Steering and Actuation status messages #2462

maxime-clem started this conversation in **General**

maxime-clem on Jan 31, 2022 Collaborator

During the design discussions, we agreed to have messages to report the current state of the vehicle:

- Steering status: report the current steering of the vehicle.
- Actuation status: report the current velocity of the vehicle.

I would like to discuss the message definitions as it was not discussed in details during the discussions. Here is what was proposed:

- `geometry_msgs/Quaternion` to represent the steering.
  - In the rest of Autoware steering is usually represented as an angle (radian) so a Quaternion might not be necessary here.
  - Do we need to include fields for separate values of the front and rear wheels ?
- `geometry_msgs/TwistWithCovariance` to represent the actuation.
  - Do we expect vehicles to report covariance values for the actuation ? And if yes should we also add a covariance to the steering report ?
  - A `Twist` only includes linear and angular velocities. Do we need to also include a field for the acceleration ?

Additionally, should we consider reporting the "brake" status of the vehicle ? In the ArchitectureProposal, a message is used to report the `steer`, `accel`, and `brake` status (https://github.com/tier4/AutowareArchitectureProposal_msgs/blob/main/autoware_vehicle_msgs/msg/ActuationStatus.msg).

@TakaHoribe @xmfcx Please share your opinions on this topic 🙏 We can also further discuss at the next Software Working Group.

↑ 1

Category

General

Labels

None yet

3 participants

0 comments · 3 replies

Oldest Newest Top

HuaweiAlgolux on Feb 1, 2022 edited

acceleration/brake measurements can be used to improve the performance and robustness of controllers for mechanical systems. To use acceleration signals, there are at least two approaches: direct use in a feedback loop to improve the trajectory tracking error, and indirect use by an observer to improve the estimates of position and speed.

↑ 1 👍 1 0 replies

TakaHoribe on Feb 9, 2022 Maintainer edited

In my mind, there are three outputs from the Vehicle component.

- Vehicle Odometry: for the velocity velocity information with speed vx and angular velocity wz. It can be represented by `TwistWithCovariance` or `Odometry` message type.
- Steering Status: for the steering information. It is completely limited in 2D space, so we don't have to use the quaternion. We should rather think about the possibility to support the non-Ackermann steering type vehicle. For now, we can define the specific message type like `Steering.msg` with just one steering_angle field, but it should be extendable for more vehicle types.
- Actuation Status: for primitive vehicle control. This represents the vehicle-specific information such as throttle, brake, torque, voltage, pressure, etc, and they are used by the adapter. So, this message type should be a generic one. In the ArchitectureProposal, the `steer`, `accel`, and `brake` are used to represent "any lateral motion related status" such as steering torque or voltage, "any accelerating longitudinal related motion status" such as accel pedal or throttle, and "any decelerating longitudinal related motion status" such as brake torque or pressure, respectively. It is based on the assumption that vehicles have three actuators for steering and accel and brake. But it could be more common message type like `actuation_status_array`.

So my proposal is (still open discussion though)

- Vehicle Odometry: `TwistWithCovariance.msg`
  - replace the current message type `nav_msgs/Odometry` ?
- Steering Status: `Steering.msg` [new]
  - with timestamp, and steering_angle.
- Actuation Status: `ActuationStatus.msg` [new]
  - with `accel`, `brake` and `steer`.

Any comments are welcome. Thanks!

↑ 1 1 reply

TakaHoribe on Feb 9, 2022 Maintainer edited

@xmfcx Appreciated if you have any comments.