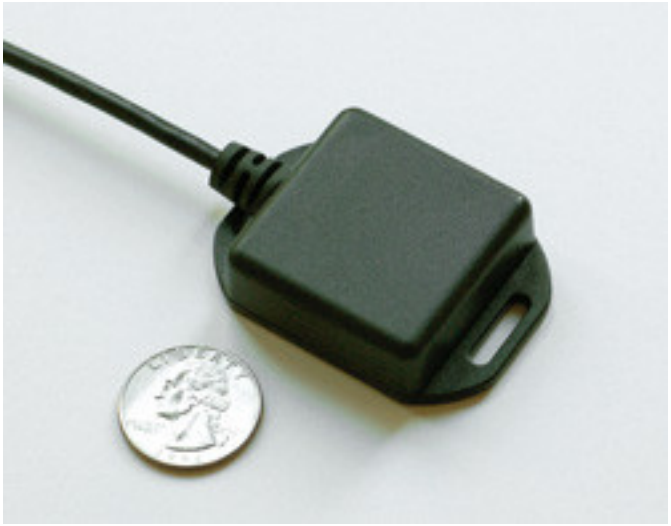
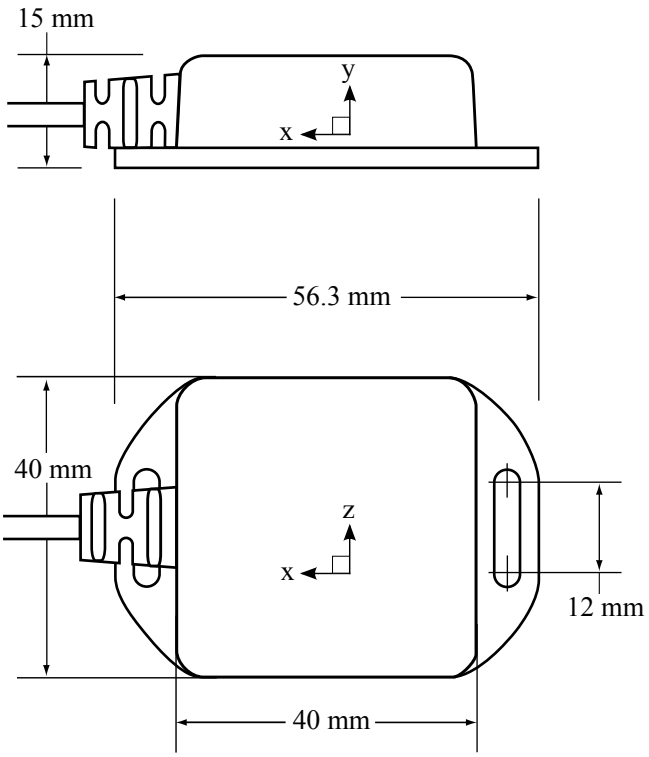
MotionNode Specification



MotionNode is a 3-DOF inertial measurement unit (IMU) for use in motion sensing applications. Our MotionNode sensor is extremely small, easy to use, and yields accurate orientation tracking results.

Key Features

- Small size, minimizes interference with natural motion
- Outputs full 360° range in all three axes
- Accurate, general purpose human motion tracker
- Simple USB connection
- Easy to use and integrate into your project or application
- Includes PC software to configure your sensor, record motion data, and export captured data
- Software Development Kit (SDK) provides real-time access to all sensor streams
- Fully integrated accelerometer, gyroscope, and magnetometer solution
- Excellent platform for research and development



Technical

Physical size	40 mm x 40 mm x 15 mm (no flanges) 56 mm x 40 mm x 15 mm (with flanges)
Weight	14 grams
Enclosure	ABS plastic
Interface	USB, Standard-A connector
Cable length	6 feet
Power requirement	Powered by USB host
Components	Surface mount MEMS sensor design for high accuracy and compact form
Operating temperature	0 to 50 °Celsius
Sampling rate	50 to 100 Hz, by 10 Hz
Orientation range	3-DOF, full 360 ° in all three axes
Orientation format	Quaternion, Euler angles, Rotation matrix
Orientation error	0.5 to 2 ° root mean square (RMS), depending on type of motion

Onboard Sensors

MotionNode uses nine high quality sensors to compute an accurate and stable orientation. One accelerometer, one gyroscope, and one magnetometer contribute real-time data for each of the three axes.

	Accelerometer	**Gyroscope**	**Magnetometer**
Measures	linear acceleration	angular velocity	magnetic field strength
Range/Sensitivity	$\pm\ 2\,g$ or $\pm\ 6\,g$	$\pm\ 500\,^\circ$/second	$\pm\ 100\,\mu T$ (microtesla)
Resolution	$0.001\,g \pm 10\%$ (at $2\,g$ range)	$0.5\,^\circ$/second	$0.1\,\mu T$ (microtesla)
Noise density	$0.00005\,g/\sqrt{Hz}$ (at $2\,g$ range)	$0.014\,^\circ$/second$/\sqrt{Hz}$	-

Example Usage

The MotionNode system provides access to all sensor streams in addition to the output of the orientation tracking pipeline. MotionNode is an excellent platform for development and evaluation of inertial sensing systems.

MotionNode tracks 3D orientation.

- Record the motion of a human body segment.
- Input device in real or virtual environments.
- Research and development of products and systems that utilize inertial sensing.

Gyroscope measures angular rate.

- Detect jitter. Stablize the lens on a handheld camera.
- Estimate local 3D orientation with a numerical integration system.

Accelerometer measures acceleration due to gravity plus dynamic acceleration.

- Estimate inclination or tilt.
- Estimate position with a dead reckoning system.
- Gesture based input system

Magnetometer measures the magnetic field of the earth, or the geomagnetic field.

- Estimate azimuth or compass direction.
- Detect local disturbances in the geomagnetic field.
- In conjuction with an inclination value, estimate global 3D orientation.

Software Features

Each MotionNode sensor includes software for your PC. The software provides a simple interface to:

- Configure your sensor
- Adjust sensitivity and filtering parameters for different application requirements
- Preview all output data in real-time
- Record orientation and sensor data
- Organize captured motion data and sensor streams for easy retrieval
- Export motion capture data to standard file formats FBX, COLLADA, BVH, and CSV
- Manage the system through your web browser
- Automate tasks with the Scripting API
- Analyze output data in Matlab, LabVIEW, and Excel

System Requirements

MotionNode requires a PC with a USB port.

- Windows Vista, XP, Linux (x86), Mac OS 10.4+
- USB host port
- Web browser
- CD-ROM drive
- Internet connection recommended

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