MEMS-IMU Operation Modes

Leveling Calculation vs GNSS/INS/VS

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Leveling Calculation vs GNSS/INS/VS

Leveling Calculation

【Description】

■IMU calculates attitude (roll & pitch) and heading (yaw) from 3-axis of angular rate and acceleration. The feature of leveling mode is stable output of attitude angle (roll & pitch) for long hours.

■The heading (yaw) angle is calculated by an integral of Z-axis of angular rate. It may gradually be drifted over time. It is recommended to perform offset cancel regularly to suppress heading (yaw) angle drift.

■The leveling mode is performed on condition that the device is not moving. If the device is affected by acceleration or centrifugal force, the attitude angle may be deteriorated. This deterioration is suppressed by a compensation of GNSS and vehicle speed.

GNSS/INS/VS

【Description】

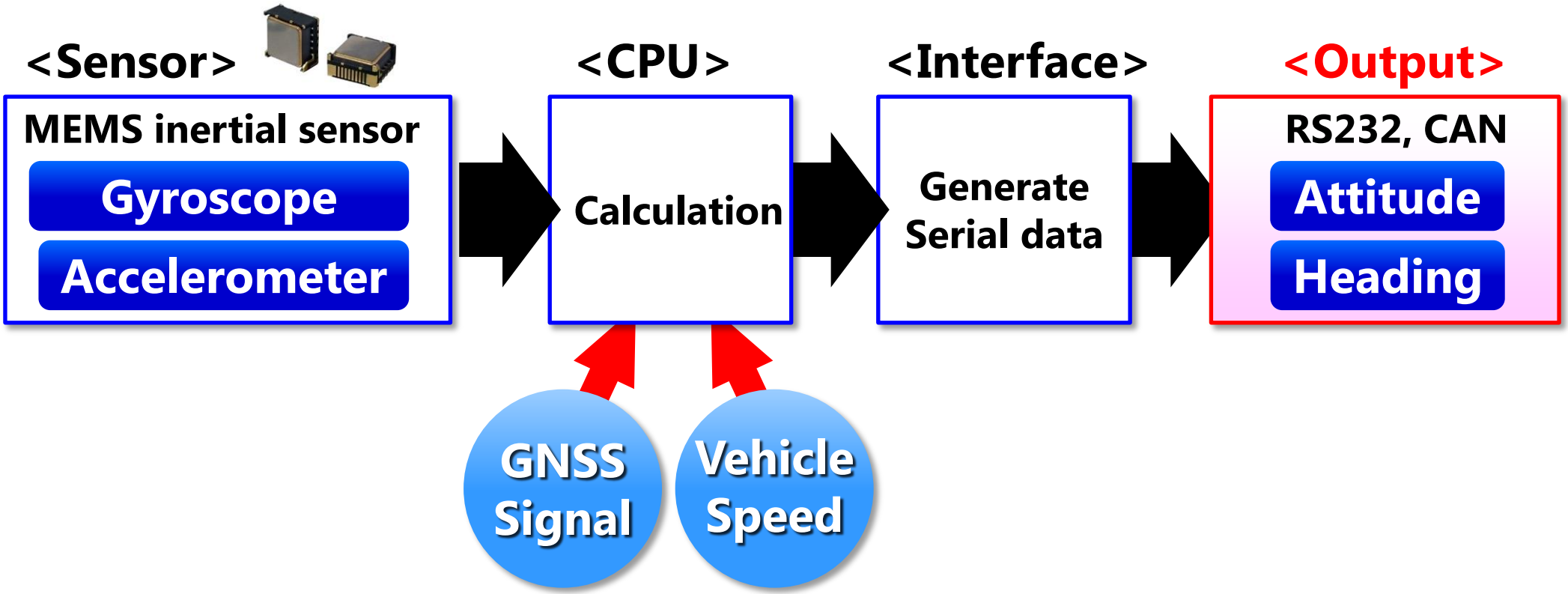
■The calculation is performed by a combination of gyroscopes and accelerometers (INS data), external GNSS data and vehicle speed.

■The error of gyroscopes and accelerometers are estimated by a difference of INS data and GNSS/VS output. In this mode, the dynamic accuracy of attitude angle is improved. It is also possible to output the position data even in GNSS-denied environment.

■The connection of GNSS to IMU is needed to operate this mode. If GNSS is not connected to IMU for a certain period of time, this mode may not be performed well. It is also recommended that vehicle speed be entered into IMU from external devices. The dynamic accuracy is more improved.

Leveling Mode

Overview, Configuration



* The feature of Leveling mode is stable output of attitude angle (roll & pitch) by a combination of accelerometers and gyroscopes.

* If the device is affected by acceleration or centrifugal force for long hours, the errors of attitude angle may be increased. However, it can be suppressed by a compensation of GNSS and vehicle speed.

GNSS/INS/VS Mode

Overview, Configuration

<Sensor>

MEMS inertial sensor

- Gyroscope
- Accelerometer

<CPU>

Calculation

<Interface>

Generate Serial data

<Output>

RS232, CAN

- Speed
- Position
- Attitude

<Kalman Filter>

- Estimated errors gyroscopes accelerometers
- Estimation (position, speed, attitude, heading)

Heading

- Position
- Speed

- GNSS Signal
- Vehicle Speed

* GNSS/INS/VS is performed by combining gyroscopes and accelerometers (INS data), external GNSS data and vehicle speed. Kalman filter estimates the errors of INS data.

* The dynamic accuracy of attitude angle is more improved. It is also possible to output the position data even in GNSS-denied environment.

Please contact to us for more details!