



ESRIUM

SAFE AND EFFICIENT ROADS



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Workshop on Traffic Infrastructure Mapping and Automated Damage Assessment Systems

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RESEARCH

WP4: Mapping of Ground Truth Data



Mobile mapping system
PEGASUS from Leica
Geosystems, operated by
JOANNEUM RESEARCH

PEGASUS is equipped with a high end
navigation unit (GNSS + IMU) and high
resolution RGB cameras and Z+F laser scanners

Road damages can be mapped with +/- 5cm
accuracy

WP4: Mapping of Ground Truth Data



Figure: FGI / H. Kaartinen 2019

Mobile mapping system
ROAMER, designed and
operated by FGI

ROAMER is equipped with a high end navigation
unit (GNSS + IMU), a panoramic camera
cameras and a Riegl laser scanner

Road damages can be mapped with +/- 5cm
accuracy

Sample images (PEGASUS)

A wide range of different road damages exists both for asphalt and concrete road type



Concrete cracks and
detachment



Pothole (7cm depth)



Fine crack in asphalt



Scan data sample (ROAMER)

Ruts and potholes can clearly be identified in the scan data



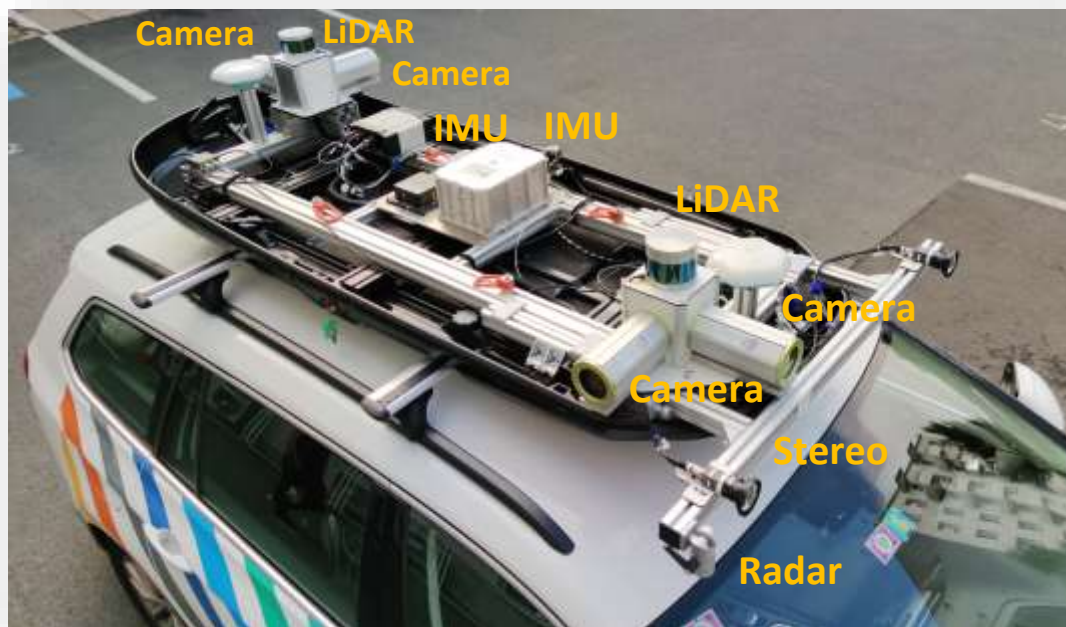
Scan data



Panoramic image



Cost Efficient Data Acquisition



Goal:
Acquire Information on
the Road Surface with
limited hardware
resources

Allow a cost-efficient
Geo-Localization

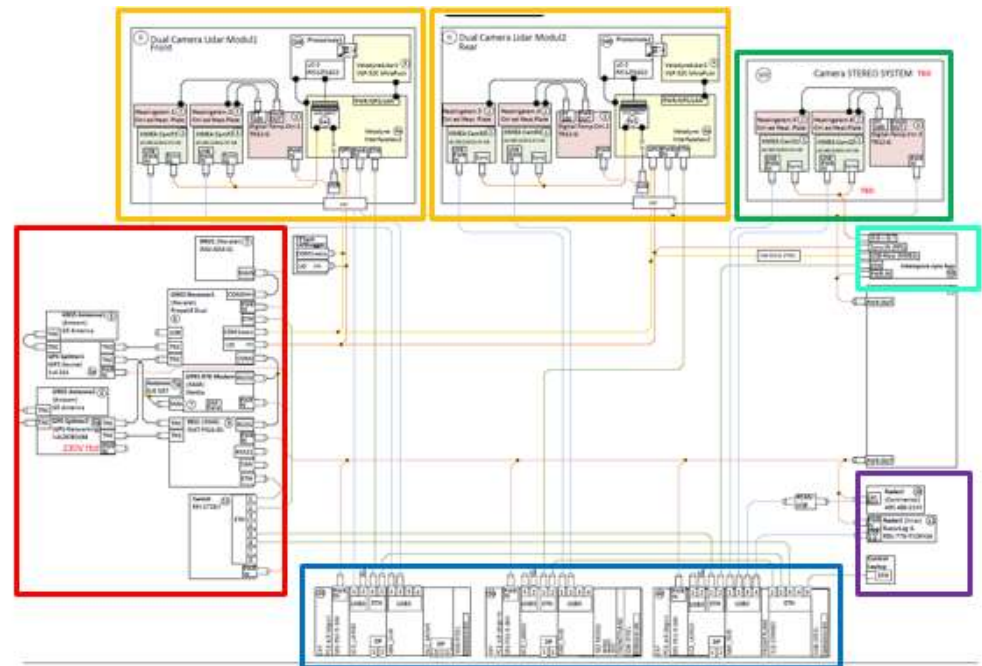
Allow an efficient Data
Transfer

→ Deployable on a
vehicle fleet

Cost Efficient Data Acquisition

Experimental System Components (overspecified)

- 2x Camera-LiDAR Unit
- 1x Localization Unit
- 1x Stereo-Camera
- 3x Compute Node
- 1x Radar
- 3x Trigger-Unit
- 1x Reference-Localization-Unit
- 1x Stereo-Unit





Qualitative Evaluation: Image Quality at 100km/h



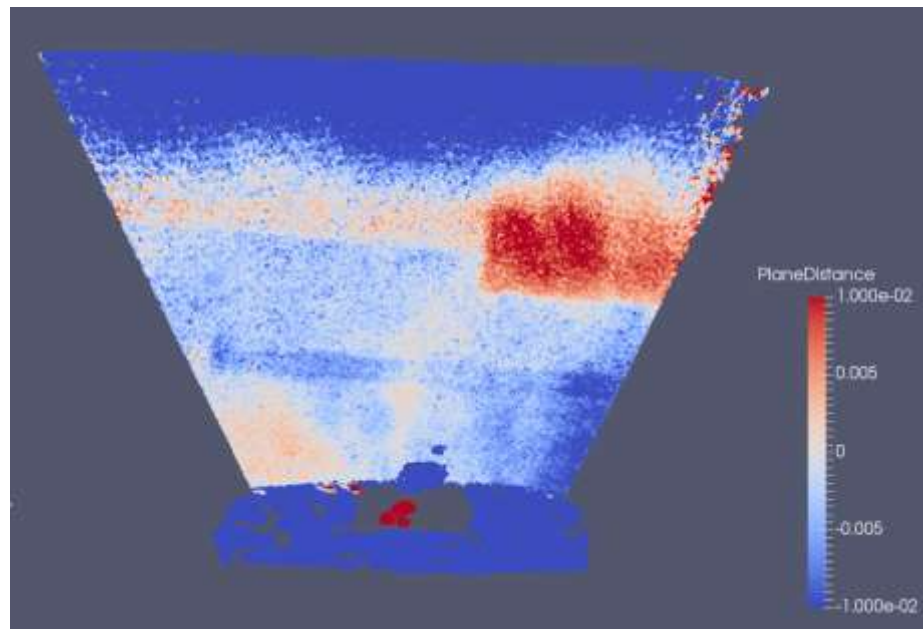


Exemplary Road Damage at 100km/h





Exemplary Stereo Reconstruction





Summary

Mobile-Mapping Systems are clearly capable of depicting and measuring Cracks and Potholes

- Survey-Grade Lidar Delivers Local Accuracy in mm-Range
- High-Resolution Images Typically have Narrow Field-of-View

Automotive-Grade Sensors (Automotive/Industrial grade Cameras and Automotive LiDAR) also show promising first Results

- Automotive LiDAR will not be capable of resolving and measuring small geometric defects
- Large Distortions (ruts) can be measured by LiDAR
- Automotive Cameras can resolve road surface defects
- Stereo reconstruction can resolve subtle road surface defects at the cost of high computational power



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Thank you!

Richard Ladstädter

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