Precise Navigation for Railway Vehicles at Swiss Federal Railways (SBB)

Enhancing Rail Operations with Advanced Sensor Fusion, powered by Septentrio mosaic-X5

ANavS GmbH delivers cutting-edge navigation solutions by combining artificial intelligence with state-of-the-art tightly coupled sensor fusion technology. The products provide highly accurate, real-time or forward-backward positioning and attitude information for autonomous vehicles, drones, and robots. Leveraging advanced sensor fusion of GNSS, IMU, odometry, LiDAR, and camera data, ANavS ensures reliable performance even in challenging or GNSS-denied environments. Septentrio's top-quality all-in-view GNSS receiver ensures reliable positioning in challenging industrial environments. Besides state-of-the-art RTK technology, ANavS is also supporting the NEW Galileo High-Accuracy Service (HAS) in its tightly coupled PPP-Engine, based on CNAV navigation data provided by the mosaic-X5 chip.

One of the most innovative applications is the **mPOM (mobile Positioning of Maintenance Work) project**, launched by **Swiss Federal Railways (SBB)**. This initiative is transforming railway vehicle localization for predictive maintenance – replacing paper-based reports with digital precision and unlocking new efficiency in track-based operations.

Figure 1: mPOM Box is the heart of the mPOM system. It is installed on the train and hosts all processing, receivers and sensors needed for precise localization

Project Overview

For SBB, accurate documentation of construction and maintenance activities along the tracks is key to introducing predictive maintenance. Until recently, this process relied on **paper reports**, an inefficient and error-prone approach that prevented automated data processing.

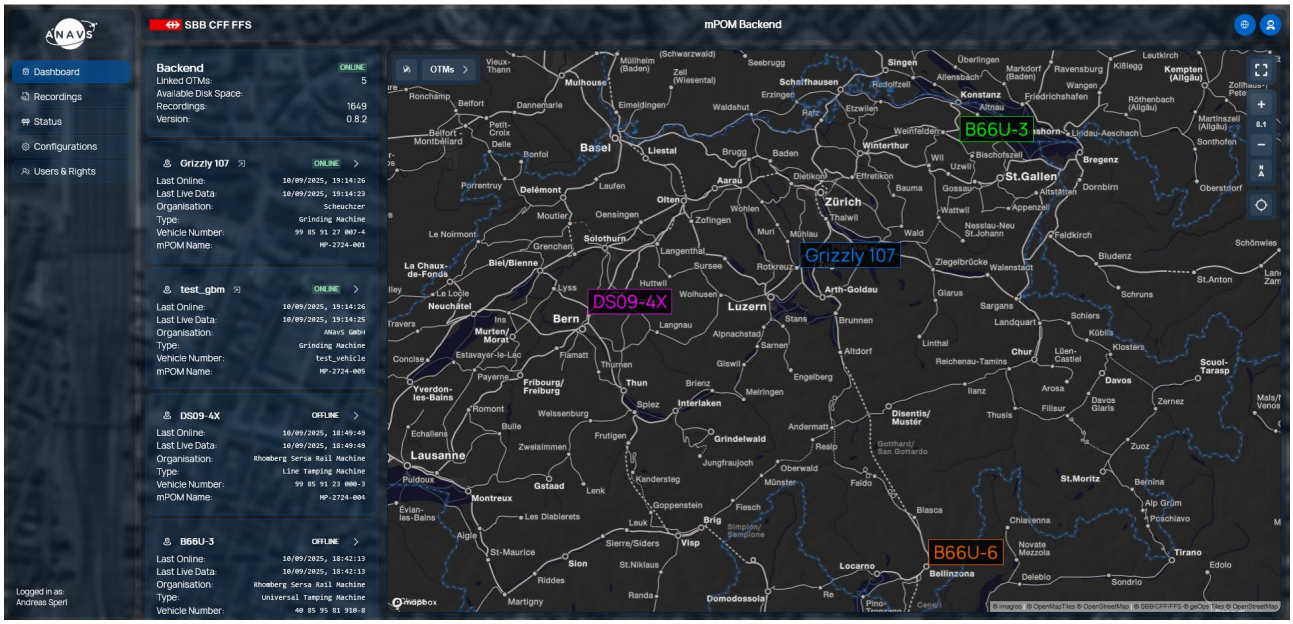
To address this, **ANavS GmbH**, together with **Rhomberg Sersa Rail Group**, was contracted to develop a **mobile positioning system (mPOM)** for track maintenance machines and integrate it into the existing SBB IT infrastructure. The mPOM system is an intelligent, battery-powered system that automatically detects work. By using a tightly coupled sensor fusion with dual-GNSS (for precise attitude determination), high-grade MEMS IMU and odometry, the mPOM system calculates the position and simultaneously records the work performed. This automatically synced data (e.g. sensor raw data, solution data, vehicle data), implemented using high bandwidth 5G, to the fleet management server, is further processed on the server and forwarded to the subsequent chain links. Everything is fully automated.

How ANavS and Septentrio Technology powers the mPOM project

- **Seamless Fleet Integration:** Real-time monitoring and automatic forward/backward processing with synchronized machine and sensor data.
- **Robust Tracking: LOCK+** technology in mosaic-X5 ensures reliable positioning despite strong vibrations and shocks during maintenance work.
- **Superior Accuracy in Challenging Environments:** mosaic-X5 APME+ multipath mitigation separates directly from reflected signals near rail structures.
- **Resilient GNSS-Denied Operation:** Intelligent fusion of odometry and IMU data bridges gaps when satellite signals are weak.
- **Cloud-Based Accessibility:** Engineers and operators can access and analyze navigation data remotely, accelerating decision-making and infrastructure assessment.

Driving the Future of Rail Operations:
With the **ANavS Fleet Management Ecosystem**, powered by the **Septentrio mosaic-X5 chipset**, the railway industry takes a decisive step toward a more **precise, efficient, and fully digitalized future**.

Want to learn more? Contact us at info@anavs.de or visit www.anavs.com.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Recordings
Status
Configurations
Users & Rights
Backend
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Version: 0.8.2
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Vehicle Number: 99 85 91 27 007-4
mPOM Name: MP-2724-001
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Zürich
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Konstanz
Chur
Davos
St.Moritz
Locarno
Bellinzona
Domodossola
Sion
Brig
Visp
Thun
Fribourg/ Freiburg
Grindelwald
Disentis/ Mustér
Arth-Goldau
Solothurn
Biel/Bienne
Neuchâtel
Montreux
Martigny
Aarau
Olten
Baden
Brugg
Schaffhausen
Singen
Bregenz
Lindau-Aeschach
Friedrichshafen
Ravensburg
Kempten (Allgäu)
Sargans
Landquart
Klosters
Scuol-Tarasp
Tirano
Chiavenna
Novate Mezzola
Sondrio
Edolo
Delebio
Poschiavo
Alp Grüm
Bernina
Oberalp
Andermatt
Realp
Gotthard/ San Gottardo
Airolo
Biasca
Faido
Münster
Oberwald
Jungfraujoch
Kandersteg
Goppenstein
Fiesch
Leuk
Sierre/Siders
St.Niklaus
Riddes
Randa
Simplon/ Sempione
Re
Pino-Tronchetto
Cenerì
Zuoz
Arosa
Filisur
Thusis
Zernez
Lenk
Gstaad
Les Diablerets
Aigle
St-Maurice
Evian-les-Bains
Puidoux
Echallens
Bulle
Romont
Payerne
Estavayer-le-Lac
Concise
Yverdon-les-Bains
Ins
Murten/ Morat
Travers
Le Locle
La Chaux-de-Fonds
Le Noirmont
Porrentruy
Delémont
Bonfol
Belfort - Montbéliard
Belfort
Ronchamp
Vieux-Thann
Mulhouse
Müllheim (Baden)
Zell (Wiesental)
Seebrugg
Erzingen
Waldshut
Rafz
Etzwilen
Ridolfzell
Allensbach
Markdorf (Baden)
Wangen
Leutkirch
Kißlegg
Zollhaus-Blitzingen
Röthenbach (Allgäu)
Martinszell (Allgäu)
Sonthofen
Oberstdorf
Dornbirn
Feldkirch
Bludenz
St.Anton
Schruns
Schiers
Küblis
Klosters
Lüen-Castiel
Reichenau-Tamins
Ilanz
Linthal
Altdorf
Sarnen
Stans
Brunnen
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Giswil
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Meiringen
Brienz
Langnau
Wolhusen
Huttwil
Sursee
Rotkreuz
Ziegelbrücke
Walenstadt
Weesen
Amden
Flumserberg
Wattwil
Uzwil
Wil
Bischofszell
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Appenzell
Nesslau-Neu St.Johann
Wald
Rüti
Bauma
Effretikon
Dietlikon
Wallisellen
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Langenthal
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Weissenburg
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Gstaad
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St-Maurice
Aigle
Les Diablerets
Evian-les-Bains
Puidoux
Montreux
Lausanne
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Murten/ Morat
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