AVP(Automated Valet Parking) by AMD using Autoware Universe SW #5273

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

Narendarselva on Sep 24

Hello Everyone,
In this discussion I would like to share & show some of our great works that we did for Autowated Valet Parking using AW universe software stack.

Zest about AVP

AVP stands for Automated Valet Parking which includes,

- Automatically driving to a parking lot from the drop-off zone. (Lane driving scenario)
- Find best available parking space and park. (Parking scenario)
- Summon Feature - Drive back to the predefined pick-up point from the parking space.
- Avoid obstacles in lane driving and parking.

AVP Architecture

Modified and optimized version of Autoware vertical stack for our AVP POC needs. Few notable changes from opensource Autoware SW stack,

- *Sensing* - LIDARs are not used for localization instead we are using GNSS based localization for AVP
- *perception* - Using vision based perception for parking lot detection and freespace segmentation. Obstacle avoidance is yet be considered on lane driving scenario. But on parking we are using Ultrasonics to avoid obstacle at low speed parking.
- *planning* - AVP is combination of lane driving and parking scenarios , BH Planner is used for lane driving and Freespace planner is used for parking scenario. Separate module called "avp_planner" module is used to control the state change from one scenario to other.
- *localization* - RTK GNSS based localization instead of LIDAR pointcloud based localization.
- *Map* - Since our systems are Vision based , we use Lidars to generate PCD map and using PCD we created OSM Lanelet map which is needed by planner module to do lane driving to reach a parking lot.
- *Rviz* - Plugins to support parking lot / space selection.

Category

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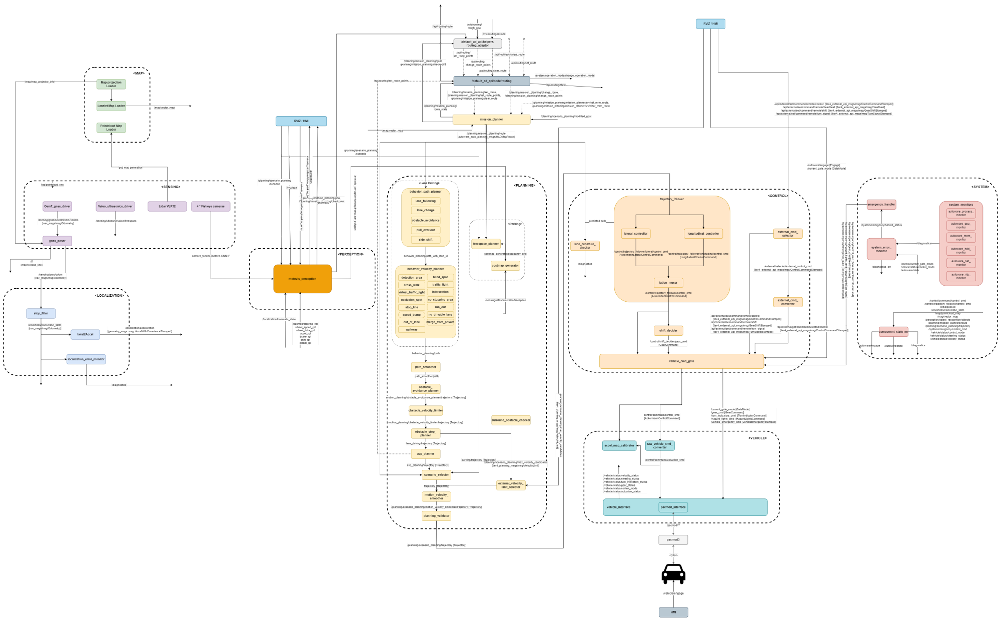
Labels

None yet

3 participants

Please find below AVP Architecture, AVP

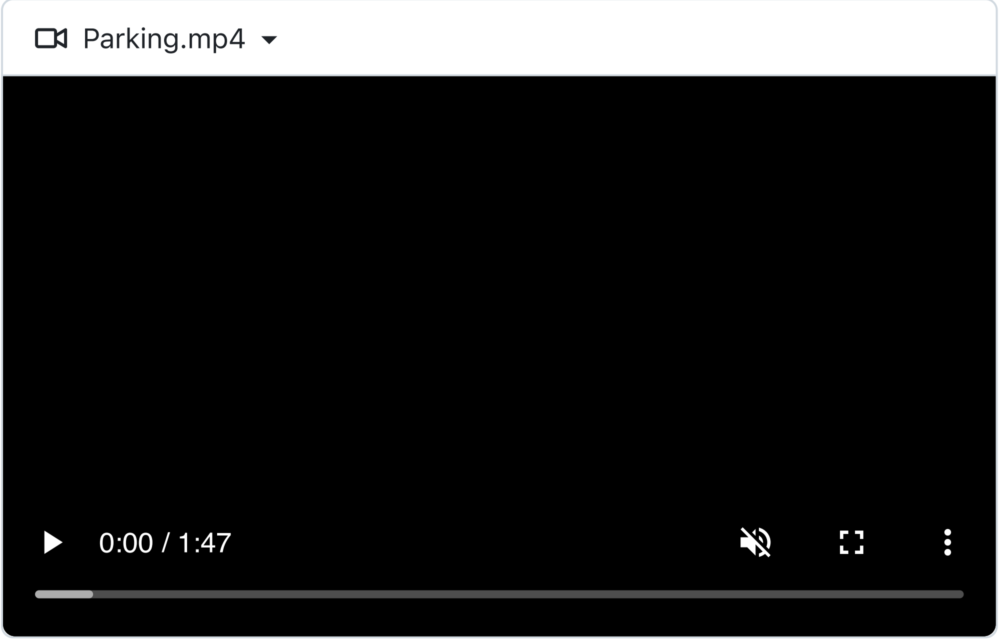


Demo Video

Please find below a quick demo video on AVP functionality achieved using planning and control simulator running on x86 AMD CPU,

Parking Scenario

- Maps are created using Lio-Sam tool and Vector Map builder tool. Poincould along with IMU & GNSS are recorder while driving around the parking spaces and used LIO-SAM tool to generate the PCD map and using that PCD we created the OSM map using vector map builder tool. Parking lots and spaces are simulated ones.
- Using parking lot selection rviz plugin we can enter the parking lot ID to select a parking lot.
- Combination of BH planner and Freespace planner makes the ego vehicle drive to a parking lot and park.



Summon Scenario

- Added a separate module inside BH planner called SingleArc algo which takes care of the intial steps to get ego align to the center of the drivable lane from the parking space where it was parked. Once aligned BH planner takes care of maneuvering ego vehicle to the pick-up zone.

summon.mp4 ▾

Hope this gives a better understanding of our work using AW Universe SW. I m happy to share further more details.

↑ 4 ❤️ 1 🚀 4

2 comments · 6 replies

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samet-kutuk on Sep 24 Collaborator

Awesome demos @Narendarselva!

↑ 1 👍 1 0 replies

maxime-clem on Oct 11 Collaborator

Thank you very much for sharing your work. The video looks nice !

> Separate module called "avp_planner" module is used to control the state change from one scenario to other.

I am very curious about this module. Are you able to share the code or a little more details about what it does ?

It would be great if we could implement your changes (or something similar) into the main branch of Autoware so that everyone can use the AVP feature.

↑ 2 ❤️ 1 6 replies

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maxime-clem on Oct 15 Collaborator

I believe it is valuable to share your changes, even if they are based on an older version of Autoware. We can also help you with making the update to the latest version.

Narendarselva on Oct 17 Author

Thanks **@maxime-clem** , I can share the changes as diff or if you need I can pack the whole src as zip or even i can create a separate branch. kindly let me know how efficiently we can proceed on this.

maxime-clem on Oct 17 Collaborator

A branch that can be checked out with git would be the easiest.

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Narendarselva last month Author

I will try to create a public branch from my private account with all the changes with single commit . Will that work ?
Since i use 2023.06 branch from "autoware" parent repo which takes care of pulling the correct autoware.universe and other dependent repos version based on autoware.repo. Kindly suggest some better way if you think this way more work when integrating.

maxime-clem last month Collaborator

Thank you your plan sounds good and we will be able to see what was modified compared to the base `2023.06` branch.