshProUGUI numofkills;

[HideInInspector]
public int killsnumber;

⊞ Unity Message | Odwołania: 0
private void Awake()
{
    if(instance==null)
    {
        instance = this;
    }
    else
    {
        Destroy(gameObject);
    }
}

1 odwołanie
public void Updatenumofkills()
{
    numofkills.text = killsnumber.ToString();
}

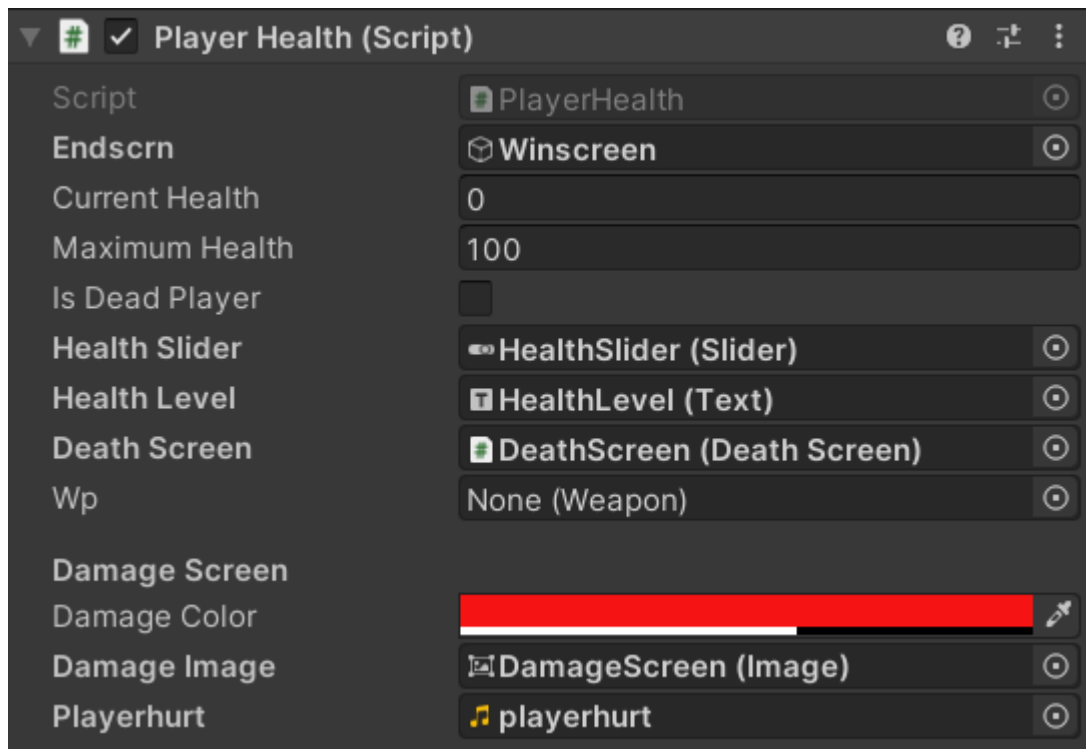
```

Feature #3. Health, damage for player:

Player has a health bar with 100 points of health, every time monster attack player he is losing his hp, when health bar is equal to 0, player is dead. When zombie attack player, blood damage screen is activated like in the screen below. When also player is losing his hp, the hurt sound is activated.



Player health options in inspector of unity editor:



Script for player health with a couple important functions, such as: `DamagePlayer()`, `UpdateHealthUI()`, `DeadPlayer()`:

```
void Start()
{
    CurrentHealth = MaximumHealth;
    healthSlider.value = MaximumHealth;
    UpdateHealthUI();

    PlayerHurt = GetComponentInParent<AudioSource>();
}

// Update is called once per frame
@ Unity Message | Odwołania: 0
void Update()
{
    if (CurrentHealth < 0)
    {
        CurrentHealth = 0;
    }

    if (isDamaged)
    {
        damageImage.color = damageColor;
    }
    else
    {
        damageImage.color = Color.Lerp(damageImage.color, Color.clear, colorSmoothing * Time.deltaTime);
    }

    if (!IsDeadPlayer)
    {
        isDamaged = false;
    }
}
```

```

public void DamagePlayer(float damage)
{
    if (CurrentHealth > 0)
    {
        if (damage >= CurrentHealth)
        {
            isDamaged = true;
            DeadPlayer();
        }
        else
        {
            isDamaged = true;
            CurrentHealth -= damage;

            if(!Endscrn.activeSelf)
            {
                PlayerHurt.PlayOneShot(playerhurt);
            }
        }
    }
    UpdateHealthUI();
}

Odwołania: 5
public void UpdateHealthUI()
{
    healthLevel.text = CurrentHealth.ToString();
    healthSlider.value = CurrentHealth;
}

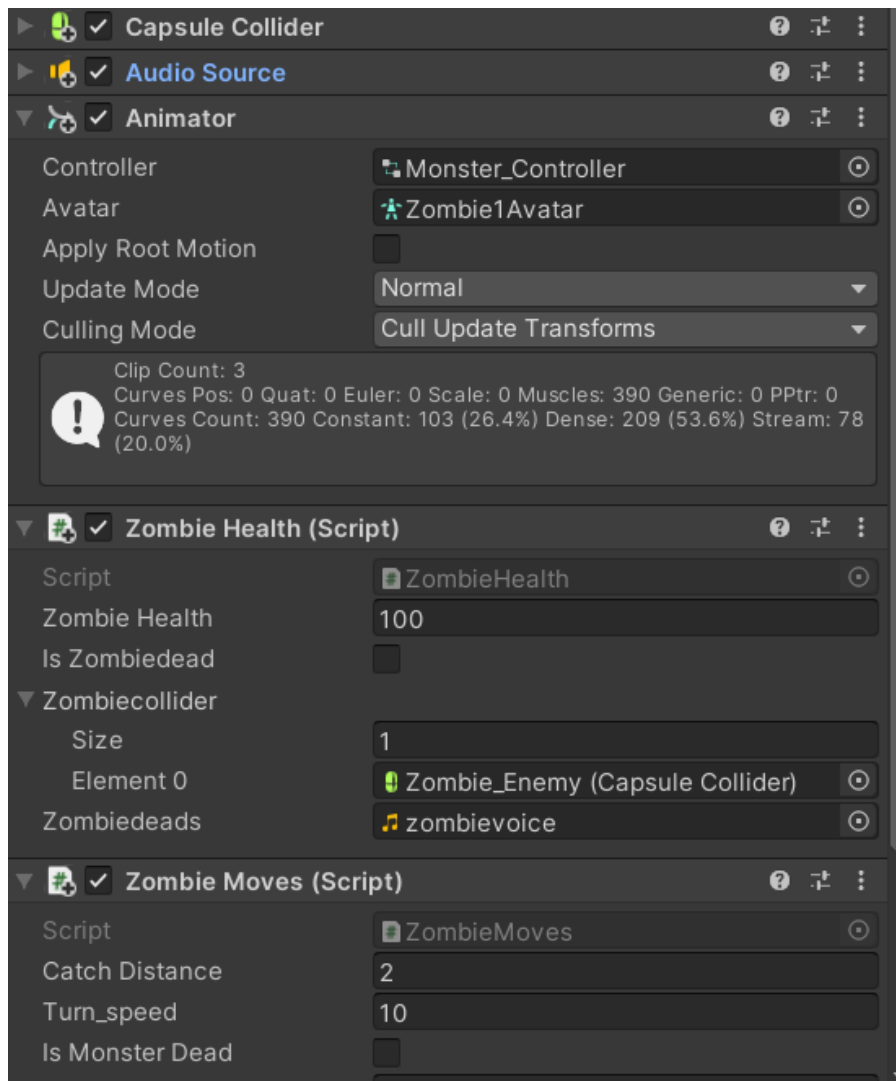
1 odwołanie
void DeadPlayer()
{
    CurrentHealth = 0;
    IsDeadPlayer = true;
    healthSlider.value = 0;
    if (!Endscrn.activeSelf)
    {
        PlayerHurt.PlayOneShot(playerhurt);
    }
    Debug.Log("Player is dead");
    UpdateHealthUI();
    deathScreen.GameOverscreen();
}

```

Feature #4. Zombie enemy with mechanics:

Zombies are main enemies for player. Monster objects have nav mesh agent, so they can find player character in every place in game world. Zombies have also health points, they are equal to 100 points. Every time zombie gets shoot from player, there is a blood animation according with it. Zombie has walking, attack and death animation.

Zombie options in unity editor:



Screens about zombie in game:





Functions in script for zombie moves:

```

1 odwołanie
public void ZombieDeathAnimation()
{
    isMonsterDead = true;
    animation.SetTrigger("isDead");
}

1 odwołanie
void CatchPlayer()
{
    nav.updateRotation = true;
    nav.updatePosition = true;
    nav.SetDestination(target.position);
    animation.SetBool("isWalking", true);
    animation.SetBool("isAttacking", false);
}

1 odwołanie
void AttackPlayer()
{
    nav.updateRotation = false;
    Vector3 direction = target.position - transform.position;
    direction.y = 0;
    transform.rotation = Quaternion.Slerp(transform.rotation, Quaternion.LookRotation(direction), turn_speed * Time.deltaTime);
    nav.updatePosition = false;
    animation.SetBool("isWalking", false);
    animation.SetBool("isAttacking", true);
    StartCoroutine(AttackbyMonster());
}

1 odwołanie
IEnumerator AttackbyMonster()
{
    CanAttack = false;
    yield return new WaitForSeconds(0.5f);

    if (!isMonsterDead)
    {
        PlayerHealth.singleton.DamagePlayer(DamageAmount);
    }

    yield return new WaitForSeconds(AttackTimes);
    CanAttack = true;
}

1 odwołanie
void StopMonster()
{
    CanAttack = false;
    animation.SetBool("isWalking", false);
    animation.SetBool("isAttacking", false);
}

```

Scripts for zombie health:


```

public float zombieHealth = 100f;
ZombieMoves zombieAI;

public bool isZombiedead;
public Collider[] zombiecollider;

AudioSource zombieDeaths;

[SerializeField]
AudioClip zombiedeaths;

@ Unity Message | Odwołania: 0
private void Start()
{
    zombieAI = GetComponent<ZombieMoves>();
    zombieDeaths = GetComponentInParent<AudioSource>();
}

1 odwołanie
public void HealthAmount(float lesshealth)
{
    if(!isZombiedead)
    {
        zombieHealth -= lesshealth;

        if (zombieHealth <= 0)
        {
            ZombieDead();
        }
    }
}

1 odwołanie
public void ZombieDead()
{
    isZombiedead = true;
    zombieAI.ZombieDeathAnimation();

    zombieDeaths.PlayOneShot(zombiedeaths);

    foreach(var collider in zombiecollider)
    {
        collider.enabled = false;
    }
    zombieHealth = 0f;

    MainUI.instance.killsnumber++;
    MainUI.instance.Updatenumofkills();
    Destroy(gameObject, 1);
}

```

Feature #5. Zombie spawner:

When player is walking in game world he is turning on zombie spawners. Then zombies appear in game and they are trying to catch and attack him. In game there are 12 different spawners, which are spawning different number of zombie objects. It is caused because OnTriggerEnter function and function called: SpawnZombies, which is presented in screen below:

```

public GameObject zombies;

public Transform[] SpawnPoints;

BoxCollider trigger;

⊞ Unity Message | Odwołania: 0
private void Start()
{
    trigger = GetComponent<BoxCollider>();
}

⊞ Unity Message | Odwołania: 0
private void OnTriggerEnter(Collider other)
{
    if(other.tag=="Player")
    {
        SpawnZombies();
        trigger.enabled = false;
    }
}

1 odwołanie
void SpawnZombies()
{
    foreach(var x in SpawnPoints)
    {
        Instantiate(zombies, x.position, x.rotation);
    }
}

```

Feature #6. Pick up system for player:

Player can pick up objects, such as ammo pack and he can win the game by pick up interact with final doors in the game. Every time player is close to item object, it is hint about pick up this or interact with it. Like in the screens below:



There is a special script for pickups with functions like: `Pickhealth()`, `Pickkey()`, `Finalescape()`:

```

ray = maincamera.ViewportPointToRay(new Vector3(0.5f, 0.5f, 0));

if (Physics.Raycast(ray, out hit, pickdistance, layer))
{
    textpick.enabled = true;
    textpick.text = hit.transform.name.ToString();

    if (hit.transform.tag == "AmmoPack")
    {
        infopick = "AMMO PACK (PICK 'E')";
        textpick.text = infopick;
        Pickkey();
    }
    else if (hit.transform.tag == "HealthPack")
    {
        if (PlayerHealth.singleton.CurrentHealth < PlayerHealth.singleton.MaximumHealth)
        {
            Pickhealth();
            infopick = "HEALTH PACK (PICK 'E')";
            textpick.text = infopick;
        }
        else
        {
            infopick = "HEALTH FULL!";
            textpick.text = infopick;
        }
    }
}
else if (hit.transform.tag == "Wingame")
{
    infopick = "CLICK 'M' TO FINAL \n ESCAPE FROM DUNGEON!";
    textpick.text = infopick;
    Finalescape();
}
}

```

```

1 odwołanie
void Pickkey()
{
    if (Input.GetKeyDown(KeyCode.E))
    {
        Destroy(hit.transform.gameObject);
        weaponScript.currentcarriedAmmo += 15;
        picksound.PlayOneShot(pickaudioammound);
        textpick.enabled = false;
        weaponScript.AmmoUI();
    }
}

1 odwołanie
void Finalescape()
{
    if(Input.GetKeyDown(KeyCode.M))
    {
        picksound.PlayOneShot(winsound);
        Endscrn.gameObject.SetActive(true);
    }
}

Odwołania: 0
IEnumerator Wait2()
{
    yield return new WaitForSeconds(2);
}

1 odwołanie
void Pickhealth()
{
    if (Input.GetKeyDown(KeyCode.E))
    {
        Destroy(hit.transform.gameObject);
        picksound.PlayOneShot(pickaudiohealthsound);
        textpick.enabled = false;

        HealthPick healthpickscript = hit.transform.GetComponent<HealthPick>();

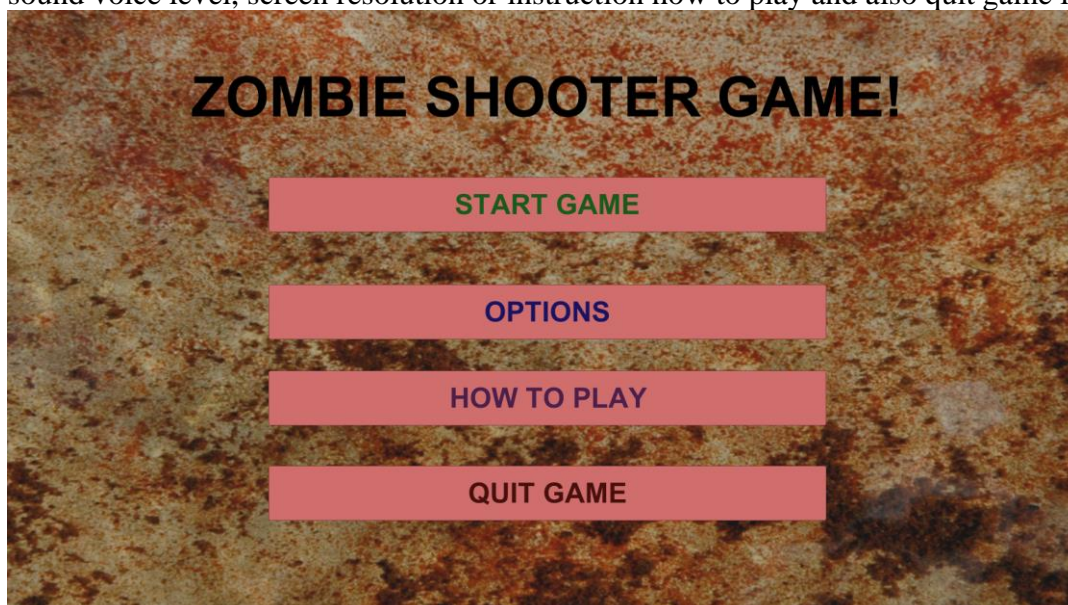
        float healthbox = healthpickscript.healthbox;

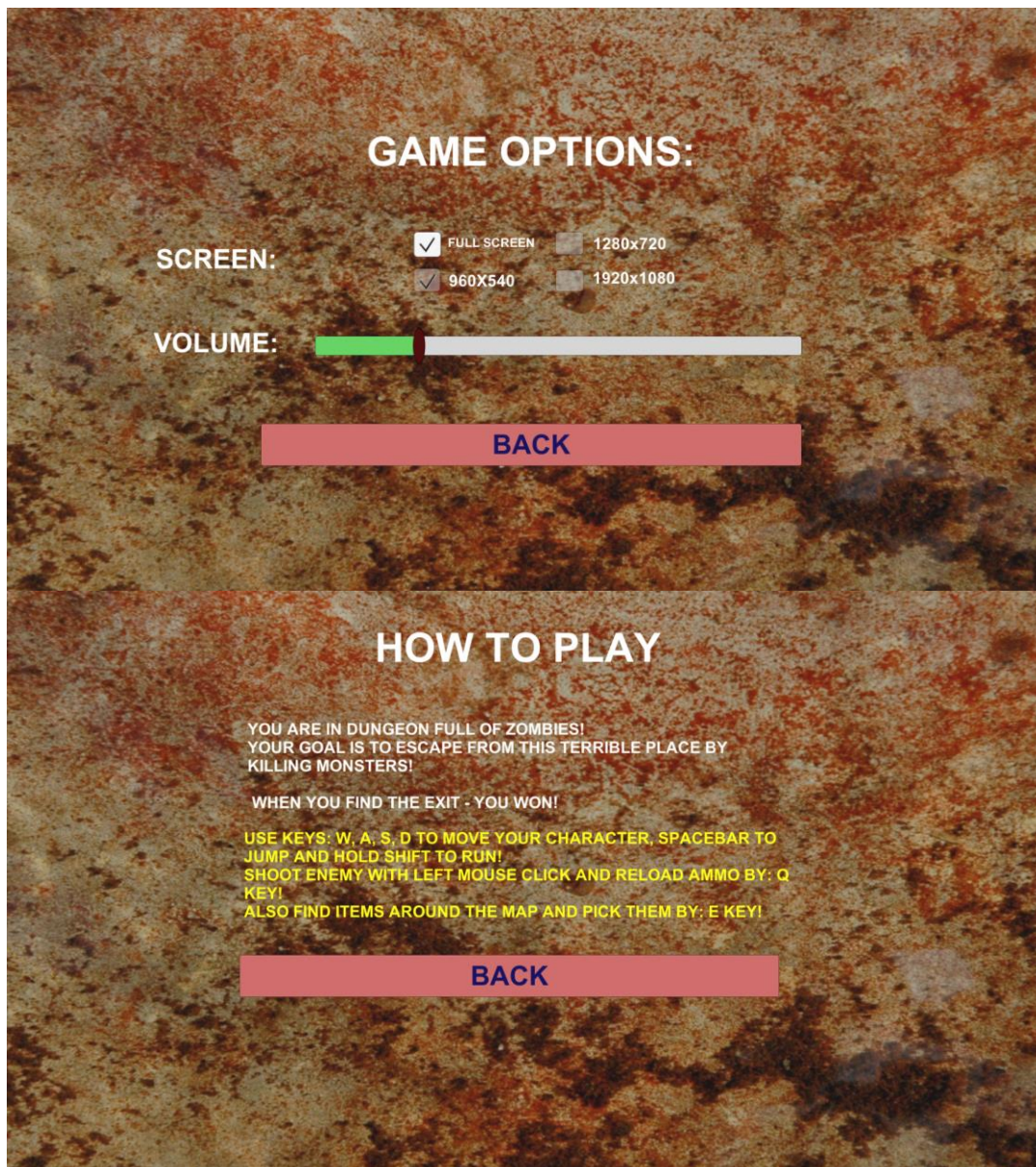
        if (PlayerHealth.singleton.CurrentHealth + healthbox > PlayerHealth.singleton.MaximumHealth)
        {
            PlayerHealth.singleton.CurrentHealth = PlayerHealth.singleton.MaximumHealth;
            PlayerHealth.singleton.UpdateHealthUI();
        }
        else
        {
            PlayerHealth.singleton.Addhealth(healthbox);
        }
    }
}

```

Feature #7. UI (Main menu, different screens, etc)

Game starts with main menu screen. It has opportunely functions like: game start, options with sound voice level, screen resolution or instruction how to play and also quit game function:



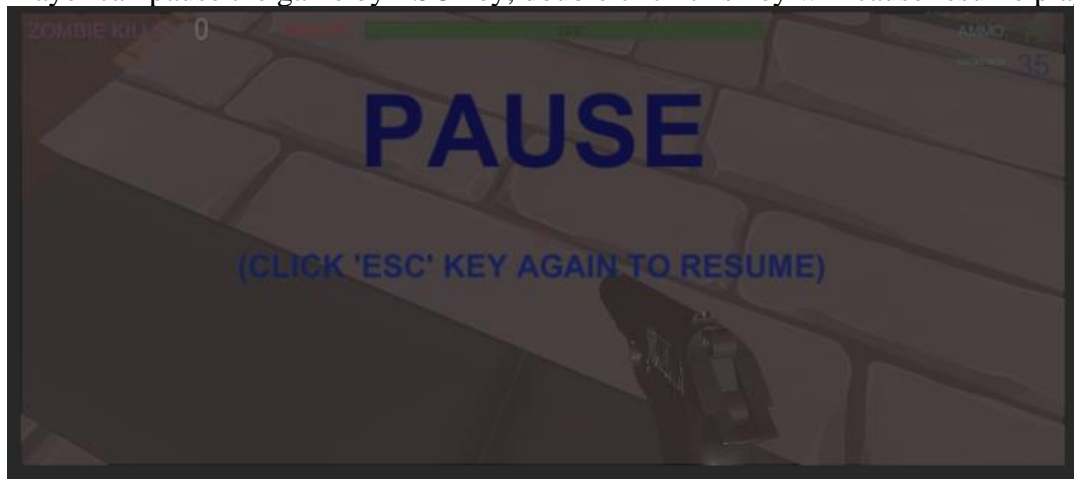


There are two special screens about game over and winning game:





Player can pause the game by ESC key, double click this key will cause resume playing.



Script for pause system:


```

// Update is called once per frame
@ Unity Message | Odwołania: 0
void Update()
{
    if(!deathscreen.activeSelf)
    {
        if (Input.GetKeyDown(KeyCode.Escape))
        {
            if (pause)
            {
                Resume();
            }
            else
            {
                Pause();
            }
        }
    }
}

1 odwołanie
void Resume()
{
    pausemenu.SetActive(false);
    Time.timeScale = 1f;
    pause = false;
}

1 odwołanie
void Pause()
{
    if(!winscreen.activeSelf)
    {
        pausemenu.SetActive(true);
        Time.timeScale = 0f;
        pause = true;
    }
}

```

Script for main menu configuration:


```

public class MainMenu : MonoBehaviour
{
    [SerializeField] GameObject OptionsMenu;

    public Toggle[] resolutiontoggles;
    public int[] screenwidths;
    int activescreenindex;

    [UnityMessage] OnScreen 0
    void Start()
    {
        activescreenindex = PlayerPrefs.GetInt("active res index");
        bool isfullscreen = (PlayerPrefs.GetInt("fullscreen")==1)?true:false;

        for(int i=0;i<resolutiontoggles.Length;i++)
        {
            resolutiontoggles[i].isOn = i == activescreenindex;
        }
        Setfullscreen(isfullscreen);
    }

    [UnityMessage] OnScreen 0
    public void loadGame()
    {
        SceneManager.LoadScene(1);
    }

    [UnityMessage] OnScreen 0
    public void MenuQuitGame()
    {
        Debug.Log("Quit");
        Application.Quit();
    }

    [SerializeField] Slider volumelider;

    [UnityMessage] OnScreen 0
    public void Awake()
    {
        if(PlayerPrefs.HasKey("Volume"))
        {
            SetVolume(PlayerPrefs.GetFloat("Volume"));
            volumelider.value = PlayerPrefs.GetFloat("Volume");
        }
    }

    [UnityMessage] OnScreen 0
    public void SetVolume(float volume)
    {
        AudioListener.volume = volume;
        PlayerPrefs.SetFloat("Volume", volume);
    }

    [UnityMessage] OnScreen 0
    public void Setscreenquality(int i)
    {
        if(resolutiontoggles[i].isOn)
        {
            activescreenindex = i;
            float x = 16/9f;
            Screen.SetResolution(screenwidths[i],(int)(screenwidths[i]/x),false);
            PlayerPrefs.SetInt("Screen res index", activescreenindex);
            PlayerPrefs.Save();
        }
    }

    [UnityMessage] OnScreen 0
    public void Setfullscreen(bool isfullscreen)
    {
        for(int i=0;i<resolutiontoggles.Length;i++)
        {
            resolutiontoggles[i].Interactable = !isfullscreen;
        }

        if(isfullscreen)
        {
            Resolution[] allresolution = Screen.resolutions;
            Resolution maxResolution = allresolution[allresolution.Length - 1];
            Screen.SetResolution(maxResolution.width, maxResolution.height, true);
        }
        else
        {
            Setscreenquality(activescreenindex);
        }

        PlayerPrefs.SetInt("Fullscreen", ( isfullscreen) ? 1:0);
        PlayerPrefs.Save();
    }
}

```

Scripts for correct result game screens (game over or win):

```
public GameObject Endscrn;
```

☞ Unity Message | Odwołania: 0

```
void Start()
{
    gameObject.SetActive(false);
}
```

1 odwołanie

```
public void GameOverscreen()
{
    if(!Endscrn.activeSelf)
    {
        gameObject.SetActive(true);
    }
}
```

Odwołania: 0

```
public void ReturntoMenu()
{
    SceneManager.LoadScene(0);
}
```

Odwołania: 0

```
public void QuitGame()
{
    Debug.Log("Exit");
    Application.Quit();
}
```

Odwołania: 0

```
public void Playagain()
{
    SceneManager.LoadScene(1);
}
}
```

// Start is called before the first frame update

Ⓜ Unity Message | Odwołania: 0

void Start()

```
{  
    gameObject.SetActive(false);  
}
```

Odwołania: 0

public void Winscreen()

```
{  
    gameObject.SetActive(true);  
}
```

Odwołania: 0

public void QuitGame()

```
{  
    Debug.Log("Exit");  
    Application.Quit();  
}
```

Odwołania: 0

public void Playagain()

```
{  
    SceneManager.LoadScene(1);  
}
```

Odwołania: 0

public void ReturntoMenu()

```
{  
    SceneManager.LoadScene(0);  
}
```

Assets and resources used

1. Texture #1. https://www.textureking.com/dsc_4439/
2. Texture #2. https://www.textureking.com/dsc_4406/
3. Texture #3. <https://www.textures.com/download/SplatterRound0083/28774>
4. Texture #4. <https://www.textures.com/download/DoorsWoodDouble0463/117358>
5. Texture #5. <https://www.textures.com/download/Cargo0092/94777>
6. Texture #6. <https://www.textures.com/download/SignsVarious0145/107775>
7. Texture #7. <https://www.textures.com/download/SplatterShot0016/28767>
8. Sound #1. <https://freesound.org/people/fastson/sounds/399116/>
9. Sound #2. <https://freesound.org/search/?q=ammo+pick&f=&s=score+desc&advanced=0&g=1>
10. Sound #3. https://freesound.org/people/Bird_man/sounds/275151/
11. Sound #4. <https://freesound.org/people/mrickey13/sounds/515624/>
12. Sound #5. <https://freesound.org/people/niockus/sounds/396331/>
13. Sound #6. <https://freesound.org/people/EricksSoundSchmiede/sounds/463721/>
14. Sound #7. https://freesound.org/people/Loyalty_Freak_Music/sounds/407479/
15. Sound #8. <https://freesound.org/people/Tuudurt/sounds/258142/>
16. Sound #9. <https://freesound.org/people/LittleRobotSoundFactory/sounds/270467/>
17. Asset #1. <https://assetstore.unity.com/packages/3d/props/guns/pbr-rov-free-edition-53060>
18. Asset #2. <https://assetstore.unity.com/packages/3d/environments/stylized-hand-painted-dungeon-free-173934>
19. Asset #3. <https://assetstore.unity.com/packages/3d/characters/humanoids/zombie-30232>
20. Asset #4. <https://assetstore.unity.com/packages/3d/environments/3d-free-modular-kit-85732>
21. Asset #5. <https://assetstore.unity.com/packages/essentials/asset-packs/standard-assets-for-unity-2018-4-32351>
22. Asset #6. <https://assetstore.unity.com/packages/vfx/particles/blood-gush-73426>
23. Asset #7. <https://assetstore.unity.com/packages/3d/fps-akm-model-textures-63654>
24. Asset #8. <https://assetstore.unity.com/packages/essentials/asset-packs/unity-particle-pack-5-x-73777>