

Autonoom rijdende OV-bussen in Groningen en Metropool Regio Den Haag Rotterdam MRDH



Jorrit Kuipers

CTO owner Green Dino & robotTUNER - automated training & assessment of human and robot drivers

Wageningen, Gelderland, Netherlands · [Contact info](#)

robotTUNER



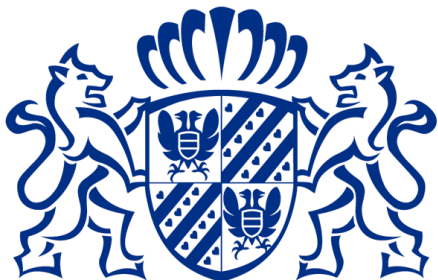


COnnected Level 5 UnManned BUSeS





partners & financiers



provincie groningen

Qbuzz

RET

EBS



METROPOOLREGIO
ROTTERDAM DEN HAAG

robotTUNER





We aim at 1) increasing the capacity of public transport with a free of charge open-source auto-pilot and 2) accelerating certification with human centered metrics





mini-taxi-public-buses 6 labs micro lab-simulator-shadow driving



Drive-by-wire vehicle control



redundant

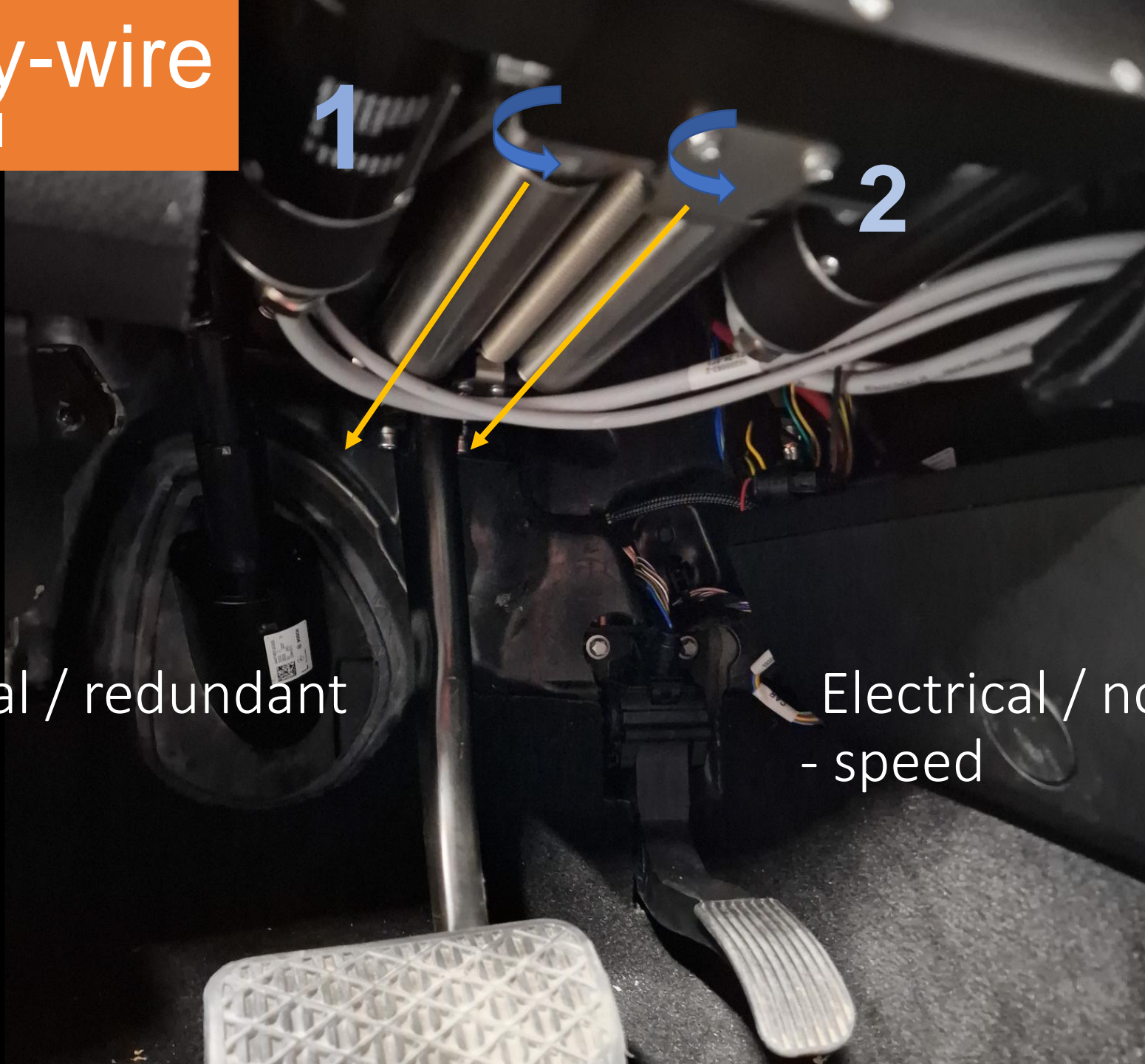
1

2

joysteer
SAM-03-A
SN: 6210005
V3.1

Drive-by-wire

vehicle control



Mechanical / redundant

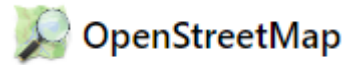
- steer
- brake

Electrical / not redundant

- speed

Perception

objectify ODD



Smart Traffic Management Systems

Localisation

Xsens Vision Navigator



Movella™

short-range barrier & object detection

Binocular stereo camera
ZED2/ZED 2i/ZED mini



StereoLabs*



Maxbotix LV-Max5
hoge prestaties
Omschrijving
- Breedte 1.5 tot 2.5m
- 120° veld vanzicht
- 25-30cm bereik
- 100-200cm bereik

long-range object detection

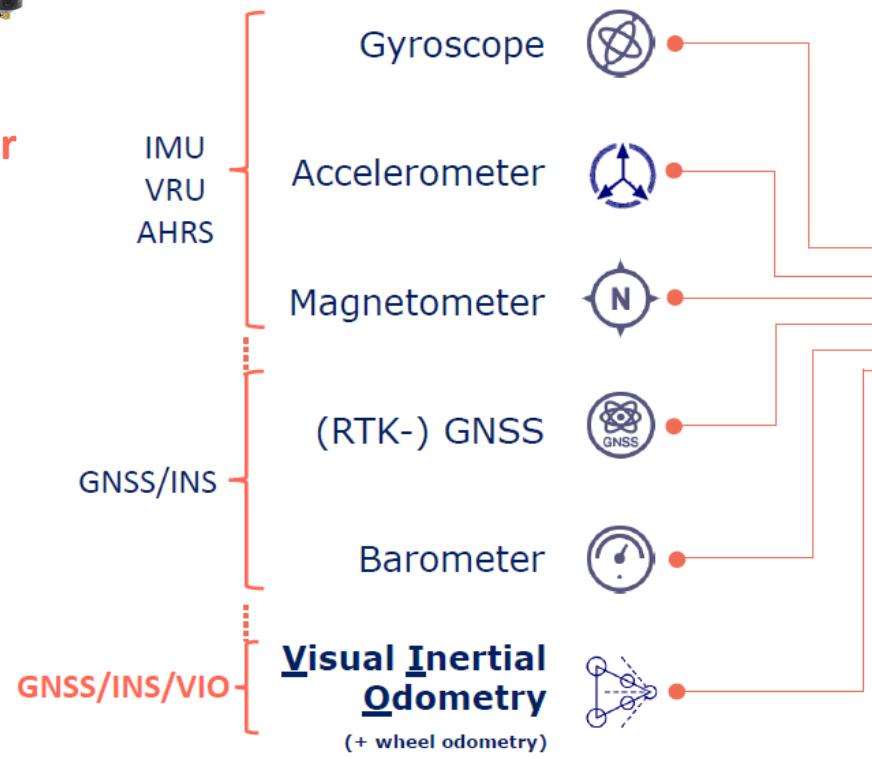
ARS540 Radar Sensor



Continental
The Future in Motion

Perception

objectify ODD



Sensor Fusion

“XSENS VISION NAVIGATOR”
2-Antenna RTK GNSS +
IMU +
Vision



GNSS/INS/VIO

Accuracies, real-time operation, speed from 0 km/h up to 80 km/h:

- **Position:** 1 cm + 1 ppm (RTK fix)
 - Position error during GNSS outages:
 - 2% of travelled distance
 - 0.75% incl. wheel odometry input
- **Orientation:** <0.4° (Roll/Pitch and Yaw/heading)
- **Velocity:** 0.1 m/s
 - Output rate up to 200 Hz

- Features:**
- SyncIn, SyncOut (GNSS 1 PPS)
 - ASCII (NMEA) messages
 - ROS driver

Perception

objectify ODD

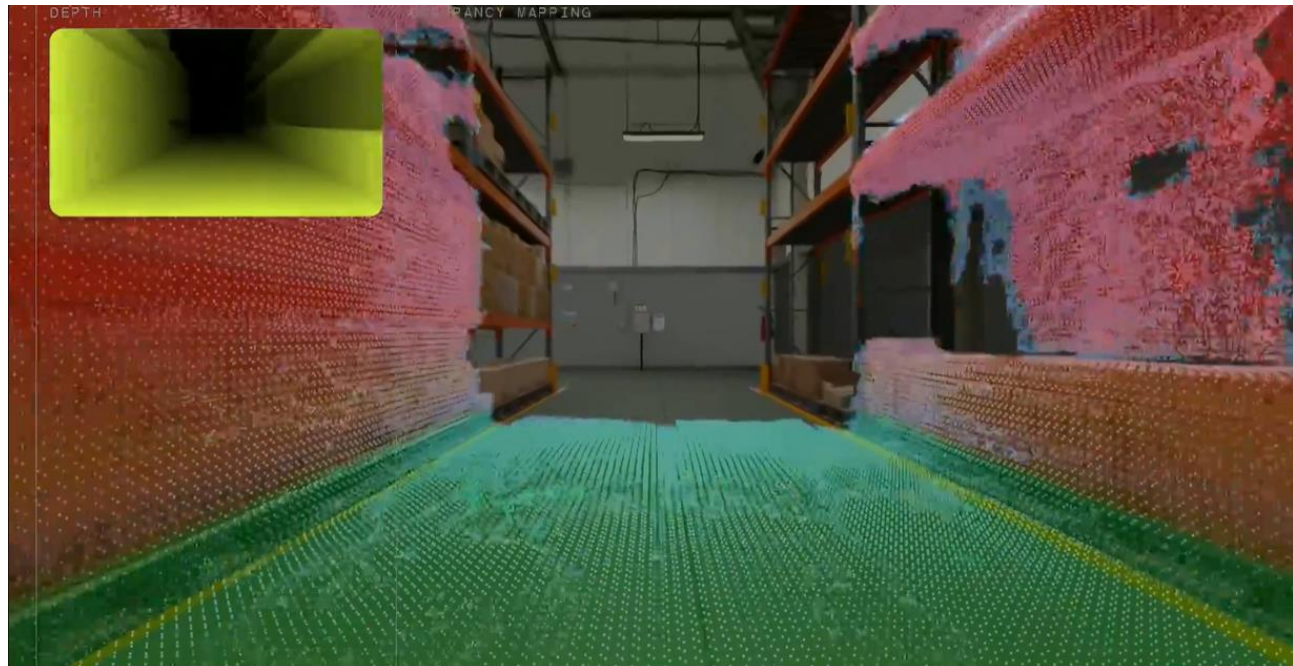
Binocular stereo camera
ZED2/ZED 2i/ZED mini



Product Features

- Neural Depth Sensing
- Spatial Object Detection
- Built-in Next-Gen IMU, Gyroscope, Barometer & Magnetometer
- 120° Wide-Angle FOV
- All-Aluminium Frame with Thermal Control
- Optional Integrated Polarizer for reflection removal
- IP66 protection from water and dust
- Secure USB Type-C connection (1.5m locking cable included)

- Depth Sensing (0.3 - 20 m)
- Resolution range (376p - 2K)



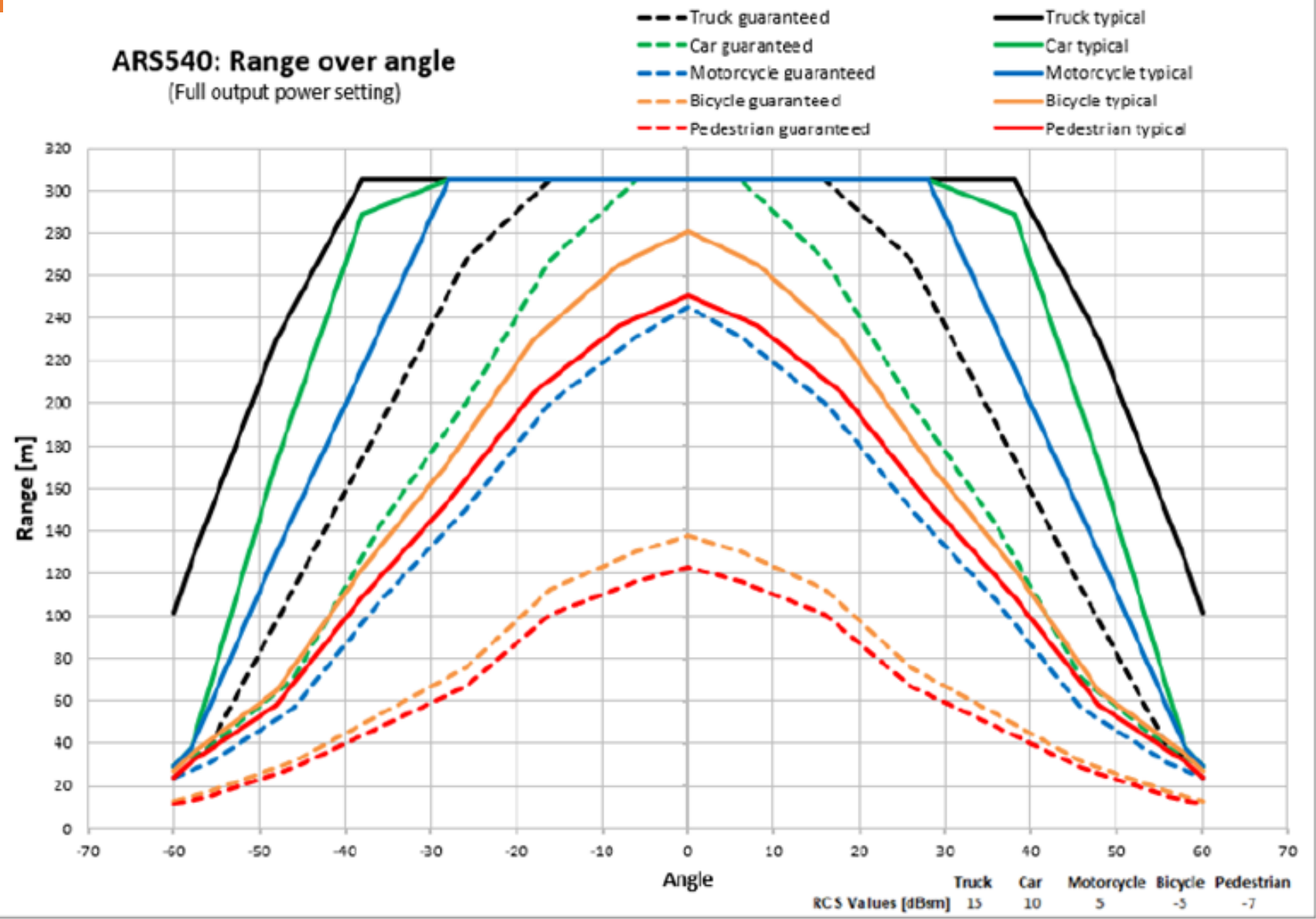
Perception

objectify ODD

ARS540 Radar Sensor



ARS540: Range over angle
(Full output power setting)



Prototypes

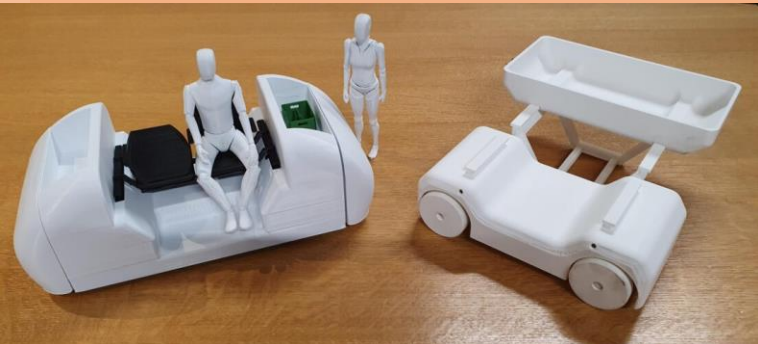


Prototypes





Campus Challenge





Campus Challenge

robotTUNER provides MPVs to Dutch knowledge institutions in 5 Dutch regions (MBO, HBO, WO). Subsidised by Nationaal Programma Groningen 'Fieldlabs Autonoom Vervoer'

robotTUNER & province of Groningen(Hive.Mobility) challenges knowledge institutions, organized in Learning Communities, to speed up commercial use of Avs (road, air, water, rail).







Campus Challenge

Together we apply for AiNED **Innovatie Labs / Learning Communities / ELSA** funding to developpe an open-source hardware and software platform.


We are seeking for companies who are interested to join our consortium

robot**TUNER**, Distribute, AON, Avular, V-tron, Noorderpoort, Hanze Hogeschool, RuG, UT, Saxion, WUR, Technova College, HAN, TUE, Fontys, TUD, provincie Groningen, Metropool Regio Rotterdam Den Haag, Qbuzz, RET, ROBOAT, Technische Unie, ROVA, STILL, ANWB, TRL (UK), CETRAN (SING), DATA Foundation, DTV....

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