

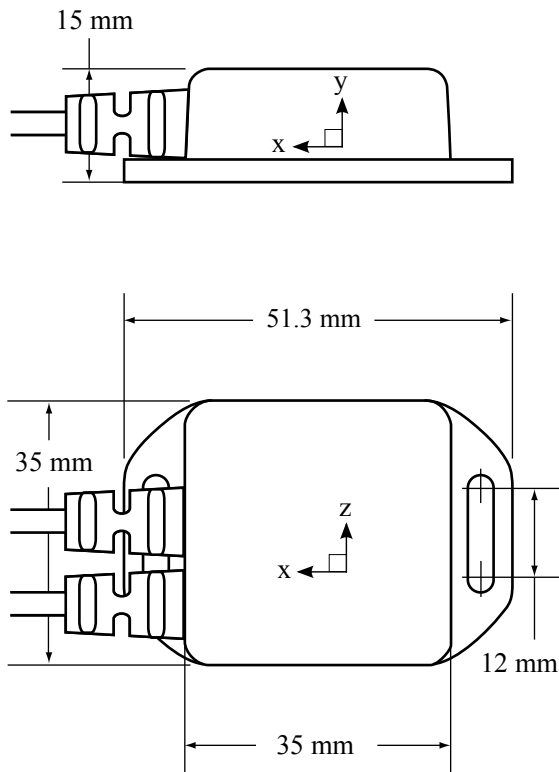
# MotionNode Bus Specification



**MotionNode Bus** is a wearable network of 3-DOF inertial measurement units (IMU) for use in motion capture applications. Our MotionNode Bus system is compact, easy to use, and yields accurate orientation tracking results.

## Key Features

- Standalone operation of multiple **MotionNode** sensor modules
- Supports from one to twenty inertial measurement units
- Wi-Fi connectivity
- Wearable, portable, ambulatory system
- Small size, minimizes interference with natural motion
- Runs from battery power
- Stream real-time data over wireless connection
- Record data to internal flash memory
- Includes software to configure the sensors, preview inertial data, record motion data, and export captured data
- Supports Windows, Mac, and Linux operating systems



## Technical

<b>Size</b>	<b>Sensor</b>	35 x 35 x 15 mm 51 mm with flanges
	<b>Controller</b>	80 x 40 x 20 mm 96 mm with flanges
	<b>Battery</b>	93 x 46 x 25 mm
<b>Weight</b>	<b>Sensor</b>	10 grams
	<b>Controller</b>	80 grams
	<b>Battery</b>	135 grams
<b>Wireless</b>	<b>Protocol</b>	802.11g
	<b>Range</b>	95 m outdoors 32 m indoors
<b>Operating temperature</b>		0 to 50 °Celsius
<b>Sampling rate</b>		100 Hz
<b>Flash memory</b>		4 GB
<b>Battery</b>	<b>Capacity</b>	6400 mAh at 5 V
	<b>Charge time</b>	4 hours
<b>Battery life</b>	<b>5 sensors</b>	7 hours
	<b>10 sensors</b>	5.5 hours
	<b>15 sensors</b>	4.75 hours
<b>Cable length</b>		1 meter between sensor modules

## Sensor Network

One controller module and up to twenty sensor modules comprise a MotionNode Bus. The bus controller hosts a wired network of MotionNode Miniature Inertial Measurement Units. The controller collects data from all connected sensors and publishes it in real-time.

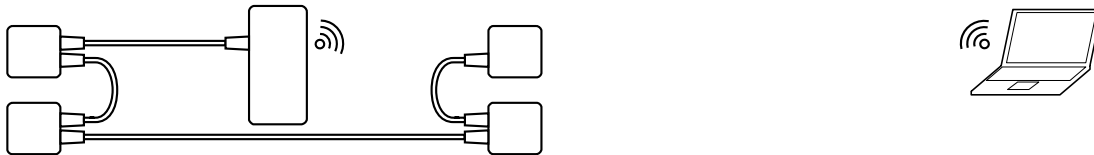
Each MotionNode module in the network uses nine high quality sensors to compute an accurate and stable orientation. One accelerometer, one gyroscope, and one magnetometer contribute real-time data for each of the three axes.

	Accelerometer	Gyroscope	Magnetometer
<b>Measures</b>	linear acceleration	angular velocity	magnetic field strength
<b>Range/Sensitivity</b>	$\pm 2g$ or $\pm 6g$	$\pm 2000^\circ/\text{second}$	$\pm 100 \mu T$ (microtesla)
<b>Resolution</b>	$190 \mu g \pm 5\%$ (at $2g$ range)	$0.07^\circ/\text{second}$	$0.1 \mu T$
<b>Noise density</b>	$50 \mu g/\sqrt{Hz}$ (at $2g$ range)	$0.1^\circ/\text{second}$	$0.4 \mu T$

The bus is configurable to support from one to twenty sensors. The sensors are chained together with locking connectors. Each chain begins at the controller. The controller supports from one to four chains of sensors for convenient wiring.

## Wireless

MotionNode Bus supports Wi-Fi connectivity. The bus supports ad-hoc mode for a direct computer to computer connection. The bus is also configurable to automatically join a preferred wireless access point or router.



## Software Features

MotionNode Bus includes software for your computer. The software provides a simple interface to:

- Configure your sensors
- 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, C3D, BVH, and CSV
- Manage the system through your web browser
- Automate tasks with the scripting interface
- Analyze output data in Matlab, LabVIEW, and Excel
- Access real-time and recorded data from your custom application

## System Requirements

MotionNode Bus requires a computer with a wireless connection.

- Windows 8, 7, Vista, XP, Mac OS 10.6+, Linux
- Wi-Fi (802.11g)
- Web browser
- CD-ROM drive
- Internet connection recommended for setup