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**ConMoRAIL - Efficient
 Sensor-Based
 Condition Monitoring
 Methodology for the
 Detection and
 Localization of Faults
 on the Railway Track**

Overall Project Goals

- Development of a methodology for the efficient detection and localization of track faults
- Development of a cost-effective, board-autonomous and permit-free monitoring system
- **Geodetic contribution:**
 - Development of a kinematic sensor fusion algorithm by Extended/Unscented Kalman Filter
 - Design and implementation of data model and relational database for digital track map
- **Project partners:** Institute of Engineering Geodesy (IIGS), University of Stuttgart; Institute of Railway and Transportation Engineering (IEV), University of Stuttgart

Approach

- Low-Cost GNSS and IMU data acquisition while mounted on a regular train



<https://www.u-blox.com/en/product/ann-mb-series>



<https://www.asc-sensors.de/sensoren/asc-imu-7-ln/>



<https://www.ni.com/de-de/shop/model/crio-9042.html>

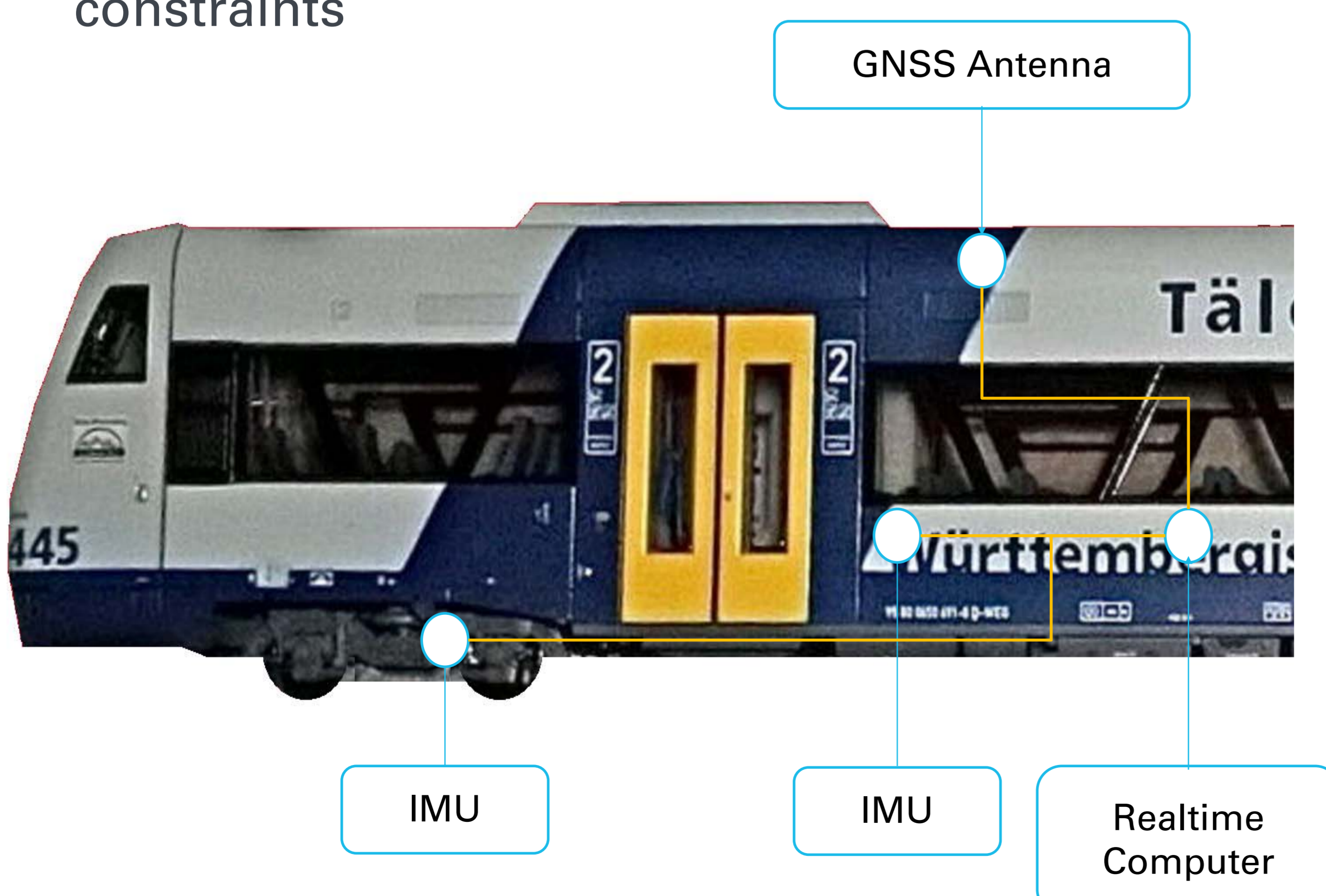
- Sensor Fusion using Extended/Unscented Kalman Filter
- Matching train position to map
- Integration of the digital track map into the algorithm as stochastic equality and inequality constraints

Digital Track Map

- Design and implementation of a data model and a relational database
- Expansion of the database with spatio-temporal attributes (e.g. average speeds)
- Further attributes for infrastructure and defect classifications
- Integration of detected and classified track faults into the map
- Additional meta data regarding the quality of the stored map elements (e.g. accuracy, up-to-dateness) must be foreseen



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Selected Publications

Lerke, O., Bahamon-Blanco, S., Metzner, M., Martin, U., Schwieger, V. (2021): Vorarbeiten zur Entwicklung eines Gleisfehlerdetektionssystems mit Regelzügen und Low-Cost Sensorik. ZfV, Vol. 146, No. 3 (2021). <https://doi.org/10.12902/zfv-0339-2021>

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