

# Realistic Car Controller Pro

Thank you for purchasing and using Realistic Car Controller Pro. This documentation will guide you on how to create and configurate new vehicles.

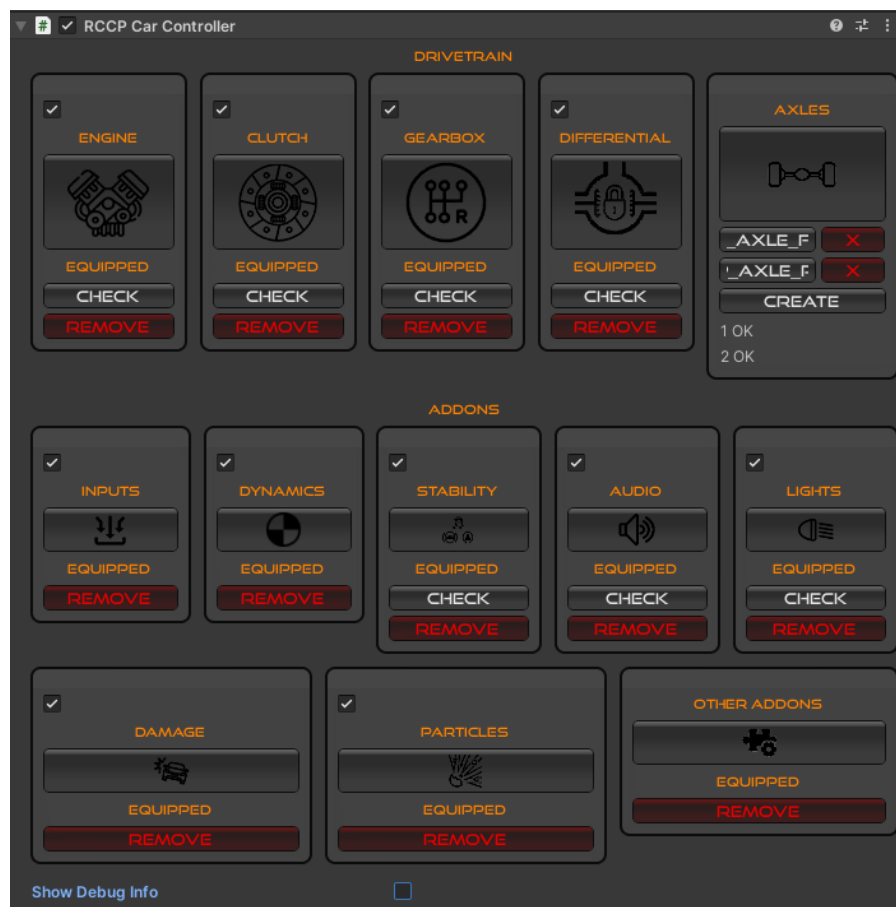
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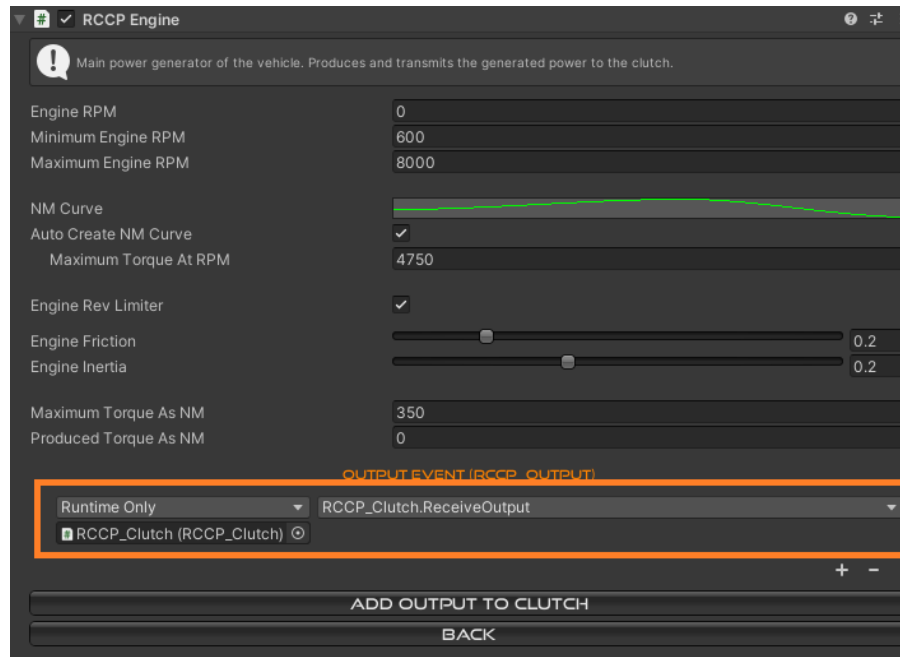
## Advantages of the Pro Version, Why Shoud I Use the Pro Version?

Realistic Car Controller was using all in one script to manage all drivetrain components and other external systems. Instead of this, Realistic Car Controller Pro is using all components individually. This will bring us more customizable and powerful opportunities. Engine, clutch, gearbox, differential, axle, and wheels are individual and not managed by one script. Each drivetrain component receives and produces torque. For example, you can directly connect your engine to the differential if you want. Or you can have multiple differentials with individual axles.



## Event Based Power Distribution

Each drivetrain component receives and delivers the torque with events. When you select any drivetrain component, you'll see those events. That means, you can deliver the torque to the any other component with events. Default event order is **Engine → Clutch → Gearbox → Differential → Axles → WheelColliders**. This order will be applied on vehicle creation if you choose automatic setup.



## Before Creating New Vehicles

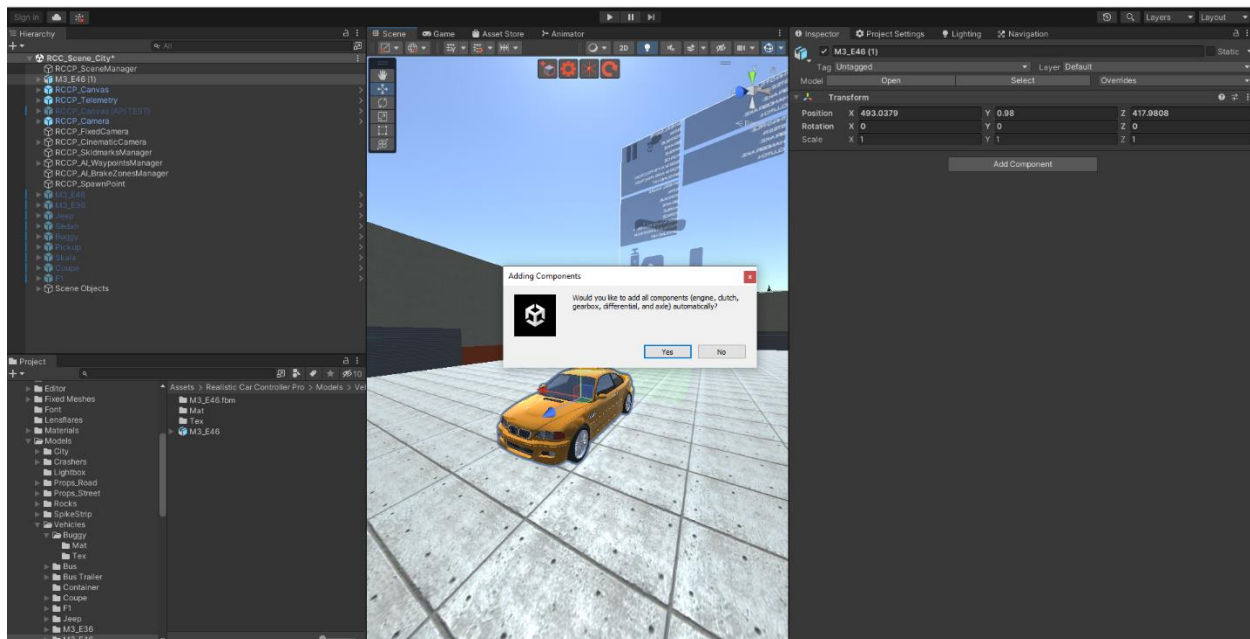
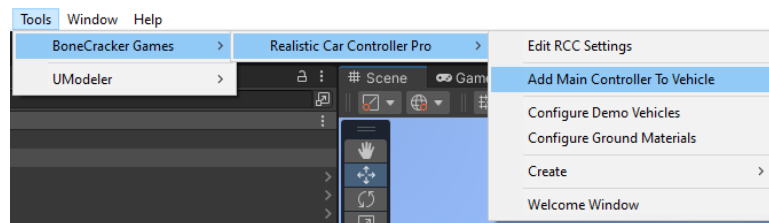
Be sure your model has proper pivot position and axle. RCCP already fixes pivot position of the model if it's not correct. Wheel models must have correct pivot positions and axes as well. Wheels with wrong pivot position and axis will lead to wrong wheelcollider alignment. **X is right**, **Y is up**, **Z is forward**. Be sure you are in **Local** and **Pivot** mode while checking your models.



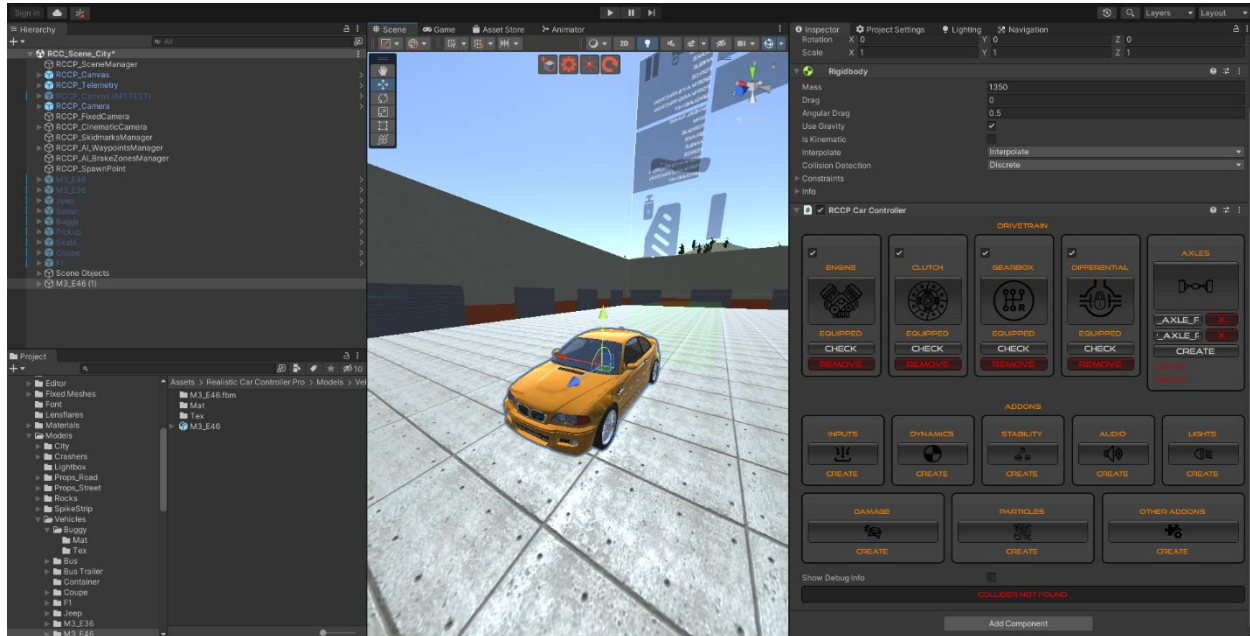
## Creating New Vehicles

Drag and drop your model to the scene first. Select root of the vehicle model in your scene and add the main car controller component from the **Tools → BCG → RCC Pro → Add Main Controller to The Vehicle**. This will add “**RCCP\_CarController**” component to the vehicle. It will ask you to add all drivetrain components automatically. Choose “**Yes**” if you want to do it automatically. If you select “**No**” you can add each drivetrain components manually. You’ll need to connect them together as well.

**Note:** Be sure your vehicle doesn’t include any additional rigidbodies, wheelcolliders, or sphere colliders attached to the wheels. Editor will warn you if your vehicle has one of them or all. Editor will create a new rigidbody and wheelcolliders for your vehicle already.



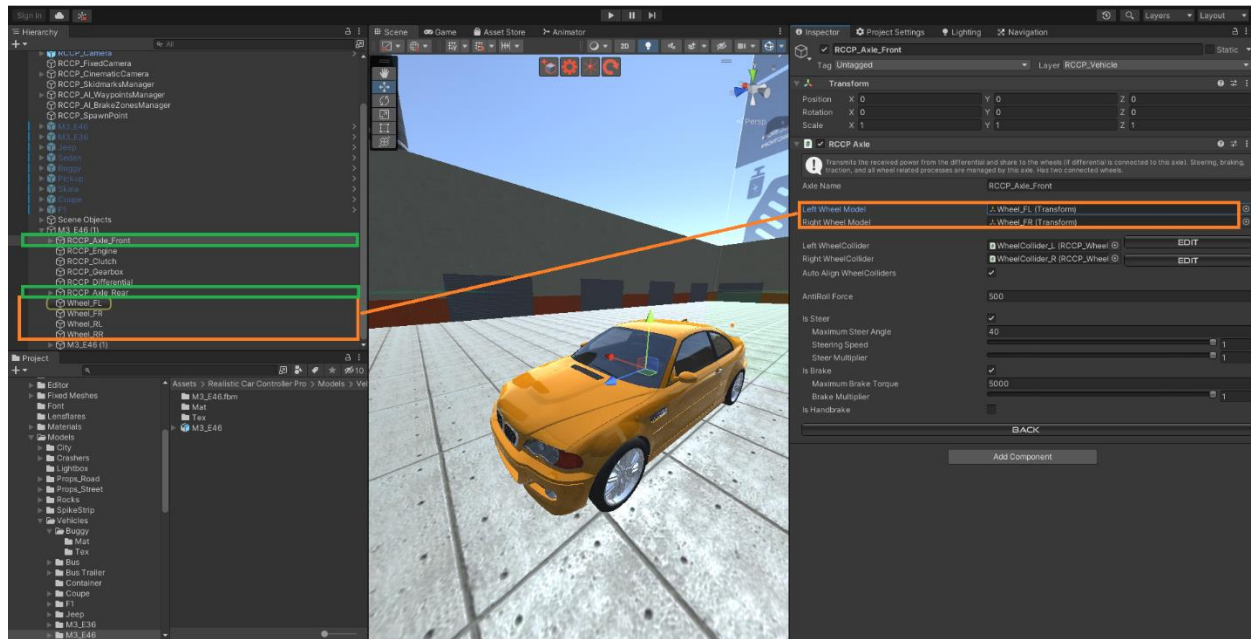
If you choose “**Yes**”, that means all drivetrain components are added and connected right now. All you have to do is, select your wheel models at this point. Simply select your axles (front and rear will be created automatically) and select left and right wheel models. Wheelcolliders will be adjusted automatically. You don’t have to create and align the wheelcolliders.



**Note:** If you want to remove or add any components, simply click on it. “**Check**” button will check the selected component and try to find any errors or misconfigurations.

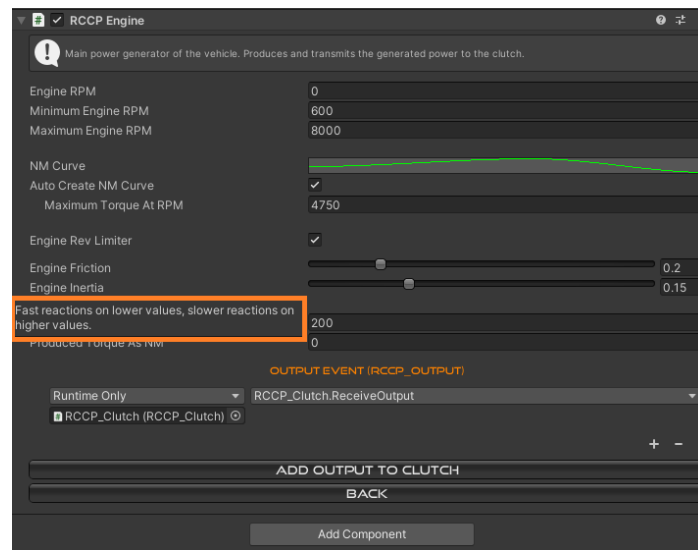
**Note:** If you want to adjust your wheelcolliders manually, simply disable the “**Auto Align WheelColliders**” option on your axle. After that, you can manually align your wheelcolliders. After selecting the wheel models, vehicle would be completely operational.

**Warning:** Be sure your vehicle model has proper body collider. Simply select the main part of your vehicle as body and add mesh collider. You can customize each component by clicking on their buttons. Your vehicle won’t run without proper body collider.



## Tooltip Information

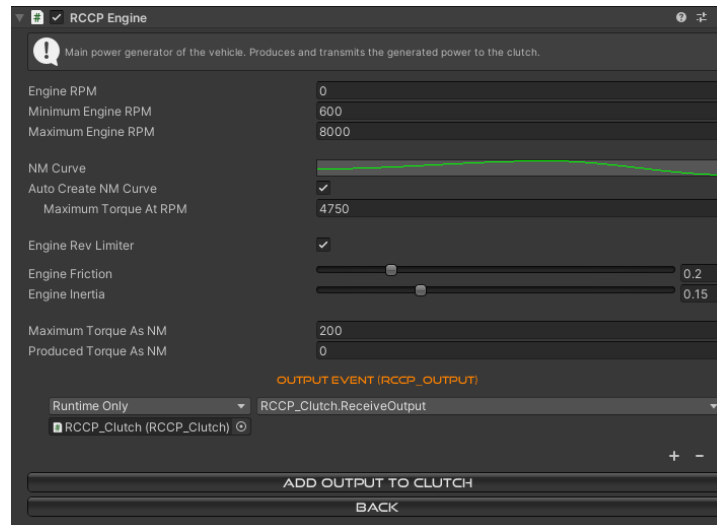
**Note:** Each variable has been explained with the toolbars. When you hover your mouse cursor on any variable, toolbar info will appear and inform you.



# Drivetrain Components

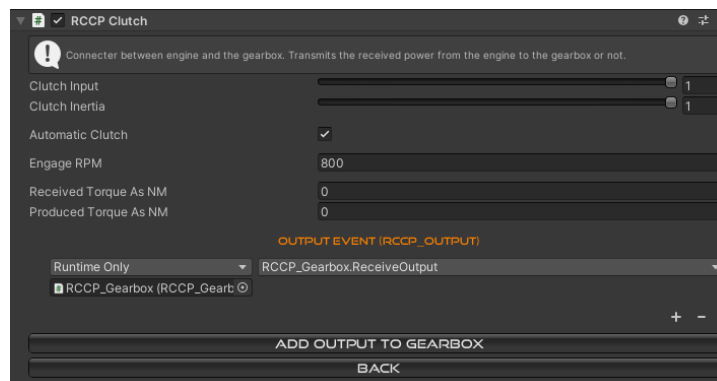
## RCCP\_Engine

Main power generator of the vehicle. Produces and transmits the generated power to the clutch. All variables have been explained in the script and inspector panel as well. Should be connected to the clutch.



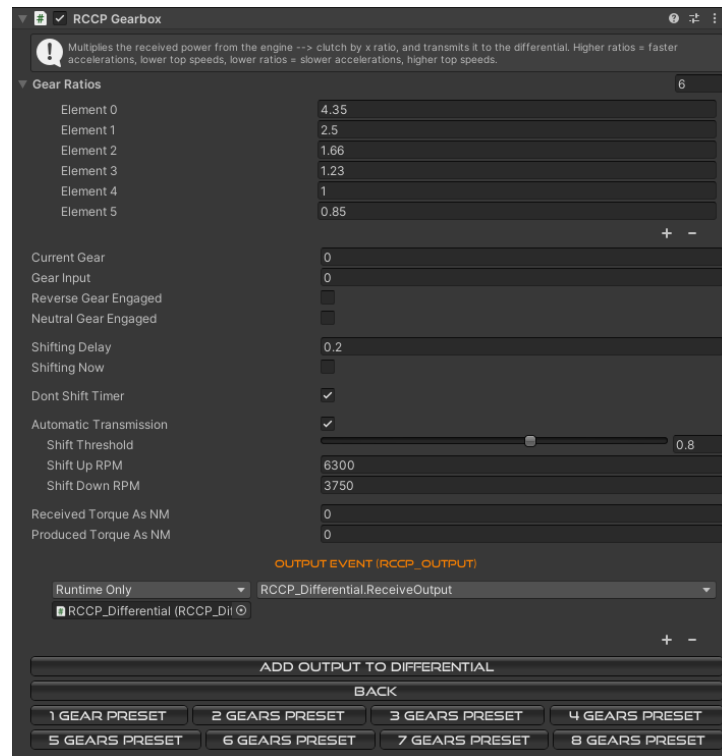
## RCCP\_Clutch

Connector between engine and the gearbox. Transmits the received power from the engine to the gearbox when the clutch pedal is not pressed. If clutch pedal is pressed, it will cut the connection between engine and the gearbox. Should be connected to the gearbox.



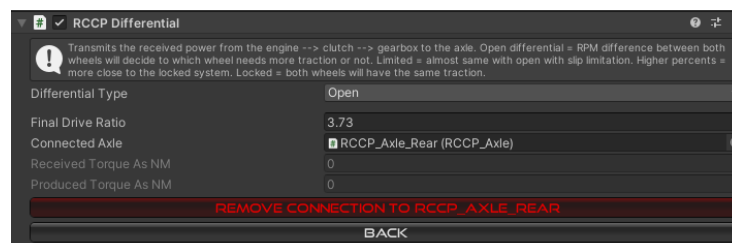
## RCCP\_Gearbox

Multiplies the received power from the engine --> clutch by x ratio and transmits it to the differential. **Higher ratios** = faster accelerations, lower top speeds. **Lower ratios** = slower accelerations, higher top speeds. Should be connected to the shaft, but RCCP doesn't include it yet. So, it should be connected to the differential.



## RCCP\_Differential

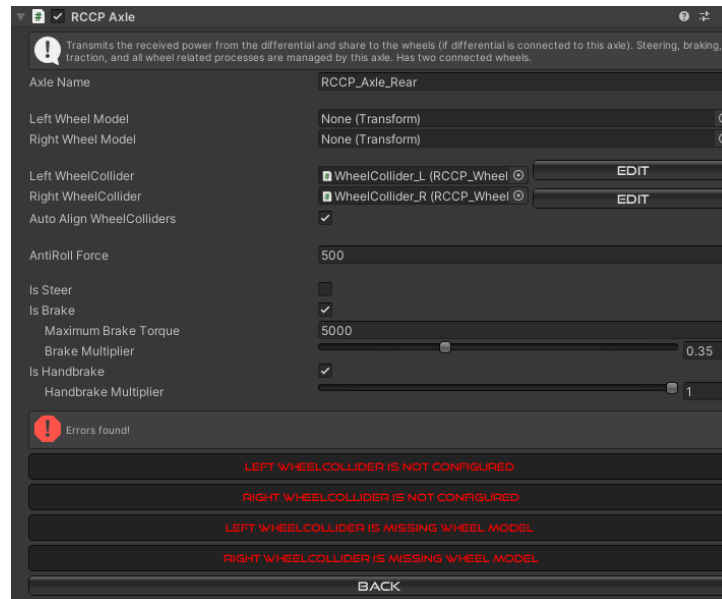
Transmits the received power from the engine --> clutch --> gearbox to the axle. **Open differential** = RPM difference between both wheels will decide to which wheel needs more traction or not. **Limited** = Almost same with open with slip limitation. **Higher percent** = Closer to the locked system. **Locked** = Both wheels will have the same traction torque and RPM. Should be connected to an axle.





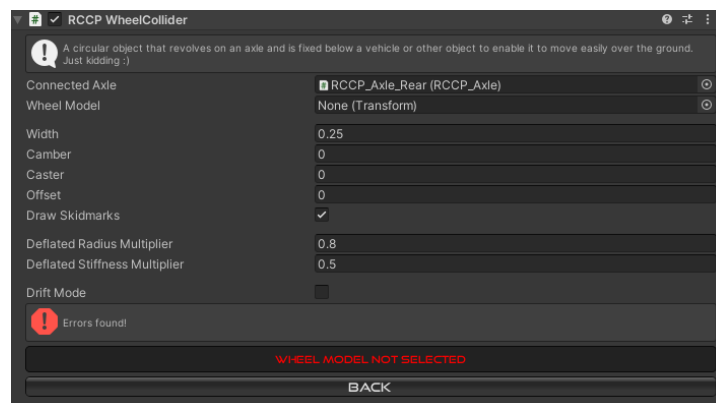
## RCCP\_Axles

Transmits the received power from the differential and share to the wheels (if differential is connected to this axle). Steering, braking, traction, and all wheel related processes are managed by this axle. Has two connected wheels (left and right).



## RCCP\_WheelCollider

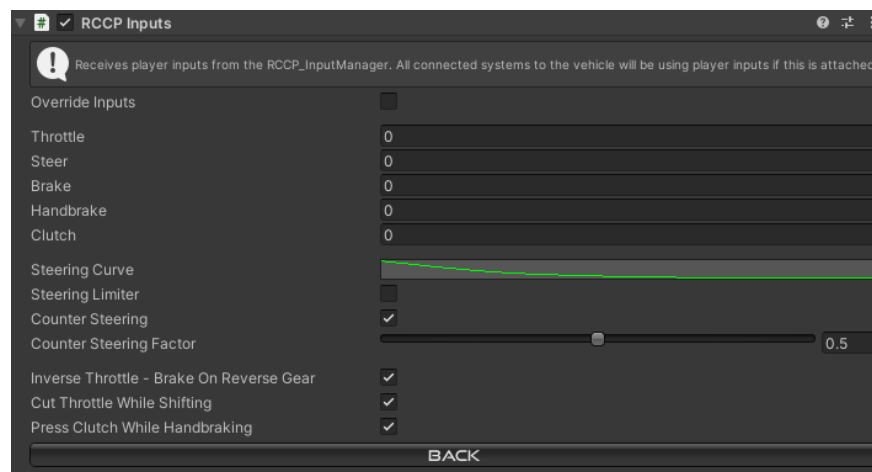
Actual wheelcolliders to apply motor torque, brake torque, and steering angle. Wheelcolliders must be connected to the axle, they won't work without an axle. Also aligns the wheel model automatically.



## Addon Components

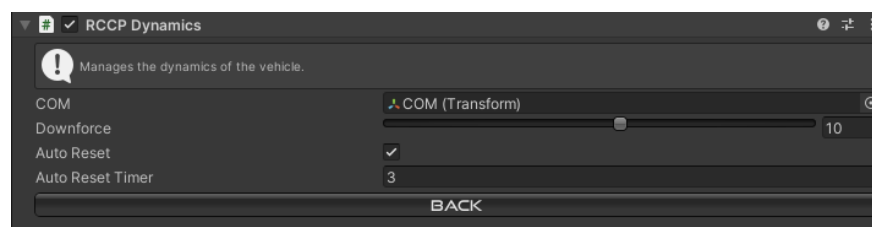
### RCCP\_Inputs

Receives player inputs from the [RCCP\\_InputManager](#). All connected systems to the vehicle will be using player inputs if this component is added to the vehicle. Vehicle will not receive player inputs if the inputs component is not added to the vehicle. In order to receive player inputs, you'll need to add inputs component to the vehicle. Simply click "[Create](#)" button under to inputs component.



### RCCP\_Dynamics

Manages the dynamics of the vehicle. Center of mass, and downforce management.

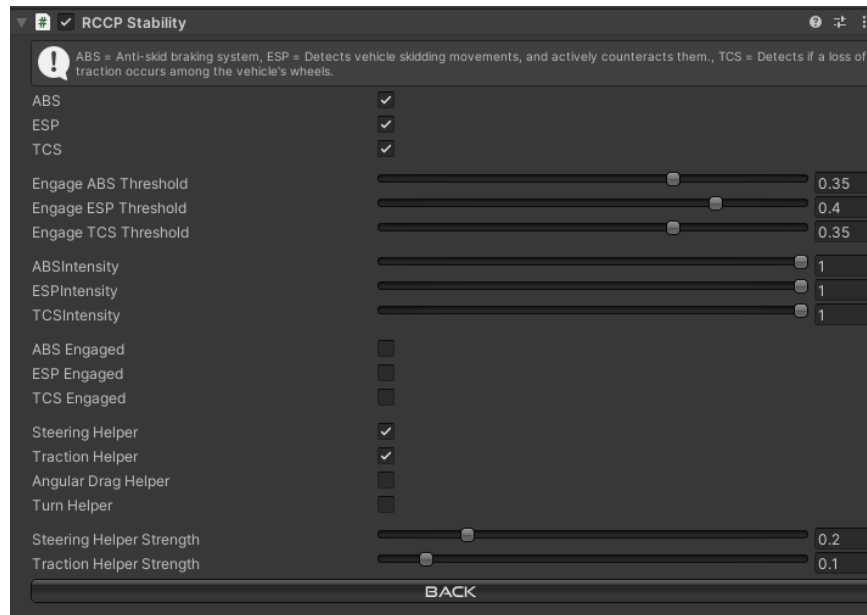


### RCCP\_Stability

Improves stability of the vehicle and includes **ABS**, **ESP**, and **TCS**.

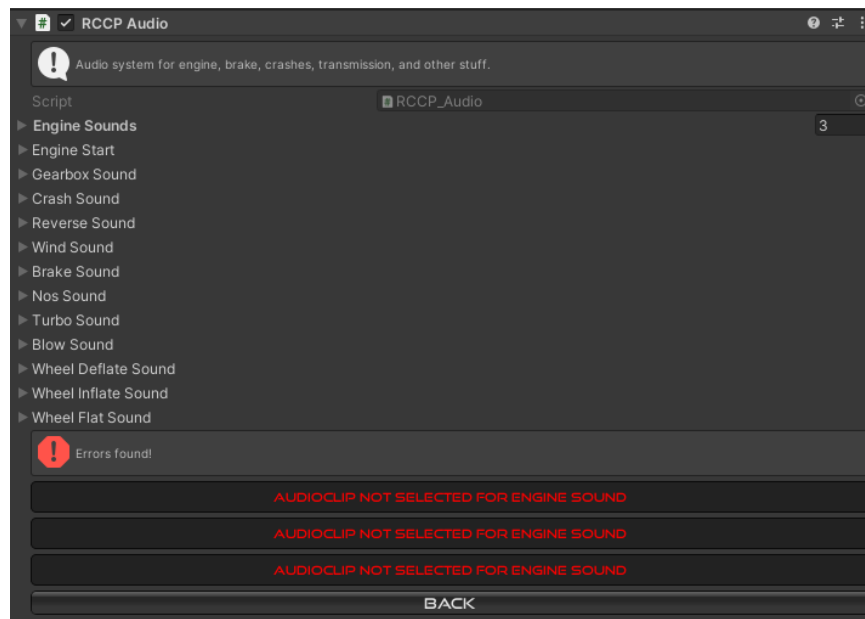
**ABS** = Anti-skid braking system. **ESP** = Detects vehicle skidding movements, and actively counteracts them. **TCS** = Detects if a loss of traction occurs among the vehicle's wheels.

Also includes steering helper, traction helper, angular drag helper, and turn helper to increase handling stability.



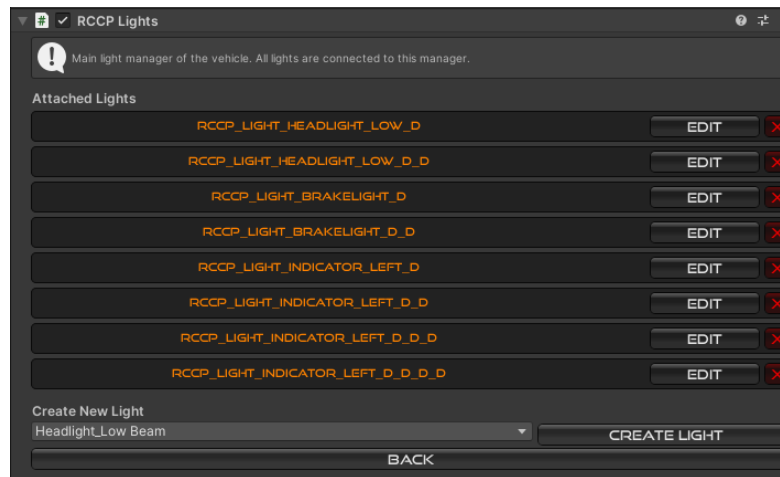
## RCCP\_Audio

Manages all audio sources belongs to the vehicle. Engine, gearbox, wheel, crash, exhaust, and all other kind of audios. Each audiosource can be customizable with range, volume, and pitch.



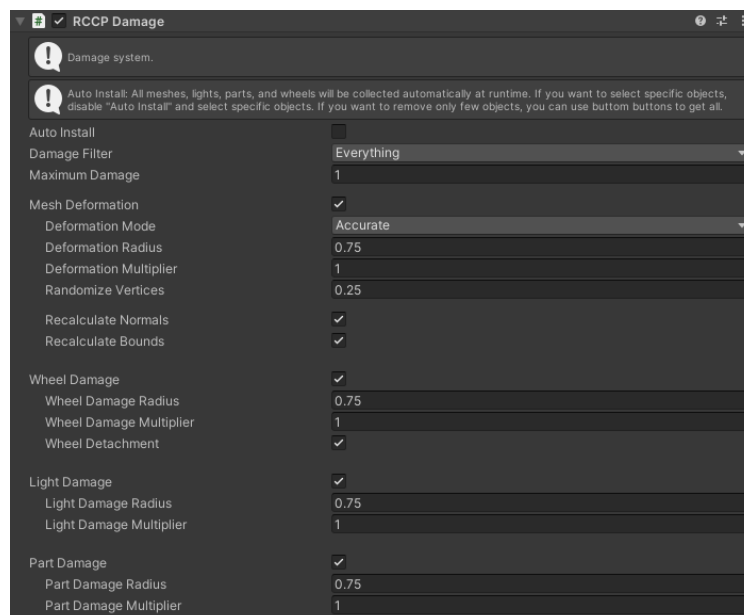
## RCCP\_Lights

Manages all light sources belongs to the vehicle. Headlights, brake lights, indicator lights, reverse lights, tail lights, and others. Each light can be customizable with range, angle, and intensity. And they have emissive renderers as well. If you choose any renderer, index of the material will be emissive related to the light.



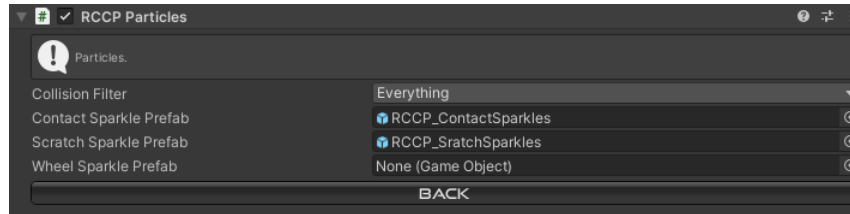
## RCCP\_Damage

Manages deformation of the vehicle. Meshes, detachable parts, lights, and wheels. Each part can be customizable with many settings. If you disable the auto installation, you have to select deformable parts of the vehicle. When you disable this option, three new buttons on your inspector panel will pop up. You can get all meshes, lights, parts, and wheels with these buttons. And then you can remove any objects by pressing the “X” button. With this way, you can include and exlude any parts of your vehicle for the damage.



## RCCP\_Particles

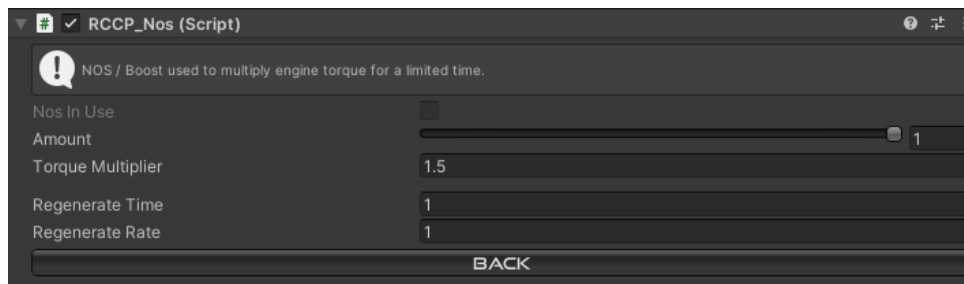
Manages particle systems belongs to the vehicle. Wheel, collision, impact, and all other particles. Script will instantiate them first, and use them in proper situations.



## Other Addon Components

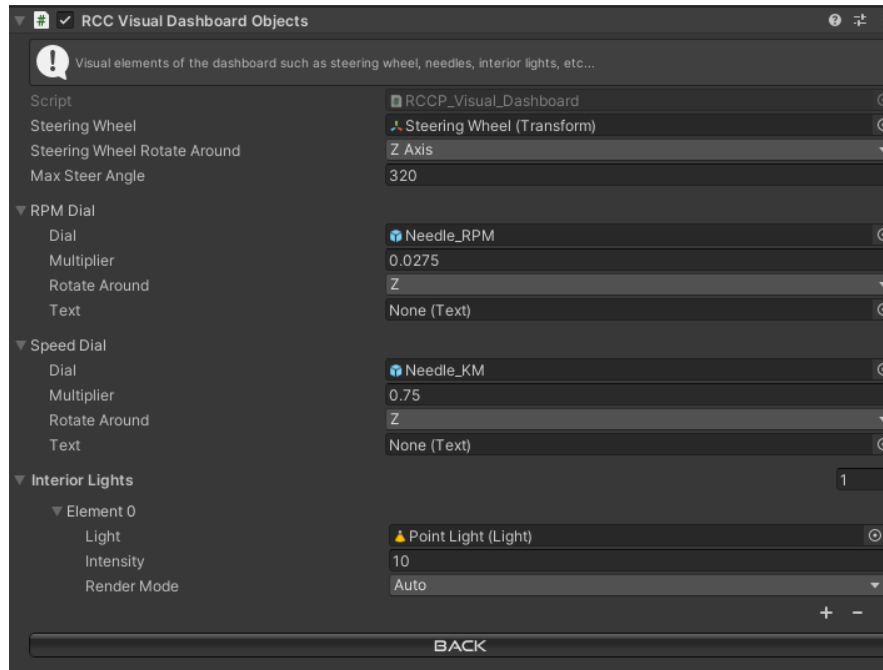
### RCCP\_Nos

Multiplies the produced engine torque while in use. Amount, multiplier, and timer can be changed.



### RCCP\_Interior

Manages the interior. Steering wheel, dials for RPM / KM/H, and interior lights.



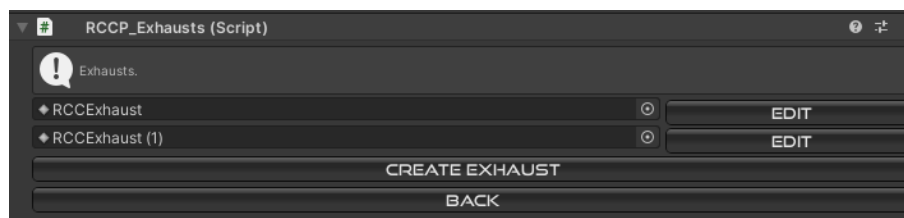
## RCCP\_Cameras

Hood and wheel cameras attached to the vehicle. Create new camera positions or edit existing ones. They are not actual cameras, just transforms. RCCP\_Camera on your scene will take position of the target camera's position.



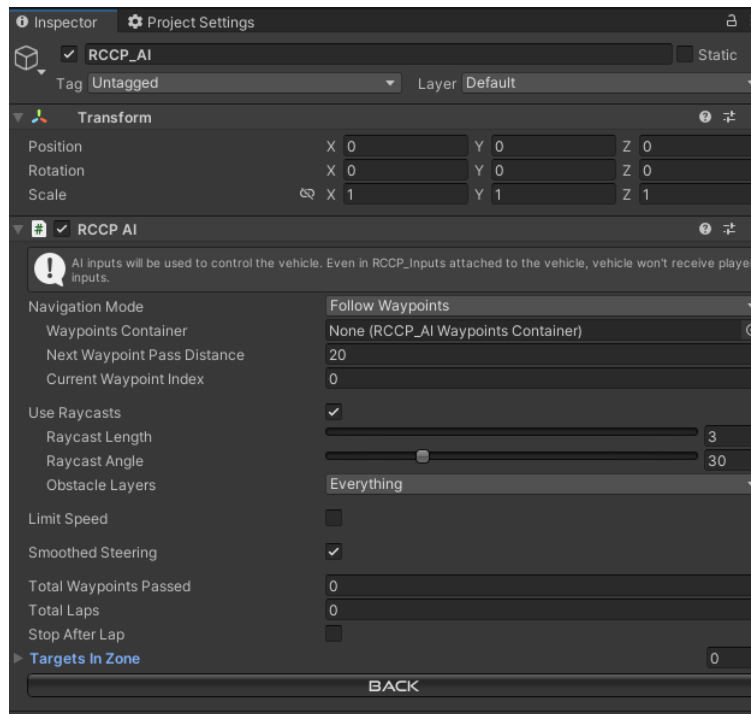
## RCCP\_Exhausts

Exhausts attached to the vehicle. You can create new exhausts or edit existing ones. They are just particle systems. You can adjust their emission rate, color, texture, or any other settings related to the particle system.



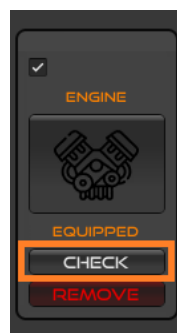
## RCCP\_AI

AI controller of the vehicle. Has three navigation modes. Follow waypoints, chase target, and follow target. Raycasts used to avoid obstacles on the path. Can go reverse if vehicle crashes or unable to move forward. Script will calculate throttle, brake, and steering related to the road and the target. And then it will feed the RCCP\_Inputs attached to the vehicle with these inputs. All player inputs will be ignored if this component is attached to the vehicle.



## Checking Components

You can check each component by clicking their “**Check**” buttons. If editor script finds an error, or misconfiguration, it will inform you. Always check your components. But this won't guarantee your vehicle runs perfectly fine.



## Adding / Removing Components At Runtime

You can add or remove any modular component at runtime, even in your own script. But you have to call **UpdateComponents()** method in the **RCCP\_CarController.cs** script. Otherwise, changes won't be applied. For example, you've added AI component to the vehicle at runtime. You have to call `yourVehicleController.UpdateComponents()` in your script. All components of the vehicle will be updated.

## Common Mistakes

- My engine revs up, but the vehicle won't move. I got no traction.
- Check output events of your drivetrain components. If one of them has missing or empty event, traction torque won't be delivered to the wheels. Engine will rev up, but no power will be delivered to the wheels in this case.
- My vehicle falls through the ground.
- Be sure your vehicle has proper body collider.
- My wheelcolliders are not aligned correctly.
- Be sure your wheelmodels have been selected correctly on your axles. Select your axles and check their left and right wheel models. If "**Auto Align WheelColliders**" option is disabled, editor script won't align wheelcolliders automatically.
- Automatic gearbox won't shift up/down at correct speed/RPM.
- You can set target RPMs for shift up/down on your gearbox. **RCCP\_Gearbox** is calculating estimated target speeds but can't calculate target RPMs. If gearbox is shifting up too early, you can increase shift up rpm. Or if gearbox is shifting down too soon, you can decrease shift down rpm.
- I can't take control of my vehicle.
- Be sure your vehicle has inputs component (**RCCP\_Inputs**). Vehicle won't receive player inputs if it's not attached.



- Wheel models are deformable on collisions. Or I don't want to deform specific objects when I collide with something.
  - You can disable “[Automatic Installation](#)” option in the damage component ([RCCP\\_Damage](#)) and select each mesh individually. When you disable this option, few buttons will appear on your inspector panel. Meshes, lights, parts, and wheels. You can click them to collect and remove only specific objects.
- 
- I don't hear any audio belongs to the vehicle.
  - Be sure your vehicle has audio component ([RCCP\\_Audio](#)) added. Vehicle won't create and use any audiosource if it's not added. Be sure all audioclips have been selected correctly on the component.
- 
- I don't see any particles.
  - Be sure your vehicle has particles component ([RCCP\\_Particles](#)) added. Vehicle won't create and use any particles if it's not added to the vehicle. Be sure all particle prefabs have been selected correctly on the component.
- 
- I can't select wheel particles on the particles component.
  - Wheel particles are managed by [RCCP\\_GroundMaterials](#). Go to [Tools → BCG → RCC Pro → Configure Ground Materials](#). You'll be able to configure each ground material here. Simply change the selected particles here. [RCCP\\_GroundMaterials](#) has been explained in the separate documentation.
- 
- I can't set max speed of the vehicle.
  - Max speed is calculated by ratios of the gearbox, differential, radius of the wheels, and RPM of the engine. On higher ratios, fast accelerations and low top speeds. On lower ratios, slow accelerations and high-top speeds. You can see the estimated top speed of the vehicle on your inspector panel if you enable “[Show Debug Info](#)” option.
- 
- Automatic gearbox is not working. Stucked on first gear.
  - Be sure your gearbox has enabled “[Automatic Transmission](#)” option. If you are using manual gearbox, default buttons for shift up / shift down are left CTRL and left shift buttons.

- Can't switch the camera mode to FPS / Wheel camera.
- Be sure your vehicle has hood camera and wheel camera. Click "[Other Addons](#)" button and select cameras. You'll be able to create and edit your vehicle cameras here.

I'll update these common mistakes section of the documentation according to the received support tickets.