pixel crown

Advanced Character Controller 2D

V 1.1.0

A character movement package for platform games in Unity

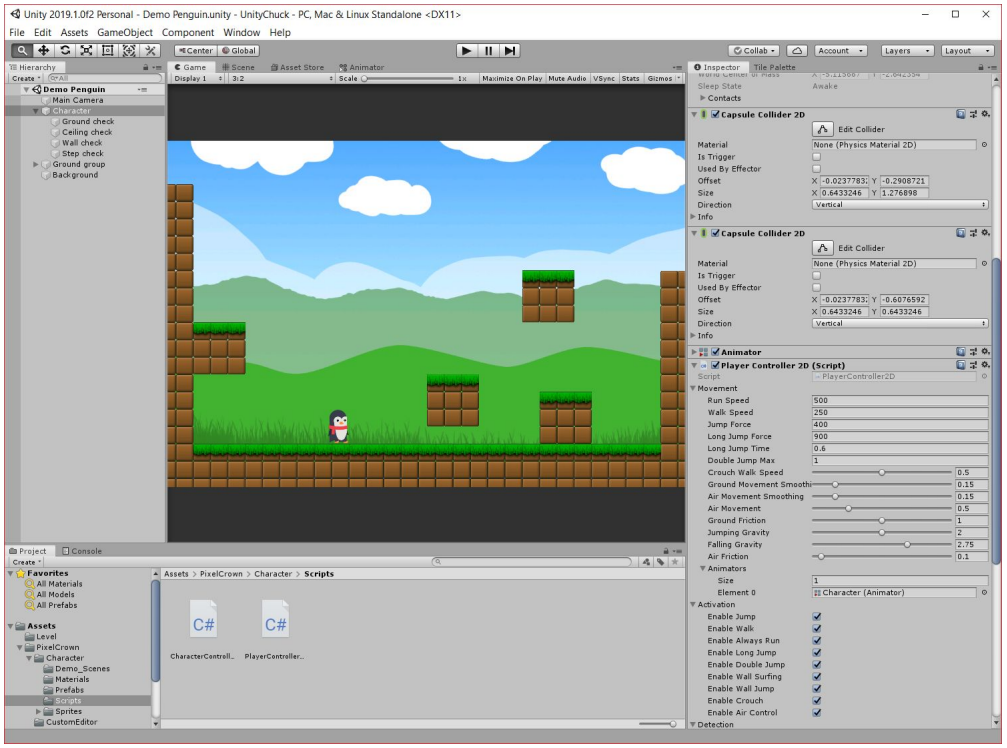
Summary

Introduction

The Advanced Character Controller 2D (ACC2D) package will give you advanced control of movement of a 2D character. It was developed to work in a 2d platform game in Unity.

Main features:

- Easy to use without coding via the Unity editor
- Horizontal movement, adjustable speed
- Jump, long jump, double jump, wall jump
- Configurable controls
- Crouch, run, walk, wall surfing
- Different dust effects for jump, double jump, walk, land ...
- Character state parameters can be sent to multiple animators
- Demo samples and tutorial



Import package

To install the package:

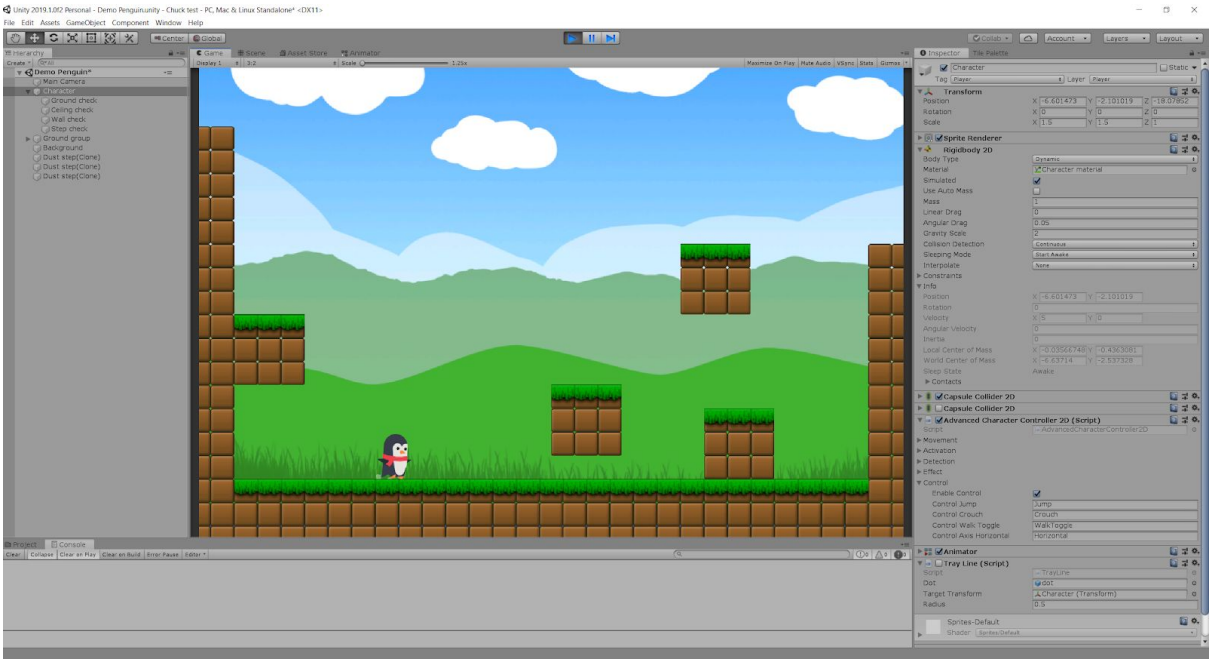
- Open Unity editor with your project
- Go to the Asset store panel
- Search for “Advanced character controller 2d”
- Click on Add to Cart / Import package
- Keep the default import options and finish import

The package is now imported in your project.You can check the following path in your project to see the imported files :
Packages > Pixel Crown > Advanced Character Controller 2D

To run a working example, open the directory “Demo_scenes”, open a scene and hit “Run”.

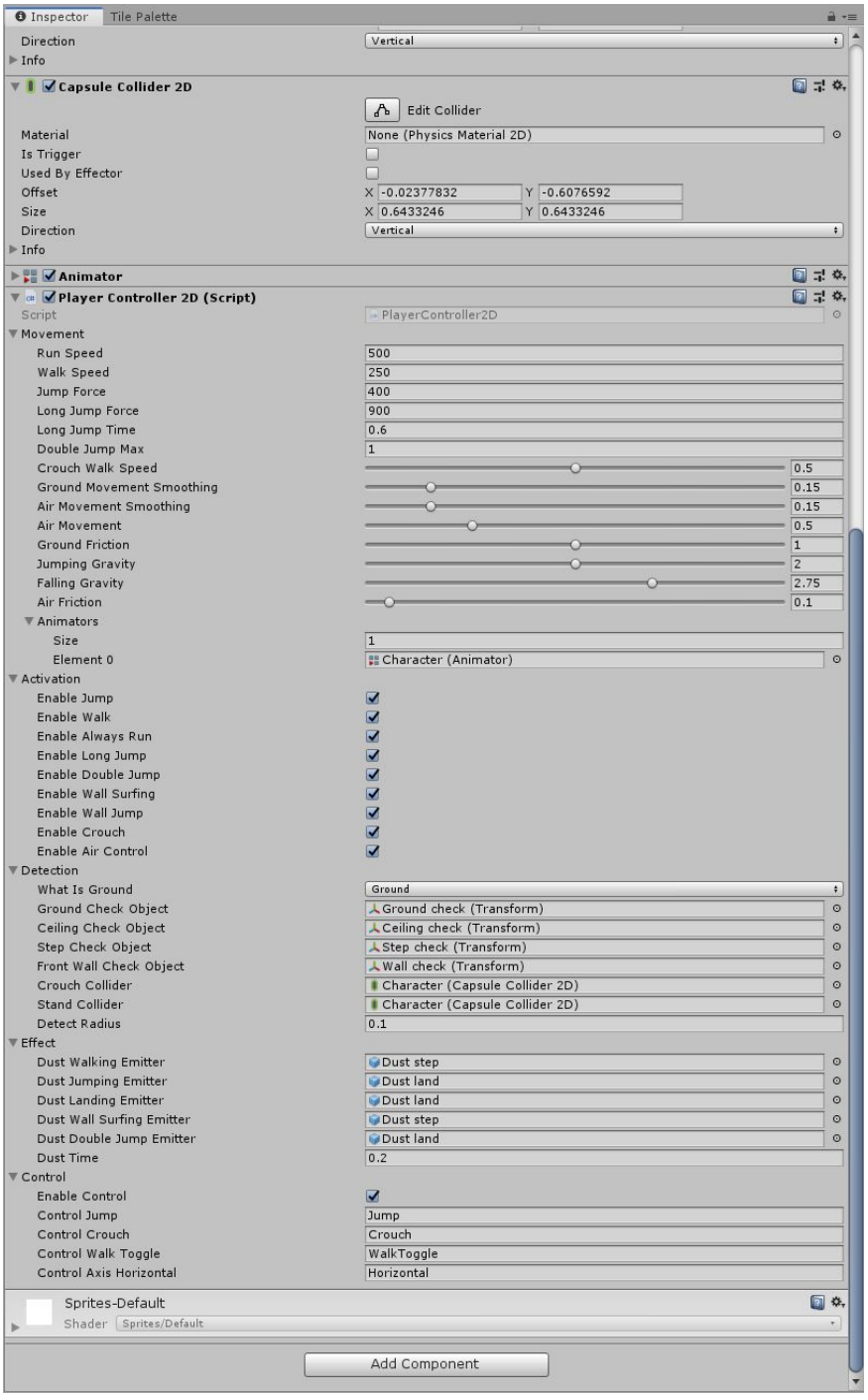
All the mechanisms of the ACC2D are in two components named “Character Controller 2D” and “Player Controler 2D”. If you want to install the Player component, select a sprite object in a scene of your project, click “Add component” and add the “Player Controller 2D” component.
You now have access to all the options of the component in your object.

For a complete tutorial on how to set up the component, go to the “How to install the component” section.



Features

You can easily change parameters, enable and disable any options to fit your needs in the Unity editor. Every option has also a tooltip description in the editor.



Movement

Run speed	Speed applied when running
Walk speed	Speed applied when walking
Jump force	Force applied up once to jump
Long jump force	Force applied up continuously to do a longer jump when long jump is enabled
Long jump time	Time to apply long jump
Double jump max	Number of double jumps when double jump is enabled
Crouch walk speed	Factor of walk speed to apply when crouch walking, from 0 to 1
Ground movement smoothing	Smooth the movement when moving on ground, from 0 to 1
Air movement smoothing	Smooth the movement when in the air, from 0 to 1
Air movement	How much movement the character is able to apply to change direction
Ground friction	How much the character is slowed on the ground
Jumping gravity	Gravity when jumping up
Falling gravity	Gravity when you are falling down (avoid floating effect)
Air friction	How much the character is slowed in the air
Animators	List of animators to send the character state parameters

Activation

Enable jump	Character can jump
Enable walk	Character can walk, in addition to running
Enable always run	Character runs by default and press toggle to walk, if not character walks by default and press toggle to run
Enable long jump	Press longer to jump higher
Enable double jump	Press jump another time in the air to jump

Enable wall surfing	Going toward a wall in the air make the character slow the fall
Enable wall jump	Character can jump again when going toward a wall
Enable crouch	Character can crouch
Enable air control	Character can move left and right after jumping

Detection

What is ground	Defines what layers are considered to be the ground
Ground check object	Object used for detection of the ground. If the ground is at detect radius, the character is considered to be on the ground
Ceiling check object	Object used for detection of the low ceiling. If the ground is at detect radius, the character cannot stand up and stay crouched
Step check object	Object to spawn step effects
Front wall check object	Object used to detect if there is a wall in front of the character. If the ground is at detect radius, the character is facing a wall. By default the character is facing right so this object must be placed right. There is no need for a left detection
Crouch collider	Collider to enable when the character is crouching, otherwise this collider is disabled when standing
Stand collider	Collider to enable when the character is standing, otherwise this collider is disabled when crouching
Detect radius	Radius used to detect ground, ceiling and walls

Effect

Dust walking emitter	Particles or object to spawn when walking at the Step check object position
Dust jumping emitter	Particles or object to spawn when jumping at the Step check object position
Dust landing emitter	Particles or object to spawn when landing at the Step check object position
Dust wall surfing emitter	Particles or object to spawn when wall surfing at the Front wall

	check object position
Dust double jump emitter	Particles or object to spawn when jumping at the Step check object position
Dust time	Minimum time interval between effects. Increase this value if you want less effects

Control (for the Player controller 2d)

Enable control	Character will be controlled by user input. If you want the character to be controlled by script, uncheck this box
Control jump	Name of the control to jump
Control crouch	Name of the control to crouch
Control walk toggle	Name of the control to walk / run
Control axis horizontal	Name of the axis to control horizontal movement

How it works

Sprites and changing direction

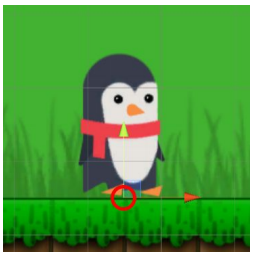
All the character sprites / animations must be facing right as a default position.

When changing direction to left, the character and all the objects inside are flipped horizontally. That means that your sprite will be facing left and object positions and facing will change too.

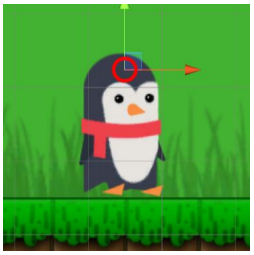
The animator parameter isFacingRight = true when facing right and isFacingRight = false when facing left.

Check object and detection

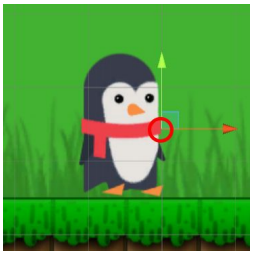
The component detects if the character is touching the ground, has a wall in front of him or have a ceiling that blocks the stand position. There are 3 empty objects that can detects those features depending on their position and the detect radius. The correct detection of the ground is important because it affects the jump feature. The script will not allow the character to jump if it thinks it’s in the air.



The ground is detected by the “Ground check object”. This object is best positioned at the bottom center of the character. If the ground is detected at a distance of the position of this object below “detect radius”, the character is considered on the ground and the animator variable “isGrounded” is set to true. Note that you should also define correctly the “What is ground” property.



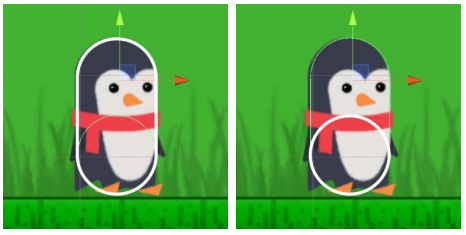
The ceiling is detected by the “Ceiling check object” This object is best positioned at the top center of the character, but slightly inside the head so the ceiling above the head is not detected. If the character is crouched and a ceiling is detected blocking the stand position, the character cannot stand up.



The wall is detected by the “Front wall check object”. This object is best positioned at the middle right of the character. The detection of the wall in front of the character is useful for the wall jump and the wall surfing features.

Posture and colliders

When standing, the Stand collider is enabled and the Crouch collider is disabled. The same way, when crouching, the Crouch collider is enabled and the Stand collider is disabled.



Only one collider is enabled at a time to prevent bugs from one way platforms you may add to your scenes. Your colliders may differ in size but try to keep other parameters identical.

Character state parameters for animations

These are the animation parameters you can use in your animator. You can base your transitions between the animations on those parameters. Be sure to add your animation to “ACC2D > Movement > Animators” and add all the parameters to prevent Warnings.

isGrounded	Bool	True if the character is standing on the ground
isJumping	Bool	True if the character is in the air and going up
isFalling	Bool	True if the character is in the air and going down
isCrouching	Bool	True if the character is crouching
isRunning	Bool	True if the character is running and not walking
isWalking	Bool	True if the character is walking and not running
isWallSurfing	Bool	True if the character is wall surfing / slowing its fall by going toward a wall
isFacingRight	Bool	True if the character is facing right (otherwise left)

Movement animation suggestions:

- Idle
- Run
- Walk
- Jump
- Fall
- Wall surfing
- Crouch idle
- Crouch walk

In addition, you can add any other animations with the parameters from ACC2D or other custom parameters sent to your animator.

Control via scripts

If you need more control of the character movement via script, you can do it too. You will need a basic understanding of how the C# scripts work.

Use the “Characer controller 2D” or the “Player Character 2D” with the controls disabled. Disable the user input controls by unckecking the “ACC2D > Control > Enable control” box.

The Main script is in the Package directory in “Scripts/CharacterController2D.cs”. The code have many comments, but the main function to control the character is very simple:

```
Move(float direction, bool crouch, bool jump, bool walkToggle)
```

Parameters:

- Direction: from -1 to 1, positive to go right

- Crouch: true if the character is crouching
- Jump: True if the character is jumping
- WalkToggle: True if the character is switching to run / walk

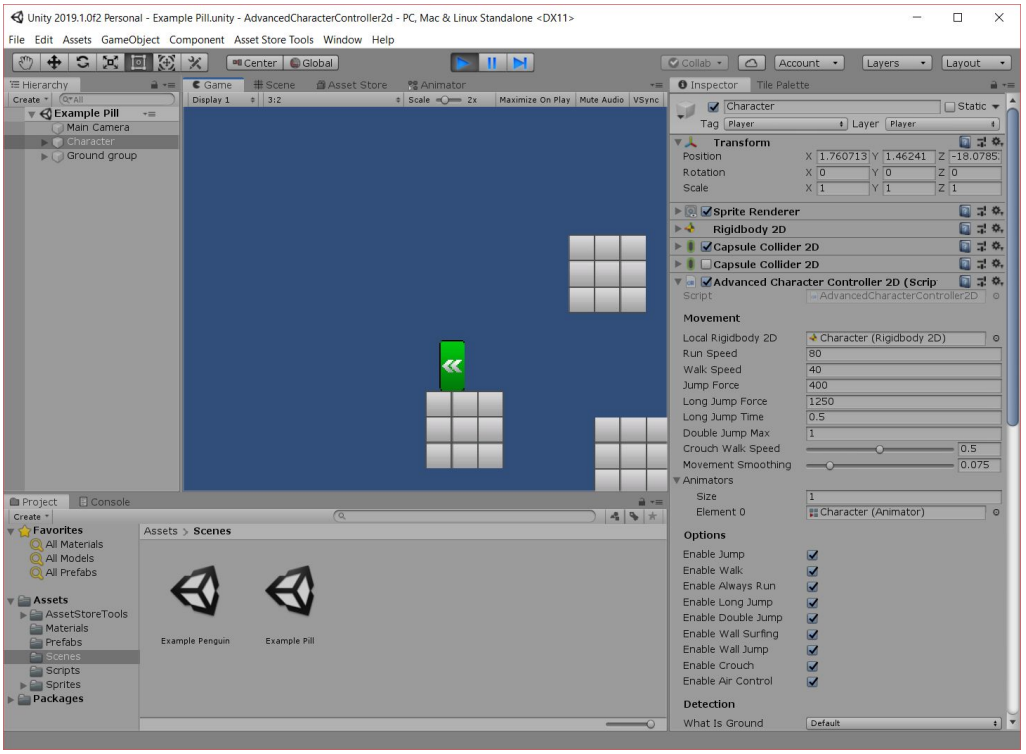
Use this function in FixedUpdate() in your script / component.

In the following example, the ACC2D component is referenced in a “acc2d” variable. We will make simply the character go right :

```
private void FixedUpdate()
{
        // Move the character right continuously
        acc2d.Move(1, false, false, false);
}
```

How to install the component

This is a step by step tutorial on how to set up the Advanced Character Controller 2D (ACC2D) and his features on your Unity project.
In addition to that, you can open the working examples in the “Demo_Scenes” directory of the package to see how to set up your character.



Movement feature

- In the Unity editor, open a scene or create a new one
- If you don't already have a ground, create a 2d sprite object with a ground image or a simple colored texture. If you don't have one, go to the Package directory and select the "Sprites/cube_stone" sprite.
- Add a "Box Collider 2d" to the ground object. Resize it and put it at the bottom of the scene.
- Create a "Ground" layer and add the ground object to the ground layer.
- Create a Sprite object for the character in the scene. If you don't have a sprite image yet, you can take the "Pill" sprite of the ACC2D package. Got to the Package directory and select a sprite in "Sprites/character_pill/"
- Rename the object "Character" in the scene
- Create a "Player" layer and add the character to this layer
- Add "Rigidbody 2d" component to character. This will enable movement of the object
- Change property "Rigidbody 2d > collision detection" to "continuous". This will add a better collision detection and the character will not get throw ground and walls
- Change property "Rigisbody 2d > Freeze rotation Z" to "checked". The character will be only moving in the x and y axis
- Add "Capsule collider 2d" to the character. Set a correct size and position to the collider by clicking on the "Edit collider" button. This will define the standing position of the character. The capsule collider is the better option as it lets the character slip when he stands on a ledge
- Add "Character Controller 2d" to the character
- Drag the standing "Capsule collider 2d" to the property "ACC2D > Movement > Stand collider"

Now if you hit play, the character will be able to move left or right with the arrow keys. If there is some warnings, it's normal. The Input settings are not fully configured yet.
Don't forget to stop the game before you continue changing properties.

- In the editor menu, go to "Edit > Project settings" and select the "Input" tab
- Duplicate a key and name it "WalkToggle", set property "Positive Button" to "right shift"
- Duplicate a key and name it "Crouch", set property "Positive Button" to "down"

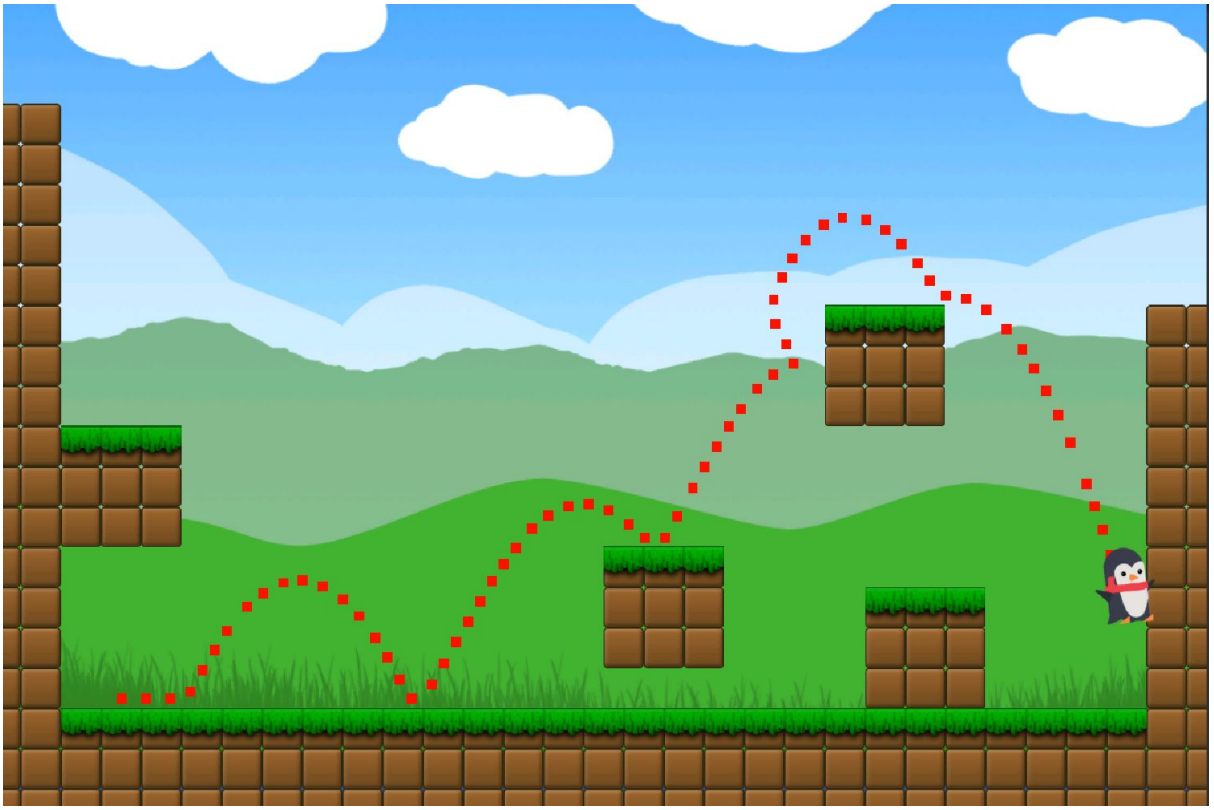
You can also change those controls in the "ACC2D > Control" section.
Now if you hit “play”, you will be able to walk, run and do a basic jump. That also depends on what options you enabled.

Jump feature

We will now configure the jump. If you don't want the character to jump, just uncheck the "ACC2D > Activation > Enable jump" option.

To configure the jump feature:

- Change "ACC2D > Detection > What is ground" to "Ground" layer
- Inside the Character in the hierarchy tree, create an Empty object (Right click on Character and Create empty). Rename this object "Ground check" and position it at the bottom center of the character. This will be the ground detection
- Drag this "Ground check" object to the property "ACC2D > Detection > Ground check object"
- Inside the Character in the hierarchy tree, create an Empty object. Rename this object "Wall check" and position it at the middle right of the character. This will be the wall detection
- Drag this "Wall check" object to the property "ACC2D > Detection > Front wall check object"
- Be sure that the "ACC2D > Activation > Enable jump" option is checked



TIP

Add gravity scale to the Rigidbody 2d component to prevent the slow floating effect when jumping. You will also need to add more ACC2D jump / long jump force if you increase gravity.

There is a gravity factor for jumping up and falling down to prevent the floating effect and to have control over the speed of going up and falling.

The Character should be able to move and jump correctly. You can tweak the value options to change the height of the jump, speed etc ...
You can also Wall surfing (slowing your fall by going toward a wall), double jump and wall jump.

Crouch feature

Now we will set up the Crouch feature. We will also add a ceiling detection to see if the character can stand up when crouched.
If you don"t want the character to crouch, just uncheck the "ACC2D > Activation > Enable crouch" option.

To configure the crouch feature:

- Inside the Character in the hierarchy tree, create an Empty object. Rename this object "Ceiling check" and position it at the top center of the character. This will be the ceiling detection
- Drag this "Ceiling check" object to the property "ACC2D > Detection > Ceiling check object"
- Add "Capsule collider 2d" to the character. Set a correct size and position to the collider for the crouch state of your character by clicking on the "Edit collider" button.
- Drag the "Capsule collider 2d" to the property "ACC2D > Movement > Crouch collider"
- Be sure that the "ACC2D > Activation > Enable crouch" option is checked

When you crouch, the character stand collider is disabled and the crouch character is enabled. Your speed is also changed to a fraction of the walking speed, configurable in "ACC2D > Movement > Crouch walk speed".

You will not be able to see your character crouching because the character have no animations yet.

Character animations

Now it's time to animate the character.

- Add an "Animator" component to the character
- Open the animation window, in the Editor menu in "Window > Animation > Animation"
- Create the animations you want the character to perform. ACC2D can control the following animations: idle, walk, run, jump, fall, wall surfing, crouch idle and crouch walk. But you can have more
- After creating the animations, go to the animator window, in the Editor menu in "Window > Animation > Animator"
- Go to the "Parameters" tab and add all the animation parameters (bool): isGrounded, isJumping, isFalling, isCrouching, isRunning, isWalking, isWallSurfing, isFacingRight. You can find a more complete description in the “Character state parameters for animation” section.
- Drag the animator into "ACC2D > Movement > Animators"

You can now add transitions to trigger animations for your character.
For example, you can add a transition from "Any state" to "Run" animation with the condition "isRunning" to "true". When the character is running, it will trigger the "Run" animation.

For a more comprehensible way to set up animations, you can open our example scenes and see how the animations is set up for the character.

Dust effects

The ACC2D component can also handle the dust effects that will spawn when you walk or jump.

- Inside the Character in the hierarchy tree, create an Empty object. Rename this object "Step check" and position it at the bottom right where you want the dust effect to appear near the feet of the character
- Drag this "Step check" object to the property "ACC2D > Detection > Step check object"
- Create a particle effect you want, for example for the landing effect. Make it bursts particles and not continuously
- Drag your particle effect in your project directory to make it a prefab
- Drag the prefab in the property you want in the "ACC2D > Effect" section

TIP

If you are making the dust for the character walk, the object “Dust walking emitter” will be spawned in the "Step check object" position when you put it in the "ACC2D > Effect > Dust walking emitter" property.

FAQ

My character jump higher when I crouch

When you jump, the Jump force is applied up once, whether you are crouching or standing. If the character behaves differently when crouching, it’s probably because you changed a property in the Crouch collider or Stand collider of the character. Don’t use Auto mass and keep both colliders with the same mass.

The jump feels slow, not falling fast enough

Try to change the gravity factor of the character. A higher gravity factor when jumping means the jump requires more force to jump. A higher gravity factor when falling means the character will fall quickly and will avoid the floating effect.

I only need the character to run or to walk

You can check the “Enable always run” option and set the “Walk speed” and “Run speed” at the same number. You can also disable walk.

I want to add more animations, like when the character Attack

You can have all the animations you want, you are not limited by the animations suggested in this documentation.
For example, if you want to add an “Attack” animation, just send the parameter to your animation, add the “Attack” animation and change your transitions.

Walking emits too much particles

You can emit less particles on the object you affected to “ACC2D > Effect > Dust walking emitter”. You can also increase the Dust time to increase the interval between spawned object / particles.

The character does not jump

Check if you have configure the Jump input correctly, if you have checked the “Enable jump” option. Also see the “Ground check” object position and “Radius detection”. If the script does not detect the ground correctly, the character is considered to be in the air.

The character switch between crouch and stand all the time

Check if you properly set “ACC2D > Detection > What is ground” to the “ground” layer (or to what layers contain the ground in your project. Check also if the player is not in a “ground” layer.

More informations

For questions about this package, go to the Unity forum.

If you want additional informations, go to our website:
https://www.pixelcrown.net/