carla_autoware_bridge package #3391

Robotics010 started this conversation in **Show and tell**

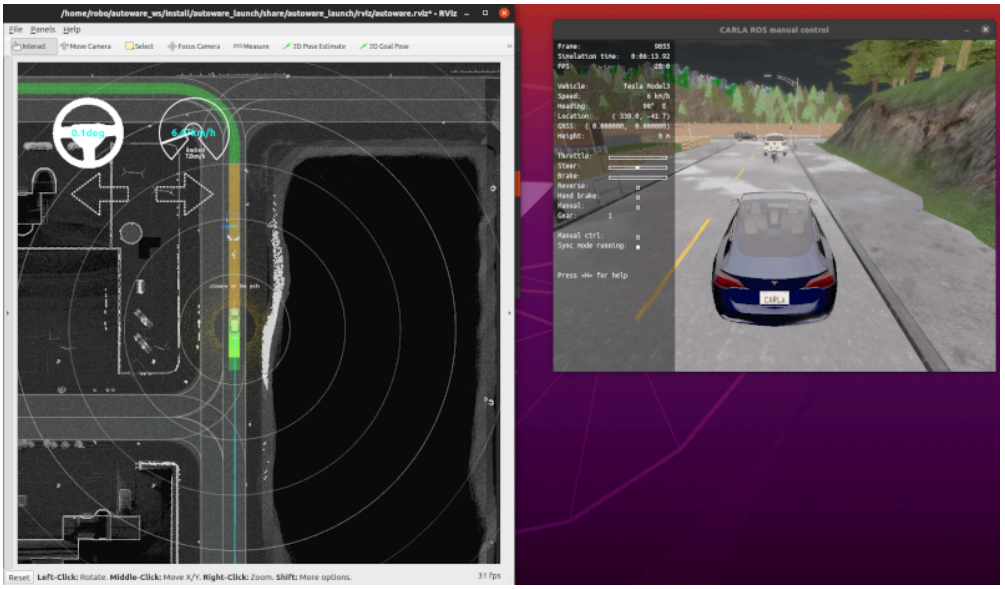
Robotics010 on Apr 3, 2023 edited

Hi Autoware community!

Here is carla_autoware_bridge, an addition package to `carla_ros_bridge` to connect CARLA simulator to Autoware Universe software. This is still Work in Progress package. So reports and improvement suggestions are very welcome.

Go to Getting started tutorial to setup and launch autoware simulation with CARLA simulator.

However there is no official support of the Autoware Universe self-driving open source project from CARLA developers, there is a maintained `carla_ros_bridge`, which supports communication between CARLA simulator and ROS2 applications. This ROS2 package reuses `carla_ros_bridge` and adds missing things to support communicating with the Autoware Universe.



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maxime-clem on Apr 3, 2023 Collaborator

Thank you for your contribution ! The instructions on how to run look very detailed. I am not a CARLA user but I will try to test your bridge when I get the time.
From what I understand, one issue with the CARLA bridge comes from its performance being very bad when using many lidars. Does your bridge help with this issue ? Or do you think some improvements are possible to make performance better ?

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maxime-clem on Apr 5, 2023 Collaborator

I could setup almost everything without issue following the instructions.
However, I encountered blocking issues that are probably related to my environment using `humble` instead of `galactic`.
Do you know if it is possible to add `humble` compatibility ? This would enable using the latest version of autoware since no new development is being done for `galactic`.

About performance, there is this open issue: carla-simulator/ros-bridge#670

Robotics010 on Apr 5, 2023 Author edited

Regarding CARLA bridge performance. CARLA simulator has a synchronous mode, with which you are not obligated to run simulator real time (depending on the hardware you go slower or faster than real time), so CARLA bridge performance even with many lidars shouldn't be a problem.
I'll check if a synchronization of data between CARLA simulator and carla-ros-bridge is working properly when you launch using the getting started tutorial from my package.

Robotics010 on Apr 5, 2023 Author edited

And about humble/galactic version. Unfortunately, CARLA developers supports up to foxy version and so CARLA simulator comes with precompiled carla 2.7, 3.6, 3.7, and 3.8 python packages. Foxy or Galactic precompiled uses python 3.8. So we can use CARLA simulator with Foxy or Galactic based systems, such as autoware galactic branch version. I've asked about humble support as a part of other discussion, but I haven't got any response yet.

On the other side humble precompiled uses python 3.10 and there is no carla 3.10 precompiled python package. That is why CARLA users are using galactic autoware branch instead of humble. However there is a way to compile CARLA and/or carla python package by yourself but I didn't try it yet and it looks like an effort (especially for someone not knowing CARLA ecosystem).

I may be wrong somewhere in my explanation (or I may be not describing a reason precisely), but I've tried and was unsuccessfull with autoware humble + the latest CARLA simulator.

maxime-clem on Apr 6, 2023 Collaborator

Thank you for the explanation and for your hard work. I understand the current limitations.

👍 1

Robotics010 on Apr 8, 2023 Author edited

FYI here is another worry about time-consuming lidar operation from a carla-ros-bridge side from the carla-ros-bridge maintainer. I hope this still can be mitigated by the synchronous mode.

👍 1

mitsudome-r on Apr 26, 2023 Maintainer

@Robotics010 Great work!
If you don't mind, please consider writing instructions to the documentation under digital-twin simulation:

- https://github.com/autowarefoundation/autoware-documentation/tree/main/docs/tutorials/ad-hoc-simulation/digital-twin-simulation
  There are currently tutorials for AWSIM and MORAI SIM, but not for CARLA

↑ 1 3 replies

Robotics010 on Apr 29, 2023 Author edited

Hey @mitsudome-r, thank you! This was the initial idea to add the CARLA option to Autoware tutorials. I would like to make it as soon as possible, but after few outstanding problems will be fixed.

Meanwhile could you share thoughts if any about the following:

1. Currently only galactic autoware branch is supported, because `carla-ros-bridge` only supports up to foxy (and galactic is just working as well). I haven't got yet a response on when carla is going to support Autoware or at least humble, but we can make a community version of carla supporting humble and hence make CARLA supports up to Autoware main branch.
2. It looks like carla maintainers are going to rewrite `carla-ros-bridge` in C++. This is a good news, because it resolves the poor performance issue, but the release date is unknown and it was not even officially published.
3. Sensors placement, vehicle/calibration configs are not added/configured yet and there wasn't yet done any control tuning

for the selected vehicle from the CARLA simulator. I'm going to perform it as well, but it will take some time.

4. Obviously it is useful to use CARLA synchronous mode, but I still need to investigate how it can be used with autoware.

evshary on Feb 7 Collaborator

Hi **@Robotics010** I've created a PR to list the projects bridge Autoware and Carla on Autoware documentation.
autowarefoundation/autoware-documentation#517
Would you mind putting your nice implementation on the list?
I know that there are still some items working in progress, but it would give more visibility to your project for the community and they don't need to rebuild the wheels.

Robotics010 on Feb 7 Author edited

@evshary hey! Yes, sure.
Thanks for adding the bridge there.

👍 1