








SPATIAL

MEMS GNSS/INS

Spatial is a ruggedised miniature GPS aided inertial navigation system and AHRS that provides accurate position, velocity, acceleration and orientation under the most demanding conditions.

It combines temperature calibrated accelerometers, gyroscopes, magnetometers and a pressure sensor with an advanced GNSS receiver. These are coupled in a sophisticated fusion algorithm to deliver accurate and reliable navigation and orientation.

PERFORMANCE

-  0.1° Roll and Pitch
-  0.2° Heading (GNSS)
-  20 mm RTK Positioning
-  3°/hr MEMS Gyroscope
-  1000 Hz Update Rate

KEY FEATURES

- Multi-Constellation RTK
- Hot Start Time : 500 ms
- Low Weight : 37 grams
- Small Size : 30 x 30 x 24 mm
- Low Power : 0.5 W

APPLICATIONS



AIR

- UAV Navigation
- Georeferencing
- Stabilisation & Pointing



LAND

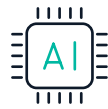
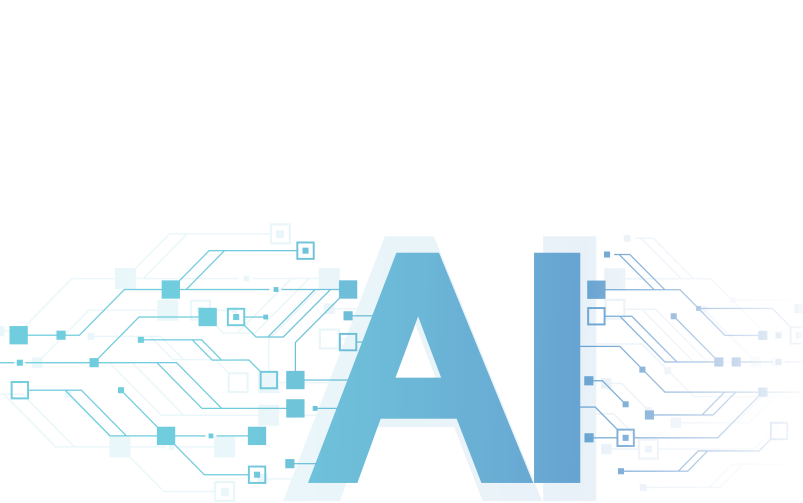
- Ground Vehicle Navigation
- Georeferencing
- Robotics Control



SEA

- AUV Navigation
- ROV Navigation
- Hydrography

FEATURES



AI NAVIGATION ALGORITHM

Spatial features Advanced Navigation's revolutionary AI neural network sensor fusion algorithm.

This provides accuracy of up to 10 times that of a traditional kalman filter.

It was designed for control applications and has a high level of health monitoring and instability prevention to ensure stable and reliable data.



HIGH PERFORMANCE MEMS

Spatial contains high performance MEMS sensors that are put through Advanced Navigation's intensive 8 hour temperature calibration process.

This provides the highest accuracy possible from this sensor class and outputs consistent accuracy over the full temperature range from -40°C to 85°C .



RELIABILITY

Spatial has been designed from the ground up for mission critical control applications where reliability is very important.

It is built on top of a safety oriented real time operating system and all software is designed and tested to safety standards with fault tolerance in mind.

The hardware is designed and manufactured to mil standards.



MULTI CONSTELLATION RTK GNSS

Spatial's GNSS receiver supports GPS, GLONASS and BeiDou.

The extra constellations provides higher availability of GNSS reception and better performance in difficult environments such as urban canyons.

It supports RTK for real time 2 cm position accuracy as well as PPK for post processed 1 cm position accuracy.



HIGH SAMPLING RATE

Spatial's internal filter runs at 1000 Hz and data can also be output at this rate over high speed RS232.

This allows for control of dynamically unstable platforms.

Spatial is also highly tolerant of dynamic movement and vibration with advanced filters designed for these applications.



SPECIFICATIONS

NAVIGATION

Horizontal Position Accuracy	2.0 m
Vertical Position Accuracy	3.0 m
Horizontal Position Accuracy (with RTK)	0.02 m
Vertical Position Accuracy (with RTK)	0.03 m
Horizontal Position Accuracy (Kinematic post processing)	0.01 m
Vertical Position Accuracy (Kinematic post processing)	0.02 m
Velocity Accuracy	0.05 m/s
Roll & Pitch Accuracy	0.1 °
Heading Accuracy (Dynamic with GNSS)	0.2 °
Heading Accuracy (Magnetic Only)	0.8 °
Roll & Pitch Accuracy (Kinematic post processing)	0.04 °
Heading Accuracy (Kinematic post processing)	0.08 °
Heave Accuracy (whichever is greater)	5 % or 0.05 m
Orientation Range	Unlimited
Hot Start Time	500 ms
Internal Filter Rate	1000 Hz
Output Data Rate	Up to 1000 Hz
Latency	0.4 ms

HARDWARE

Operating Voltage	5 to 36 V
Input Protection	± 60 V
Power Consumption (typical)	0.5 W
Hot Start Battery Capacity	> 48 hrs
Hot Start Battery Charge Time	30 mins
Hot Start Battery Endurance	> 10 years
Operating Temperature	-40 °C to 85 °C
Environmental Protection	IP67 MIL-STD-810G
MTBF	310,000 hrs
Shock Limit	2000 g
Dimensions (excluding tabs)	30 x 30 x 24 mm
Dimensions (including tabs)	30 x 40.6 x 24mm
Weight	37 grams

SENSORS

SENSOR	ACCELEROMETERS	GYROSCOPES	MAGNETOMETERS
Range (dynamic)	± 2 g ± 4 g ± 16 g	± 250 °/s ± 500 °/s ± 2000 °/s	± 2 G ± 4 G ± 8 G
Bias Instability	20 ug	3 °/hr	-
Initial Bias	< 5 mg	< 0.2°/s	-
Initial Scaling Error	< 0.06 %	< 0.04 %	< 0.07 %
Scale Factor Stability	< 0.06 %	< 0.05 %	< 0.09 %
Non-linearity	< 0.05 %	< 0.05 %	< 0.08 %
Cross-axis Alignment Error	< 0.05 °	< 0.05 °	< 0.05 °
Noise Density	100 ug/√Hz	0.004 °/s/√Hz	210 uG/√Hz
Bandwidth	400 Hz	400 Hz	110 Hz

GNSS

Model	u-blox M8P
Supported Navigation Systems	GPS L1 GLONASS L1 GALILEO E1 BeiDou L1
Update Rate	10 Hz
Cold Start Sensitivity	-148 dBm
Tracking Sensitivity	-160 dBm
Hot Start First Fix	1 s
Cold Start First Fix	26 s
Horizontal Position Accuracy	2.5 m
Horizontal Position Accuracy (with L1 RTK)	0.02 m
Velocity Accuracy	0.05 m/s
Timing Accuracy	30 ns
Acceleration Limit	4 g

COMMUNICATION

Interface	RS232
Speed	4800 to 2M baud
Protocol	AN Packet Protocol or NMEA
Peripheral Interface	2x GPIO and 2x Auxiliary RS232
GPIO Level	5 V or RS232
GPIO Functions	1PPS Odometer Stationary Pitot Tube NMEA input / output Novatel GNSS input Trimble GNSS input Packet Trigger Input Event Input



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