High-quality training datasets:
How our HD maps helped enhance the fleet safety and efficiency of a leading autonomous delivery service provider

OVERVIEW

Highly accurate and up-to-date HD maps are critical to running a business that relies on a fleet of autonomous vehicles. It assists autonomous fleet operators in the precise localization of their vehicles, enables them to optimize routes, and enhances fleet safety.

We collaborated with our GIS technology partner on this project to provide mapping solutions for an autonomous middle-mile delivery service provider in North America.

The client required a comprehensive and accurate HD mapping solution that provided real-time data on road conditions, local traffic rules, and other parameters critical for the smooth operation of their autonomous fleet. The final output would be used to train their ADAS products and Autonomous Driving System.
Scope of work

- Generate HD maps equivalent to Navigational Data Standards (NDS) format by extracting road assets and traffic features from mobile LiDAR point cloud data and 360-degree panorama images.

- Create HD maps with Absolute Map Accuracy: < 10 cm

PROCESS

Our team started the project by pre-processing mobile LiDAR point cloud data and 360-degree panorama images to remove noise and unwanted data. Next, deep-learning AI algorithms and Machine Learning techniques were used to extract critical features such as roads, road assets, road signs, and parking lots.

The team developed automated tools to link attributes to these features and update them with metadata, such as lane models and traffic signs. They also conducted extensive, automated and manual quality control checks to ensure data accuracy and consistency throughout the process.
CHALLENGES

- Extracting features from big data sources required advanced hardware and software, and experts with deep knowledge of algorithms and data analysis techniques.

- Disparate data sources made it difficult to align the data correctly, particularly for coupling point cloud data with camera images.

- Data output required strict compliance with relevant industry standards to ensure maps could be successfully inputted into autonomous vehicle systems.

- Integrating data from various sources had the potential to create compatibility and data alignment issues. Interoperability was also essential for data sharing and collaboration.

- Updating and maintaining maps required a dependable team of experts and sophisticated software tools.

SOLUTION

Absolute Map Accuracy: < 10 cm
Our domain experts have decades of experience extracting data from disparate sources to create accurate HD maps. We aligned the data sets and achieved the required quality specification by employing specialized resources and a rigorous quality assurance process.

Automated and manual quality checks
The team performed multiple checks on data completeness at various stages in the process, from data sourcing to the final deliverable using automated tools. They also conducted manual checks on the data to verify the accuracy of the automated results.
CONCLUSION

Our process-driven and quality-first approach to HD mapping services for middle-mile transportation delivered accurate and up-to-date HD maps, providing the client's autonomous vehicles with real-time information about traffic conditions, road hazards, and other crucial parameters.

Logical and consistency checks
The team performed logical and consistency checks throughout the mapping process to validate the accuracy and consistency of the maps’ components. They also ran several levels of consistency checks on the data to ensure it met the defined quality standards.

Continuous improvement of HD maps
We used AI-powered algorithms to improve the HD maps delivered to the client constantly. These algorithms can detect changes in road conditions and traffic patterns in real time, allowing HD maps to be updated quickly and accurately.

OUTCOME

High-quality training datasets
Training datasets are essential for autonomous vehicles to understand and navigate real-world scenarios. Our high-quality training datasets helped the client optimize their algorithms and improve the accuracy and reliability of their HD maps.

Improved safety
By providing real-time data on road conditions, traffic rules/directions/features and other critical parameters, we enabled the client to ensure the safety of their autonomous vehicles while navigating various routes.

Increased operational efficiency
Our accurate and up-to-date HD map enabled our client’s autonomous vehicles to optimize routes, make real-time traffic-based adjustments, and reduce delivery time, fuel consumption, and costs.