

Integrated Sensor Platform (ISP)

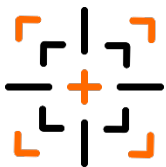
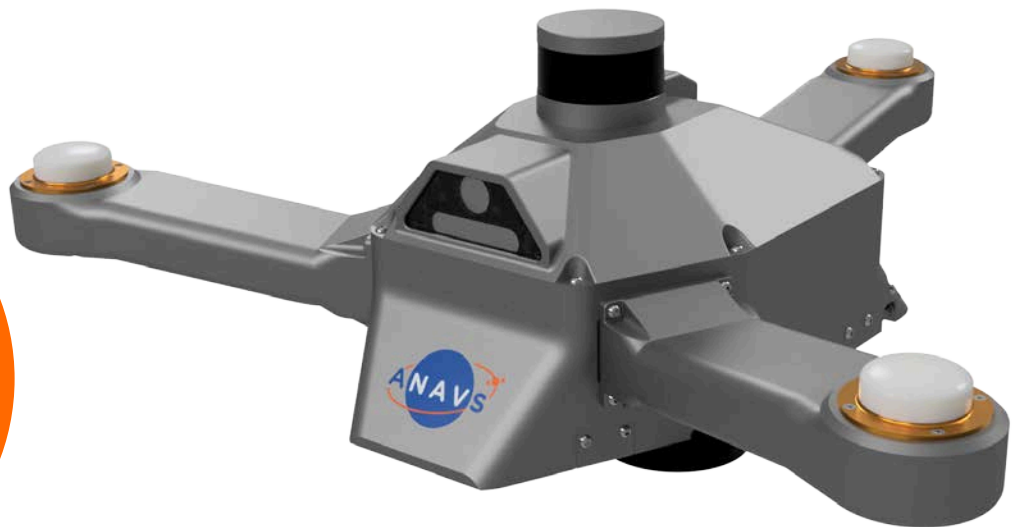
WITH  SOFTWARE FRAMEWORK

Integrated Sensors and Electronics:

- Multi-GNSS, Multi-Antenna Setup
- 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: 0.15 m + 1 ppm

Vertical accuracy: 0.20 m + 1 ppm

Accurate Attitude * (1σ):

Accuracy: 0.25° (1m antenna spacing)

Velocity Accuracy: 0.03 m/s RMS

Time-Stamp Accuracy: 1 μ s RMS

Solution Output-Rate: up to 120 Hz

RTK Initialization *:

Initialization Time: < 7 sec

PPP Initialization *:

Initialization Time: < 15 min

* Depends on Environment and used GNSS-Antenna

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

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

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/ \sqrt{h}

Bias stability:

3 degree/ hour (typical)

* more powerful IMUs can be chosen.

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
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

INDUSTRIAL 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



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Solutions

ANavS GmbH
Gotthardstraße 40, 80686 Munich
Phone: +49 (0) 89 89056721
Fax: +49 (0) 89 89056720
Email: info@anavs.de
Web: <http://www.anavs.de>