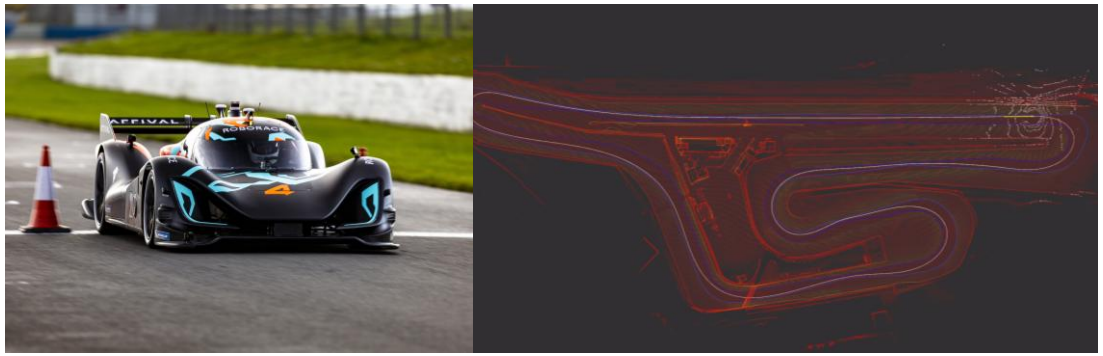
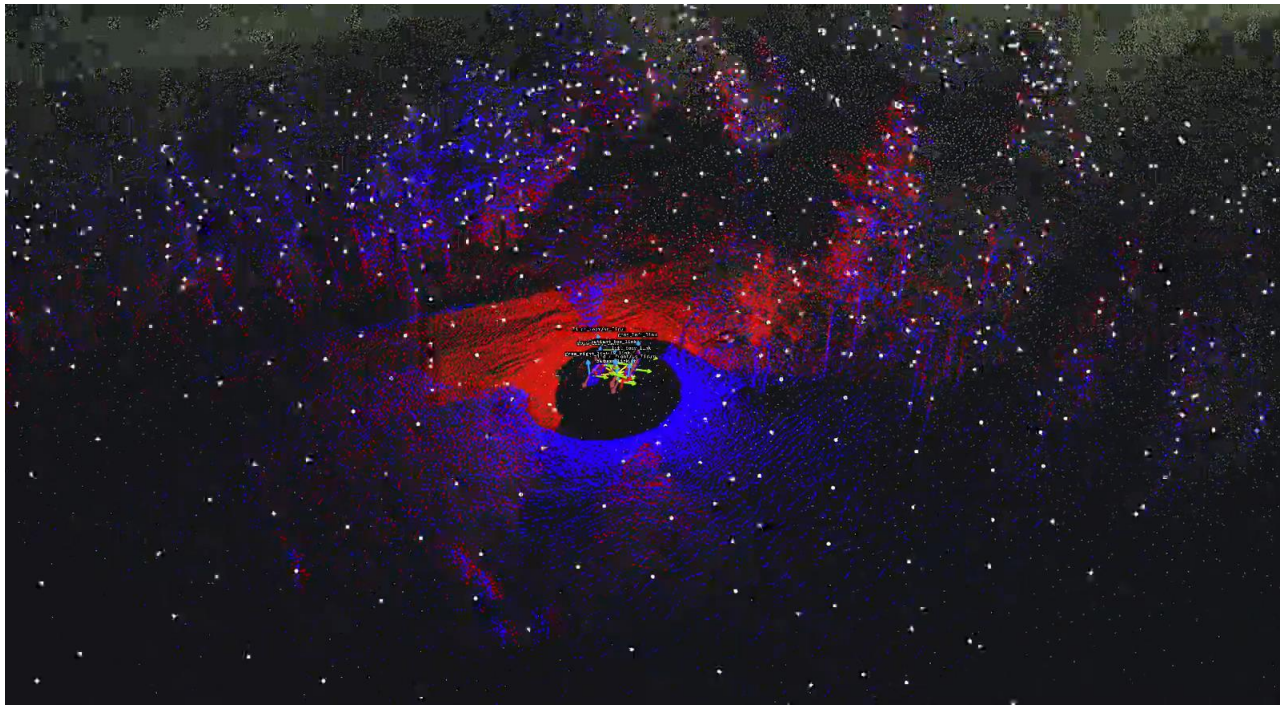
Localization / Sensor Fusion

- Robotics and Automotive Usage
- Localization Architecture
- Live Demonstration
  - Lidar- and GNSS-based localization
  - Parameter variation



https://github.com/virtual-vehicle/aa274_autoware_ws

Localization Offroad



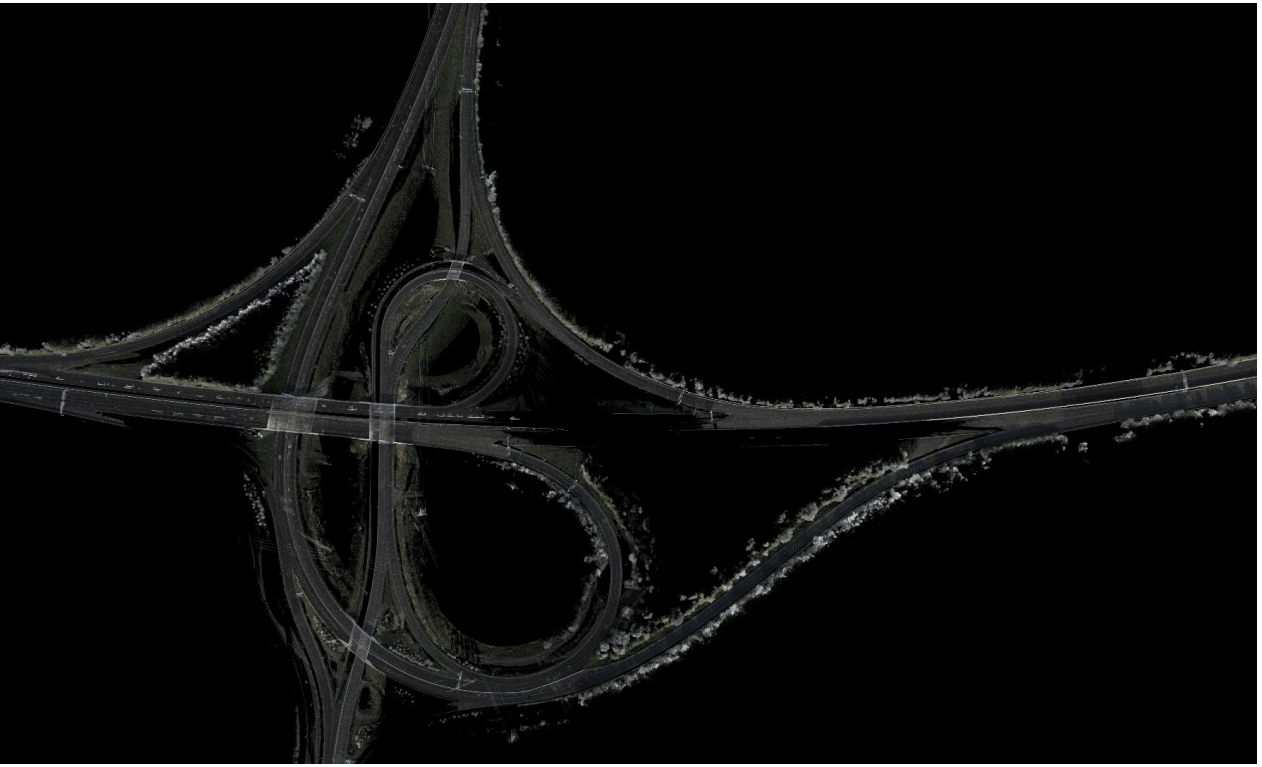
Why?

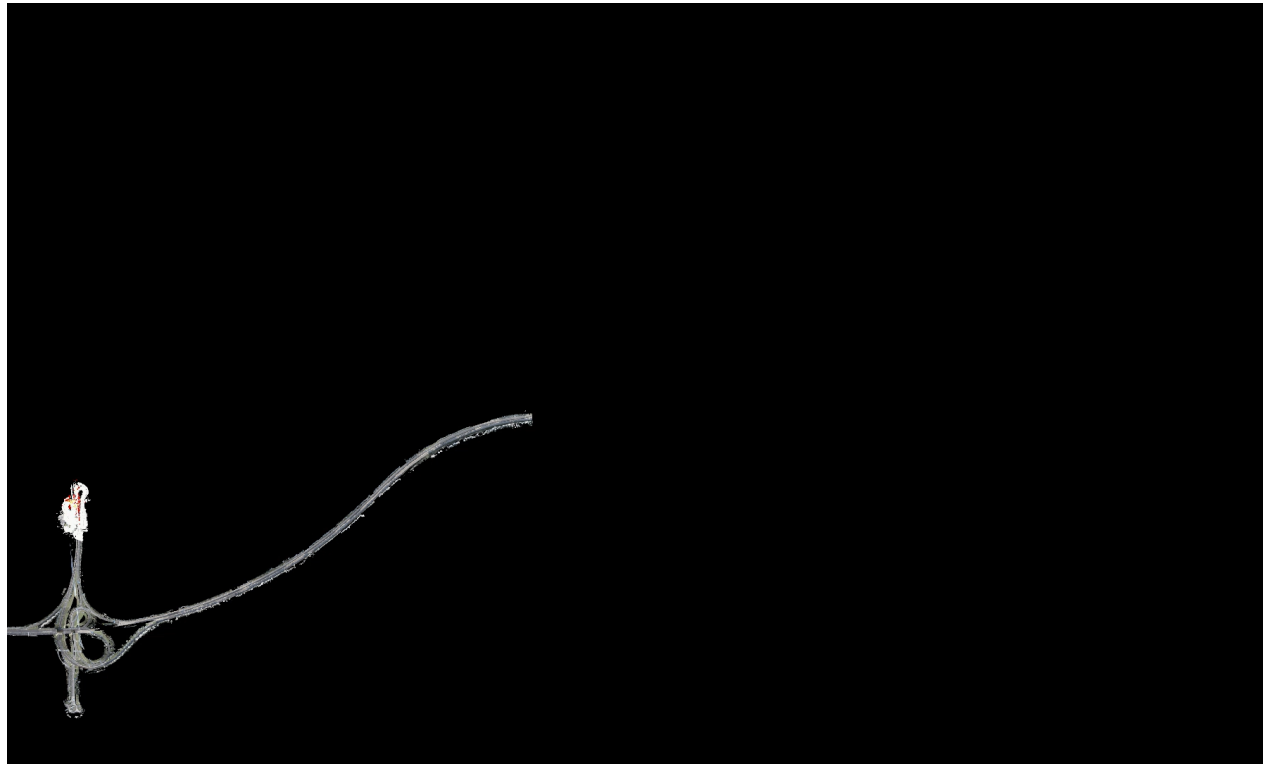
- Robots and AVs must know their position
- Mission planning to navigate from A → B
- Follow trajectories accurately

Challenges!

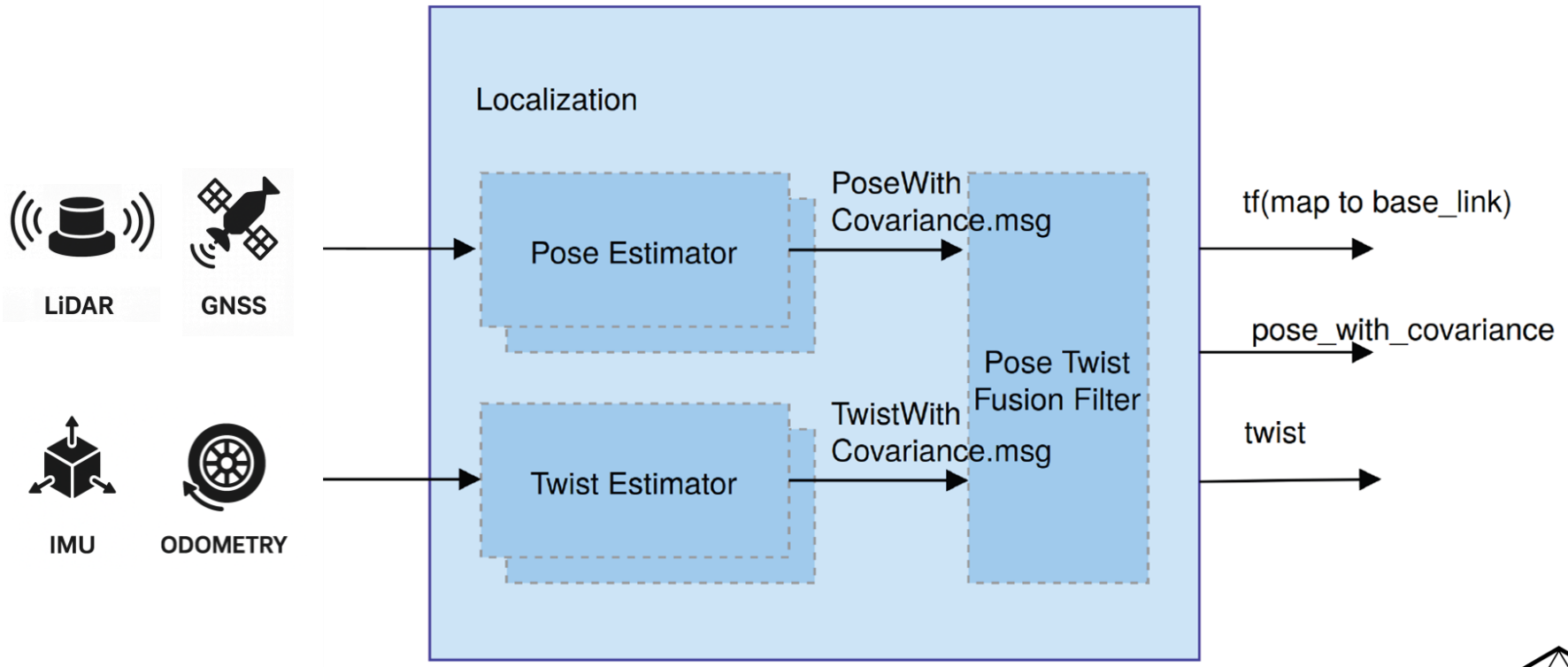
- Safety critical function
- Different sensors to combine robus localization
- Update rates and time syncronization

Localization on the Highway





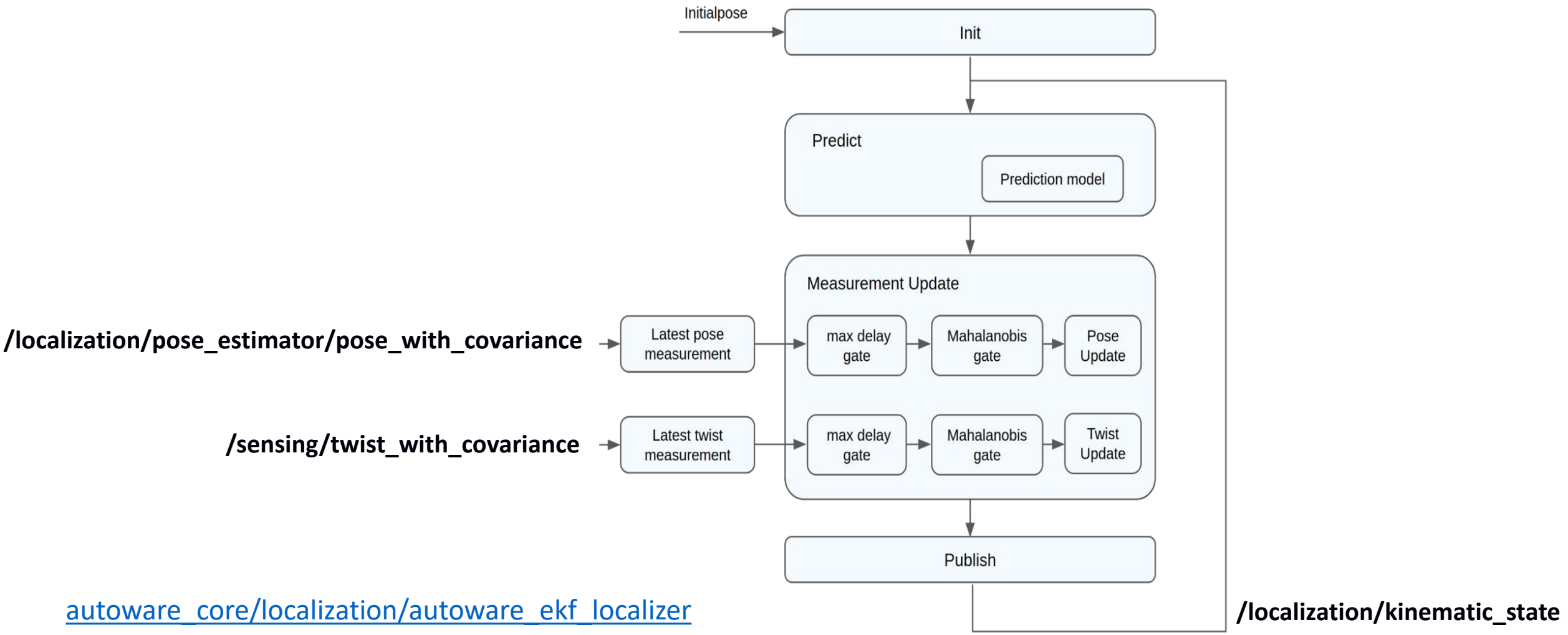
Localization Architecture



THE AUTOWARE FOUNDATION

[autowarefoundation/autoware: Autoware - the world's leading open-source software project for autonomous driving]

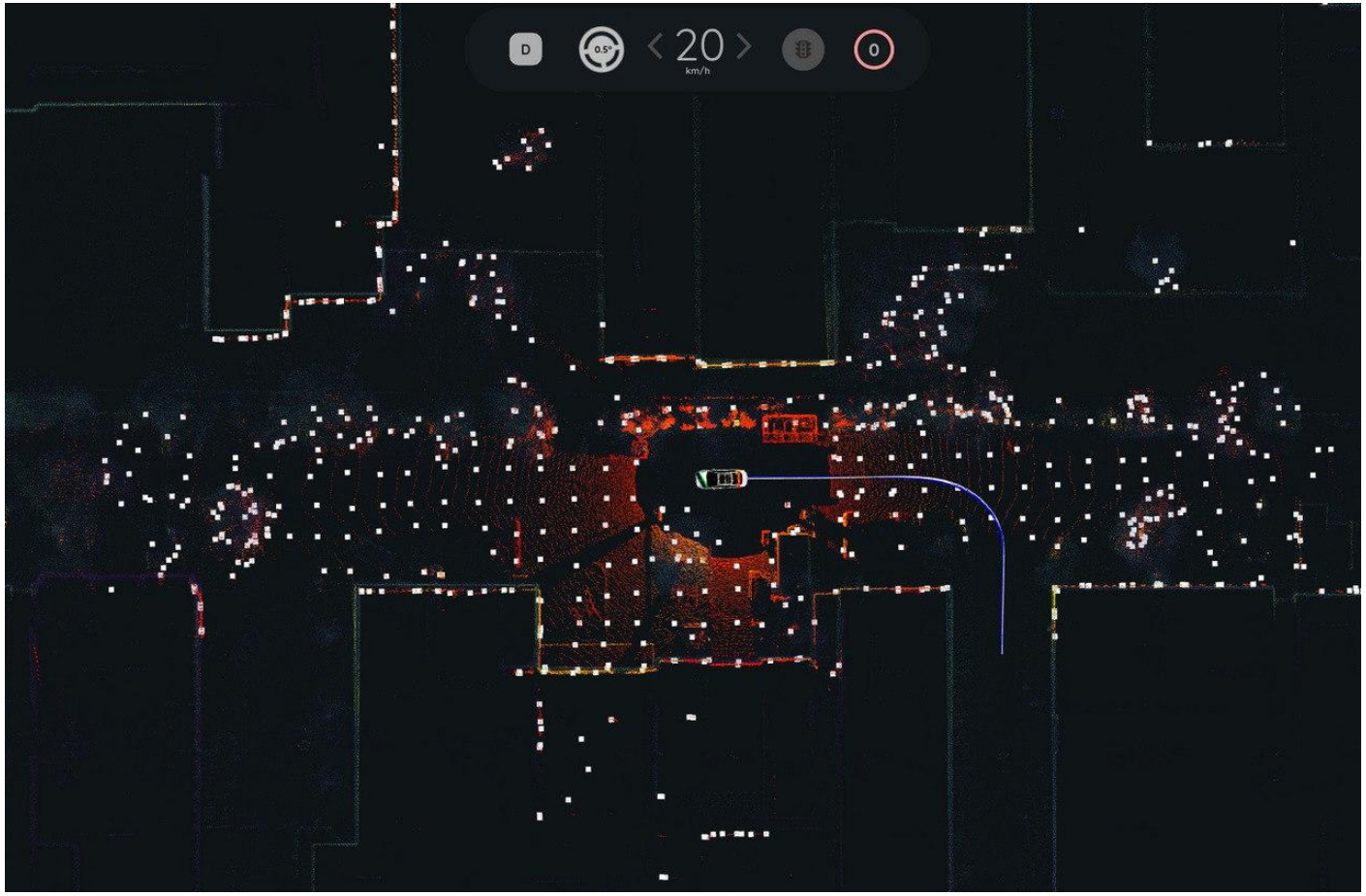
EKF Localizer (Pose Twist Fusion Filter)



[autoware_core/localization/autoware_ekf_localizer]

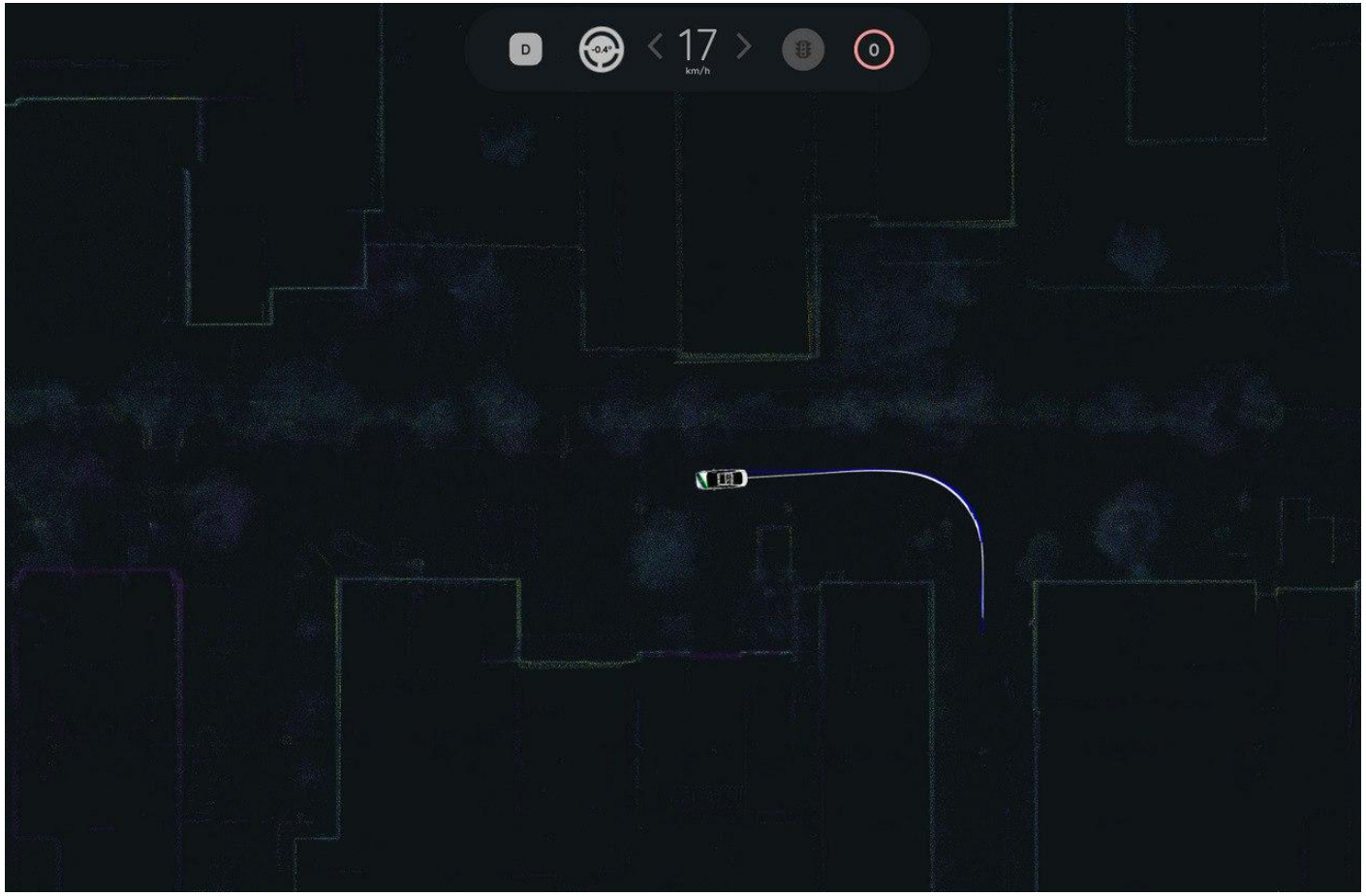
Localization with Odometry and Lidar

EKF input: `/sensing/twist_with_covariance`
`/localization/pose_estimator/pose_with_covariance`



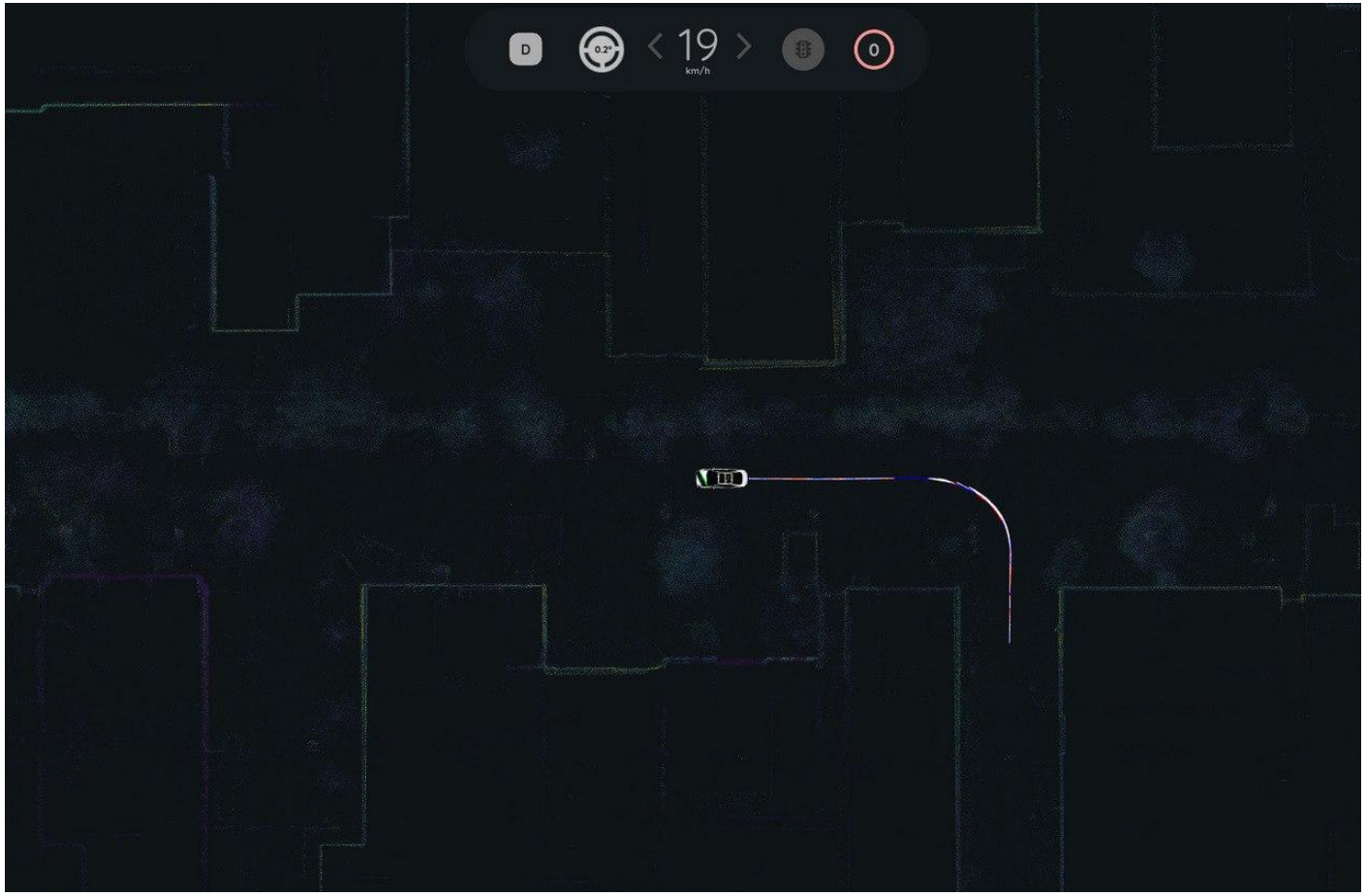
Localization with Odometry

EKF input: `/sensing/twist_with_covariance`



Localization with Odometry and GPS

EKF input: `/sensing/twist_with_covariance`
`/localization/pose_estimator/pose_with_covariance`



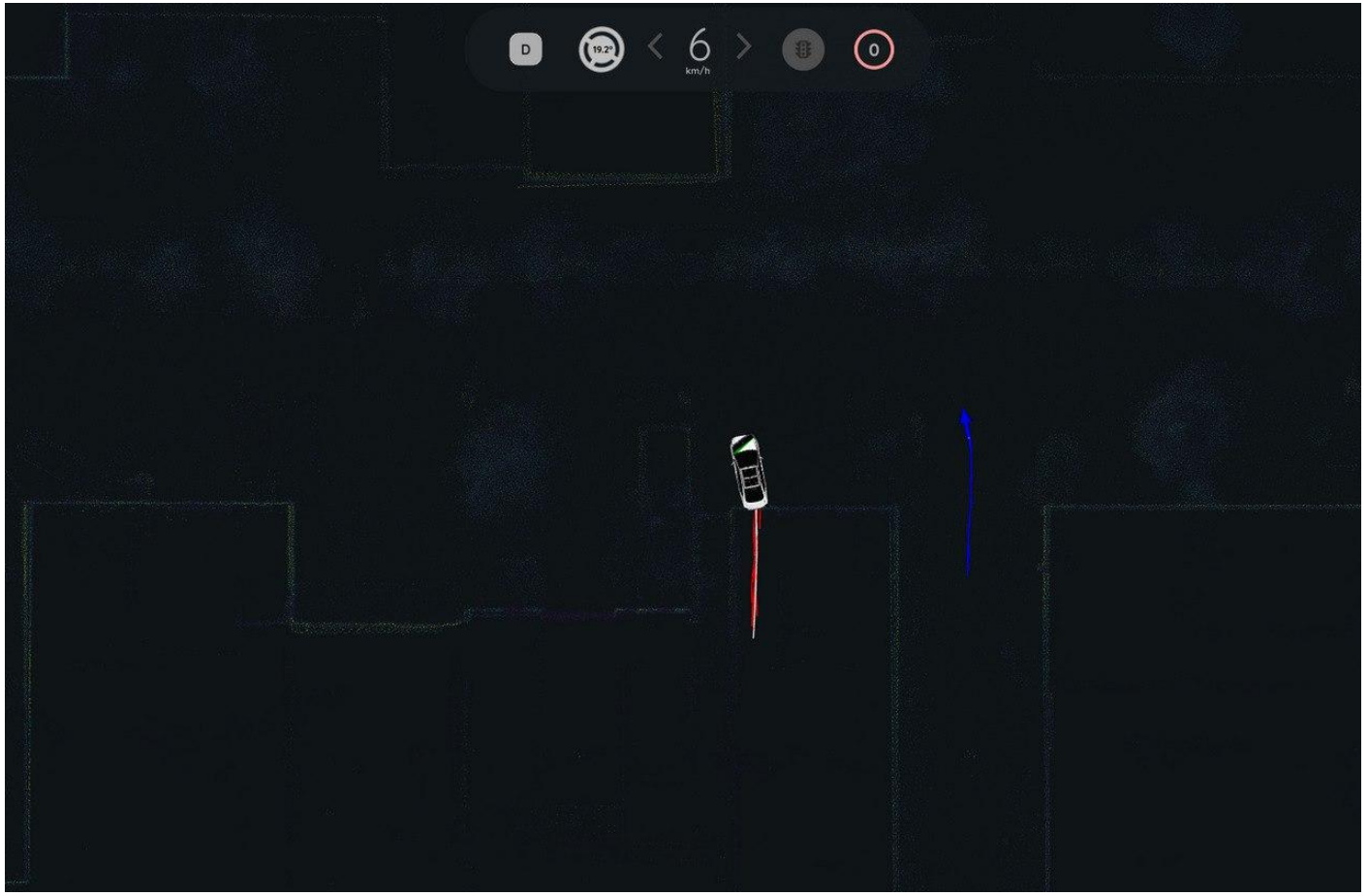
Localization with Odometry and GPS + noise

EKF input: `/sensing/twist_with_covariance`
`/localization/pose_estimator/pose_with_covariance`

$N(0, 3)$

Localization with Odometry and GPS + bias

EKF input: `/sensing/twist_with_covariance`
`/localization/pose_estimator/pose_with_covariance`



$N(10, 0)$

Thanks for your attention!
Questions?

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