Documentation

Version 03.2b eng

Simple. Fast. Helpful.

Simple A* Pathfinding (SAP2D)

This documentation will help you set up and start using the path search system in 2D games (SAP2D) developed on Unity.

The SAP2D (Simple A * Pathfinding 2D) path search system is based on Astar algorithm –the shortest path between two points. This search system path you can use to write your own artificial intelligence systems that will help you implement enemies or a system of controlling a character in your 2D game.

The system is very simple, so if you are not an advanced Unity user, you can easily and fast set up the SAP2D system.

Sections of documentation

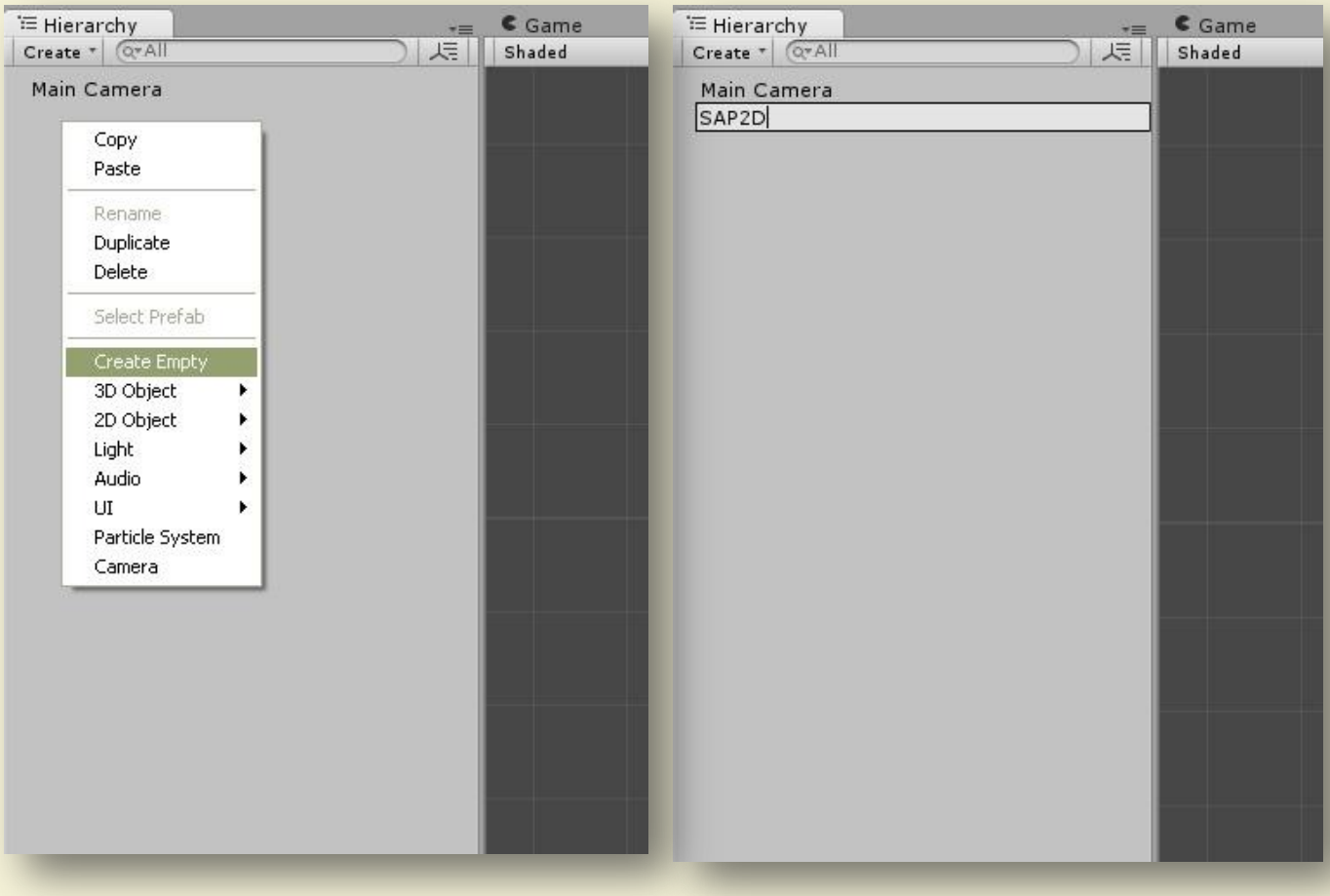
Quick start

This section details the setup process of SAP2D system, so that you can quickly assess its features.

One of the main feature of the SAP2D path search system - is a **quick setup**. Follow all stages of the setup below.

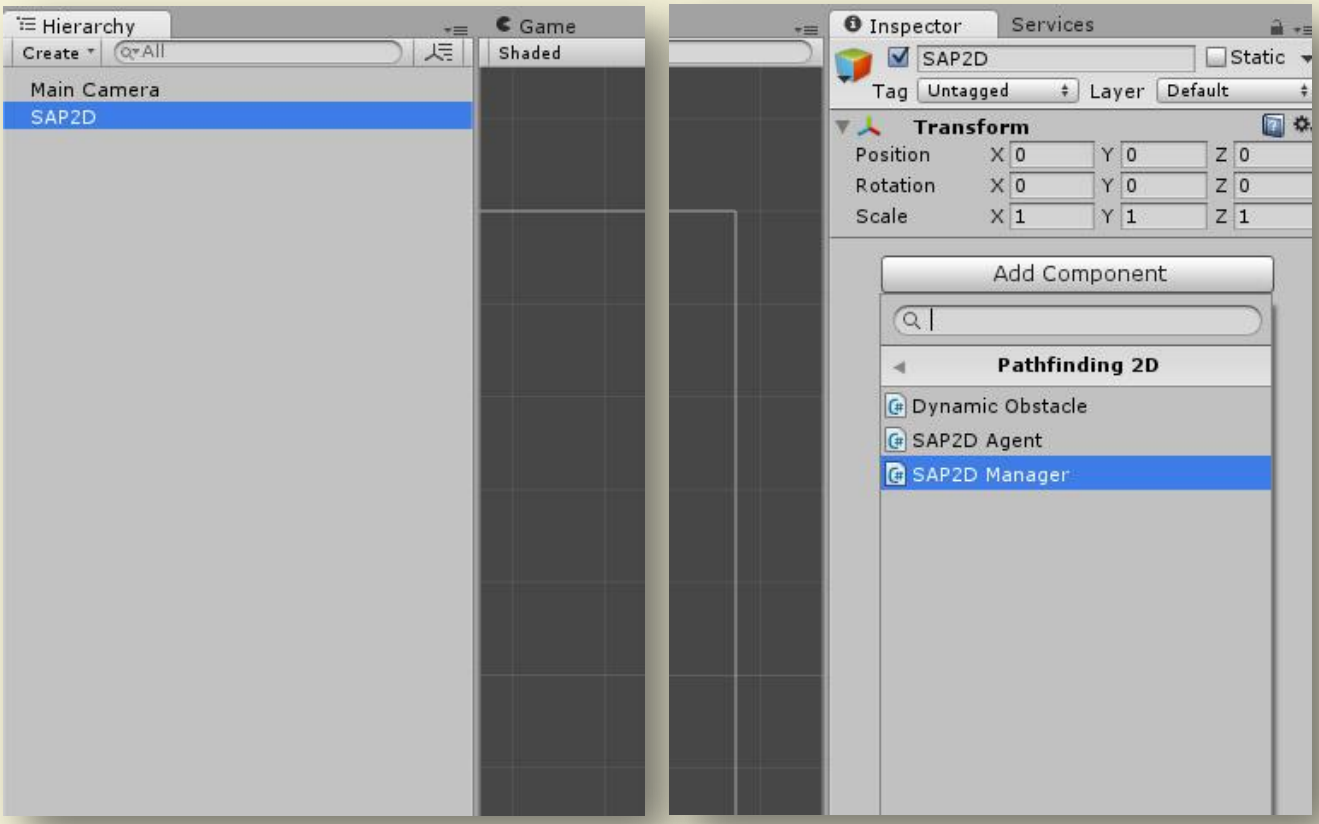
Stage 1:

After importing the system into your project, create an empty object on the scene and name it for example "SAP 2D".



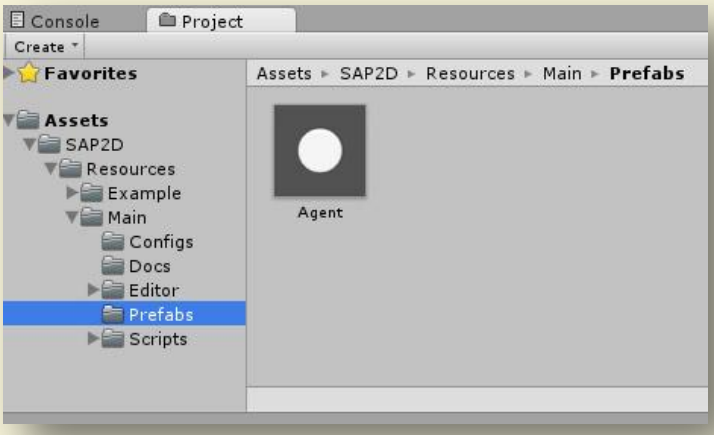
Stage 2:

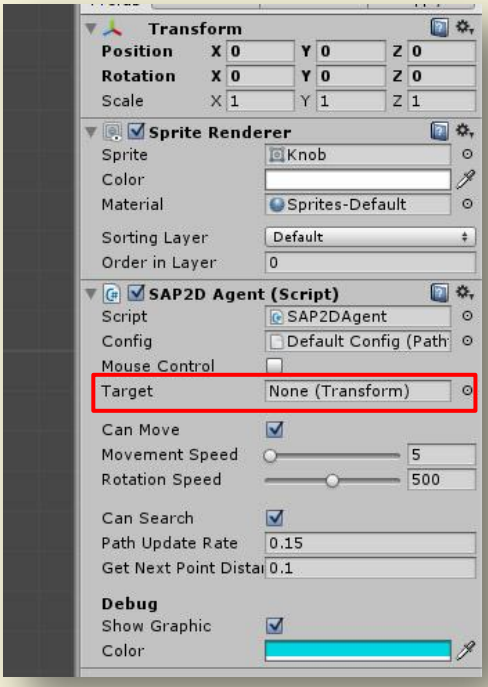
Add to the created empty object the main script that manages the SAP2D system - **SAP2D Manager**. Select the object and click on the "Add Component" button. In the drop-down list, select**: Pathfinding 2D > SAP2D Manager**



Stage 3:

Add a prefab agent to the scene. You can find this prefab on the directory: **SAP2D > Resources > Main > Prefabs > Agent**. Create an empty object and name it "Target". Place this object in the Target field in the SAP2D Agent script





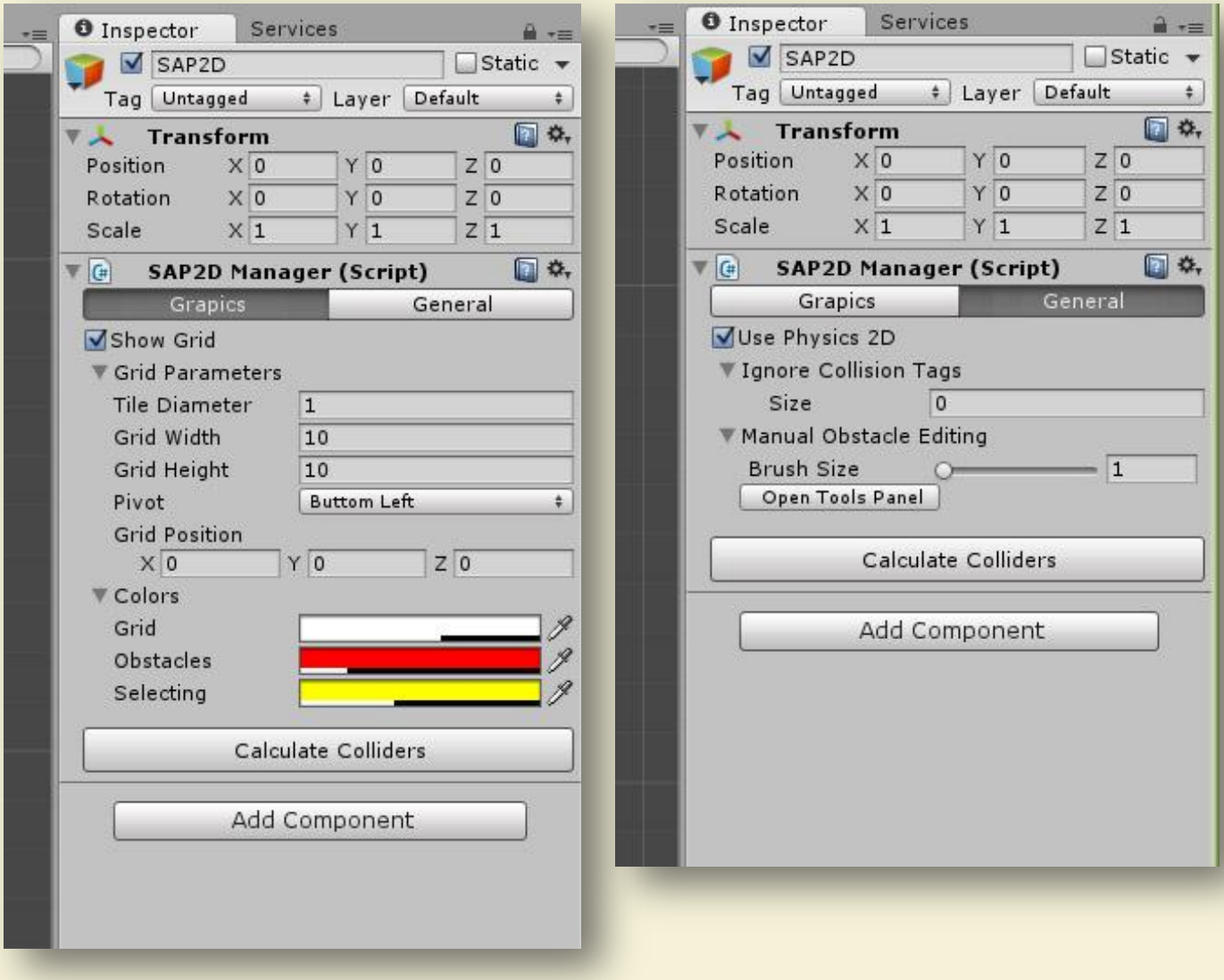
The setup of SAP2D system is ready. Start the scene and test the performance.

SAP2D system Settings

In this section, we will consider the features of the SAP2D system and look detail to SAP2D settings.

SAP2D Manager

SAP2D Manager is the main script of SAP2D system. This script should be on the scene in a single copy. When you add this script to the scene, you will immediately see the grid in the scene editor window. SAP2D Manager has a few important settings: grid parameters and collision calculation.



Grid Settings:

Show Graphic – display / hide grid

Tile Diameter – since each cell is a square, the length and height of the tile is set by one parameter

Grid Width –number of tiles in grid by x axis

Grid Height – number of tiles in grid by y axis

Pivot – grid bandings point

Grid Position – the position of the grid in a world space

Color settings:

Grid Color – grid color

Obstacles Color - unwalkable areas color

Selecting Color – selected tiles color in manual obstacles editing mode

General SAP2D Settings:

Physics 2D calculation settings:

Use Physics 2D – calculate 2D colliders

Ignore Collision Tags - List of ignored tags. Obstacles that have one of the tags of this list will be ignored when calculating 2D colliders. Dynamic obstacles will also be ignored.

Manual obstacles editing mode settings:

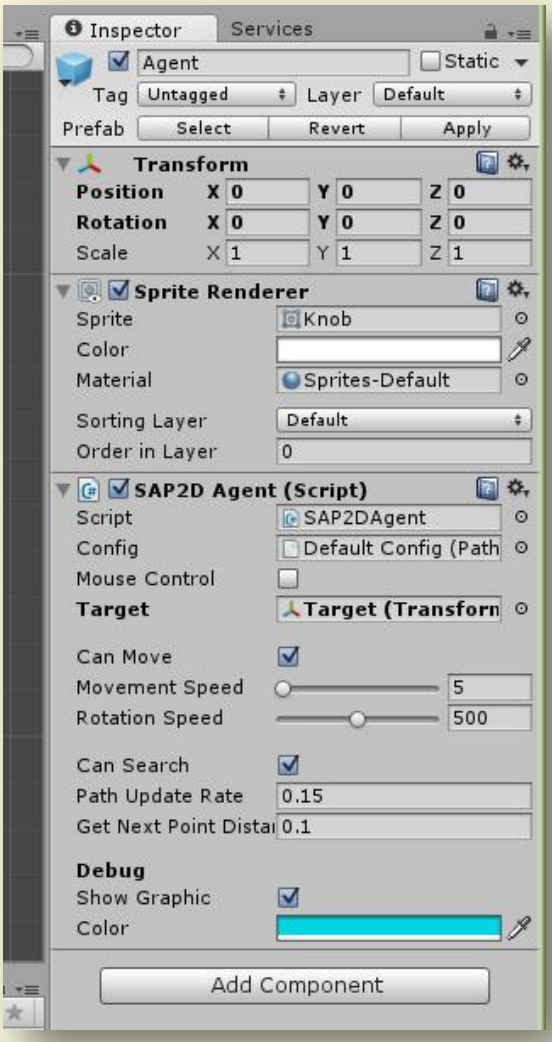
Brush Size – selected area size

Click the **Open Tools Panel** button to open the toolbar for manual editing obstacles

Tip: Lock the editor window where the SAP2D script is located by clicking on the lock icon at the top of the inspector window so that when you select other objects on the scene, you see the grid.

SAP2D Agent

SAP2D Agent is an example of a ready AI system based on SAP2D, created to demonstrate the features of SAP2D.



Config – pathfinding settings for this agent

Mouse Control - the parameter is for controlling the object with the mouse. By clicking with the left mouse button the object placed in the Target field will automatically change its position

Target – target position

Can Move – can move agent parameter

Movement Speed – agent movement speed

Rotation Speed – agent rotation speed

Can Search – can agent find path

Path Update Rate – path update rate

Get Next Point Distance – distance to the next tile in path

Show Graphic –display / hide path

Color – path color

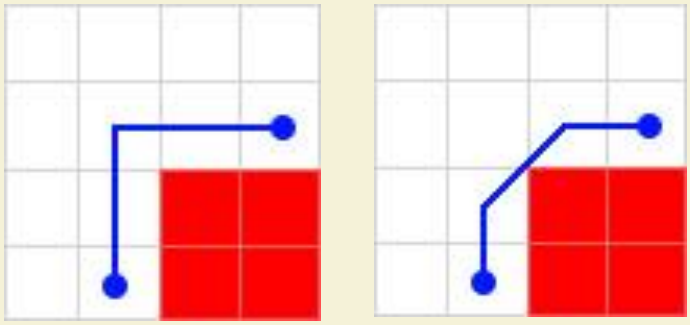
Pathfinding Configs 2D

Pathfinding Config it is the storge for pathfinding settings. Pathfinding Config allows you to set unique path search settings for each agent on the scene. To create a Pathfinding Config, click the left mouse button in the project window and select**: Create > SAP2D > Pathfinding Config 2D.**

For each agent using the SAP2D system, you must create a Pathfinding Config.

Pathfinding Config Settings:

Ignore Corners - If this option is enabled, the system will ignore the angles of obstacles when calculating the path. The meaning of this parameter can be seen in the pictures below.



Ignore Corners = false *Ignore Corners = true*

Diagonal Movement – disable agent diagonal movement

Dynamic Obstacles

The SAP2D system supports dynamic obstacles. To create a dynamic obstacle, you just need to add the **DynamicObstacle** script to the objects. **Pathfinding 2D > Dynamic Obstacle**.

SAP2D Dynamic obstacles support:

Circle Collider 2D

Box Collider 2D

Polygon Collider 2D

Tilemap Collider 2D

SAP2D API

To write your own control system for artificial intelligence you need to know how to get the path between two points.

Create a new script.

Below is an example of using SAP2D API for writing AI systems:

```
1  using UnityEngine;
2  using System.Collections;
3  using SAP2D;
4
5  public class MyAgent : MonoBehaviour {
6
7      public Transform Target;
8      public PathfindingConfig2D Config;
9      public Vector2[] path;
10
11     private SAP2DManager manager;
12
13     void OnEnable(){
14         manager = SAP2DManager.singleton;
15     }
16
17     void Start () {
18         path = manager.FindPath (transform.position, Target.position, Config);
19     }
20 }
21
```

After executing the program, you get an array of points of type Vector2 in the path variable. This is the path from the object to which this script is added to the object placed in the Target field.

Note that in the Config field you need to put Pathfinding Config 2D. You can create a new configuration or use a standard configuration that is located in
SAP2D/Resources/Main/Configs/Default Config

Also, do not forget to include a namespace – **using SAP2D;**

FAQ

The system SAP2D made by **Michel Schneider**.

I apologize for possible translation problems, since I am not a native speaker of English. If you notice a translation error, please write to me about it on Twitter:

TWITTER PAGE

Also you can write me to my email:

greatchuduk@gmail.com

I hope that the SAP2D system will help you create a good game. Thanks for reading.