

VTT

Connected and Automated Driving - technologies and validation

Tele days, Espoo, 17th of May 2023

Dr. Matti Kutila, Research Team Leader

18/05/2023 VTT – beyond the obvious

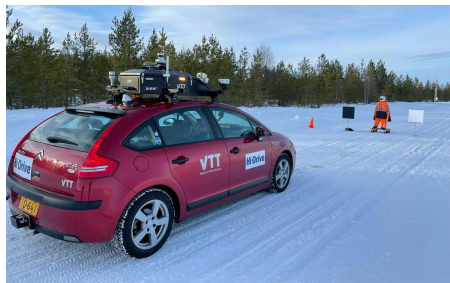




VTT – *beyond the obvious*

VTT is a visionary **research, development and innovation partner** and one of the leading research organisations in Europe

Our role is to promote the **utilisation and commercialisation of research and technology** in business and society.



254 M€
turnover and other
operating income

2,093
employees

45%
of the net turnover
from abroad

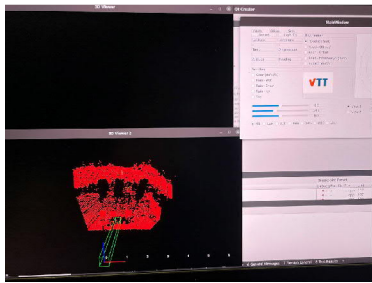
32%
a doctorate or a
licentiate's degree

Established in
1942

Steered by Ministry
of Economic Affairs
and Employment

CAD enablers

Sensing solutions



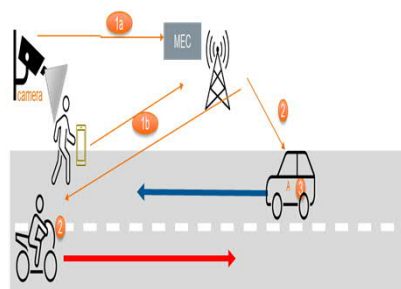
- Radar, LiDAR, camera fusion
- Filtering
- AI algorithms
- Patenting

Positioning



- Error correction for GNSS
- Landmark based positioning in outdoors

V2X



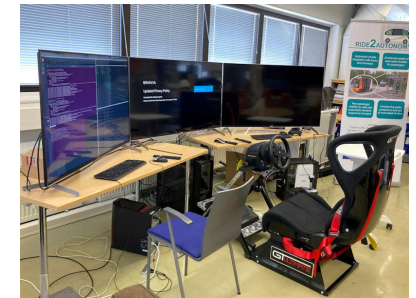
- C-V2X, 5G => 6G
- Low latency applications
- Collision avoidance

Automated operations



- Automated driving functions
- Operation Design Domains (ODDs)
- Automation feasibility studies

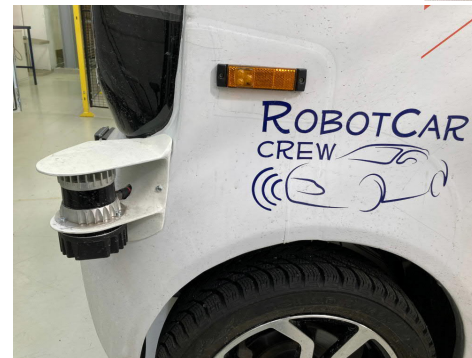
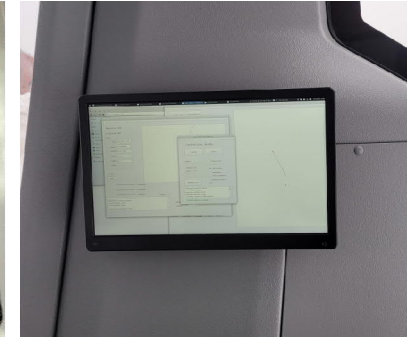
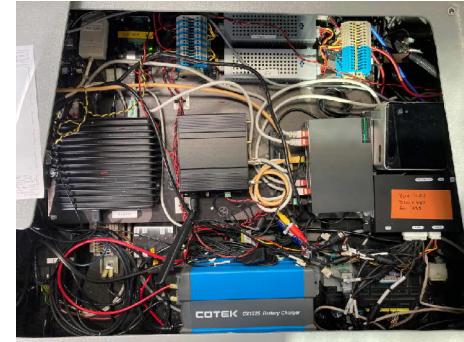
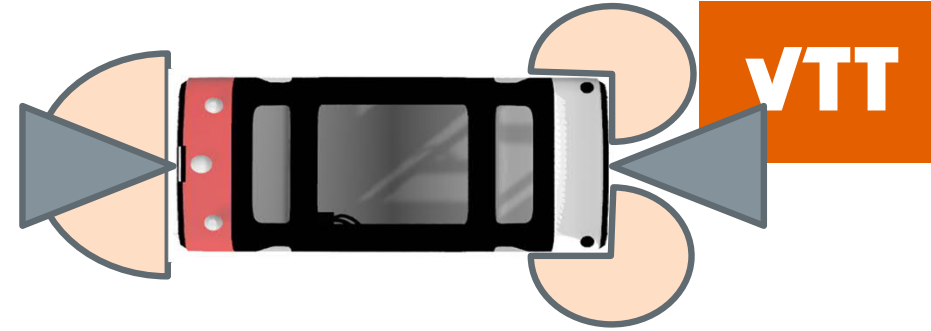
Digital twins



- CARLA based simulation
- ODD in edge cases
- Driven miles

Last-Mile shuttle components

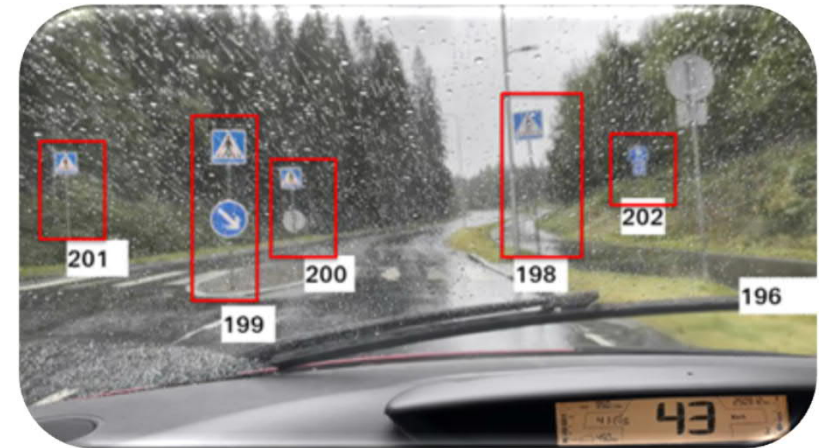
- Auve Tech - electric shuttle bus
- front and rear radars, Continental, 77 GHz
- front, rear and side cameras – 360° view
- 2x front laserscanners, Ouster
- rear laserscanner, Ouster
- GNSS, Leica + RTK
- IMU, Xsens
- 4G and 5G, parallel cellural capabilities



IP development

Patents:

- V2X based cooperative traffic sign exchange
- Landmark based positioning with occupancy grids
- Sensor calibration
- Automation system energy saving



Software tools:

- testing tools for V2X features
- SLAM algorithms
- Object detection
- eCall testing&validation

VTT LIDAR solutions



VTT offers wide range of software solutions where LIDAR technology have essential role.

You may download our demo application to do feasibility study by yourself for assessing if LIDAR is the optimal solution for your needs. The application is dedicated for acquiring data from commercial LIDARs and provides quick point cloud interface to estimate if the targets are visible in your application domain.

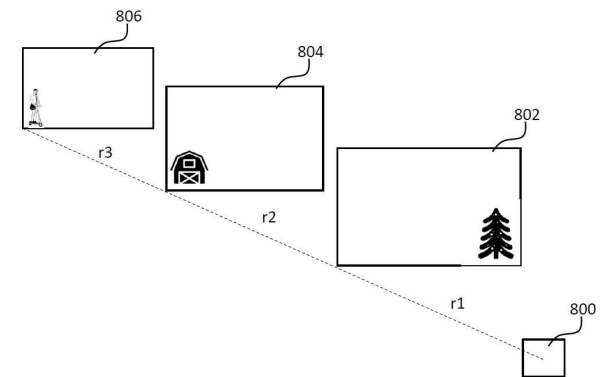
Fill in your contact details and download our demo app for Android devices to get a glimpse of our LIDAR software solutions.

First name*

Last name*

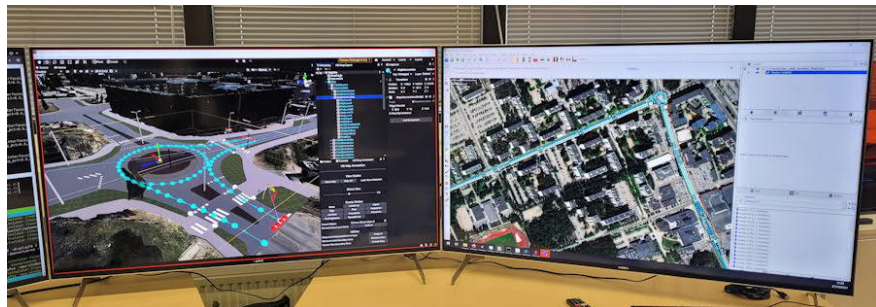
Work email*

Company



HD mapping + dynamic digital twin

- Support for automated driving functions and sensing systems
- Improved reliability of vehicle positioning on urban environments
- Enables remote vehicle diagnostics and control for CAVs



Arctic testing

Test vehicles

- “Martti” Volkswagen Touareg
- “Elvira” Volkswagen eGolf (electric)
- Various sensors such as lidars, cameras, radars, RTK-GNSS, IMU, weather



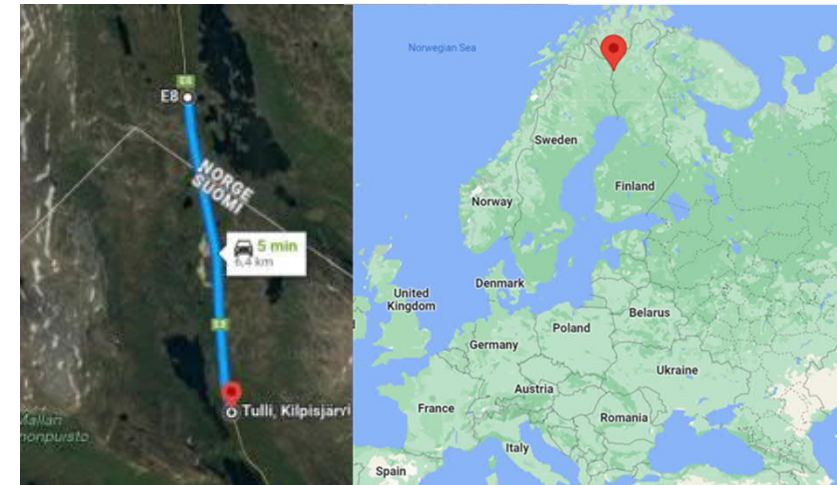
Muonio ”city”

- 8 landmarks areas measured by the Geographical Institute of Finland
- Fair amount of traffic trough to village especially tourist season



FI-NO cross-border

- AURORA E8 Snowbox testing area – TEN-T network road
- Cross-border between Finland and Norway
- Lots of salmon trucks



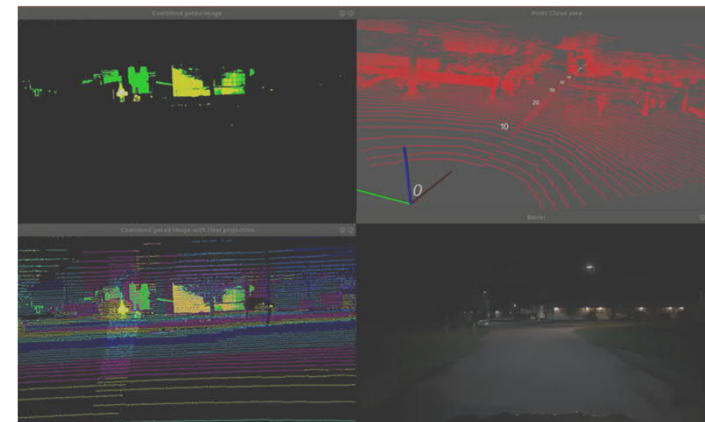
Collecting data in different regions

AI-SEE



Testing campaigns:

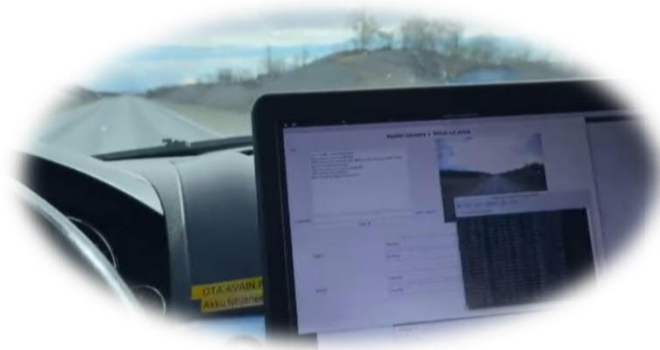
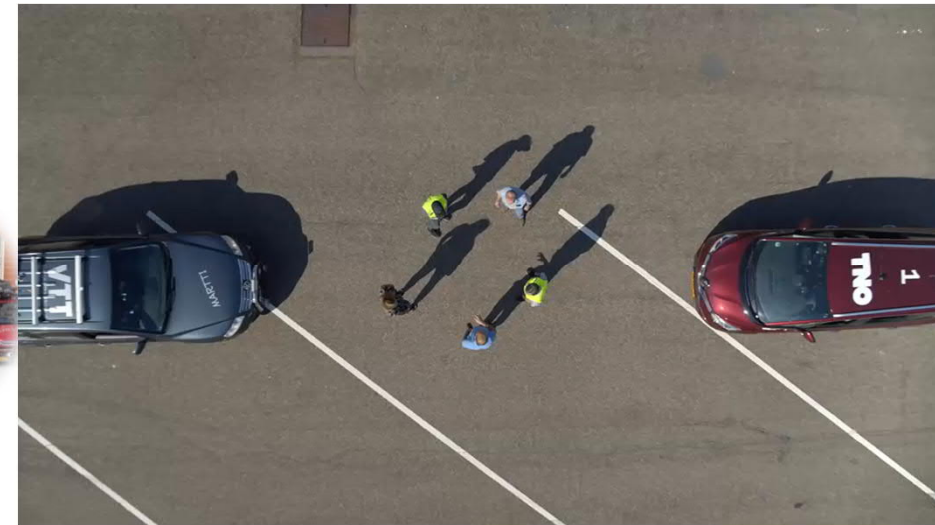
- Mercedes, Kanagawa, Japan, 16-20 Jan 2023
- VTT-Veoneer, Muonio, Finland, 13-17 Feb 2023
- Mercedes-VTT, Princeton, U.S., Mar 21 – Apr 3, 2023
- Collection of more than 10 TBts data
- Scenarios: lost cargo, highway, forest, gravel road, etc.



V2X connected driving projects



- 5G-MOBIX – Connected driving **cross the borders**.
- 5G-SAFE-PLUS – Improving **automated driving capabilities with using weather services**.
- 5G-ROUTE – **5G connectivity in Estonia-Finland corridor**



5/18/2023

VTT – beyond the obvious



Relevant standards

- ETSI: **Collective Perception Message (CPM)** and **Manoeuvre Coordination Message (MCM)** are experimented
 - *Bases on ETSI TR 103 562 V2.1.1*
 - *Use in the V2X based collision avoidan*
- ISO TC204 WG 14: **Cooperative Intersection Warning system**
- ETSI TC ITS WG5: **Data protection and privacy issues**
- ISO/DIS 22737: **Low-speed automated driving (LSAD) systems for predefined routes** — Performance requirements, system requirements and performance test procedures
- 3GPP: **Test specification for LTE-V2X applications**



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the obvious

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