Sensors

12-Axis Xtrinsic Sensor Platform for Windows® 8

Features and Benefits

- MCU + sensor breadth for a fully integrated hardware solution

- 12-axis solution helps customers differentiate

- Sensor fusion is essential to the Windows 8 system solution

- Ease of integration for streamlined development

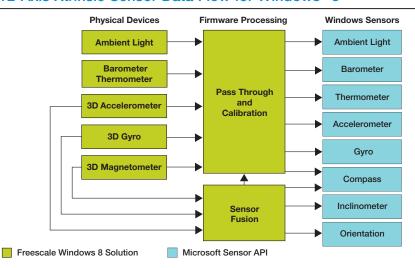- Low power is conducive for portable devices

Overview

Targeted for use in tablets, slates, laptops and other mobile devices, Microsoft's Windows 8 operating system expands capabilities for running smartphone and tablet applications with the computing power of a personal computer. Freescale received Windows 8 certification for its innovative 12-axis Xtrinsic sensor platform that extends the Microsoft Windows 8 mandate for sensor fusion.

Our complete hardware and software solution fuses the Xtrinsic MMA8451Q 3-axis accelerometer, Xtrinsic FXMS3110CDR1 3-axis magnetometer and Xtrinsic FXAS21002 gyroscope data using a Freescale ColdFire+ MCU for high quality output. The additional integration of the MCF51JU128VHS ColdFire+ MCU acts as a sensor hub and couples with Freescale sensor fusion software to efficiently combine, configure and process the sensor data to the requirements of the Windows 8 operating system. Built with an acute focus on standby power consumption, overall power consumption and cost effectiveness, the platform communicates with the host PC via USB using standard HID drivers.

The Xtrinsic MPL3115A2 precision altimeter, pressure and temperature sensor and an analog ambient light sensor account for the remaining axes in the Freescale Windows 8 12-axis Xtrinsic sensor platform. The platform leverages the strengths of the individual sensors to synthesize data such as motion, location and ambient light into an integrated whole, resulting in more accurate, reliable and sensitive device performance. The platform offloads and performs sensor fusion tasks normally performed by the host processor, allowing for more customizable, power-efficient solutions.

12-Axis Xtrinsic Sensor Data Flow for Windows® 8

Physical Devices	Firmware Processing	Windows Sensors
Ambient Light		Ambient Light
Barometer Thermometer	Pass Through and Calibration	Barometer
3D Accelerometer		Thermometer
3D Gyro		Accelerometer
3D Magnetometer		Gyro
	Sensor Fusion	Compass
		Inclinometer
		Orientation

Freescale Windows 8 Solution   Microsoft Sensor API

12-Axis Xtrinsic Sensor Platform Block Diagram for Windows® 8

Board Overview

The Freescale 12-axis Xtrinsic sensor platform board contains sensors, dedicated MCU and software to perform sensor fusion for Windows 8 tablets, slates, laptops and other mobile devices. The board includes the following components:
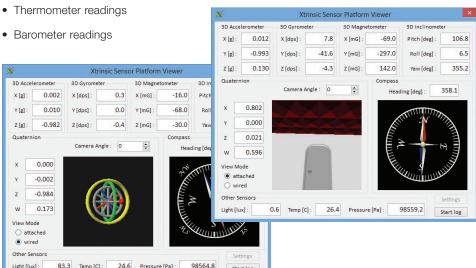
- ColdFire MCF51JU128 MCU
- MMA8451Q 3-axis accelerometer at 7-bit I²C address 0x1C
- FXMS3110CDR1 3-axis magnetometer at 7-bit I²C address 0x0F
- FXAS21002 3-axis gyroscope with 7-bit I²C address 0x20
- MPL3115A2 pressure sensor/altimeter at 7-bit I²C address 0x60
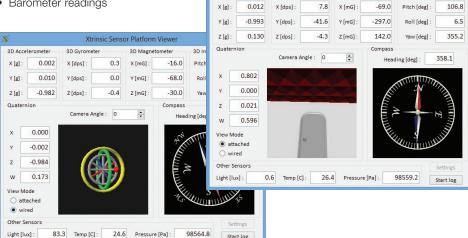- BH1620FVC Rohm Semiconductor ambient light sensor (feeds ADC input on the JU128)

Windows 8 Sensor Test Tool

Freescale has developed a simple demo program that shows the operation of the sensor platform on a Windows 8 PC. The program displays:

- Corrected accelerometer readings
- Corrected gyro readings
- Corrected magnetometer readings
- Euler angles in roll, pitch and yaw format
- Orientation in quaternion format
- Compass heading and graphical display
- Ambient light readings
- Thermometer readings
- Barometer readings

The program has two display modes. Wired mode works when the sensor platform is connected via cable to the stationary PC. In this mode, the red button on the top of the gyroscope points in the direction of the top of the screen (+Y axis).

The second mode is used when the sensor platform has been integrated directly into a Windows 8 tablet. In this case, the gyroscope is replaced by the image of a room. When the tablet is vertical looking north you will see the door. The compass direction will also change to show north.

For more information, visit freescale.com/Windows8