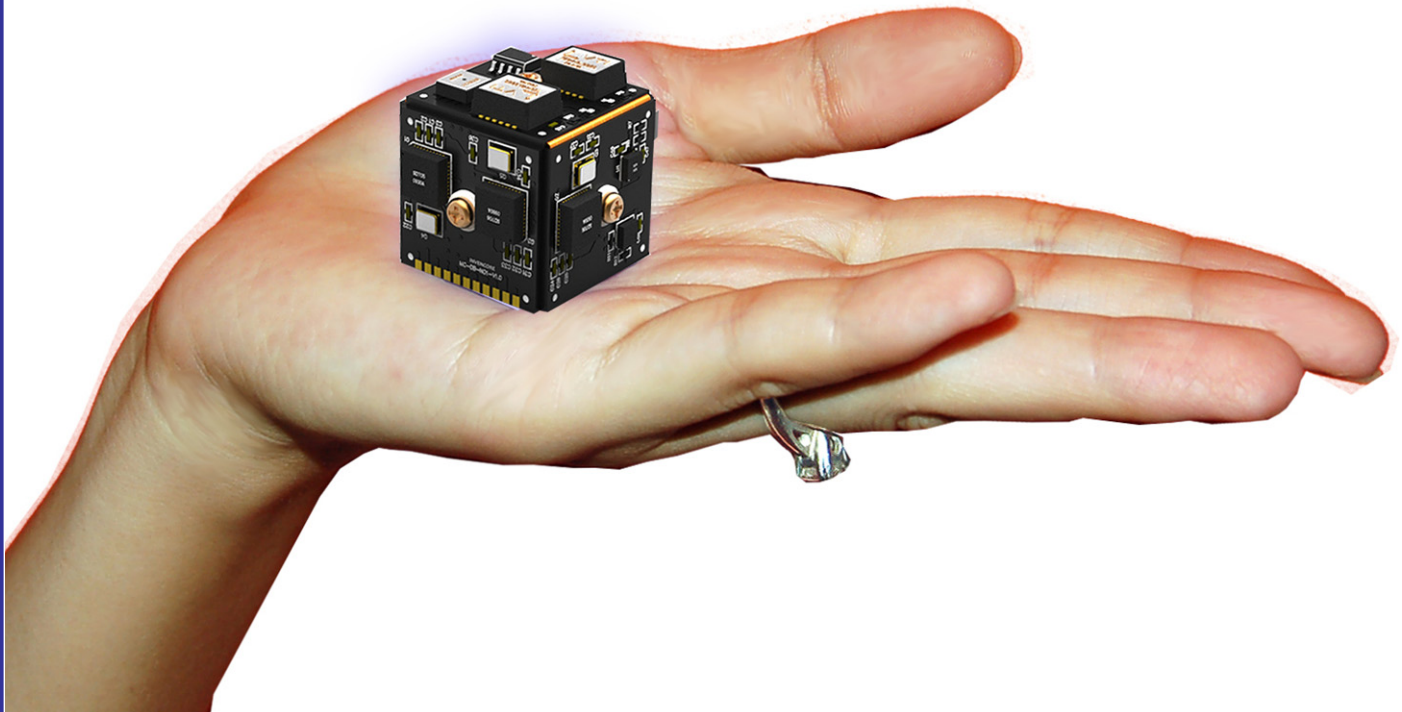# *MotionCore*™

Miniature Angular & Heading Reference System
The World's Smallest Mini-AHRS

MotionCore™

Miniature Attitude & Heading Reference System

MotionCore™, the smallest size AHRS in the world, is an ultra-small form factor, highly accurate inertia system based on MEMS miniature sensors and sophisticated algorithms. The system is able to output attitude of its carrier body continuously and dynamically. Plus it sends out auxiliary signals including acceleration, angular rate, geomagnetic field, temperature and barometric information.

MotionCore's™ ultra-compact size an high accuracy is realized through Senlution's unique multi-dimensional assembling technology [patent pending]. Furthermore, MotionCore™ Mini-AHRS is designed with an unique concept named "*Drop-in OEM*", i.e. customer may deploy the device inside its own mother system just like a surface mounted IC chip, without having to interface with it through special wired / wireless communications. Unlike a regular AHRS which only sends out attitude information, MotionCore™ also provides an open environment of its processor with rich I/Os for customer to further development on. Therefore, MotionCore™ is not merely an AHRS sub-system functioning as a sensing module, but also can become the controlling core and power core of the entire user system.

MotionCore™ Mini-AHRS enjoyS a wide spectrum of applications, including aeronautics and astronautic, remote monitoring, automotive electronics, virtual reality, motion capture and home entertainment, etc.

FEATURES

➢ Highly accurate, real-time attitude computation of carrier body, continuously and dynamically

➢ Mature algorithm based on EKF & Quaternion theory, running on a 32-bit high speed processor, guarantees accuracy of the real-time computation.

➢ Various errors sources are compensated, including non-orthogonality; hard & soft iron and temperature dependent sensor offset and sensitivity

UNIQUE "DROP-IN OEM" CONCEPT

➢ User may treat MotionCore as a surface mounted IC chip, very easy to deploy

➢ A 32-bit high speed processor inside MotionCore is open to user, to be the central processing core of user's system

➢ A rich family of I/Os are provided, for a variety of typical applications (motor driving; data communication; WSN node construction)

➢ Very easy to be mounted. Installation accuracy is guaranteed through special mechanical arrangements, without introducing extra non-orthogonality errors.

OUTPUTS

➢ 3D attitude (pitch, roll, yaw)

➢ Acceleration along three axis

➢ Angular rate along three axis

➢ Geomagnetic field along three axis

➢ Air pressure (can be converted into altitude)

➢ Ambient temperature
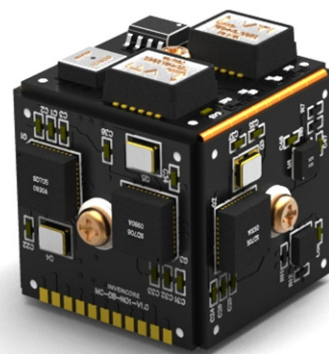
MotionCore™

Miniature Attitude & Heading Reference System

TYPICAL APPLICATIONS

AERONAUTICS

MotionCore™ provides real-time attitude data and other auxiliary functions to Unmanned Aerial Vehicle (UAV).

The system outputs 3D attitude (pitch, roll, yaw), altitude, temperature and real-time acceleration, angular rate and magnetic field data. These data is employed to realize an autonomous control and navigation of UAV. Our unique "_Drop-in OEM_" concept greatly helps simplify the UAV system design and lower the system cost, which paves the way for future mass deployment of utra-small, ultra-low cost Mini-UAVs.

CONTROL, AUTOMATION & ROBOTS

Robots are often deployed in tasks which are either too dangerous, or too high cost or too low efficiency if human beings are placed. Therefore, autonomous working capability is crucial for robots in many circumstances.

MotionCore™ helps robot system to monitors its own position; attitude and movement, enabling it to work autonomously & efficiently. Either on land or under water; either for indoors robot arm positioning or open field exploration, robots with MotionCore™ inside will function more intelligently, reliably and accurately.

MOTION CAPTURE

Motion capture is the process of recording movement and translating that movement on to a digital model. It is used in military, entertainment, sports, and medical applications, and for validation of computer vision and robotics. In filmmaking it refers to recording actions of human actors, and using that information to animate digital character models in 2D or 3D computer animation.

With MotionCore™, motion capture system developer may find it much easier to design their hardware & software systems.

OTHER APPLICATIONS

- ➢ Structural / Machine Health Monitoring with
  Wireless Sensor Network
- ➢ Asset tracking
- ➢ Virtual Reality
- ➢ Smart weapon
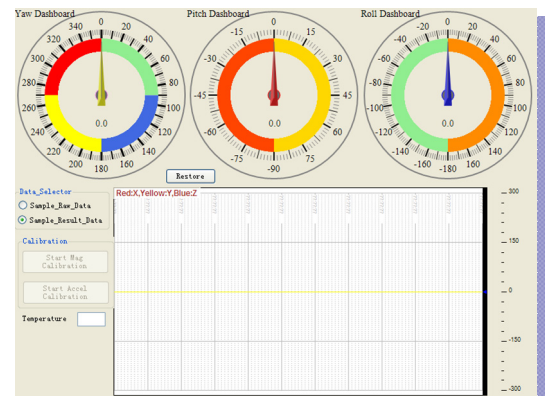
MotionCore™

EVALUATION KIT

MotionCore Evaluation Board

➢ Provides standard JTAG connections for user to further develop using MotionCore's processor

➢ Provides RS232 data connections, protocol compatible with XSENS Mti-G

➢ Provides regulated power supply of 3.3V and 5.0V, output current can be as high as 300mA, to be employed by user to power up other devices in the user's main system

➢ Provides precision mechanical holes for installation alignment
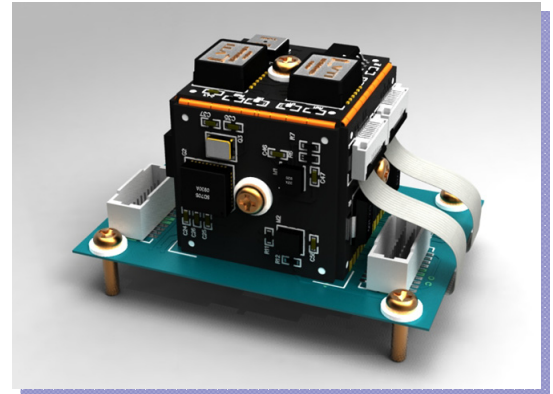
MotionCore PC Demoware

➢ Straightforward user interface

➢ Real-time display of all data and logging

➢ User initiated calibration procedure

MotionCore™

Miniature Attitude & Heading Reference System

ELECTRICAL SPECIFICATIONS

OUTPUT DATA

Accuracy, Static	
- pitch	$\pm$ 0.5°
- roll	$\pm$ 0.5°
- yaw	$\pm$ 2.0°
Accuracy, Dynamic	3.0° RMS
Angular Resolution	
- pitch	0.02°
- roll	0.02°
- yaw	0.10°
Angular Range	
- pitch	$\pm$ 90°
- roll	$\pm$ 180°
- yaw	$\pm$ 180°
Altitude	
- accuracy	10 m
- resolution	0.2 m
- range	−500 → 9000 m
Temperature	
- accuracy	$\pm$ 1 °C
- resolution	$\pm$ 0.1 °C
- range	−40 → 135°C
Output Data Rate (ODR)	100 Hz

INTERFACE & ENVIRONMENT

Power Supply	
- voltage	5 – 9V
- current	120 mA
Temperature	
- storing	−40 → 135° C
- operation	−20 → 85° C
Data Interface	
- standard	RS232
- optional	available upon request
Motor Control Interface	available upon request
- type	fast PWM
- no. of channels	**4**
GPS Input Interface	available upon request

MECHANICAL SPECIFICATIONS

FORM FACTOR

Characteristic Dimension	
- length	21 mm
- width	21 mm
- height	21 mm
Weight	65 克
Solder Pad Dimension	
- length	1.0 mm
- width	1.2 mm
- spacing	0.5 mm

MotionCore™ is RoHS compliant
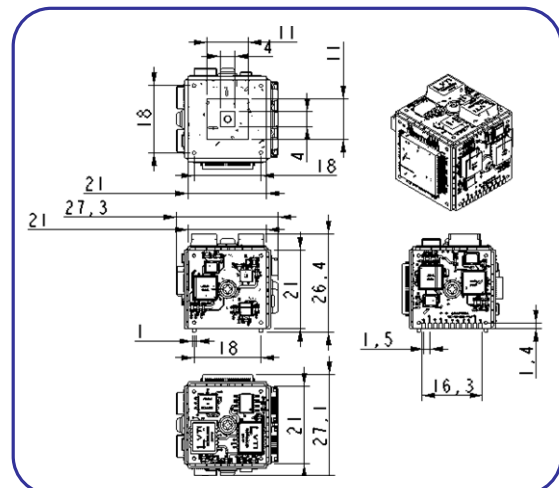
SENLUTION

About Senlution

Senlution is a worldwide leading supplier of inertial sensor modules and turnkey solutions. Specifically, the company is a pioneer in the development of Mini-AHRS (Miniature Altitude & Heading Reference System), which is a highly sophisticated inertial sensor module incorporating multiple MEMS sensors and electronics. With proprietary EKF based algorithm plus a unique multi-dimensional assembling technology called MotionCore™, Senlution currently offers the smallest and most integrable Mini-AHRS products in the world.

Mini-AHRS with ultra-low cost, ultra-compact size and ultrahigh integrability has always been the epicenter of its effort. Senlution believes that Mini-AHRS will enjoy an unprecedented wide spectrum of fields in the future, including consumer electronics, industrial controls, automotive electronics and aeronautics, etc. With the advent of truly affordable Mini-AHRS, many applications in those field will be revolutionized.

Senlution has been actively driving cooperative developments with our customers, in order to further broaden the scope of application for Mini-AHRS. "Sensing solutions for a more sensible world", that's the ultimate goal.

Senlution is headquartered in Wuxi, China, which is a satellite city in the greater Shanghai area.

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