

Nine-Axis Sensor Fusion Using the Direction Cosine Matrix Algorithm on the MSP430F5xx Family

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ABSTRACT

This application report explains the implementation of an Attitude and Heading Reference System (AHRS), using the ultra-low-power MSP430F5xx microcontroller, a magnetometer, a gyroscope, and an accelerometer at all three axes. The combination of the sensors is key to the accuracy of the algorithm. Therefore, the sensors' output must be calibrated before being input to the Direction Cosine Matrix (DCM) algorithm. The algorithm is applied to the calibrated sensor readings to calculate the Euler angles describing the orientation of a body, consisting of the yaw, roll, and pitch angles.

Project collateral and source code discussed in this application report can be downloaded from the following URL: <http://www.ti.com/MS430AHRS>.

This application report uses the MPLAB® IDE MicroC™ Windows Developer Kit from Microchip (<http://www.microchip.com/dk>).

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