Realistic Traffic Controller

Thank you for purchasing and using RTC! This documentation will guide you on how to install and use the package in your projects.

Tutorial Videos

You can watch tutorial videos from here. Playlist will be updated frequently.

Importing

Package doesn't require any dependencies. Importing the package would be enough to work with it. Select all assets in the importer screen. Be sure to not have any errors on your console. If you do, please try to remove the entire package from the project and import it again. If you are still having errors, please send me an email with urgent title, I'll get back to you as soon as possible.

Overview

Package includes complete demo scene that includes traffic system. Once you import the package, open the demo scene named "**RTC_Demo_City**", which can be found in the scenes folder. I would recommend you to open and investiagate this scene to understand how the system works.

Each component has been managed by their editor script. Hover your mouse cursor on any variable to see detailed information about it. All scripts are commented, easy to understand and easy to edit. All prefabs are located in the prefabs folder. You may want to use them in your scenes.

Image of the components may be different from the latest release.

How the System Works

Traffic vehicles will be using the lanes and their waypoints on your scene. Each lane has multiple waypoints. You can draw shape of the lane with these waypoints. Lanes can have hundreds of waypoints, not limited. These waypoints are connected to each other. Each waypoint has next waypoint, previous waypoint, and interconnection waypoint. These target waypoints will lead the traffic vehicle's path. Lanes can be connected to each other. All lanes are collected in the **RTC_Lanes** gameobject on the scene. And all waypoints related to the lane are collected in the lane itself. **RTC_TrafficSpawner** will spawn the traffic vehicles on random waypoints, and manage the traffic. Vehicles at certain distance will be enabled / disabled by the **RTC_TrafficSpawner**. All traffic management is up to this spawner. **RTC_TrafficSpawner** will follow the main camera on your scene if selected. Each traffic vehicle has **RTC_CarController** component. This component manages the control and the navigation of the traffic vehicle. **RTC_SceneManager** will be observing the scene for all lanes, waypoints, spawner, traffic vehicles, etc…

Lanes have **RTC_Lane** component, waypoints have **RTC_Waypoint** component, traffic vehicles have **RTC_CarController** component, and the spawner has **RTC_TrafficSpawner** component. These components are managed by their responsive editor scripts. This means that if you add or remove any public variables in these scripts, you must edit their editor scripts as well. Otherwise, you'll get errors.

Spawner will spawn the traffic vehicle at random waypoint with proper distance. Spawned vehicle will get closest waypoint and lane directly and navigate itself. Spawner has a radius to spawn / despawn traffic vehicles at runtime. If a traffic vehicle exceeds the radius, it will be disabled and wait for his next possible turn. System has many optimization methods to run the traffic vehicles at best performance. Everything related to the components will be explained below.

Toolbar Menu

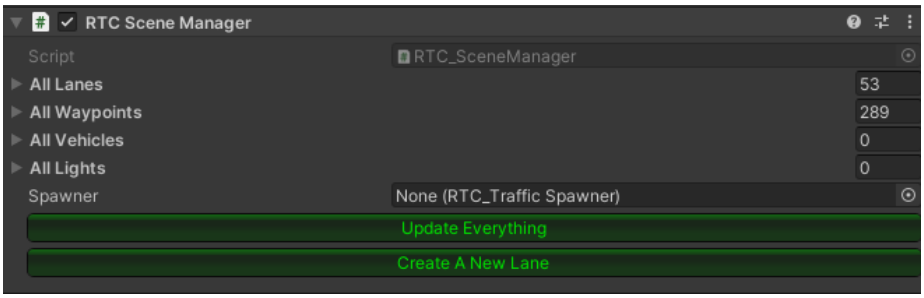
You can access to the toolbar menu from the **Tools → BCG → RTC**.

RTC_Settings

You can access to the **RTC_Settings** from the **Tools → BCG → RTC → Edit Settings**.

RTC_SceneManager

Manager script for all lanes, waypoints, traffic vehicles, and spawner. Lists and updates all lanes and their waypoints, registers spawned traffic vehicles and spawner. All other system based on lanes, waypoints, spawner, and spawned traffic vehicles will use this manager. This manager will be instantiated automatically on your scene, and doesn't require any action. It can be used to get lanes, waypoints, spawner, and traffic vehicles at runtime without using heavier methods.



RTC_Lane

All lanes must have this component. When you create a new lane, this component will be added to the new lane automatically. It has a list for all waypoints connected to this lane. This script is managed by the editor script. You can create / edit / remove any waypoints, close the circuit, break the circuit, and align the waypoints. When you select any lane on your scene, all waypoints will be editable with transform gizmos. You can change their positions easily. All buttons of the **RTC_Lane** have been explained below.

Create New Waypoint

Enables the mode for creating new waypoint. When this mode is on, you can create a new waypoint by holding left shift and clicking left mouse button on your scene. This will create first waypoint of this lane. After that, mode will be switched to the create next waypoint automatically. Press cancel button when you're done with creating waypoints.

Create Next Waypoint

Enables the mode for creating next waypoint. When this mode is on, you can create a next waypoint by holding left shift and clicking left mouse buton on your scene. This will create next waypoint, and first / previous waypoint will be connected to this waypoint. For example, if your lane has four waypoints, this will create the fifth waypoint. You can create next waypoints as long as you want, unless you press cancel button.

Create Previous Waypoint

Enables the mode for creating previous waypoint. You can create a previous waypoint by holding left shift and clicking left mouse button on your scene. This will create previous waypoint of very first waypoint. You can create previous waypoints as long as you want, unless you press cancel button.

Caution!

When you are in mode for creating new waypoints, creating next waypoints, or creating previous waypoints, you can't select any other gameobjects. You'll be informed by labels about this. You'll need to press cancel button to exit the mode. Otherwise, you won't be able to select other gameobjects in the scene.

Align X, Y, Z

Aligns all waypoints by the selected axis. For example, you are trying to make a straight line, but all X – Z values are different, and the line is not perfectly straight. You can align all waypoints with these buttons.

Close Circuit

If the lane has three or more waypoints, you can close the circuit by clicking this button. This will connect last waypoint to the first waypoint.

Break Circuit

If the lane has closed circuit, you can break it by clicking this button. This will break the connection between last waypoint and the first waypoint.

Remove Last Waypoint

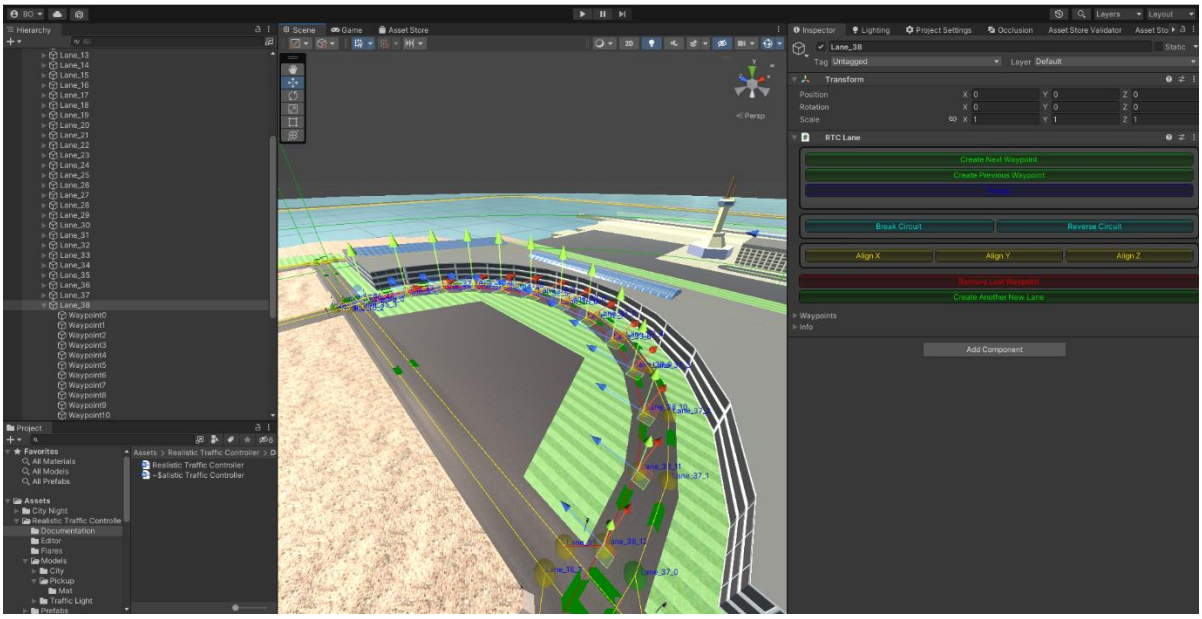
Removes the last waypoint and disconnects all connections related to this waypoint. Be careful what you're doing, you can't undo this operation.

How to Create New Lane

You can create new lane on your scene from the toolbar menu, from the **RTC_SceneManager**, or from the any lane on your scene. This will create an empty lane without any waypoints at center position. You'll need to draw the shape of the lane by creating and placing waypoints. When you choose the new lane, you can click "**Create New Waypoint**" button to create first waypoint. Then you can create next waypoints with the same way. When you are done with it, press cancel to exit the mode.

How to Edit Shape Of The Lane

You can edit positions of the waypoints directly by changing their positions, or you can simply select the lane (not the waypoint itself), it would let you to change positions of all waypoints individually.

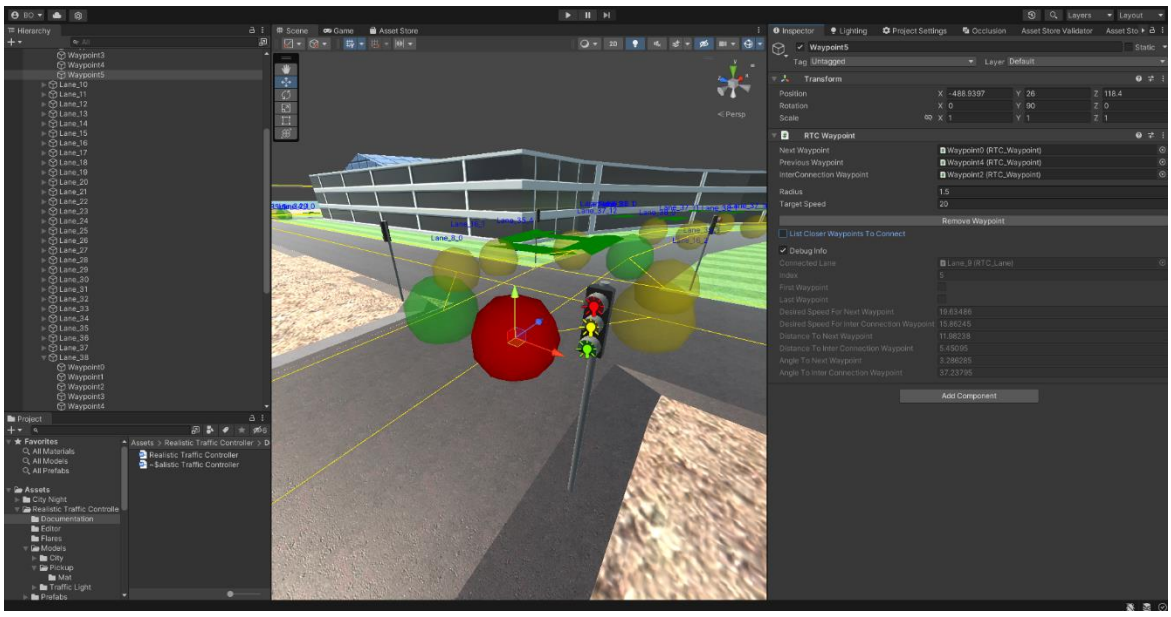


How to Add New Waypoints

You can increase length of the waypoint by clicking “**Create Next Waypoint**”. However, this will create a new waypoint at the end of the lane. If you want to create a new waypoint at specific index, simply select the waypoint you want, and click “**Create Next Waypoint**” button. This will add a new waypoint on specific index.

Waypoint Settings

Each waypoint has target speed, and radius. You can edit them from the lane, or from the waypoint directly. When a traffic vehicle gets closer to the waypoint, it will adapt its speed to the target speed. And won’t pass the waypoint if distance to the radius is not enough. On higher radius, traffic vehicle will switch to the next waypoint too earlier. On smaller radius, traffic vehicle will try to get closer to the waypoint to pass to the next waypoint. Waypoints have calculated distances, speeds, angles, and directions. Traffic vehicles will be using them to behave realistically. This calculation has been made by the lane itself. When you select the lane on your scene, editor will update all these settings of the waypoints. It would be good to select the lane once if you’ve done changes on any waypoints. Because updating process is triggered by the lane script.



Updating Lanes and Waypoints

Waypoints and lanes must be in a relationship with updated values. When you select a lane on your scene, it will update all waypoints of the lane. It would be good to select the lane once if you've done changes on any waypoints. Because updating process is triggered by the lane script.

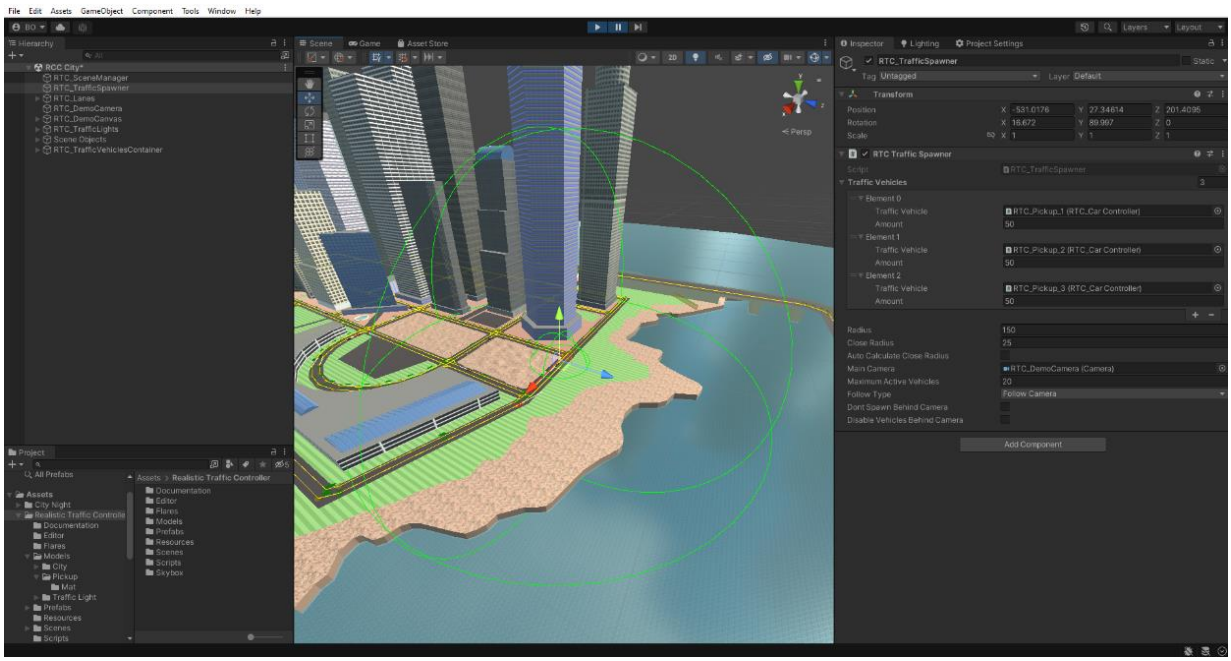
However, you can update all lanes on your scene from the **RTC_SceneManager**. You may want to use this feature to keep your lanes and waypoints up to date.

Waypoint Connections

Waypoints have three connections for previous waypoint, next waypoint, and interconnection waypoint. You can connect to closer waypoints directly inside the inspector panel. Once you select any waypoint you want to connect to, enable "**List Closer Waypoints To Connect**". You'll have buttons to connect the selected waypoint to closer possible waypoints.

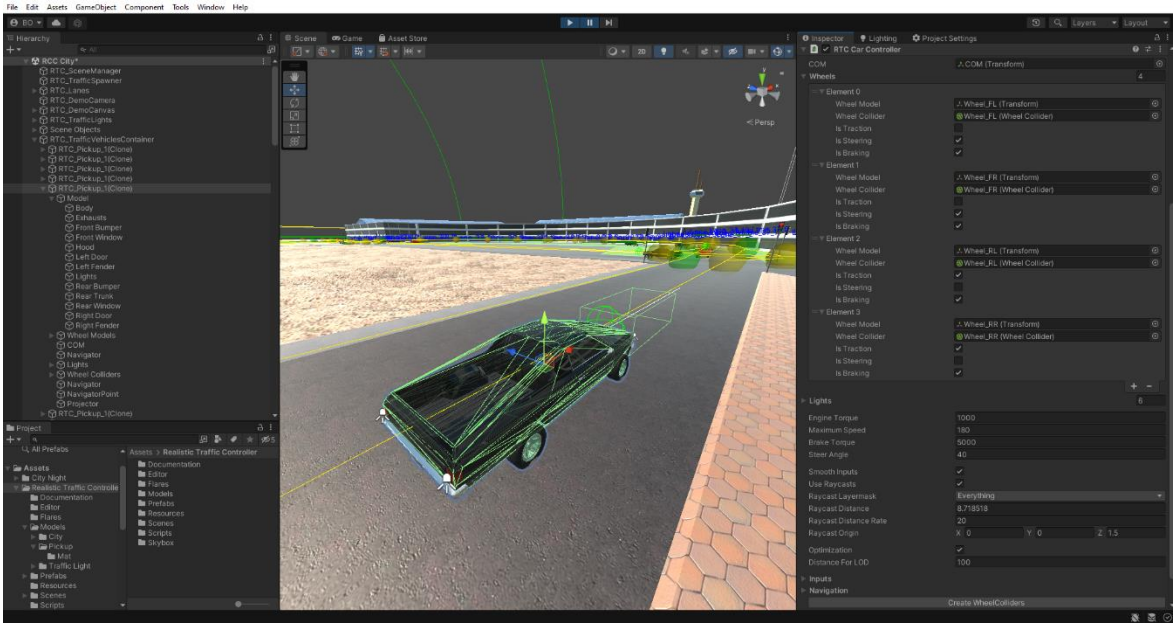
RTC_Spawner

Will be spawning new vehicles and observing them periodaclly. It should follow the main camera. Select the traffic vehicle prefabs you want to use, set their amount. Radius means traffic vehicles can be spawned / transported to any waypoint in this radius range. If any vehicle gets off the radius, it will be disabled. Closer radius means, spawner won't spawn / enable any traffic vehicle in this radius range. Closer radius can't be higher than the radius, and shouldn't be close to each other. Usually, you don't want to spawn / enable traffic vehicles below 200 meters. Spawner has optimization methods to improve the performance. You can enable them for best performance. However, traffic vehicles will not be spawned / enabled at behind the main camera in this case.



RTC_CarController

Controls and navigates the vehicle. Must be attached to the root of the vehicle. You'll have to choose all wheels of the vehicle, and create their wheelcolliders. When you choose all wheels, create all wheelcolliders button will be visible. You can create all wheelcolliders easily. **RTC_CarController** will calculate all inputs based on the current waypoint's position and rotation. Uses raycasts to detect obstacles and other traffic vehicles. Brake and indicator lights can be used on the vehicles. Optimization methods will ignore heavy processes on far away distance vehicles. All traffic vehicles must have Rigidbody, **RTC_CarController**, and a body collider.



How to Create New Traffic Vehicle

First of all, drag and drop your vehicle model to the scene. Be sure X, Y, Z axes of your vehicle model are correct, otherwise vehicle will behave wrongly. X must be facing to right, Y to up, and Z to forward.

Select the traffic vehicle on your scene, and add main controller component from the **Tools → BCG → RTC → Add Traffic Controller To Vehicle**. Rigidbody will be added automatically as well. You'll have to choose all wheels of the vehicle, and create their wheelcolliders. When you choose all wheels, create all wheelcolliders button will be visible. You can create all wheelcolliders easily. At this point, you can use this vehicle. You can set it's maximum speed, maximum steer angle, torques for motor and brake, raycast settings, lights, optimization, etc… Create a prefab version of your vehicle inside your project. To do this, simply drag the vehicle gameobject and drop to your project folder. When you drag and drop the gameobject to your project folder, you would create a prefab version of the vehicle. Or you can directly create prefab by simply clicking the create prefab button. Now you can use your vehicle prefab for **RTC_TrafficSpawner**. **Be sure your vehicle has proper body collider.**

How to Use Traffic Vehicles

RTC_TrafficSpawner is using vehicle prefabs to spawn and manage the traffic vehicles. You'll need to assign traffic vehicles of the **RTC_TrafficSpawner** on your scene. Simply select the **RTC_TrafficSpawner** and you'll see a list for traffic vehicles. Simply add a new row and add your own vehicle prefab here. You can set amount of them as well.

Common Mistakes

Can't spawn traffic vehicles on the lanes / waypoints

Be sure your scene has **RTC_TrafficSpawner** with proper configurations. And be sure main camera variable of the spawner has been selected, it should follow the main camera. And pay attention to the radius of the spawner. If it's too low, it won't detect any lanes and waypoints.

I've created a new vehicle but it keeps falling through the ground

Be sure your vehicle has proper collider for body shape.

I've created a new vehicle but it won't move

Be sure your vehicle has proper wheel models and wheel colliders. Once you select all wheel models, you'll be able to create their wheel colliders by pressing the create wheelcolliders button.

I've created a new vehicle but it won't detect obstacles

Be sure your vehicle has proper raycast settings. If distance of the ray is too low, or layermask of the raycast is wrong, this would happen.

I can't select any other gameobject in my scene

You're in lane / waypoint creation mode right now. Press cancel to exit this mode.

My waypoints are not positioned correctly on the road

Creation mode will use the colliders on your road. If your road gameobject doesn't have a collider, or wrong shaped collider, this would happen.

I can’t create lanes / waypoints on my road

Creation mode will use the colliders on your road. If your road gameobject doesn’t have a collider, or wrong shaped collider, this would happen.

Traffic vehicles can’t turn on corners with proper inputs

Be sure waypoints of the lane don’t have closer angles to 90 degrees. Otherwise vehicle will try to slow too much. Smooth your corners with multiple waypoints. Pay attention to target speed of your waypoints.

Traffic vehicles are taking corners too fast / too slow

You can set target speed of the waypoint easily. Simply select the waypoint you want to edit, and set it’s target speed properly.

Traffic vehicles are dropping performance

If your traffic vehicle has lights, be sure they are in not important mode. And be sure they are not reflecting to anything.

Traffic vehicles are spawning too high / too low

You can set spawn offset directly from the vehicle. Simply select the vehicle prefab in your project, and inrease / descrease Y spawn offset.

Raycast of the traffic vehicle is too high / too low

You can set raycast offset directly from the vehicle. Simply select the vehicle prefab in your project, and inrease / descrease Y raycast offset.

Raycast of the traffic vehicle is detecting ground on hills

You can use raycast layermask to ignore the road. Simply select the road collider(s) on your scene, and add “Ground” layer to it. Now disable “Ground” layer in the vehicle’s layermask. Raycast of the vehicle won’t detect any objects with “Ground” layer now.

Traffic vehicles can't detect obstacles or other traffic vehicles at high speed

Raycast length of the vehicle is calculated by the speed of the vehicle. You can increase the length multiplier directly from the vehicle. Simply increase the "Raycast Distance", or "Raycast Distance Rate" of the vehicle. But don't use higher values, otherwise vehicle will detect unnecessary obstacles at very far away distances.

Usage of the Package

RTC can be used to have realistic and stable traffic management on your scenes. Behavior of the traffic vehicles have been aimed for stable simulation. It can't be used for racing, chasing, or any kind of high speed based behaviors. If you are trying to use it for these behaviors, you just can't.

Legal

You can use the package in any personal / commercial projects. However, you don't have rights to redistribute, modify and redistribute, resell, or include in a project for sale. You don't have to leave credits, but if you do, I would appreciate.

Support

You can contact me via email. I'll be responding within 24 hours. Please include your invoice number while sending me an email.

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