Integrated Sensor Platform (ISP)

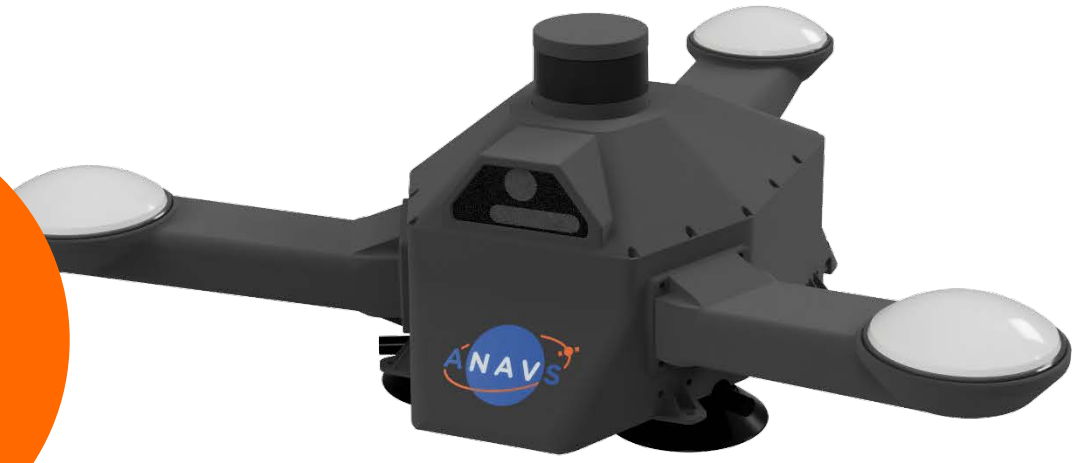
WITH ANAVS SOFTWARE FRAMEWORK

Integrated Sensors and Electronics:

- Multi-GNSS, Multi-Antenna Setup
- High-Grade MEMS IMU
- Cameras
- 3D-LiDAR
- Vehicle Data
- Powerful processors
- LTE module

Hardware-platform and software-framework for the combination of classical sensor fusion with artificial intelligence algorithms for autonomous driving, mapping and object detection and classification

All-In-One Solution for Positioning



Accurate Position and Attitude

High Precision Maps (2D/3D)

Artificial Intelligence

- Complete Sensor-Setup for Autonomous Driving
- Easy System Integration

SENSOR FUSION PERFORMANCE

Accurate RTK Positioning * (1σ):
Horizontal accuracy: 0.006 m + 1 ppm
Vertical accuracy: 0.010 m + 1 ppm

Accurate PPP Positioning * (1σ):
Horizontal accuracy: 0.20 m + 1 ppm
Vertical accuracy: 0.40 m + 1 ppm

Accurate Attitude * (1σ):
Accuracy: 0.25° (1m antenna spacing)

Velocity Accuracy: 0.03 m/s RMS
Time-Stamp Accuracy: 1 µs RMS
Solution Output-Rate: up to 120 Hz

RTK Initialization *:
Initialization Time: < 7 sec
PPP Initialization *:
Initialization Time: < 5 min

* Depends on Environment and used GNSS-Antenna

LIDAR FEATURES*

Type: Velodyne LiDAR
Model: Puck (VLP-16)
Channels: 16
Measurement Range: 100m
Range accuracy: up to +/- 3 cm (typical)
Field of View (Vertical): +15° to -15° (30°)
Angular res. (Vertical): 2.0°
Field of View (Horizontal): 360°
Angular res. (Horizontal): 0.1° to 0.4°
Rotation rate: 5 Hz to 20 Hz

* Other LiDARs, e.g. from Ouster, are also possible

STANDARD* IMU FEATURES

Linear acceleration meas. range:
+/-16 g (configurable)
Angular rate meas. range:
+/- 4000 dps (configurable)
Linear acceleration sensitivity:
0.061 mg/LSB with +/-2 g range
Angular rate sensitivity:
4.37 mdps/LSB bei +/- 125 dps range
Angular random walk (T=25°C):
0.21 deg/√h
Bias stability:
3 degree/ hour (typical)

* more powerful IMUs can be chosen.

GNSS FEATURES

GNSS Constellations:
Galileo, GPS, Glonass,
Beidou, SBAS (Egnos, WAAS, GAGAN)
GNSS Const. concurrent:
All
GNSS-Bands:
GPS: L1C/A, L1C, L1PY, L2C, L2P, L5
GLO: L1CA, L2CA, L2P, L3
GAL: E1, E5a, E5b, E5 AltBoc, E6*
BDS: B1I, B1C, B2a, B2I, B3*
QZSS: L1C/A, L1C, L2C, L5, L6

Channels: 448
GNSS data rate: max. 100 Hz
Jamming detection: Yes
Timepulse-Output: Yes

* Hardware-ready

CAMERA 1 FEATURES

Type: FLIR Grasshopper3 USB3
Model: GS3-U3-23S6C-C
Description: High-quality color-camera with high frame-rate and global shutter
Frame rate: 163 FPS
Resolution: 1920 x 1200 (2.3 MP)
Image sensor: Sony IMX174

CAMERA 2 FEATURES

Type: Intel Real Sense Camera
Model: Tracking Camera T 265 or Depth Camera D435i
Description: Global shutter fisheye stereo-camera with integrated IMU and visual-inertial odometry, or depth camera (global shutter infrared stereo-camera) and RGB camera with integrated IMU

ODOMETRY FEATURES

Performance:
Depends on resolution and quality of user-based wheel/steering measurements
Input/Output:
Configurable with DBC-files or according to customer specification
Communication Interfaces:
CAN, Ethernet, USB

PROCESSOR 1 PERFORMANCE

CPU:	ARM 64Bit Quad-Core with 1.4 GHz
RAM:	1 Gbyte LPDDR2 RAM
Flash:	16 Gbyte
OS:	Linux
Description:	Used for classical ANavS sensor fusion with GNSS, IMU and Odometry sensors

PROCESSOR 2 PERFORMANCE

CPU:	6-core NVIDIA Carmel ARM®v8.2 64-bit CPU, 6 MB L2 + 4 MB L3
GPU:	NVIDIA Volta™ architecture with 384 NVIDIA® CUDA® cores and 48 Tensor cores
Memory:	8 GB 128-bit LPDDR4x 51.2GB/s
Storage:	microSD + SSD-Storage with 1 TByte
OS:	Linux
Description:	Used for deep learning algorithms, object-detection/classification, semantic maps (LiDAR-based), HD-maps (Camera-based) and SLAM.

ELECTRICAL & INTERFACES

Power Connector:
12V (optional 230 V)
via waterproofed screwable connector

Power Consumption:

Peak:	30 W (5A)
Average:	20 W (3 A)

Communication Interfaces:
Gigabit-Ethernet, Wi-Fi, CAN,
USB 2.0, LTE

Output format:

Standardized:	NMEA format, ROS
Proprietary:	ANavS binary format

CASING

Dimension:	800 x 800 x 300 mm
Weight:	7000 g
Operating Temp.:	-25°C to +65°C
Display:	Yes
Mounting:	Screwable or use of suction cups

ANAVS

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