Panpro Team

Panpro builds a successful new road safety business based on powerful integration of LiDAR and accurate georeferencing tools from OxTS.

Panpro Team had spotted a gap in the road construction industry, and a golden opportunity to improve road safety, by providing traffic authorities with data about sight distance (the distance a driver can see ahead or behind them) on their road networks. Using that data, authorities could use signage to improve road safety on existing roads, and plan new roads with these distances in mind.

Panpro had an innovative solution for mapping and simulating these distances using pointcloud data – but the team needed a way to accurately georeference its pointcloud data to maximise its effectiveness and the solution's affordability.

SUMMARY

Company:
Panpro Team

Industry:
Infrastructure Monitoring

Country:
Serbia

Website:
www.panpro.rs

OxTS Hardware:
xNAV650 Inertial Navigation System

OxTS Software:
OxTS Georeferencer and Boresight Calibration Tool
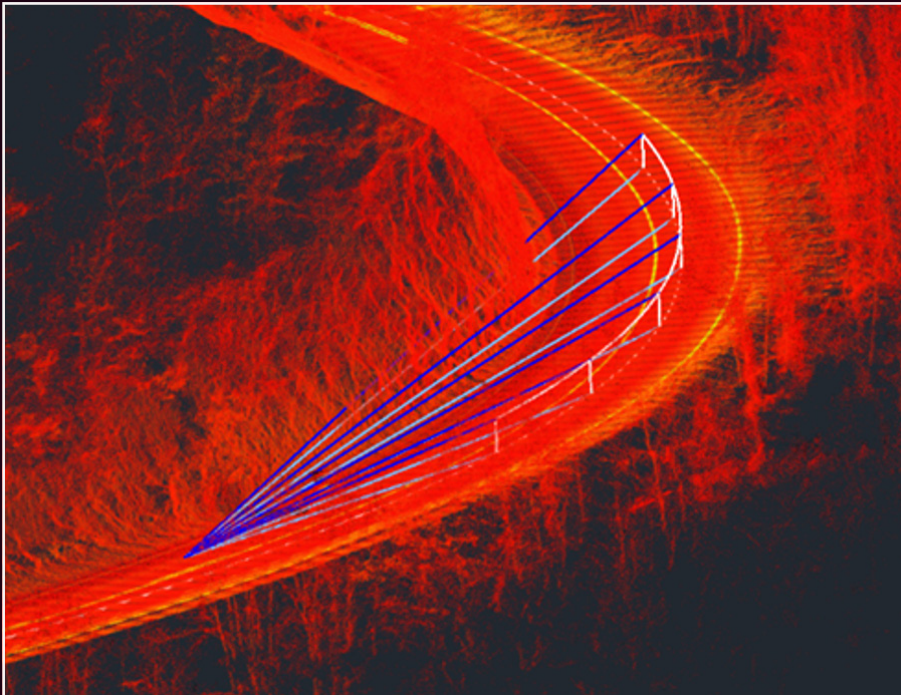
LiDAR:
Ouster OS2

**Partner:**
DTC Navigation Solutions GmbH

Who is Panpro Team?

Panpro Team Ltd. is a private consultancy based in Belgrade in Serbia, founded in 2010. Panpro's primary focus is road design, and in recent years the team has focus particularly on road safety. By combining the experience of its people with innovative tools, including the OxTS xNAV650 and OxTS Georeferencer, Panpro ensures that RSI (Road Safety Inspection) and RSA (Road safety audit) projects are completed successfully, and taking into account driver sight challenges.

Panpro offer a traffic safety 'driver visibility' service
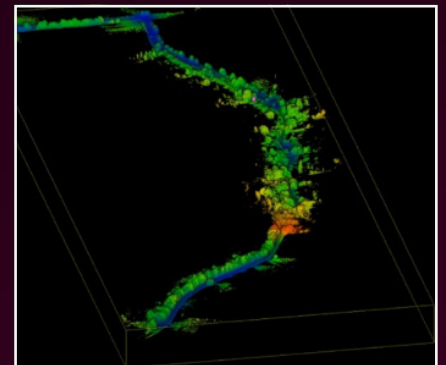
Recorded Panpro pointcloud

The overall goal?

Panpro wanted to use LiDAR technology to provide clients with highly accurate driver sight distances on road networks. That data would help those clients to improve road safety and so reduce traffic accidents, injuries, and deaths.

In order to deliver this at scale, the team needed a way to accurately georeference the point cloud data they gathered. The solution needed to be small enough to mount on their survey vehicles, but still with centimetre-level accuracy.

Panpro's LiDAR system includes an OxTS xNAV650 and Ouster LiDAR sensor

CHALLENGES

Panpro had an idea, a plan, and a LiDAR scanner. What they were missing was something to tie those things together.

LiDAR was chosen as the best technology to support Panpro's traffic safety because of its ability to provide precise measurements of an environment. By scanning road networks with the LiDAR, Panpro's team could create a pointcloud which could be used to measure distances between any two points – a car and a bend, for instance, or a car and an overhanging tree branch. From that, the team could quickly identify areas on a road where the driver's line of sight was less than required for the speed limit, leading to unsafe conditions.

The missing component of the solution was a way to tie the pointcloud to a geodetic model of the earth – or georeferencing. Without

it, none of Panpro's data could be easily applied to the earth, making its solution drastically less practical and useful.

The Panpro team needed a solution that would let them georeference pointclouds quickly so they could deliver on time for clients, and accurately so that their work would be of the highest quality. Ideally, the solution would also be as cost-effective as possible, allowing Panpro to price their new service competitively.
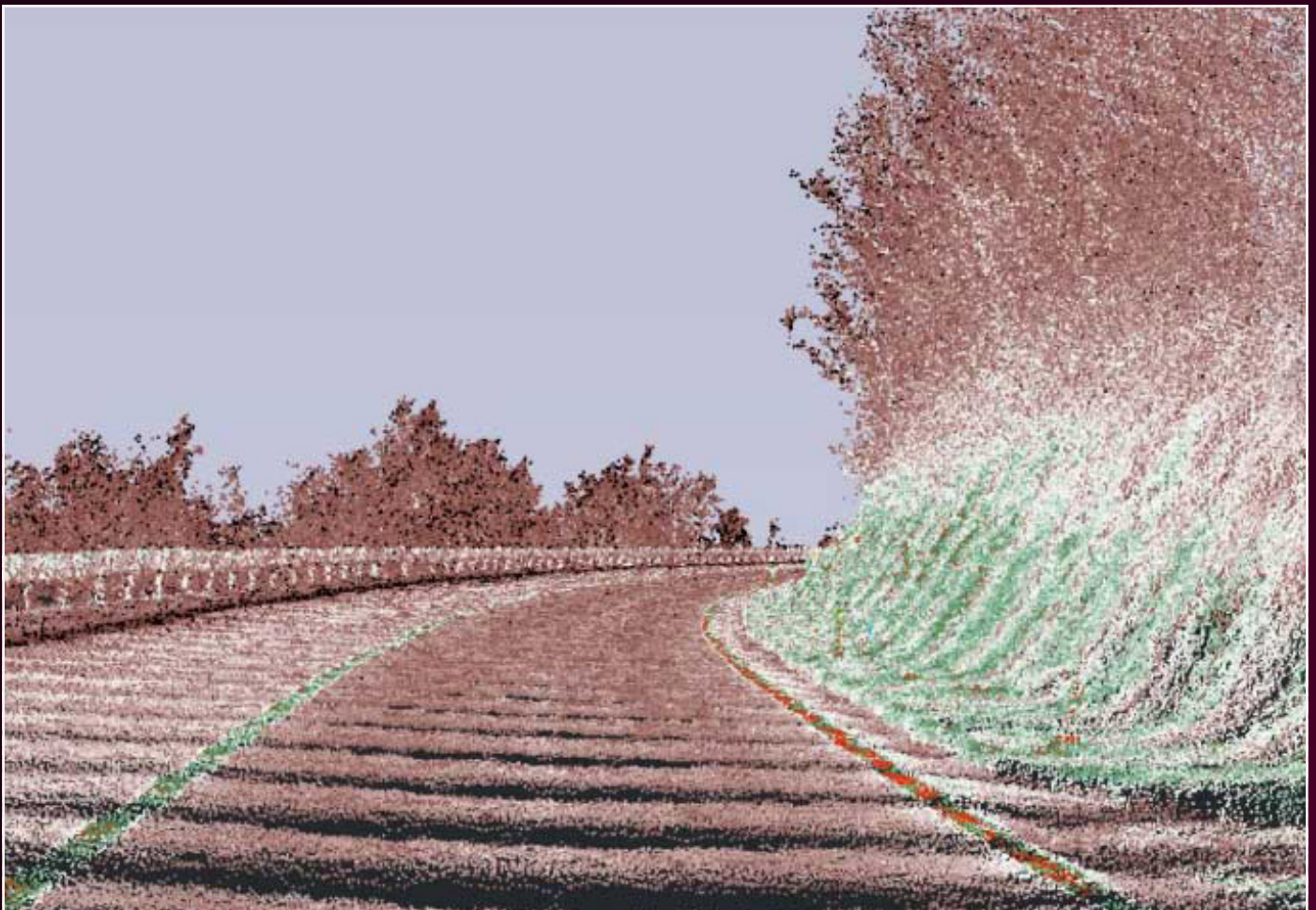
Panpro road bend animation screenshot

SOLUTION

The solution that Panpro devised consisted of the following components:

+ Ouster OS2 LiDAR Scanner
+ OxTS xNAV650 Inertial Navigation Solution
+ OxTS Georeferencer and the boresight calibration tool

The LiDAR and INS were both mounted to Panpro's survey vehicle, while OxTS Georeference was used to georeference the pointcloud data after each survey.

Panpro discovered OxTS via web search, and was impressed by the specification of our INS devices and our integrations with leading automotive LiDAR scanners. In order to give Panpro the best service possible, we directed them to our channel partner in Germany, DTC, who was able to support Panpro with its project.

Working with DTC and based on its own research, Panpro decided to use a combination of the OxTS xNAV650 INS and the OxTS Georeferencer software as the heart of its new offering. OxTS Georeferencer enables Panpro to quickly, easily, and accurately georeference its pointclouds based on the data gathered by the xNAV650; the INS itself delivers centimetre-level

accuracy throughout the survey, even through tunnels and in wooded areas, despite being just 130g heavy and measuring 77 x 63 x 24mm.

The xNAV650 can deliver this level of performance thanks to its cutting-edge MEMS IMU sensors and survey-grade GNSS receivers, combined with our unique gx/ix tight-coupling technology which preserves GNSS accuracy even in areas where signal is poor, and speeds up RTK reacquisition after a loss of signal – for instance, after going through a tunnel. On top of this, the pre-built integrations with the Ouster OS2 LiDAR scanner meant that Panpro could start georeferencing its data without the need for coding.

Products used in this project

xNAV650

A high-grade miniature INS from OxTS. It uses survey-grade dual frequency GNSS receivers and custom MEMS IMU for centimetre-level position accuracy, precise orientation and true heading. It logs the navigation data on internal storage for downloading and viewing post-mission. For many applications, such as corridor mapping and precision agriculture, the xNAV650 provides one of the best price/performance ratios on the market.

OxTS Georeferencer

OxTS Georeferencer is OXTS' proprietary LiDAR data georeferencing software. It takes the position and navigation measurements from an INS and combines them with the raw data from a wide range of LiDAR sensors through a simple 'drag and drop' method. An additional boresight calibration tool allows OxTS Georeferencer users to take advantage of a simple LiDAR and INS sensor calibration method to eliminate blurring and double-vision from pointclouds.
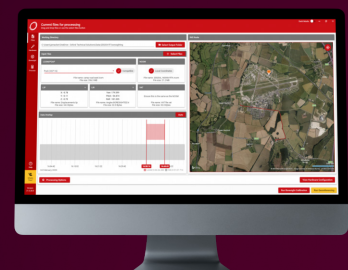
"OxTS has allowed us to enter the world of pointclouds. Its hardware and software is the heart of our pointcloud creation and georeferencing process - delivered at a reasonable price that is attractive to small and medium enterprises worldwide."

The setup allows Panpro to use a very simple workflow to obtain the data needed for its work:

- Spend around three minutes calibrating the INS and LiDAR scanner before the survey

- Drive along the road to conduct the survey, with the INS gathering high-precision position data that is automatically synchronised with the LiDAR data

- After the survey, the data is processed using the free OxTS NAVsuite software

- That data is then processed through OxTS Georeferencer, creating a perfectly georeferenced pointcloud with the click of a button.

Part of the power of OxTS Georeferencer lies in its Boresight Calibration Tool, a unique capability that allows the user to eliminate blurring and double vision from their pointcloud by precisely calibrating the position between the INS and the LiDAR scanner. So, in combination, the xNAV650 and OxTS Georeferencer are giving Panpro not just accurately georeferenced pointclouds, but better-quality ones, too.

OxTS xNAV650 and Ouster LiDAR sensor

RESULTS

By combining their pointcloud data with their own innovative calculations and animation skills, the team at Panpro can accurately map driver sight distances onto digital models of the road network. The resulting data clearly shows areas where driver sight distances are less than they should be, indicating areas where additional measures need to be taken in order to improve road safety. The precision of the pointcloud data means that Panpro can even consider whether road furniture and trees are causing the issue, rather than issues such as embankments or the curve of the road.

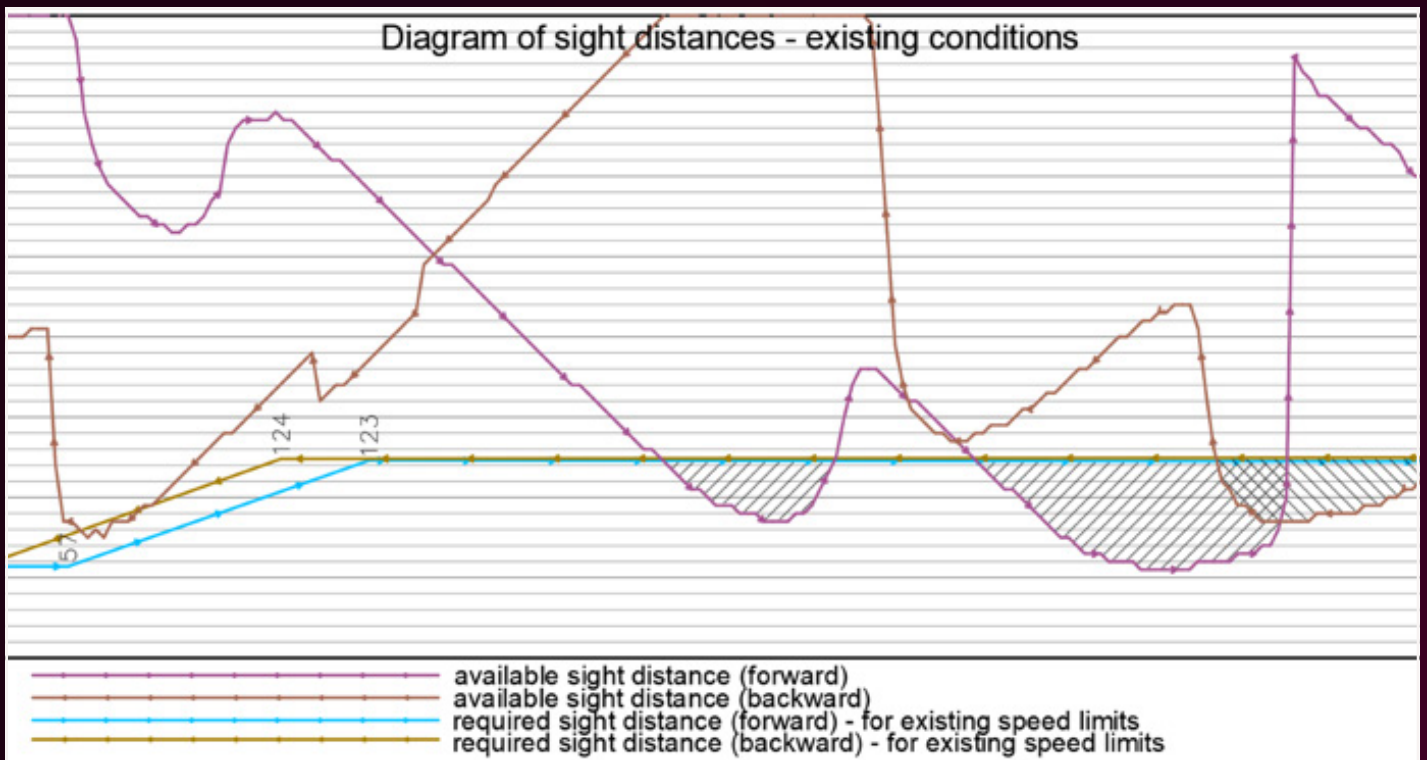The data is provided to clients in a variety of ways, including:

· A graph like the one below

· An animation of the road network showing an object at the minimum safe sight distance moving in and out of vision as the driver moves along the road

· A layout plan showing the envelope of driver sight distance lines (both for normal driving conditions and for overtaking) compared to the actual road layout

Fuelled by OxTS Technology, this new business arm for Panpro has been highly successful. Though the solution has been live for less than a year, Panpro has already impressed road managers in both Montenegro and the Republic of Serbia, successfully working on more than 200km of state road networks.

On top of this, clients in Switzerland, Slovenia, and Austria are also taking an interest in Panpro's innovative approach to road safety.

Diagram of sight distances - existing conditions

— available sight distance (forward)
— available sight distance (backward)
— required sight distance (forward) - for existing speed limits
— required sight distance (backward) - for existing speed limits

"The OxTS team and the people at DTC have been a pleasure to work with. They have always given us help and advice when we needed it, and they made the process of setting up our solution much easier."

Mišel Sabo
Co-owner and Director
Panpro Team

Global leaders in inertial and GNSS since 1998

T: +44 (0) 1869 814253
E: sales@oxts.com

Accurate and reliable georeferencing solutions for land, air and marine applications.

At OxTS we're passionate about inertial navigation and how we can help our customers with our technology. With over two decades of experience in combining the best of high precision GNSS receivers and world-class inertial navigation expertise, OxTS' products have become the industry standard for automotive testing and are widely used in other industries.

Our products provide position, roll, pitch, heading and other measurements of vehicles on land, sea and in the air.

Our highly accurate RT3000 series is used by almost all car manufacturers in the world for vehicle dynamics testing, validating advanced driver assistance systems (ADAS) sensors or developing self-driving cars.

Our range of combined, compact GNSS/INS systems are used for sensor position and orientation on mobile mapping vehicles or for direct georeferencing of data from airborne surveying.

Twitter
twitter.com/OxfordTechnical

YouTube
youtube.com/user/oxts

To find out more please visit www.oxts.com

LinkedIn
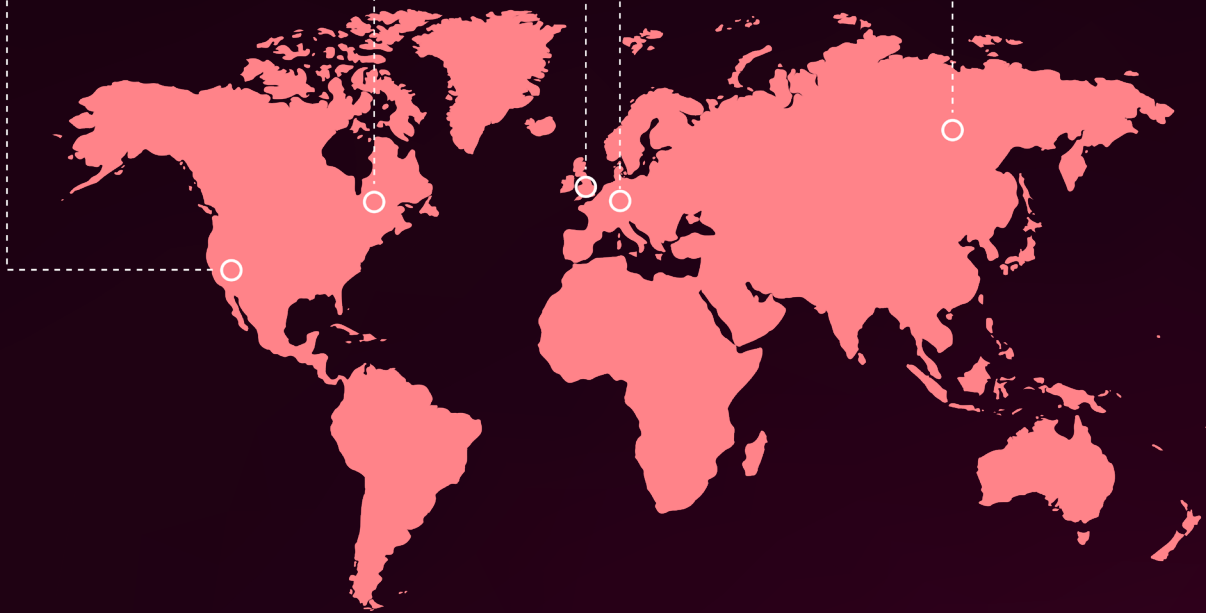linkedin.com/company/oxts-ltd-

OXTS

California
Local Support Team

Detroit
Bloomfield Hills

United Kingdom
Oxfordshire

Germany
Augsburg

China
Shanghai

OxTS Inertial Navigation Experts since 1998

Global Headquarters - UK

Park Farm Business Centre, Middleton Stoney, Oxfordshire, UK, OX25 4AL

Sales, support and all other enquiries call: +44 (0) 1869 814 253

China

Suite 2808

Building 1 Grand Gateway

1 Hongqiao Road

Shanghai, 200030

Tel: +86 1377 601 1215

US

OxTS inc.

Office 304

Regus Business Center

41000 Woodward Avenue,
Suite 350 East

Bloomfield Hills

Michigan 48304

Tel:: +1 248 260 1981

Germany

OxTS GmbH

Wankelstrasse 5a

86356 Neusaess

Tel: +49 175 627 9428

OXTS