Switch from obstacle_stop_planner to obstacle_cruise_planner #3964

Closed **takayuki5168** started this conversation in **Design**

takayuki5168 on Nov 7, 2023 Collaborator edited by xmfcx

Background

Currently, we are using the obstacle_stop_planner package by default which is responsible for the stop against obstacles and adaptive cruise.
https://github.com/autowarefoundation/autoware.universe/tree/main/planning/obstacle_stop_planner

The package is mostly working well, but there are some points to be improved as follows.

- Since the input of this package is not the dynamic objects but the pointcloud, the pointcloud velocity which is assumed as the front vehicle's velocity is calculated in this planning package, which is not well-designed.
- The front vehicle's velocity estimation by the pointcloud is not so accurate. Especially when the front vehicle cuts in the ego lane from the neighbor lane, the velocity is estimated as almost 0, resulting in the sudden stop planning.

Proposal

To deal with these issues, we developed the obstacle_cruise_planner package.
https://github.com/autowarefoundation/autoware.universe/tree/main/planning/obstacle_cruise_planner

The aim is the same as the obstacle_stop_planner package, but this package uses dynamic objects instead of the pointcloud.
Therefore, we can use the front vehicle's velocity estimated on the perception side, which has a higher accuracy than estimating the velocity on the planning side.

This package was implemented 1 year ago, and has been tested and used by the TIER IV's real vehicle for 1 year.
I would like to propose that we use the obstacle_cruise_planner package by default instead of the obstacle_stop_planner.

Category
Design

Labels
component:planning

4 participants

Issue

- Switch to obstacle cruise planner and enable AEB (autonomous emergency braking) #4520

↑ 1

4 comments · 5 replies

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takayuki5168 on Nov 7, 2023 Collaborator Author

@mehmetdogru @xmfcx cc @TakaHoribe
This is the proposal from TIER IV. If you agree with this proposal, I will change the default planner.

Our concern is that if the sensor is poor or the object recognition accuracy is not so high, the ego may collide with the front vehicle.
I will add documentation to be careful about this point.

↑ 1 👍 1 🚀 1 4 replies

xmfcx on Nov 9, 2023 Maintainer

The default clustering and object tracking performance should be brought to same level as the Autoware.AI times by tuning so that even small non ground points are clustered and fed to the planner.

Only then this can be made the default.

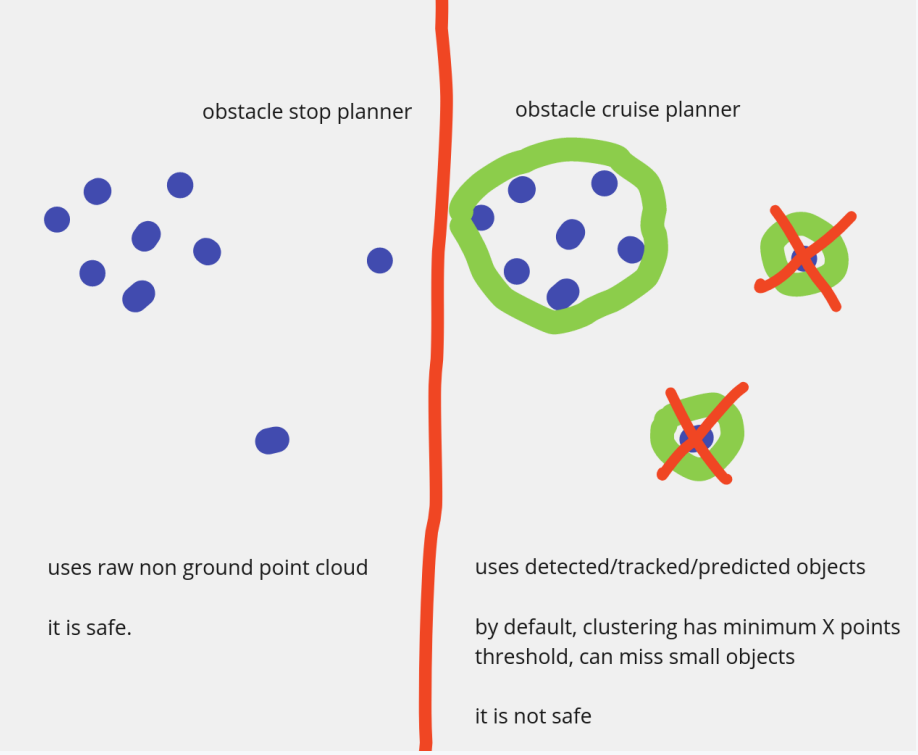
With the current state of 3D neural net based detection, there are no guarantees of safety.

This proposal cannot be accepted without ensuring clustering+tracking based detection improvements.

xmfcx on Nov 9, 2023 Maintainer

I never understood why the perception team don't provide objects (even if they are basic cluster polygons) but give the raw cloud to the planner.

xmfcx on Dec 12, 2023 Maintainer

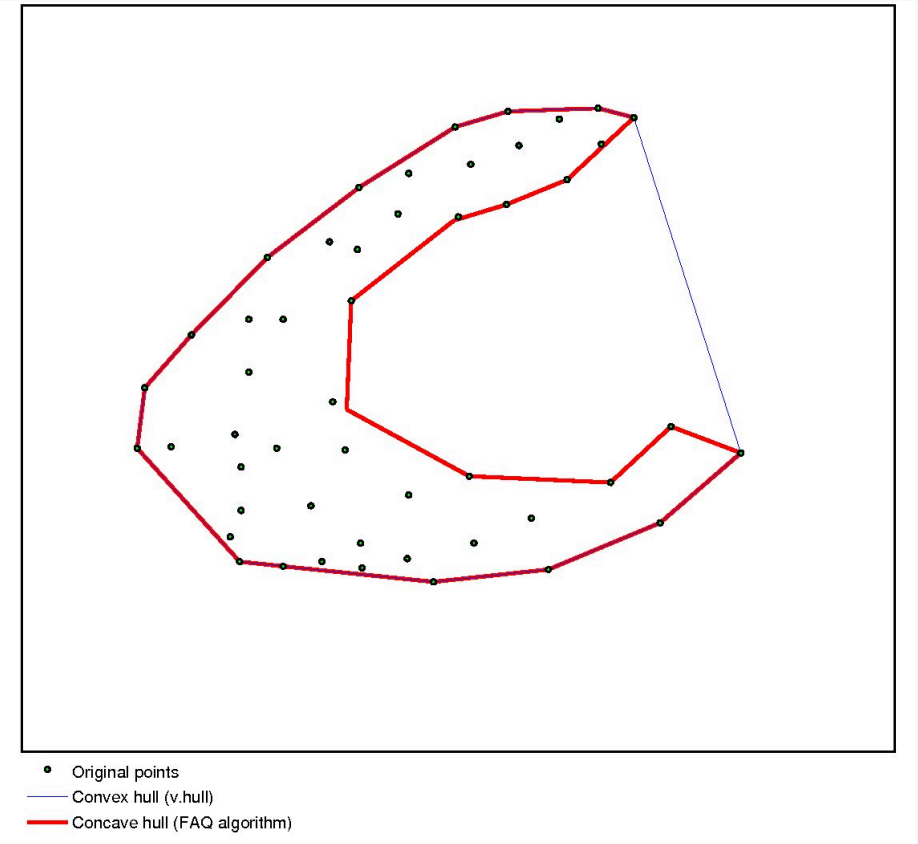


We should readjust the clustering params to make it at least act like the raw non ground point cloud.

xmfcx on Dec 12, 2023 Maintainer edited

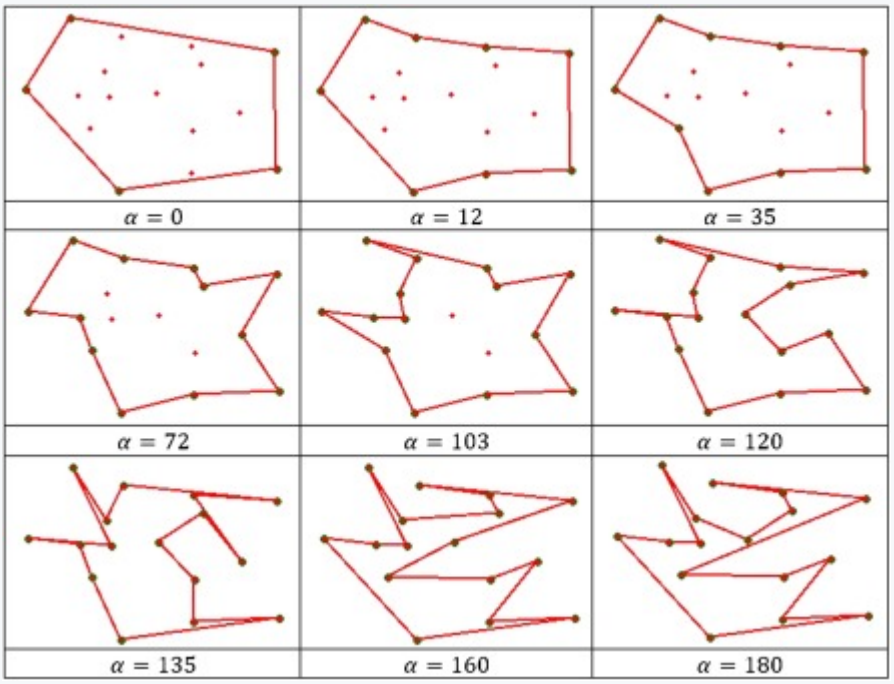
Large obstacles are a problem.
Convex hull will create issues.

@xmfcx :
Maybe we can use concave hull algorithms.



img src: https://gis.stackexchange.com/questions/1200/what-are-definition-algorithms-and-practical-solutions-for-concave-hull

@mitsudome-r :
But the alpha value might be tricky and tuning might create issues.



img src:
https://www.sciencedirect.com/science/article/pii/S0304397517306230

@xmfcx :
Maybe we can cut large obstacles in pieces before assigning convex polygons.
@mitsudome-r :
But then, the velocity info can be wrong.

@mitsudome-r :
Maybe we can remove the detected objects from the raw non-ground point cloud and only have the small objects in the raw point cloud.

ismetatabay on Nov 9, 2023 Collaborator

I think this is a good idea, as it can address the sudden stop problem. However, I think it also comes with some potential drawbacks. For example, since the obstacle cruise planner package does not consider object point clouds, it could stop for unwanted objects such as trees, which cannot be avoided.

https://github.com/orgs/autowarefoundation/discussions/3857

↑ 1 0 replies

mehmetdogru on Dec 11, 2023 Maintainer

@xmfcx @mitsudome-r

Could we add this discussion to the next software wg meeting agenda to be able to get everyone's opinion?

↑ 1 1 reply

xmfcx on Dec 11, 2023 Maintainer

Sure, added to the agenda:
https://github.com/orgs/autowarefoundation/discussions/4052

❤️ 1

xmfcx on Mar 6 Maintainer

This issue is being tracked by:

- Switch to obstacle cruise planner and enable AEB (autonomous emergency braking) #4520

Therefore I'm closing this discussion, thanks everyone for participating!

↑ 1 ❤️ 1 0 replies