API WG Meeting (02/21/2024) #4201

yuasabe started this conversation in **Working group meetings**

yuasabe on Feb 21 Collaborator edited

Date: 2024-02-21

Administrative

- Previous meeting minutes
- API WG project board
- API WG Roadmap

Participants:

- [x] David Cole (DanLaw)
- [x] Daniel Shih (Tier4/NTU)
- [x] Ryohsuke Mitsudome (TSC Chair)
- [ ] Bonolo Mathibela (AUTOWARE)
- [ ] Abinesh Lingeswaran (Danlaw)
- [x] David Walmroth
- [x] Huei-Ru Tseng (ITRI)
- [ ] Isamu-takagi
- [ ] Jaiden
- [x] Pedro
- [x] Rohit
- [ ] Rojer
- [ ] Sudharsan Srikanthan
- [ ] Sujith (Interpl.ai)
- [ ] Tanishq
- [ ] Venkat
- [x] Yu Asabe
- [ ] Christian John (SPC/Tier 4)
- [ ] Weilin Yao (Whaledynamic)
- [ ] Ram (Interpl.ai)
- [ ] Mark (Interpl.ai)
- [ ] Armagan (Leodrive)
- [ ] Lingzi (Whaledynamic)
- [ ] Heewon Kim (AWF korea)
- [ ] Shreekant Marwadi (Leidos)

Category
Working group meetings

Labels
meeting:api-wg

1 participant

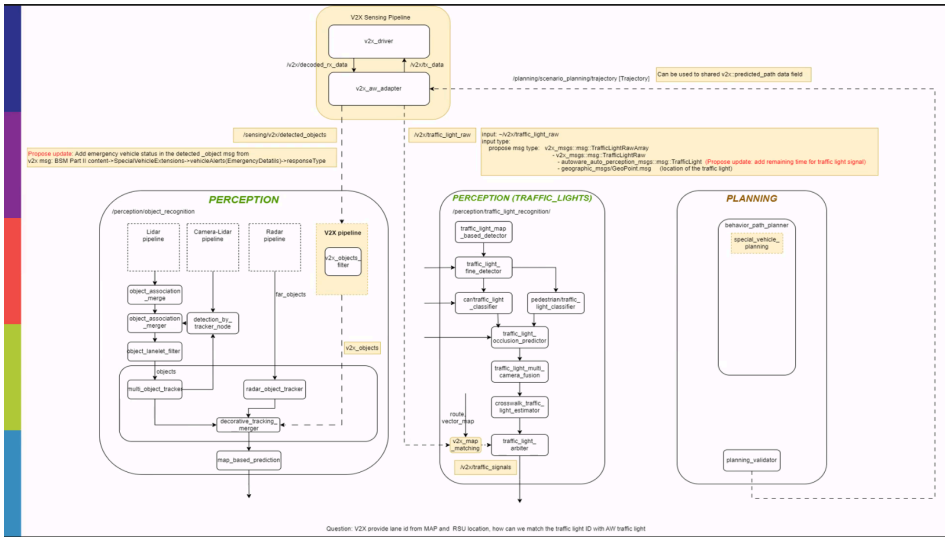
- [ ] Hidenaga Ushijima
- [ ] Yu Zhigang
- [ ] CY
- [ ] Ziri
- [ ] Will Martin
- [x] Chang
- [ ] Joao Amaral
- [x] Samet Kutuk
- [x] Jon Smet

Agenda

- AW-V2X Traffic Signal ID Mapping Logic Proposal from Chang (30-40 mins)
- Discussion on the above

Notes

AW-V2X Traffic Signal ID Mapping Logic Proposal (Chang Liu)

- 

  - Recap from the previous meeting.
  - The IDs of the intersection traffic signals and SPAT need to be matched to the traffic light IDs of Autoware. How can we match these two different IDs?

V2X – AW Traffic light signal ID mapping logic proposal

Chang Liu

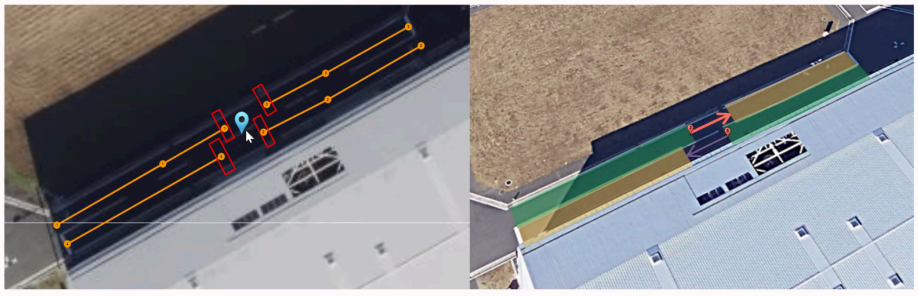
2-21-2024

The input provided by the V2X MAP and SPAT

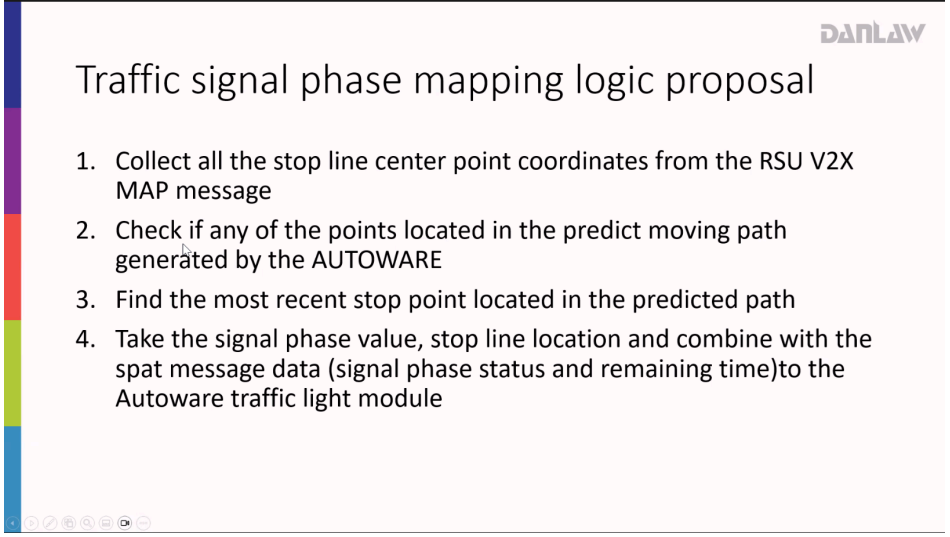
- V2X MAP message
  - Intersection ID
  - Coordinate location of the center points of each lane, width of each lane
  - Lane ID and it's connected lane ID(Ingress lane & Egress lane)
  - Signal phase ID for each connection
- V2X Spat message
  - Signal phase status for each signal phase ID(eventstate)
  - Remaining time for the signals

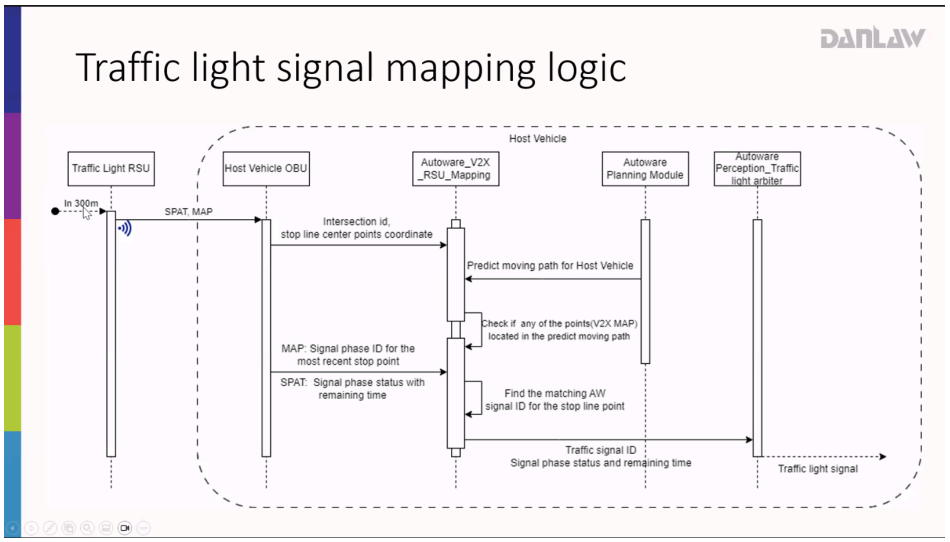
V2X MAP and Spat data visualization

MAP message visualization



- Visualize the MAP and SPAT message.
- Left: MAP message, Width of the lane, centerline, lane IDs
- Right: SPaT message, Signal Group IDs

- 

  - Some teams that they talked to hardcoded the mapping list to the code
- 

  - Sequence diagram of the entire process.

Discussion

- Mitsudome) Can't the vehicle receive the traffic light info from the nearest RSU, and map the relevant IDs to the Lanelet2 traffic signal IDs? All the traffic light information from V2X can be published. Do we need the RSU_Mapping module to receive the predicted path of the ego vehicle from the Planning module?
  - A table that matches the Lane IDs in the MAP message and the traffic_signal_id in the LL2 map is necessary. Then, the SPaT information can be matched to the traffic signal information used in Autoware.
  - The ego-vehicle's path information can be used to make the matching process more efficient. (But is it necessary?)
- Daniel) Should the traffic_light_arbiter be placed there? Should the V2X output be put directly into the traffic_light_arbiter?
  - The traffic_light_arbiter will take in a TrafficSignalArray, arbitrate the information, and output the final traffic light information that will be fed to the planner. The SPaT message only includes the signal phase information and does not have the physical location information of the lights. Therefore, the MAP message needs to be used simultaneously to know the coordinates of the specific traffic lights.

- Rohit) Can the map matching of the IDs happen prior? Or should it happen at run-time?
- Can the predicted path of the ego-vehicle be used as a way to optimize? For example, out of all the V2X traffic light information received, only the traffic light information that is related to the trajectory of the ego-vehicle needs to be published.
  - Both ways are probably possible. Which is better to align with other Autoware modules?
  - Any input from **@mitsudome-r** -san?
- https://github.com/autowarefoundation/autoware.universe/tree/main/perception/traffic_light_map_based_detector: there is an option to use the route as a way to filter the traffic lights that are published.
- Huei-Ru) In ITRI, only V2X was used for traffic light detection for the bus project.
  - We can maybe hold another meeting to discuss possible ways to proceed and to also share previous work.
- Rohit) The map matching may also fail if the stop line location in the Autoware Lanelet2 map and V2X map are not aligned.

Next Steps

- Possibly another meeting to discuss the above before the next API meeting.
- Especially the topic of whether to use the ego-vehicle trajected path in the traffic signal detection process.

Overall, we want to discuss the following over the next few meetings.

- Consider various use-cases and identify what kind of communication will take place between Autoware and the V2X stack.
- Requirements on the handshake between the V2X software and autonomous driving stack (creating sequence diagrams)
- Requirements for the interfaces/APIs
- Interface between V2X software and AD stack (not only APIs, any means of communication)
- HMI (both in-cabin and external) of Autoware and V2X applications

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0 comments