

## README

This is a mini game with three areas: Forest, Cavity, and Goal. The player spawns in the top left corner in the forest, and must collect pickups in the forest, use them to build platforms to cross the cavity, and then reach the goal to win.

Scenes: Main (level), Win (win UI), Lose (lose UI)

Layers: Ground, Trees, Player, Projectile, Platform, Volumn

Tag: Player (on the player root)

### Features:

#### 1. Player Movement (Script: PlayerController)

The player is represented by a capsule with a cube to represent its head, with a CharacterController attached to the capsule, and the Main Camera attached near the head. Uses the default input controller in unity for WASD movement, which is displacement of CharacterContoller, and sliding mouse to look in first-person view, which is rotation of the Camera transform. Gravity is set to -10, applied manually so the player doesn't float in mid air when the ground gets lower, and falls off platforms into the cavity when not grounded.

#### 2. Trail Marks (Script: TrailMarkDropper)

The trail marks are quad objects. In the Forest area, the player leaves a trail of quads on the ground, which are spaced every 2 units so the player can track where they have been. The script checks for the distance between quads, and if distance is satisfied, it uses the player's current location to leave a mark. It raycasts from above the player to get the slope of the surface and set the rotation of the mark, ensuring trail marks align with the terrain. A slight offset is added in the up direction to prevent jitters.

#### 3. Pickup Spawning and Collection (PickUpsSpawner, Pickups, PlayerInventory)

PickUpsSpawner is attached to the ForestArea object, and generates 10 pickups at valid ground positions. A position is determined valid by: Raycasts downward to reject placement not on ground (floating); same raycast to reject slopes steeper than the player could walk; and CheckSphere to reject positions near trees.

Pickups are just cubes, but material is glowing for them to be easy to find. On collision with the player, pickups disappear and increment the player's inventory count, which connects to a canvas and is displayed to the player on the top right corner.

PlayerInventory keeps track of the number of Pickups the player currently has, and handles adding and consuming (1) of the Pickups.

#### 4. Projectiles (Shoot, Projectile)

On Left-click, the player can fire a projectile, if: 1. The player has at least 1 pickups in inventory, 2. No other projectile is already in flight. Projectiles are spawn at the camera position, and travel towards the direction the camera is viewing at. It travels forward every frame with Rigidbody physics, until: 1. If a projectile hits ground or obstacles outside the cavity, it disappears, 2. If a projectile hits the cavity, it transforms into a platform at a certain height (Y=180).

#### 5. Platforms (PlatformDie, StepTrigger, PlatformManager)

Platforms are flat square planes with a child object, also a flat square plane, slightly smaller than and higher than it. They are spawned at fixed height (Y=180) in the cavity. The child object is called StepTrigger, they are triggers to detect player's enter and exit of the platform. Once the player leaves a platform, it destroys itself. The first platform stepped on also closes a wall behind the player, preventing them from returning to the forest.

#### 6. One-Way Gates (Script: GateManager)

Two invisible rectangular cube colliders act as gates: ForestWall, closes after the first platform is stepped on; and GoalWall, closes once the player enters the goal area trigger. This ensures the player cannot return to earlier areas.

#### 7. End Game Detection (Script: GameFlow, GameWin, AreaKillCollider)

The game ends either when the player wins or loses the game. The player could Lose by falling into KillArea, which is an invisible rectangular collider. The player wins when they enter the goal trigger collider at the other end of the cavity, with the goal tile there labeled blue. When the game ends, the scene transitions to Win scene or Lose scene, both are just simple UI displaying words. The game exits 5 seconds after showing these scenes.

#### 8. Goal Area (Script: GoalLand, GoalLandTrigger)

The goal area consists of 4 goal tiles, each are long rectangular cubes with a child, a trigger of the same size and orientation. The first 3 tiles are white, and will destroy themselves after the player leaves them. The last one is blue, which triggers game win when the player collides with its trigger.

### Limitations

1. On some slopes at the edge of the terrain, the player may slide down gradually without falling into the kill-zone. In this case, projectiles can still be thrown, but platforms always form at the fixed cavity height (Y=180), potentially stranding the player.
2. The game does not display guidance on controls or objectives. Players must figure out that they need to collect pickups in the forest and use them to cross the cavity.