# VM-i

## Attitude and Heading Reference Systems (AHRS)

V.M.SENS

Inertial Motion Sensing Technology


Continuing the success that VMSENS inertial technologies provides motion tracking solution, now, the VM-i is a ideal multi-purpose sensor for real-time applications in stabilization and control of cameras and antenna, robots, vehicles and other (un)manned equipment, simulation & training, virtual & augmented reality.

The VM-i integrates 3D orientation MEMS elements, utilizing VMSENS Sensor Fusion algorithms to process full 360° orientation tracking to provides real-time and drift-free 3D orientation data

## High Light

- Real-time computed attitude/heading and inertial data output
- Gyroscopes enable high-frequency orientation tracking
- High effective VMSENS EKF sensor fusion
- 360º orientation referenced by gravity and earth magnetic field
- MEMS base 3D gyroscopes, accelerometers and magnetometers integrated
- On board data processor with real-time sensor fusion algorithm
- Compact and lightweight design
- End to end software support

## Performance

The VMSENS device uses multi-inertial sensors to estimate the orientation. The single used gyroscopes to calculate orientation, the drift is inevitable. To compensate for drift completely, the device corrects its orientation using the gravity and the earth magnetic field as reference vectors. The VMSENS iMTFusion™ algorithm can cope with magnetic and accelerations, resulting in a reliable orientation estimate. Additionally, the VMSENS provided a magnetic field calibration routine to correct for hard and soft iron effects.

## Output

- 3D orientation Quaternion/ Euler/ DCM
- 3D acceleration/ 3D rate of turn/ 3D magnetic field

AUV

Platform Stabilization

Vehicles

## System Performance

| | |
|---|---|
| Dynamic range | ± 360 deg - Pitch/ -Roll/ -Heading |
| Acceleration | ±20/ 50/160 m/s² (±2/ 5/ 16g) |
| Max rate of turn | ±450/ 1200/ 2000°/sec |
| Static accuracy pitch/ roll | < 0.5 deg |
| Static accuracy heading1 | < 1 deg |
| Dynamic accuracy2 | 2 deg RMS |
| Angular resolution | 0.05 deg |
| Max updated rate | 120 Hz |

1 in homogeneous magnetic environment,
2 under condition of VMSENS algorithm, decided by motion type

## Sensor Specification

| | Gyroscope | Accelerometer | Magnified |
|---|---|---|---|
| Dimension | 3D | 3D | 3D |
| Range | ± 2000 deg/s（Max） | ± 50 m/s² | ± 450 mGauss |
| linear | 0.2% of FS | 0.2% of FS | 0.1% of FS |
| Gyro bias stability | < 0.025 deg/s （25 °） | | |
| Noise | 0.03 deg/s/√Hz | 250 μg/√Hz rms | 0.5 mGauss (1σ) |
| Alignment error Axis-to-axis | 2% | 0.1 deg | 0.25 deg |
| Alignment error Axis-to-frame | - | 1 deg | 0.5 deg |
| Linear Acceleration Effect on Bias | 0.1 °/sec/g | | |

## Physical Specification

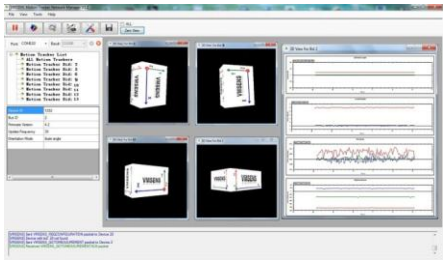
| | |
|---|---|
| Environment | -20.... +60 oC |
| Working Environment | 0.... +40 oC |
| Dimensions (WxLxH) | 59×34×14 mm |
| Weight | 32 g |

# Software System Integration

With the VMSENS SDK, your preferred solution is easy and fast to realize, with the demo source code, you will have your measurement unit up and running in just a few minutes to start your first R&D.

### The COM-Object and DLL API interface Development Tools

The VMSENS COM-Object and DLL API will help save time in interfacing in a reliable way with VMSENS devices in a Windows environment. Direct low level interfacing gives full control and maximum flexibility. The example code (C/C++, Excel (VBA) and Matlab/ Labview) can be easily extended to a user-specific program.



### Low Level Communication Lib (For embedded systems) (optional)

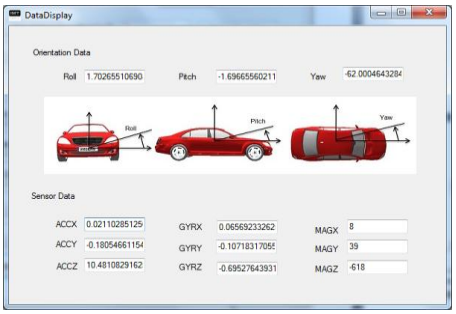
VMSENS provided low-level C libraries for embedded developments to ease the development procedure on embedded systems.

### Sample code

The VMSENS provide sample code of the development ways mentioned above, by reading the sample code and comments, unprofessional developers can developer the motion applications in a few minutes time.

### VMSENS Motion Tracker Network Manager

The VMSENS Motion Tracker Network Manager is graphical interfaced software to be used with the VMSENS devices, by using the Motion Tracker Network Manager, user can get ,save and view the real-time inertial motion data easily, the data is shown via friendly graphical component to the you.




### iMT™ inertial Motion Tracking

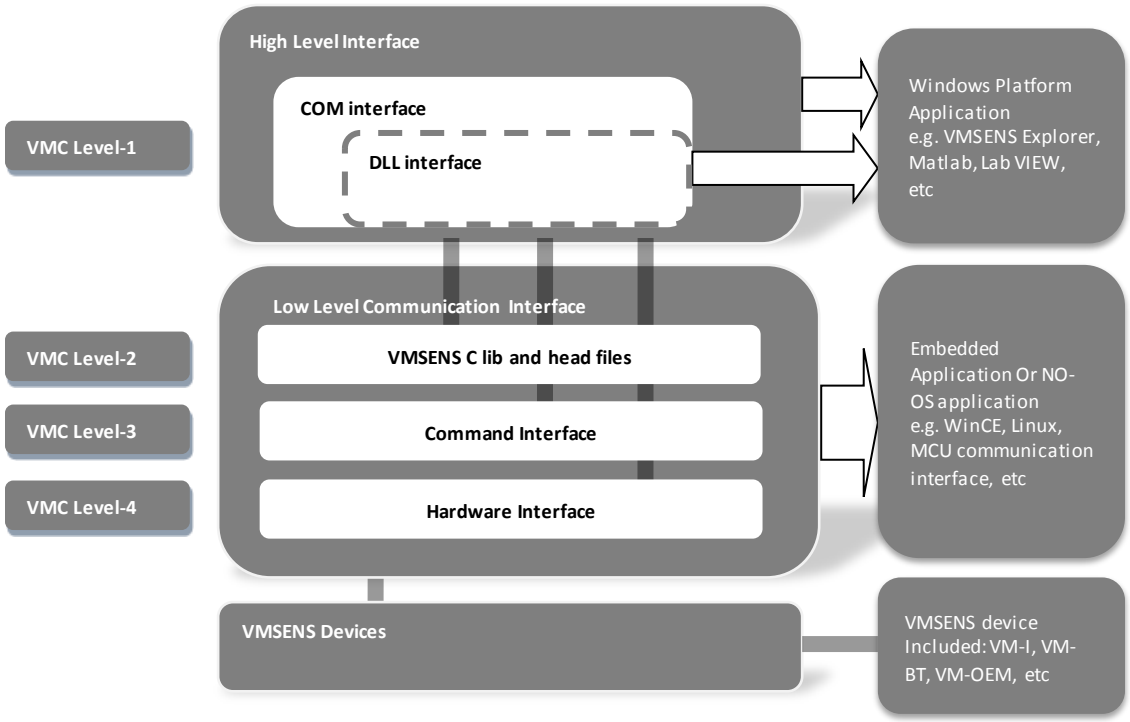
The inertial Motion Tracking Package（iMT）is a collection of functions used in the inertial measuring field by the VMSENS, by exploring the iMT, users can find useful functions needed in the motion and attitude measuring field, also user can integrate these function componets into their own systems quickly.

### Operation Environment

Operating system: Windows 7/ Vista/ XP
Processor: Dual core e.g. Core2 (minimal Pentium4 - 2.6 GHz)
Graphics card: Any graphics card with DirectX 9 hardware acceleration

The 3rd Party Support






### VM- I Development Kit include:

- VM-I motion sensor
- Power Cable
- USB adapter
- Document
- Portable case


# Application

## Unmanned Vehicles control

The Inertial Navigation System (INS) is one of the most critical parts of an unnamed vehicle. VMSENS has developed reliable products to help you in the design of a miniature and powerful Navigation System. Due to its small size and high performance, a full featured Attitude and Heading Reference System (AHRS), is perfect to measure the orientation and the position of a miniature unmanned vehicles.
VMSENS AHRS products are fast responding can ensure stabilize the orientation and can also keep the heading in normal and abnormal situations.

- Stabilization AUV/ROV/UUV
- Orientation adjustment for equipment under water
- Vehicle performance analyzing
- Orientation measuring for unmanned vehicles
- GPS enhancements

## Platform Stabilize

The VMSENS product is small enough for integration with most of the platforms where stabilizing is needed, such include cell base station antennas, radar systems, the satellite tracking antennas, the VMSENS provide product with fast response and high turning rate measuring range to track the platform in full 360 orientations, for Stabilizing the camera platform, the picture quality of the camera can be ensured.

- Antenna platform tracking
- Camera platform

## Robot &Equipment Control and Stabilize

- Equipment Control and Stabilize
- Robot orientation sensing
- Balance control for humanoid& biped robot
- Robot arm control
- Remote control robot

Vmsens Inertial Technology specializes in the design and development of ultra high performance inertial motion tracking technologies meeting the needs of our global customers.

As the leading solution provider of inertial motion tracking technologies, we provide miniature (MEMS) inertial motion tracker/ AHRS ( VM-i, iVM-x , iVM-w ) and portable, occlusion free, camera-less inertial motion capture system (MOX), combining high-quality hardware and easy-to-use software, we offer innovative ground-breaking solutions.

Vmsens' R&D stuff has created unique intellectual property in the field of sensor fusion algorithms and biomechanical modeling; our inertial tracking system has been proved to be accurate, fast response, reliable, and robust against any harsh environments.

Now, Vmsens brings all the benefits of the inertial tracking solution to market with our unique motion tracker product line.

**Industrial Application**

Equipment Control and Stabilize
Unmanned Vehicles control
Robot controls
Platform Stabilize
Personnel Tracking

**Media & Entertainment**

Animation
Games
Virtual Reality

**Virtual Reality & Simulation**

Training Simulations
HMD Walking in Virtual World
Full-Body Motion Capture
Interaction

**Biomechanics**

Biomechanics
Sport Science
Gait Analysis & Rehabilitation