

# [Feature] Improve Hybrid A\* planner

## #1594

New issue

Merged

aohsato merged 60 commits into develop from feature/improve\_astar\_planner on Mar 14, 2019

Conversation 46 Commits 60 Checks 0 Files changed



aohsato commented on Oct 14, 2018 • edited

### Status

#### DEVELOPMENT

### Description

I merged logics in `astar_navi` and `obstacle_avoid` and created `astar_search` library package.  
I fixed some problems on Hybrid A\* algorithm in present Autoware, like the coordinate system, performance, and so on.  
Finally, I re-created `astar_navi` node for free space planning and `astar_avoid` node for avoiding obstacles on waypoints with the internal state transition.

### README

- Freespace planner  
[https://github.com/CPFL/Autoware/blob/feature/improve\\_astar\\_planner/ros/src/computing/planning/mission/packages/freespace\\_planner/README.md](https://github.com/CPFL/Autoware/blob/feature/improve_astar_planner/ros/src/computing/planning/mission/packages/freespace_planner/README.md)
- Waypoint planner (old name: Astar planner)  
[https://github.com/CPFL/Autoware/blob/feature/improve\\_astar\\_planner/ros/src/computing/planning/motion/packages/waypoint\\_planner/README.md](https://github.com/CPFL/Autoware/blob/feature/improve_astar_planner/ros/src/computing/planning/motion/packages/waypoint_planner/README.md)

### Related branch

~~depended on feature/rebuild\_decision\_maker~~  
-> This PR is independent now

#### Reviewers

	kfunaoka	
	sgermanserrano	✓
	yn-mrse	✓
	s-azumi	●
	h-ohta	●

#### Assignees

No one assigned

#### Labels

version:autoware-ai

#### Projects

None yet

#### Milestone

v1.10

#### Development

Successfully merging this pull request may close these issues.

#### 8 participants



# Todos

- ✓ Tests
  - ✓ astar\_search/astar\_util ([🔗 Feature/test astar planner #1753](#) To be merged)
  - ✓ astar\_search/astar\_search ([🔗 Feature/test astar planner #1753](#) To be merged)
  - ☐ freespace\_planner
  - ☐ waypoint\_planner/astar\_avoid
- ✓ Documentation

## Steps to Test or Reproduce

### Freespace planning

1. Launch Autoware and localization on real vehicle or `wf_simulator`
2. Launch `points2costmap` and `grid_map_filter`
3. Launch `astar_navi` and publish `2D Nav Goal` on Rviz
4. `lane_waypoints_array` is published and you can see it

### Obstacle avoidance

1. Launch Autoware and localization, `waypoint_loader` and other planners
2. Launch `points2costmap` and `grid_map_filter`
3. Launch `astar_avoid` with `Enable Avoidance` config
4. Launch `velocity_set`, `pure_pursuit`, `twist_filter` for motion planning
5. When find obstacle and stop (by `velocity_set` behavior), the car start to plan and avoidance behavior

NOTE: If you want to use `wf_simulator` instead of real vehicle, please use `lidar_fake_perception` on `sim_base_link` frame to simulate pointcloud and you need to publish `localizer_pose` for `velocity_set`.



**aohsato** added 19 commits [6 years ago](#)



Merge branch  
'feature/lidar\_fake\_perception' into  
feature/improve\_obs... [...](#)



e41c0b6



Delete obstacle\_sim from  
astar\_planner package, replaced to  
lidar\_fak... [...](#)

















































f8bc439





Modify package name, astar\_planner ->  
waypoint\_planner, and create as... [...](#)



563c8fb

-   Delete obstacle\_avoid/astar\* and modify its dependency to astar\_plann...  6fe0d73  
...
-   Merge branch 'develop' into feature/improve\_astar\_planner  cb20112
-   Fix astar\_navi with astar\_planner library  22c831e
-   Refactor astar\_navi by separating HStar library and fixing coordinate...  3209517  
...
-   Rename obstacle\_avoid -> astar\_avoid and under refactoring  99f93b9
-   Fix cost function and configures  e5ec12b
-   Fix backward search and refactor configurations  055ad1e
-   Apply clang-format  f48c0f7
-   Refactor include  8dccf43
-   Fix typo and so on  13e54db
-   Improve astar\_avoid by incremental goal search  11d50bd
-   Apply clang-format  3034985
-   Revert package names  4040212
-   Fix package/code names  51fb2a8
-   Update runtime\_manager  d1a5c0f
-   Improve astar\_avoid to execute avoidance behavior by state transition...  2855307  
...

  **aohsato** requested review from **s-azumi** and **kfunaoka** 6 years ago



**kennedywai** commented on Oct 16, 2018

Hello Aohsato, thanks for trying to improve astar\_navi! BTW I have a few questions about how this planner works:

1. Which branch should I use to perform the astar planner + obstacle avoidance?
2. Is it not required to use either vector map and waypoint saver methods?

3. Is it the final output that we set up a goal wherever on the free areas on the grid map and it will publish a global path and a velocity to the robot until it reaches the goal? Just like a normal 2D slam on ROS Navigation stack, we don't need to create a lane on vector map.
4. I tried to follow the instructions above but I could not get it working, the astar path wasn't out on Rviz, is that ok that you could upload your testing video on Youtube and share the link here?

Thank you!



**aohsato** commented on Oct 19, 2018

Author

**@kennedywai** Thanks for your comments! Can we continue to discuss on my issue post?



**aohsato** added 7 commits 6 years ago

- Merge branch 'develop' into feature/improve\_astar\_planner f2d49b0
- Fix PascalCase message names by [#1408](#) d50c88f
- Remove obstacle\_avoid directory 189265e
- Fix default parameter for costmap topic 3e0f4b3
- Fix warning and initialize condition 819cf8a
- Remove use\_avoidance\_state mode (TODO: after merging rebuild decision... [...](#)) 2d1519a
- Improve astar\_avoid behavior by simple state transition and multi-thr... [...](#) 9200cf3

43 hidden items

[Load more...](#)



**kfunaoka** commented on Jan 24, 2019

**@kennedywai** Would you create an issue and show details including how to reproduce the problem and where the process dies? I assume any issue can be categorized into environment problem, procedure problem, and/or code problem.



**sgermanserrano** commented on Jan 24, 2019

**@kennedywai** although the branch works the unit tests are needed to improve Autoware's code base. Let me know if you'd be happy to contribute to adding some unit tests as you have some experience with the modifications on this PR.



**aohsato** added 6 commits [5 years ago](#)

- Merge branch 'develop' into feature/improve\_astar\_planner ab95ea3
- Merge branch 'develop' into feature/improve\_astar\_planner 6636d21
- Refactor threading 99d09ce
- Re-adding lidar\_fake\_perception 49aadd3
- Fix the condition to judge reaching goal 3df2bbc
- Add 'use\_decision state' mode to transit avoidance state by decision\_... 94af7b6






**aohsato** requested a review from **h-ohta** 5 years ago



**aohsato** and others added 6 commits [5 years ago](#)

- Merge branch 'develop' into feature/improve\_astar\_planner 240062c
- Fix calcDiffOfRadian (if diff > 2pi) 1bb1fc7
- Feature/test astar planner (#1753) ebf7de6
- Merge remote-tracking branch 'origin/feature/test\_astar\_planner' into... fad341d
- Revert use\_state\_decision mode 3085b0a ([94af7b6](#))

  Fix costmap topic names by merging  f23c838  
costmap\_generator



**ahsato** commented on Mar 13, 2019

Author

@sgermanserrano Thanks and sorry for my late. About calcDiffOfRadian, I fixed that with fmod in this commit.

[1bb1fc7](#)

But actually, it's more simple to handle angle diff between  $-\pi \sim \pi$  by using  $\text{atan2}(\sin(t), \cos(t))$  technique, so I'll fix that in my next chance. Thanks.



**ahsato** commented on Mar 14, 2019

Author

@kennedywai I fixed process died problem in above changes, thanks for your comment.

 1



**ahsato** commented on Mar 14, 2019 • edited ▼


Author

Finally, we already tested on our real car. Plz check. :)


<https://www.dropbox.com/s/ista3yrnxc2sbdo/hybrid-astar-avoidance-moricoro-01-x3.mp4?dl=0>

 1



 **ahsato** merged commit **8381c44** into **develop**  
on Mar 14, 2019



 **ahsato** deleted the **feature/improve\_astar\_planner**  
branch 5 years ago



**kennedywai** commented on Mar 14, 2019

@ahsato Thank you Ahsato! I had been testing this in Jan on my robot and it worked fine except for the process died problem. I am now currently busy with other things but I will be soon testing the new code on my robot!! Thank you once again!

 1



**ahsato** commented on Mar 14, 2019

Author

[@kennedywai](#) Wow sounds great. Hopefully, let me know in Github, Autoware slack, and so on. Thanks too!



**hamkuchan** commented on Jun 18, 2019 • edited ▾

Hi, guys, I'm wondering why we use the node "grip\_map\_filter", because the output topic of "grip\_map\_filter" goes nowhere. And where comes the topic "/realtime\_cost\_map" from if I just using 3D Lidar? And I followed the guide above, but no costmap out, can you please show me which nodes and which topic I should use in the latest version 1.11.0@aohsato@sgermanserrano



**gbiggs** commented on Jun 18, 2019

Thanks for using Autoware and for your question. However the issue tracker is for posting confirmed bugs and feature requests.

We ask that you please ask questions at the [ROS Answers website](#) following our support guidelines: <https://github.com/autowarefoundation/autoware/wiki/Support-guidelines#ros-answers>. Please pay particular attention to the information we ask you to provide.



**anubhavashok** pushed a commit to NuronLabs/autoware.ai that referenced this pull request on Sep 7, 2021



[Feature] Improve Hybrid A\* planner b53bd9a  
([autowarefoundation#1594](#)) ...



**mitsudome-r** added the **version:autoware-ai** label on Jun 14, 2022